NIAGARA MOHAWK POWER CORPORATION
301 PLAIN FIELD ROAD
SM-3
SYRACUSE, NY 13212

TECHNICAL REPORT TR-6801-2

REVISION 1

MARK I TORUS SHELL AND VENT SYSTEM THICKNESS REQUIREMENTS
NINE MILE POINT UNIT 1 NUCLEAR STATION

JANUARY 29, 1988

TELEDYNE ENGINEERING SERVICES

130 SECOND AVENUE
WALTHAM, MASSACHUSETTS 02254
617-890-3350

LIST OF REVISIONS

Revision 1 — Revise cover and report to Revision 1.

Revise Figures 9, 10, 14, 15, 16 and 17 to add clarity.

Add Figure 18 vent sphere thicknesses.

Revise text to simplify figure use.

Add page D-3, Rev. 1, VADR.

Add Appendix E.

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1.0 INTRODUCTION

Teledyne Engineering Services (TES) has been requested by Niagara Mohawk Power Corporation (NMPC) (Reference 1) to review the Mark I Torus Containment Program analysis of the torus and vent system to determine the shell thickness requirements for these vessel components.

The torus shell analysis of record will be reviewed herein using available information to:

1. Map the profile of the required minimum shell thickness for the symmetric torus bays.

2. Determine the permissible local reduction in shell thickness at midbay bottom dead center, the location of least margin, for a range of postulated indications.

3. Review the Nine Mile Point Nuclear Station Certified Material Test Reports (Reference 2) for the torus shell plate material to determine if an additional margin exists when compared to the appropriate design stress intensity values from the Code.

In addition, TES will review the existing vent system analysis to:

1. Determine the corrosion allowance used for the analysis, if any.

2. Review all critical vent system shell locations calculating the minimum required shell thickness based on the present Mark I event loading combinations.

3. Identify and report on analysis conservatisms which might significantly decrease the required minimum wall thickness with additional refinement, if any.

2.0 TORUS SHELL ANALYSIS

TES had previously determined that the Mark I Program analysis of record for the torus shell took advantage of the full as-built vessel thickness (Reference 3). In reviewing the documentation, it was determined that both the full thickness and the refinement by GE to the drywell vent system pressurization transient were required to comply with the Code (Reference 4) requirements for the torus shell stress at the midbay (free-shell) locations for the specified event combinations (Reference 5). These event combinations include both the original design loads and Mark I Program loads per the structural acceptance criteria (Reference 6).

It should be noted that along with the use of the full torus shell thickness in the analysis of record its availability had been appropriately verified by NMPC using ultrasonic thickness measurements (Reference 7).

During the review of this documentation TES determined that the torus shell analysis conservatisms had been previously considered and eliminated as a practical consideration for demonstrating compliance with the Code requirements during the original evaluation. Some of the important refinements which eliminated the analysis conservatism and reduced the number of modifications at the Nine Mile Point include:

- Use of a Y-quencher in place of the standard T-quencher for mitigation of SRV loading.

- Use of in-situ SRV testing to reduce the conservatism in the GE load definition.

- TES in-house development of the torus shell stress postprocessing program DISTRESS to handle the many computer analyses for the various loading conditions, to combine all data on a component stress level, and to produce final results for the 27 Mark I event combinations.

- Redefinition of the condensation oscillation loading function in the time domain to account for load phasing.

- Development of an improved methodology to enforce compatibility between the torus shell and the attached piping systems.

Therefore, it is our opinion that additional refinement of the Mark I torus shell analysis would not be practical to increase the margin on torus shell thickness.

2.1 Minimum Torus Shell Thickness Requirements

TES has reviewed the torus shell analysis package (Reference 8) and associated computer output from our one-fortieth Stardyne (Reference 9) finite-element computer model (Figures 1 and 2) to obtain event combination stress output at specific locations from our DISTRESS torus shell stress postprocessor (Reference 10). Because of the large volume of data available for postprocessing during the Mark I Program, only those elements at critical locations as determined by preliminary scoping analyses had been postprocessed during the final analysis phase. These elements, which are located at midbay (free-shell) and adjacent to the ring girder (local shell), are shaded in Figures 3 and 4. It is our opinion that this information is adequate to determine the minimum thickness requirements since the major loads (i.e., pressure, DBA condensation oscillation, poolswell) are relatively constant along the longitudinal axis of the torus bay.

The minimum thickness requirements at the midbay (free-shell) location of the torus shell are governed by the primary membrane stress (P_M) obtained from the one-fortieth Stardyne model considering the various Mark I event combinations. For the torus shell adjacent to the ring girder (local shell), a gross structural discontinuity, the minimum thickness requirements are governed by the primary local stress (P_L). The primary local stress region extends for a distance of a 8.6325 inches or one-square-root-of-mean-radius-times-thickness ($1.0\sqrt{Rt}$) from the intersection of the ring girder longitudinally along the torus bay (Figure 5).

Code compliance for primary membrane and primary local stress intensity shall be determined based on comparison of the actual event stress intensity (i.e., from the finite-element analysis of the torus shell) to the Code allowable stress which is a function of the event service limit as defined by the structural acceptance criteria (Reference 5).

Stress Intensity	Service Limit Allowable A or B	Service Limit Allowable C
P_M	S_{MC}	Larger of 1.2 S_{MC} or 1.0 S_Y
P_L	1.5 S_{MC}	Larger of 1.8 S_{MC} or 1.5 S_Y

The Mark I program event combinations to be reviewed are those which were previously found to control the torus shell stress analysis as bounding cases (Reference 11). They are event combinations 2, 3, 14, 15, 18, 19, 20, 21 and 25 (Figure 6). However, some of these event combinations can be eliminated from further consideration without increasing the conservatism as follows:

- Event combinations 2 and 3 are bounded by event combinations 14 and 15.

- The difference between event combinations, pairs 14 and 15, 18 and 19, 20 and 21, is OBE versus SSE seismic loading. The SSE load is marginally larger (i.e., much less than 20%) than the OBE load in all cases. For these pairs, the higher event numbers (i.e., the SSE event) are Level C service limit events with a minimum 20% increase in allowable stress. Therefore, the Level B lower event numbers 14, 18, and 20 will control the analyses.

Therefore, the remaining event combinations to be reviewed are 14, 18, 20 and 25.

Calculation of the minimum thickness herein is based on the determination of an equivalent pressure (P_O) which will yield a hoop membrane stress equal to the event combination primary membrane or local stress intensity. Then, solving for the required minimum thickness based on compliance with the Code allowable stress intensity:

$$(P_O)R/t \leq S_{MC} \text{ for } P_M$$

or

$$(P_O)R/t \leq 1.5\ S_{MC} \text{ for } P_L$$

where P_O - equivalent pressure (psi)
R - torus radius (162 inches)
t - required thickness (i.e., ≤ 0.46)

Table 1 provides the minimum thickness requirements as calculated in Appendix A for the two torus shell locations adjacent to the ring girder (local shell region) and at midbay (free-shell region). Figures 7 and 8 represent this data plotted as the permissible corroded thickness on the torus cross sections. As previously suggested, the thickness requirements adjacent to the ring girder extend longitudinally 8.6325 inches along the torus shell. In addition, on the torus shell mitre side of the ring girder, the local region shall extend 8.6325 inches beyond the mitre away from the ring girder (Figure 5). The remainder of the torus shell is governed by the midbay thickness requirements.

2.2 Permissible Local Reduction in Torus Shell Thickness for an Indication

An indication, which may be found upon inspection of the torus shell (Figure 5), may be acceptable if it does not meet the screening criteria of 2.1, Table 1, for required shell thickness (Figures 7 and 8) provided that it meets the local stress criteria of the Code for the particular location of concern.

A generalized compatibility analysis to determine the effect of a cylindrical depression on a uniform stress distribution was performed (Appendix B) for a large circular plate of constant thickness.

Figure 9 for the free shell and Figure 10 for the local shell regions of the torus are based upon this analysis using the necessary Nine Mile Point torus parameters. Therefore, if an indication is found in these regions which does not meet the minimum wall thickness requirements of Table 1 or Figure 7 (the permissible corroded thickness of the local shell region adjacent to the ring girder) or Figure 8 (the permissible corroded thickness of the free-shell region), the following procedure may be performed using the appropriate Figure 9 or Figure 10.

The procedure for use of Figures 9 and 10 for an indication in its final-blended and as-examined state is as follows:

1. Circumscribe the area of the indication and measure the diameter (D).

2. Determine the maximum indication depth (d).

3. Assure that no additional indications are found local to the circumscribed area within 21.5 inches or two-and-one-half-square-roots-of-mean-radius-times-thickness (i.e., $2.5\sqrt{Rt}$).

4. If the criterion of step 3 is violated, repeat the procedure starting with step 1 and include any indications which violate the criterion of step 3 in the circumscribed area.

5. Review Figure 7 or 8 to determine the arc region (S) of the torus shell which contains the circumscribed indications resulting from step 1.

6. If the measured indication depth (d) is less than the permissible corroded thickness from the appropriate Figure 7 or 8, the indication is acceptable and the remaining steps 7 through 9 may be skipped. ⚠1

7. Determine the circumscribed diameter multiplier (F) from the table of Figure 9 or 10 based on the arc region (S) from

step 5. If the circumscribed indications extend into other arc regions, use the largest multiplier (F) in step 7.

8. Determine the equivalent diameter (D') which circumscribes the indications:

$$D' = D \times F$$

9. Using D' and the appropriate Figure 9 or 10 curve, determine the allowable indications depth d' and compare it to the measured depth d.

$$d \leq d'$$

Note that the allowable depth (d') shall be measured based on the uncorroded nominal shell thickness. See Appendix E for sample calculations. ⚠1

2.3 Certified Material Test Report Review for Torus Shell

TES has reviewed the Torus Shell Certified Material Test Reports (A201 Gr B FBX), which are provided for clarity in Appendix C. A statistical analysis was performed using this (large) sample data to determine the .99 confidence interval estimate of the mean yield and ultimate strength of this material.

The Code requires that the minimum yield and minimum ultimate strength of the material be used to determine the allowable stress intensity (S_{MC}) as follows:

S_{MC} at 70°F is the lessor of

$$1.1 \left[\frac{5}{8} S_{Y_{min}}\right] \quad \text{or} \quad 1.1 \left[\frac{1}{4} S_{U_{min}}\right]$$

Therefore, TES has assumed that the minimum yield and ultimate strengths of the material are bounded by using two sample standard deviations from the statistically estimated minimum mean values.

Based on the Appendix C calculations using the above stated criteria, the Code allowable stress intensity would be estimated at:

$$S_{MC} = 17600 \text{ at } 70°F$$

Use of this estimated allowable stress intensity will provide an additional 1100 psi relief as compared to the present Code allowable of 16500 psi which was used during the Mark I analysis for the torus shell material for the full range of anticipated event temperatures from 70 to 350°F. In terms of relief on the shell thickness requirements, the increased allowable will provide just under 1/32 inches or 6% additional margin.

3.0 VENT SYSTEM SHELL STRESS ANALYSIS

TES has reviewed the calculation packages (References 12 through 16) associated with the drywell vent system and has determined that the shell thicknesses used for the vent system components during the Mark I Torus Requalification Program analyses of record were not reduced for corrosion. This philosophy was consistent with the decisions made for the torus shell as described in Section 2.0. The vent system components analyzed for shell stress are the vent pipe, vent header, vent sphere, and downcomers.

The Mark I Torus Program vent system analyses (References 13, 15 and 16) were completed using a combination of hand calculations and two Stardyne (Reference 3) models; a beam model (Figure 11) for general loading (Reference 12); and a detailed finite-element model (Figure 12) for the downcomer/vent header intersection (References 14 and 20). The less detailed beam model analysis was possible in this case for two reasons: first, because GE provided the BWR Owner's Group detailed stress intensification factors for each specific BWR vent pipe/vent header intersection (i.e., the vent sphere, Reference 13), and secondly, because the anticipated stress levels in the vent system based on the initial scoping analyses appeared to be well within Code allowables for all components with the exception of the vent header at the downcomer intersection. The vent header/downcomer intersection eventually required a modification to the downcomer pairs, tie bars, even with the use of significantly more refined analytical techniques.

Generally, as a result of low stress levels and in accordance with our five BWR clients' wishes, the final vent system analyses were completed using conservative bounding techniques to reduce costs and to provide timely results. Loads in most cases were combined absolutely for the two event combinations analyzed. These two event combinations (Reference 13), a poolswell event (event combination 19) and a vent system chugging event (event combination 21), were determined to conservatively bound the remaining twenty-five combinations listed in the structural acceptance criteria (Reference 5). The resultant stress intensities were also conservatively calculated without regard to location and were compared to Code allowables.

Based on our recent review of this work, it does appear that an additional margin exists for some of the vent system components with regard to minimum shell thickness requirements and the remaining shell thicknesses available for corrosion to be reported on in Sections 3.1 and 3.2. It should be noted that the aforementioned analysis conservatisms could be reduced, through a moderate effort, using less conservative stress analysis techniques and the presently available loads.

3.1 Minimum Vent System Shell Thickness Requirements

TES has reviewed the vent system analysis packages (References 13 and 14) to determine the minimum shell thickness requirements for each of the major components: the vent pipe, vent sphere, vent header and downcomers. The calculation of the minimum thickness requirements herein (A.2) is based on the methodology presented in Section 2.1 for the torus shell.

As described in Section 3.0, because of the known available margins, much of the vent system stress analysis was completed in a conservative fashion by hand. In most instances the amount of data presently available without completing a more refined analysis for each of the major components is limited. Therefore, additional conservative assumptions were required to determine the minimum vent system shell thickness requirements and resulting shell thickness remaining for corrosion for the major component locations as provided in Table 2. The vent header thickness requirements are determined for the free shell and the local shell regions adjacent to the mitred joint, the downcomer and vent sphere as defined in Figure 13.

3.2 Permissible Local Reduction in Vent System Thickness for an Indication

An indication which may be found upon inspection of the vent system components - the vent pipe, vent sphere, vent header, and downcomers - may be acceptable if it does not meet the screening criteria of 3.1, Table 2, provided that it meets the local stress criteria of the Code for the particular location of concern.

The generalized compatibility analysis of Appendix B, as described in Section 2.2, was used to perform these analyses as provided in B.2 and Figures 13 through 17 herein.

The procedure for the use of Figures 14 through 17 for an indication in its final-blended and as-examined state is as follows:

1. Circumscribe the area of the indication and measure the diameter (D).

2. Determine the maximum indication depth (d).

3. Assure that no additional indications are found local to the circumscribed area within two-and-one-half-square-roots-of-mean-radius-times-thickness (i.e., $2.5\sqrt{Rt}$) as listed below.

Vent System Component	Thickness in	Radius in	$2.5\sqrt{Rt}$ in
Vent Pipe	.3125	40.94	8.94
Vent Sphere	.3125	66.00	11.35
	.6875		16.84
	.8125		18.31
Vent Header	.3125	29.36	7.57
Downcomer	.25	12.25	4.38

4. If the criterion of step 3 is violated, repeat the procedure starting with step 1 and include any indications which violate the criterion of step 3 in the circumscribed area.

5. If the measured indication depth (d) is less than the permissible corroded thickness (remaining thickness) of Table 2 for the appropriate location, the indication is acceptable and the remaining steps may be skipped.

6. Review Figures 14 through 17 to determine the appropriate curve for the region of the vent system that contains the circumscribed indications.

7. Using D' and the appropriate figure and curve, determine the allowable indications depth d' and compare it to the measured depth d.

$$d \leq d'$$

Note that the allowable depth (d') shall be measured based on the uncorroded nominal shell thickness. See Appendix E for sample calculations. ⚠1

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4.0 REFERENCES

1. NMPC P.O. Number 62144 and Change Order Numbers 1 (11/3/87) and 3 (11/25/87).

2. Nine Mile Point Nuclear Station Certified Mill Reports, Stone and Webster Engineering Corporation, File Number 3-N2-S22.4.

3. TES Technical Report Number TR-6801-1, August 6, 1987, Verification of the Analyzed Corrosion Allowance, Mark I Torus Requalification Program, Nine Mile Point Unit 1.

4. ASME Boiler and Pressure Vessel Code, Section III, Division 1, Subsection NE, Class MC Vessels, 1974 Edition through Summer 1977 Addenda.

5. Mark I Containment Program, Structural Acceptance Criteria, Plant Unique Analysis Application Guide, Document Number NEDO-24583-1, October 1979.

6. Mark I Containment Program Load Definition Report, Document Number NEDO-21888, Rev. 2, November 1981.

7. NMPC Letter F. A. Hawksley to R. M. Pace, "Suppression Chamber Thickness Measurements at Nine Mile Point Unit #1 Nuclear Station", April 26, 1979.

8. TES Analysis Package 5320-20, Nine Mile Point Torus Shell Analysis, September 6, 1984.

9. Stardyne User Information Manual, January 1984.

10. TES Computer Code TG-8, DISTRESS Computer Program Check, October 13, 1982.

11. TES Technical Report TR-5320-1, Mark I Containment Program, Plant Unique Analysis Report of the Torus Suppression Chamber for Nine Mile Point Unit 1.

12. TES Calculation Package 5320-10, Nine Mile Vent System Beam Model Geometry.

13. TES Calculation Package 5320-3, Nine Mile Point Vent System, Vent Pipe/Vent Header Intersection Analysis.

14. TES Calculation Package 5320-2, Nine Mile Point Vent System, Vent Header/Downcomer Intersection Analysis.

15. TES Calculation Package 5320-16, Torus Vent System Acoustic Pressure Loads Evaluation.

16. TES Calculation Package 5320-22, Nine Mile Point Fatigue Analysis Vent System.

17. Applied Business Statistics, Second Edition, Fadil H. Zuwaylif, May 1984.

18. CB&I Contract No. 9-1370, Drawing 316, Rev 3.

19. TES Project Quality Assurance Program, Project 6801, Revision 1, November 20, 1987, Niagara Mohawk Corporation.

20. TES Calculation Package 5320-5, Nine Mile Point, Vent Header/Downcomer Intersection Analysis, Downcomer Chugging and Condensation Loading.

TABLE 1

MINIMUM TORUS SHELL THICKNESS REQUIREMENTS
NINE MILE POINT UNIT 1 NUCLEAR STATION

Element No. (Midbay)	Required Thickness (inches)	Remaining Thickness (inches)
11	.304	.156
13	.362	.098
15	.418	.042
17	.446	.014
19	.447	.013
21	.425	.035
23	.382	.078
25	.320	.140
27	.287	.173
(Ring Girder)		
123	.172	.288
129	.191	.269
135	.168	.292
141	.173	.287
147	.125	.335
153	.139	.321
159	.198	.262

NOTE: Only lower shell elements are listed.

TABLE 2

MINIMUM VENT SYSTEM THICKNESS REQUIREMENTS
NINE MILE POINT UNIT 1 NUCLEAR STATION

Component Location	Shell Thickness (in)	Required Thickness (in)	Remaining Thickness (in)
Vent Pipe	.3125	.201	.1115
Vent Header	.3125	.159	.1535
Downcomer	.250	.222	.028
Vent Pipe at Drywell	.3125	.134	.1785
Vent Header at Mitre Joint	.3125	.203	.1095
Vent Header at Downcomer	.3125	.248	.0645
Downcomer at Mitre Joint	.250	.148	.102
Vent Sphere at t_1	.3125	.290	.0225
Vent Sphere at t_2	.6875	.637	.0505
Vent Sphere at t_3	.8125	.753	.0595

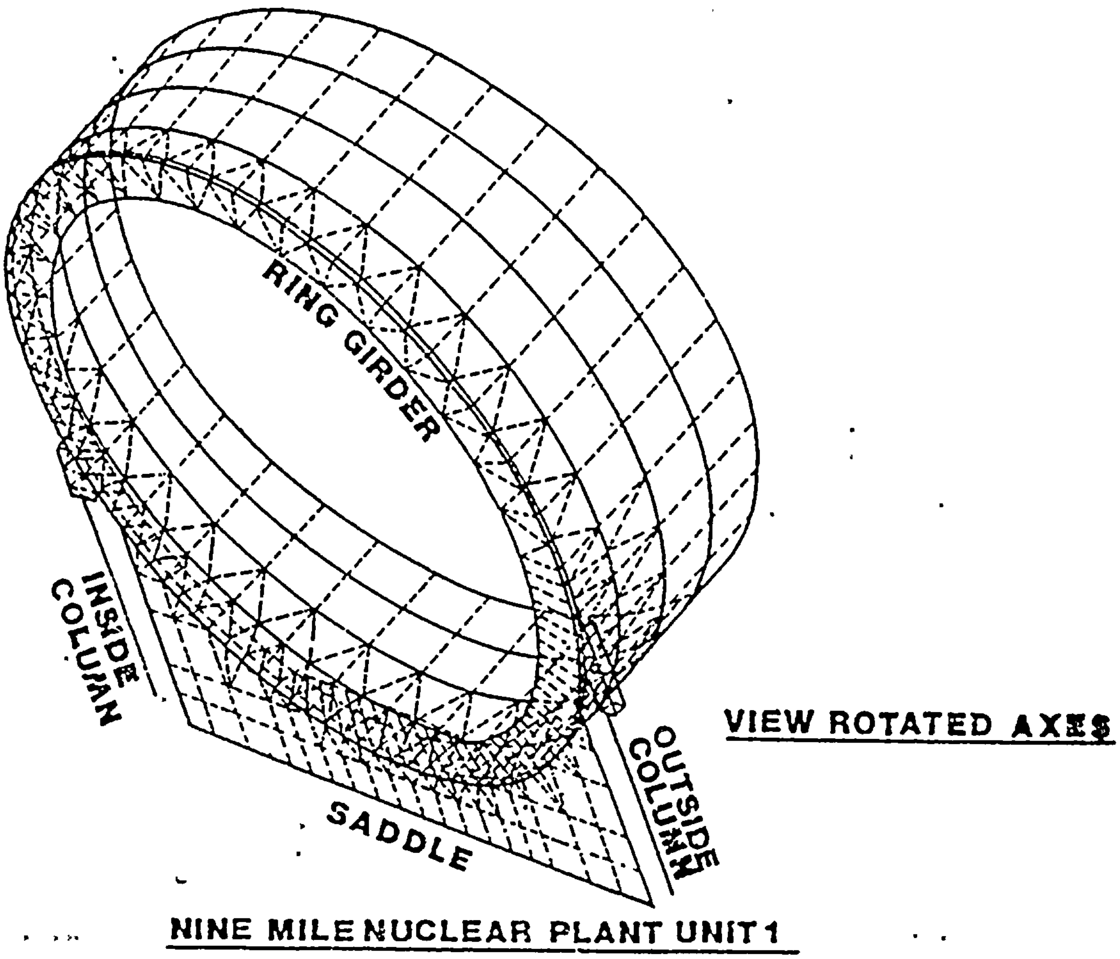


FIGURE 1. STARDYNE ONE-FORTIETH FINITE-ELEMENT COMPUTER MODEL, NINE MILE POINT UNIT 1 NUCLEAR STATION

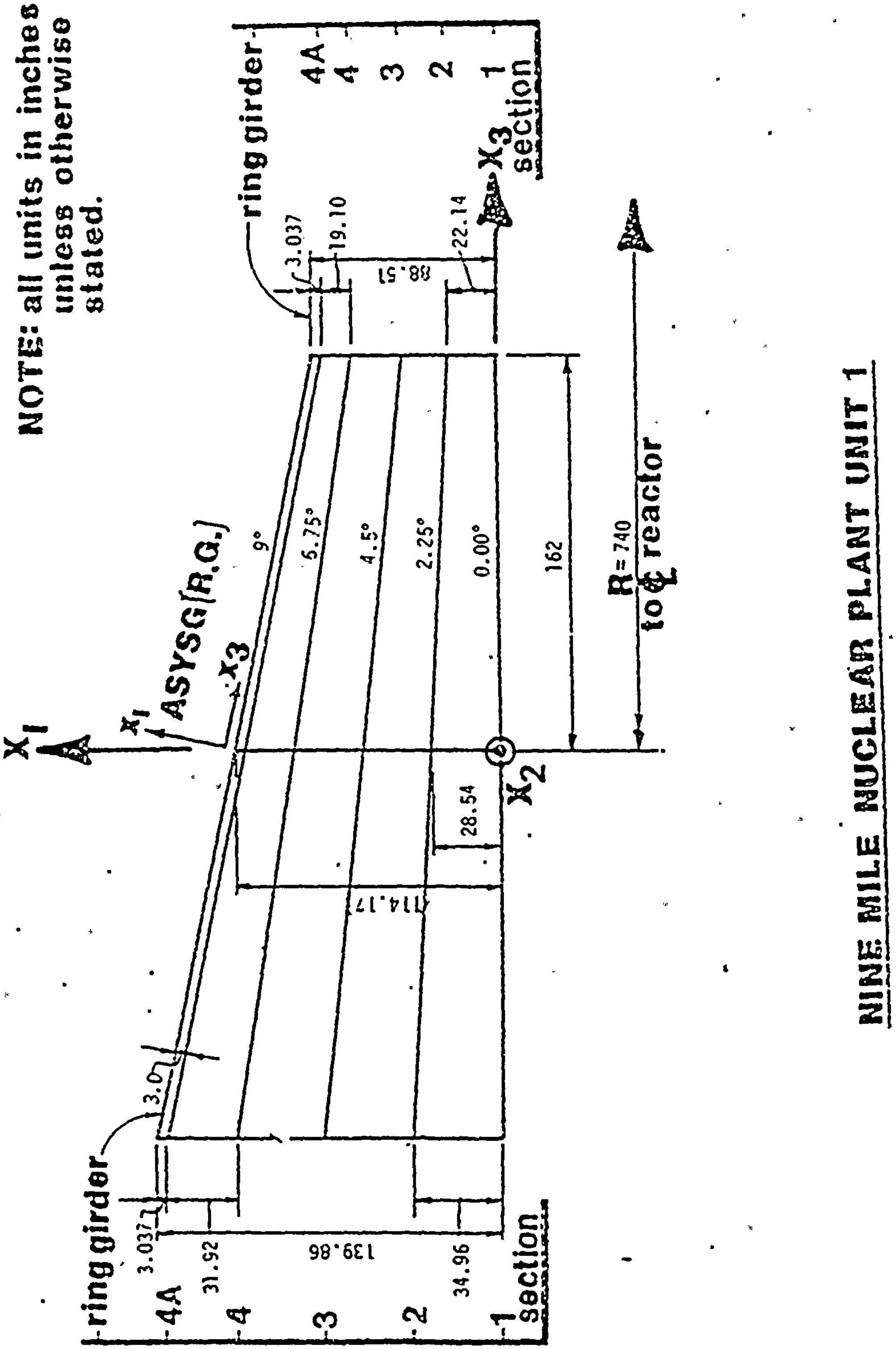
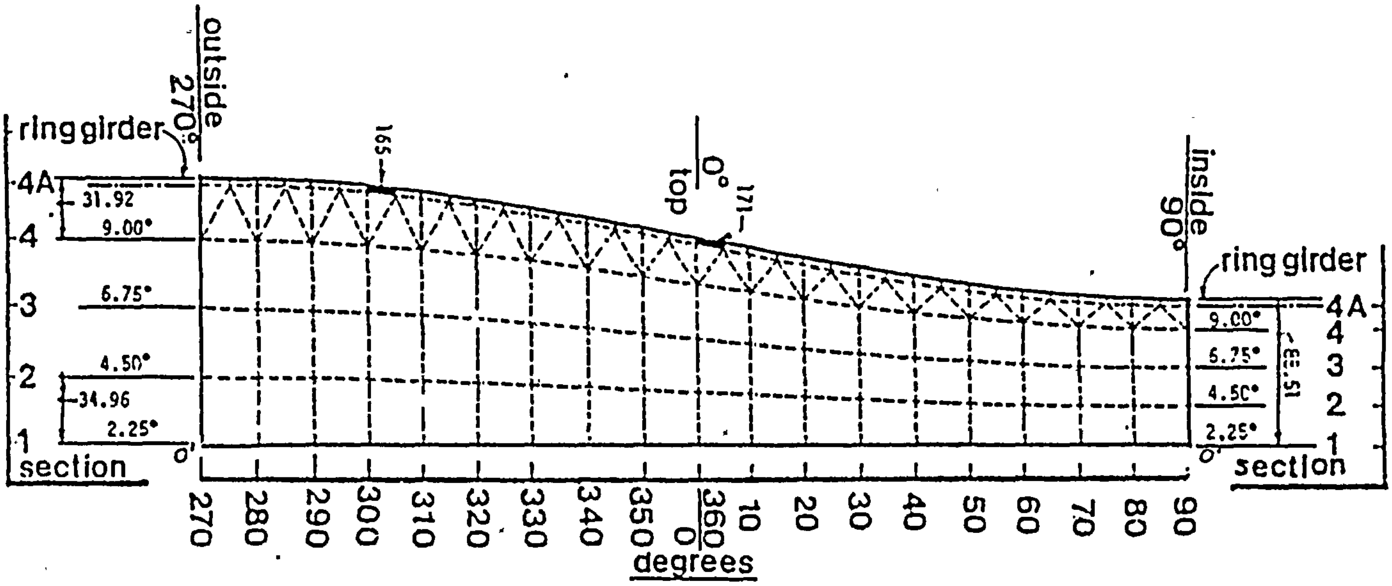


FIGURE 2. STARDYNE ONE FORTIETH COMPUTER MODEL DIMENSIONS, NINE MILE POINT UNIT 1 NUCLEAR STATION

NOTE: all units in inches unless otherwise stated.

TORUS ELEMENTS



NINE MILE POINT NUCLEAR PLANT

FIGURE 3. STARDYNE TORUS MODEL UPPER SHELL SECTION, NINE MILE POINT UNIT 1 NUCLEAR STATION

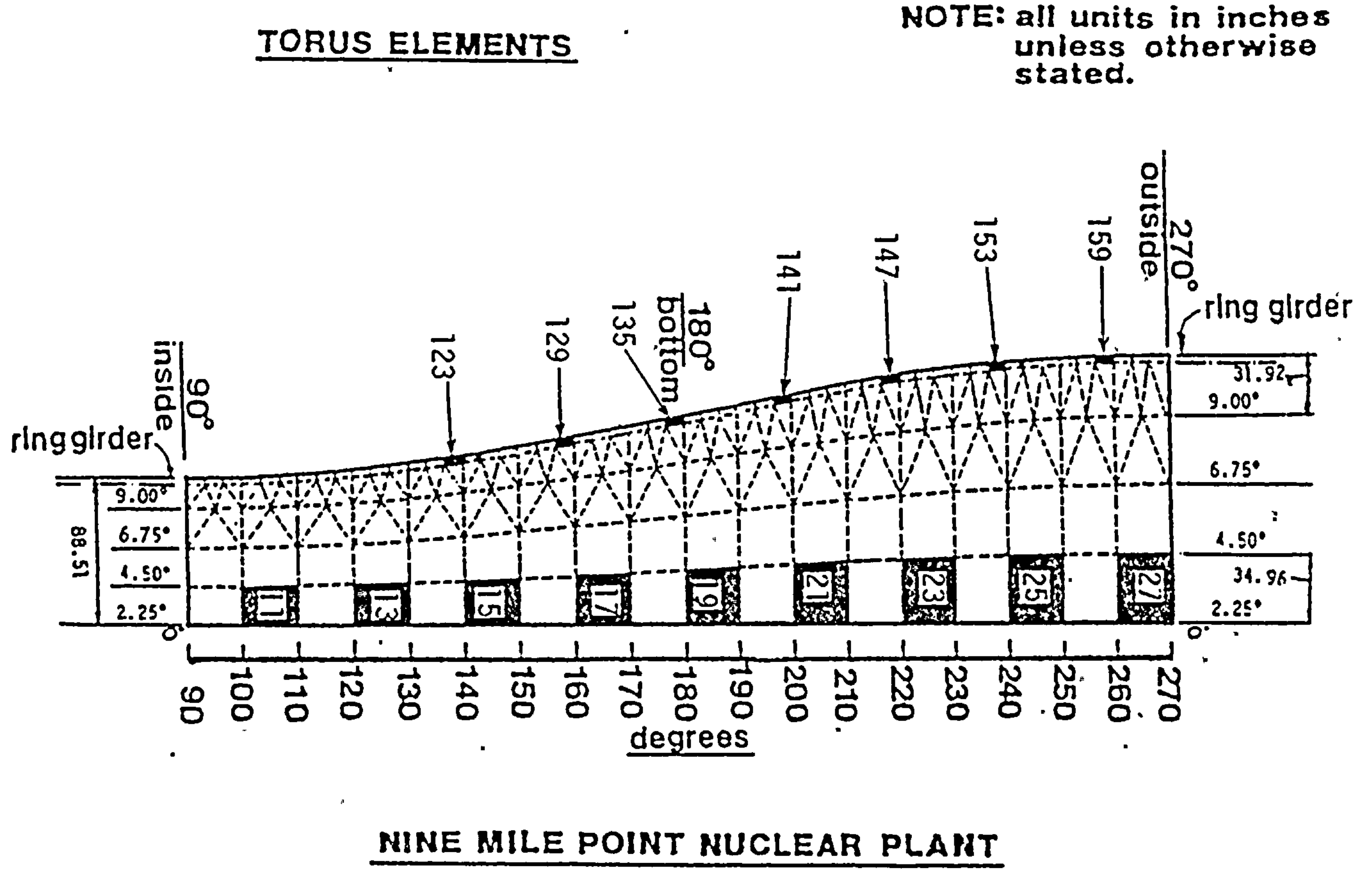


FIGURE 4. STARDYNE TORUS MODEL LOWER SHELL SECTION, NINE MILE POINT UNIT 1 NUCLEAR STATION

LOCAL TORUS SHELL STRESS REGIONS
NINE MILE POINT UNIT 1 NUCLEAR STATION

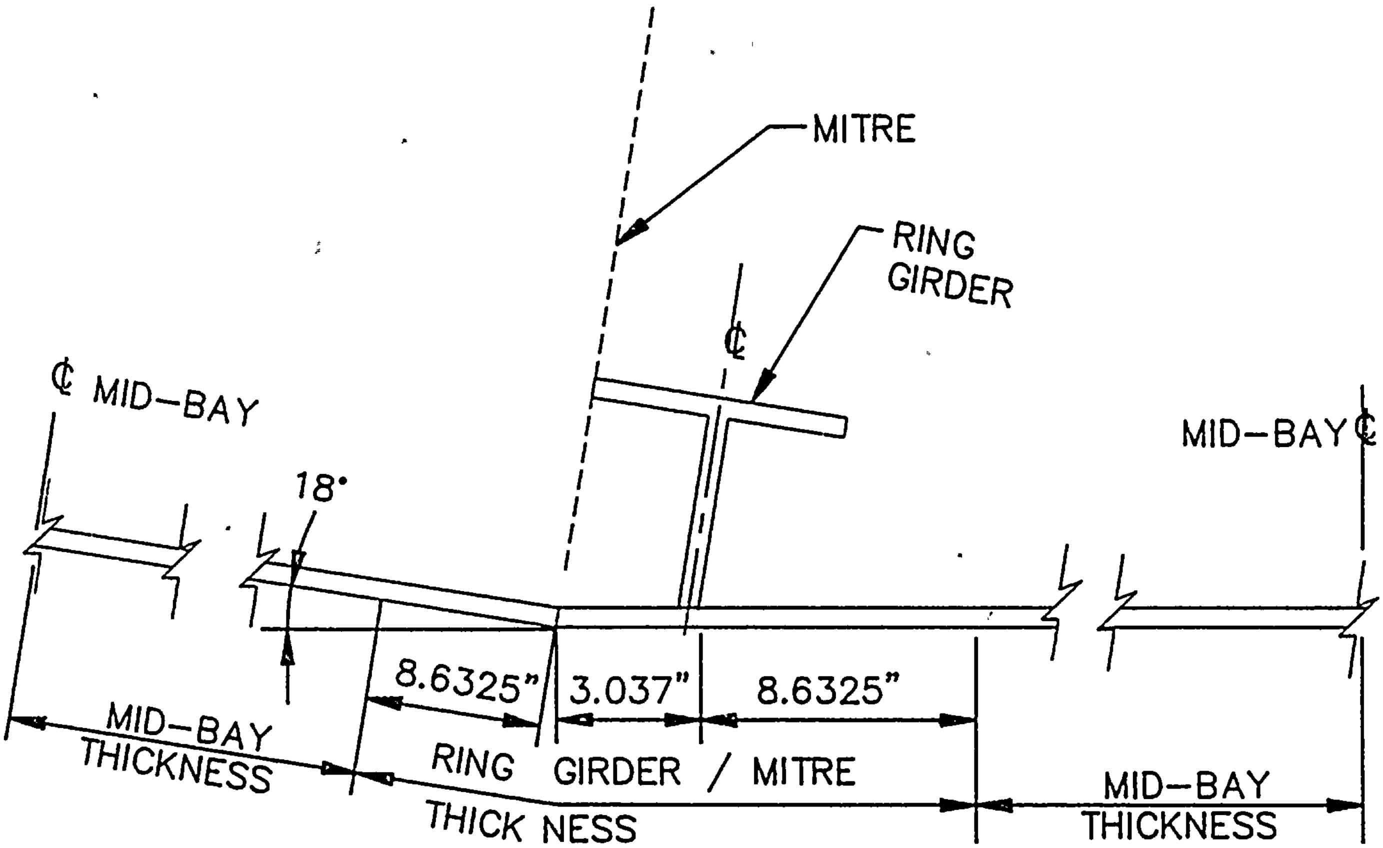


FIGURE 5

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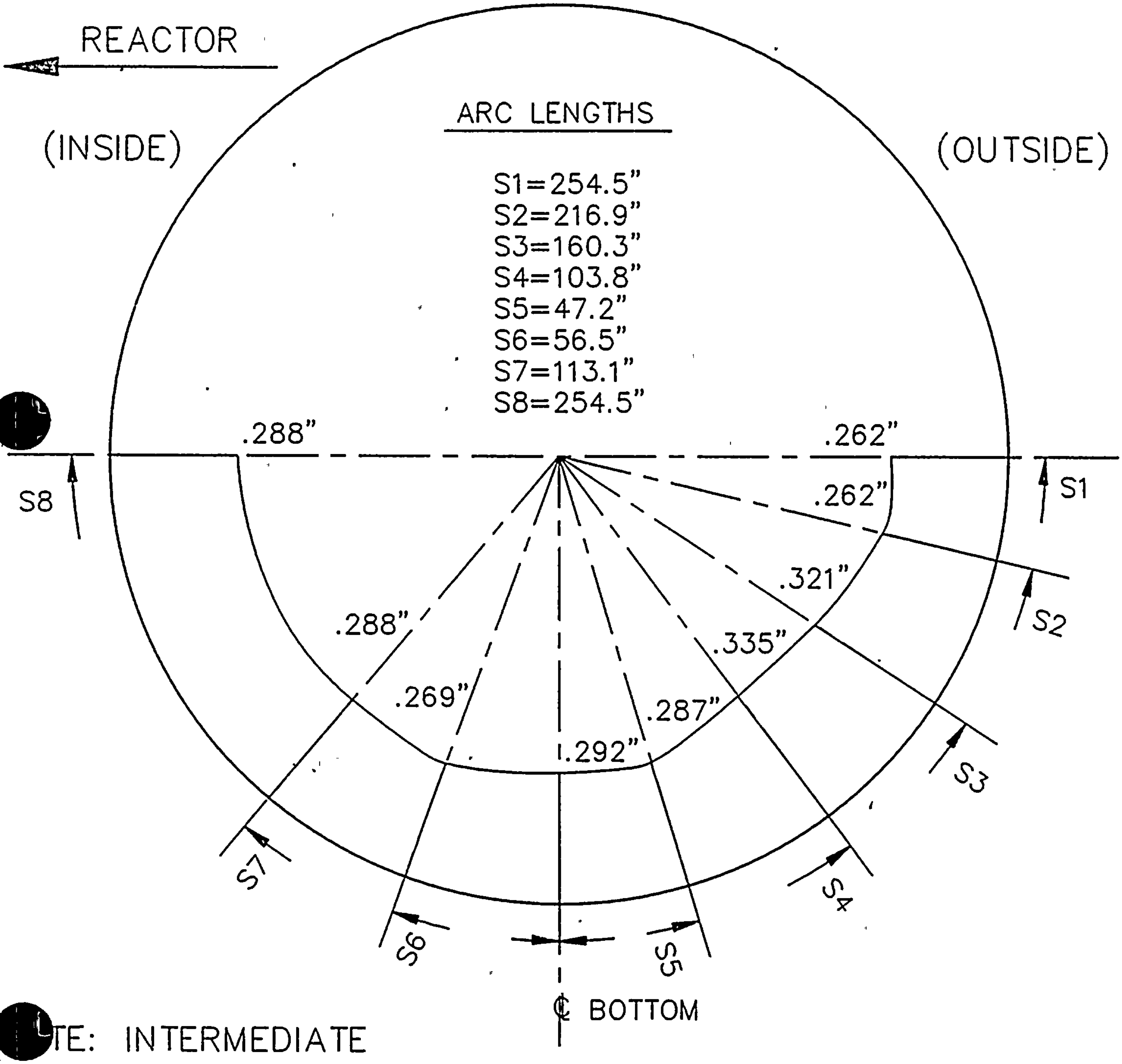
CLASS MC COMPONENTS AND INTERNAL STRUCTURES

EVENT COMBINATIONS		SRV	SRV + EQ		SBA IBA		SBA + EQ IBA + EQ				SBA + SRV IBA + SRV		SBA + SRV + EQ IBA + SRV + EQ				DBA		DBA + EQ				DBA + SRV		DBA + EQ + SRV			
						CO, CH			CO, CH			CO, CH			CO, CH		PS (1)	CO, CH	PS		CO, CH		PS	CO, CH	PS		CO, CH	
TYPE OF EARTHQUAKE			O	S			O	S	O	S			O	S	O	S			O	S	O	S			O	S	O	S
COMBINATION NUMBER		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
LOADS																												
Normal (2)	N	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Earthquake	EQ		X	X			X	X	X	X			X	X	X	X			X	X	X	X			X	X	X	X
SRV Discharge	SRV	X	X	X							X	X	X	X	X	X							X	X	X	X	X	X
LOCA Thermal	T_A				X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
LOCA Reactions	R_A				X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
LOCA Quasi-Static Pressure	P_A				X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
LOCA Pool Swell	P_{PS}																X		X	X			X		X	X		
LOCA Condensation Oscillation	P_{CO}					X			X	X		X			X	X		X			X	X		X			X	X
LOCA Chugging	P_{CH}					X			X	X		X			X	X		X			X	X		X			X	X
STRUCTURAL ELEMENT	ROW																											
External Class MC																												
Torus, External Vent Pipe, Bellows, Drywell (at Vent), Attachment Welds, Torus Supports, Seismic Restraints	1	A	B	C	A	A	B	C	B	C	A	A	B	C	B	C	A (3, 6)	A	B (3, 6)	C	B	C	C	C	C	C	C	C
Internal Vent Pipe																												
General and Attachment Welds	2	A	B	C	A	A	B	C	B	C	A	A	B	C	B	C	A (3, 5)	A	B (3, 5)	C	B	C	C	C	C	C	C	C
At Penetrations (e.g., Header)	3	A	B	C	A	A	B	C	B	C	A	A	B	C	B	C	A (3)	A	B (3)	C	B	C	C	C	C	C	C	C
Vent Header																												
General and Attachment Welds	4	A	B	C	A	A	B	C	B	C	A	A	B	C	B	C	A (3, 5)	A	B (3, 5)	C	B	C	C	C	C	C	C	C
At Penetrations (e.g., Downcomers)	5	A	B	C	A	A (4)	B	C	B (4)	C	A	A (4)	B	C	B (4)	C	A (3, 4,5)	A (4)	B (3, 4,5)	C	B (4)	C	C	C	C	C	C	C
Downcomers																												
General and Attachment Welds	6	A	B	C	A	A	B	C	B	C	A	A	B	C	B	C	A (3, 5)	A	B (3, 5)	C	B	C	C	C	C	C	C	C
Internal Supports	7	A	B	C	A	A	B	C	B	C	A	A	B	C	B	C	A	A	B	C	B	C	C	C	C	C	C	C
Internal Structures																												
General	8	A	B	C	A	A	C	D	C	D	C	C	D	E	D	E	E	E	E	E	E	E	E	E	E	E	E	E
Vent Deflector	9	A	B	C	A	A	C	D	C	D	C	C	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D

FIGURE 6. MARK I STRUCTURAL ACCEPTANCE CRITERIA EVENT COMBINATIONS

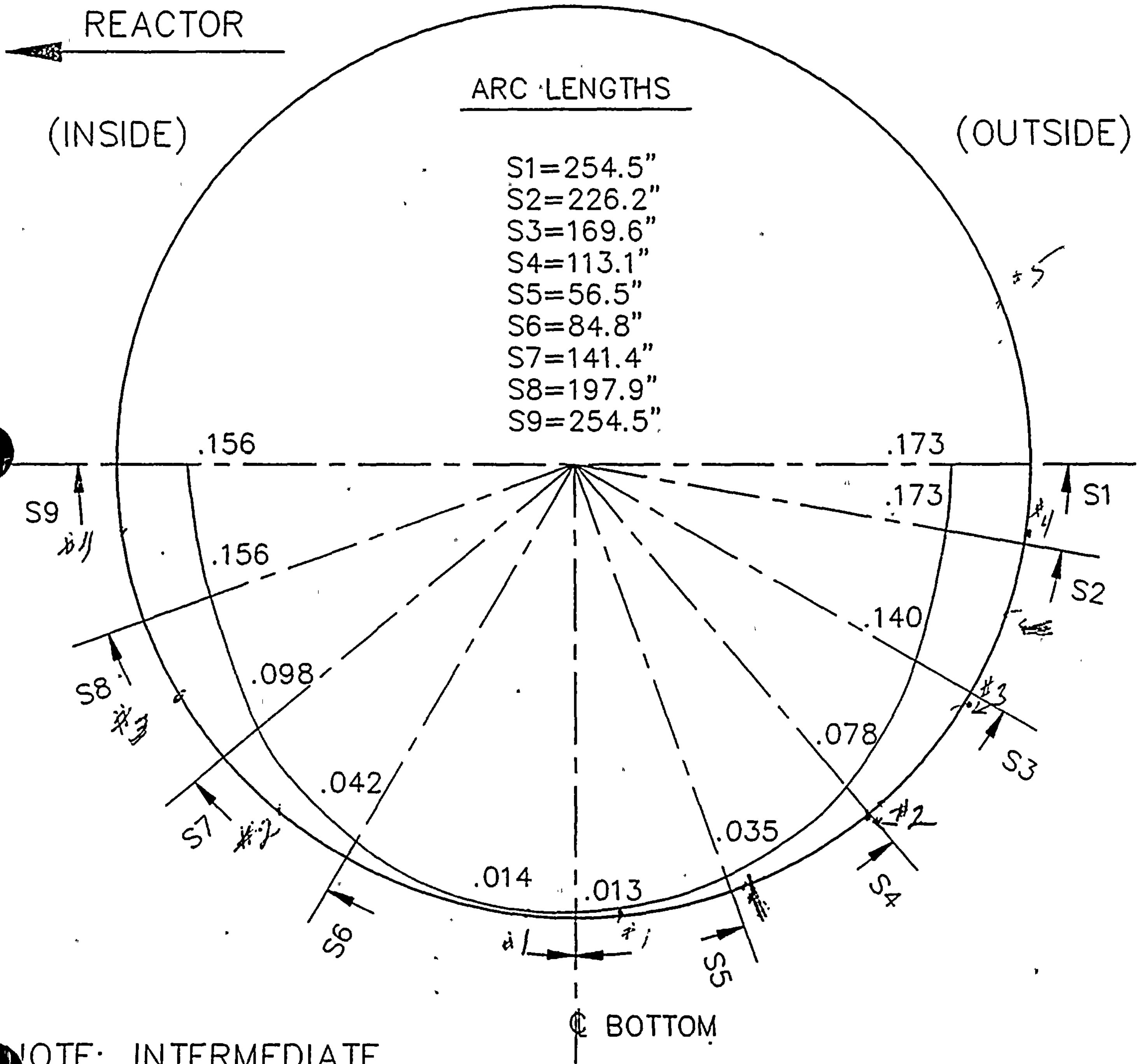
PERMISSIBLE CORRODED THICKNESS FOR THE TORUS CROSS-SECTION ADJACENT TO RING-GIRDER (LOCAL SHELL REGION) NINE MILE POINT UNIT 1 NUCLEAR STATION



NOTE: INTERMEDIATE VALUES MAY BE SCALED

FIGURE 7

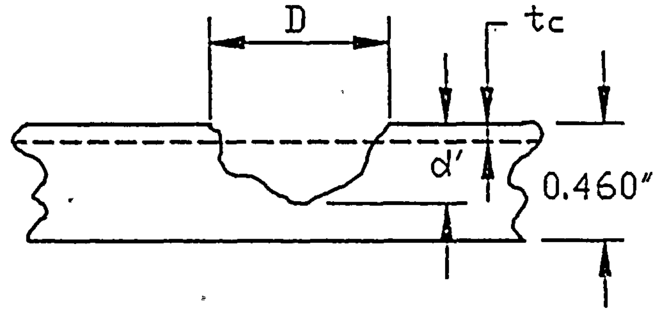
PERMISSIBLE CORRODED THICKNESS FOR THE TORUS CROSS-SECTION AT MID-BAY (FREE SHELL REGION) NINE MILE POINT UNIT 1 NUCLEAR STATION

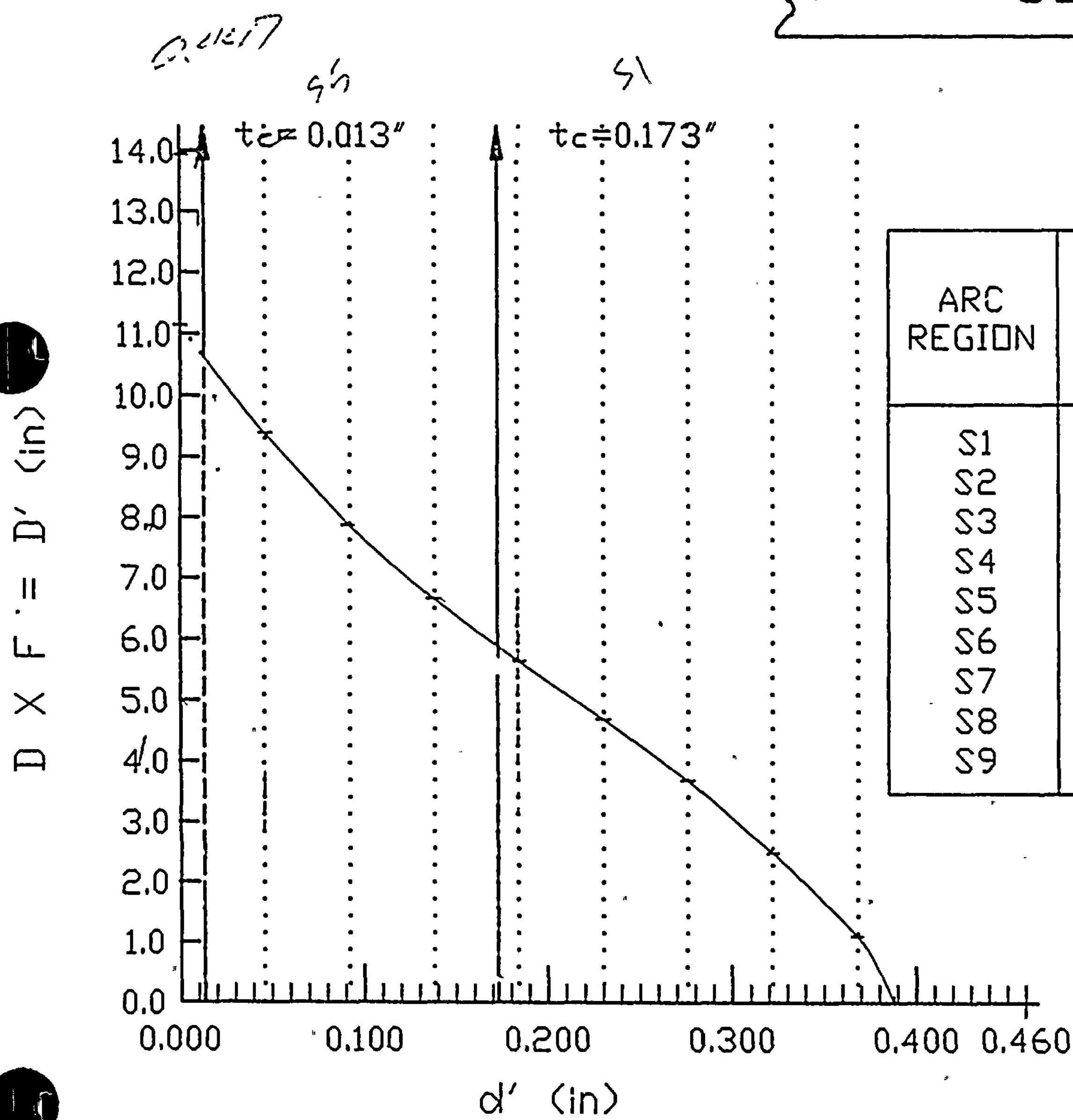


NOTE: INTERMEDIATE VALUES MAY BE SCALED

FIGURE 8

PERMISSIBLE SIZE RANGE FOR INDICATION FREE SHELL REGION OF THE TORUS NINE MILE POINT UNIT 1 NUCLEAR STATION

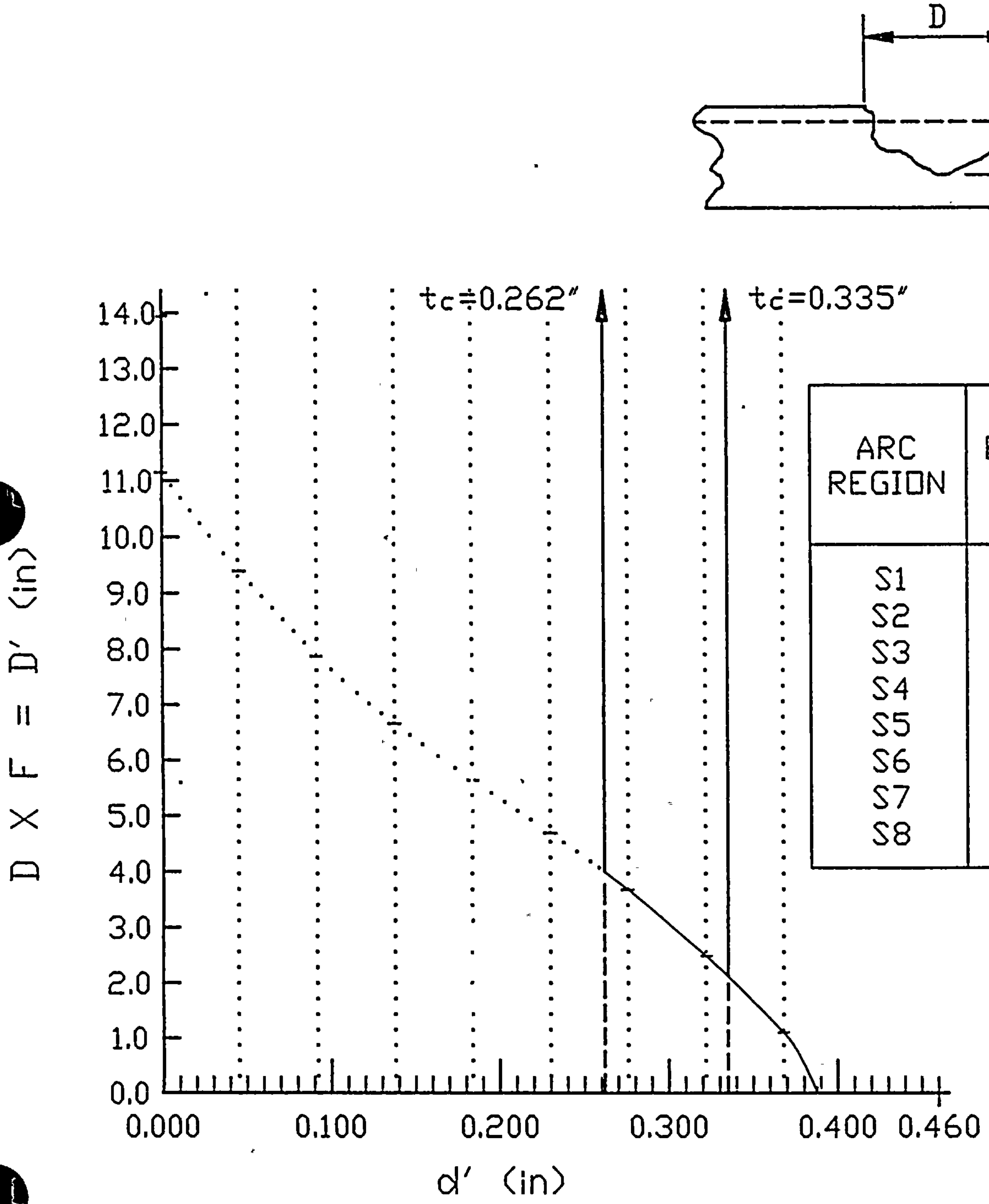




ARC REGION	FACTOR "F"	GEN. CORR. tc
S1	0.800	0.173
S2	0.851	0.140
S3	0.930	0.078
S4	0.974	0.035
S5	1.000	0.013
S6	1.000	0.014
S7	0.965	0.042
S8	0.904	0.098
S9	0.824	0.156

FIGURE 9

PERMISSIBLE SIZE RANGE FOR INDICATION
RING GIRDER REGION OF THE TORUS
NINE MILE POINT UNIT 1 NUCLEAR STATION



ARC REGION	FACTOR "F"	GEN. CORR. tc
S1	1.000	0.262
S2	0.839	0.321
S3	0.796	0.335
S4	0.935	0.287
S5	0.925	0.292
S6	0.925	0.292
S7	0.978	0.269
S8	0.935	0.288

FIGURE 10

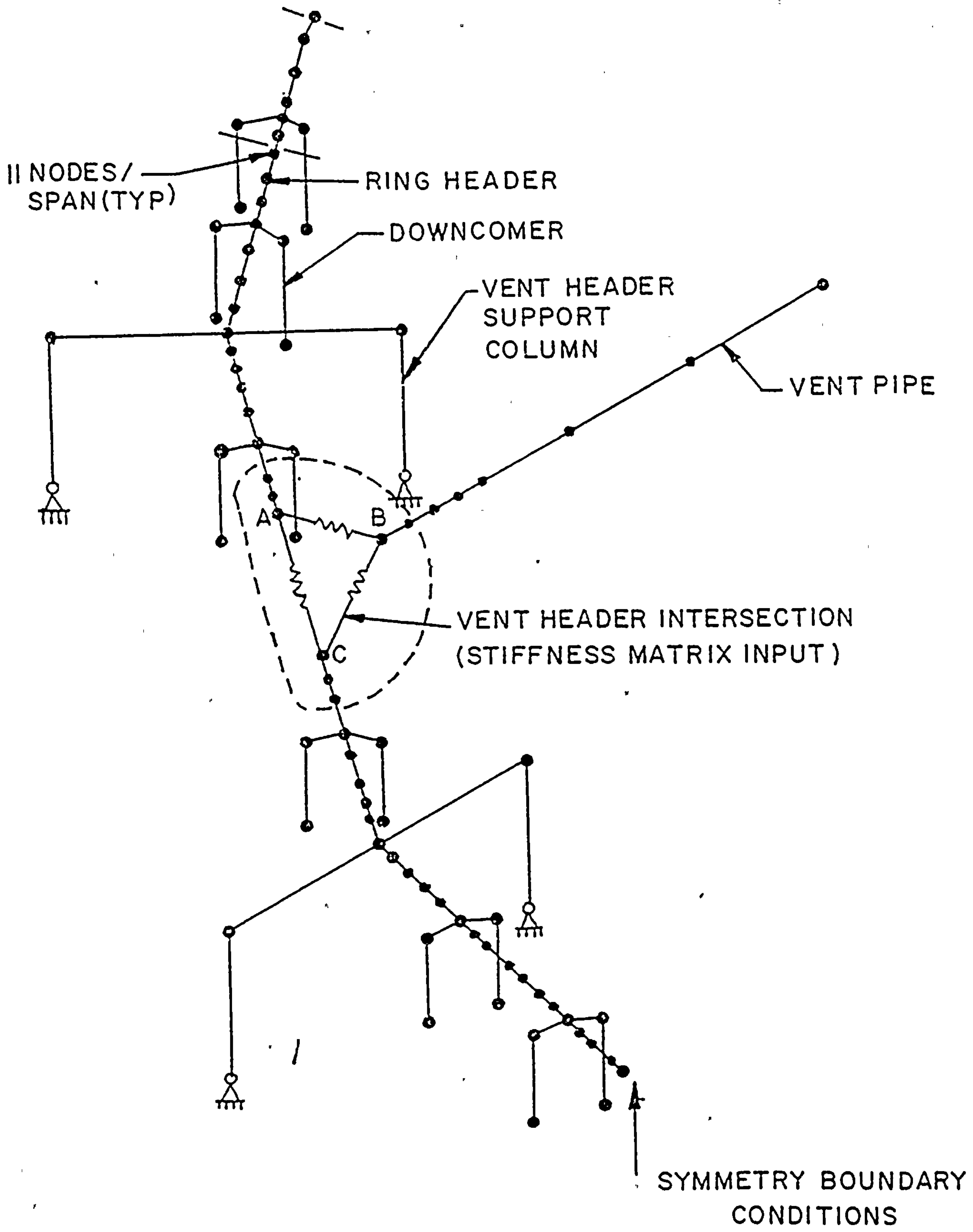


FIGURE 11. VENT SYSTEM BEAM MODEL, NINE MILE POINT UNIT 1 NUCLEAR STATION

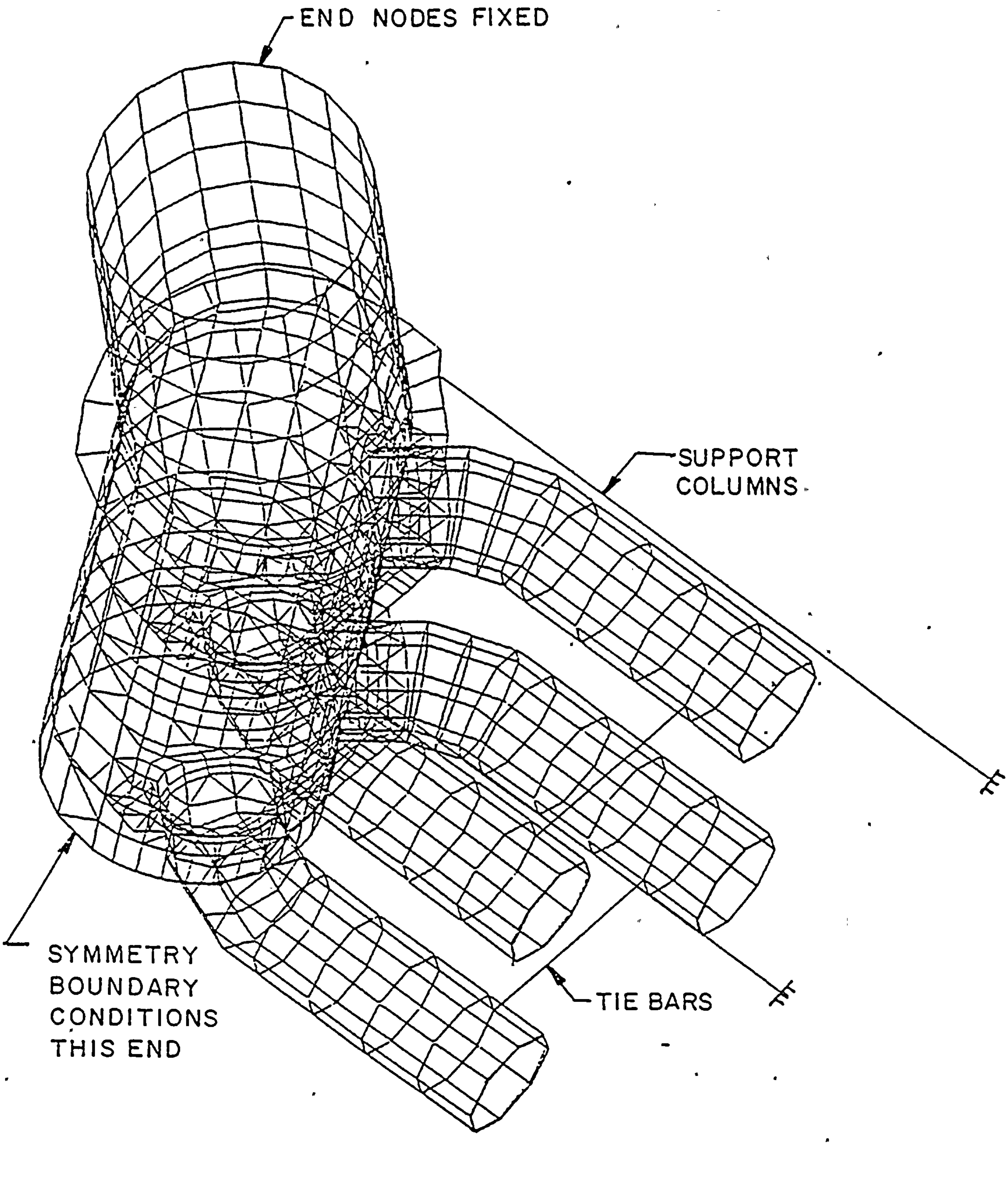
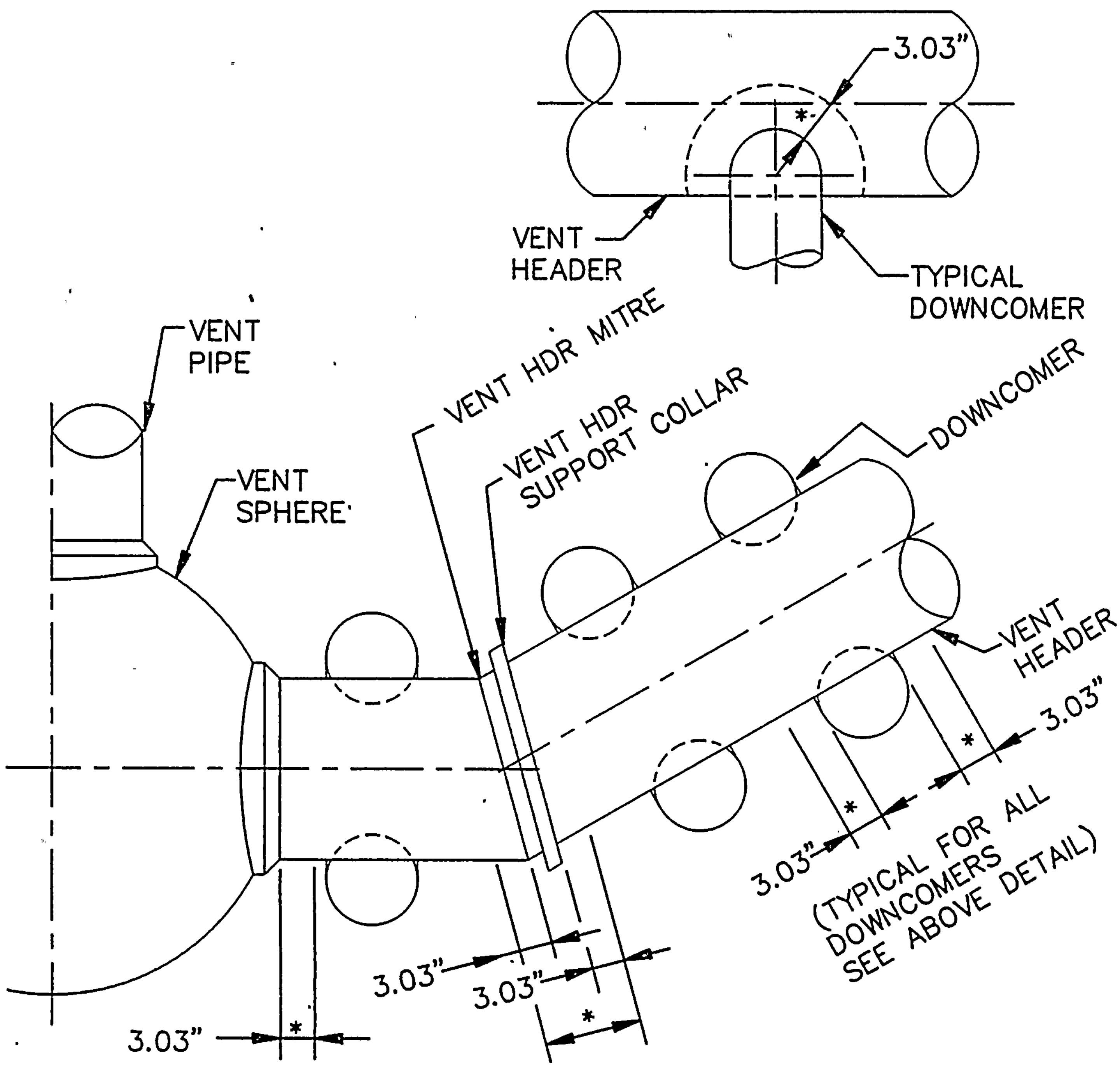


FIGURE 12. VENT HEADER/DOWNCOMER INTERSECTION MODEL, NINE MILE POINT UNIT 1 NUCLEAR STATION

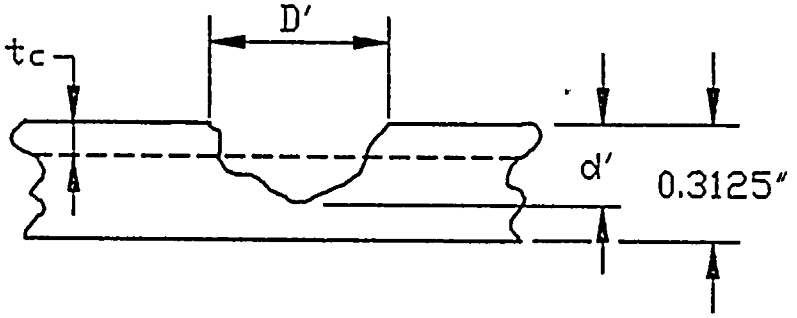
FREE AND LOCAL SHELL REGIONS FOR THE VENT HEADER NINE MILE POINT UNIT 1 NUCLEAR STATION



* LOCAL REGIONS ($1.0\sqrt{RT} = 3.03"$)

FIGURE 13

PERMISSIBLE SIZE RANGE FOR INDICATION
VENT PIPE
NINE MILE POINT UNIT 1 NUCLEAR STATION



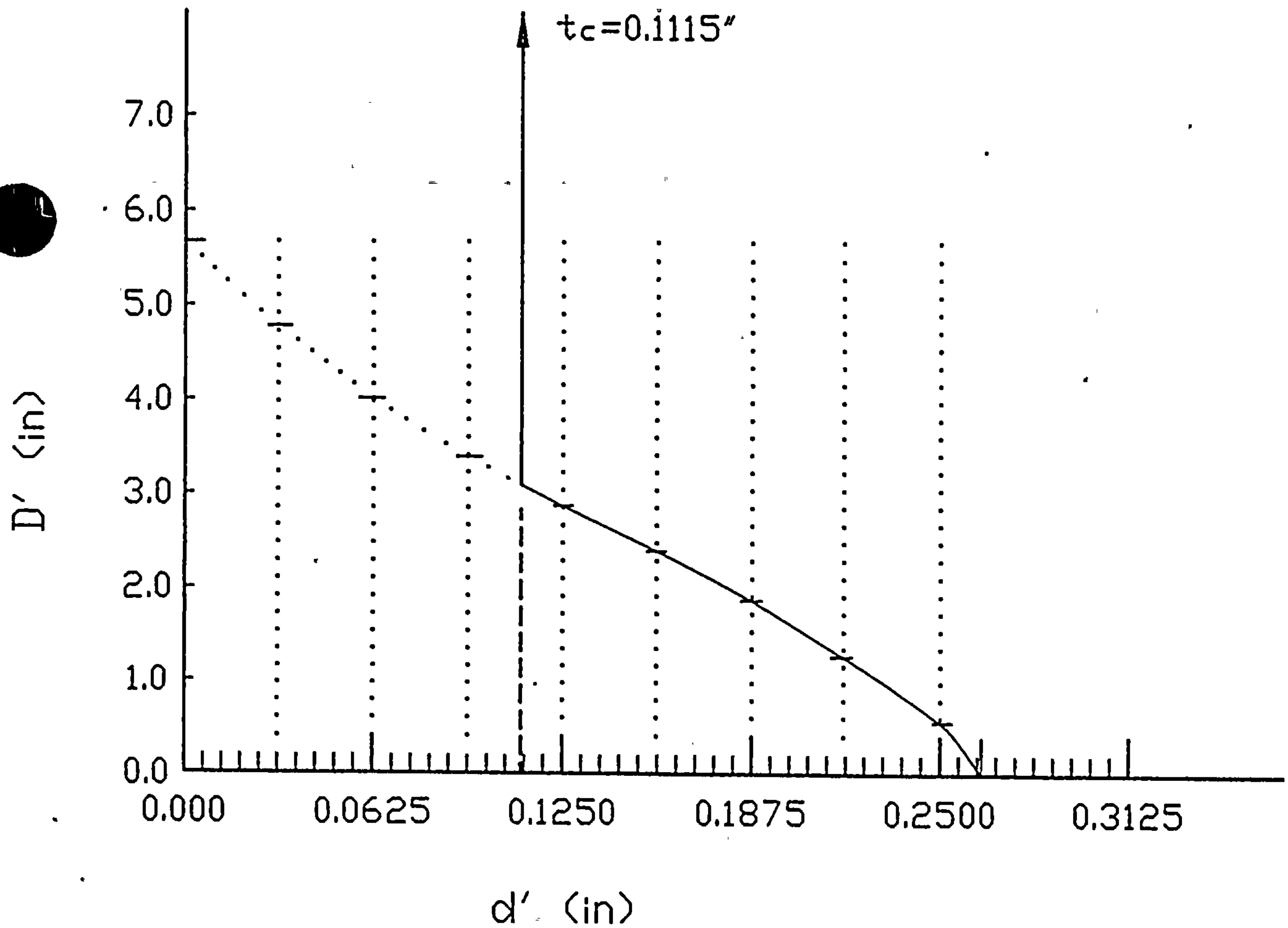
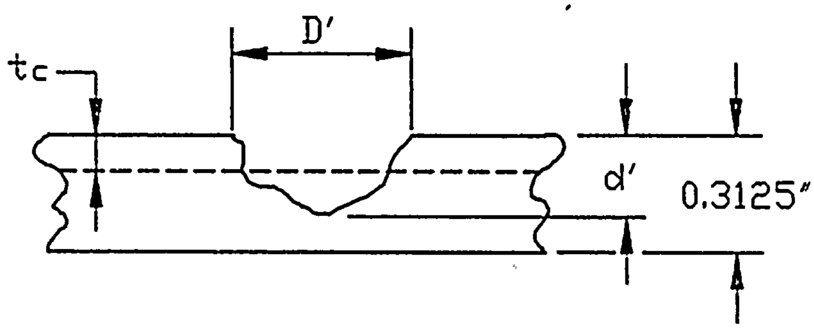


FIGURE 14

PERMISSIBLE SIZE RANGE FOR INDICATION VENT HEADER
NINE MILE POINT UNIT 1 NUCLEAR STATION



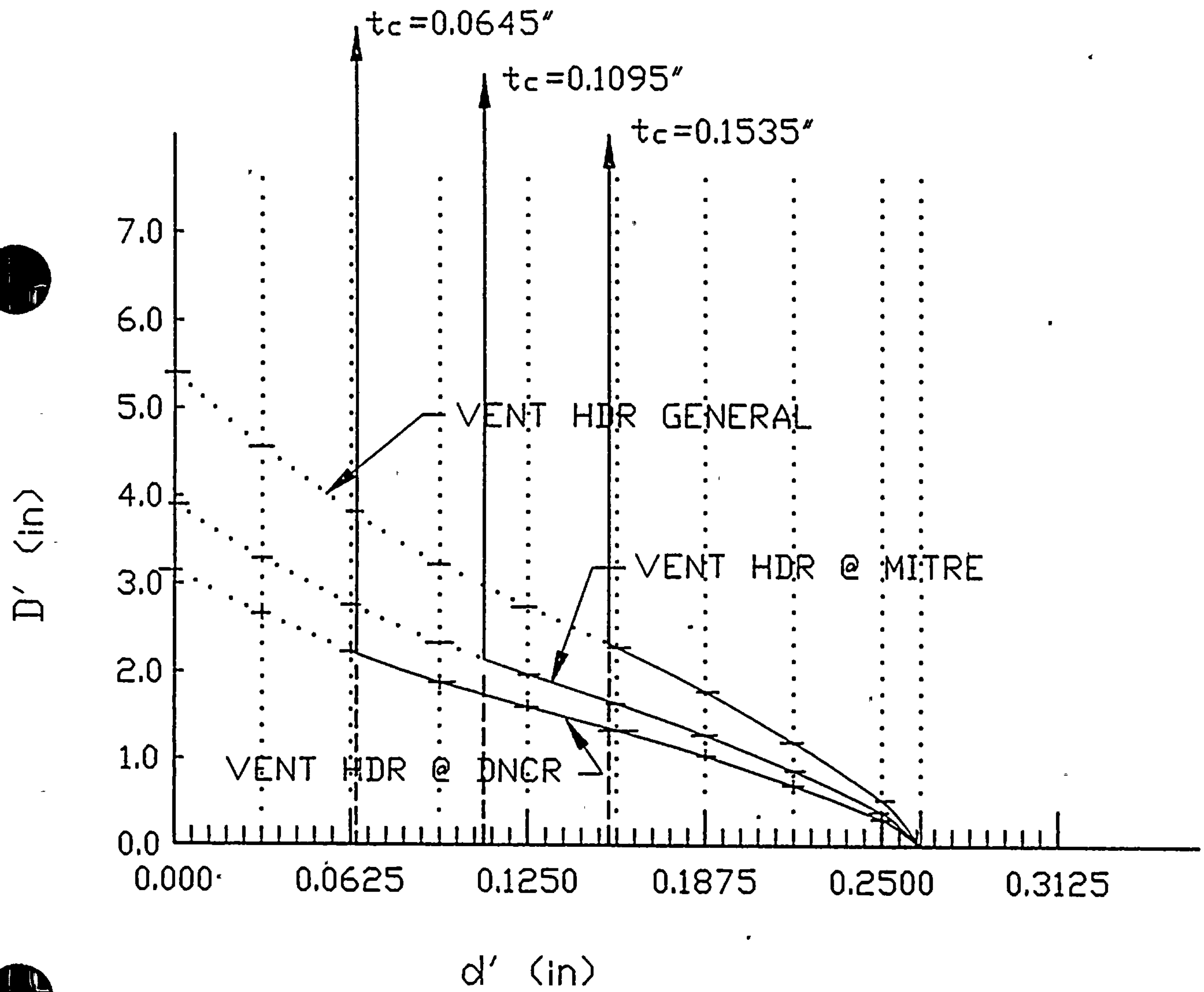
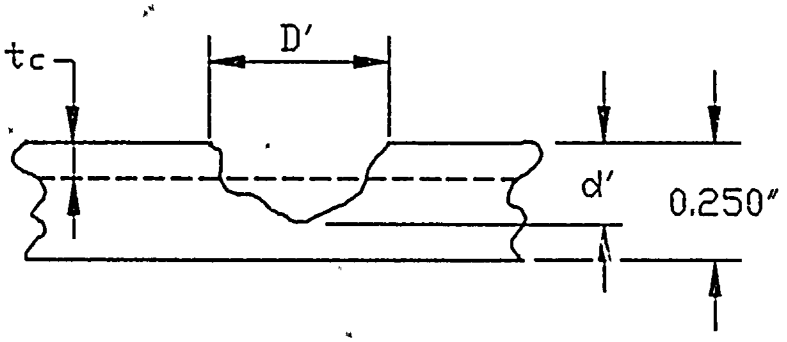


FIGURE 15

PERMISSIBLE SIZE RANGE FOR INDICATION DOWNCOMER NINE MILE POINT UNIT 1 NUCLEAR STATION



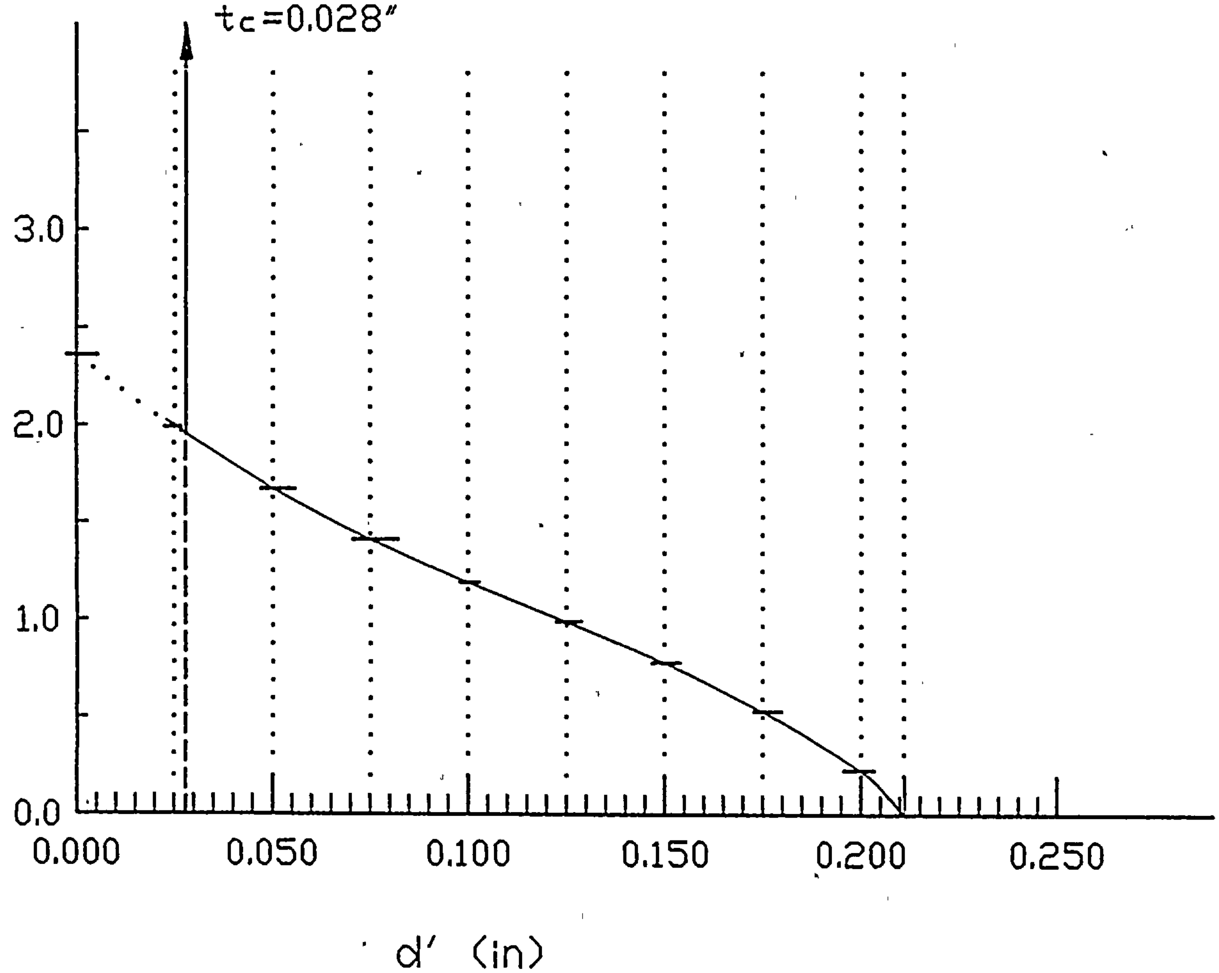


FIGURE 16

PERMISSIBLE SIZE RANGE FOR INDICATION VENT SPHERE
NINE MILE POINT UNIT 1 NUCLEAR STATION

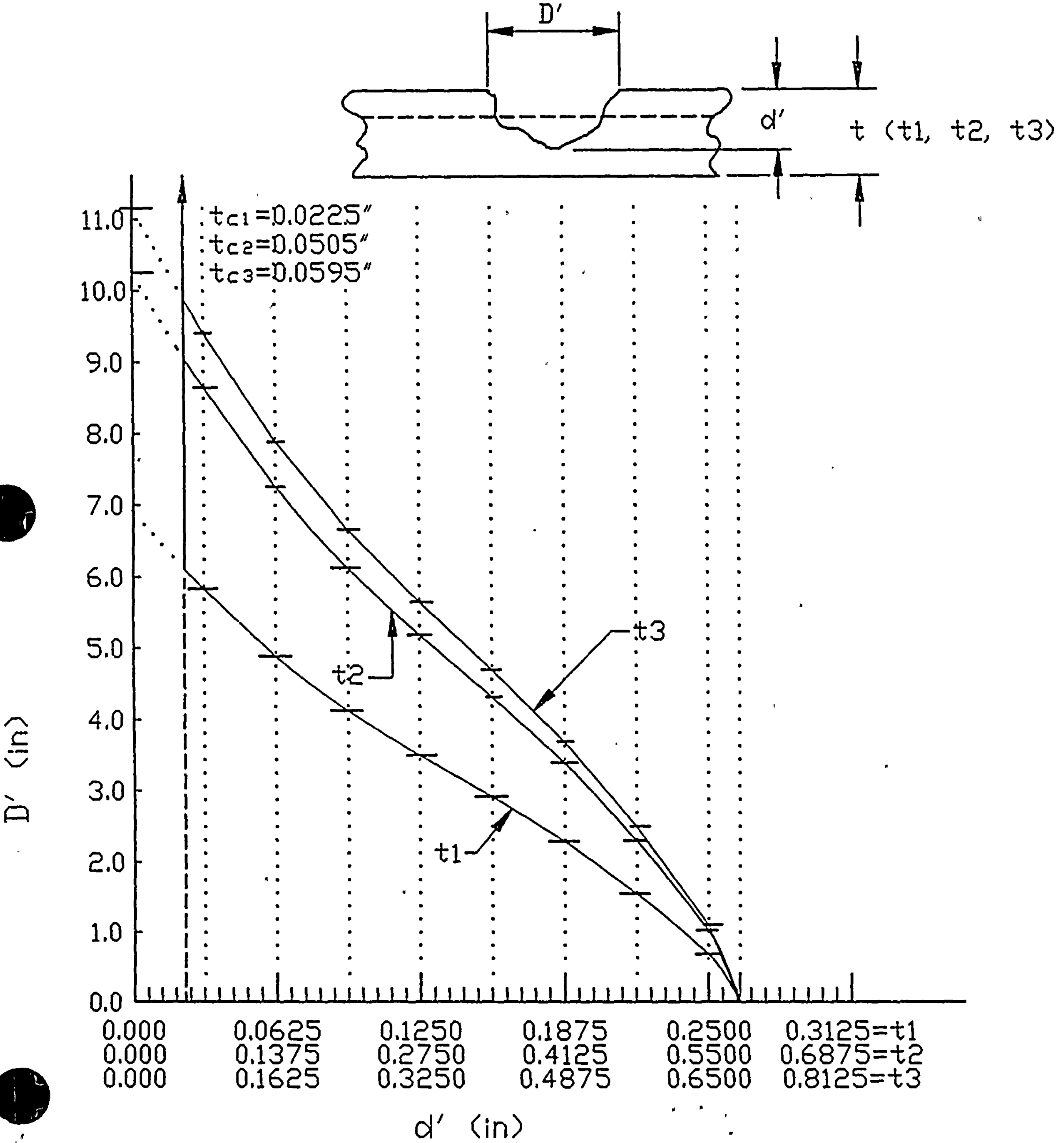


FIGURE 17

VENT SPHERE LOCAL THICKNESS REGIONS
NINE MILE POINT UNIT 1 NUCLEAR STATION

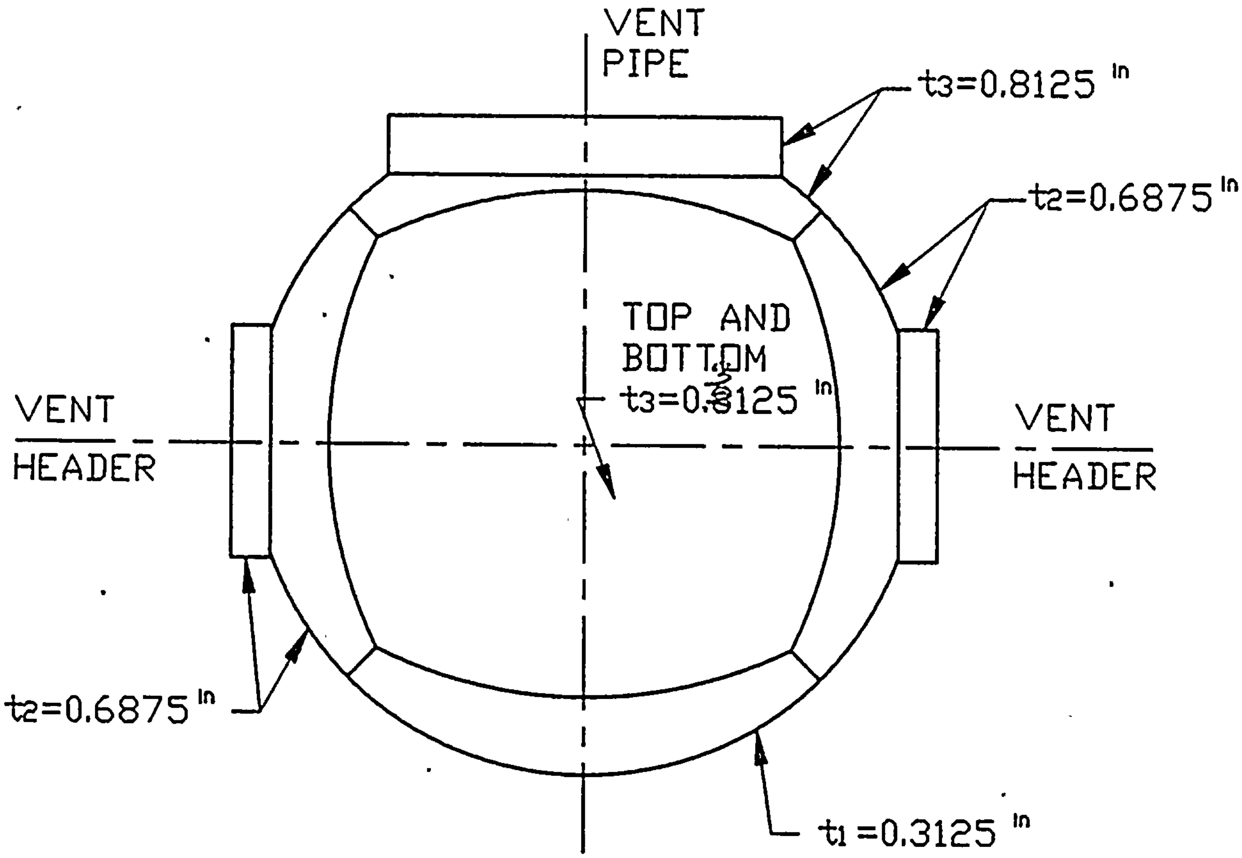


FIGURE 18

APPENDIX A

TORUS AND VENT SYSTEM REQUIRED SHELL THICKNESS CALCULATIONS

The calculations herein were performed using the Mark I Analysis of Record for Nine Mile Point Unit 1. The minimum thickness requirements are based on the analyzed state of stress for the postulated Mark I event combinations.

APPENDIX A.1

TORUS SHELL THICKNESS CALCULATIONS

TELEDYNE ENGINEERING SERVICES

BY RKE DATE 12-10-87 CHKD. BY RMP DATE 12-18-87	NMP-1 SHELL THICKNESS REQUIREMENTS 6801-2	SHEET NO. 3 OF PROJ. NO. 6801

NMP-1 TORUS SHELL

DETERMINATION OF MINIMUM SHELL THICKNESS REQUIRED

THE MINIMUM TORUS SHELL THICKNESS IS BASED ON THE EQUIVALENT HOOP PRESSURE STRESS WHICH WOULD BE EQUAL TO THE MARK I PROGRAM EVENT COMBINATION PRIMARY MEMBRANE OR LOCAL MEMBRANE STRESS INTENSITY.

$$P_M = \frac{PR}{t} \leq S_{mc}$$

$$P_L = \frac{PR}{t} \leq 1.5\, S_{mc}$$

THE PRIMARY LOCAL STRESS REGION EXTENDS FOR A LONGITUDINAL DISTANCE OF $1.0\sqrt{Rt}$ FROM THE INTERSECTION OF THE SHELL AND RING GIRDER.

$$1.0\sqrt{Rt} = 1.0\sqrt{162^{IN}(0.460^{IN})} = 8.6325^{IN} \text{ (REF. 4)}$$

THE TORUS SHELL THICKNESS USED IN THE NINE MILE POINT UNIT 1 MARK I CONTAINMENT ANALYSIS IS 0.460 INCHES, (NO CORROSION ALLOWANCE WAS USED.). ALL MARK I LOADINGS (EXCLUDING DEADWEIGHT AND SEISMIC CASES) WERE INPUT AS INTERNAL PRESSURE LOADINGS. IT IS

TELEDYNE ENGINEERING SERVICES

BY RAE DATE 12-10-87 | NMP-1 SHELL THICKNESS REQUIREMENTS 6801-2 | SHEET NO. 4 OF
CHKD. BY RMP DATE 12-18-87 | PROJ. NO. 6801

NMP-1 TORUS SHELL

DETERMINATION OF MINIMUM SHELL THICKNESS REQUIRED (CONTINUED)

CONSERVATIVE TO CONSIDER THE TOTAL COMBINED EVENT LOADING AS AN INTERNAL PRESSURE CASE. THUS, THE MINIMUM WALL THICKNESS CAN BE CALCULATED WITH THE FOLLOWING EQUATIONS:

MID-BAY

$$t_{MIN} = \frac{P_M \; (0.460^{IN})}{S} \qquad \{EQ. \; No \; 1\}$$

RING GIRDER

$$t_{MIN} = \frac{P_L \; (0.460^{IN})}{1.5 \, S} \qquad \{EQ. \; No. \, 2\}$$

WHERE:

STRESS INTENSITY	SERVICE LIMIT ALLOWABLE (S) A	B	C
P_M	S_{mc}	S_{mc}	LARGER OF $1.2\,S_{mc}$ or $1.0\,S_y$
P_L	$1.5\,S_{mc}$	$1.5\,S_{mc}$	LARGER OF $1.8\,S_{mc}$ or $1.5\,S_y$

(REFERENCE 4)

TELEDYNE ENGINEERING SERVICES

BY KHE DATE 12-11-87	NMP-1 SHELL THICKNESS REQUIREMENTS 6801-2	SHEET NO. 5 OF
CHKD. BY RMC DATE 12-18-87		PROJ. NO. 6801

NMP-1 Torus Shell
Primary Membrane Stress t_{min}

Element No.	Event 14 P_M (Ref 8)	Allowable S_{MC} (Ref 11)	t_{min} (Using EQ-1)
11	10,568. Psi	16,500. Psi	.295 in
13	11,595.	↓	.323
15	12,575.	↓	.351
17	12,576.	↓	.351
19	13,232.	↓	.369
21	12,426.	↓	.346
23	11,965.	↓	.334
25	10,912.	↓	.304
27	10,289.	↓	.287
	(P_L)	(1.5 S_{mc})	(Using EQ-2)
123	7,247. Psi	24,750. Psi	.135 in
129	7,796.	↓	.145
135	9,040.	↓	.168
141	9,325.	↓	.173
147	6,712.	↓	.125
153	7,459.	↓	.139
159	8,282.	↓	.154
165	8,824.	↓	.164
171	8,361.	↓	.155

(Level B).

TELEDYNE ENGINEERING SERVICES

BY RAF DATE 12-11-87	NMP-1 SHELL THICKNESS REQUIREMENTS 6801-2	SHEET NO. 6 OF
CHKD. BY RMP DATE 12-18-87		PROJ. NO. 6801

NMP-1 TORUS SHELL

PRIMARY MEMBRANE SHELL t_{MIN}

ELEMENT NO.	EVENT 18 P_M (REF 8)	ALLOWABLE S_{MC} (REF 11)	t_{MIN} (USING EQ-1)
11	3,293. psi	16,500. psi	.092 IN
13	4,436.	↓	.124
15	6,506.	↓	.181
17	7,668.	↓	.214
19	7,812.	↓	.218
21	7,251.	↓	.202
23	4,826.	↓	.134
25	5,130.	↓	.143
27	3,611.	↓	.101
	(P_L)	($1.5 S_{MC}$)	(USING EQ-2)
123	9,260.	24,750.	.172
129	10,265.	↓	.191
135	6,944.	↓	.129
141	4,752.	↓	.088
147	4,423.	↓	.082
153	5,652.	↓	.105
159	10,078.	↓	.187
165	13,187.	↓	.245
171	12,225.	↓	.227

(Level B)

TELEDYNE ENGINEERING SERVICES

BY KAE DATE 12-11-87 CHKD. BY RMP DATE 12-18-97	NMP-1 SHELL THICKNESS REQUIREMENTS 6801-2	SHEET NO. 7 OF PROJ. NO. 6801

NMP-1 TORUS SHELL
PRIMARY MEMBRANE STRESS t_{MIN}:

ELEMENT No.	EVENT 20 P_M (REF 8)	ALLOWABLE S_{MC} (REF 11)	t_{MIN} (USING EQ-1)
11	10,902. psi	16,500. psi	.304
13	12,975.		.362
15	14,988.		.418
17	16,005.		.446
19	16,025.		.447
21	15,231.		.425
23	13,706.		.382
25	11,493.		.320
27	9,791.		.273
	(P_L)	(1.5 S_{mc})	(Using EQ-2)
123	9,033.	24,750.	.168
129	8,368.		.156
135	7,398.		.137
141	6,037.		.112
147	6,742.		.125
153	7,003.		.130
159	10,644.		.198
165	10,033.		.186
171	10,464.		.194

(Level B)

TELEDYNE ENGINEERING SERVICES

BY RJE DATE 12-11-87 | NMP-1 SHELL THICKNESS REQUIREMENTS 6801-2 | SHEET NO. 8 OF
CHKD. BY RMP DATE 12-18-87 | PROJ. NO. 6801

NMP-1 TORUS SHELL

PRIMARY MEMBRANE STRESS t_{min}

ELEMENT No.	EVENT 25 P_M (REF 8)	ALLOWABLE S_Y (REF 11)	t_{MIN} (USING EQ-1)
11	3,934.	32,000. psi	.057
13	5,737.	↓	.082
15	7,362.	↓	.106
17	9,251.	↓	.133
19	8,920.	↓	.128
21	7,585.	↓	.109
23	5,907.	↓	.085
25	7,511.	↓	.108
27	4,657.	↓	.067
	(P_L)	(1.5 S_y)	(Using EQ-2)
123	13,612.	48,000.	.130
129	12,339.	↓	.118
135	10,678.	↓	.102
141	8,480.	↓	.081
147	5,931.	↓	.057
153	8,554.	↓	.082
159	13,687.	↓	.131
165	18,738.	↓	.180
171	14,747.	↓	.141

(Level C)

TELEDYNE ENGINEERING SERVICES

BY RAE DATE 12-11-87 | NMP-1 SHELL THICKNESS REQUIREMENTS 6801-2 | SHEET NO. 1 OF
CHKD. BY RMC DATE 12-18-87 | | PROJ. NO. 6801

NMP-1 Torus Shell

Membrane Minimum Shell Thickness Summary

Element No.	Event 14	Event 18	Event 20	Event 25	Governing t min
11	.295 in	.092 in	.304 in	.057 in	.304 in
13	.323	.124	.362	.082	.362
15	.351	.181	.418	.106	.418
17	.351	.214	.446	.133	.446
19	.369	.218	.447	.128	.447
21	.346	.202	.425	.109	.425
23	.334	.134	.382	.085	.382
25	.304	.143	.320	.108	.320
27	.287	.101	.273	.067	.287
123	.135	.172	.168	.130	.172
129	.145	.191	.156	.118	.191
135	.168	.129	.137	.102	.168
141	.173	.088	.112	.081	.173
147	.125	.082	.125	.057	.125
153	.139	.105	.130	.082	.139
159	.154	.187	.198	.131	.198
165	.164	.245	.186	.180	.245
171	.155	.227	.194	.141	.227

TELEDYNE ENGINEERING SERVICES

BY RKE DATE 12-16-87
CHKD. BY RWF DATE 12-18-87

NMP-1 SHELL THICKNESS REQUIREMENTS 6801-2

NMP-1 TORUS SHELL
MINIMUM THICKNESS REQUIREMENTS

ELEMENT NO. (MID-BAY)	REQUIRED THICKNESS	REMAINING THICKNESS
11	.304 IN	.156 IN
13	.362	.098
15	.418	.042
17	.446	.014
19	.447	.013
21	.425	.035
23	.382	.078
25	.320	.140
27	.287	.173
(RING GIRDER)		
123	.172 IN	.288 IN
129	.191	.269
135	.168	.292
141	.173	.287
147	.125	.335
153	.139	.321
159	.198	.262

NOTE: ONLY LOWER SHELL ELEMENTS LISTED

TELEDYNE ENGINEERING SERVICES

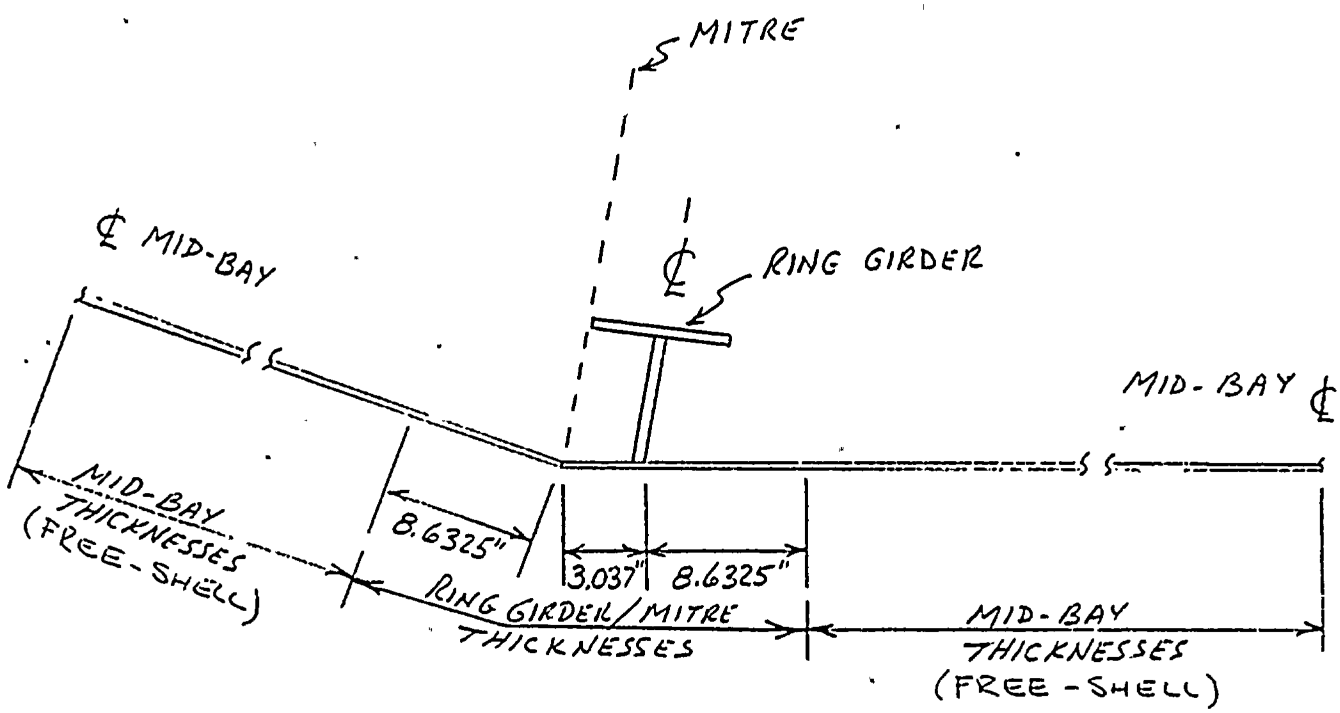
BY RKE DATE 12-18-87
CHKD. BY RMP DATE 12-21-87

NMP-1 SHELL THICKNESS REQUIREMENTS 6801-2

SHEET NO. 11 OF
PROJ. NO. 6801

NMP-1 Torus Shell

Longitudinal Location Guide for Remaining Thickness



TELEDYNE ENGINEERING SERVICES

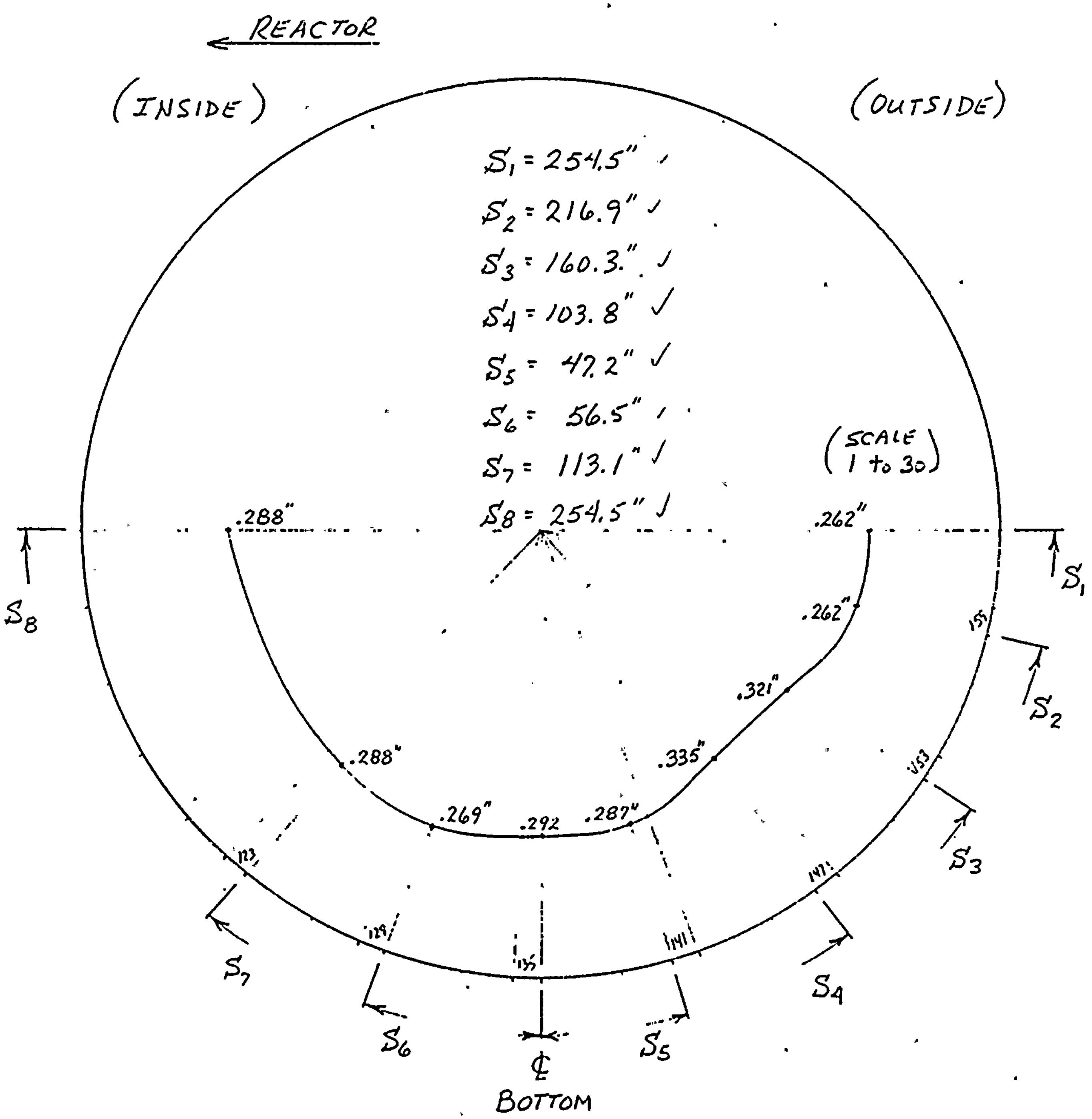
BY RKE DATE 12-18-87
CHKD. BY RWP DATE 12-21-87

NMP-1 SHELL THICKNESS REQUIREMENTS 6801-2

SHEET NO. 17 OF
PROJ. NO. 6801

NMP-1 TORUS SHELL

RING GIRDER / MITRE REMAINING THICKNESS



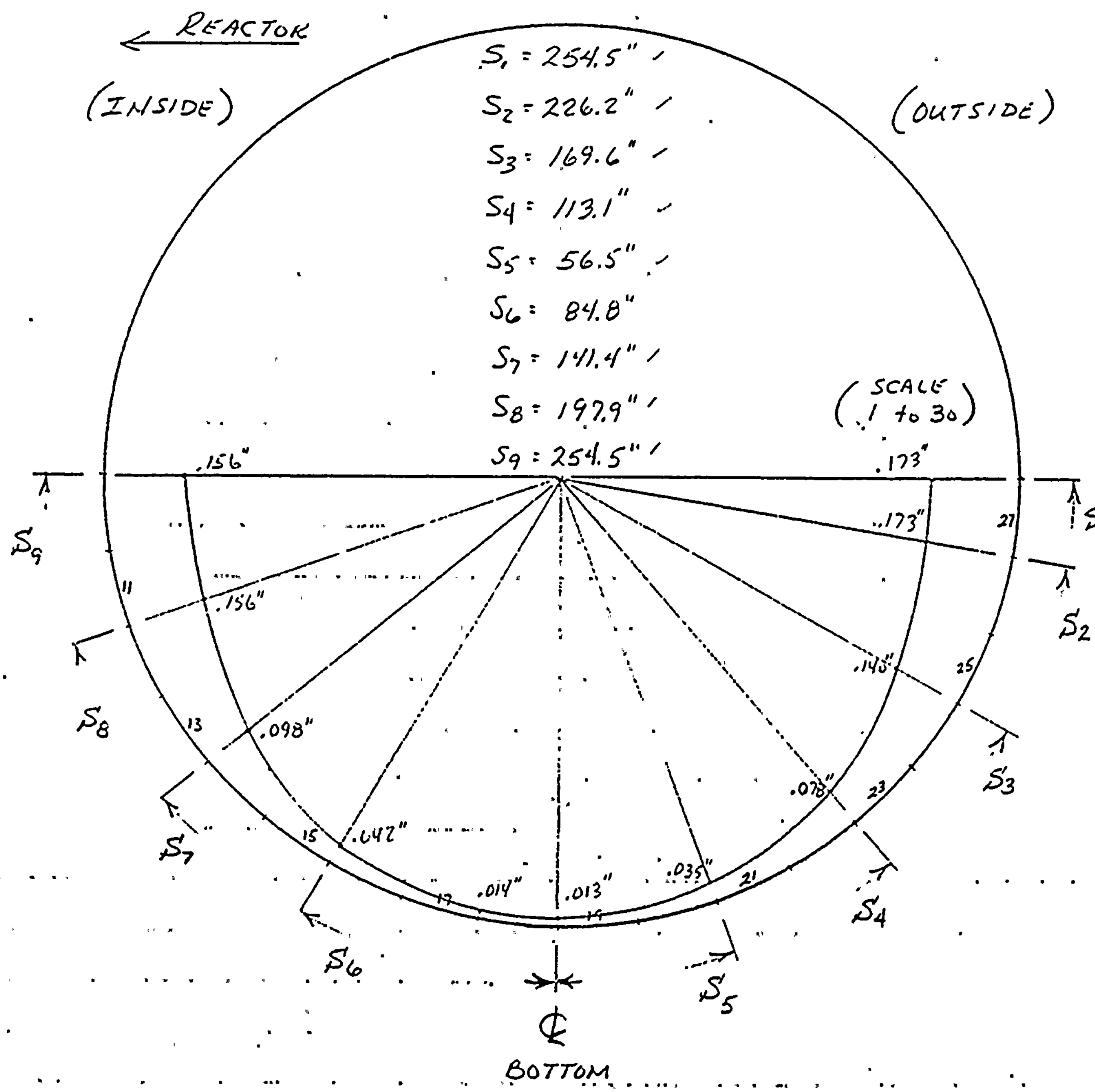
TELEDYNE ENGINEERING SERVICES

BY RAE DATE 12-17-87
CHKD. BY RMP DATE 12-21-87

NMP-1 SHELL THICKNESS REQUIREMENTS 6801-2

SHEET NO. ____ OF ____
PROJ. NO. 6801

NMP-1 TORUS SHELL
MID-BAY REMAINING THICKNESS



APPENDIX A.2

VENT SYSTEM THICKNESS CALCULATIONS

The vent system thickness calculations were performed using a similar methodology to that of the torus shell in A.1.

TELEDYNE ENGINEERING SERVICES

BY RKE DATE 12-17-87
CHKD. BY RMP DATE 12-22-87

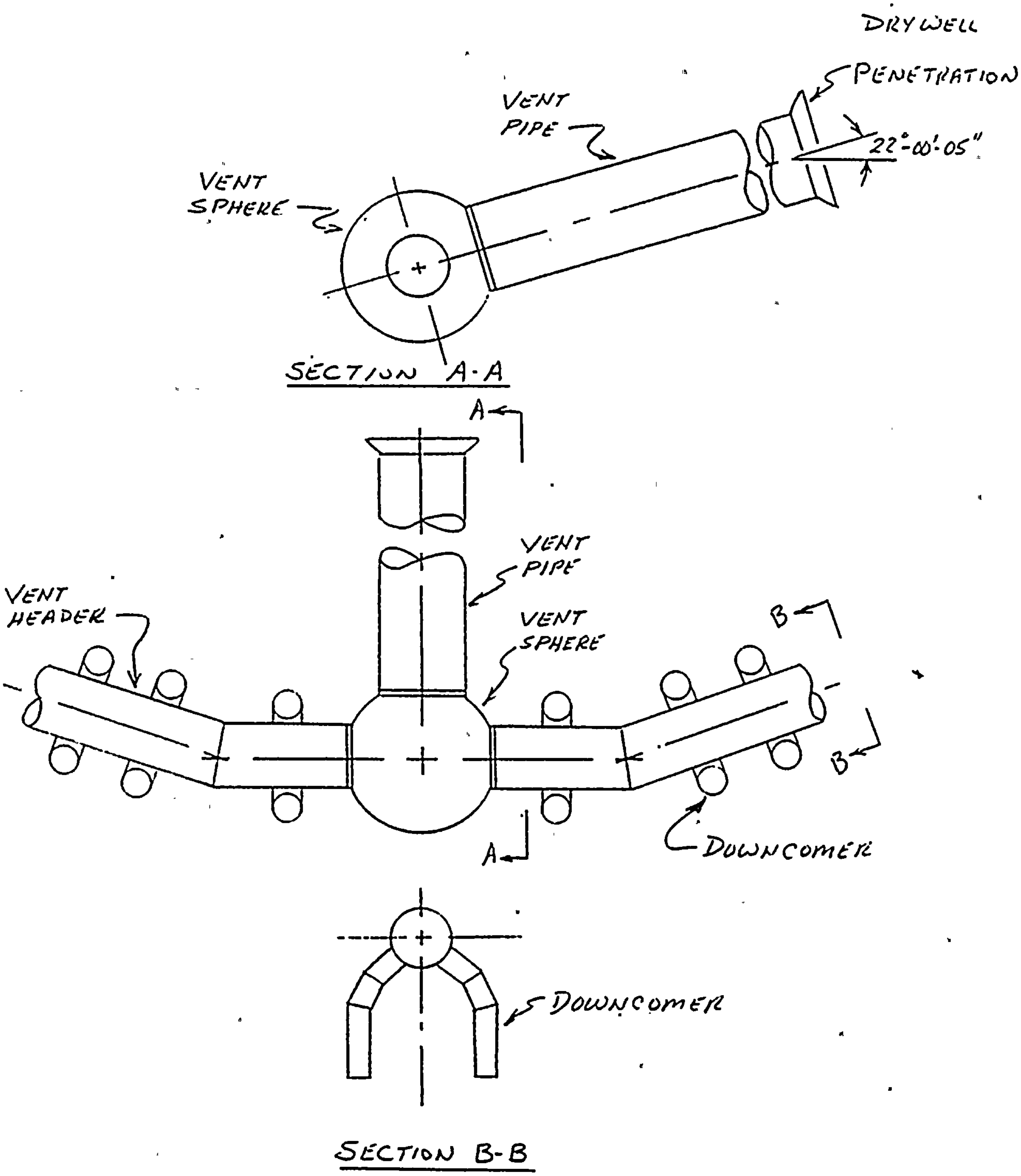
NMP-1 SHELL THICKNESS REQUIREMENTS 6801-2

SHEET NO. ____ OF ____
PROJ. NO. 6801

NMP-1 VENT SYSTEM

TYPICAL VENT SYSTEM CONFIGURATION

(REFERENCE 12)



TELEDYNE ENGINEERING SERVICES

BY KMF DATE 12-17-87
CHKD. BY RW DATE 12-22-87

NMP-1 SHELL THICKNESS REQUIREMENTS 6801-2

SHEET NO. ____ OF ____
PROJ. NO. 6801

NMP-1 VENT SYSTEM

PRIMARY MEMBRANE SHELL t_{min}

COMPONENT LOCATION	SHELL THICKNESS (REFERENCE 12)	EVENT 19 P_M (REFERENCE 13)	ALLOWABLE S_{mc}	t_{min} (EQ-1)
VENT PIPE	.3125 IN	10,194. Psi	16,500. Psi	.193 IN
VENT HEADER	.3125	7,081. *	↓	.134
DOWNCOMER	.250	9,729.	↓	.147

		EVENT 21 P_M		
VENT PIPE	.3125 IN	10,628. Psi	16,500. Psi	.201 IN
VENT HEADER	.3125	8,380. *	↓	.159
DOWNCOMER	.250	14,673.	↓	.222

* STRESSES UNINTENSIFIED ARE REPRESENTATIVE OF VENT HEADER PIPE, WHEN INTENSIFIED WITH "GE FACTORS" THEY REPRESENT THE INTERSECTION STRESSES AT THE SPHERE.

TELEDYNE ENGINEERING SERVICES

BY RKE DATE 12-17-87
CHKD. BY [illegible] DATE 12-23-87

NMP-1 SHELL THICKNESS REQUIREMENTS 6801-2

SHEET NO. ____ OF ____
PROJ. NO. 6801

NMP-1 VENT SYSTEM

LOCAL MEMBRANE SHELL t_{MIN}

COMPONENT LOCATION	SHELL THICKNESS (REF 12)	EVENT 19 P_L (REF 13 AND 14)	ALLOWABLE 1.5 S_{mc}	t_{MIN} (EQ-2)
VENT PIPE @ DRYWELL	.3125 IN	10,194. PSI	24,750. PSI	.129 IN
VENT HEADER @ MITRE JOINT	.3125	14,721.	↓	.186
VENT HEADER @ DOWNCOMER	.3125	10,421.	↓	.105
DOWNCOMER @ MITRE JOINT	.250	9,729.	↓	.098

COMPONENT LOCATION	SHELL THICKNESS	EVENT 21 P_L	ALLOWABLE 1.5 S_{mc}	t_{MIN}
VENT PIPE @ DRYWELL	.3125	10,628. PSI	24,750. PSI	.134 IN
VENT HEADER @ MITRE JOINT	.3125	16,063.	↓	.203
VENT HEADER @ DOWNCOMER	.3125	24,600.	↓	.248
DOWNCOMER @ MITRE JOINT	.250	14,673.	↓	.148

TELEDYNE ENGINEERING SERVICES

BY RKE DATE 12-18-87 | NMP-1 SHELL THICKNESS REQUIREMENTS 6801-2 | SHEET NO.____ OF____
CHKD. BY AWP DATE 12-23-87 | | PROJ. NO. 6801

NMP-1 VENT SYSTEM
LOCAL MEMBRANE SHELL t_{min} (CONT'D)

COMPONENT LOCATION	SHELL THICKNESS (REF 18)	EVENT 19 P_L (REF 13)	ALLOWABLE 1.5 S_{mc}	t_{min} (EQ-7)
VENT SPHERE @ t_1	.3125 IN	19,689. PSI	24,750. PSI	.248 IN
VENT SPHERE @ t_2	.6875	↓	↓	.547
VENT SPHERE @ t_3	.8125	↓	↓	.646

		EVENT 21 P_L		
VENT SPHERE @ t_1	.3125 IN	22,936. PSI	24,750. PSI	.290 IN
VENT SPHERE @ t_2	.6875	↓	↓	.637
VENT SPHERE @ t_3	.8125	↓	↓	.753

TELEDYNE ENGINEERING SERVICES

BY RKE DATE 12-18-87
CHKD. BY [illegible] DATE 12-23-87

NMP-1 SHELL THICKNESS REQUIREMENTS 6801-2

SHEET NO. ____ OF ____
PROJ. NO. 6801

NMP-1 VENT SYSTEM
MINIMUM THICKNESS REQUIREMENTS

COMPONENT LOCATION	SHELL THICKNESS	REQUIRED THICKNESS	REMAINING THICKNESS
VENT PIPE	.3125 IN	.201 IN	.1115 IN
VENT HEADER	.3125	.159	.1535
DOWNCOMER	.250	.222	.028
VENT PIPE @ DRYWELL	.3125	.134	.1785
VENT HEADER @ MITRE JOINT	.3125	.203	.1095
VENT HEADER @ DOWN COMER	.3125	.248	.0645
DOWNCOMER @ MITRE JOINT	.250	.148	.102
VENT SPHERE @ t_1	.3125	.290	.0225
VENT SPHERE @ t_2	.6875	.637	.0505
VENT SPHERE @ t_3	.8125	.753	.0595

APPENDIX B

PERMISSIBLE INDICATION SIZE CALCULATIONS

The general calculations contained in this appendix consider the discontinuity effects resulting from a localized indication to determine the range of permissible indication sizes in the presence of general membrane stresses for Class MC pressure vessel.

B.1 and B.2 use the general results to specifically address the torus shell and vent system range of permissible indication sizes.

TELEDYNE ENGINEERING SERVICES

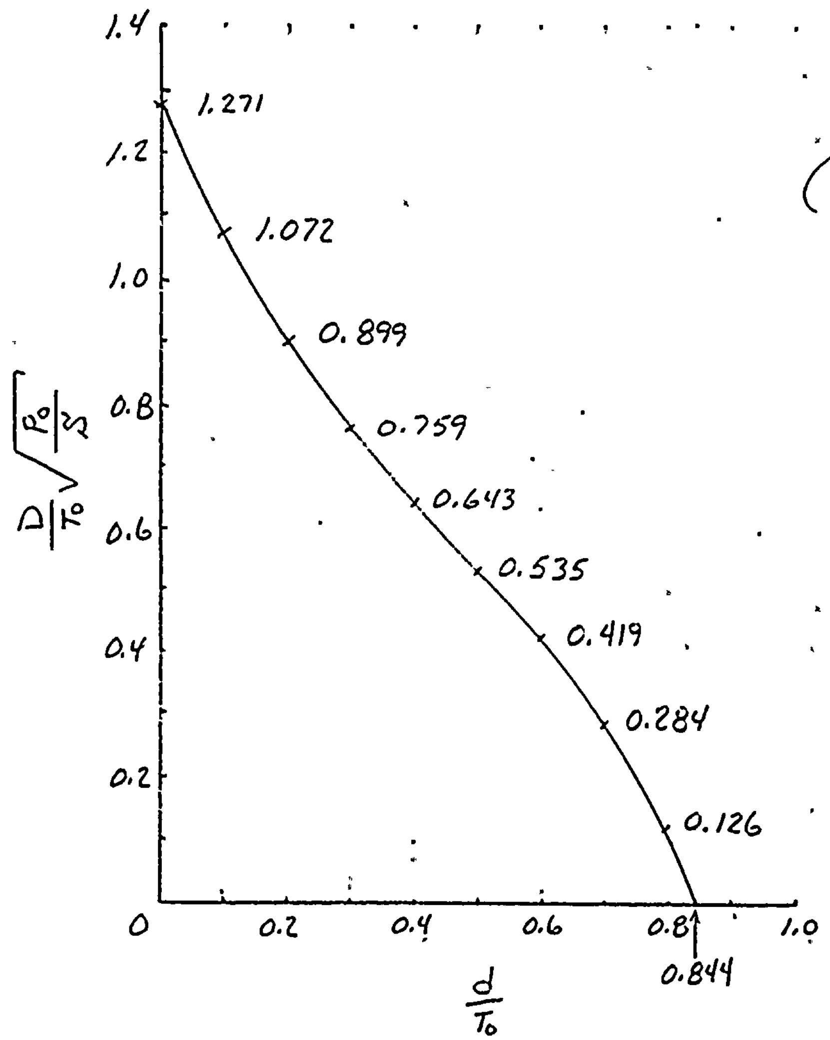
BY RNE DATE 12-16-87
CHKD. BY RMP DATE 12-21-87

NMP-1 SHELL THICKNESS REQUIREMENTS 6801-2

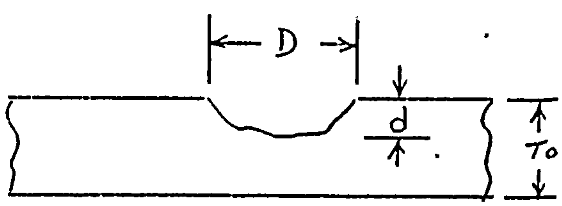
SHEET NO. ____ OF ____
PROJ. NO. 6801

NMP-1 Torus Shell

Permissible Indication Size Class MC Vessel



(Scale 1 to 30)



D = dia. of reduced thickness
d = Maximum depth
To = Original thickness
Po = Pressure Normal to Surface
S = Allowable Membrane Stress

BY ____ DATE 790424
CHKD. BY GM DATE 4-27-79

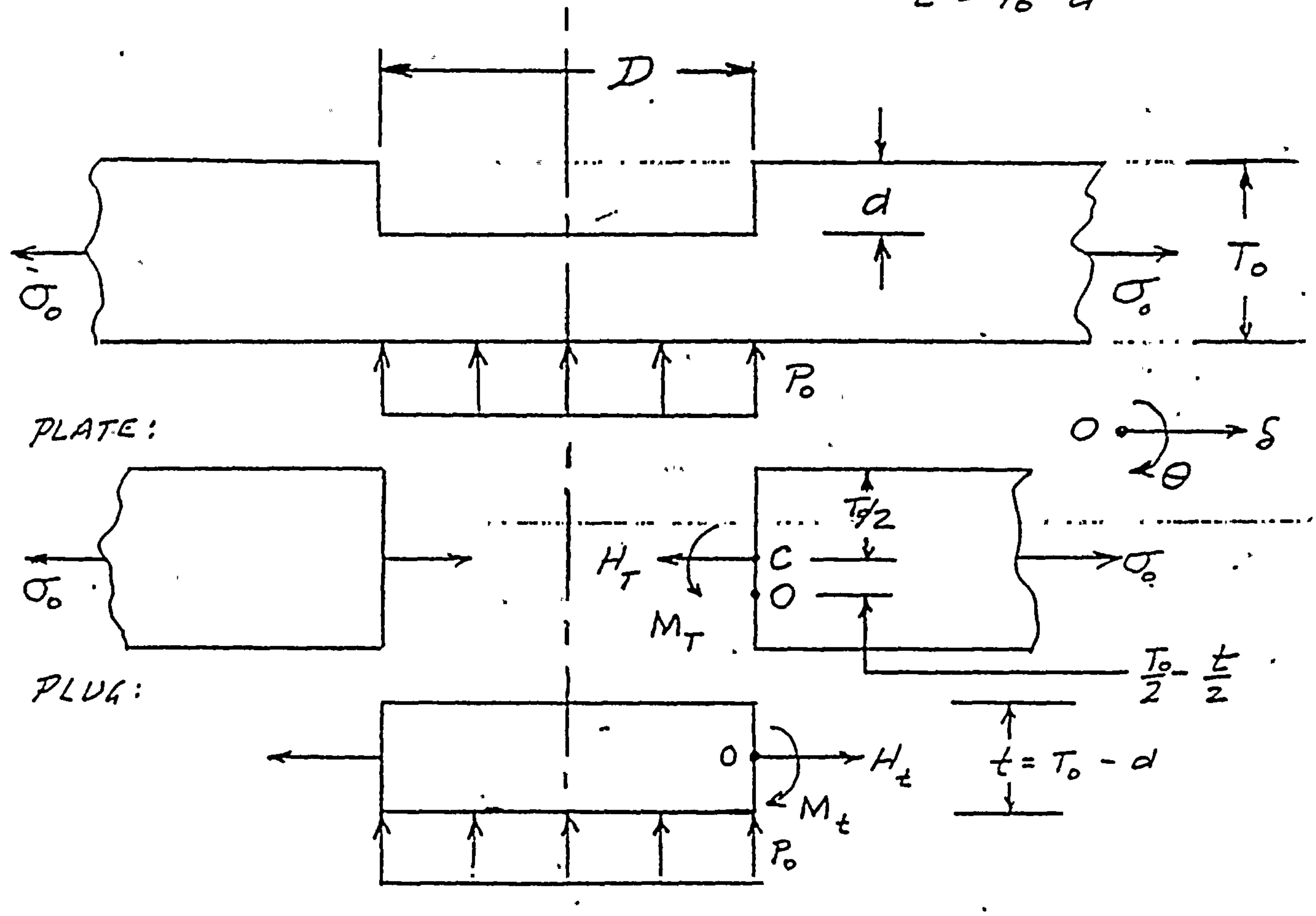
NMP-1 SHELL THICKNESS REQUIREMENTS 6801-2

SHEET NO. 1 OF ____
PROJ. NO. 6801

Consider a large circular plate of thickness T_o subject to a uniform membrane stress σ_o which may be less than or equal to the allowable general membrane stress S_m. Let the plate contain a cylindrical depression of diameter D and depth d. How may D and d be varied without exceeding the limits on local membrane stress intensity or on local membrane plus primary bending stress intensity, both of which are $1.5S_m$. In considering primary bending, the effects of a lateral pressure P_o will have to be considered.

$D = 2R$

$t = T_o - d$



Primary bending stress in plug:

Maximum at center, tensile on top

$$S_p = \frac{3(3+\nu)R^2 P_o}{8\, t^2}$$ ... (Timoshenko, Plates & Shells, Eq. (71)) (1)

Plug deformation

$$\delta_{ot} = \frac{(1-\nu)R H_t}{E t}$$ (2)

$$\theta_{ot} = \frac{12(1-\nu)R M_t}{E t^3} + \frac{3(1-\nu)R^3 P_o}{2 E t^3}$$ (Roark) (3)

Plate deformation

$$\delta_{CT} = R\,\varepsilon_{\theta R}$$

$\varepsilon_{\theta R}$ = hoop strain at radius R

$$= \frac{1}{E}\left[\sigma_\theta - \nu\,\sigma_r\right]$$

For an internal pressure p_i and an external pressure p_o; and an internal radius a and external radius b; and evaluating at radius a

$$\sigma_\theta = -\frac{a^2 b^2 (p_o - p_i)}{b^2 - a^2}\left(\frac{1}{a}\right)^2 + \frac{p_i a^2 - p_o b^2}{b^2 - a^2}$$ (Timoshenko, Th. Elas., Eq (40))

divide by b^2, let $b^2 \to \infty$

$$\sigma_\theta = -(p_o - p_i) - p_o = -2p_o + p_i$$

so that

$$\sigma_\theta = 2\sigma_o - \frac{H_T}{T_o}$$

$$\sigma_r = \frac{H_T}{T_o}$$

and

$$\delta_{CT} = \frac{R}{E}\left[2\sigma_o - \frac{H_T}{T_o} - \nu \frac{H_T}{T_o}\right]$$

or

$$\delta_{CT} = \frac{R}{E}\left[2\sigma_o - (1+\nu)\frac{H_T}{T_o}\right] \qquad (4)$$

The rotation of a circular plate of radius a containing a hole of radius b and subject to a moment M_1 around the hole is, evaluated at r = b

$$\frac{dw}{dr} = \frac{a^2 b^2 M_1}{D(1-\nu)(a^2-b^2)}\left[\frac{1}{b} + \frac{1-\nu}{1+\nu}\,\frac{b}{a^2}\right] \qquad \left(\text{Timo, P\&S Eq 72}\right)$$

Dividing by a^2, let $a \to \infty$

$$\frac{dw}{dr} = \frac{b M_1}{D(1-\nu)} = \frac{12\, b M_1 (1-\nu^2)}{E t^3 (1-\nu)} = \frac{12\, b M_1}{E t^3}(1+\nu)$$

whence

$$\theta_{CT} = -\frac{12 R M_T}{E T_o^3}(1+\nu) \qquad (5)$$

The displacement and rotation at point O are related to those at point C as follows:

$$\theta_{OT} = \theta_{CT} \qquad (6)$$

$$\delta_{OT} = \delta_{CT} - \frac{1}{2}(T_o - t)\,\theta_{CT} \qquad (7)$$

Therefore:

$$\theta_{OT} = -\frac{12 R M_T}{E T_o^3}(1+\nu) \qquad (8)$$

and

$$\delta_{0T} = \frac{R}{E}\left[2\sigma_0 - (1+\nu)\frac{H_T}{T_0}\right] - \frac{1}{2}(T_0 - t)\left(-\frac{12 R M_T}{E T_0^3}\right)(1+\nu)$$

$$\delta_{0T} = \frac{R}{E}\left[2\sigma_0 - (1+\nu)\frac{H_T}{T_0} + \frac{6(T_0 - t)M_T}{T_0^{\,3}}(1+\nu)\right] \qquad (9)$$

For equilibrium of internal forces and moments:

$$H_T = H_t \qquad (10)$$

$$M_T = M_t - \frac{1}{2}(T_0 - t)H_t \qquad (11)$$

Substituting (10) and (11) in (8) and (9)

$$\theta_{0T} = -\frac{12R}{E T_0^3}\left[M_t - \frac{1}{2}(T_0 - t)H_t\right](1+\nu) \qquad (12)$$

$$\delta_{0T} = \frac{R}{E}\left\{2\sigma_0 - (1+\nu)\frac{H_t}{T_0} + \frac{6(T_0 - t)}{T_0^{\,3}}\left[M_t - \frac{1}{2}(T_0 - t)H_t\right](1+\nu)\right\}$$

$$= \frac{R}{E}\left\{2\sigma_0 + \frac{6(1+\nu)(T_0 - t)}{T_0^3}M_t - (1+\nu)\left[\frac{1}{T_0} + \frac{3(T_0 - t)^2}{T_0^{\,3}}\right]H_t\right\}$$

$$\delta_{0T} = \frac{R}{E}\left\{2\sigma_0 + \frac{6(1+\nu)(T_0 - t)M_t}{T_0^3} - (1+\nu)\left[1 + \frac{3(T_0 - t)^2}{T_0^{2}}\right]\frac{H_t}{T_0}\right\} \qquad (13)$$

For compatability:

$$\delta_{0t} = \delta_{0T} \qquad (14)$$

$$\theta_{0t} = \theta_{0T} \qquad (15)$$

Substituting (2) and (13) in (14)

TELEDYNE ENGINEERING SERVICES

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NMP-1 SHELL THICKNESS REQUIREMENTS 6801-2

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PROJ. NO. 6801

$$\frac{(1-\nu)RH_t}{Et} = \frac{R}{E}\left\{2\sigma_o + \frac{6(1+\nu)(T_o-t)M_t}{T_o^3} - (1+\nu)\left[1+\frac{3(T_o-t)^2}{T_o^2}\right]\frac{H_t}{T_o}\right\}$$

$$\left[\frac{(1-\nu)}{t} + \frac{(1+\nu)}{T_o} + \frac{3(1+\nu)(T_o-t)^2}{T_o^3}\right]H_t - \frac{6(1+\nu)(T_o-t)}{T_o^3}M_t = 2\sigma_o$$

$$\left[(1-\nu)+(1+\nu)\left(\frac{t}{T_o}\right)+3(1+\nu)\left(1-\frac{t}{T_o}\right)^2\left(\frac{t}{T_o}\right)\right]\frac{H_t}{t} - 6(1+\nu)\left(1-\frac{t}{T_o}\right)\left(\frac{t}{T_o}\right)^2\frac{M_t}{t^2}t = 2\sigma_o \qquad (16)$$

Let $t/T_o = \tau$

$$\left[\frac{1-\nu}{1+\nu} + \tau + 3(1-\tau)^2\tau\right]\frac{H_t}{t} - 6(1-\tau)(\tau)^2\frac{M_t}{t^2} = \frac{2}{(1+\nu)}\sigma_o$$

$$\left[\frac{1-\nu}{1+\nu} + \tau + 3\tau - 6\tau^2 + 3\tau^3\right]\frac{H_t}{t} - 6(1-\tau)\tau^2\frac{M_t}{t^2} = \frac{2}{(1+\nu)}\sigma_o$$

$$\left[\frac{1-\nu}{1+\nu} + 4\tau - 6\tau^2 + 3\tau^3\right]\frac{H_t}{t} - 6(1-\tau)\tau^2\frac{M_t}{t^2} = \frac{2}{(1+\nu)}\sigma_o \qquad (17)$$

From which

$$\frac{M_t}{t^2} = \frac{\left[\left(\frac{1-\nu}{1+\nu}\right) + 4\tau - 6\tau^2 + 3\tau^3\right]\frac{H_t}{t} - \frac{2}{(1+\nu)}\sigma_o}{6(1-\tau)\tau^2} \qquad (18)$$

Subst. (3) and (12) in (15)

$$\frac{12(1-\nu)RM_t}{Et^3} + \frac{3(1-\nu)R^3P_o}{2Et^3} = -\frac{12(1+\nu)R}{ET_o^3}\left[M_t - \frac{1}{2}(T_o - t)H_t\right]$$

$$-\,2\frac{(1+\nu)(T_o-t)}{T_o^3}H_t + 4\left[\frac{(1-\nu)}{t^3} + \frac{(1+\nu)}{T_o^3}\right]M_t = -\frac{(1-\nu)R^2P_o}{2t^3}$$

$$2(1+\nu)\left(1-\frac{t}{T_o}\right)\frac{H_t}{T_o^2} - 4\left[\frac{(1-\nu)}{t} + \frac{(1+\nu)t^2}{T_o^3}\right]\frac{M_t}{t^2} = +\frac{(1-\nu)}{2t}\left(\frac{R}{t}\right)^2P_o$$

$$2(1+\nu)\left(1-\frac{t}{T_o}\right)\left(\frac{t}{T_o}\right)^2\frac{H_t}{t} - 4\left[(1-\nu) + (1+\nu)\left(\frac{t}{T_o}\right)^3\right]\frac{M_t}{t^2} = \frac{(1-\nu)}{2}\left(\frac{R}{t}\right)^2P_o$$

Using (16)

$$(1+\nu)(1-\tau)\tau^2\frac{H_t}{t} - 2\left[(1-\nu) + (1+\nu)\tau^3\right]\frac{M_t}{t^2} = \frac{(1-\nu)}{4}\left(\frac{R}{t}\right)^2P_o$$

$$(1-\tau)\tau^2\frac{H_t}{t} - 2\left[\frac{1-\nu}{1+\nu} + \tau^3\right]\frac{M_t}{t^2} = \frac{(1-\nu)}{4(1+\nu)}\left(\frac{R}{t}\right)^2P_o \qquad (19)$$

Subst. (18) in (19)

$$(1-\tau)\tau^2\frac{H_t}{t} - 2\left[\frac{1-\nu}{1+\nu} + \tau^3\right]\left\{\frac{\left[\left(\frac{1-\nu}{1+\nu}\right) + 4\tau - 6\tau^2 + 3\tau^3\right]\frac{H_t}{t} - \frac{2}{(1+\nu)}\sigma_o}{6(1-\tau)\tau^2}\right\} = \frac{(1-\nu)}{4(1+\nu)}\left(\frac{R}{t}\right)^2P_o$$

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NMP-1 SHELL THICKNESS REQUIREMENTS 6801-2

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$$\left\{2\left[\frac{1-\nu}{1+\nu}+\tau^3\right]\frac{\sigma_0}{(1+\nu)}-\frac{3(1-\tau)\tau^2(1-\nu)}{4(1+\nu)}\left(\frac{R}{t}\right)^2 P_0\right\}\frac{t}{H_t}=$$

$$+3(1-\tau)^2\tau^4+\left[\frac{1-\nu}{1+\nu}+\tau^3\right]\left[\frac{1-\nu}{1+\nu}+4\tau-6\tau^2+3\tau^3\right]=$$

$$-3\tau^4+6\tau^5-3\tau^6+\left[\frac{1-\nu}{1+\nu}\right]\left[\frac{1-\nu}{1+\nu}+4\tau-6\tau^2+3\tau^3\right]$$

$$+4\tau^4-6\tau^5+3\tau^6+\left[\frac{1-\nu}{1+\nu}\right]\tau^3=$$

$$\tau^4+\left[\frac{1-\nu}{1+\nu}\right]\left[\frac{1-\nu}{1+\nu}+4\tau-6\tau^2+4\tau^3\right]$$

$$\left\{2\left[\frac{1-\nu}{1+\nu}+\tau^3\right]\sigma_0-\frac{3}{4}(1-\nu)(1-\tau)\tau^2\left(\frac{R}{t}\right)^2P_0\right\}\frac{t}{H_t}=$$

$$(1-\nu)\left[\frac{1-\nu}{1+\nu}+4\tau-6\tau^2+4\tau^3\right]+(1+\nu)\tau^4=$$

$$(1-\nu)\left[\frac{1-\nu}{1+\nu}+4\tau-6\tau^2+4\tau^3+\left(\frac{1+\nu}{1-\nu}\right)\tau^4\right]$$

$$\frac{H_t}{t}=\frac{2\left[\frac{1}{1+\nu}+\frac{\tau^3}{1-\nu}\right]\sigma_0-\frac{3}{4}(1-\tau)\tau^2\left(\frac{R}{t}\right)^2P_0}{\frac{1-\nu}{1+\nu}+4\tau-6\tau^2+4\tau^3+\left(\frac{1+\nu}{1-\nu}\right)\tau^4}\qquad(20)$$

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NMP-1 SHELL THICKNESS REQUIREMENTS 6801-2

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$$\frac{H_t}{t} = \frac{2\left[\frac{1}{1+\nu} + \frac{\tau^3}{1-\nu}\right]\sigma_0 - \frac{3}{4}(1-\tau)\tau^2\left(\frac{R}{t}\right)^2 P_0}{\frac{1-\nu}{1+\nu} + 4\tau - 6\tau^2 + 4\tau^3 + \left(\frac{1+\nu}{1-\nu}\right)\tau^4} \qquad (20)$$

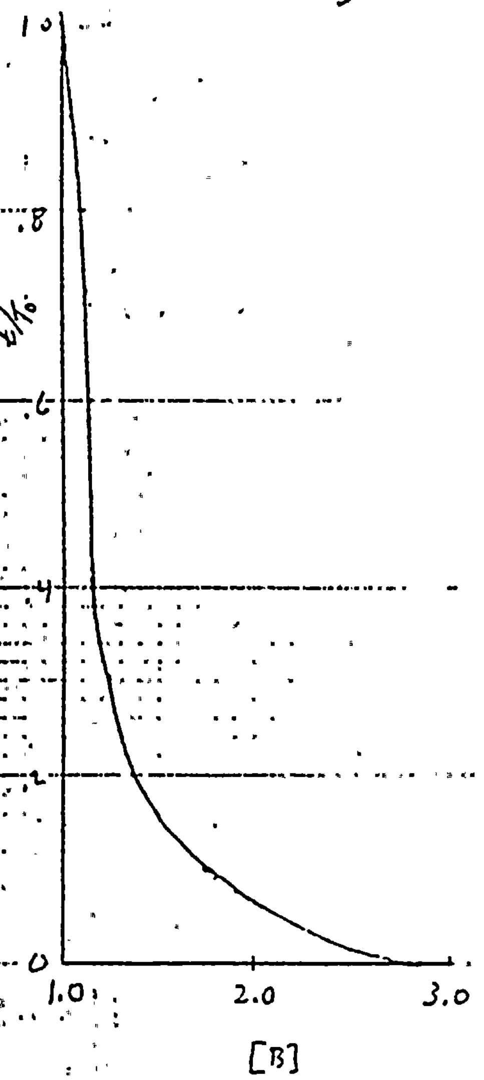
Let

$$\left.\begin{aligned} [A] &= \frac{1-\nu}{1+\nu} + 4\tau - 6\tau^2 + 4\tau^3 + \left(\frac{1+\nu}{1-\nu}\right)\tau^4 \\ [B] &= 2\left[\frac{1}{1+\nu} + \frac{\tau^3}{1-\nu}\right] / [A] \\ [C] &= \frac{3}{4}(1-\tau)\tau^2 / A \\ \nu &= 0.3 \end{aligned}\right\} \qquad (21)$$

Then

$$\frac{H_t}{t} = [B]\,\sigma_0 - [C]\left(\frac{R}{t}\right)^2 P_0$$

For t/T_0	[A]	[B]	[C]
1.0	4.396	1.0	0
0.9	3.413	1.061	0.0178
0.821		1.100	
0.8	2.707	1.109	0.0355
0.7	2.216	1.136	0.0497
0.6	1.883	1.145	0.0574
0.5	1.655	1.146	0.0567
0.4	1.482	1.161	0.0486
0.3	1.3215	1.223	0.0358
0.2	1.133	1.378	0.0212
0.156	1.033	1.500	
0.1	0.883	1.746	0.0076
0.	0.538	2.857	0



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NMP-1 SHELL THICKNESS REQUIREMENTS 6801-2

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The total local membrane plus primary bending stress is

$$P_L + P_b = [B]\,\sigma_o - [C]\left(\frac{R}{t}\right)^2 P_o + \frac{3(3+\nu)}{8}\left(\frac{R}{t}\right)^2 P_o$$

$$= [B]\,\sigma_o + \left\{1.2375 - [C]\right\}\left(\frac{R}{t}\right)^2 P_o \qquad (22)$$

Noting that $0 \leq [C] < 0.06$, it is conservative to neglect the effects of $[C]$. Then

$$P_L + P_b < [B]\,\sigma_o + 1.2375\left(\frac{R}{t}\right)^2 P_o \qquad (23)$$

The Code allowable is

$$(P_L + P_b) < 1.5\,S_m \qquad (24)$$

For Class MC S_m should be taken as S. Therefore it is required that

$$[B]\,\sigma_o + 1.2375\left(\frac{R}{t}\right)^2 P_o \leq 1.5S \qquad (25)$$

If there is no excess thickness, so that $\sigma_o = S$

$$1.2375\left(\frac{R}{t}\right)^2\left(\frac{P_o}{S}\right) \leq 1.5 - [B]$$

or $$\left(\frac{R}{t}\right)^2\left(\frac{P_o}{S}\right) \leq \frac{1.5 - [B]}{1.2375}$$

Since $$\frac{R}{t} = \frac{D/2}{T_o - d} = \frac{D/T_o}{2\left(1 - \frac{d}{T_o}\right)}$$

it is required that

$$\frac{D}{T_o} \leq 2\left[1 - \frac{d}{T_o}\right]\sqrt{\left(\frac{1.5 - [B]}{1.2375}\right)\frac{S}{P_o}} \qquad (26)$$

TELEDYNE ENGINEERING SERVICES

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For

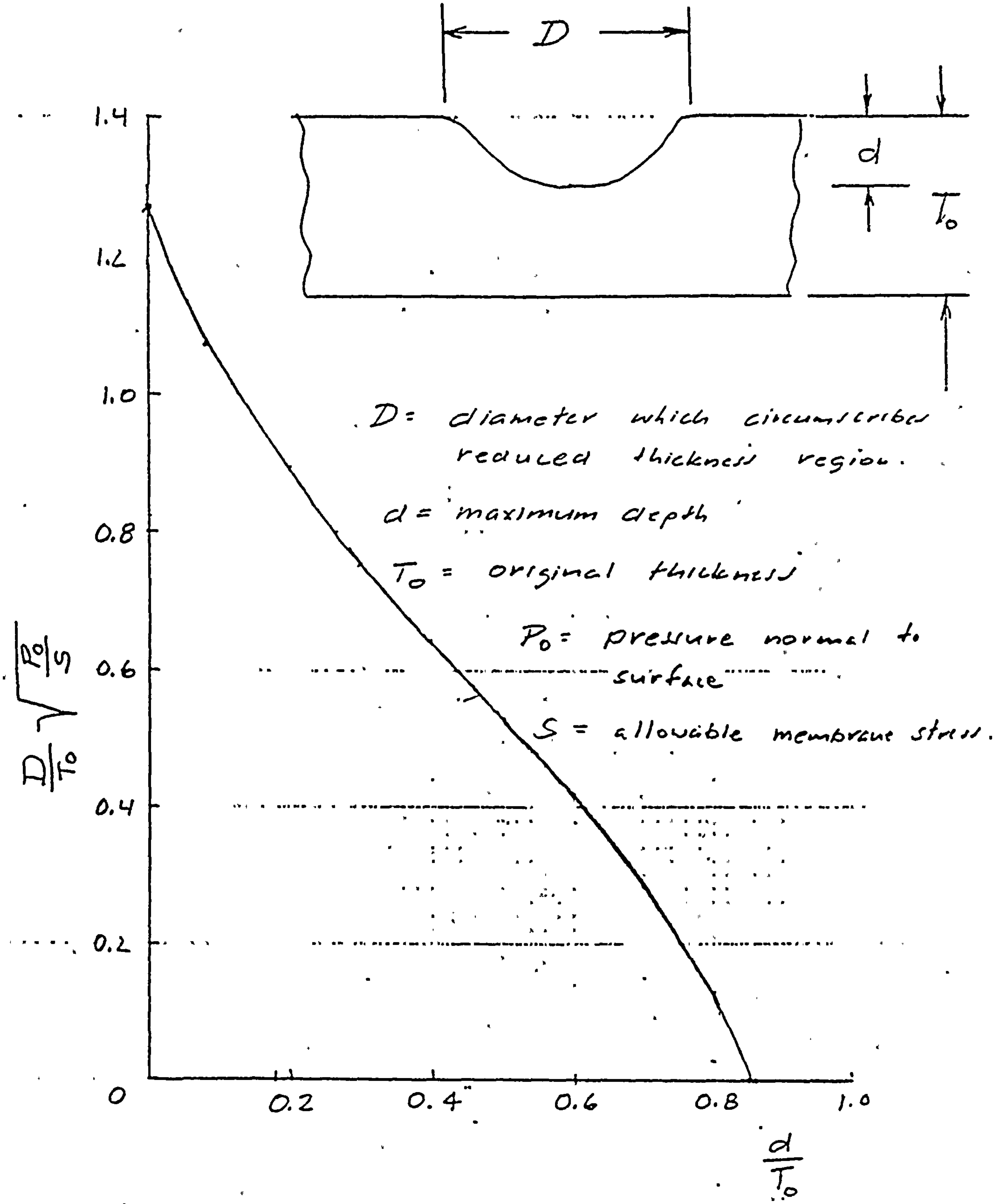
$\frac{t}{T_o} = 1 - \frac{d}{T_o}$	$[B]$	$1.5 - [B]$	$\frac{D_o}{T}\sqrt{\frac{P_o}{S}} \leq 2\left[1 - \frac{d}{T_o}\right]\sqrt{\frac{1.5 - [B]}{1.2375}}$
1.0	1.0	0.5	1.271
0.9	1.061	0.439	1.072
0.8	1.109	0.391	0.899
0.7	1.136	0.364	0.759
0.6	1.145	0.355	0.643
0.5	1.146	0.354	0.535
0.4	1.161	0.339	0.419
0.3	1.223	0.277	0.284
0.2	1.378	0.122	0.126
0.156	1.500	0	0

TELEDYNE ENGINEERING SERVICES

BY 2W DATE 790425
CHKD. BY GM DATE 6-5-79

Permissable Local Reduction in Thickness

SHEET NO. 11 OF
PROJ. NO. 6801



APPENDIX B.1

TORUS SHELL RANGE OF INDICATION SIZES

Specific dimensional data, the analyzed state of stress and the Code allowable stress intensity for the torus are used to determine the range of permissible indication sizes for the torus shell.

The results are based on the primary membrane stress intensities of A.1 and the general calculations for Class MC vessels provided in this appendix.

TELEDYNE ENGINEERING SERVICES

BY CIE DATE 12-15-87 | NMP-1 SHELL THICKNESS REQUIREMENTS 6801-2 | SHEET NO. ___ OF ___
CHKD. BY RWP DATE 12-18-87 | PROJ. NO. 6801

NMP-1 TORUS SHELL

PERMISSIBLE LOCAL REDUCTION IN THICKNESS (CONTINUED)

ELEMENT NO.	GOVERNING P_M (APPENDIX A.1)	EQUIVALENT PRESS. = P_0
11	10,902. psi	31.0 psi
13	12,975.	36.9
15	14,988	42.6
17	16,005.	45.4
19	16,025.	45.5
21	15,231.	43.3
23	13,706.	38.9
25	11,493.	32.9
27	10,289. *	29.2

* FROM EVENT 14, ALL OTHERS FROM EVENT 20.

$$P_0 = \frac{P_M t}{R} = \frac{P_M (0.460^{in})}{162.0^{in}}$$

TELEDYNE ENGINEERING SERVICES

BY K/E DATE 12-15-87 | NMP-1 SHELL THICKNESS REQUIREMENTS 6801-2 | SHEET NO. ___ OF ___
CHKD. BY RMP DATE 12-18-87 | | PROJ. NO. 6801

NMP-1 TORUS SHELL

PERMISSIBLE LOCAL REDUCTION IN THICKNESS (CONTINUED)

ELEMENT NO.	EQUIVALENT PRESSURE, P_o	$\frac{D}{T_o}\sqrt{\frac{P_o}{S}}$	NORMALIZED $\frac{D}{T_o}\sqrt{\frac{P_o}{S}} = D(f)$
11	31.0 psi	.094 D	0.824 D
13	36.9	.103 D	0.904 D
15	42.6	.110 D	0.965 D
17	45.4	.114 D	1.000 D
19	45.5	.114 D	1.000 D
21	43.3	.111 D	0.974 D
23	38.4	.106 D	0.930 D
25	32.9	.097 D	0.851 D
27	29.2	.091 D	0.800 D

WHERE: T_o = SHELL THICKNESS = 0.460 IN

S = P_M ALLOWABLE STRESS = S_{mc} = 16,500 psi

TELEDYNE ENGINEERING SERVICES

BY RKE DATE 12-16-87 | NMP-1 SHELL THICKNESS REQUIREMENTS 6801-2 | SHEET NO. ____ OF ____
CHKD. BY RMC DATE 12-21-87 | | PROJ. NO. 6801

NMP-1 TORUS SHELL

PERMISSIBLE LOCAL REDUCTION IN THICKNESS (CONT'D)

(NOMINALIZATION OF THICKNESS REDUCTION CURVE)

① $\frac{d}{T_0}$	② $d' = \frac{d}{T_0}(0.460")$	③ $\frac{D}{T_0}\sqrt{\frac{P_0'}{S}}$	④ $\frac{③}{0.114} = D'_{F_{max}}$	⑤ $\frac{④}{0.800} = D'_{F_{min}}$
0.0	0.000	1.271	11.15	13.94
0.1	0.046	1.072	9.40	11.75
0.2	0.092	0.899	7.88	9.85
0.3	0.138	0.759	6.66	8.32
0.4	0.184	0.643	5.64	7.05
0.5	0.230	0.535	4.69	5.86
0.6	0.276	0.419	3.68	4.60
0.7	0.322	0.284	2.49	3.11
0.8	0.368	0.126	1.11	1.39
0.844	0.388	0.000	0.00	0.00
0.9	0.414			
1.0	0.460			

TELEDYNE ENGINEERING SERVICES

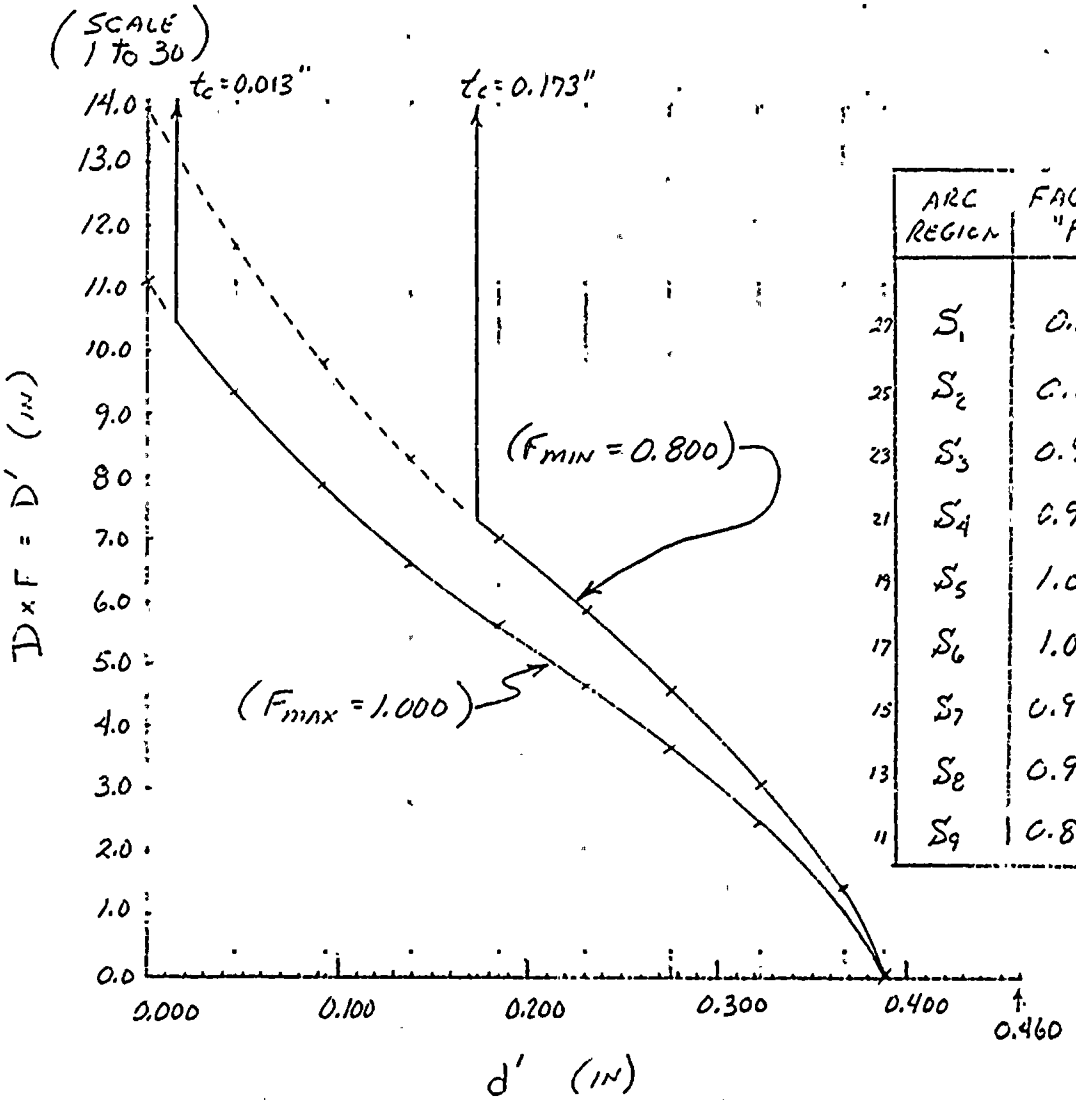
BY RAE DATE 12-16-87
CHKD. BY RMP DATE 12/21/87
REV. BY RAE 1-26-88
CHKD. BY RWP 1-26-88

NMP-1 SHELL THICKNESS
REQUIREMENTS 6801-2

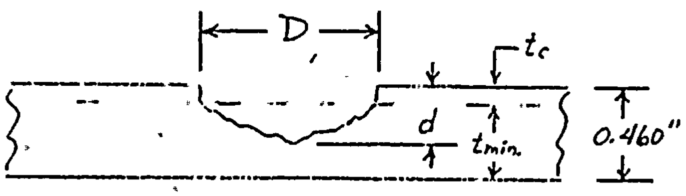
SHEET NO. ____ OF ____
PROJ. NO. 6801

NMP-1 Torus Shell

Permissible Local Reduction in Thickness (Cont'd)



	ARC REGION	FACTOR "F"	GENERAL CORROSION t_c
27	S_1	0.800	0.173"
25	S_2	0.851	0.140"
23	S_3	0.930	0.078"
21	S_4	0.974	0.035"
19	S_5	1.000	0.013"
17	S_6	1.000	0.014"
15	S_7	0.965	0.042"
13	S_8	0.904	0.098"
11	S_9	0.824	0.156"



TELEDYNE ENGINEERING SERVICES

BY KKE DATE 12-18-87
CHKD. BY RMC DATE 12-22-87

NMP-1 SHELL THICKNESS REQUIREMENTS 6801-2

SHEET NO. ____ OF ____
PROJ. NO. 6801

NMP-1 TORUS SHELL

PERMISSIBLE LOCAL REDUCTION IN THICKNESS FOR LOCAL REGION ADJACENT TO RING GIRDER

	ELEMENT No.	GOVERNING P_L	EQUIV. PRESS. P_o	$\frac{D}{T_o}\sqrt{\frac{P_o}{S}}$	NOMINALIZED D(F)
BOTTOM	123	9260. Psi *	26.3 Psi	.087 D	0.935 D
	129	10,265. *	29.1	.091 D	0.978 D
	135	9,040.	25.7	.086 D	0.925 D
	141	9,325.	26.5	.087 D	0.935 D
	147	6,712.	19.1	.074 D	0.796 D
	153	7459.	21.2	.078 D	0.839 D
	159	10,644. **	30.2	.093 D	1.000 D
TOP	165	13,187. *	37.4	.104 D	—
	171	12,225. *	34.7	.100 D	—

$$P_o = \frac{P_L t}{R} = \frac{P_L (.460'')}{162''}$$

t = T_o = SHELL THICKNESS = 0.460"

R = TORUS RADIUS = 162."

S = P_M ALLOWABLE STRESS = S_{mc} = 16,500. Psi

** P_L from EVENT 20

* P_L from EVENT 18

ALL OTHER P_L from EVENT 14

TELEDYNE ENGINEERING SERVICES

BY RAE DATE 12-18-87
CHKD. BY RWC DATE 12-26-87

NMP-1 SHELL THICKNESS REQUIREMENTS 6801-2

SHEET NO.____ OF____
PROJ. NO. 6801

NMP-1 TORUS SHELL

PERMISSIBLE LOCAL REDUCTION IN THICKNESS FOR LOCAL REGION ADJACENT TO RING GIRDER (CONT'D)

(NOMINALIZATION OF THICKNESS REDUCTION CURVES)

① $\frac{d}{T_o}$	② $d' = \frac{d}{T_o}(.460)$	③ $\frac{D}{T_o}\sqrt{\frac{P_o}{S}}$	④ $\frac{③}{0.093} = D'_{F_{max}}$	⑤ $\frac{④}{0.796} = D'_{F_{min}}$
0.0	0.000	1.271	13.67	17.16
0.1	0.046	1.072	11.53	14.48
0.2	0.092	0.899	9.67	12.13
0.3	0.138	0.759	8.16	10.25
0.4	0.184	0.643	6.91	8.68
0.5	0.230	0.535	5.75	7.22
0.6	0.276	0.419	4.51	5.66
0.7	0.322	0.284	3.05	3.83
0.8	0.368	0.126	1.35	1.70
0.844	0.388	0.000	0.00	0.00
0.9	0.414			
1.0	0.460			

TELEDYNE ENGINEERING SERVICES

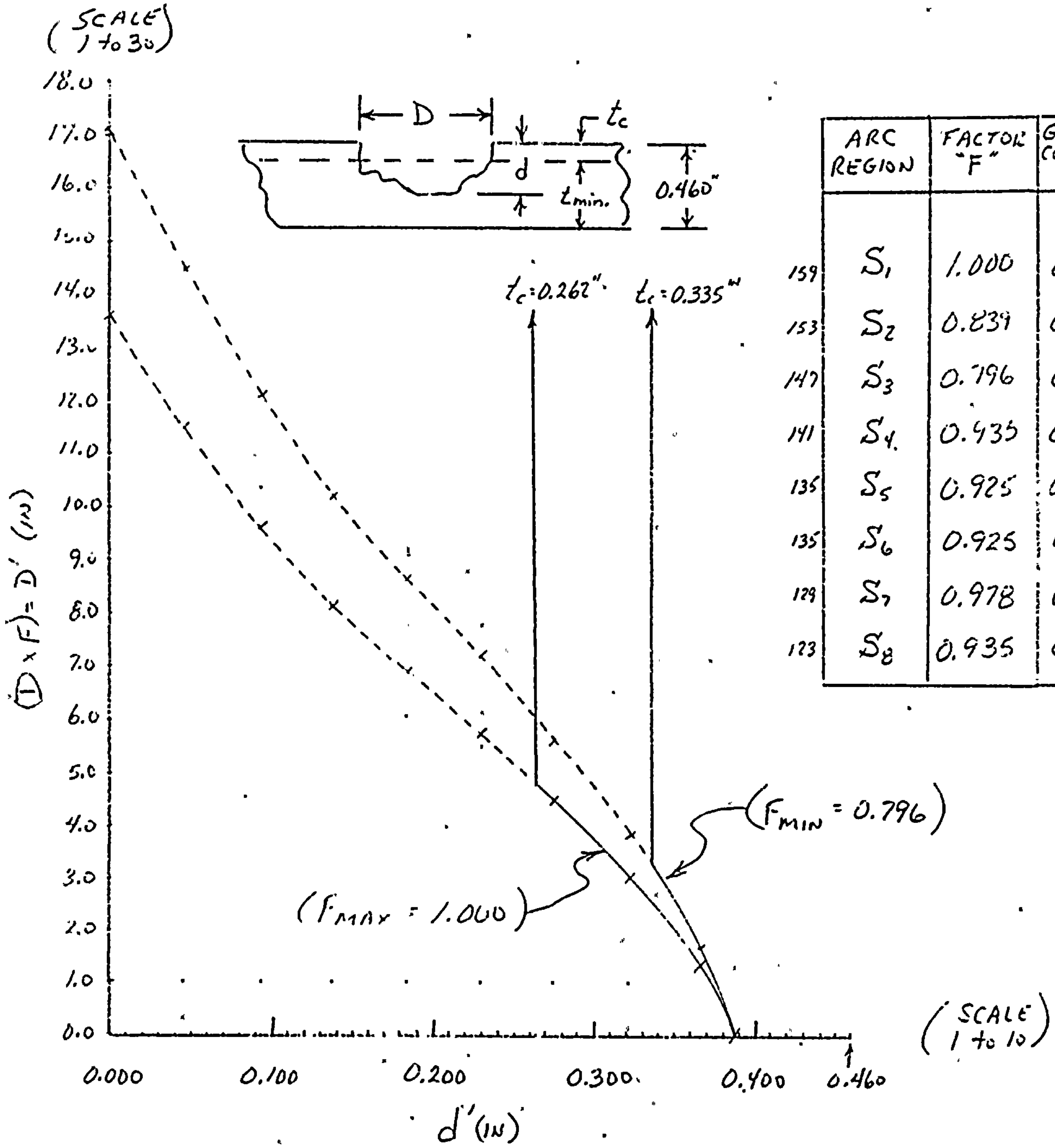
BY RAE DATE 12-18-87
CHKD. BY RMC DATE 12-22-87
REV BY RAE 1-26-88
CHKD BY RMC 1-26-88

NMP-1 SHELL THICKNESS REQUIREMENTS - 6801-2

SHEET NO. ____ OF ____
PROJ. NO. 6801

NMP-1 Torus Shell

Permissible Local Reduction In Thickness For Local Region Adjacent To Ring Girder (Cont'd)



	ARC REGION	FACTOR "F"	GENERAL CORROSION t_c
159	S_1	1.000	0.262"
153	S_2	0.839	0.321"
147	S_3	0.796	0.335"
141	S_4	0.935	0.287"
135	S_5	0.925	0.292"
135	S_6	0.925	0.292"
129	S_7	0.978	0.269"
123	S_8	0.935	0.288"

APPENDIX B.2

VENT SYSTEM RANGE OF INDICATION SIZES

The range of indication sizes for the vent system components - the vent pipe, vent header, and downcomers - were calculated using the A.2 primary membrane stress intensities as well as vent system specific dimensions by the same procedures utilized for the torus shell (B.1).

TELEDYNE ENGINEERING SERVICES

BY KAE DATE 12-18-87 | NMP-1 SHELL THICKNESS REQUIREMENTS 6801-2 | SHEET NO. ___ OF ___
CHKD. BY RMP DATE 12-23-87 | | PROJ. NO. 6501

NMP-1 VENT SYSTEM
PERMISSIBLE LOCAL REDUCTION IN THICKNESS

COMPONENT LOCATION	GOVERNING STRESS (A.2)	SHELL THICKNESS (A.2)	SHELL RADIUS	EQUIVALENT PRESS. = P_o
VENT PIPE	10,628. psi	.3125 IN	40.94 IN	81.12 psi
VENT HEADER	8,380.	.3125	29.36	89.19
DOWNCOMER	14,673.	.250	12.25	299.45
VENT PIPE @ DRYWELL	10,628.	.3125	40.94	81.12
VENT HEADER @ MITRE JOINT	16,063.	.3125	29.36	170.97
VENT HEADER @ DOWNCOMER	24,600.	.3125	29.36	261.83
DOWNCOMER @ MITRE JOINT	14,673.	.250	12.25	299.45
VENT SPHERE @ t_1	22,936.	.3125	66.00	54.30
VENT SPHERE @ t_2	22,936.	.6875	66.00	119.46
VENT SPHERE @ t_3	22,936.	.8125	66.00	141.18

SAME

SAME

$P_o = \frac{\text{Stress}(t)}{\text{Radius}}$ * for SPHERE, $P_o = \frac{\text{Stress}(t)}{2(\text{Radius})}$.

TELEDYNE ENGINEERING SERVICES

BY ____ DATE 12-18-87
CHKD. BY RMP DATE 12-23-87

NMP-1 SHELL THICKNESS REQUIREMENTS 6801-2

SHEET NO. ____ OF ____
PROJ. NO. 6801

NMP-1 VENT SYSTEM

PERMISSIBLE LOCAL REDUCTION IN THICKNESS (CONT'D)

COMPONENT LOCATION	EQUIV. PRESS. P_o	SHELL (t) T_o	$\frac{D}{T_o}\sqrt{\frac{P_o}{S}}$	NORMALIZED (DYF)
VENT PIPE (GENERAL + LOCAL)	81.12 psi	.3125 in	.224 D	1.000 D
DOWNCOMER (GENERAL + LOCAL)	299.45	.250	.539 D	1.000 D
VENT HEADER	89.19	.3125	.235 D	0.583 D
VENT HEADER @ MITRE JOINT	170.97	.3125	.326 D	0.809 D
VENT HEADER @ DOWNCOMER	261.83	.3125	.403 D	1.000 D
VENT SPHERE @ t_1	54.30	.3125	.184 D	1.000 D_{t_1}
VENT SPHERE @ t_2	119.46	.6875	.124 D	1.000 D_{t_2}
VENT SPHERE @ t_3	141.18	.8125	.114 D	1.000 D_{t_3}

WHERE: S = P_m ALLOWABLE STRESS = S_{mc} = 16,500 psi

TELEDYNE ENGINEERING SERVICES

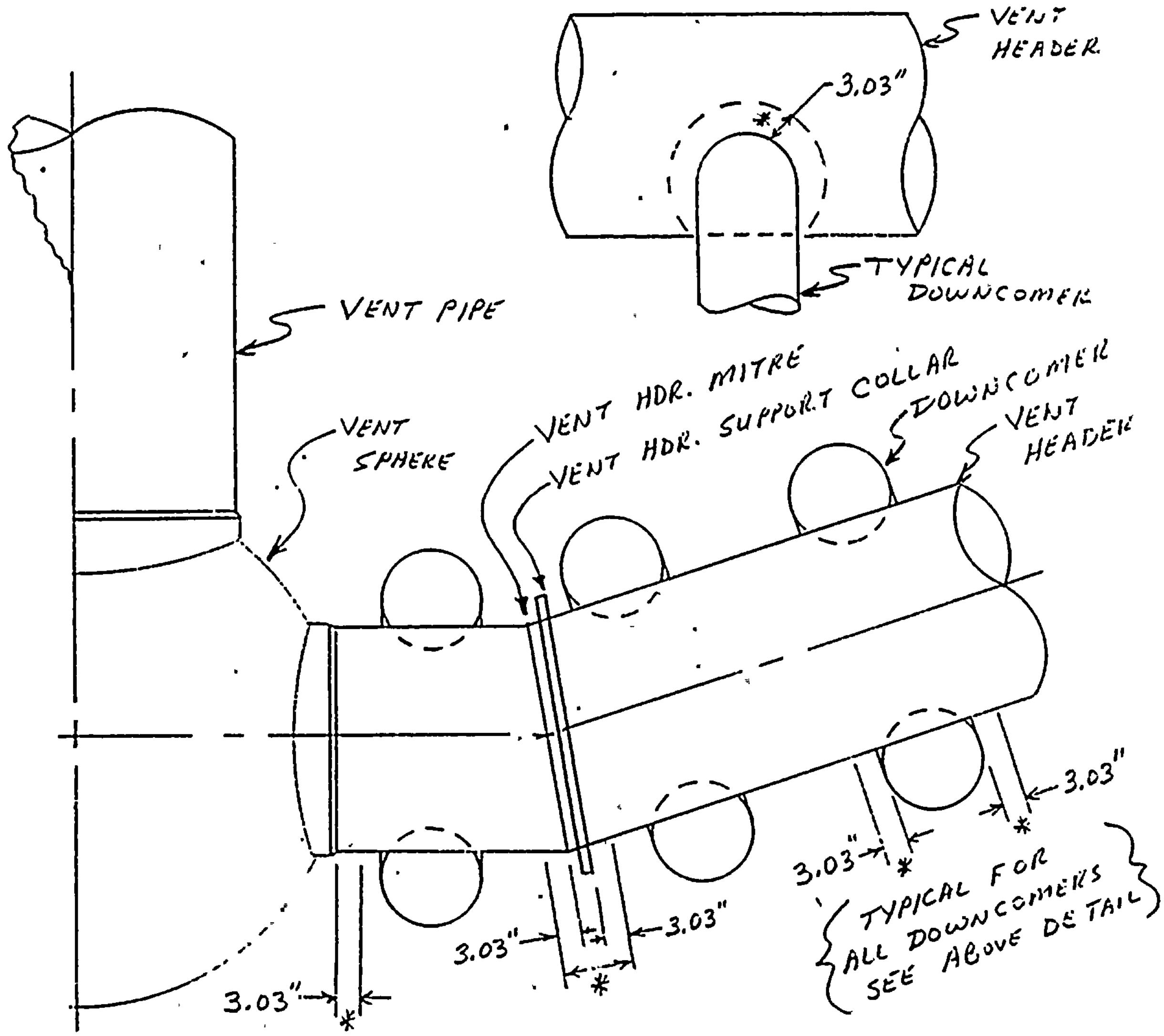
BY RAE DATE 12-23-87
CHKD. BY RMP DATE 12-23-87

NMP-1 SHELL THICKNESS REQUIREMENTS 6801-2

SHEET NO. ____ OF ____
PROJ. NO. 6801

NMP-1 VENT SYSTEM

VENT HEADER FREE AND LOCAL SHELL REGIONS



* LOCAL REGIONS ($1.0\sqrt{Rt} = 3.03''$)

TELEDYNE ENGINEERING SERVICES

BY KAE DATE 12-21-87
CHKD. BY RMV DATE 12-23-87

NMP-1 SHELL THICKNESS REQUIREMENTS 6801-2

SHEET NO. ____ OF ____
PROJ. NO. 6801

NMP-1 VENT SYSTEM

PERMISSIBLE LOCAL REDUCTION IN THICKNESS (CONT'D)

VENT PIPE GENERAL + LOCAL AREAS

(NOMINALIZATION OF. THICKNESS REDUCTION CURVE)

① $\frac{d}{T_o}$	② $d' = \frac{d}{T_o}(.3125)$	③ $\frac{D}{T_o}\sqrt{\frac{P_o}{S}}$	④ $\frac{③}{0.224} = D'_{F_{MAX}}$
0.0	0.0000"	1.271	5.67
0.1	0.0312	1.072	4.78
0.2	0.0625	0.899	4.01
0.3	0.0938	0.759	3.39
0.4	0.1250	0.643	2.87
0.5	0.1562	0.535	2.39
0.6	0.1875	0.419	1.87
0.7	0.2188	0.284	1.27
0.8	0.2500	0.126	0.56
0.844	0.2638	0.000	0.00
0.9	0.2812		
1.0	0.3125		

TELEDYNE ENGINEERING SERVICES

BY RKE DATE 12-22-87
CHKD. BY RWP DATE 12-23-87
REV BY RKE 1-26-88
CHKD BY RWP 1-26-88

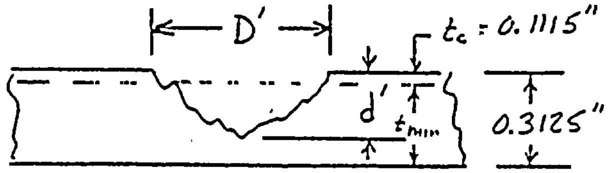
NMP-1 SHELL THICKNESS REQUIREMENTS 6801-2

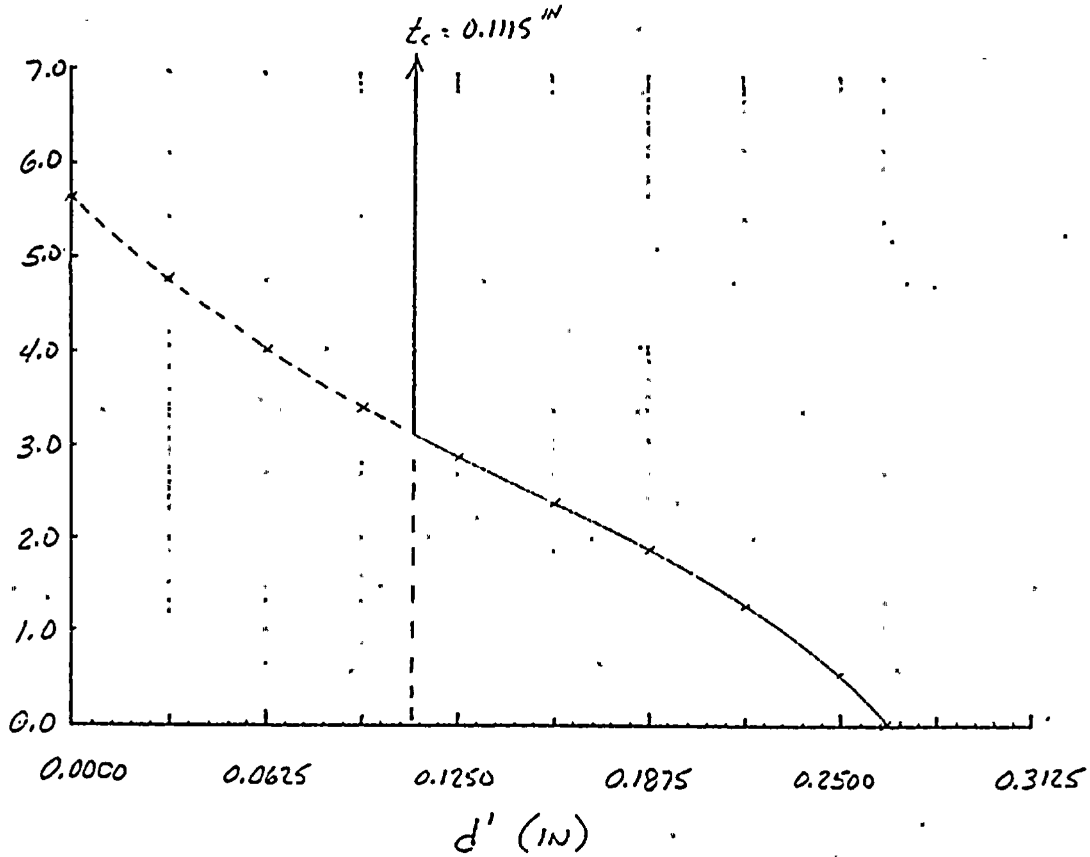
SHEET NO. ____ OF ____
PROJ. NO. 6801

NMP-1 VENT SYSTEM

PERMISSIBLE LOCAL REDUCTION IN THICKNESS (CONT'D)

VENT PIPE GENERAL + LOCAL AREAS





TELEDYNE ENGINEERING SERVICES

BY KAE DATE 12-21-87
CHKD. BY LWP DATE 12-23-87

NMP-1 SHELL THICKNESS REQUIREMENTS 6801-2

SHEET NO.____ OF____
PROJ. NO. 6801

NMP-1 VENT SYSTEM

PERMISSIBLE LOCAL REDUCTION IN THICKNESS (CONT'D)

DOWNCOMER GENERAL + LOCAL AREAS

(NOMINALIZATION OF THICKNESS REDUCTION CURVE)

1	2	3	4
$\frac{d}{T_o}$	$d' = \frac{d}{T_o}(.250)$	$\frac{D}{T_o}\sqrt{\frac{P_o}{S}}$	$\frac{③}{0.539} = D'_{F\,max}$
0.0	0.000 IN	1.271	2.36
0.1	0.025	1.072	1.99
0.2	0.050	0.899	1.67
0.3	0.075	0.759	1.41
0.4	0.100	0.643	1.19
0.5	0.125	0.535	0.99
0.6	0.150	0.419	0.78
0.7	0.175	0.284	0.53
0.8	0.200	0.126	0.23
0.844	0.211	0.000	0.00
0.9	0.225		
1.0	0.250		

TELEDYNE ENGINEERING SERVICES

BY RKE DATE 12-22-87
CHKD. BY RMP DATE 12-23-87
REV BY RKE 1-26-88
CHKD BY RMP 1-26-88

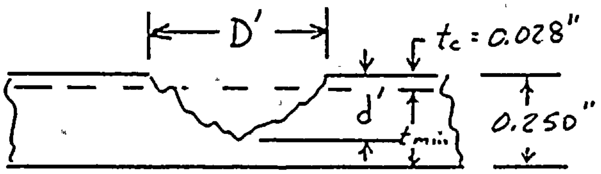
NMP-1 SHELL THICKNESS REQUIREMENTS 6801-2

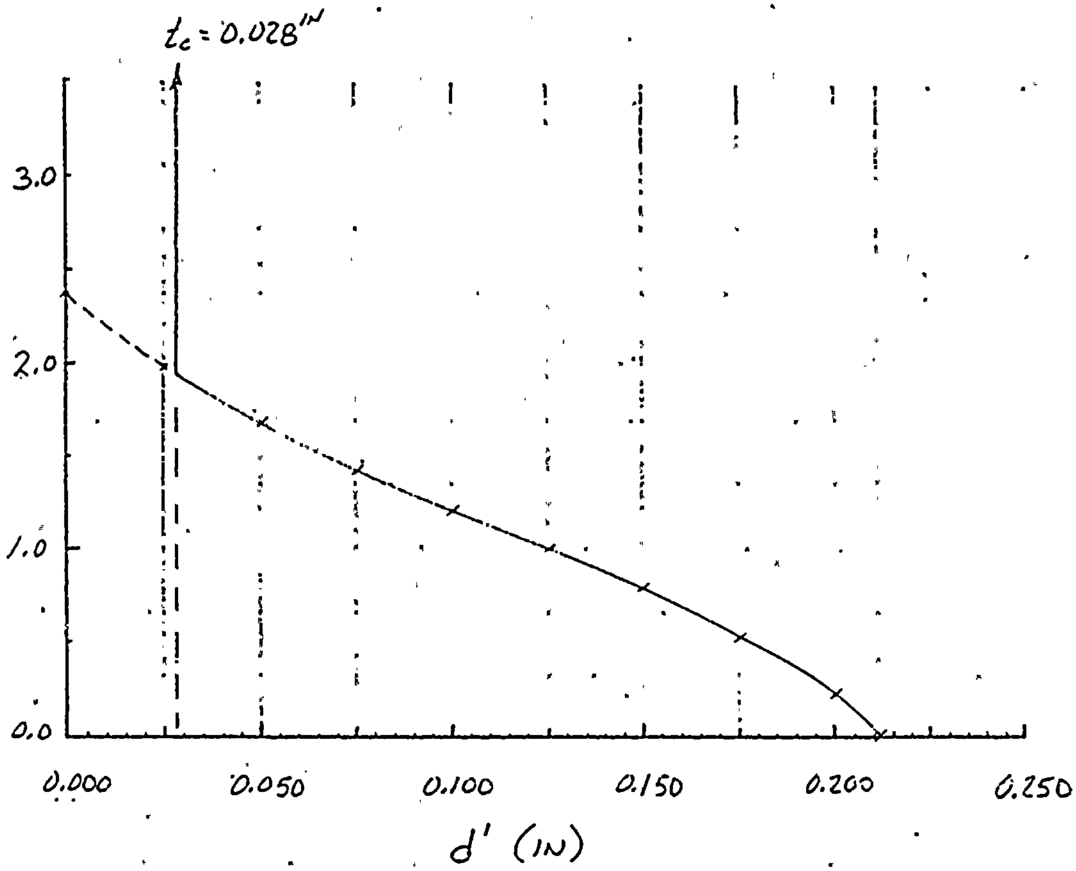
SHEET NO. ____ OF ____
PROJ. NO. 6801

NMP-1 VENT SYSTEM

PERMISSIBLE LOCAL REDUCTION IN THICKNESS (CONT'D)

DOWNCOMER GENERAL + LOCAL AREAS





TELEDYNE ENGINEERING SERVICES

BY RAF DATE 12-21-87 CHKD. BY RW DATE 12-23-87

NMP-1 SHELL THICKNESS REQUIREMENTS 6801-2

SHEET NO. ____ OF ____ PROJ. NO. 6801

NMP-1 VENT SYSTEM

PERMISSIBLE LOCAL REDUCTION IN THICKNESS (CONT'D)

VENT HEADER, + @ MITRE JOINT, + @ DOWNCOMER JOINT

(NOMINALIZATION OF THICKNESS REDUCTION CURVE)

① $\frac{d}{T_o}$	② $d' = \frac{d}{T_o}(.3125)$	③ $\frac{D}{T_o}\sqrt{\frac{P_o}{S}}$	④ $\frac{③}{0.403} = D'_{F_{MAX}\ DNCR.}$	⑤ $\frac{④}{0.809} = D'_{MITRE}$	⑥ $\frac{④}{0.583} = D'_{V.HDR\ GENERAL}$
0.0	0.0000	1.271	3.15	3.90	5.40
0.1	0.0312	1.072	2.66	3.29	4.56
0.2	0.0625	0.899	2.23	2.76	3.82
0.3	0.0938	0.759	1.88	2.33	3.22
0.4	0.1250	0.643	1.60	1.97	2.74
0.5	0.1562	0.535	1.33	1.64	2.28
0.6	0.1875	0.419	1.04	1.28	1.78
0.7	0.2188	0.284	0.70	0.87	1.20
0.8	0.2500	0.126	0.31	0.38	0.53
0.844	0.2638	0.000	0.00	0.00	0.00
0.9	0.2812				
1.0	0.3125				

TELEDYNE ENGINEERING SERVICES

BY RAE DATE 12-22-87
CHKD. BY RWC DATE 12-23-87
REV. BY RAE 1-26-88
CHKD BY RWP 1-26-88

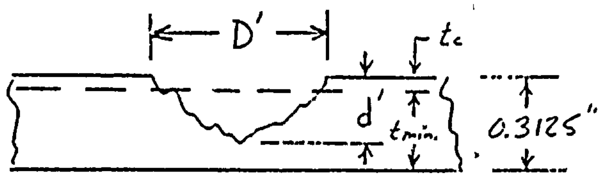
NMP-1 SHELL THICKNESS REQUIREMENTS 6801-2

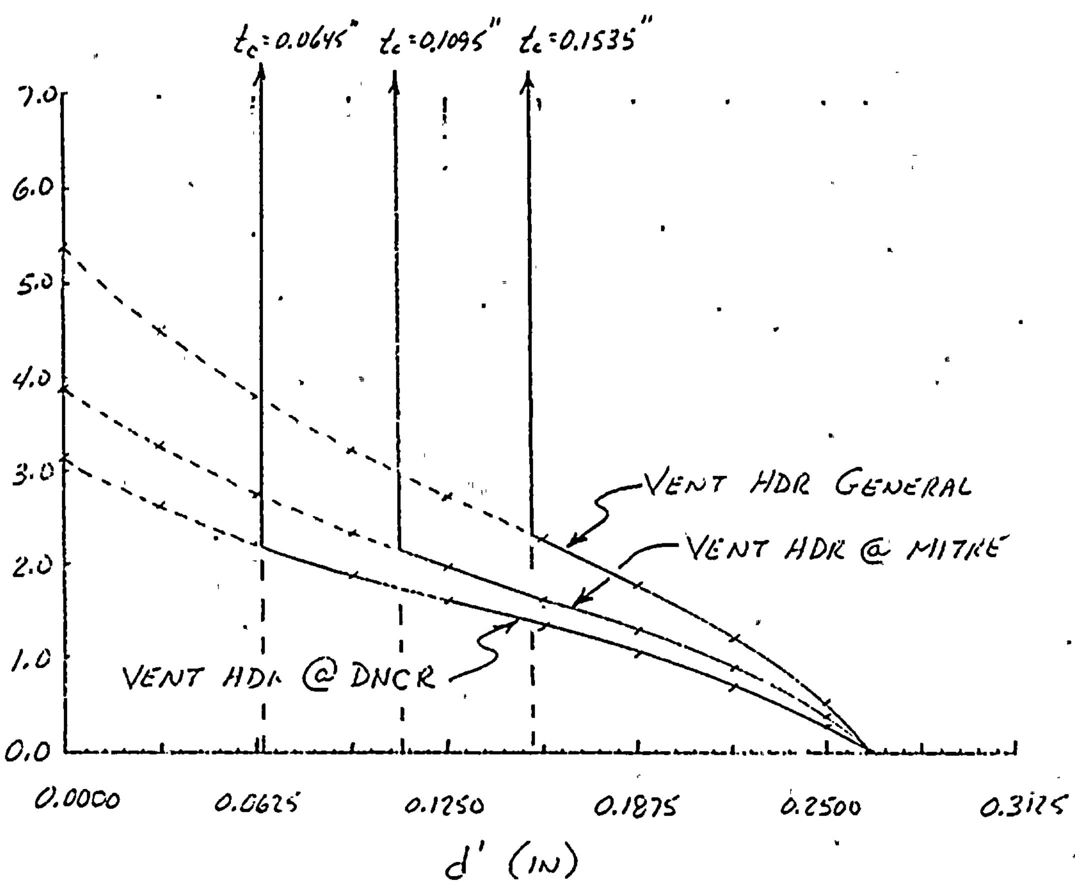
SHEET NO.____ OF____
PROJ. NO. 6801

NMP-1 VENT SYSTEM

PERMISSIBLE LOCAL REDUCTION IN THICKNESS (CONT'D)

VENT HEADER GENERAL, VENT HDR @ MITRE, VENT HDR @ DNCR





TELEDYNE ENGINEERING SERVICES

BY RAE DATE 12-21-87 | NMP-1 SHELL THICKNESS REQUIREMENTS 6801-2 | SHEET NO. ____ OF ____
CHKD. BY RMP DATE 12-23-87 | PROJ. NO. 6801

NMP-1 VENT SYSTEM

PERMISSIBLE LOCAL REDUCTION IN THICKNESS (CONT'D)

VENT SPHERE @ $t_i = 0.3125^{IN}$

(NOMINALIZATION OF THICKNESS REDUCTION CURVE)

① $\frac{d}{T_o}$	② $d' = \frac{d}{T_o}(.3125)$	③ $\frac{D}{T_o}\sqrt{\frac{P_o}{S}}$	④ $\frac{③}{0.184} = D'_{F_{MAX}}$
0.0	0.0000	1.271	6.91
0.1	0.0312	1.072	5.83
0.2	0.0625	0.899	4.88
0.3	0.0938	0.759	4.12
0.4	0.1250	0.643	3.49
0.5	0.1562	0.535	2.91
0.6	0.1875	0.419	2.28
0.7	0.2188	0.284	1.54
0.8	0.2500	0.126	0.68
0.844	0.2638	0.000	0.00
0.9	0.2812		
1.0	0.3125		

TELEDYNE ENGINEERING SERVICES

BY KHE DATE 12-21-87
CHKD. BY RW DATE 12-23-87

NMP-1 SHELL THICKNESS REQUIREMENTS 6801-2

SHEET NO. ____ OF ____
PROJ. NO. 6801

NMP-1 VENT SYSTEM

PERMISSIBLE LOCAL REDUCTION IN THICKNESS (CONT'D)

VENT SPHERE @ $t_2 = 0.6875^{IN}$

(NOMINALIZATION OF THICKNESS REDUCTION CURVE)

① $\frac{d}{T_0}$	② $d' = \frac{d}{T_0}(.6875)$	③ $\frac{D}{T_0}\sqrt{\frac{P_0}{S}}$	④ $\frac{③}{0.124} = D'_{F_{MAX}}$
0.0	0.0000	1.271	10.25
0.1	0.0688	1.072	8.64
0.2	0.1375	0.899	7.25
0.3	0.2062	0.759	6.12
0.4	0.2750	0.643	5.18
0.5	0.3438	0.535	4.31
0.6	0.4125	0.419	3.38
0.7	0.4812	0.284	2.29
0.8	0.5500	0.126	1.02
0.844	0.5802	0.000	0.00
0.9	0.6188		
1.0	0.6875		

[illegible]

BY RKG DATE 12-21-87
CHKD. BY RMP DATE 12-23-87

NMP-1 SHELL THICKNESS REQUIREMENTS 6801-2

SHEET NO. ____ OF ____
PROJ. NO. 6801

NMP-1 VENT SYSTEM
PERMISSIBLE LOCAL REDUCTION IN THICKNESS (CONT'D)
VENT SPHERE @ $t_3 = 0.8125^{in}$

(NOMINALIZATION OF THICKNESS REDUCTION CURVE)

1	2	3	4
$\frac{d}{T_o}$	$d' = \frac{d}{T_o}(.8125)$	$\frac{D}{T_o}\sqrt{\frac{P_o}{S}}$	$\frac{③}{0.114} = D'_{F_{MAX}}$
0.0	0.0000	1.271	11.15
0.1	0.0812	1.072	9.40
0.2	0.1625	0.899	7.88
0.3	0.2437	0.759	6.66
0.4	0.3250	0.643	5.64
0.5	0.4062	0.535	4.69
0.6	0.4875	0.419	3.68
0.7	0.5688	0.284	2.49
0.8	0.6500	0.126	1.10
0.844	0.6858	0.000	0.00
0.9	0.7312		
1.0	0.8125		

TELEDYNE ENGINEERING SERVICES

BY KAE DATE 12-22-87
CHKD. BY RMP DATE 12-23-87
REV BY RAE 1-26-88
CHKD BY RMP 1-26-88

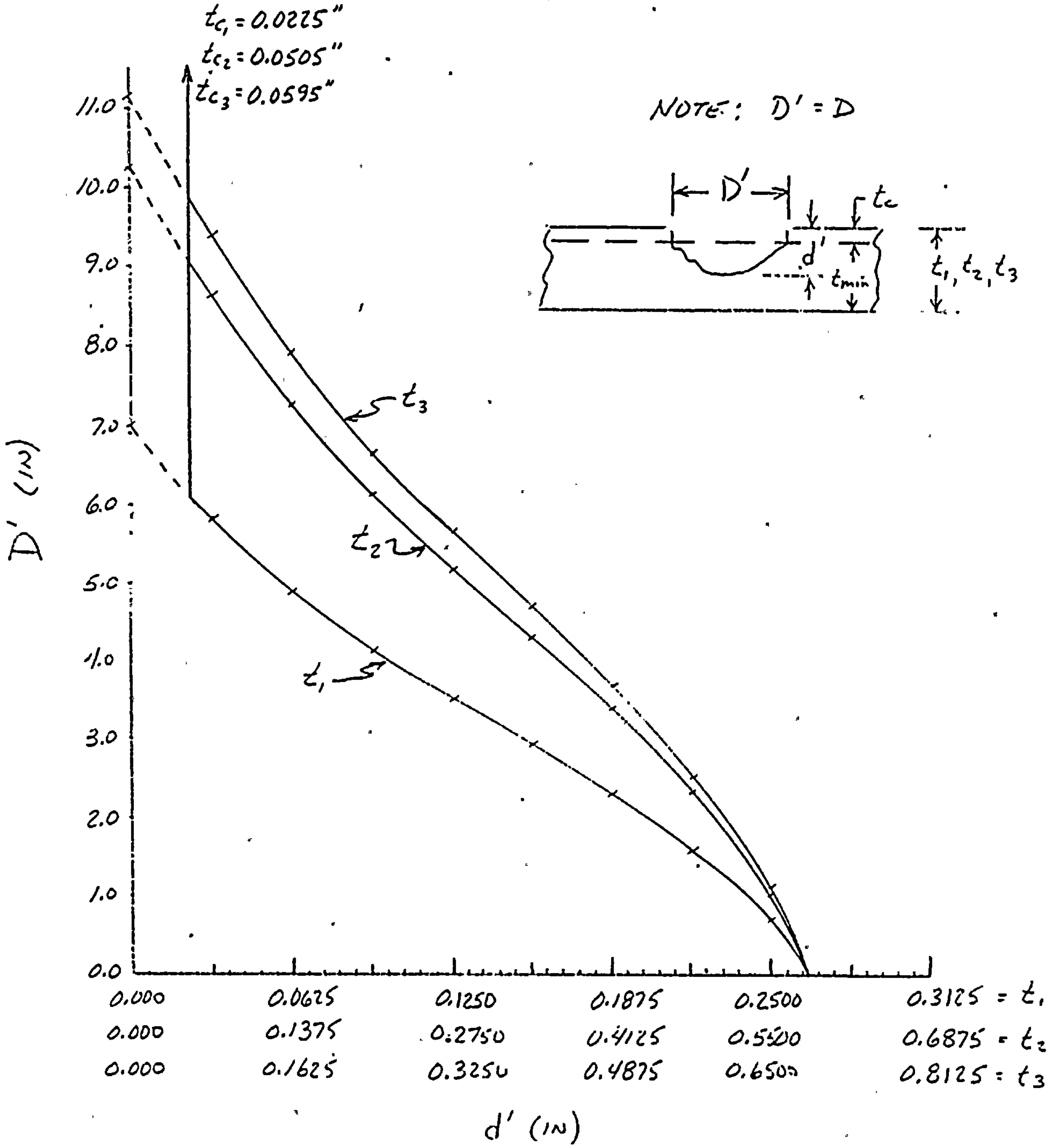
NMP-1 SHELL THICKNESS REQUIREMENTS 6801-2

SHEET NO. ____ OF ____
PROJ. NO. 6801

NMP-1 VENT SYSTEM

PERMISSIBLE LOCAL REDUCTION IN THICKNESS (CONT'D)

VENT SPHERE @ $t_1 = 0.3125''$, $t_2 = 0.6875''$, $t_3 = 0.8125''$

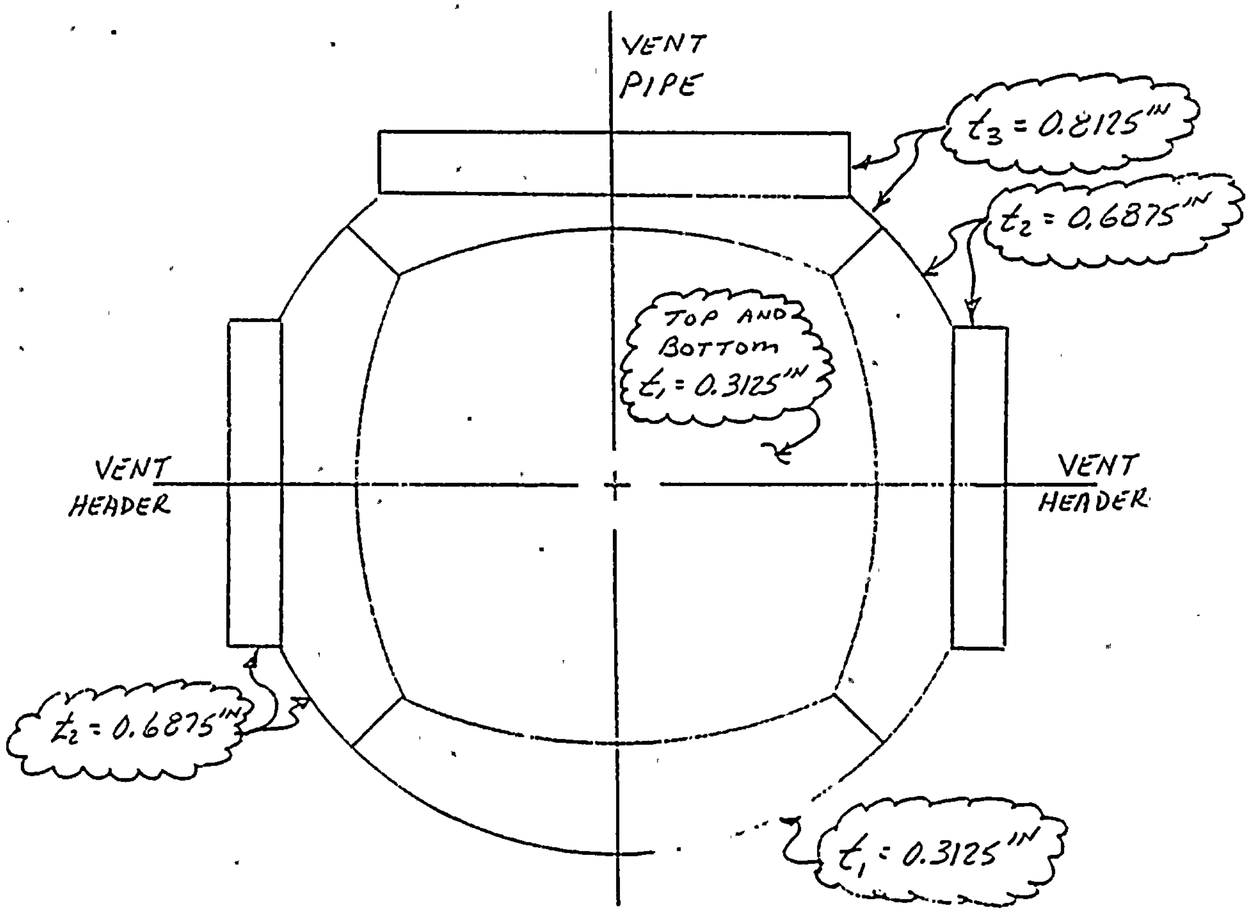


TELEDYNE ENGINEERING SERVICES

REV. BY RKE DATE 1-26-88	NMP-1 SHELL THICKNESS REQUIREMENTS 6801-2	SHEET NO. ___ OF ___
CHKD. BY RMP DATE 1-26-88		PROJ. NO. 6801

NMP-1 VENT SYSTEM

VENT SPHERE LOCAL THICKNESS REGIONS



REF #18: CB&I CONTRACT 9-1370 DWG. 316 REV. 3

SHOP DETAILS OF VENT HEADER JUNCTION

APPENDIX C

TORUS SHELL CERTIFIED MATERIAL REPORTS AND STATISTICAL ANALYSIS

The certified material reports (Reference 2) are reviewed herein to determine the margin present on the Code (Reference 4) allowable stress intensity S_{MC} for the torus shell material A201, Gr B FBX.

APPENDIX C.1

STATISTICAL ANALYSIS

The sample data extracted from the material certifications, which are presented in C.2, is evaluated herein to determine the minimum expected mean values of yield and ultimate strength at 70°F. This data was then used to approximate the minimum yield and ultimate strength of the torus shell material (A201, Gr B FBX).

TELEDYNE ENGINEERING SERVICES

BY RMP DATE 12/18/87 | NMP-1 SHELL THICKNESS REQUIREMENTS 6801-2 | SHEET NO. ___ OF ___
CHKD. BY MCR DATE 12/23/87 | | PROJ. NO. 6801

SAMPLE STATISTICS - TORUS SHELL *
(BASED ON CERTIFIED MATERIAL TEST REPORTS)
A 201 61-T GR B FBX

MATERIAL ALLOWABLE (PSI)	SAMPLE MEAN ($\bar{X}$)	STANDARD DEVIATION (S)	STANDARD ERROR ($S/\sqrt{n}$)	NUMBER OF SAMPLES (n)
S_Y	47407	1287	105	150
S_{ULB}	67076	1220	100	150
S_{ULT}	67096	1421	116	149

DETERMINE THE POPULATION MEAN (μ) BASED ON A .99 CONFIDENCE INTERVAL ESTIMATE FROM THE SAMPLE DATA (LARGE SAMPLE $n > 30$).

WHERE $\mu = \bar{X} \pm 2.58 \, (S/\sqrt{n})$

	μ_{MIN}	μ_{MAX}
S_Y	47136	47678
S_{ULB}	66818	67334
S_{ULT}	66796	67396 ← CONTROLS

* TABULARIZED DATA IS FROM SUMMARIES IN C.2

TELEDYNE ENGINEERING SERVICES

BY RMP DATE 12/18/87 CHKD. BY MGR DATE 12/23/87	NMP-1 SHELL THICKNESS REQUIREMENTS 6801.2	SHEET NO. ___ OF ___ PROJ. NO. 6801

BASED ON ARTICLES III - 1000 AND 3000 SMC THE ALLOWABLE TORUS SHELL STRESS INTENSITY IS THE LESSER OF THE FOLLOWING:

$$1.1\left[\tfrac{5}{8}\,S_{Y_{MIN}}\right]$$

$$1.1\left[\tfrac{1}{4}\,S_{U_{MIN}}\right]$$

AT 70°F

ASSUME THAT THE MINIMUM VALUES OF SY AND SU WILL OCCUR TWO STANDARD DEVIATIONS AWAY FROM THE MINIMUM ESTIMATED POPULATION MEAN (μ_{MIN}).

$$S_{Y_{MIN}} = 47136 - 2(1287) = 44562 \text{ psi}$$

$$S_{U_{MIN}} = 66796 - 2(1421) = 63954 \text{ psi}$$

NOW FIND SMC:

$$1.1\left[\tfrac{5}{8}(44562)\right] = 30.6 \text{ ksi}$$

$$1.1\left[\tfrac{1}{4}(63954)\right] = 17.6 \text{ ksi}$$

$\boxed{S_{MC} \sim 17.6 \text{ ksi}}$ AT 70°F

APPENDIX C.2

DATA EXTRACTION

The C.3 certified material reports were reviewed for the yield and ultimate strengths of the torus shell material (A201, Gr B FBX) with a shell thickness of 0.46 inches. This data was extracted and re-digitized herein.

REPORT DATE
12/22/87 15:25

TELEDYNE ENGINEERING SERVICES
130 SECOND AVENUE
WALTHAM, MASS. 02154

BY MCR DATE 12/23/87
CHKD BY RMP DATE 12/23/87

SUBJECT: NINE MILE POINT NUCLEAR STATION
MILL REPORTS
FILE 3-N2-S22.4

HEAT NUMBER	PIECE NUMBER	SY (PSI)	SU-LB (PSI)	SU-LT (PSI)
72P781	284907A	47950	68900	68650
72P781	284907B	47950	68900	68650
72P781	284908A	45850	67310	68150
72P781	284908B	47950	67310	69150
72P781	284911B	47750	65830	64110
72P781	284912A	47060	68360	68080
72P781	284912B	47060	69380	68080
72P781	284916A	46900	66010	66240
72P781	284916B	46900	66010	66240
72P781	284917A	48750	66390	66540
72P781	284920A	46350	65460	65250
72P781	284925A	45380	66560	67000
72P781	284925B	45380	66560	67000
72P781	284953B	47960	67560	67330
72P781	284954A	46180	67230	69210
72P781	284954B	46180	67230	68210
72P781	284958A	47930	67520	68740
72P781	284969B	45920	69130	66870
72P781	284970A	47850	67340	66900
72P781	284970B	47950	67340	66900
73P685	289911A	46220	66960	67240
73P685	289911B	46220	66950	67240
73P685	289912B	46990	66730	67160
73P685	289915B	47260	65200	67190
73P685	289916B	49070	66770	67290
73P685	289917A	46030	65560	64360
73P685	289917B	46030	65560	64360
73P685	289919A	46170	67000	67020
73P685	289920A	46210	66080	66070
73P685	289920B	46210	66080	66070
72P781	284953A	47960	67560	67330
72P781	284965A	47720	66720	67570
73P685	289912A	46990	66780	67160
73P685	289913A	49030	67160	66960
73P685	289913B	49030	67160	66960
73P685	289919B	46170	67000	67020
72P781	284914A	46350	67310	68290

REPORT DATE
12/22/87 15:25

TELEDYNE ENGINEERING SERVICES
130 SECOND AVENUE
WALTHAM, MASS. 02154

PAGE 2

BY MGR DATE 12/23/87

CHKD BY RMP DATE 12/23/87

SUBJECT: NINE MILE POINT NUCLEAR STATION
MILL REPORTS
FILE 3-N2-S22.4

HEAT NUMBER	PIECE NUMBER	SY (PSI)	SU-LB (PSI)	SU-LT (PSI)
72P781	284914B	46380	67310	68290
72P781	284918A	46600	67610	67720
72P781	284918B	46600	67610	67720
72P781	284926A	47080	65000	65550
72P781	284911A	47750	65830	64110
72P781	284913A	47760	66660	66200
72P781	284913B	47760	66660	66200
72P781	284915A	46900	65870	66010
72P781	284915B	46900	65870	66010
72P781	284919A	47160	65860	65900
72P781	284920B	46350	65460	65250
72P781	284921A	47070	66600	64870
72P781	284921B	47070	66600	64870
72P781	284923A	47220	65130	65640
72P781	284924B	46650	65140	66390
72P781	284926B	47080	65000	65550
72P781	284919B	47160	65860	65900
72P781	284923B	47720	65150	65640
72P781	284944A	49420	68010	67440
72P781	284944B	49420	68010	67440
72P781	284945A	46560	67160	67270
72P781	284945A1	46560	67160	67270
72P781	284948A	47440	66820	65360
72P781	284948B	47440	66820	65360
72P781	284949A	48530	67550	67080
72P781	284949B	48530	67550	67080
72P781	284956B	47840	66750	66780
72P781	284962B	47030	65000	65550
72P781	284965B	47720	66720	67570
72P781	284966A	48530	67050	68250
72P781	284966B	48530	67050	68250
72P781	284968A	48300	66640	66840
72P781	284969A	45920	63180	66870
72P781	287473A	47390	67810	66850
72P781	284947B	46370	66940	67450
72P781	284955A	48600	68190	68260
72P781	284955B	48600	68190	68260

REPORT DATE
12/22/87 15:25

TELEDYNE ENGINEERING SERVICES
130 SECOND AVENUE
WALTHAM, MASS. 02154

BY MQR DATE 12/23/87
CHKD BY RMP DATE 12/23/87

SUBJECT: NINE MILE POINT NUCLEAR STATION
MILL REPORTS
FILE 3-N2-S22.4

HEAT NUMBER	PIECE NUMBER	SY (PSI)	SU-LB (PSI)	SU-LT (PSI)
72P781	284959A	48430	67930	68130
72P781	284959B	48430	67930	68130
72P781	284963A	46390	67600	66900
72P781	284963B	46390	67600	66900
72P781	284967A	47610	67780	67030
72P781	284967B	47610	67780	67030
72P781	284971B	48310	67710	68240
72P781	284975B	46480	67240	67200
73P685	289914A	46380	67310	67070
73P685	289914B	46380	67310	67070
72P781	284960B	47690	66760	65140
72P781	284909A	47610	68800	68340
72P781	284946A	47570	68300	68570
72P781	284950A	46870	67820	68100
72P781	284950B	46870	67820	68100
72P781	284952B	48370	66760	68510
72P781	284957A	46450	67250	67600
72P781	284957B	46450	67250	67600
72P781	284958B	47930	67520	66740
72P781	284961A	48270	66300	66600
72P781	284961B	48270	66300	66600
72P781	284973B	47390	67810	66850
73P685	289915A	47260	66200	67190
68P772	282303A	48030	68550	68670
68P772	282303B	48030	68550	68670
68P772	282304A	48830	68900	68380
68P772	282304A1	48830	68900	68380
72P781	284910B	46360	67620	66960
72P781	284922A	47020	66880	66170
72P781	284922B	47080	66880	66170
72P781	284975A	46480	67240	67200
72P781	284909B	47610	68300	68340
72P781	284971B	48750	66390	66540
72P781	284960A	47690	66730	65140
73P685	289916A	49060	66770	67290
73P685	290049B	45750	63400	64470
73P685	290050A	47160	64400	64340

REPORT DATE
12/22/87 15:25

TELEDYNE ENGINEERING SERVICES
130 SECOND AVENUE
WALTHAM, MASS. 02154

PAGE 4

BY MCR DATE 12/23/87
CHKD BY RWP DATE 12/23/87

SUBJECT: NINE MILE POINT NUCLEAR STATION
MILL REPORTS
FILE 3-N2-S22.4

HEAT NUMBER	PIECE NUMBER	SY (PSI)	SU-LS (PSI)	SU-LT (PSI)
73P685	290050B	47160	64400	64340
72P781	284910A	46360	67620	65950
71P952	341708A	47030	67300	0
71P952	341709B	48910	68490	69360
71P952	343000B	49330	69320	70140
71P952	343001A	51300	69470	69730
71P952	343001B	51300	69470	69730
73P685	289918A	45680	67540	66320
73P685	289918B	45680	67540	66320
73P685	289921A	45370	64950	64440
73P685	289921A1	45370	64950	64440
73P693	301657A	47210	66540	65960
73P693	301657B	47210	66540	65860
73P685	290055A	46490	65280	64430
73P685	290055B	46490	65280	64430
71P952	343000A	49330	69320	70140
73P693	301659A	47420	65350	66500
73P685	290052A	48020	66140	65960
73P685	290052B	48020	66140	65960
73P685	290054A	46300	64830	65400
73P685	290054B	46300	64830	65400
71P952	341695A	49650	68850	69500
71P952	341695B	49650	68850	69500
73P685	289922A	46580	67160	67300
73P685	289922A1	46590	67160	67300
71P952	341686A	50670	69520	70310
71P952	341686B	50670	69520	70310
71P952	341694A	50050	68660	68470
71P952	341694B	50050	68660	68470
71P952	341709A	48910	68490	69360
71P952	341710A	49160	68420	69520
71P952	341710B	49160	68420	69520
71P952	341711B	48150	67460	69220
71P952	C03998	48340	67880	68820
71P952	341685A	47860	67760	68340
71P952	341685B	47860	67760	68340
71P952	341708B	47090	67300	69520

REPORT DATE
12/22/87 15:25

TELEDYNE ENGINEERING SERVICES
130 SECOND AVENUE
WALTHAM, MASS. 02154

PAGE 5

BY MCR DATE 12/23/87
CHKD BY RM DATE 12/23/87

SUBJECT: NINE MILE POINT NUCLEAR STATION
MILL REPORTS
FILE 3-N2-S22.4

HEAT NUMBER	PIECE NUMBER	SY (PSI)	SU-LB (PSI)	SU-LT (PSI)
73P693	291571	45920	63950	65200
72P781	284946A	47570	68300	68570

STATISTICS SUMMARY FOR VARIABLE SY

	SY
MEAN	47407
STD DEV	1286.76
STD ERR	105.06
MINIMUM	43270
MAXIMUM	51300
RANGE	8030

NMP-1 SHELL THICKNESS REQUIREMENTS 680-.-

BY MCR DATE 12/23/87
CHKD BY RMP DATE 12/23/87

STATISTICS SUMMARY FOR VARIABLE SU-LB

	SU.LB
MEAN	67076
STD DEV	1220.46
STD ERR	99.65
MINIMUM	63400
MAXIMUM	69520
RANGE	6120

NMP-1 SHELL THICKNESS
REQUIREMENTS 6801-2

BY MCR DATE 12/23/87
CHKD BY RMP DATE 12/23/87

STATISTICS SUMMARY FOR VARIABLE SU-LT

	SU.LT
MEAN	67096
STD DEV	1420.80
STD ERR	116.40
MINIMUM	64110
MAXIMUM	70310
RANGE	6200

NMP-1 SHELL THICKNESS
REQUIREMENTS 6801-2

BY MQR DATE 12/23/87
CHKD BY RMP DATE 12/23/87

TELEDYNE ENGINEERING SERVICES

BY Rmp DATE 12/23/87
CHKD. BY [illegible] DATE 12-23-87

NMP-1 SHELL THICKNESS REQUIREMENTS 6801-2

SHEET NO.____ OF____
PROJ. NO.____

THE FOLLOWING REPRESENTS A CHECK OF THE PROGRAM USED TO GENERATE THE MEAN, STANDARD DEVIATION AND STANDARD ERROR ASSOCIATED WITH THE SAMPLE DATA.

REPORT DATE
12/22/87 16:58

TELEDYNE ENGINEERING SERVICES
130 SECOND AVENUE
WALTHAM, MASS. 02154

PAGE 1

BY MGR DATE 12/23/87
CHKD BY RWP DATE 12/23/87

SUBJECT: NINE MILE POINT NUCLEAR STATION
MILL REPORTS
FILE 3-N2-S22.4

HEAT NUMBER	PIECE NUMBER	SY (PSI)	SU-LB (PSI)	SU-LT (PSI)
73P685	2900498	45730	63400	64470
73P685	290050A	47160	64400	64340
73P685	290050B	47160	64400	64340
73P685	290055A	46490	65280	64430
73P685	290055B	46490	65280	64430
73P685	290052A	48020	66140	65960
73P685	290052B	48020	66140	65960
73P685	290054A	46300	64830	65400
73P685	290054B	46300	64830	65400
	$\Sigma =$	421,690	584,700	584,730
	$\bar{X} =$	46,854	64,967	64,970

FULL TEST CASE

STATISTICS SUMMARY FOR VARIABLE SY

NMP-1 SHELL THICKNESS
REQUIREMENTS 680...

BY MCR DATE 12/23/87
CHKD BY RMP DATE 12/23/87

	SY
MEAN	46854
STD DEV	790.89
STD ERR	263.63
MINIMUM	45750
MAXIMUM	48020
RANGE	2270

SY	$(SY - \bar{X}_{SY})$	$(SY - \bar{X}_{SY})^2$
45750	-1104	1,218,816
47160	306	93,636
47160	306	93,636
46490	-364	132,496
46490	-364	132,496
48020	1166	1,359,556
48020	1166	1,359,556
46300	-554	306,916
46300	-554	306,916

$\Sigma = 5{,}004{,}024$

$$STD\ DEV = \sqrt{\frac{\Sigma (SY - \bar{X}_{SY})^2}{n-1}} = \sqrt{\frac{5{,}004{,}024}{8}} = 790.89$$

$$STD\ ERR = \frac{STD\ DEV}{\sqrt{n}} = \frac{790.89}{3} = 263.63$$

STATISTICS SUMMARY FOR VARIABLE SU-LR

	SU.LE
MEAN	64966
STD DEV	872.05
STD ERR	290.68
MINIMUM	63400
MAXIMUM	66140
RANGE	2740

NMP-1 SHELL THICKNESS
REQUIREMENTS 680-.2

BY MCR DATE 12/23/87
CHKD BY RMP DATE 12/23/87

STATISTICS SUMMARY FOR VARIABLE SU-LT

	SU.LT
MEAN	64970 ✓
STD DEV	703.30
STD ERR	234.43
MINIMUM	64340
MAXIMUM	65960
RANGE	1620

NMP-1 SHELL THICKNESS REQUIREMENTS 6801-2

BY mcR DATE 12/23/87
CHKD BY RMP DATE 12/23/87

APPENDIX C.3

CERTIFIED MATERIAL REPORTS

The Reference 2 certified material reports were reviewed for the torus shell data (i.e., A201, Gr B FBX, t=0.46 inches). The information specific to the torus shell is provided herein.

NIAGARA MOHAWK POWER CORPORATION

NIAGARA MOHAWK

BUFFALO, NEW YORK 14203

December 13, 1965

Stone & Webster Engineering Corporation
P. O. Box #64
Lycoming, New York - 13903

Attention: Mr. C. E. Goodman

Subject: Nine Mile Point Nuclear Station
Mill Reports
File 3-N2-S22.4

Gentlemen:

We are enclosing copies of a complete set of certified mill reports for the CB&I contract work.

Yours very truly,

NIAGARA MOHAWK POWER CORPORATION

G. E. Sanford

G. E. Sanford

GES:RC
Enc.
cc: M. W. Morris

NOTED
DEC 15 1965
D. R. WARREN

PRODUCTION DEPARTMENT – METALLURGICAL

United States Steel Corporation

TEST REPORT OF PLATES

WORKS HOMESTEAD DISTRICT U.S.S. ORDER NO. HP83405 INVOICE NO. 164-0-42345

CUSTOMER ORDER NO. 9-1370 SHEET 1 10/9/64

CAR OR TRUCK NO. EJCE006701 SHIPPER NO. & DATE 56051 160

STATE OF PENNSYLVANIA
COUNTY OF ALLEGHENY

SUBSCRIBED AND SWORN TO BEFORE ME THIS 10th DAY OF Dec. 19 [illegible] H. FAWCETT, Notary Public, Pittsburgh, Allegheny Co., Penna. My Commission Expires May 25, 1965

CHICAGO BRIDGE & IRON CO
P O BOX 610
GREENVILLE PA

SHIP TO

CHICAGO BRIDGE & IRON CO
GREENVILLE PA

BEING DULY SWORN ACCORDING TO LAW, DESPOSES AND SAYS THAT THE CHEMICAL ANALYSIS AND/OR TESTS SHOWN IN THIS REPORT ARE CORRECT AS CONTAINED IN THE RECORDS OF THE COMPANY.

ASTM A 201 61T GR B FIREBOX FINE GRAIN NORMALIZE & FLATTEN TO STD
& CLS ASTM A 300 CHARPY IMPACT LONG TEST AT MINUS 50 DEG F

03986

MILL & SEP SH TR SHOW FA ALSO ASTM A-201-61T GRADE B
FIREBOX ALSO ASTM A-300-58 & CHARPY IMPACT TEST RESULTS

0706

SIGNATURE J.L. GIOVE, CH. MET.

DATE 12/09/64

ITEM NO	HEAT NO	PIECE IDENTITY NO		NO. PCS	THICKNESS OR SECTION	WIDTH, DIA, OR FT. WT.	LENGTH	WEIGHT	YIELD PT. PSI.	TENSILE STR. PSI.	ELONGATION % IN 8"	ELONGATION % IN 2"	% RED OF AREA	
1	72P781	284907A	LB CT	1	.46000	120	255 3/8	4080	47950	68900 68650	32.0			BH
1	72P781	284907B	LB CT	1	.46000	120	255 3/8	4070	47950	68900 68650	32.0			BH
1	72P781	284908A	LB CT	1	.46000	120	255 3/8	4100	45850	67310 68150	32.0			BH
1	72P781	284908B	LB LT	1	.46000	120	255 3/8	4090	47950	67310 68150	32.0			BH
1	72P781	284911B	LB CT	1	.46000	120	255 3/8	4080	47750	65830 64110	32.0			BH
1	72P781	284912A	LB CT	1	.46000	120	255 3/8	4100	47060	68380 68080	29.5			BH
1	72P781	284912B	LB CT	1	.46000	120	255 3/8	4110	47060	68380 68080	29.5			BH
1	72P781	284916A	LB LT	1	.46000	120	255 3/8	4170	46900	66010 66240	31.0			BH
1	72P781	284916B	LB LT	1	.46000	120	255 3/8	4170	46900	66010 66240	31.0			BH
1	72P781	284917A	LB CT	1	.46000	120	255 3/8	4100	48750	66390 66340	2810			BH
1	72P781	284920A	LB CT	1	.46000	120	255 3/8	4150	46350	65460 65250	31.0			BH

WHEN SIZE TESTED ACCORDING TO COMPANY RECORDS CONFORMS TO THE REQUIREMENTS OF THE SPECIFICATION LISTED ABOVE.

See Sheet #3 for Impact Values

HEAT NO.		C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	Al	N	V	B	Ti	Cb	Co
72P781	1	14	112	012	022	29						050						

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PRODUCTION DEPARTMENT - METALLURGICAL

PRODUCTION DEPARTMENT - METALLURGICAL

United States Steel Corporation

Sheet #2

TEST REPORT OF PLATES

WORKS HOMESTEAD DISTRICT U.S.S. ORDER NO. HP83405 INVOICE NO. 164-0-42345

CUSTOMER ORDER NO. 9-1370 SHEET 1 10/9/64

CAR OR TRUCK NO. EJ&E006701 SHIPPER NO & DATE 56051 160

STATE OF PENNSYLVANIA
COUNTY OF ALLEGHENY

SUBSCRIBED AND SWORN TO BEFORE ME THIS 10th DAY OF Dec. 1964

JUSE M. FAWCETT, Notary Public
Pittsburgh, Allegheny Co., Penna.
My Commission Expires May 20, 1965.

SOLD TO: CHICAGO BRIDGE & IRON CO
P O BOX 410
GREENVILLE PA

SHIP TO: CHICAGO BRIDGE & IRON CO
GREENVILLE PA

ASTM A 201 61T GR B FIREBOX FINE GRAIN NORMALIZE & FLATTEN TO STD
T OLS ASTM A 300 CHARPY IMPACT LONG TEST AT MINUS 50 DEG F

03986

BILL 4 SEP SR TR SHOW FA ALSO ASTM A-201-61T GRADE B
FIREBOX ALSO ASTM A-300-58 & CHARPY IMPACT TEST RESULTS

0706

BEING DULY SWORN ACCORDING TO LAW, DESPOSES AND SAYS THAT THE CHEMICAL ANALYSIS AND/OR TESTS SHOWN IN THIS REPORT ARE CORRECT AS CONTAINED IN THE RECORDS OF THE COMPANY.

SIGNATURE J.L. GIOVE, CH. MET.

DATE 12/09/64

TEST NO.	HEAT NO.	PIECE IDENTITY NO.	NO PCS	THICKNESS OR SECTION	WIDTH, DIA OR FT. WT	LENGTH	WEIGHT	YIELD PT. PSI.	TENSILE STR. PSI.	ELONGATION % IN 8"	ELONGATION % IN 2"	% RED. OF AREA	
1	72P781	284925A LB LT	1	.46000	120	255 3/8	4150	45380	66560 67000	31.0			BH
1	72P781	284925B LB LT	1	.46000	120	255 3/8	4140	45380	66560 67000	31.0			BH
1	72P781	284953B LB LT	1	.46000	120	255 3/8	4100	47960	67560 67330	34.5			BH
1	72P781	284954A LB LT	1	.46000	120	255 3/8	4110	46180	67230 68210	32.5			BH
1	72P781	284954B LB LT	1	.46000	120	255 3/8	4140	46180	67230 68210	32.5			BH
1	72P781	284958A LB LT	1	.46000	120	255 3/8	4240	47930	67520 68140	32.5			BH
1	72P781	284969B LB LT	1	.46000	120	255 3/8	4170	45920	68180 68810	30.0			BH
1	72P781	284970A LB LT	1	.46000	120	255 3/8	4170	47850	67340 68960	30.5			BH
1	72P781	284970B LB LT	1	.46000	120	255 3/8	4180	47850	67340 68900	30.5			BH
1	73P685	289911A LB LT	1	.46000	120	255 3/8	4150	46220	66960 67240	33.0			BH
1	73P685	289911B LB LT	1	.46000	120	255 3/8	4100	46220	66960 67240	33.0			BH

SPECIMENS ARE TESTED ACCORDING TO COMPANY RECORDS CONFORMS TO THE REQUIREMENTS OF THE SPECIFICATION LISTED ABOVE.

See Sheet #3 for Impact Values

HEAT NO.	TYPE	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	Al	N	V	B	Ti	Cb	Co
72P781	1	14	112	012	022	29						050						
73P685	1	13	115	009	024	27												

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PRODUCTION DEPARTMENT – METALLURGICAL

United States Steel Corporation

Sheet #3

TEST REPORT OF PLATES

WORKS HOMESTEAD DISTRICT U.S.S. ORDER NO. HP83405 INVOICE NO. 164-0-42345

CUSTOMER ORDER NO. 9-1370 SHEET 1 10/9/64

CAR OR TRUCK NO. EJEE006701 SHIPPER NO & DATE 56051 160

STATE OF PENNSYLVANIA
COUNTY OF ALLEGHENY

SUBSCRIBED AND SWORN TO BEFORE ME THIS 10th DAY OF Dec. 1964

OTIS M. FAWCETT, Notary Public
Pittsburgh, Allegheny Co., Penna.
My Commission Expires
May 24, 1965

CHICAGO BRIDGE & IRON CO
P O BOX 610
GREENVILLE PA

SHIP TO
CHICAGO BRIDGE & IRON CO
GREENVILLE PA

BEING DULY SWORN ACCORDING TO LAW, DEPOSES AND SAYS THAT THE CHEMICAL ANALYSIS AND/OR TESTS SHOWN IN THIS REPORT ARE CORRECT AS CONTAINED IN THE RECORDS OF THE COMPANY.

ASTM A 201 61T GR B FIREBOX FINE GRAIN NORMALIZE & FLATTEN TO STD
F-ULS ASTM A 300 CHARPY IMPACT LONG TEST AT MINUS 50 DEG F

03986

MILL 6 SEP SH TR SHOW FA ALSO ASTM A-201-61T GRADE B
FIREBOX ALSO ASTM A-300-58 & CHARPY IMPACT TEST RESULTS

0706

SIGNATURE J.L. GIOVE, CH. MET.

DATE 12/09/64

ITEM NO.	HEAT NO.	PIECE IDENTITY NO.	NO. PCS.	THICKNESS OR SECTION	WIDTH, DIA. OR FT. WT	LENGTH	WEIGHT	YIELD PT. PSI.	TENSILE STR. PSI.	ELONGATION % IN 8"	ELONGATION % IN 2"	% RED. OF AREA	
1	73P685	289912B LB CT	1	.46000	120	255 3/8	4140	46990	66780 67160	28.0			B
1	73P685	289915B LB CT	1	.46000	120	255 3/8	4080	47260	66200 67190	32.0			B
1	73P685	289916B LB CT	1	.46000	120	255 3/8	4180	49070	66170 67290	29.5			B
1	73P685	289917A LB CT	1	.46000	120	255 3/8	4260	46030	65560 64360	31.0			B
1	73P685	289917B LB CT	1	.46000	120	255 3/8	4270	46030	65560 64360	31.0			B
1	73P685	289919A LB CT	1	.46000	120	255 3/8	4270	46170	67000 67020	33.0			B
1	73P685	289920A LB CT	1	.46000	120	255 3/8	4180	46210	66080 66070	33.0			B
1	73P685	289920B LB CT	1	.46000	120	255 3/8	4180	46210	66060 66070	33.0			B

284925 Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF-73-73-72 Ft. Lbs.
284953 Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF-111-82-77 Ft. Lbs.
284954 Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF-83-80-111 Ft. Lbs.
284958 Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF-76-132-160 Ft. Lbs.

SPECIMEN WE TESTED ACCORDING TO COMPANY RECORDS CONFORMS TO THE REQUIREMENTS OF THE SPECIFICATION LISTED ABOVE.

See Sheet #4

HEAT NO	TYPE	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	Al	N	V	B	Ti	Cb	Co
73P685	1	13	115	009	024	27												

PRODUCTION DEPARTMENT – METALLURGICAL

United States Steel Corporation

Sheet #4

TEST REPORT OF PLATES

WORKS [illegible] DISTRICT U.S.S. ORDER NO. HP 83405 INVOICE NO. 164-0-42345

CUSTOMER'S ORDER NO. 9-1370 10/9/64

CAR OR TRUCK NO. [illegible] 006701 SHIPPER NO. & DATE 56051 160

STATE OF PENNSYLVANIA
COUNTY OF ALLEGHENY

SUBSCRIBED AND SWORN TO BEFORE ME
THIS 10th DAY OF Dec. 1964

[illegible] M. FAWCETT, Notary Public
Pittsburgh, Allegheny Co., Penna.
My Commission Expires [illegible] 25, 1965

CHICAGO BRIDGE & IRON CO
PO BOX 610
GREENVILLE PA

SHIP TO

CHICAGO BRIDGE & IRON CO
GREENVILLE PA

BEING DULY SWORN ACCORDING TO LAW; DEPOSES AND SAYS THAT THE CHEMICAL ANALYSES AND/OR TESTS SHOWN IN THIS REPORT ARE CORRECT AS CONTAINED IN THE RECORDS OF THE COMPANY.

SIGNATURE J.L. GLOVE, CH. MET.

DATE 12/9/64

ITEM NO.	HEAT NO.	PIECE IDENTITY NO.	MATERIAL DESCRIPTION / TEST RESULTS
	721731	284969	Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF-66-74-71 Ft. Lbs.
		284970	Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF-105-94-110 Ft. Lbs.
	731685	289911	Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF-65-72-81 Ft. Lbs.
		289912	Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF-93-91-81 Ft. Lbs.
		289915	Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF-73-77-76 Ft. Lbs.
		289916	Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF-119-97-66 Ft. Lbs.
		289917	Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF-105-103-111 Ft. Lbs.
		289919	Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF-136-91-87 Ft. Lbs.
		289920	Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF-87-109-93 Ft. Lbs.
	721731	284907	Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF-86-90-86 Ft. Lbs.
		284908	Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF-98-67-83 Ft. Lbs.
		284911	Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF-180-184-187 Ft. Lbs.
		284912	Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF-56-65-59 Ft. Lbs.
		284916	Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF-105-142-152 Ft. Lbs.
		284917	Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF-122-81-72 Ft. Lbs.
		284920	Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF-77-87-76 Ft. Lbs.

WHEN THE TESTED ACCORDING TO COMPANY RECORDS CONFORMS TO THE REQUIREMENTS OF THE SPECIFICATION LISTED ABOVE.

Plates Normalized

HEAT NO.	C	Mn	P	S	Si	Cu	Ni	Cr	Mo
721731	14	1 12	012	022	29		Grain	Size	#8
731685	13	1 15	009	024	27		Grain	Size	#8

C-24

PRODUCTION DEPARTMENT – METALLURGICAL
United States Steel Corporation

TEST REPORT OF PLATES

WORKS HOMESTEAD DISTRICT U.S.S. ORDER NO. HP83405 INVOICE NO. 164-0-42953

CUSTOMER ORDER NO. 9-1370 SHEET 1 10/9/64

CAR OR TRUCK NO. NYC 500769 SHIPPER NO. & DATE 56117 160

STATE OF PENNSYLVANIA
COUNTY OF ALLEGHENY

SUBSCRIBED AND SWORN TO BEFORE ME THIS 11th DAY OF Dec. 1964

Otis M. FAWCETT, Notary Public
Pittsburgh, Allegheny Co., Penna
Commission Expires
Mar. 25, 1966

SOLD TO: CHICAGO BRIDGE & IRON CO
P O BOX 610
GREENVILLE PA

SHIP TO: CHICAGO BRIDGE & IRON CO
GREENVILLE PA

~~ASTM A 201-61T GR B FIREBOX FINE GRAIN NORMALIZE & FLATTEN TO STD~~
T OLS ASTM A 300 CHARPY IMPACT LONG TEST AT MINUS 50 DEG F

03986

~~MILL 6 SEP SW TR SHOW FA ALSO ASTM A 201-61T GRADE B~~
FIREBOX ALSO ASTM A-300-58 & CHARPY IMPACT TEST RESULTS

0706

BEING DULY SWORN ACCORDING TO LAW, DESPOSES AND SAYS THAT THE CHEMICAL ANALYSIS AND/OR TESTS SHOWN IN THIS REPORT ARE CORRECT AS CONTAINED IN THE RECORDS OF THE COMPANY.

SIGNATURE J.L. GIOVE, CH. MET.

DATE 12/11/64

ITEM NO.	HEAT NO.	PIECE IDENTITY NO.	NO. PCS	THICKNESS OR SECTION	WIDTH, DIA. OR FT. WT.	LENGTH	WEIGHT	YIELD PT. PSI.	TENSILE STR. PSI.	ELONGATION % IN 8"	ELONGATION % IN 2"	% RED. OF AREA	
1	72P781	284953A LB LT	1	.46000	120	255 3/8	4060	47960	67560 67330	34.5			B
1	72P781	284965A LB LT	1	.46000	120	255 3/8	4160	47720	66720 67570	29.0			B
1	73P685	289912A LB LT	1	.46000	120	255 3/8	4160	46990	66780 67160	28.0			B
1	73P685	289913A LB LT	1	.46000	120	255 3/8	4160	49030	67160 66960	32.0			B
1	73P685	289913B LB LT	1	.46000	120	255 3/8	4190	49030	67160 66960	32.0			B
1	73P685	289919B LB LT	1	.46000	120	255 3/8	4260	46170	67000 67020	33.0			B
2	72P781	284914A LB LT	1	.46000	111 1/4	255 3/8	3830	46380	67310 66290	31.0			BH
2	72P781	284914B LB LT	1	.46000	111 1/4	255 3/8	3830	46380	67310 66290	31.0			BH
2	72P781	284918A LB LT	1	.46000	111 1/4	255 3/8	3810	46600	67610 67720	32.0			BH
2	72P781	284918B LB LT	1	.46000	111 1/4	255 3/8	3850	46600	67610 67720	32.0			BH
2	72P781	284926A LB LT	1	.46000	111 1/4	255 3/8	3890	47080	65000 65550	30.0			BH

[illegible] SIZE TESTED ACCORDING TO COMPANY RECORDS CONFORMS TO THE REQUIREMENTS OF THE SPECIFICATION LISTED ABOVE.

See Sheet #3 for Impact Values

HEAT NO.	LADLE	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	Al	N	V	B	Ti	Cb	
72P781	1	14	112	012	022	29						050						
73P685	1	13	115	009	024	27												

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PRODU[illegible]N DEPARTMENT – METALLURGICAL

PRODUCTION DEPARTMENT – METALLURGICAL
United States Steel Corporation

Sheet #2

TEST REPORT OF PLATES

MILLS HOMESTEAD DISTRICT U.S.S. ORDER NO. HP83405 INVOICE NO. 164-0-42953

CUSTOMER ORDER NO. 9-1370 SHEET 1 10/9/64

CAR OR TRUCK NO. NYC 500769 SHIPPER NO & DATE 56117 160

~~STATE OF PENNSYLVANIA~~
COUNTY OF ALLEGHENY

SUBSCRIBED AND SWORN TO BEFORE ME
THIS 11th DAY OF 1964

Dagus [illegible] Notary Public
Pittsburgh, Allegheny Co., Penna
My Commission Expires
May 25, 1966

SOLD TO: CHICAGO BRIDGE & IRON CO
P O BOX 610
GREENVILLE PA

SHIP TO: CHICAGO BRIDGE & IRON CO
GREENVILLE PA

~~ASTM A 201-61T GR B FIREBOX FINE GRAIN NORMALIZE & FLATTEN TO STD~~
T ULS ASTM A 300 CHARPY IMPACT LONG TEST AT MINUS 50 DEG F

03986

~~MILL 6 SEP SH TR SHOW FA ALSO ASTM A 201-61T GRADE B~~
FIREBOX ALSO ASTM A-300-58 & CHARPY IMPACT TEST RESULTS

0706

BEING DULY SWORN ACCORDING TO LAW, DESPOSES AND SAYS THAT THE CHEMICAL ANALYSIS AND/OR TESTS SHOWN IN THIS REPORT ARE CORRECT AS CONTAINED IN THE RECORDS OF THE COMPANY:

SIGNATURE J.L. GIOVE, CH. MET.

DATE 12/11/64

ITEM NO	HEAT NO.	PIECE IDENTITY NO.	NO. PCS	THICKNESS OR SECTION	WIDTH, DIA. OR FT. WT.	LENGTH	WEIGHT	YIELD PT. PSI.	TENSILE STR. PSI.	ELONGATION % IN 8"	ELONGATION % IN 2"	% RED OF AREA	BH
1	72P781	284911A LB LT	1	.46000	120	255 3/8	4050	47750	65830 64110	32.0			BH
1	72P781	284913A LB LT	1	.46000	120	255 3/8	4200	47160	66660 66200	28.0			BH
1	72P781	284913B LB LT	1	.46000	120	255 3/8	4240	47760	66660 66200	28.0			BH
1	72P781	284915A LB LT	1	.46000	120	255 3/8	4310	46900	65870 66010	31.0			BH
1	72P781	284915B LB LT	1	.46000	120	255 3/8	4280	46900	65870 66010	31.0			BH
1	72P781	284919A LB LT	1	.46000	120	255 3/8	4080	47160	65860 65900	34.0			BH
1	72P781	284920B LB LT	1	.46000	120	255 3/8	4180	46350	65460 65250	31.0			BH
1	72P781	284921A LB LT	1	.46000	120	255 3/8	4090	47070	666000 64870	30.0			BH
1	72P781	284921B LB LT	1	.46000	120	255 3/8	4080	47070	666000 64870	30.0			BH
1	72P781	284923A LB LT	1	.46000	120	255 3/8	4060	47220	65180 65640	31.0			BH
1	72P781	284924B LB LT	1	.46000	120	255 3/8	4090	46650	65140 66390	31.5			BH

[illegible] SIZE TESTED ACCORDING TO COMPANY RECORDS CONFORMS TO THE REQUIREMENTS OF THE SPECIFICATION LISTED ABOVE.

See Sheet #3 for Impact Values

HEAT NO.	TYPE	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	Al	N	V	B	Ti	Cb	Co
72P781	1	14	112	012	022	29						050						

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PRODUCTION DEPARTMENT - METALLURGICAL

United States Steel Corporation

Sheet #3

TEST REPORT OF PLATES

WORKS HOMESTEAD DISTRICT U.S.S. ORDER NO. HP83405 INVOICE NO. 164-0-42953

CUSTOMER ORDER NO. 9-1370 SHEET 1 10/9/64

CAR OR TRUCK NO. NYC 500769 SHIPPER NO. & DATE 56117 160

~~STATE OF PENNSYLVANIA~~
COUNTY OF ALLEGHENY

SUBSCRIBED AND SWORN TO BEFORE ME
THIS 11th DAY OF Dec. 1964

OTIS M. FAWCETT, Notary Public
Pittsburgh, Allegheny Co., Penna.
My Commission Expires
Aug. 25, 1965

CHICAGO BRIDGE & IRON CO
P O BOX 610
GREENVILLE PA

SHIP TO

CHICAGO BRIDGE & IRON CO
GREENVILLE PA

BEING DULY SWORN ACCORDING TO LAW; DESPOSES AND SAYS THAT THE CHEMICAL ANALYSIS AND/OR TESTS SHOWN IN THIS REPORT ARE CORRECT AS CONTAINED IN THE RECORDS OF THE COMPANY.

~~ASTM A 201 61T GR B FIREBOX FINE GRAIN NORMALIZE & FLATTEN TO STD~~
T OLS ASTM A 300 CHARPY IMPACT LONG TEST AT MINUS 50 DEG F

03986

~~MILL 6 SEP SW TR SHOW FA ALSO ASTM A 201 61T GRADE B~~
FIREBOX ALSO ASTM A-300-58 & CHARPY IMPACT TEST RESULTS

0706

SIGNATURE J.L. GIOVE, CH. MET.

DATE 12/11/64

ITEM NO.	HEAT NO.	PIECE IDENTITY NO.	NO. PCS	THICKNESS OR SECTION	WIDTH, DIA OR FT. WT.	LENGTH	WEIGHT	YIELD PT. PSI.	TENSILE STR. PSI.	ELONGATION % IN 8"	ELONGATION % IN 2"	% RED. OF AREA
2	72P781	284926B LB LT	1	.46000	111 1/4	255 3/8	3920	~~47080~~	~~65000~~ 65550	~~30.0~~		

Longitudinal V Notch Charpy Impac t Tests 10 x 10 MM Made at Minus 50oF-45-54-70 Ft. Lbs.

Grain Size #8

HEAT NO.	PIECE IDENTITY NO.	
72P781	284953	Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF-111-82-77 Ft. Lbs.
	284965	Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF-123-102-104 Ft. Lbs.
73P685	289912	Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF-93-91-81 Ft. Lbs.
	289913	Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF-53-87-87 Ft. Lbs.
	289919	Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF-136-91-87 Ft. Lbs.
72P781	284914	Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF-94-64-110 Ft. Lbs
	284918	Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF-101-92-115 Ft. Lbs.
	284926	Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF-45-54-70 Ft. Lbs.
	284911	Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF-180-184-187 Ft. Lbs.
	284913	Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF-83-84-70 Ft. Lbs.
	284915	Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF-91-80-97 Ft. Lbs.

CHEMISTRY SIZE TESTED ACCORDING TO COMPANY RECORDS CONFORMS TO THE REQUIREMENTS OF THE SPECIFICATION LISTED ABOVE.

Heat		C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	Al	N	V	B	Ti	Cb	
72P781	1	14	112	012	022	29						050						

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PRODUCTION DEPARTMENT – METALLURGICAL
United States Steel Corporation

Sheet #4

TEST REPORT OF PLATES

WORKS HOMESTEAD DISTRICT U.S.S. ORDER NO. HP-83405 INVOICE NO. 164-0-42953

CUSTOMER ORDER NO. 9-1370 10/9/64

CAR OR TRUCK NO. ERIO 500769 SHIPPER NO. & DATE 56117 160

STATE OF PENNSYLVANIA
COUNTY OF ALLEGHENY

SUBSCRIBED AND SWORN TO BEFORE ME
THIS 11th DAY OF Dec. 1964

JOHN M. FAWCETT, Notary Public
Pittsburgh, Allegheny Co., Penna.
My Commission Expires
May 25, 1965

CHICAGO BRIDGE & IRON CO
PO BOX 410
GREENVILLE PA

SHIP TO

CHICAGO BRIDGE & IRON CO
GREENVILLE PA

BEING DULY SWORN ACCORDING TO LAW, DEPOSES AND SAYS THAT THE CHEMICAL ANALYSES AND/OR TESTS SHOWN IN THIS REPORT ARE CORRECT AS CONTAINED IN THE RECORDS OF THE COMPANY.

SIGNATURE J. L. GLOVE, CH. MET.

DATE 12/11/64

ITEM NO.	HEAT NO.	PIECE IDENTITY NO.	MATERIAL DESCRIPTION
	72P761	284919	Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF-100-108-103 Ft. Lbs.
		284920	Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF-77-87-76 Ft. Lbs.
		284921	Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF-100-84-106 Ft. Lbs
		284923	Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF-104-92-118 Ft. Lbs.
		284924	Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF-71-93-93 Ft. Lbs.

Grain Sizes #8

Plates Normalized

EVERY SIZE TESTED ACCORDING TO COMPANY RECORDS CONFORMS TO THE REQUIREMENTS OF THE SPECIFICATION LISTED ABOVE

HEAT NO.	TYPE	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	Al	N	V	B	Ti	Cb	Co
72P761		14	1 12	012	022	29												

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PRODU[illegible]N DEPARTMENT – METALLURGICAL
United States Steel Corporation

TEST REPORT OF PLATES
[illegible] DISTRICT U S S ORDER NO. HF 83405 INVOICE NO. 164-0-42522
CUSTOMER [illegible] NO 9-1370 10/9/64
CAR [illegible] NO. RI 090843 SHIPPER NO & DATE 56059 160

STATE OF PENNSYLVANIA
COUNTY OF ALLEGHENY
SUBSCRIBED AND SWORN TO BEFORE ME THIS 11th DAY OF Dec. 1964
[illegible] M. FAWCETT, Notary Public Pittsburgh, Allegheny Co., Penna. My Commission Expires May 25, 1968

CHICAGO BRIDGE & IRON CO
PO BOX 61 0
GREENVILLE PA

SHIP TO
CHICAGO BRIDGE & IRON CO
GREENVILLE PA

BEING DULY SWORN ACCORDING TO LAW, DEPOSES AND SAYS THAT THE CHEMICAL ANALYSES AND/OR TESTS SHOWN IN THIS REPORT ARE CORRECT AS CONTAINED IN THE RECORDS OF THE COMPANY.

ASTM A 201 61T GR B FIREBOX FINE GRAIN NORMALIZE & FLATTEN TO STD TOLS ASTM A 300
CHARPY IMPACT LONG TEST AT MINUS 50oF

MILL 6 S&P SW TR SHOW PA ALSO ASTM A 201-61T GRADE B FIREBOX ALSO ASTM A-300

SIGNATURE J.L. GLOVE, CH. MET.
DATE 12/10/64

ITEM NO	HEAT NO	PIECE IDENTITY NO.	NO PCS	THICKNESS OR SECTION	WIDTH, DIA OR FT. WT	LENGTH	WEIGHT	YIELD PT. PSI	TENSILE STR. PSI	ELONGATION % IN 8"	IN 2"	% RED. OF AREA	[illegible]
1	72P781	284919B LB LT	1	.46000	120	255 3/8	4100	47160	65860 65900	34.0			D..
		Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF- 100-108-103 Ft. Lbs.											
1	72P781	284923B LB LT	1	.46000	120	255 3/8	4150	47720	65190 65640	31.0			E[illegible]
		Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF- 104-92-118 Ft. Lbs.											
1	72P781	284944A LB LT	1	.46000	120	255 3/8	4120	49420	66010 67440	30.0			D[illegible]
		Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF- 98-132-114 Ft. Lbs.											
1	72P781	284944B	1	.46000	120	255 3/8	4150	See Above					
1	72P781	284945A LB LT	1	.46000	120	255 3/8		46560	67160 67270	30.5			DH
		Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF- 56-74-79 Ft. Lbs.											
1	72P781	284945A1	1	.46000	120	255 3/8	8510	See Above					

[illegible] ACCORDING TO COMPANY RECORDS CONFORMS TO THE REQUIREMENTS OF THE SPECIFICATION LISTED ABOVE.

HEAT NO	TYPE	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	Al	N	V	B	Ti	Cb	Co
72P781		14	1 12	012	022	29												

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PRODU[illegible]ION DEPARTMENT – METALLURGICAL

United States Steel Corporation

Sheet #2

TEST REPORT OF PLATES

WORKS HOMESTEAD DISTRICT U S S ORDER NO. HP 83405 INVOICE NO. 164-0-42522

CUSTOMER ORDER NO. 9-1370 10/9/64

CAR & TRUCK NO. BL 090848 SHIPPER NO & DATE 56059 106

STATE OF PENNSYLVANIA
COUNTY OF ALLEGHENY

SUBSCRIBED AND SWORN TO BEFORE ME THIS 11th DAY OF Dec. 1964

[illegible] Notary Public, Pittsburgh, Allegheny Co., Pa. My Commission Expires May 25, 1965

BEING DULY SWORN ACCORDING TO LAW, DEPOSES AND SAYS THAT THE CHEMICAL ANALYSES AND/OR TESTS SHOWN IN THIS REPORT ARE CORRECT AS CONTAINED IN THE RECORDS OF THE COMPANY.

SIGNATURE J. L. GLOVE, CH. MET.

DATE 12/10/64

CHICAGO BRIDGE & IRON CO
PO BOX 610
GREENVILLE PA

SHIP TO
CHICAGO BRIDGE & IRON CO
GREENVILLE PA

ASTM A 201 61T GRADE B FIREBOX FINE GRAIN NORMALIZE & FLATTEN TO STD TOLS ASTM A 300
CHARPY IMPACT LONG TEST AT MINUS 50oF

MILL 6 SEP SH TR SHOW FA ALSO ASTM A 201 61T GRADE B FIREBOX ALSO ASTM A-300

ITEM NO	HEAT NO.	PIECE IDENTITY NO.	NO. PCS	THICKNESS OR SECTION	WIDTH, DIA. OR FT. WT.	LENGTH	WEIGHT	YIELD PT. PSI.	TENSILE STR. PSI.	ELONGATION % IN 8"	ELONGATION % IN 2"	% RED. OF AREA	BH
1	72P781	284948A LB LT	1	.46000	120	255 3/8	4230	47440	66820 65360	31.0			BH
Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF- 170-173-195 Ft. Lbs.													
1	72P781	284948B	1	.46000	120	255 3/8	4210	See Above					
1	72P781	284949A LB LT	1	.46000	120	255 3/8	4200	48530	67550 67080	29.0			B..
Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF- 131-62-87 Ft. Lbs.													
1	72P781	284949B	1	.46000	120	255 3/8	4200	See Above					
1	72P781	284956B LB LT	1	.46000	120	255 3/8	4150	47840	66750 66730	32.0			BH
Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF- 115-115-126 Ft. Lbs.													
1	72P781	284962B LB LT	1	.46000	120	255 3/8	4120	47030	65000 65550	30.0			BH
Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF- 45-54-70 Ft. Lbs.													
1	72P781	284965B LB LT	1	.46000	120	255 3/8	4120	47720	66720 67570	29.0			BH
Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF- 123-102-104 Ft. Lbs.													

MATERIAL HAS BEEN TESTED ACCORDING TO COMPANY RECORDS CONFORMS TO THE REQUIREMENTS OF THE SPECIFICATION LISTED ABOVE.

HEAT NO.	TYPE	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	Al	N	V	B	Ti	Cb	Co
72P781		14	1 12	012	022	29												

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PRODUCTION DEPARTMENT — METALLURGICAL

United States Steel Corporation

Sheet #3

TEST REPORT OF .... PLATES

WORKS ... HOMESTEAD DISTRICT   U S S ORDER NO. HP 84305   INVOICE NO. 164-0-42522

CUSTOMER ORDER NO. ... 9-1370 10/9/64

CAR OR RECEIVED ... RI 090848   SHIPPER NO & DATE 56059 160

STATE OF PENNSYLVANIA
COUNTY OF ALLEGHENY

SUBSCRIBED AND SHORN TO BEFORE ME THIS 11th DAY OF Dec. 1964

ELSIE M. FAWCETT, Notary Public
Pittsburgh, Allegheny Co., Penna.
My Commission Expires May 25, 1965

CHICAGO BRIDGE & IRON CO
PO BOX 610
GREENVILLE PA

SHIP TO

CHICAGO BRIDGE & IRON CO
GREENVILLE PA

BEING DULY SHORN ACCORDING TO LAW, DEPOSES AND SAYS THAT THE CHEMICAL ANALYSES AND/OR TESTS SHOWN IN THIS REPORT ARE CORRECT AS CONTAINED IN THE RECORDS OF THE COMPANY.

ASTM A 201 61T GRADE B FIREBOX FINE GRAIN NORMALIZE & FLATTEN TO STD TOLS ASTM A 300
CHARPY IMPACT LONG TEST AT MINUS 50oF

MILL 6 SEP SH TR SHOW PA ALSO ASTM A 201 61T GRADE B FIREBOX ALSO ASTM A300

SIGNATURE J. L. GLOVE, CH. MET.

DATE 12/10/64

ITEM NO.	HEAT NO.	PIECE IDENTITY NO.	NO. PCS	THICKNESS OR SECTION	WIDTH, DIA. OR FT. WT.	LENGTH	WEIGHT	YIELD PT. PSI.	TENSILE STR. PSI.	ELONGATION % IN 8"	ELONGATION % IN 2"	% RED. OF AREA	SHEET NO.
1	72P781	284966A LB	1	.46000	120	255 3/8	4150	48530	67050	32.0			E
		LT							68250				
		Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF						63-29-30 Ft. Lbs.					
1	72P781	284966B	1	.46000	120	255 3/8	4140	See Above					
1	72P781	284968A LB	1	.46000	120	295 3/8	4070	48300	66640	33.0			E
		LT							66640				
		Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF-						174-159-133 Ft. Lbs.					
1	72P781	284969A LB	1	.46000	120	255 3/8	4130	45920	65100	30.0			BH
		LT							66370				
		Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF-						66-74-71 Ft. Lbs.					
1	72P781	284973A LB	1	.46000	120	255 3/8	4170	47390	67010	27.5			BH
		LT							66350				
		Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF-						36-78-62 Ft. Lbs.					
2	72P781	284947B LB	1	.46000	111 1/4	255 3/8	3880	46370	65940	30.0			BH
		LT							67450				
		Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF-						139-134-122 Ft. Lbs.					

EACH SIZE TESTED ACCORDING TO COMPANY RECORDS CONFORMS TO THE REQUIREMENTS OF THE SPECIFICATION LISTED ABOVE.

HEAT NO.	TYPE	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	Al	N	V	B	Ti	Cb	Co
72P781		14	1 12	012	022	29												

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PRODUCTION DEPARTMENT – METALLURGICAL

United States Steel Corporation

Sheet #4

TEST REPORT OF PLATES

WORKS HOMESTEAD DISTRICT U S S ORDER NO. HP 84305 INVOICE NO. 164-0-42522

CUSTOMER ORDER NO. 9-1370 10/9/64

CAR OR TRUCK NO. RI 090948 SHIPPER NO. & DATE 56059 160

STATE OF PENNSYLVANIA
COUNTY OF ALLEGHENY

SUBSCRIBED AND SWORN TO BEFORE ME THIS 11th DAY OF Dec. 1964

M. FAWCETT, Notary Public
Pittsburgh, Allegheny Co., Penna.
My Commission Expires May 25, 1965

CHICAGO BRIDGE & IRON CO
PO BOX 610
GREENVILLE PA

SHIP TO

CHICAGO BRIDGE & IRON CO
GREENVILLE PA

BEING DULY SWORN ACCORDING TO LAW, DEPOSES AND SAYS THAT THE CHEMICAL ANALYSES AND/OR TESTS SHOWN IN THIS REPORT ARE CORRECT AS CONTAINED IN THE RECORDS OF THE COMPANY.

ASTM A 201 61T GRADE B FIREBOX FINE GRAIN NORMALIZE & FLATEN TO STD TOLS ASTM A 300
CHARPY IMPACT LONG TEST AT MINUS 50oF

MILL 6 SEP SH TR SHOW PA ALSO ASTM A 201 61T GRADE B FIREBOX ALSO ASTM A 300

SIGNATURE J. L. GLOVE, CH. MET.

DATE 12/10/64

ITEM NO.	HEAT NO.	PIECE IDENTITY NO.	NO. PCS	THICKNESS OF SECTION	WIDTH, DIA. OR FT. WT.	LENGTH	WEIGHT	YIELD PT. PSI.	TENSILE STR. PSI.	ELONGATION % IN 8"	ELONGATION % IN 2"	% RED. OF AREA	[illegible]
2	72P781	284955A LB LT	1	.46000	111 1/4	255 3/8	3840	48600	69190 68260	30.0			EI
		Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF-						143-103-143 Ft. Lbs.					
2	72P781	284955B	1	.46000	111 1/4	255 3/8	3850	See Above					
2	72P781	284959A LB LT	1	.46000	111 1/4	255 3/8	3840	48430	67930 68130	32.5			Li
		Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF-						134-105-128 Ft. Lbs.					
2	72P781	284959B	1	.46000	111 1/4	255 3/8	3860	See Above					
2	72P781	284963A LB LT	1	.46000	111 1/4	255 3/8	3830	46390	67600 66900	32.5			EI
		Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF-						105-110-98 Ft. Lbs.					
2	72P781	284963B	1	.46000	111 1/4	255 3/8	3830	See Above					
2	72P781	284967A LB LT	1	.46000	111 1/4	255 3/8	3870	47610	67730 67030	31.0			BH
		Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF-						150-165-153 Ft. Lbs.					
2	72P781	284967B	1	.46000	111 1/4	255 3/8	3870	See Above					

SPECIMEN SIZE TESTED ACCORDING TO COMPANY RECORDS CONFORMS TO THE REQUIREMENTS OF THE SPECIFICATION USED ABOVE.

HEAT NO.	TYPE	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	Al	N	V	B	Ti	Co	Co
72P781		24	1 12	012	022	29												

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N DEPARTMENT – METALLURGICAL
United States Steel Corporation

Sheet #3

PLATES
DISTRICT — U.S.S. ORDER NO. HP 84305 — INVOICE NO. 164-0-42522
9-1370 10/9/64
RI 090348 — SHIPPER NO. & DATE 56059 160

STATE OF PENNSYLVANIA
COUNTY OF ALLEGHENY
SUBSCRIBED AND SWORN TO BEFORE ME
THIS 11th DAY OF Dec. 1964

M. FAWCETT, Notary Public
Pittsburgh, Allegheny Co., Penna.
My Commission Expires
May 25, 1965

BRIDGE & IRON CO
PO BOX 710
PA

SHIP TO
CHICAGO BRIDGE & IRON CO
GREENVILLE PA

A 201 61T GRADE B FIREBOX FINE GRAIN NORMALIZE & FLATTEN TO STD TOLS ASTM A 300
Y IMPACT LONG TEST AT MINUS 50oF

6 SHP SH TR SHOW FAALSO ASTM A 201 61T GRADE B FIREBOX ALSO ASTM A300

BEING DULY SWORN ACCORDING TO LAW, DEPOSES AND SAYS THAT THE CHEMICAL ANALYSES AND/OR TESTS SHOWN IN THIS REPORT ARE CORRECT AS CONTAINED IN THE RECORDS OF THE COMPANY.

SIGNATURE J.L. GLOVE, CH. MET.
DATE 12/10/64

NO.	HEAT NO.	PIECE IDENTITY NO.	NO. PCS	THICKNESS OR SECTION	WIDTH, DIA. OR FT. WT.	LENGTH	WEIGHT	YIELD PT. PSI	TENSILE STR. PSI	ELONGATION % IN 8"	IN 2"	% RED. OF AREA	BEND
2	72F781	2849718 LB LT	1	.46000	111 1/4	255 3/8	3840	48310	67710 68240	31.0			BB
		Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF- 120-135-121 Ft. Lbs.											
2	72F781	2849758 LB LT	1	.46000	111 1/4	255 3/8	3870	46480	67240 67200	30.5			BB
		Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF-132-143-64 Ft. Lbs.											
2	72F685	289914A LB LT	1	.46000	111 1/4	255 3/8	3870	46380	67310 67070	31.0			BB
		Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF-100-89-109 Ft. Lbs.											
2	72F685	289914B	1	.46000	111 1/4	255 3/8	3950	See Above					
				Plates Normalized									

MATERIAL TESTED ACCORDING TO COMPANY RECORDS CONFORMS TO THE REQUIREMENTS OF THE SPECIFICATION LISTED ABOVE.

HEAT NO.	C	Mn	P	S	Si						
72F781	14	1 12	012	022	29	Grain Size #8					
72F685	13	1 15	009	024	27	Grain Size #8					

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PRODUCTION DEPARTMENT – METALLURGICAL

United States Steel Corporation

TEST REPORT OF .... PLATES

WORKS HOMESTEAD DISTRICT U.S.S. ORDER NO. HP83405 INVOICE NO. 164-0-46150

CUSTOMER'S ORDER NO. 9-1370 SHEET 1 10/9/64

CAR OR TRUCK NO. PCLE000702 SHIPPER NO & DATE 56550 160

STATE OF PENNSYLVANIA
COUNTY OF ALLEGHENY

SUBSCRIBED AND SWORN TO BEFORE ME THIS 23 rd DAY OF Dec 1964

[stamp:] ... FAWCETT, Notary Public, Pittsburgh, Allegheny Co., Penna. My Commission Expires ...

Joan E Kline

BEING DULY SWORN ACCORDING TO LAW, DESPOSES AND SAYS THAT THE CHEMICAL ANALYSIS AND/OR TESTS SHOWN IN THIS REPORT ARE CORRECT AS CONTAINED IN THE RECORDS OF THE COMPANY.

SIGNATURE J. L. GIOVE, CH. MET.

DATE 12/18/64

CHICAGO BRIDGE & IRON CO
P O BOX 610
GREENVILLE PA

SHIP TO: CHICAGO BRIDGE & IRON CO
GREENVILLE PA

ASTM A 201 61T GR B FIREBOX FINE GRAIN NORMALIZE & FLATTEN TO STD
T OLS ASTM A 300 CHARPY IMPACT LONG TEST AT MINUS 50 DEG F 03986

MILL 6 SEP SW TR SHOW FA ALSO ASTM A-201-61T GRADE B
FIREBOX ALSO ASTM A-300-58 & CHARPY IMPACT TEST RESULTS 0706

ITEM NO.	HEAT NO.	PIECE IDENTITY NO.	NO. PCS.	THICKNESS OR SECTION	WIDTH, DIA. OR FT. WT.	LENGTH	WEIGHT	YIELD PT. PSI.	TENSILE STR. PSI.	ELONGATION % IN 8"	ELONGATION % IN 2"	% RED. OF AREA	
1	72P781	284960B LT	1	.46000	111 1/4	255 3/8	4120		65140				
1	72P781	284909A LB LT	1	.46000	120	255 3/8	4090	47690	66760 68340	33.0			B:
1	72P781	284946A LB LT	1	.46000	120	255 3/8	4100	47610	68800 68570	31.0			B:
1	72P781	284950A LB LT	1	.46000	120	255 3/8	4210	47570	68300 68100	31.0			BH
1	72P781	284950B LB LT	1	.46000	120	255 3/8	4230	46870	67220 68100	27.5			CH
1	72P781	284952B LB LT	1	.46000	120	255 3/8	4150	45870	67420 68510	27.5			CH
1	72P781	284957A LB LT	1	.46000	120	255 3/8	4090	48370	66760 67600	32.5			BH
1	72P781	284957B LB LT	1	.46000	120	255 3/8	4060	46450	67250 67600	30.0			BH
1	72P781	284958B LB LT	1	.46000	120	255 3/8	4230	46450	67750 68740	30.0			BH
1	72P781	284961A LB LT	1	.46000	120	255 3/8	4030	47930	67520 66600	32.5			BH
1	72P781	284961B LB LT	1	.46000	120	255 3/8	4070	43270	66300 66600	30.0			BH
								43270	66300	30.0			BH

CHEMICALS TESTED ACCORDING TO COMPANY RECORDS CONFORMS TO THE REQUIREMENTS OF THE SPECIFICATION LISTED ABOVE.

HEAT NO.	LADLE	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	Al	N	V	B	Ti	Cb	Co
72P781	1	14	112	012	022	29						050						

See Sheet # 3 for Charpy Tests

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PRODUC[illegible]R DEPARTMENT – METALLURGICAL

United States Steel Corporation

[illegible] F 2

EST REPORT OF PLATES

WORKS HOMESTEAD DISTRICT U.S.S. ORDER NO. HP83405 INVOICE NO. 164-0-46150

[illegible] 9-1370 SHEET 1 10/9/64

[illegible] PGLE000702 SHIPPER NO. & DATE 56550 160

STATE OF PENNSYLVANIA
COUNTY OF ALLEGHENY

SUBSCRIBED AND SWORN TO BEFORE ME
THIS 23rd DAY OF Dec 19[illegible] [illegible], Notary Public
Pittsburgh, Allegheny Co., Penna.
My Commission Expires
May [illegible], 19[illegible]

[illegible]

CHICAGO BRIDGE & IRON CO
P O BOX 610
GREENVILLE PA

SHIP TO

CHICAGO BRIDGE & IRON CO
GREENVILLE PA

BEING DULY SWORN ACCORDING TO LAW, DESPOSES AND SAYS THAT THE CHEMICAL ANALYSIS AND/OR TESTS SHOWN IN THIS REPORT ARE CORRECT AS CONTAINED IN THE RECORDS OF THE COMPANY.

ASTM A 201 61T GR B FIREBOX FINE GRAIN NORMALIZE & FLATTEN TO STD
T OLS ASTM A 300 CHARPY IMPACT LONG TEST AT MINUS 50 DEG F

03986

MILL 6 SEP SW TR SHOW FA ALSO ASTM A-201-61T GRADE B
FIREBOX ALSO ASTM A-300-58 & CHARPY IMPACT TEST RESULTS

0706

SIGNATURE J.L. GIOVE, CH. MET.

DATE 12/18/64

ITEM NO	HEAT NO.	PIECE IDENTITY NO.	NO. PCS.	THICKNESS OR SECTION	WIDTH, DIA. OR FT. WT.	LENGTH	WEIGHT	YIELD PT. PSI.	TENSILE STR. PSI.	ELONGATION % IN 8"	ELONGATION % IN 2"	% RED. OF AREA	BH
1	72P781	284973B LB LT	1	.46000	120	255 3/8	4130	47370	67810	27.5			[illegible]
1	73P685	289915A B LD LT	1	.46000	120	255 3/8	4110	47260	66850 65[illegible]0	32.0			[illegible]
2	68P772	282303A B LB LT	1	.46000	111 1/4	255 3/8	3820	48030	67190 68[illegible]0	29.5			[illegible]
2	68P772	282303B B LD LT	1	.46000	111 1/4	255 3/8	3870	48030	68670 68550 68670	[illegible].5			[illegible]
2	68P772	282304A LB	1	.46000	111 1/4	255 3/8		48830	68900	32.0			[illegible]
2	68P772	282304A1 LT LB	1	.46000	111 1/4	255 3/8	7610	48830	[illegible] 68900	32.0			[illegible]
2	72P781	284910B LT LT	1	.46000	111 1/4	255 3/8	3900	46360	[illegible] 66960 67[illegible]0	30.0			BH
2	72P781	284922A LB LT	1	.46000	111 1/4	255 3/8	3930	47020	66170 66[illegible]0	30.0			BH
2	72P781	284922B LD LT	1	.46000	111 1/4	255 3/8	3920	47030	66170 6[illegible]0	30.0			BH
2	72P781	284975A LB LT BLB	1	.46000	111 1/4	255 3/8	3870	46480	67200 67[illegible]0	30.5			BH

See Sheet # 3 for Charpy Tests

[illegible] TESTED ACCORDING TO COMPANY RECORDS CONFORMS TO THE REQUIREMENTS OF THE SPECIFICATION LISTED ABOVE.

HEAT NO	[illegible]	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	Al	N	V	B	Ti	Cb	Co
72P781	1	14	112	012	022	29						050						
73P685	1	13	115	009	024	27												
68P772	1	17	108	007	020	23												

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PRODUCTION DEPARTMENT – METALLURGICAL
United States Steel Corporation

PRODUCTION DEPARTMENT – METALLURGICAL
United States Steel Corporation

Sheet # 3

TEST REPORT OF Plates

WORKS Homestead District U.S.S. ORDER NO HF83405 INVOICE NO 164-0-46150

CUSTOMER ORDER NO 9-1370 Sheet 1 10/9/64

SHIPPER NO & DATE

STATE OF PENNSYLVANIA
COUNTY OF ALLEGHENY

SUBSCRIBED AND SWORN TO BEFORE ME
THIS 23rd DAY OF December, 1964

BEING DULY SWORN ACCORDING TO LAW, DEPOSES AND SAYS THAT THE CHEMICAL ANALYSES AND/OR TESTS SHOWN IN THIS REPORT ARE CORRECT AS CONTAINED IN THE RECORDS OF THE COMPANY.

SIGNATURE J. L. GLOVE, CH. MET.

DATE 12/23/64

Chicago Bridge & Iron Co
P O Box 610
Greenville, Pa

SHIP TO Chicago Bridge & Iron Co
Greenville Pa

HEAT NO.	PIECE IDENTITY NO / MATERIAL DESCRIPTION / TEST RESULTS
72P781	284960 - Longitudinal V Notch Charpy Impact Tests 7.5 x 10 MM Made at Minus 50oF-93-141-96-Ft. Lbs.
72P781	284909 - Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF.- 94-61-100-Ft. Lbs.
72P781	284946 - Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF.-72-102-90-Ft. Lbs.
72P781	284950 - Longitudinal V Notch Charpy Impact Tests 7.5 x 10 MM Made at Minus 50oF.-103-109-102-Ft. Lbs.
72P781	284952 - Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF.-72-117-1[illegible]-Ft. Lbs.
72P781	284957 - Longitudinal V Notch Charpy Impact Tests 7.5 x 10 MM Made at Minus 50oF-132-139-113-Ft. Lbs.
72P781	284958 - Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF.-76-135-1[illegible]-Ft. Lbs.
72P781	284961 - Longitudinal V Notch Charpy Impact Tests 7.5 x 10 MM Made at Minus 50oF-116-124-120-Ft. Lbs.
72P781	284973 - Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF.-35-78-62-Ft. Lbs.
73F683	289915 - Longitudinal V Notch Charpy Impact tests 10 x 10 MM Made at Minus 50oF.-73-93-75-Ft. Lbs.
68P772	282303 - Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus. 50oF-91-122-124-Ft. Lbs.
68P772	282304 - Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF.-71-74-65-Ft. Lbs.
72P781	284910 - Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF.-110-92-64-Ft. Lbs.
72P781	284922 - Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF.-97-79-70-Ft. Lbs.
72P781	284975 - Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF.-132-143-64-Ft. Lbs.
	Grain Size all Heats #.8 Plates and tests normalized.

MATERIAL DESCRIBED ACCORDING TO COMPANY RECORDS CONFORMS TO THE REQUIREMENTS OF THE SPECIFICATION LISTED ABOVE.

HEAT NO.	TYPE	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	Al	N	V	B	Ti	Co	Co

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PRODUCTION DEPARTMENT - METALLURGICAL

United States Steel Corporation

TEST REPORT OF PLATES

WORKS HOMESTEAD DISTRICT U.S.S. ORDER NO. HP83405 INVOICE NO. 164-0-50528

CUSTOMER ORDER NO. 9-1370 SHEET 1 10/9/64

CAR OR TRUCK NO. PELE000742 SHIPPER NO. & DATE 57146 160

STATE OF PENNSYLVANIA
COUNTY OF ALLEGHENY

SUBSCRIBED AND SWORN TO BEFORE ME
THIS 4th. DAY OF Jan. 1964

CHICAGO BRIDGE & IRON CO
P O BOX 610
GREENVILLE PA

SHIP TO

CHICAGO BRIDGE & IRON CO
GREENVILLE PA

BEING DULY SWORN ACCORDING TO LAW, DESPOSES AND SAYS THAT THE CHEMICAL ANALYSIS AND/OR TESTS SHOWN IN THIS REPORT ARE CORRECT AS CONTAINED IN THE RECORDS THE COMPANY.

ASTM A 201 61T GR B FIREBOX FINE GRAIN NORMALIZE & FLATTEN TO STD
T OLS ASTM A 300 CHARPY IMPACT LONG TEST AT MINUS 50 DEG F

03986

FILL 6 SEP SW TR SHOW FA ALSO ASTM A-201-61T GRADE B
FIREBOX ALSO ASTM A-300-58 & CHARPY IMPACT TEST RESULTS

SIGNATURE J.L. GIOVE, CH. MET.

0776 DATE 12/31/64

ITEM	NO.	PIECE IDENTITY NO		NO PCS	THICKNESS OF SECTION	WIDTH, DIA OR FT. WT.	LENGTH	WEIGHT	YIELD PT PS	TENSILE STR PS	ELONG. %		% RED OF AREA	BEND
1	72P781	2849C93	LB LT	1	.46000	120	255 3/8	4150	*47610	65850 68340	31.0			B
1	72P781	2849173	LB LT	1	.46000	120	255 3/8	4100	*48750	66290 65510	28.0			B
1	72P781	284962A	LB LT	1	.46000	120	255 3/8	3940	*47690	[illegible] 65140	[illegible]			B
1	73P685	289916A	LB LT	1	.46000	120	255 3/8	4200	*49060	66770 67290	29.5			BH
1	73P685	2900498	LB LT	1	.46000	120	255 3/8	4260	*45750	63400 64470	34.0			BH
1	73P685	29005CA	LB LT	1	.46000	120	255 3/8	4170	*47160	64400 64340	28.0			BH
1	73P685	290050B	LB LT	1	.46000	120	255 3/8	4190	*47160	64400 64340	28.0			BH
2	72P781	28491CA	LB LT	1	.46000	111 1/4	255 3/8	3910	*46360	67620 66560	30.0			BH

See Sheet #2 for Impact Values

GRAIN SIZE TESTED ACCORDING TO COMPANY RECORDS CONFORMS TO THE REQUIREMENTS OF THE SPECIFICATION LISTED ABOVE.

*YLD PT AT .5% EXT

HEAT NO.	TYPE	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	Al	N	V	B	Ti	Cb	Co
72P781	1	14	112	012	022	29						050						
73P685	1	13	115	009	024	27												

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[illegible]

PRODUCTION DEPARTMENT – METALLURGICAL

United States Steel Corporation

Sheet #2

TEST REPORT OF PLATES

WORKS HOMESTEAD DISTRICT U S S ORDER NO. HP 83405 INVOICE NO. 164-0-50528

CUSTOMER ORDER NO 9-1370 10/9/64

CAR OR TRUCK NO PLE 000742 SHIPPER NO. & DATE 57146 160

STATE OF PENNSYLVANIA
COUNTY OF ALLEGHENY

SUBSCRIBED AND SWORN TO BEFORE ME
THIS 4th DAY OF Jan. 1965

Otis M. Fawcett, Notary Public
Pittsburgh, Allegheny Co., Pa.
My Commission Expires May 23, 1965

BEING DULY SWORN ACCORDING TO LAW, DEPOSES AND SAYS THAT THE CHEMICAL ANALYSES AND/OR TESTS SHOWN IN THIS REPORT ARE CORRECT AS CONTAINED IN THE RECORDS OF THE COMPANY.

SIGNATURE J. L. GLOVE, CH. MET.

DATE 12/31/64

SOLD TO:
CHICAGO BRIDGE & IRON CO
PO BOX 610
GREENVILLE PA

SHIP TO:
CHICAGO BRIDGE & IRON CO
GREENVILLE PA

[illegible]781	284909	Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF-94-[illegible]-100 Ft. Lbs.
	284917	Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF-122-81-72 Ft. Lbs.
	284969	Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF-98-141-96 Ft. Lbs.
	284969	Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF-98-141-96 Ft. Lbs.
73F[illegible]35	289916	Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF-119-[illegible]7-66 Ft. Lbs.
	290049	Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF-86-87-85 Ft. Lbs.
	290050	Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF-77-8[illegible]-74 Ft. Lbs.
73F781	284910	Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF-110-92-64 Ft. Lbs.

Grain Sizes #8
Plates Normalized

MATERIAL TESTED ACCORDING TO COMPANY RECORDS CONFORMS TO THE REQUIREMENTS OF THE SPECIFICATION LISTED ABOVE.

HEAT NO.	TYPE	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	Al	N	V	B	Ti	Cb	Co

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[illegible]

... DEPARTMENT – METALLURGICAL

United States Steel Corporation

TEST REPORT OF PLATES

WORKS HOMESTEAD DISTRICT U.S.S. ORDER NO. HP 90240 INVOICE NO. 164-0-18842

CUSTOMER ORDER NO. 9-1370 10/20/64

CAR OR TRUCK NO. PRR 469685 SHIPPER NO. & DATE 41401 160

CHICAGO BRIDGE & IRON CO
PO BOX 610
GREENVILLE PA

SHIP TO
CHICAGO BRIDGE & IRON CO
GREENVILLE PA

ASTM A201-61T GR B FIREBOX QUAL FINE GRAIN NORMALIZE & FLATTEN ASTM A-300
CHARPY IMPACT LONG TEST AT MINUS 50oF

MILL 6 SW TR

RECEIVED

STATE OF PENNSYLVANIA
COUNTY OF ALLEGHENY

SUBSCRIBED AND SWORN TO BEFORE ME
THIS 28th DAY OF Jan. 1965

...M. FAWCETT, Notary Public
Pittsburgh, Allegheny Co., Penna.
My Commission Expires
May 25, 1966

BEING DULY SWORN ACCORDING TO LAW, DEPOSES AND SAYS THAT THE CHEMICAL ANALYSES AND/OR TESTS SHOWN IN THIS REPORT ARE CORRECT AS CONTAINED IN THE RECORDS OF THE COMPANY.

SIGNATURE J.L. GLOVE, CH. MET.

DATE 1/27/65

ITEM NO.	HEAT NO.	PIECE IDENTITY NO.	NO. PCS	THICKNESS OR SECTION	WIDTH, DIA. OR FT. WT.	LENGTH	WEIGHT	YIELD PT. PSI.	TENSILE STR. PSI.	ELONGATION % IN 8"	ELONGATION % IN 2"	% RED. OF AREA
3	71F952	341708A LB LT	1	.46000	124	346 1/8	5800	47080	67300	27.5		
		Longitudinal V Notdh Charpy Impact Tests 10 x 10 MM Made at Minus 50oF-104-91-85 Ft. Lbs.										
3	71P952	341709B LB LT	1	.46000	124	346 1/8	5730	48910	68490 69360	26.0		
		Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF-85-126-139 Ft. Lbs.										
4	71P952	343000B LB LT	1	.46000	112	255 1/4	3980	49330	69320 70140	30.0		
		Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF-47-82-92 Ft. Lbs.										
4	71F952	343001A LB LT	1	.48000	112	255 1/4	3830	51300	69470 69730	31.0		
		Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF-90-74-84 Ft. Lbs.										
4	71F952	343001B	1	.46000	112	255 1/4	3860	See Above				
				Grain Size #7 Plates Normalized								

SPECIMEN SIZE TESTED ACCORDING TO COMPANY RECORDS CONFORMS TO THE REQUIREMENTS OF THE SPECIFICATION LISTED ABOVE.

HEAT NO.	TYPE	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	Al	N	V	B	Ti	Cb	Co
71P952		15	116	010	024	27												

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[illegible]

PRODUCTION DEPARTMENT – METALLURGICAL
United States Steel Corporation

TEST REPORT OF PLATES

WORKS HOMESTEAD DISTRICT U.S.S. ORDER NO. HP83405 INVOICE NO. 164-C-23612

CUSTOMER'S ORDER NO. S-1370 SHEET 1 10/9/64

CAR OR TRUCK NO. RI 091069 SHIPPER NO & DATE 42027 160

STATE OF PENNSYLVANIA
COUNTY OF ALLEGHENY

SUBSCRIBED AND SWORN TO BEFORE ME THIS 9th. DAY OF Feb.

Iris M. Fawcett, Notary Public
Pittsburgh, Allegheny Co., Penna.
My Commission Expires
May 25, 1965

CHICAGO BRIDGE & IRON CO
P O BOX 610
GREENVILLE PA

SHIP TO: CHICAGO BRIDGE & IRON CO
GREENVILLE PA

ASTM A 201 61T GR B FIREBOX FINE GRAIN NORMALIZE & FLATTEN TO STD
T OLS ASTM A 300 CHARPY IMPACT LONG TEST AT MINUS 50 DEG F

03966

MILL 6 SEP SH TR SHOW PA ALSO ASTM A-201-61T GRADE B
FIREBOX ALSO ASTM A-300-58 & CHARPY IMPACT TEST RESULTS

0706

BEING DULY SWORN ACCORDING TO LAW, DEPOSES AND SAYS THAT THE CHEMICAL ANALYSIS AND/OR TESTS SHOWN IN THIS REPORT ARE CORRECT AS CONTAINED IN THE RECORDS OF THE COMPANY.

SIGNATURE J. L. GIOVE, CH. MET.

DATE 02/09/65

ITEM NO.	HEAT NO.	PIECE IDENTITY NO.	NO. PCS	THICKNESS OR SECTION	WIDTH, DIA., OR FT. WT.	LENGTH	WEIGHT	YIELD PT. PSI.	TENSILE STR. PSI.	ELONGATION % IN 8"	ELONGATION % IN 2"	% RED. OF AREA	BE ED
2	73P685	289918A LB LT	1	.46000	111 1/4	255 3/8	3880	45680	67540 66820	35.0			BE
	V NOTCH 10 x 10 MM												
	LONGITUDINAL CHARPY IMPACT TESTS MADE AT MINUS 050F 104 093 092 000 FT. LBS												
2	73P685	289918B	1	.46000	111 1/4	255 3/8	3890	See Above					
	CHARPY IMPACT TESTS MADE AT MINUS FT. LBS												

Grain Size #8

Plates Normalized

MATERIAL TESTED ACCORDING TO COMPANY RECORDS CONFORMS TO THE REQUIREMENTS OF THE SPECIFICATION LISTED ABOVE.

HEAT NO.	TYPE	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	Al	N	V	B	Ti	Cb	Co
73P685	1	13	115	009	024	27												

C-40

PRODUCTION DEPARTMENT – METALLURGICAL

United States Steel Corporation

TEST REPORT OF: PLATES

WORKS: HOMESTEAD DISTRICT — USS ORDER NO. HP83405 — INVOICE NO. 164-C-23617

CUSTOMER ORDER NO.: 9-1370 SHEET 1 10/9/64

CAR OR TRUCK NO.: MILW650486 — SHIPPER NO. & DATE: 42029 160

STATE OF PENNSYLVANIA
COUNTY OF ALLEGHENY

SUBSCRIBED AND SWORN TO BEFORE ME
THIS 9th DAY OF Feb. 1965

Otis N. Fawcett, Notary Public, Pittsburgh, Allegheny Co., Pa.

BEING DULY SWORN ACCORDING TO LAW, DEPOSES AND SAYS THAT THE CHEMICAL ANALYSIS AND/OR TESTS SHOWN IN THIS REPORT ARE CORRECT AS CONTAINED IN THE RECORDS OF THE COMPANY.

SIGNATURE: J. L. GIOVE, CH. MET.

DATE: 02/09/65

SOLD TO:
CHICAGO BRIDGE & IRON CO
P O BOX 610
GREENVILLE PA

SHIP TO:
CHICAGO BRIDGE & IRON CO
GREENVILLE PA

ASTM A 201 61T GR B FIREBOX FINE GRAIN NORMALIZE & FLATTEN TO STD
PLUS ASTM A 300 CHARPY IMPACT LONG TEST AT MINUS 50 DEG F

03986

MILL & SEP SH TR SECH PA ALSO ASTM A-201-61T GRADE B
FIREBOX ALSO ASTM A-300-58 & CHARPY IMPACT TEST RESULTS

0706

ITEM NO.	HEAT NO.	PIECE IDENTITY NO.	NO. PCS.	THICKNESS OR SECTION	WIDTH, DIA. OR FT WT.	LENGTH	WEIGHT	YIELD PT. PSI.	TENSILE STR. PSI.	ELONGATION % IN 8"	ELONGATION % IN 2"	% RED. OF AREA	
1	73P685	289921A LB LT	1	.46000 V NOTCH 10 x 10 MM	120	255 3/8	4155	45370	64950 64440	31.0			B
LONGITUDINAL CHARPY IMPACT TESTS MADE AT MINUS 050F 092 080 062 000 FT. LBS													
1	73P685	289921A1	1	.46000	120	255 3/8	4155	See Above					
CHARPY IMPACT TESTS MADE AT MINUS FT. LBS													
1	73P693	301657A LB LT	1	.46000 V NOTCH 10 x 10 MM	120	255 3/8	4110	47210	66540 65860	34.0			B
LONGITUDINAL CHARPY IMPACT TESTS MADE AT MINUS 050F 071 065 056 000 FT. LBS													
1	73P693	301657B	1	.46000	120	255 3/8	4120	See Above					

Grain Size #8
Plates Normalized

STEEL SIZE TESTED ACCORDING TO COMPANY RECORDS CONFORMS TO THE REQUIREMENTS OF THE SPECIFICATION LISTED ABOVE.

HEAT NO.		C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	Al	N	V	B	Ti	Cb	Co
73P685	1	13	115	009	024	27												
73P693	1	15	95	010	026	29												

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USS [illegible]N DEPARTMENT – METALLURGICAL

United States Steel Corporation

TEST REPORT OF: PLATES

WORKS: HOMESTEAD DISTRICT — U S S ORDER NO: HP-90249 — INVOICE NO.: 164-0-23287

CUSTOMER ORDER NO.: 9-1370 10/20/64

[illegible]: HRP-002625 — SHIPPER NO. & DATE: 41959 160

STATE OF PENNSYLVANIA
COUNTY OF ALLEGHENY

SUBSCRIBED AND SWORN TO BEFORE ME THIS 9th. DAY OF Feb. 1965

OTIS C. FAWCETT, Notary Public
Pittsburgh, Allegheny Co., Penna.
My Commission Expires
May 25, 1965

BEING DULY SWORN ACCORDING TO LAW, DEPOSES AND SAYS THAT THE CHEMICAL ANALYSES AND/OR TESTS SHOWN IN THIS REPORT ARE CORRECT AS CONTAINED IN THE RECORDS OF THE COMPANY.

SIGNATURE: J. L. GLOVE, CH. MET.

DATE: 2/7/65

CHICAGO BRIDGE & IRON CO
PO BOX 610
GREENVILLE PA

SHIP TO: CHICAGO BRIDGE & IRON CO
GREENVILLE PA

ASTM A 201 61T GR B FIREBOX FINE GRAIN NORMALIZE & FLATTEN
ASTM A 300 CHARPY IMPACT LONG TEST AT MINUS 50o

MILL 6 SW TR ALSO ASTMA 201-61T GR B FIREBOX QUAL & A-300-58

ITEM NO	HEAT NO.	PIECE IDENTITY NO	NO. PCS	THICKNESS OR SECTION	WIDTH, DIA. OR FT. WT.	LENGTH	WEIGHT	YIELD PT. PSI.	TENSILE STR. PSI.	ELONGATION % IN 8"	ELONGATION % IN 2"	% RED. OF AREA	BEND
4	73P685	290055A LB LT	1	.46000	112	255 1/4	3860	46490	65230 64430	32.5			BH
		Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF-						82-84-82 Ft. Lbs.					
4	73P685	290055B	1	.46000	112	255 1/4	3820	See Above					
4	71P952	343000A LB LT	1	.46000	112	255 1/4	3910	49330 -	69380 70140	30.0			BH
		Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF-						47-82-92 Ft. Lbs.					
4	73P693	301659A LB LT	1	.46000	112	255 1/4	3830	47420	65350 66500	33.0			BH
		Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF-						80-102-71 Ft. Lbs.					

COMMENTS: TESTED ACCORDING TO COMPANY RECORDS CONFORMS TO THE REQUIREMENTS OF THE SPECIFICATION LISTED ABOVE.

HEAT NO	TYPE	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	Al	N	V	B	Ti	Cb	Co
73P685		13	1 15	009	024	27	Grain Size #8											
71P952		15	116	010	024	27	Grain Size #7											
73P693		15	95	010	026	29	Grain Size #8											

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[illegible]

PRODUCTION DEPARTMENT – METALLURGICAL

United States Steel Corporation

Sheet #2

TEST REPORT OF PLATES

WORKS HOMESTEAD DISTRICT U S S ORDER NO. HP-90240 INVOICE NO. 164-0-23287

CUSTOMER'S ORDER NO. 9-1370 10/20/64

CAR OR TRUCK NO. BKP 002625 SHIPPER NO & DATE 41959 160

STATE OF PENNSYLVANIA
COUNTY OF ALLEGHENY

SUBSCRIBED AND SWORN TO BEFORE ME THIS 9th. DAY OF Feb. 1965

... M. FAWCETT, Notary P.
Pittsburgh, Allegheny Co., Pa.
My Commission Expires May 25, 1965

SOLD TO: CHICAGO BRIDGE & IRON CO
PO BOX 410
GREENVILLE PA

SHIP TO: CHICAGO BRIDGE & IRON CO
GREENVILLE PA

ASTM A 201 61T GR B FIREBOX FINE GRAIN NORMALIZE & FLATTEN ASTM A 300 CHARPY IMPACT LONG TEST AT MINUS 50o

MILL 6 SW TR ALSO ASTM A-201-61T GR B FIREBOX QUAL & A-300-58

BEING DULY SWORN ACCORDING TO LAW, DEPOSES AND SAYS THAT THE CHEMICAL ANALYSES AND/OR TESTS SHOWN IN THIS REPORT ARE CORRECT AS CONTAINED IN THE RECORDS OF THE COMPANY.

SIGNATURE J. L. GLOVE, CH. MET.

DATE 2/7/65

ITEM NO.	HEAT NO.	PIECE IDENTITY NO	NO. PCS	THICKNESS OR SECTION	WIDTH, DIA. OR FT. WT.	LENGTH	WEIGHT	YIELD PT. PSI.	TENSILE STR. PSI.	ELONGATION % IN 8"	ELONGATION % IN 2"	% RED OF AREA	BEND
4	73F685	290052A LB LT	1	.46000	112	255 1/4	3880	48020	66140 65960	32.5			E.
		Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF- 57-55-40 Ft. Lbs.											
4	73F685	290052B	1	.46000	112	255 1/4	3960	See Above					
4	73F685	290054A LB LT	1	.46000	112	255 1/4	3890	46300	64830 65400	31.0			E.
		Longitudinal V Notch Charpy Impact Tests 10 x 10 MM Made at Minus 50oF- 39-60-46 Ft. Lbs.											
4	73F685	290054B	1	.46000	112	255 1/4	3950	See Above					

MATERIAL DESCRIBED HEREIN ACCORDING TO COMPANY RECORDS CONFORMS TO THE REQUIREMENTS OF THE SPECIFICATION LISTED ABOVE.

HEAT NO.	TYPE	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	Al	N	V	B	Ti	Cb	Co
73F685		13	1 15	009	024	27	Grain Size 68											

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PRODUCTION DEPARTMENT – METALLURGICAL
United States Steel Corporation

Sheet #3

TEST REPORT OF PLATES

WORKS HOMESTEAD DISTRICT U.S.S. ORDER NO. HP90240 INVOICE NO. 164-0-23287

CUSTOMER ORDER NO. 9-1370 SHEET NO 2 10/20/64

CAR OR TRUCK NO. NKP 002625 SHIPPER NO. & DATE 41959 160

STATE OF PENNSYLVANIA
COUNTY OF ALLEGHENY

SUBSCRIBED AND SWORN TO BEFORE ME
THIS 9th.DAY OF Feb. 1965

J. M. FAWCETT, Notary Public, Allegheny Co.
My Commission Expires May 25, 1965

CHICAGO BRIDGE & IRON CO
P O BOX 610
GREENVILLE PA

SHIP TO
CHICAGO BRIDGE & IRON CO
GREENVILLE PA

BEING DULY SWORN ACCORDING TO LAW, DEPOSES AND SAYS THAT THE CHEMICAL ANALYSIS AND/OR TESTS SHOWN IN THIS REPORT ARE CORRECT AS CONTAINED IN THE RECORDS OF THE COMPANY.

ASTM A 201 61T GR B FIREBOX FINE GRAIN NORMALIZE & FLATTEN TO STD
PLUS ASTM A 300 CHARPY IMPACT LONG TEST AT MINUS 50 DEG F

03986

MILL 6 SW TR SHOW PA ALSO ASTM A-201-61T GRADE B FIREBOX
QUALITY AND A-300-58

0706

SIGNATURE J.L. GIOVE, CH. MET.

DATE 02/07/65

ITEM NO.	HEAT NO.	PIECE IDENTITY NO.	NO. PCS	THICKNESS OR SECTION	WIDTH, DIA. OR FT. WT.	LENGTH	WEIGHT	YIELD PT. PSI.	TENSILE STR. PSI.	ELONGATION % IN 8"	ELONGATION % IN 2"	% RED OF AREA	BEND
4	71P952	341695A LB LT	1	.46000 V NOTCH 10 x 10 MM	112	255 1/4	3880	49650	68850 65500	34.0			Bh
LONGITUDINAL CHARPY IMPACT TESTS MADE AT MINUS 050F 075 046 071 000 FT. LBS													
4	71P952	341695B	1	.46000	112	255 1/4	3900	See Above					
CHARPY IMPACT TESTS MADE AT MINUS FT. LBS													
4	73P685	289922A LB LT	1	.46000 V NOTCH 10 x 10 MM	112	255 1/4		46580	67160 67300	33.0			Bh
LONGITUDINAL CHARPY IMPACT TESTS MADE AT MINUS 050F 073 074 075 000 FT. LBS													
4	73P685	289922A1	1	.46000	112	255 1/4	7800	See Above					

EQUALITY SIZE TESTED ACCORDING TO COMPANY RECORDS CONFORMS TO THE REQUIREMENTS OF THE SPECIFICATION LISTED ABOVE.

HEAT NO.	TYPE	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	Al	Ti	V	B	Ti	Cb	Co
71P952	1	15	116	010	024	27	Grain Size #7											
73P685	1	13	115	009	024	27	Grain Size #8											

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PRODUCTION DEPARTMENT – METALLURGICAL
United States Steel Corporation

Sheet #4

TEST REPORT OF PLATES

WORKS HOMESTEAD DISTRICT U.S.S. ORDER NO. HP90240 INVOICE NO. 164-0-23287

CUSTOMER ORDER NO. S-1370 SHEET NO 2 10/20/64

CAR OR TRUCK NO. NKP 002625 SHIPPER NO. & DATE 41959 160

STATE OF PENNSYLVANIA
COUNTY OF ALLEGHENY

SUBSCRIBED AND SWORN TO BEFORE ME
THIS 9th DAY OF Feb. 1965

M. FAWCETT, Notary Pc.
Allegheny Co., Pan
My Commission Expires
May 25, 1965

CHICAGO BRIDGE & IRON CO
P O BOX 610
GREENVILLE PA

SHIP TO
CHICAGO BRIDGE & IRON CO
GREENVILLE PA

ASTM A 201 61T GR B FIREBOX FINE GRAIN NORMALIZE & FLATTEN TO STD
T ULS ASTM A 300 CHARPY IMPACT LONG TEST AT MINUS 50 DEG F

03986

MILL 6 SW TR SHOW FA ALSO ASTM A-201-61T GRADE B FIREBOX
QUALITY AND A-300-58

0706

BEING DULY SWORN ACCORDING TO LAW, DESPOSES AND SAYS THAT THE CHEMICAL ANALYSIS AND/OR TESTS SHOWN IN THIS REPORT ARE CORRECT AS CONTAINED IN THE RECORDS OF THE COMPANY.

SIGNATURE J.L. GIOVE, CH. MET.

DATE 02/07/65

ITEM NO.	HEAT NO.	PIECE IDENTITY NO.	NO. PCS	THICKNESS OR SECTION	WIDTH, DIA. OR FT. WT.	LENGTH	WEIGHT	YIELD PT. PSI.	TENSILE STR. PSI.	ELONGATION % IN 8"	IN 2"	% RED OF AREA	BH
4	71P952	341686A LB LT	1	.46000 V NOTCH 10	112 x 10 MM	255 1/4	3970	50670	69520 70310	31.0			BH
LONGITUDINAL CHARPY IMPACT TESTS MADE AT MINUS 050F 024 025 022 000 FT. LBS													
4	71P952	341686B	1	.46000	112	255 1/4	3960	See Above					
CHARPY IMPACT TESTS MADE AT MINUS FT. LBS													
4	71P952	341694A LB LT	1	.46000 V NOTCH 10	112 x 10 MM	255 1/4	3870	50050	68660 68470	33.0			BH
LONGITUDINAL CHARPY IMPACT TESTS MADE AT MINUS 050F 071 062 049 000 FT. LBS													
4	71P952	341694B	1	.46000	112	255 1/4	3940	See Above					

SPECIMEN SIZE TESTED ACCORDING TO COMPANY RECORDS CONFORMS TO THE REQUIREMENTS OF THE SPECIFICATION LISTED ABOVE.

HEAT NO.		C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	Al	N	V	B	Ti	Cb	Co
71P952	1	15	116	010	024	27		Grain Size #7										

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PRODUCTION DEPARTMENT - METALLURGICAL
United States Steel Corporation

Sheet #5

REPORT OF PLATES

HOMESTEAD DISTRICT U.S.S. ORDER NO. HP9C240 INVOICE NO. 164-0-23287

9-1370 SHEET NO 2 10/20/64

GRP CC2625 SHIPPER NO & DATE 41959 160

STATE OF PENNSYLVANIA
COUNTY OF ALLEGHENY

SUBSCRIBED AND SWORN TO BEFORE ME
THIS 9th DAY OF Feb. 1965

J. FAWCETT, Notary Public
Pittsburgh, Allegheny Co., Pa.
My Commission Expires May 25, 1965

CHICAGO BRIDGE & IRON CO
P O BOX 610
GREENVILLE PA

SHIP TO

CHICAGO BRIDGE & IRON CO
GREENVILLE PA

BEING DULY SWORN ACCORDING TO LAW, DEPOSES AND SAYS THAT THE CHEMICAL ANALYSIS AND/OR TESTS SHOWN IN THIS REPORT ARE CORRECT AS CONTAINED IN THE RECORDS OF THE COMPANY.

ASTM A 201 61T GR B FIREBOX FINE GRAIN NORMALIZE & FLATTEN TO STD
PLUS ASTM A 300 CHARPY IMPACT LONG TEST AT MINUS 50 DEG F

03986

MILL 6 SW TR SHOW FA ALSO ASTM A-201-61T GRADE B FIREBOX
QUALITY AND A-300-58

0706

SIGNATURE J.L. GIOVE, CH. MET.

DATE 02/07/65

ITEM NO	HEAT NO	PIECE IDENTITY NO.		NO. PCS	THICKNESS OR SECTION	WIDTH, DIA. OR FT. WT.	LENGTH	WEIGHT	YIELD PT. PSI.	TENSILE STR. PSI.	ELONGATION % IN 8"	IN 2"	% RED. OF AREA	BEND
3	71P952	341709A	LB LT	1	.46000	124	346 1/8	5770	48910	68490 69360	26.0			BH
	V NOTCH 10 x 10 MM LONGITUDINAL CHARPY IMPACT TESTS MADE AT MINUS 050F 085 126 139 000 FT. LBS													
3	71P952	341710A	LB LT	1	.46000	124	346 1/8	5740	48160	68420 68520	30.0			BH
	V NOTCH 10 x 10 MM LONGITUDINAL CHARPY IMPACT TESTS MADE AT MINUS 050F 054 081 139 000 FT. LBS													
3	71P952	341710B		1	.46000	124	346 1/8	5860	See Above					
	CHARPY IMPACT TESTS MADE AT MINUS FT. LBS													
3	71P952	341711B	LB LT	1	.46000	124	346 1/8	5660	48150	67460 69220	24.5			BH
	LONGITUDINAL V NOTCH CHARPY IMPACT TESTS 10 x 10 MM MADE AT MINUS 50oF - 87-109-101 FT. LBS.													

SPECIMEN SIZE TESTED ACCORDING TO COMPANY RECORDS CONFORMS TO THE REQUIREMENTS OF THE SPECIFICATION LISTED ABOVE.

HEAT NO.	LADLE	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	Al	N	V	B	Ti	Cb	Co
71P952	1	15	76	010	024	27		Grain	Size	#7								

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PRODUCTION DEPARTMENT – METALLURGICAL
United States Steel Corporation

Sheet #5

TEST REPORT OF PLATES

WORKS HOMESTEAD DISTRICT USS ORDER NO. HP90240 INVOICE NO. 164-0-23287

CUSTOMER ORDER NO. 9-1370 SHEET NO 2 10/20/64

MILL ORDER NO. MKP 002625 SHIPPER NO & DATE 41959 160

STATE OF PENNSYLVANIA
COUNTY OF ALLEGHENY

SUBSCRIBED AND SWORN TO BEFORE ME THIS 9th DAY OF Feb. 1965

BEING DULY SWORN ACCORDING TO LAW, DEPOSES AND SAYS THAT THE CHEMICAL ANALYSIS AND/OR TESTS SHOWN IN THIS REPORT ARE CORRECT AS CONTAINED IN THE RECORDS OF THE COMPANY.

SIGNATURE J.L. SIOVE, CH. MET.

DATE 02/01/65

SOLD TO: CHICAGO BRIDGE & IRON CO
P O BOX 610
GREENVILLE PA

SHIP TO: CHICAGO BRIDGE & IRON CO
GREENVILLE PA

ASTM A 201 61T GR B FIREBOX FINE GRAIN NORMALIZE & FLATTEN TO STD
T PLS ASTM A 300 CHARPY IMPACT LONG TEST AT MINUS 50 DEG F

03986

MILL 6 SH TR SHOH FA ALSO ASTM A-201-61T GRADE B FIREBOX
QUALITY AND A-300-58

0706

ITEM NO	HEAT NO	PIECE IDENTITY NO		NO PCS	THICKNESS OR SECTION	WIDTH, DIA. OR FT. WT.	LENGTH	WEIGHT	YIELD PT. PSI.	TENSILE STR. PSI.	ELONGATION % IN 8"	ELONGATION % IN 2"	% RED. OF AREA	BEND NO.
3	71P952	003998	LB LT	1	.46000 10 x 10 MM	124	346 1/8	5870	48340	67880 68920	31.0			BI-
LONGITUDINAL V NOTCH CHARPY IMPACT TESTS MADE AT MINUS 50oF – 150-122-105 FT. LBS														
3	71P952	341685A	LB LT	1	.46000 10 x 10 MM V NOTCH	124	346 1/8	5910	47860	67760 68340	31.0			BH
LONGITUDINAL CHARPY IMPACT TESTS MADE AT MINUS 050F 067 062 063 000 FT. LBS														
3	71P952	341685B		1	.46000	124	346 1/8	5960	See Above					
CHARPY IMPACT TESTS MADE AT MINUS FT. LBS														
3	71P952	341708B	LB LT	1	.46000	124	346 1/8	5820	47080	67300 68520	27.5			BH
LONGITUDINAL V NOTCH CHARPY IMPACT TESTS 10 x 10 MM MADE AT MINUS 50oF-104-91-85 FT. LBS.														

CHEMISTRY IN THE ABOVE ACCORDING TO COMPANY RECORDS CONFORMS TO THE REQUIREMENTS OF THE SPECIFICATION LISTED ABOVE.

HEAT NO		C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	Al	N	V	B	Ti	Cb	Co
71P952	1	15	116	010	024	27	Grain Size #7											

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PRODUCTION DEPARTMENT – METALLURGICAL
United States Steel Corporation

Sheet #6

TEST REPORT OF PLATES

MILLS HOMESTEAD DISTRICT U.S.S. ORDER NO HP90240 INVOICE NO. 164-0-23287

CUSTOMER ORDER NO. 9-1370 SHEET NO 2 10/20/64

HKP 002625 SHIPPER NO & DATE 41959 160

CHICAGO BRIDGE & IRON CO
P O BOX 610
GREENVILLE PA

SHIP TO: CHICAGO BRIDGE & IRON CO
GREENVILLE PA

ASTM A 201 61T GR B FIREBOX FINE GRAIN NORMALIZE & FLATTEN TO STD
T CLS ASTM A 300 CHARPY IMPACT LONG TEST AT MINUS 50 DEG F

03986

MTL 6 SW TR SFOW PA ALSO ASTM A-201-61T GRADE B FIREBOX
QUALITY AND A-300-58

0706

STATE OF PENNSYLVANIA
COUNTY OF ALLEGHENY

SUBSCRIBED AND SWORN TO BEFORE ME
THIS 9th DAY OF Feb. 1965

JOHN M. FAWCETT, Notary
Pittsburgh, Allegheny Co.
My Commission Expires May ... 1965

BEING DULY SWORN ACCORDING TO LAW, DEPOSES AND SAYS THAT THE CHEMICAL ANALYSIS AND/OR TESTS SHOWN IN THIS REPORT ARE CORRECT AS CONTAINED IN THE RECORDS OF THE COMPANY.

SIGNATURE J.L. GIOVE, CH. MET.

DATE 02/07/65

ITEM NO	HEAT NO.	PIECE IDENTITY NO.	NO PCS	THICKNESS OR SECTION	WIDTH, DIA OR FT. WT.	LENGTH	WEIGHT	YIELD PT. PSI	TENSILE STR. PSI	ELONGATION % IN 8"	ELONGATION % IN 2"	% RED. OF AREA	BEND
5	73P693	291571 LB LT	1	.46000	112	267 1/4	4060	45290	63550 65200	32.0			8:

V NOTCH 10 x 10 MM
LONGITUDINAL CHARPY IMPACT TESTS MADE AT MINUS 050F 110 110 140 000 FT. LBS

Plates Normalized

CHEMICAL ANALYSIS ACCORDING TO COMPANY RECORDS CONFORMS TO THE REQUIREMENTS OF THE SPECIFICATION LISTED ABOVE.

HEAT NO	LADLE	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	Al	N	V	B	Ti	Cb	Co
73P693	1	15	55	010	026	25		Grain	Size	#8								

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PRODUCTION DEPARTMENT – METALLURGICAL
United States Steel Corporation

TEST REPORT OF PLATES

WORKS HOMESTEAD DISTRICT U.S.S. ORDER NO. HP83405 INVOICE NO. 163-0-34666

CUSTOMER'S ORDER NO. 9-1370-SHEET-1-10/9/64

CAR OR TRUCK NO. NYC-496189 SHIPPER NO & DATE 43098 160

STATE OF PENNSYLVANIA
COUNTY OF ALLEGHENY

SUBSCRIBED AND SWORN TO BEFORE ME
THIS 4th DAY OF March 196[illegible]

Notary, Pittsburgh, Allegheny Co., Pa.
My Commission Expires May 25, 1955

CHICAGO BRIDGE & IRON CO
P O BOX 610
GREENVILLE PA

SHIP TO

CHICAGO BRIDGE & IRON CO
GREENVILLE PA

BEING DULY SWORN ACCORDING TO LAW, DEPOSES AND SAYS THAT THE CHEMICAL ANALYSIS AND/OR TESTS SHOWN IN THIS REPORT ARE CORRECT AS CONTAINED IN THE RECORDS OF THE COMPANY.

SIGNATURE J.L. GIOVE, CH. MET.

DATE 03/02/65

ASTM A 201 61T GR B FIREBOX FINE GRAIN NORMALIZE & FLATTEN TO STD
T OLS ASTM A 300 CHARPY IMPACT LONG TEST AT MINUS 50 DEG F

03986

MILL 6 SEP SW TR SHOW FA ALSO ASTM A-201-61T GRADE B
FIREBOX ALSO ASTM A-300-58 & CHARPY IMPACT TEST RESULTS

0706

ITEM NO	HEAT NO	PIECE IDENTITY NO.	NO. PCS	THICKNESS OR SECTION	WIDTH, DIA OR FT WT.	LENGTH	WEIGHT	YIELD PT. PSI.	TENSILE STR. PSI.	ELONGATION % IN 8"	ELONGATION % IN 2"	% RED. OF AREA	BEND
1	72P781	284946A LR	1	.46000	120	255 3/8	4100	47570	68570	31.0			E

Longitudinal V Notch CHARPY IMPACT TESTS MADE AT MINUS 50°F.-72-102-90- FT. LBS
10 x 10 MM

Plates Normalized
Grain Size # 8

WE HEREBY CERTIFY THAT THE MATERIAL DESCRIBED HEREIN HAS BEEN MADE AND TESTED ACCORDING TO COMPANY RECORDS CONFORMS TO THE REQUIREMENTS OF THE SPECIFICATION LISTED ABOVE.

HEAT NO		C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	Al	N	V	B	Ti	Cb	Co
72P781	1	14	112	012	022	29						050						

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APPENDIX D

QUALITY ASSURANCE INFORMATION

The completed "Verification and Document Release" form contained herein is indication of the compliance of this technical report with the Teledyne Engineering Services Quality Assurance Program (Reference 19).

Technical Report
TR-6801-2

D-2

TELEDYNE ENGINEERING SERVICES

VERIFICATION AND DOCUMENT RELEASE

PROJECT NO. 6801 DATE January 7, 1988

DOCUMENT ID NO. TR-6801-2 REV NO 0

TYPE OF DOCUMENT Technical Report NUMBER OF PAGES 144

TITLE

Mark I Torus Shell and Vent System Thickness Requirement

Nine Mile Point Unit 1 Nuclear Station

REV DESCRIPTION

None

THE FOLLOWING COMPUTER RUNS APPLY TO THIS DOCUMENT:

	Unique ID	Date	Prog. Name/ Version	Software Error Check		Unique ID	Date	Prog. Name/ Version	Software Error Check
1.	None				7.				
2.					8.				
3.					9.				
4.					10.				
5.					11.				
6.					12.				

If more space required, attach additional pages.

ORIGINATOR [signature] DATE 1/6/88

CHECKER Richard A. [signature] DATE 1-6-88

THIS DOCUMENT HAS BEEN VERIFIED AND IS IN COMPLIANCE WITH THE REQUIREMENTS OF THE TES QUALITY ASSURANCE PROGRAM.

VERIFIER [signature] DATE 1-6-88

APPROVED FOR RELEASE

PROJECT MANAGER [signature] DATE 1/6/88

QAE Dwight Chandler DATE 1-6-88

12/84

TELEDYNE
ENGINEERING SERVICES

VERIFICATION AND DOCUMENT RELEASE

PROJECT NO. 6801 DATE January 29, 1988

DOCUMENT ID NO. TR-6801-2 REV NO 1

TYPE OF DOCUMENT Technical Report NUMBER OF PAGES 163

TITLE

Mark I Torus Shell and Vent System Thickness Requirements

Nine Mile Point Unit 1 Nuclear Station

REV DESCRIPTION

E.C.O. No. 8582

THE FOLLOWING COMPUTER RUNS APPLY TO THIS DOCUMENT:

	Unique ID	Date	Prog. Name/ Version	Software Error Check		Unique ID	Date	Prog. Name/ Version	Software Error Check
1.	None				7.				
2.					8.				
3.					9.				
4.					10.				
5.					11.				
6.					12.				

If more space required, attach additional pages.

ORIGINATOR [signature] DATE 1-29-88

CHECKER Richard W. Enis DATE 1-29-88

THIS DOCUMENT HAS BEEN VERIFIED AND IS IN COMPLIANCE WITH THE REQUIREMENTS OF THE TES QUALITY ASSURANCE PROGRAM.

VERIFIER [signature] DATE 1-29-88

APPROVED FOR RELEASE

PROJECT MANAGER [signature] DATE 1-29-88

QAE [signature] Chandler DATE 1-29-88

APPENDIX E

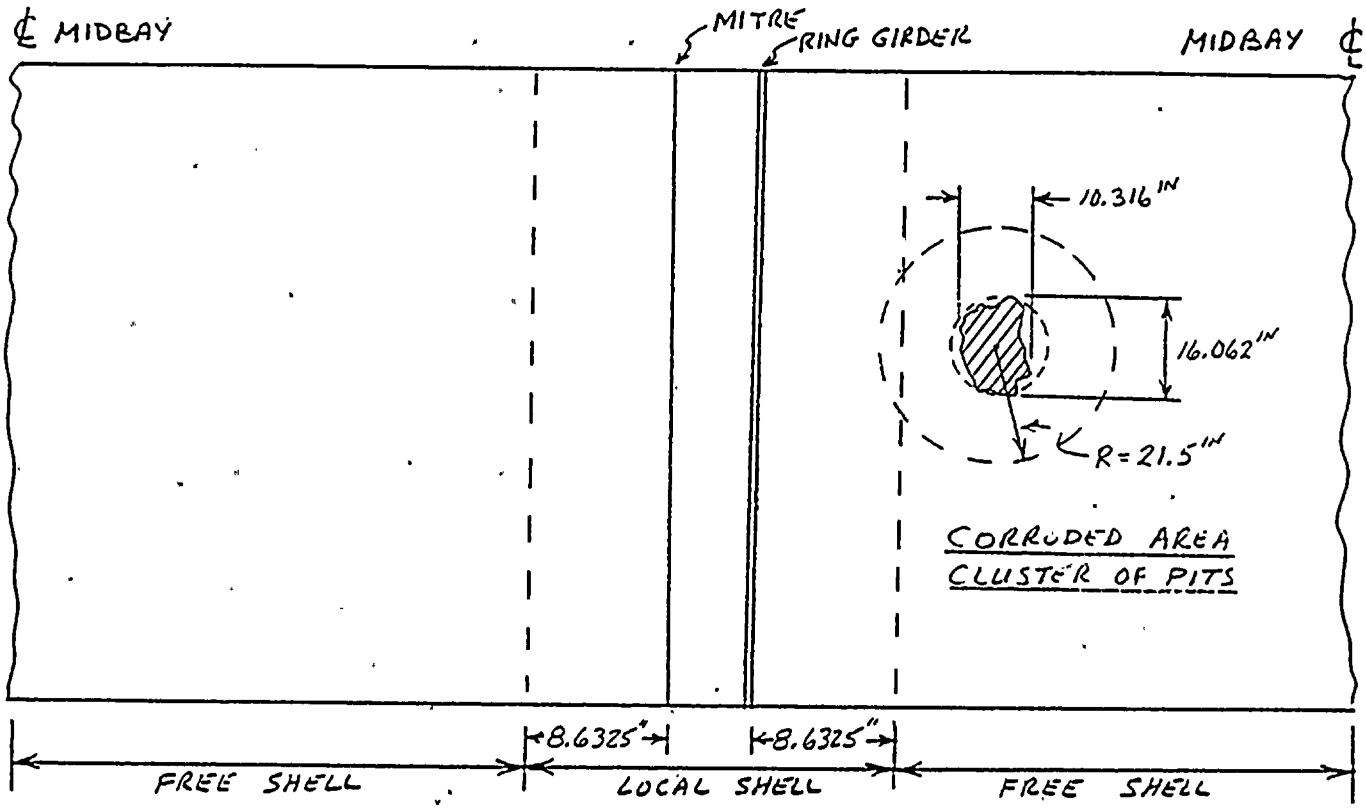
SAMPLE TORUS SHELL CALCULATIONS FOR POSTULATED INDICATIONS

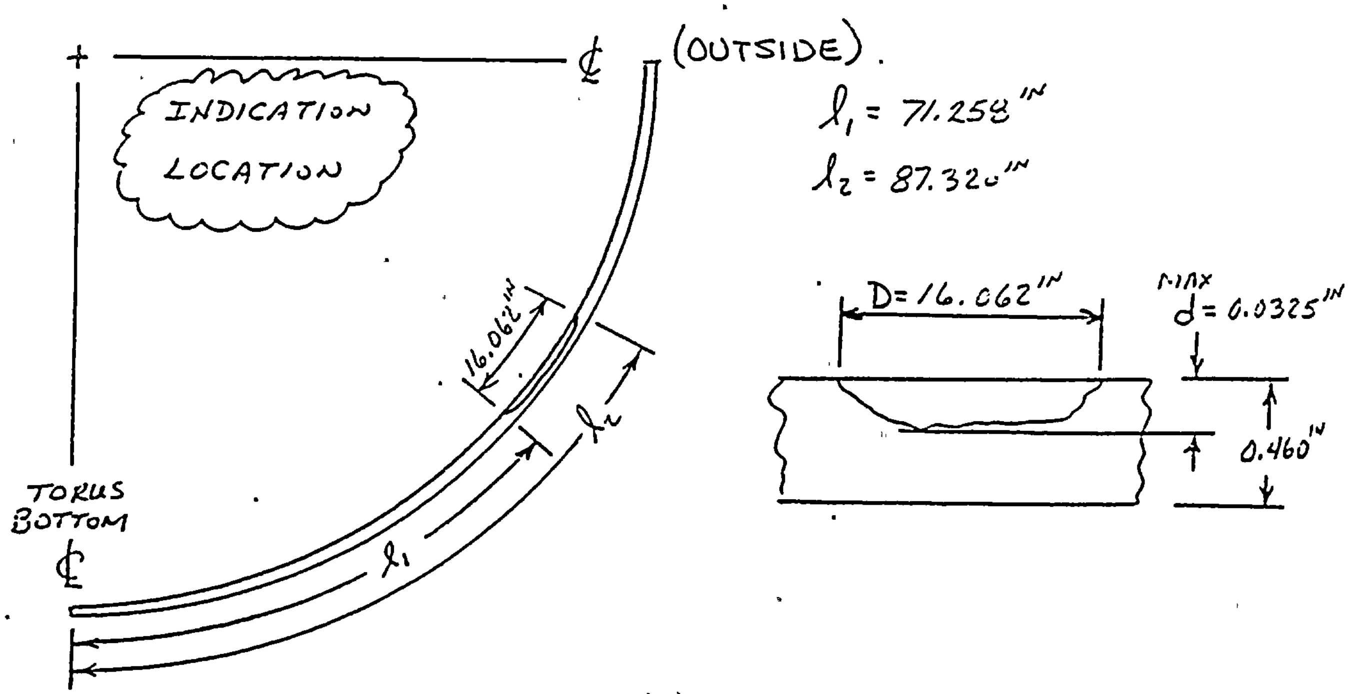
TELEDYNE ENGINEERING SERVICES

BY RAE DATE 1-26-88 CHKD. BY RMP DATE 1-26-88	NMP-1 SHELL THICKNESS REQUIREMENTS 6801-2	SHEET NO. 1 OF PROJ. NO. 6801

NMP-1 TORUS SHELL

TORUS SHELL INDICATION SAMPLE CALCULATION #1





[illegible]

TELEDYNE ENGINEERING SERVICES

BY RBE DATE 1-26-88 | NMP-1 SHELL THICKNESS REQUIREMENTS 6801-2 | SHEET NO. 2 OF
CHKD. BY RMP DATE 1-26-88 | PROJ. NO. 6801

NMP-1 TORUS SHELL

TORUS SHELL INDICATION SAMPLE CALCULATION #1

STEP 1 CIRCUMSCRIBED DIAMETER OF INDICATION AREA.
$D = 16.062^{IN}$

STEP 2 MAXIMUM DEPTH OF INDICATION $d = 0.0325^{IN}$

STEP 3 CONFIRM THAT NO ADDITIONAL INDICATIONS ARE FOUND WITHIN A 21.5^{IN} RADIUS
✓ CONFIRMED

STEP 4 IF STEP 3 IS VIOLATED, RE-CIRCUMSCRIBE THE AREA AND RE-DETERMINE "D" AND "d"

STEP 5 DETERMINE ARC REGION (S) FROM APPROPRIATE FIGURE 7 or 8
___ LOCAL SHELL REGION, FIGURE 7.
✓ FREE SHELL REGION, FIGURE 8.

$l_1 = 71.258^{IN}$ LIES IN ARC REGION S 4
$l_2 = 87.320^{IN}$ LIES IN ARC REGION S 4

S4 PERMISSIBLE CORRODED THICKNESS = 0.035^{IN}
S4 PERMISSIBLE CORRODED THICKNESS = 0.035^{IN}

TELEDYNE ENGINEERING SERVICES

BY RAE DATE 1-26-88
CHKD. BY LMP DATE 1-26-88

NMP-1 SHELL THICKNESS REQUIREMENTS 6801-2

NMP-1 TORUS SHELL

TORUS SHELL INDICATION SAMPLE CALCULATION #1

STEP 6 CHECK IF MEASURED INDICATION DEPTH IS LESS THAN THE PERMISSIBLE CORRODED THICKNESS (t_c)

PERMISSIBLE CORRODED THICKNESS = t_c = 0.035 IN
INDICATION DEPTH = d = 0.0325 IN

✓ , $d \leq t_c$, THEN INDICATION IS ACCEPTABLE, STOP, SKIP REMAINING STEPS

___ , $d > t_c$, THEN CONTINUE

STEP 7 DETERMINE CIRCUMCRIBED DIAMETER MULTIPLIER (F) FROM THE TABLE OF FIGURE 9 OR 10.

___ FREE SHELL REGION, FIGURE 9
___ RING GIRDER (LOCAL) SHELL REGION, FIGURE 10

S__, FACTOR "F" = ______
S__, FACTOR "F" = ______

LARGEST MULTIPLIER FACTOR "F" = ______

TELEDYNE ENGINEERING SERVICES

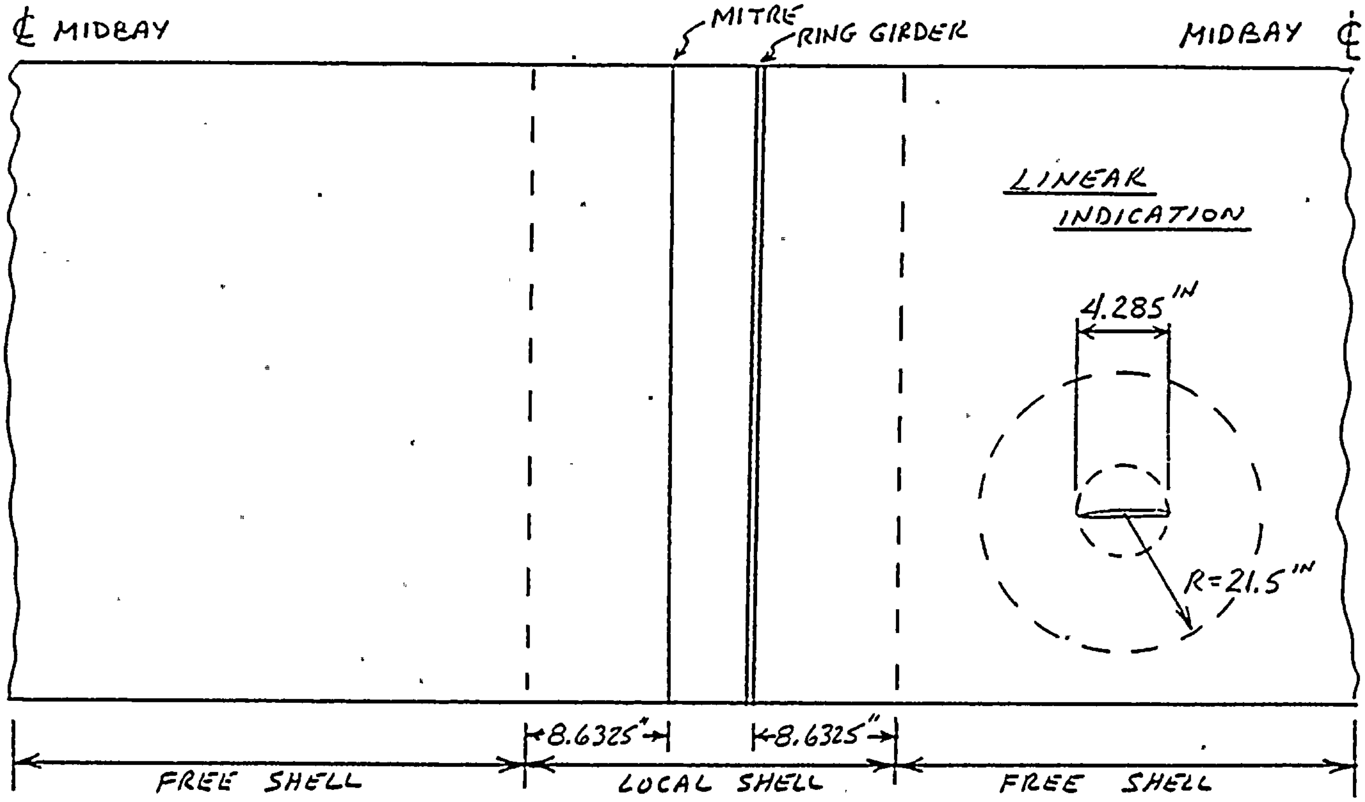
BY RKE DATE 1-26-88
CHKD. BY [illegible] DATE 1-26-88

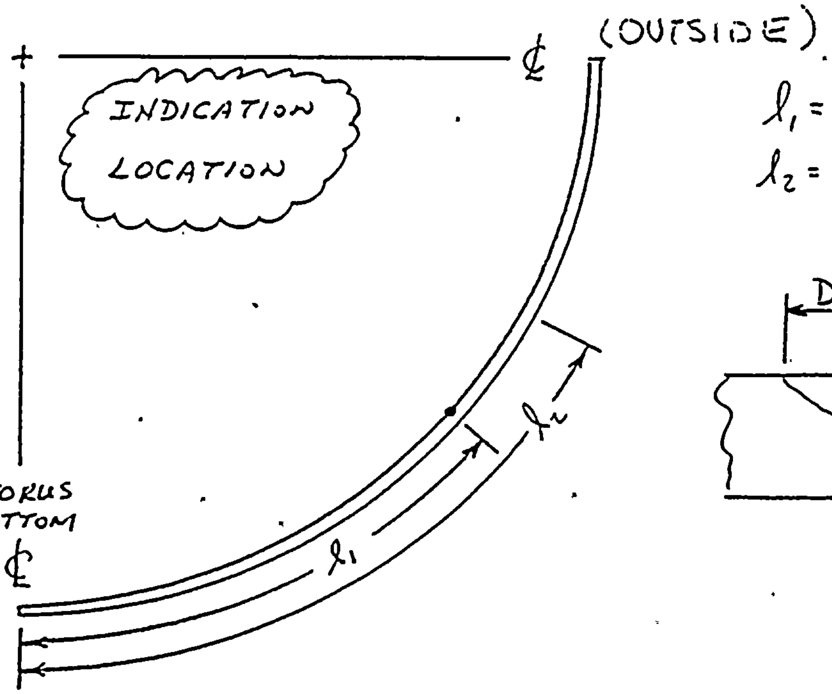
NMP-1 SHELL THICKNESS REQUIREMENTS 6801-2

SHEET NO. 4 OF
PROJ. NO. 6801

NMP-1 TORUS SHELL

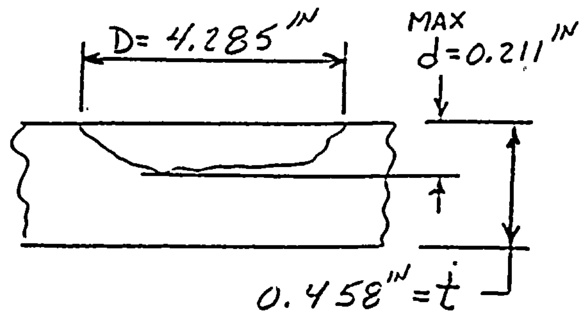
TORUS SHELL INDICATION SAMPLE CALCULATION





$l_1 = 136.122^{IN}$

$l_2 = l_1$



[illegible]

TELEDYNE ENGINEERING SERVICES

BY RAE DATE 1-26-88 CHKD. BY RMP DATE 1-26-88	NMP-1 SHELL THICKNESS REQUIREMENTS 6801-2	SHEET NO. 5 OF PROJ. NO. 6801

NMP-1 TORUS SHELL

TORUS SHELL INDICATION SAMPLE CALCULATION #2

STEP 1 CIRCUMSCRIBED DIAMETER OF INDICATION AREA.
D = 4.285 IN

STEP 2 MAXIMUM DEPTH OF INDICATION d = 0.211 IN

STEP 3 CONFIRM THAT NO ADDITIONAL INDICATIONS ARE FOUND WITHIN A 21.5 IN RADIUS
✓ CONFIRMED

STEP 4 IF STEP 3 IS VIOLATED, RE-CIRCUMSCRIBE THE AREA AND RE-DETERMINE "D" AND "d"

STEP 5 DETERMINE ARC REGION (S) FROM APPROPRIATE FIGURE 7 or 8
___ LOCAL SHELL REGION, FIGURE 7.
✓ FREE SHELL REGION, FIGURE 8.

l_1 = 136.122 IN LIES IN ARC REGION S 3
l_2 = N/A LIES IN ARC REGION S ___

S 3 PERMISSIBLE CORRODED THICKNESS = 0.078/0.140
S ___ PERMISSIBLE CORRODED THICKNESS = ___

[illegible]

TELEDYNE ENGINEERING SERVICES

BY RKE DATE 1-26-88 | NMP-1 SHELL THICKNESS REQUIREMENTS 6801-2 | SHEET NO. 6 OF
CHKD. BY PMP DATE 1-26-88 | PROJ. NO. 6801

NMP-1 TORUS SHELL

TORUS SHELL INDICATION SAMPLE CALCULATION #2

STEP 6 CHECK IF MEASURED INDICATION DEPTH IS LESS THAN THE PERMISSIBLE CORRODED THICKNESS (t_c)

NOTE IF d WAS IN THE RANGE OF t_c ACTUAL t_c COULD BE INTERPOLATED

PERMISSIBLE CORRODED THICKNESS = t_c = 0.078 IN / 0.190 IN

INDICATION DEPTH = d = 0.211 IN

___ , $d < t_c$, THEN INDICATION IS ACCEPTABLE, STOP, SKIP REMAINING STEPS

✓ , $d > t_c$, THEN CONTINUE

STEP 7 DETERMINE CIRCUMCRIBED DIAMETER MULTIPLIER (F) FROM THE TABLE OF FIGURE 9 OR 10.

✓ FREE SHELL REGION, FIGURE 9

___ RING GIRDER (LOCAL) SHELL REGION, FIGURE 10

S3, FACTOR "F" = 0.930

S__, FACTOR "F" = ______

LARGEST MULTIPLIER FACTOR "F" = 0.930

TELEDYNE ENGINEERING SERVICES

BY RAE DATE 1-26-88
CHKD. BY RMP DATE 1-26-88

NMP-1 SHELL THICKNESS REQUIREMENTS 6801-2

SHEET NO. 7 OF
PROJ. NO. 6801

NMP-1 TORUS SHELL

TORUS SHELL INDICATION SAMPLE CALCULATION*

STEP 8 DETERMINE EQUIVALENT DIAMETER (D') WHICH CIRCUMSCRIBES THE INDICATIONS.

$D' = D \times F$

$D' = 4.285^{IN} \times 0.930 = 3.985^{IN}$

STEP 9 USING D' AND APPROPRIATE FIGURE 9 OR 10, DETERMINE THE ALLOWABLE INDICATION DEPTH (d')

✓ FREE SHELL, FIGURE 9
___ LOCAL SHELL, FIGURE 10

ALLOWABLE DEPTH, $d' = 0.265^{IN}$

* ADJUST ALLOWABLE DEPTH (d') TO ACCOUNT FOR REDUCED WALL THICKNESS MEASURED.

ORIGINAL WALL THICKNESS, $T_o = 0.460^{IN}$
MEASURED WALL THICKNESS, $t = 0.458^{IN}$

ADJUSTED $d' = d' - (T_o - t) = 0.263^{IN}$
INDICATION DEPTH, $d = 0.211^{IN}$

✓, $d \leq d'$, INDICATION IS ACCEPTABLE
___, $d > d'$, WELD REPAIR REQUIRED

[illegible]

TELEDYNE ENGINEERING SERVICES

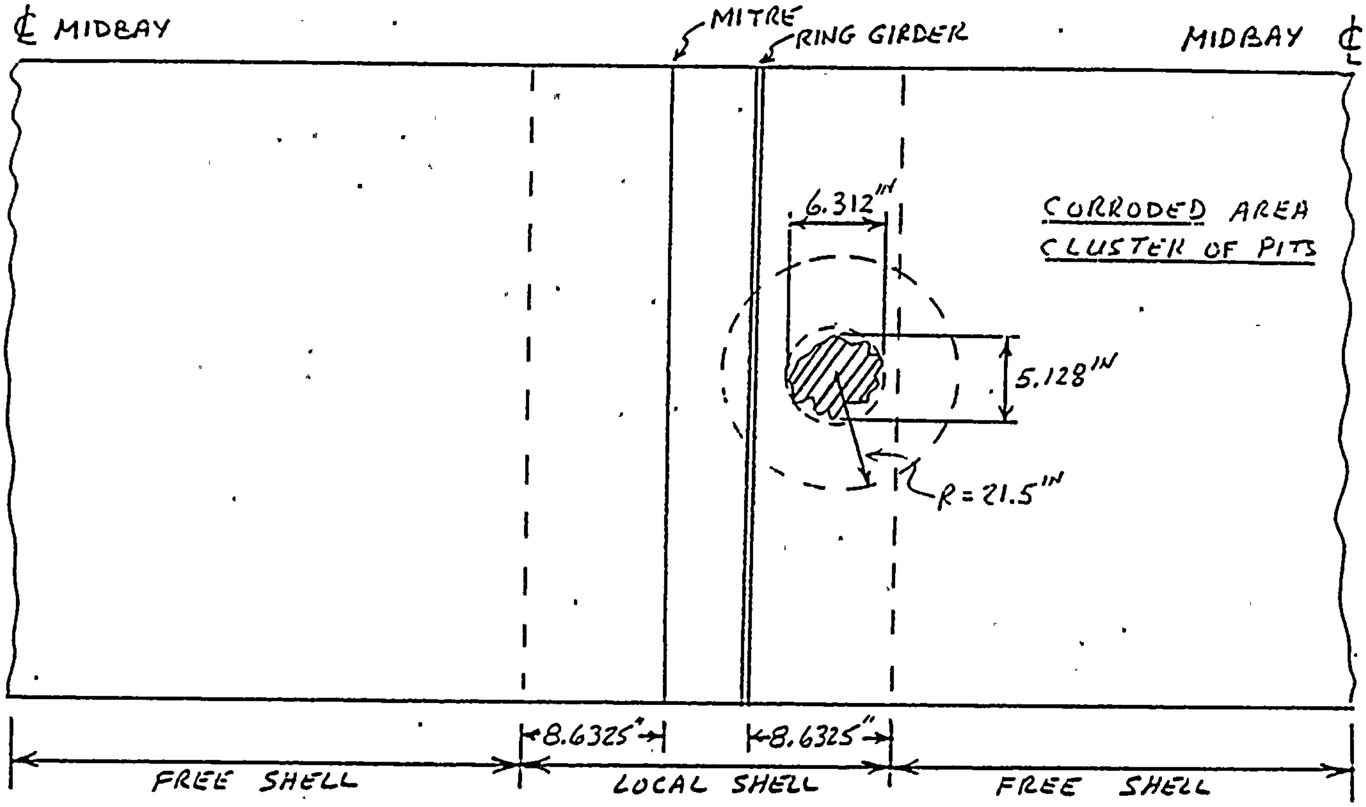
BY RKE DATE 1-26-88
CHKD. BY RWP DATE 1-26-88

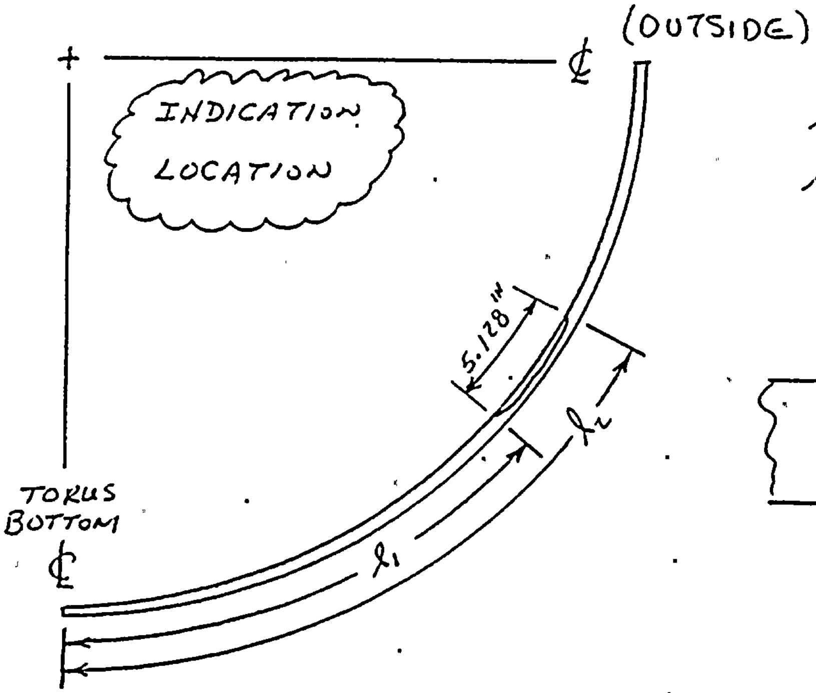
NMP-1 SHELL THICKNESS REQUIREMENTS 6801-2

SHEET NO. 8 OF
PROJ. NO. 6801

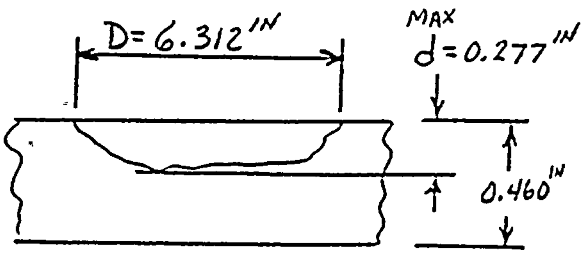
NMP-1 TORUS SHELL

TORUS SHELL INDICATION SAMPLE CALCULATION #3





$l_1 = 38.125$ IN
$l_2 = 43.253$ IN



TELEDYNE ENGINEERING SERVICES

BY RKE DATE 1-26-88 | NMP-1 SHELL THICKNESS REQUIREMENTS 6801-2 | SHEET NO. 4 OF
CHKD. BY RWP DATE 1-26-88 | | PROJ. NO. 6801

NMP-1 TORUS SHELL

TORUS SHELL INDICATION SAMPLE CALCULATION #3

STEP 1 CIRCUMSCRIBED DIAMETER OF INDICATION AREA.
D = 6.312 IN.

STEP 2 MAXIMUM DEPTH OF INDICATION d = 0.277 IN

STEP 3 CONFIRM THAT NO ADDITIONAL INDICATIONS ARE FOUND WITHIN A 21.5 IN RADIUS
✓ CONFIRMED

STEP 4 IF STEP 3 IS VIOLATED, RE-CIRCUMSCRIBE THE AREA AND RE-DETERMINE "D" AND "d"

STEP 5 DETERMINE ARC REGION (S) FROM APPROPRIATE FIGURE 7 or 8
✓ LOCAL SHELL REGION, FIGURE 7.
___ FREE SHELL REGION, FIGURE 8.

l_1 = 38.125 IN LIES IN ARC REGION S5
l_2 = 43.253 IN LIES IN ARC REGION S5

S5 PERMISSIBLE CORRODED THICKNESS = 0.292 IN
S5 PERMISSIBLE CORRODED THICKNESS = 0.292 IN

TELEDYNE ENGINEERING SERVICES

BY RKE DATE 1-26-88
CHKD. BY RWP DATE 1-26-88

NMP-1 SHELL THICKNESS REQUIREMENTS 6801-2

SHEET NO. 10 OF
PROJ. NO. 6801

NMP-1 TORUS SHELL

TORUS SHELL INDICATION SAMPLE CALCULATION #3

STEP 6 CHECK IF MEASURED INDICATION DEPTH IS LESS THAN THE PERMISSIBLE CORRODED THICKNESS (t_c)

PERMISSIBLE CORRODED THICKNESS = t_c = 0.292 IN
INDICATION DEPTH = d = 0.277 IN

✓ , $d \leq t_c$, THEN INDICATION IS ACCEPTABLE, STOP, SKIP REMAINING STEPS

___ , $d > t_c$, THEN CONTINUE

STEP 7 DETERMINE CIRCUMCRIBED DIAMETER MULTIPLIER (F) FROM THE TABLE OF FIGURE 9 OR 10.

___ FREE SHELL REGION, FIGURE 9
___ RING GIRDER (LOCAL) SHELL REGION, FIGURE 10

S__, FACTOR "F" = ________
S__, FACTOR "F" = ________

LARGEST MULTIPLIER FACTOR "F" = ________

TELEDYNE ENGINEERING SERVICES

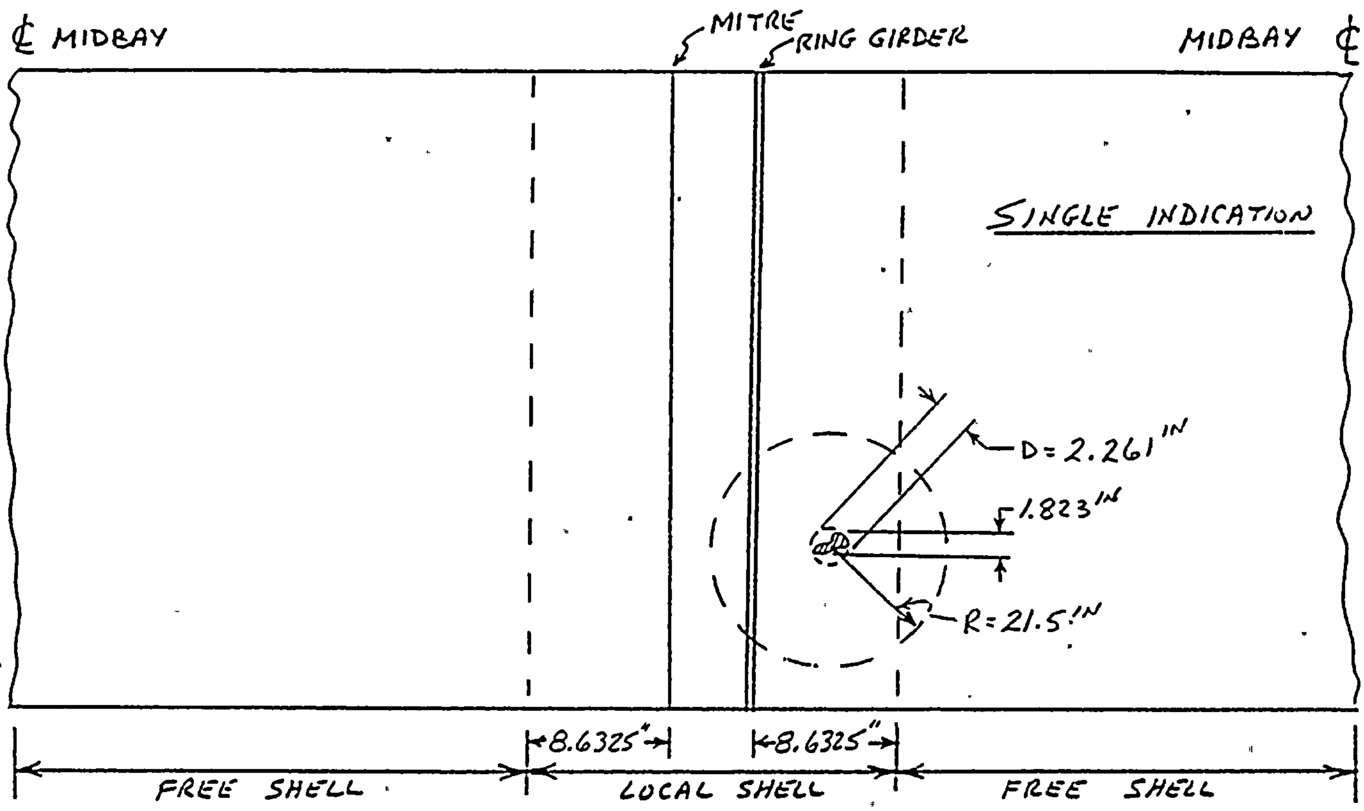
BY RAE DATE 1-26-88
CHKD. BY RMP DATE 1-26-88

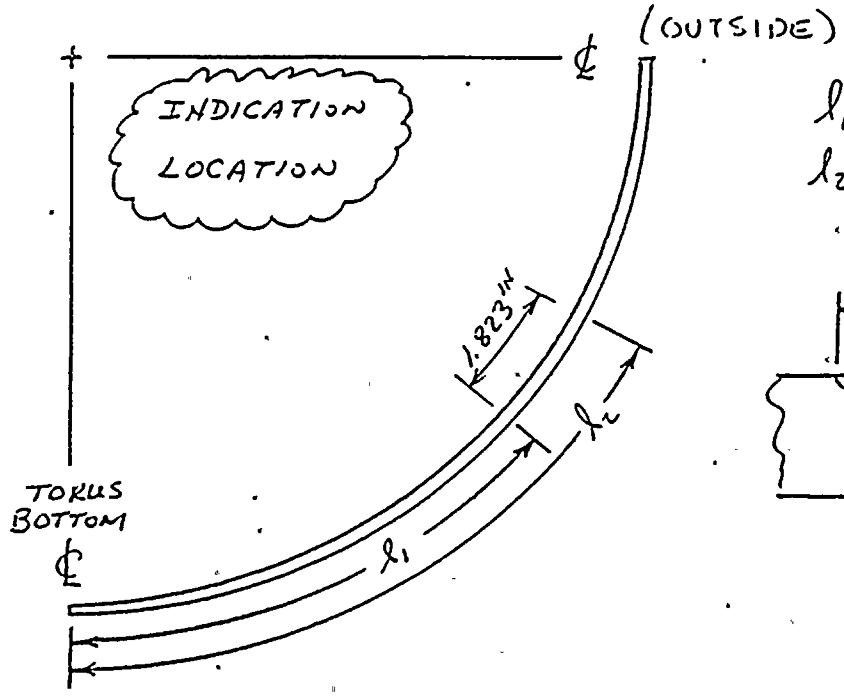
NMP-1 SHELL THICKNESS REQUIREMENTS 6801-2

SHEET NO. 11 OF
PROJ. NO. 6801

NMP-1 TORUS SHELL

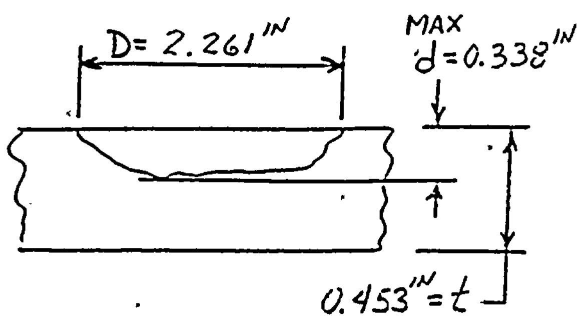
TORUS SHELL INDICATION SAMPLE CALCULATION #4





$l_1 = 46.513^{IN}$

$l_2 = 48.336^{IN}$



TELEDYNE ENGINEERING SERVICES

BY R.K. DATE 1-26-88 | NMP-1 SHELL THICKNESS REQUIREMENTS 6801-2 | SHEET NO. 12 OF
CHKD. BY JWP DATE 1-26-88 | | PROJ. NO. 6801

NMP-1 TORUS SHELL

TORUS SHELL INDICATION SAMPLE CALCULATION #4

STEP 1 CIRCUMSCRIBED DIAMETER OF INDICATION AREA.
D = 2.261 IN

STEP 2 MAXIMUM DEPTH OF INDICATION d = 0.338 IN

STEP 3 CONFIRM THAT NO ADDITIONAL INDICATIONS ARE FOUND WITHIN A 21.5 IN RADIUS
✓ CONFIRMED

STEP 4 IF STEP 3 IS VIOLATED, RE-CIRCUMSCRIBE THE AREA AND RE-DETERMINE "D" AND "d"

STEP 5 DETERMINE ARC REGION (S) FROM APPROPRIATE FIGURE 7 or 8

✓ LOCAL SHELL REGION, FIGURE 7.
___ FREE SHELL REGION, FIGURE 8.

ℓ_1 = 46.513 IN LIES IN ARC REGION S 5
ℓ_2 = 48.336 IN LIES IN ARC REGION S 4

S 5 PERMISSIBLE CORRODED THICKNESS = 0.292 IN
S 4 PERMISSIBLE CORRODED THICKNESS = 0.287 IN

TELEDYNE ENGINEERING SERVICES

BY RKS DATE 1-26-88 CHKD. BY RWM DATE 1-26-88	NMP-1 SHELL THICKNESS REQUIREMENTS 6801-2	SHEET NO. 13 OF PROJ. NO. 6801

NMP-1 TORUS SHELL

TORUS SHELL INDICATION SAMPLE CALCULATION #4

STEP 6 CHECK IF MEASURED INDICATION DEPTH IS LESS THAN THE PERMISSIBLE CORRODED THICKNESS (t_c).

PERMISSIBLE CORRODED THICKNESS = t_c = 0.287 IN

INDICATION DEPTH = d = 0.338 IN

___ , $d < t_c$, THEN INDICATION IS ACCEPTABLE, STOP, SKIP REMAINING STEPS

✓ , $d > t_c$, THEN CONTINUE

STEP 7 DETERMINE CIRCUMSCRIBED DIAMETER MULTIPLIER (F) FROM THE TABLE OF FIGURE 9 OR 10.

___ FREE SHELL REGION, FIGURE 9

✓ RING GIRDER (LOCAL) SHELL REGION, FIGURE 10

S5, FACTOR "F" = 0.925

S4, FACTOR "F" = 0.935

LARGEST MULTIPLIER FACTOR "F" = 0.935

TELEDYNE ENGINEERING SERVICES

BY RKE DATE 1-26-88 | NMP-1 SHELL THICKNESS REQUIREMENTS 6801-2 | SHEET NO. 14 OF
CHKD. BY RMP DATE 1-26-88 | PROJ. NO. 6801

NMP-1 TORUS SHELL

TORUS SHELL INDICATION SAMPLE CALCULATION #4

STEP 8 DETERMINE EQUIVALENT DIAMETER (D') WHICH CIRCUMSCRIBES THE INDICATIONS.

$D' = D \times F$

$D' = 2.261^{IN} \times 0.935 = 2.114^{IN}$

STEP 9 USING D' AND APPROPRIATE FIGURE 9 OR 10, DETERMINE THE ALLOWABLE INDICATION DEPTH (d')

___ FREE SHELL, FIGURE 9
✓ LOCAL SHELL, FIGURE 10

ALLOWABLE DEPTH, $d' = 0.347^{IN}$

* ADJUST ALLOWABLE DEPTH (d') TO ACCOUNT FOR REDUCED WALL THICKNESS MEASURED.

ORIGINAL WALL THICKNESS, $T_0 = 0.460^{IN}$
MEASURED WALL THICKNESS, $t = 0.453^{IN}$

ADJUSTED $d' = d' - (T_0 - t) = 0.340^{IN}$
INDICATION DEPTH, $d = 0.338^{IN}$

✓, $d \le d'$, INDICATION IS ACCEPTABLE
___, $d > d'$, WELD REPAIR REQUIRED

ATTACHMENT D

Niagara Mohawk Calculation S22-4-WW198-STAT01

Torus Wall Thinning

Trending Analysis

NIAGARA MOHAWK

CALCULATION COVER SHEET

NUCLEAR ENGINEERING & LICENSING

DISCIPLINE: STRUCTURAL

PAGE 1

PROJECT: NINE MILE POINT NUC. STA.-UNIT 1

CALC. NO. S22.4-WW198-STATØ1

SUBJECT: TORUS WALL THINNING, TRENDING ANALYSIS

BUILDING: REACTOR

FLOOR ELEV.: 198'

INDEX NO.: 3-N2.1-S22.4

ORIGINATOR(S): A-Habib (SSL) D. Westcott

TOTAL SHT'S. 119

CHECKER(S): [illegible]

LAST SHT. NO: 115

RECORD OF ISSUES									
REV.	DESCRIPTION	M.O.#	BY	DATE	CHKD.	DATE	APPD.	DATE	DATE FILMED:
0	INITIAL ISSUE	—	AH/DW	5/23/88	FHF	5/23	RDD	5/24/88	

COMPUTER OUTPUT YES ☒ NO ☐

SAFETY RELATED YES ☒ NO ☐

DRAWINGS REFERENCED: NONE

DWG. NO.	INDEX	SHT.	REV.

REFERENCES:

(1) ISI TORUS WALL THICKNESS MEASUREMENTS (APPENDIX A)

(2) SOFTWARE PACKAGES SYMPHONY (1.2) & CHART MASTER (VER. 6.2)

KEYWORDS: NMP 1, STRUCTURAL, TORUS WALL,

CROSS REF.:

12/84

EIP-091

NIAGARA MOHAWK

CALCULATION SHEET

NUCLEAR ENGINEERING & LICENCING

DISCIPLINE STRUCTURAL

PROJECT: NINE MILE POINT NUC. STA.-UNIT I		CALC. NO. S22-4-WW198 -STAT Φ1	REV. 0
SUBJECT: TORUS WALL THINNING TRENDING . ANALYSIS		ORIG. AH/DRW	DATE: 5/20/88
INDEX: 3-N2.1-S22-4		CHK'D. FMF	DATE: 5/23

TABLE OF CONTENTS

CALCULATION SHEET

NIAGARA MOHAWK

NUCLEAR ENGINEERING & LICENCING

DISCIPLINE STRUCTURAL

PAGE 3

PROJECT: NINE MILE POINT NUC. STA.-UNIT 1		CALC. NO. S22.4-WW198-STAT Φ1	REV. 0
SUBJECT: TORUS WALL THINNING TRENDING ANALYSIS		ORIG. AH/DRW	DATE: 5/20/88
INDEX: 3-N2.1-S22.4		CHK'D. FIF	DATE: 5/23/88

SCOPE

TO GENERATE TRENDING CHARTS FOR TORUS SHELL THICKNESS BASED ON MEASUREMENTS CONDUCTED BY THE ISI GROUP AT NINE MILE POINT.

THESE CHARTS HAVE BEEN PRESENTED TO RESOLVE NRC CONCERN REGARDING TORUS WALL THINNING.

DISCUSSION

THE ISI GROUP AT NINE MILE POINT HAS CONDUCTED THE MEASUREMENTS OF TORUS SHELL THICKNESS SINCE 1975 USING UT METHODS. THIS DATA IS CONTAINED IN APPENDIX 'A' OF THESE CALCULATIONS.
'SYMPHONY' WAS USED TO ANALYZE THIS DATA TO CALCULATE:

(i) MEAN VALUE
(ii) STANDARD DEVIATION
& (iii) (MEAN VALUE) – (STANDARD DEVIATION)

FOLLOWING 'SYMPHONY' FILES WERE GENERATED.

FILE NAME	DESCRIPTION
DAN. WR1	ANALYSIS OF 1975, 1977, 1979, 1981 AND 1984 ISI DATA. ALSO INCLUDES SUMMARY OF RESULTS.
DAN. WR2	ANALYSIS OF 1986 DATA
DAN. WR3	ANALYSIS OF 1988 DATA
DAN. WR4	ANALYSIS OF 1988 BOTTOM RADIAL DATA
DAN. WR5	ANALYSIS OF 1988 NRC DATA

PROJECT: NINE MILE POINT NUC. STA.-UNIT I	CALC. NO. S22-4-WW198 - STAT Φ1 REV. 0
SUBJECT: TORUS WALL THINNING TRENDING . ANALYSIS	ORIG. AH/DRW DATE: 5/20/88
INDEX: 3-N2.1-S22-4	CHK'D. EHF DATE: 5/23/88

THE 'SYMPHONY' FILES WERE USED AS INPUT TO 'CHART MASTER' TO GENERATE TRENDING CHARTS FOR DIFFERENT REGIONS.

FOLLOWING 'CHART MASTER' FILES WERE GENERATED

FILE NAME	DESCRIPTION
DAN 1. CHT	REGION 1 TRENDING CHART
DAN 1A. CHT	REGION 1 TRENDING CHART (W/O 1984 DATA)
DAN 2. CHT	REGION 2 TRENDING CHART.
DAN 3. CHT	REGION 3 TRENDING CHART
DAN 4. CHT	REGION 4 TRENDING CHART
DAN 5. CHT	REGION 5 TRENDING CHART

REGION 1 THRU 5 ARE SHOWN ON THE SKETCH ON PAGE 5

THE SPREADSHEETS FOR SYMPHONY FILES DAN,WR1 THRU DAN,WR5 ARE STRUCTURED IN TWO BLOCKS OF FIVE COLUMNS. THE SECOND SET OF COLUMNS INVOLVE INSTRUMENT ERROR CALCULATIONS THAT WERE NOT USED IN THIS ANALYSIS.

THE ERROR MESSAGES AT THE BOTTOM OF COLUMNS FOUR & FIVE IN DAN, WR5 ARE IRRELEVENT BECAUSE THESE COLUMNS WERE NOT USED IN THE CALCULATIONS.

A TYPICAL ~~ERI~~

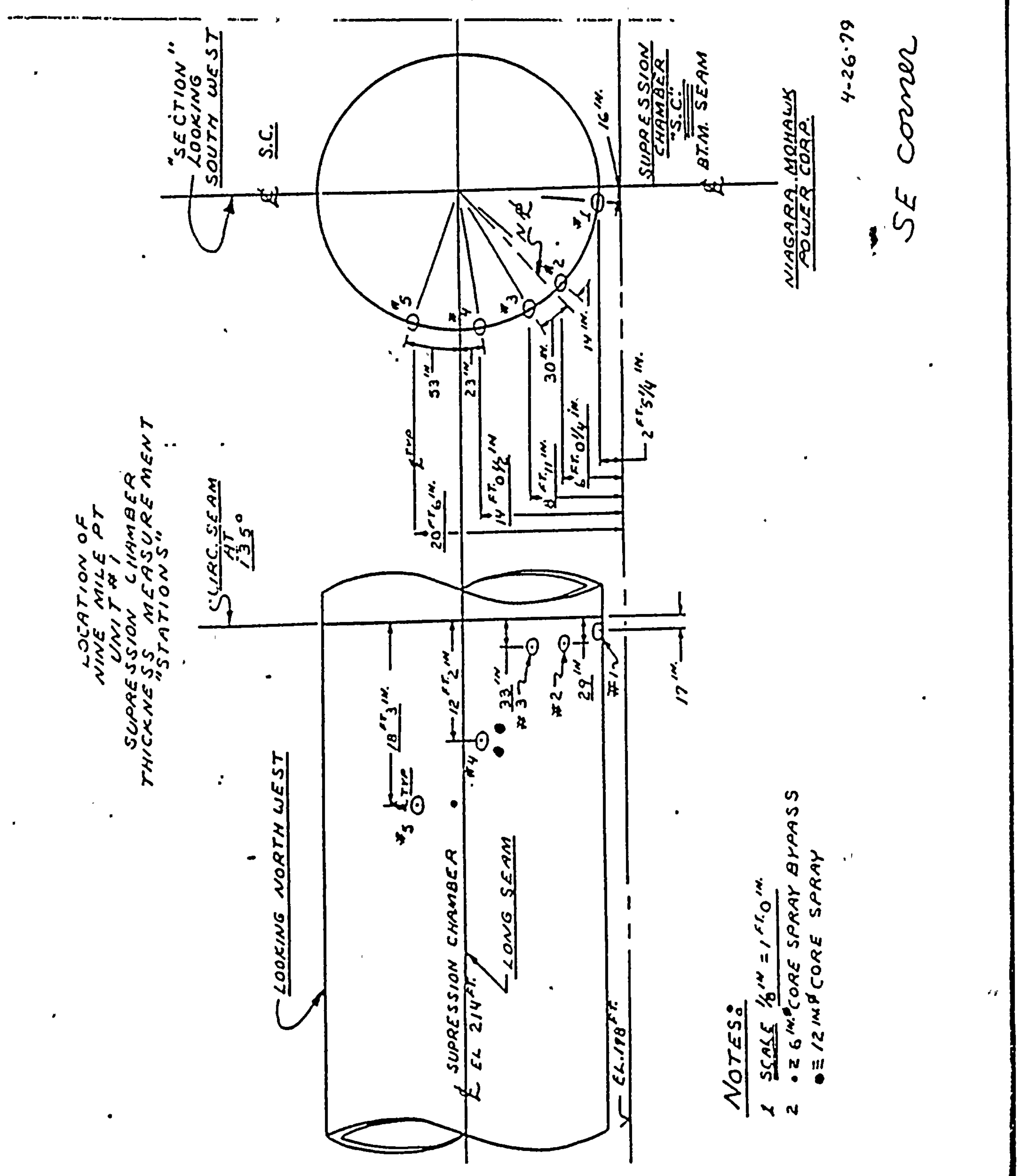
NIAGARA MOHAWK

NUCLEAR ENGINEERING & LICENCING

CALCULATION SHEET

DISCIPLINE STRUCTURAL

PROJECT: NINE MILE POINT NUC. STA.-UNIT I		CALC. NO. S22-4-WW198 -STAT Ø1	REV. 0
SUBJECT: TORUS WALL THINNING TRENDING ANALYSIS		ORIG. AH/DRW	DATE: 5/20/88
INDEX: 3-N2.1-S22-4		CHK'D. FHF	DATE: 5/23/88



NIAGARA MOHAWK

CALCULATION SHEET

PAGE 6

NUCLEAR ENGINEERING & LICENCING

DISCIPLINE STRUCTURAL

PROJECT: NINE MILE POINT NUC. STA.-UNIT 1

CALC. NO. S22-4-WW198 -STAT Φ1 REV. 0

SUBJECT: TORUS WALL THINNING TRENDING . ANALYSIS

ORIG. AH/DRW DATE: 5/20/88

INDEX: 3-N2.1-S22-4

CHK'D. FHF DATE: 5/23

DAN. WR1

Dan's Analysis
Outage Year - 1975
~~Instr. Error - 0.01~~

POINT	AREA 1	2	3	4	5	1	2	3	4	5
A1	0.485	0.475	0.485	0.490	0.485	0.48015	0.47025	0.48015	0.4851	0.48015
A2	0.495	0.480	0.490	0.485	0.490	0.49005	0.4752	0.4851	0.48015	0.4851
A3	0.490	0.475	0.490	0.495	0.490	0.4851	0.47025	0.4851	0.49005	0.4851
A4	0.500	0.475	0.490	0.495	0.485	0.495	0.47025	0.4851	0.49005	0.48015
A5	0.490	0.480	0.495	0.495	0.485	0.4851	0.4752	0.49005	0.49005	0.48015
B1	0.485	0.480	0.490	0.490	0.485	0.48015	0.4752	0.4851	0.4851	0.48015
B2	0.495	0.480	0.490	0.490	0.485	0.49005	0.4752	0.4851	0.4851	0.48015
B3	0.490	0.475	0.490	0.495	0.485	0.4851	0.47025	0.4851	0.49005	0.48015
B4	0.490	0.475	0.490	0.495	0.485	0.4851	0.47025	0.4851	0.49005	0.48015
B5	0.495	0.475	0.490	0.495	0.485	0.49005	0.47025	0.4851	0.49005	0.48015
C1	0.490	0.475	0.490	0.485	0.490	0.4851	0.47025	0.4851	0.48015	0.4851
C2	0.495	0.475	0.490	0.490	0.490	0.49005	0.47025	0.4851	0.4851	0.4851
C3	0.490	0.475	0.490	0.495	0.485	0.4851	0.47025	0.4851	0.49005	0.48015
C4	0.490	0.475	0.490	0.495	0.485	0.4851	0.47025	0.4851	0.49005	0.48015
C5	0.495	0.480	0.490	0.490	0.485	0.49005	0.4752	0.4851	0.4851	0.48015
D1	0.490	0.475	0.495	0.490	0.485	0.4851	0.47025	0.49005	0.4851	0.48015
D2	0.495	0.475	0.490	0.495	0.485	0.49005	0.47025	0.4851	0.49005	0.48015
D3	0.490	0.480	0.490	0.495	0.485	0.4851	0.4752	0.4851	0.49005	0.48015
D4	0.485	0.475	0.490	0.495	0.485	0.48015	0.47025	0.4851	0.49005	0.48015
D5	0.490	0.475	0.490	0.490	0.485	0.4851	0.47025	0.4851	0.4851	0.48015
E1	0.490	0.475	0.490	0.490	0.490	0.4851	0.47025	0.4851	0.4851	0.4851
E2	0.480	0.475	0.490	0.495	0.485	0.4752	0.47025	0.4851	0.49005	0.48015
E3	0.485	0.475	0.490	0.495	0.485	0.48015	0.47025	0.4851	0.49005	0.48015
E4	0.490	0.475	0.490	0.495	0.485	0.4851	0.47025	0.4851	0.49005	0.48015
E5	0.485	0.475	0.490	0.495	0.480	0.48015	0.47025	0.4851	0.49005	0.4752
F1	0.490	0.475	0.490	0.485	0.490	0.4851	0.47025	0.4851	0.48015	0.4851
F2	0.485	0.480	0.490	0.495	0.485	0.48015	0.4752	0.4851	0.49005	0.48015
F3	0.490	0.480	0.490	0.495	0.490	0.4851	0.4752	0.4851	0.49005	0.4851
F4	0.490	0.475	0.490	0.495	0.485	0.4851	0.47025	0.4851	0.49005	0.48015
F5	0.490	0.475	0.490	0.490	0.470	0.4851	0.47025	0.4851	0.4851	0.4653
G1	0.495	0.475	0.490	0.485	0.490	0.49005	0.47025	0.4851	0.48015	0.4851
G2	0.495	0.475	0.490	0.495	0.490	0.49005	0.47025	0.4851	0.49005	0.4851
G3	0.495	0.480	0.495	0.490	0.485	0.49005	0.4752	0.49005	0.4851	0.48015
G4	0.500	0.475	0.490	0.490	0.485	0.495	0.47025	0.4851	0.4851	0.48015
G5	0.490	0.475	0.490	0.490	0.470	0.4851	0.47025	0.4851	0.4851	0.4653
	0.490714	0.476285	0.490285	0.492142	0.485285	~~0.486897~~	~~0.471622~~	~~0.485382~~	~~0.487221~~	~~0.489472~~
	0.004333	0.002185	0.001665	0.003440	0.004462					
	0.486381	0.474100	0.488619	0.488702	0.480822					

MEAN VALUE

STANDARD DEVIATION

(MEAN VALUE) MINUS (STANDARD DEVIATION)

TYPICAL FOR PGS 7, 8, 9, 10, 13, 16, 19 & 21

NIAGARA MOHAWK

CALCULATION SHEET

PAGE 7

NUCLEAR ENGINEERING & LICENCING

DISCIPLINE STRUCTURAL

PROJECT: NINE MILE POINT NUC. STA.-UNIT 1	CALC. NO. S22-4-WW198 -STAT Ø1	REV. 0	
SUBJECT: TORUS WALL THINNING TRENDING . ANALYSIS	ORIG. AH / DRW	DATE: 5/20/88	
INDEX: 3-N2.1-S22.4	CHK'D. FHF	DATE: 5/23	

Outage Year 1977

~~Instr. Error~~

POINT	AREA 1	2	3	4	5	~~1~~	~~2~~	~~3~~	~~4~~	~~5~~
A1	0.470	0.470	0.470	0.470	0.470	~~0.4653~~	~~0.4653~~	~~0.4653~~	~~0.4653~~	~~0.4653~~
A2	0.470	0.465	0.470	0.470	0.470	~~0.4653~~	~~0.46035~~	~~0.4653~~	~~0.4653~~	~~0.4653~~
A3	0.465	0.470	0.470	0.470	0.470	~~0.46035~~	~~0.4653~~	~~0.4653~~	~~0.4653~~	~~0.4653~~
A4	0.470	0.470	0.470	0.470	0.470	~~0.4653~~	~~0.4653~~	~~0.4653~~	~~0.4653~~	~~0.4653~~
A5	0.470	0.470			0.470	~~0.4653~~	~~0.4653~~			~~0.4653~~
B1	0.470	0.468	0.470	0.470	0.470	~~0.4653~~	~~0.46332~~	~~0.4653~~	~~0.4653~~	~~0.4653~~
B2	0.470	0.468	0.470	0.470	0.470	~~0.4653~~	~~0.46332~~	~~0.4653~~	~~0.4653~~	~~0.4653~~
B3	0.475	0.470	0.470	0.470	0.470	~~0.47025~~	~~0.4653~~	~~0.4653~~	~~0.4653~~	~~0.4653~~
B4	0.470	0.470	0.470	0.470	0.470	~~0.4653~~	~~0.4653~~	~~0.4653~~	~~0.4653~~	~~0.4653~~
B5	0.470	0.470			0.470	~~0.4653~~	~~0.4653~~			~~0.4653~~
C1	0.468	0.470	0.470	0.470	0.470	~~0.46332~~	~~0.4653~~	~~0.4653~~	~~0.4653~~	~~0.4653~~
C2	0.470	0.465	0.470	0.470	0.470	~~0.4653~~	~~0.46035~~	~~0.4653~~	~~0.4653~~	~~0.4653~~
C3	0.468	0.465	0.470	0.470	0.470	~~0.46332~~	~~0.46035~~	~~0.4653~~	~~0.4653~~	~~0.4653~~
C4	0.470	0.465	0.470	0.470	0.470	~~0.4653~~	~~0.46035~~	~~0.4653~~	~~0.4653~~	~~0.4653~~
C5	0.470	0.470			0.470	~~0.4653~~	~~0.4653~~			~~0.4653~~
D1	0.470	0.470	0.470	0.470	0.470	~~0.4653~~	~~0.4653~~	~~0.4653~~	~~0.4653~~	~~0.4653~~
D2	0.470	0.470	0.470	0.470	0.470	~~0.4653~~	~~0.4653~~	~~0.4653~~	~~0.4653~~	~~0.4653~~
D3	0.470	0.470	0.470	0.470	0.470	~~0.4653~~	~~0.4653~~	~~0.4653~~	~~0.4653~~	~~0.4653~~
D4	0.470	0.470	0.470	0.470	0.470	~~0.4653~~	~~0.4653~~	~~0.4653~~	~~0.4653~~	~~0.4653~~
D5	0.470	0.470			0.470	~~0.4653~~	~~0.4653~~			~~0.4653~~
E1	0.470	0.460	0.470	0.470	0.470	~~0.4653~~	~~0.4554~~	~~0.4653~~	~~0.4653~~	~~0.4653~~
E2	0.478	0.470	0.470	0.470	0.470	~~0.47322~~	~~0.4653~~	~~0.4653~~	~~0.4653~~	~~0.4653~~
E3	0.470	0.470	0.470	0.470	0.470	~~0.4653~~	~~0.4653~~	~~0.4653~~	~~0.4653~~	~~0.4653~~
E4	0.475	0.470	0.470	0.470	0.470	~~0.47025~~	~~0.4653~~	~~0.4653~~	~~0.4653~~	~~0.4653~~
E5	0.460	0.470			0.470	~~0.4554~~	~~0.4653~~			~~0.4653~~
F1	0.470	0.470	0.470	0.470	0.470	~~0.4653~~	~~0.4653~~	~~0.4653~~	~~0.4653~~	~~0.4653~~
F2	0.465	0.470	0.470	0.470	0.470	~~0.46035~~	~~0.4653~~	~~0.4653~~	~~0.4653~~	~~0.4653~~
F3	0.465	0.470	0.470	0.470	0.470	~~0.46035~~	~~0.4653~~	~~0.4653~~	~~0.4653~~	~~0.4653~~
F4	0.470	0.470	0.470	0.470	0.470	~~0.4653~~	~~0.4653~~	~~0.4653~~	~~0.4653~~	~~0.4653~~
F5	0.470	0.470			0.470	~~0.4653~~	~~0.4653~~			~~0.4653~~
G1										
G2										
G3										
G4										
G5										
	0.469633	0.468866	0.47	0.47	0.47	~~0.464937~~	~~0.464178~~	~~0.4653~~	~~0.4653~~	~~0.4653~~
	0.003124	0.002376	0.000000	0.000000	0.000000					
	0.466508	0.466489	0.469999	0.469999	0.469999					

(SEE PAGE 6)

CALCULATION SHEET

NIAGARA MOHAWK

NUCLEAR ENGINEERING & LICENCING

DISCIPLINE STRUCTURAL

PROJECT: NINE MILE POINT NUC. STA.-UNIT 1

CALC. NO. S22.4-WW198 -STAT Φ1

REV. 0

SUBJECT: TORUS WALL THINNING TRENDING. ANALYSIS

ORIG. AH/DRW DATE: 5/20/88

INDEX: 3-N2.1-S22.4

CHK'D. TMF DATE: 5/23/88

Outage Year 1979
Instr.Error

POINT	AREA 1	2	3	4	5	1	2	3	4	5
A1	0.491	0.483	0.495	0.491	0.485	0.48609	0.47817	0.49005	0.48609	0.48015
A2	0.491	0.478	0.495	0.483	0.487	0.48609	0.47322	0.49005	0.47817	0.48213
A3	0.487	0.482	0.495	0.495	0.483	0.48213	0.47718	0.49005	0.49005	0.47817
A4	0.482	0.483	0.480	0.498	0.483	0.47718	0.47817	0.4752	0.49302	0.47817
A5	0.488	0.485	0.486	0.487	0.497	0.48312	0.48015	0.48114	0.48213	0.49203
A6	0.484	0.483	0.485	0.490	0.498	0.47916	0.47817	0.48015	0.4851	0.49302
B1	0.482	0.481	0.485	0.489	0.498	0.47718	0.47619	0.48015	0.48411	0.49302
B2	0.486	0.488	0.489	0.490	0.488	0.48114	0.48312	0.48411	0.4851	0.48312
B3	0.480	0.483	0.482	0.496	0.493	0.4752	0.47817	0.47718	0.49104	0.48807
B4	0.482	0.486	0.484	0.490	0.490	0.47718	0.48114	0.47916	0.4851	0.4851
B5	0.479	0.481	0.500	0.492	0.480	0.47421	0.47619	0.495	0.48708	0.4752
B6	0.485	0.486	0.494	0.488	0.487	0.48015	0.48114	0.48906	0.48312	0.48213
C1	0.485	0.484	0.492	0.490	0.485	0.48015	0.47916	0.48708	0.4851	0.48015
C2	0.483	0.483	0.487	0.491	0.489	0.47817	0.47817	0.48213	0.48609	0.48411
C3	0.484	0.478	0.483	0.485	0.490	0.47916	0.47322	0.47817	0.48015	0.4851
C4	0.487	0.483	0.483	0.489	0.488	0.48213	0.47817	0.47817	0.48411	0.48312
C5	0.479	0.480	0.488	0.482	0.489	0.47421	0.4752	0.48312	0.47718	0.48411
C6	0.485	0.484	0.490	0.485	0.488	0.48015	0.47916	0.4851	0.48015	0.48312
D1	0.480	0.480	0.495	0.487	0.490	0.4752	0.4752	0.49005	0.48213	0.4851
D2	0.487	0.482	0.487	0.478	0.489	0.48213	0.47718	0.48213	0.47322	0.48411
D3	0.481	0.484	0.498	0.480	0.488	0.47619	0.47916	0.49302	0.4752	0.48312
D4	0.486	0.482	0.490	0.489	0.482	0.48114	0.47718	0.4851	0.48411	0.47718
D5	0.482	0.477	0.486	0.486	0.485	0.47718	0.47223	0.48114	0.48114	0.48015
D6	0.483	0.490	0.493	0.486	0.489	0.47817	0.4851	0.48807	0.48114	0.48411
E1	0.487	0.487	0.487	0.488	0.493	0.48213	0.48213	0.48213	0.48312	0.48807
E2	0.482	0.493	0.480	0.487	0.489	0.47718	0.48807	0.4752	0.48213	0.48411
E3	0.460	0.482	0.483	0.484	0.483	0.4554	0.47718	0.47817	0.47916	0.47817
E4	0.485	0.481	0.487	0.488	0.492	0.48015	0.47619	0.48213	0.48312	0.48708
E5	0.488	0.485	0.480	0.487	0.490	0.48312	0.48015	0.4752	0.48213	0.4851
E6	0.482	0.485	0.489	0.480	0.490	0.47718	0.48015	0.48411	0.4752	0.4851
F1	0.484	0.475	0.490	0.486	0.486	0.47916	0.47025	0.4851	0.48114	0.48114
F2	0.485	0.484	0.487	0.485	0.491	0.48015	0.47916	0.48213	0.48015	0.48609
F3	0.488	0.492	0.480	0.487	0.485	0.48312	0.48708	0.4752	0.48213	0.48015
F4	0.479	0.480	0.486	0.483	0.485	0.47421	0.4752	0.48114	0.47817	0.48015
F5	0.475	0.480	0.483	0.488	0.488	0.47025	0.4752	0.47817	0.48312	0.48312
F6	0.483	0.476	0.484	0.480	0.485	0.47817	0.47124	0.47916	0.4752	0.48015
G1										
G2										
G3										
G4										
G5										
	0.48325	0.482944	0.487722	0.487222	0.488277	~~0.478417~~	~~0.478118~~	~~0.482046~~	~~0.48[illegible]~~	~~0.483396~~
	0.005203	0.003929	0.005236	0.004353	0.004127					
	0.478046	0.479014	0.482485	0.482868	0.484150					

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NIAGARA MOHAWK

CALCULATION SHEET

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NUCLEAR ENGINEERING & LICENCING

DISCIPLINE STRUCTURAL

PROJECT: NINE MILE POINT NUC. STA.-UNIT 1	CALC. NO. S22-4-WW198 -STAT01	REV. 0	
SUBJECT: TORUS WALL THINNING TRENDING . ANALYSIS	ORIG. AH/DRW	DATE: 5/20/88	
INDEX: 3-N2.1-S22-4	CHK'D. FHF	DATE: 5/23	

Outage Year 1981

~~Instr.Error~~

POINT	AREA 1	2	3	4	5	1	2	3	4	5
A1	0.481	0.466	0.479	0.482	0.490	0.47619	0.46134	0.47421	0.47718	0.4851
A2	0.480	0.472	0.481	0.483	0.488	0.4752	0.46728	0.47619	0.47817	0.48312
A3	0.482	0.468	0.478	0.487	0.485	0.47718	0.46332	0.47322	0.48213	0.48114
A4	0.481	0.468	0.483	0.483	0.487	0.47619	0.46332	0.47817	0.47817	0.48213
A5	0.470	0.470	0.481	0.489	0.488	0.4653	0.4653	0.47619	0.48411	0.48712
A6	0.471	0.485	0.482	0.489	0.483	0.46629	0.48015	0.47718	0.48411	0.47817
B1	0.479	0.469	0.478	0.483	0.485	0.47421	0.46431	0.47322	0.47817	0.48015
B2	0.481	0.470	0.477	0.481	0.486	0.47619	0.4653	0.47223	0.47619	0.48114
B3	0.488	0.468	0.479	0.485	0.483	0.48312	0.46332	0.47421	0.48015	0.47817
B4	0.484	0.470	0.480	0.486	0.483	0.47916	0.4653	0.4752	0.48114	0.47817
B5	0.467	0.469	0.487	0.482	0.486	0.46233	0.46431	0.48213	0.47718	0.48114
B6	0.471	0.480	0.478	0.488	0.490	0.46629	0.4752	0.47322	0.48312	0.4851
C1	0.483	0.473	0.481	0.479	0.486	0.47817	0.46827	0.47619	0.47421	0.48114
C2	0.487	0.468	0.482	0.480	0.484	0.48213	0.46332	0.47718	0.4752	0.47916
C3	0.486	0.473	0.479	0.481	0.488	0.48114	0.46827	0.47421	0.47619	0.48312
C4	0.479	0.471	0.482	0.475	0.482	0.47421	0.46629	0.47718	0.47025	0.47718
C5	0.474	0.469	0.485	0.482	0.483	0.46926	0.46431	0.48015	0.47718	0.47817
C6	0.467	0.480	0.488	0.477	0.479	0.46233	0.4752	0.48312	0.47223	0.47421
D1	0.487	0.471	0.484	0.479	0.485	0.48213	0.46629	0.47916	0.47421	0.48015
D2	0.489	0.474	0.481	0.481	0.483	0.48411	0.46926	0.47619	0.47619	0.47817
D3	0.479	0.478	0.483	0.479	0.486	0.47421	0.47322	0.47817	0.47421	0.48114
D4	0.480	0.469	0.483	0.480	0.482	0.4752	0.46431	0.47817	0.4752	0.47718
D5	0.474	0.475	0.482	0.479	0.487	0.46926	0.47025	0.47718	0.47421	0.48213
D6	0.476	0.480	0.478	0.483	0.480	0.47124	0.4752	0.47322	0.47817	0.4752
E1	0.483	0.471	0.485	0.480	0.484	0.47817	0.46629	0.48015	0.4752	0.47916
E2	0.482	0.474	0.484	0.483	0.482	0.47718	0.46926	0.47916	0.47817	0.47718
E3	0.486	0.470	0.485	0.473	0.483	0.48114	0.4653	0.48015	0.46827	0.47817
E4	0.482	0.475	0.484	0.477	0.482	0.47718	0.47025	0.47916	0.47223	0.47718
E5	0.491	0.475	0.480	0.477	0.470	0.48609	0.47025	0.4752	0.47223	0.4653
E6	0.468	0.482	0.483	0.481	0.479	0.46332	0.47718	0.47817	0.47619	0.47421
F1	0.488	0.473	0.493	0.475	0.485	0.48312	0.46827	0.48807	0.47025	0.48015
F2	0.483	0.476	0.490	0.483	0.483	0.47817	0.47124	0.4851	0.47817	0.47817
F3	0.486	0.478	0.489	0.475	0.483	0.48114	0.47322	0.48411	0.47025	0.47817
F4	0.482	0.475	0.482	0.475	0.484	0.47718	0.47025	0.47718	0.47025	0.47916
F5	0.472	0.476	0.478	0.479	0.472	0.46728	0.47124	0.47322	0.47421	0.46728
F6	0.467	0.481	0.478	0.479	0.479	0.46233	0.47619	0.47322	0.47421	0.47421
G1										
G2										
G3										
G4										
G5										
	0.479611	0.473388	0.482277	0.480833	0.4835	~~0.474816~~	~~0.468665~~	~~0.477165~~	~~0.476036~~	~~0.479665~~
	0.006791	0.004650	0.003708	0.003954	0.004106					
	0.472819	0.468738	0.478568	0.476878	0.479393					

(SEE PAGE 6)

NIAGARA MOHAWK

CALCULATION SHEET

NUCLEAR ENGINEERING & LICENCING

DISCIPLINE STRUCTURAL

PROJECT: NINE MILE POINT NUC. STA.-UNIT I

CALC. NO. S22.4-WW198 -STAT Φ1 REV. 0

SUBJECT: TORUS WALL THINNING TRENDING. ANALYSIS

ORIG. AH/DRW DATE: 5/20/88

INDEX: 3-N2.1-S22.4

CHK'D. FHF DATE: 5/23/88

Outage Year 1984

~~Instr. Error~~

POINT	AREA 1	2	3	4	5	1	2	3	4	5
A1	0.48	0.50	0.51	0.49	0.51	0.4752	0.495	0.5049	0.4851	0.5049
A2	0.49	0.50	0.49	0.48	0.51	0.4851	0.495	0.4851	0.4752	0.5049
A3	0.50	0.50	0.50	0.49	0.50	0.495	0.495	0.495	0.4851	0.495
A4	0.49	0.49	0.50	0.49	0.51	0.4851	0.4851	0.495	0.4851	0.5049
A5	0.47	0.50	0.51	0.48	0.51	0.4653	0.495	0.5049	0.4752	0.5049
A6	0.49	0.50	0.50	0.49	0.50	0.4851	0.495	0.495	0.4851	0.495
B1	0.49	0.53	0.51	0.49	0.49	0.4851	0.5247	0.5049	0.4851	0.4851
B2	0.48	0.50	0.51	0.49	0.52	0.4752	0.495	0.5049	0.4851	0.5148
B3	0.50	0.49	0.52	0.49	0.51	0.495	0.4851	0.5148	0.4851	0.5049
B4	0.48	0.49	0.50	0.49	0.50	0.4752	0.4851	0.495	0.4851	0.495
B5	0.49	0.50	0.50	0.49	0.50	0.4851	0.495	0.495	0.4851	0.495
B6	0.49	0.50	0.49	0.48	0.49	0.4851	0.495	0.4851	0.4752	0.4851
C1	0.50	0.50	0.50	0.49	0.50	0.495	0.495	0.495	0.4851	0.495
C2	0.49	0.50	0.51	0.49	0.50	0.4851	0.495	0.5049	0.4851	0.495
C3	0.48	0.49	0.50	0.48	0.50	0.4752	0.4851	0.495	0.4752	0.495
C4	0.48	0.50	0.52	0.48	0.51	0.4752	0.495	0.5148	0.4752	0.5049
C5	0.49	0.50	0.50	0.48	0.51	0.4851	0.495	0.495	0.4752	0.5049
C6	0.49	0.50	0.49	0.48	0.50	0.4851	0.495	0.4851	0.4752	0.495
D1	0.51	0.50	0.52	0.48	0.50	0.5049	0.495	0.5148	0.4752	0.495
D2	0.49	0.51	0.50	0.48	0.49	0.4851	0.5049	0.495	0.4752	0.4851
D3	0.49	0.50	0.50	0.48	0.49	0.4851	0.495	0.495	0.4752	0.4851
D4	0.48	0.50	0.51	0.49	0.49	0.4752	0.495	0.5049	0.4851	0.4851
D5	0.49	0.50	0.50	0.48	0.49	0.4851	0.495	0.495	0.4752	0.4851
D6	0.48	0.50	0.49	0.48	0.48	0.4752	0.495	0.4851	0.4752	0.4752
E1	0.50	0.50	0.53	0.48	0.49	0.495	0.495	0.5247	0.4752	0.4851
E2	0.49	0.50	0.50	0.48	0.51	0.4851	0.495	0.495	0.4752	0.5049
E3	0.49	0.49	0.52	0.48	0.50	0.4851	0.4851	0.5148	0.4752	0.495
E4	0.48	0.50	0.50	0.48	0.50	0.4752	0.495	0.495	0.4752	0.495
E5	0.49	0.50	0.50	0.48	0.50	0.4851	0.495	0.495	0.4752	0.495
E6	0.49	0.50	0.48	0.48	0.51	0.4851	0.495	0.4752	0.4752	0.5049
F1	0.51	0.50	0.50	0.48	0.49	0.5049	0.495	0.495	0.4752	0.4851
F2	0.48	0.50	0.50	0.48	0.51	0.4752	0.495	0.495	0.4752	0.5049
F3	0.49	0.49	0.51	0.48	0.51	0.4851	0.4851	0.5049	0.4752	0.5049
F4	0.50	0.50	0.50	0.48	0.50	0.495	0.495	0.495	0.4752	0.495
F5	0.50	0.50	0.50	0.49	0.49	0.495	0.495	0.495	0.4851	0.4851
F6	0.49	0.50	0.48	0.48	0.49	0.4851	0.495	0.4752	0.4752	0.4851
G1										
G2										
G3										
G4										
G5										

[illegible]9722 0.499444 0.502777 0.483611 0.500277
[illegible]08655 0.006643 0.010700 0.004803 0.008970
0.481066 0.492800 0.492077 0.478807 0.491306

~~0.484825 0.49445 0.49775 0.478775 0.495275~~

(SEE PAGE G)

NIAGARA MOHAWK

CALCULATION SHEET

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NUCLEAR ENGINEERING & LICENCING

DISCIPLINE STRUCTURAL

PROJECT: NINE MILE POINT NUC. STA.-UNIT 1

CALC. NO. S22.4-WW198 - STAT Φ1 REV. 0

SUBJECT: TORUS WALL THINNING TRENDING. ANALYSIS

ORIG. AH/DRW DATE: 5/20/88

INDEX: 3-N2.1-S22.4

CHK'D. FHF DATE: 5/23

DAN. WR2

Dna's Analysis #2

YEAR 1986

~~INSTR. ERROR 0.01~~

POINT	AREA 1	2	3	4	5	*	AREA 1	2	3	4	5
A1	0.46	0.46	0.44	0.48	0.46	*	0.4554	0.4554	0.4356	0.4752	0.4554
A2	0.46	0.46	0.44	0.48	0.46	*	0.4554	0.4554	0.4356	0.4752	0.4554
A3	0.46	0.48	0.46	0.48	0.46	*	0.4554	0.4752	0.4554	0.4752	0.4554
A4	0.46	0.46	0.46	0.48	0.46	*	0.4554	0.4554	0.4554	0.4752	0.4554
A5	0.46	0.48	0.44	0.48	0.46	*	0.4554	0.4752	0.4356	0.4752	0.4554
A6	0.46	0.46	0.46	0.48	0.46	*	0.4554	0.4554	0.4554	0.4752	0.4554
A7	0.46	0.46	0.46	0.48	0.46	*	0.4554	0.4554	0.4554	0.4752	0.4554
A8	0.46	0.46	0.46	0.48	0.46	*	0.4554	0.4554	0.4554	0.4752	0.4554
A9	0.46	0.46	0.46	0.48	0.46	*	0.4554	0.4554	0.4554	0.4752	0.4554
A10	0.46	0.46	0.46	0.48	0.46	*	0.4554	0.4554	0.4554	0.4752	0.4554
A11	0.46	0.46	0.46	0.48	0.46	*	0.4554	0.4554	0.4554	0.4752	0.4554
A2	0.46	0.46	0.46	0.48	0.46	*	0.4554	0.4554	0.4554	0.4752	0.4554
B1	0.46	0.46	0.46	0.48	0.46	*	0.4554	0.4554	0.4554	0.4752	0.4554
B2	0.46	0.46	0.46	0.48	0.46	*	0.4554	0.4554	0.4554	0.4752	0.4554
B3	0.46	0.46	0.46	0.48	0.46	*	0.4554	0.4554	0.4554	0.4752	0.4554
B4	0.46	0.46	0.46	0.48	0.46	*	0.4554	0.4554	0.4554	0.4752	0.4554
B5	0.46	0.46	0.46	0.48	0.46	*	0.4554	0.4554	0.4554	0.4752	0.4554
B6	0.46	0.46	0.46	0.48	0.46	*	0.4554	0.4554	0.4554	0.4752	0.4554
B7	0.46	0.46	0.46	0.48	0.46	*	0.4554	0.4554	0.4554	0.4752	0.4554
B8	0.48	0.46	0.46	0.48	0.46	*	0.4752	0.4554	0.4554	0.4752	0.4554
B9	0.46	0.46	0.46	0.48	0.46	*	0.4554	0.4554	0.4554	0.4752	0.4554
B10	0.46	0.46	0.46	0.48	0.46	*	0.4554	0.4554	0.4554	0.4752	0.4554
B11	0.46	0.46	0.46	0.48	0.46	*	0.4554	0.4554	0.4554	0.4752	0.4554
B12	0.48	0.46	0.46	0.48	0.46	*	0.4752	0.4554	0.4554	0.4752	0.4554
C1	0.46	0.46	0.46	0.48	0.46	*	0.4554	0.4554	0.4554	0.4752	0.4554
C2	0.46	0.46	0.46	0.48	0.46	*	0.4554	0.4554	0.4554	0.4752	0.4554
C3	0.46	0.46	0.46	0.48	0.46	*	0.4554	0.4554	0.4554	0.4752	0.4554
C4	0.46	0.46	0.46	0.48	0.46	*	0.4554	0.4554	0.4554	0.4752	0.4554
C5	0.46	0.46	0.46	0.48	0.46	*	0.4554	0.4554	0.4554	0.4752	0.4554
C6	0.46	0.46	0.46	0.48	0.46	*	0.4554	0.4554	0.4554	0.4752	0.4554
C7	0.46	0.46	0.46	0.48	0.46	*	0.4554	0.4554	0.4554	0.4752	0.4554
C8	0.46	0.46	0.46	0.48	0.46	*	0.4554	0.4554	0.4554	0.4752	0.4554
C9	0.46	0.46	0.46	0.48	0.46	*	0.4554	0.4554	0.4554	0.4752	0.4554
C10	0.46	0.46	0.46	0.48	0.46	*	0.4554	0.4554	0.4554	0.4752	0.4554
C11	0.46	0.46	0.46	0.48	0.46	*	0.4554	0.4554	0.4554	0.4752	0.4554
C12	0.46	0.46	0.46	0.48	0.46	*	0.4554	0.4554	0.4554	0.4752	0.4554
D1	0.46	0.46	0.46	0.48	0.46	*	0.4554	0.4554	0.4554	0.4752	0.4554
D2	0.46	0.46	0.46	0.48	0.46	*	0.4554	0.4554	0.4554	0.4752	0.4554
D3	0.46	0.46	0.46	0.48	0.46	*	0.4554	0.4554	0.4554	0.4752	0.4554
D4	0.46	0.44	0.46	0.48	0.46	*	0.4554	0.4356	0.4554	0.4752	0.4554
D5	0.46	0.44	0.46	0.48	0.46	*	0.4554	0.4356	0.4554	0.4752	0.4554
D6	0.46	0.46	0.46	0.48	0.46	*	0.4554	0.4554	0.4554	0.4752	0.4554
D7	0.46	0.46	0.46	0.48	0.46	*	0.4554	0.4554	0.4554	0.4752	0.4554
D8	0.46	0.46	0.46	0.48	0.46	*	0.4554	0.4554	0.4554	0.4752	0.4554
D9	0.44	0.46	0.46	0.48	0.46	*	0.4356	0.4554	0.4554	0.4752	0.4554
D10	0.44	0.46	0.46	0.48	0.46	*	0.4356	0.4554	0.4554	0.4752	0.4554
D11	0.44	0.46	0.46	0.48	0.46	*	0.4356	0.4554	0.4554	0.4752	0.4554
D12	0.44	0.46	0.46	0.48	0.46	*	0.4356	0.4554	0.4554	0.4752	0.4554
E1	0.46	0.46	0.46	0.48	0.46	*	0.4554	0.4554	0.4554	0.4752	0.4554
E2	0.46	0.46	0.46	0.48	0.46	*	0.4554	0.4554	0.4554	0.4752	0.4554
E3	0.48	0.46	0.46	0.48	0.46	*	0.4752	0.4554	0.4554	0.4752	0.4554
E4	0.46	0.46	0.46	0.48	0.46	*	0.4554	0.4554	0.4554	0.4752	0.4554
E5	0.46	0.46	0.46	0.48	0.46	*	0.4554	0.4554	0.4554	0.4752	0.4554

NIAGARA MOHAWK

CALCULATION SHEET

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NUCLEAR ENGINEERING & LICENCING

DISCIPLINE STRUCTURAL

PROJECT: NINE MILE POINT NUC. STA.-UNIT 1	CALC. NO. S22.4-WW198 -STAT Ø1 REV. 0
SUBJECT: TORUS WALL THINNING TRENDING. ANALYSIS	ORIG. AH/DRW DATE: 5/20/88
INDEX: 3-N2.1-S22.4	CHK'D. [illegible] DATE: 5/23

E6	~~0.4554~~	~~0.4752~~	~~0.4554~~	~~0.4554~~	~~0.4554~~	0.46	0.48	0.46	0.46	0.46
E7	~~0.4554~~	~~0.4752~~	~~0.4554~~	~~0.4554~~	~~0.4554~~	0.46	0.48	0.46	0.46	0.46
E8	~~0.4554~~	~~0.4752~~	~~0.4554~~	~~0.4554~~	~~0.4554~~	0.46	0.48	0.46	0.46	0.46
E9	~~0.4554~~	~~0.4752~~	~~0.4554~~	~~0.4554~~	~~0.4554~~	0.46	0.48	0.46	0.46	0.46
E10	~~0.4554~~	~~0.4752~~	~~0.4554~~	~~0.4554~~	~~0.4554~~	0.46	0.48	0.46	0.46	0.46
E11	~~0.4554~~	~~0.4752~~	~~0.4554~~	~~0.4554~~	~~0.4554~~	0.46	0.48	0.46	0.46	0.46
E12	~~0.4554~~	~~0.4752~~	~~0.4554~~	~~0.4554~~	~~0.4554~~	0.46	0.48	0.46	0.46	0.46
F1	~~0.4554~~	~~0.4752~~	~~0.4554~~	~~0.4554~~	~~0.4554~~	0.46	0.48	0.46	0.46	0.46
F2	~~0.4554~~	~~0.4752~~	~~0.4554~~	~~0.4554~~	~~0.4554~~	0.46	0.48	0.46	0.46	0.46
F3	~~0.4554~~	~~0.4752~~	~~0.4554~~	~~0.4554~~	~~0.4554~~	0.46	0.48	0.46	0.46	0.46
F4	~~0.4554~~	~~0.4752~~	~~0.4554~~	~~0.4554~~	~~0.4554~~	0.46	0.48	0.46	0.46	0.46
F5	~~0.4554~~	~~0.4752~~	~~0.4554~~	~~0.4554~~	~~0.4554~~	0.46	0.48	0.46	0.46	0.46
F6	~~0.4554~~	~~0.4752~~	~~0.4554~~	~~0.4554~~	~~0.4554~~	0.46	0.48	0.46	0.46	0.46
F7	~~0.4554~~	~~0.4752~~	~~0.4554~~	~~0.4554~~	~~0.4554~~	0.45	0.48	0.46	0.46	0.46
F8	~~0.4554~~	~~0.4752~~	~~0.4554~~	~~0.4554~~	~~0.4554~~	0.46	0.48	0.46	0.46	0.46
F9	~~0.4554~~	~~0.4752~~	~~0.4554~~	~~0.4554~~	~~0.4554~~	0.46	0.48	0.46	0.46	0.46
F10	~~0.4554~~	~~0.4752~~	~~0.4554~~	~~0.4554~~	~~0.4554~~	0.46	0.48	0.46	0.46	0.46
F11	~~0.4554~~	~~0.4752~~	~~0.4554~~	~~0.4554~~	~~0.4554~~	0.46	0.48	0.46	0.46	0.46
F12	~~0.4554~~	~~0.4752~~	~~0.4554~~	~~0.4554~~	~~0.4554~~	0.46	0.48	0.46	0.46	0.46
G1	~~0.4554~~	~~0.4752~~	~~0.4554~~	~~0.4554~~	~~0.4554~~	0.46	0.48	0.46	0.46	0.46
G2	~~0.4554~~	~~0.4752~~	~~0.4554~~	~~0.4554~~	~~0.4554~~	0.46	0.48	0.46	0.46	0.46
G3	~~0.4554~~	~~0.4752~~	~~0.4554~~	~~0.4554~~	~~0.4554~~	0.46	0.48	0.46	0.46	0.46
G4	~~0.4554~~	~~0.4752~~	~~0.4554~~	~~0.4554~~	~~0.4554~~	0.46	0.48	0.46	0.46	0.46
G5	~~0.4554~~	~~0.4752~~	~~0.4554~~	~~0.4554~~	~~0.4554~~	0.46	0.48	0.46	0.46	0.46
G6	~~0.4554~~	~~0.4752~~	~~0.4554~~	~~0.4554~~	~~0.4554~~	0.46	0.48	0.46	0.46	0.46
G7	~~0.4554~~	~~0.4752~~	~~0.4554~~	~~0.4554~~	~~0.4554~~	0.46	0.48	0.46	0.46	0.46
G8	~~0.4554~~	~~0.4752~~	~~0.4554~~	~~0.4554~~	~~0.4554~~	0.46	0.48	0.46	0.46	0.46
G9	~~0.4554~~	~~0.4752~~	~~0.4554~~	~~0.4554~~	~~0.4554~~	0.46	0.48	0.46	0.46	0.46
G10	~~0.4554~~	~~0.4752~~	~~0.4554~~	~~0.4554~~	~~0.4554~~	0.46	0.48	0.46	0.46	0.46
G11	~~0.4554~~	~~0.4752~~	~~0.4554~~	~~0.4554~~	~~0.4554~~	0.46	0.48	0.46	0.	0.46
G12	~~0.4554~~	~~0.4752~~	~~0.4554~~	~~0.4554~~	~~0.4554~~	0.46	0.48	0.46	0.46	0.46
H1	~~0.4554~~	~~0.4752~~	~~0.4554~~	~~0.4554~~	~~0.4356~~	0.46	0.48	0.46	0.46	0.44
H2	~~0.4554~~	~~0.4752~~	~~0.4554~~	~~0.4356~~	~~0.4356~~	0.46	0.48	0.46	0.44	0.44
H3	~~0.4554~~	~~0.4752~~	~~0.4554~~	~~0.4554~~	~~0.4554~~	0.46	0.48	0.46	0.46	0.46
H4	~~0.4554~~	~~0.4752~~	~~0.4554~~	~~0.4554~~	~~0.4554~~	0.46	0.48	0.46	0.46	0.46
H5	~~0.4554~~	~~0.4752~~	~~0.4554~~	~~0.4554~~	~~0.4554~~	0.46	0.48	0.46	0.46	0.46
H6	~~0.4554~~	~~0.4752~~	~~0.4554~~	~~0.4554~~	~~0.4554~~	0.46	0.48	0.46	0.46	0.46
H7	~~0.4554~~	~~0.4752~~	~~0.4554~~	~~0.4356~~	~~0.4554~~	0.46	0.48	0.46	0.44	0.46
H8	~~0.4554~~	~~0.4752~~	~~0.4554~~	~~0.4554~~	~~0.4356~~	0.46	0.48	0.46	0.46	0.44
H9	~~0.4554~~	~~0.4752~~	~~0.4554~~	~~0.4554~~	~~0.4554~~	0.46	0.48	0.46	0.46	0.46
H10	~~0.4554~~	~~0.4752~~	~~0.4554~~	~~0.4554~~	~~0.4356~~	0.46	0.48	0.46	0.46	0.44
H11	~~0.4554~~	~~0.4752~~	~~0.4554~~	~~0.4554~~	~~0.4554~~	0.46	0.48	0.46	0.46	0.46
H12	~~0.4554~~	~~0.4752~~	~~0.4554~~	~~0.4554~~	~~0.4554~~	0.46	0.48	0.46	0.46	0.46
I1	~~0.4554~~	~~0.4752~~	~~0.4554~~	~~0.4554~~	~~0.4554~~	0.46	0.48	0.46	0.46	0.46
I2	~~0.4554~~	~~0.4752~~	~~0.4554~~	~~0.4554~~	~~0.4554~~	0.46	0.48	0.46	0.46	0.46
I3	~~0.4554~~	~~0.4752~~	~~0.4554~~	~~0.4554~~	~~0.4554~~	0.46	0.48	0.46	0.46	0.46
I4	~~0.4554~~	~~0.4752~~	~~0.4554~~	~~0.4554~~	~~0.4554~~	0.46	0.48	0.46	0.46	0.46
I5	~~0.4554~~	~~0.4752~~	~~0.4554~~	~~0.4554~~	~~0.4554~~	0.46	0.48	0.46	0.46	0.46
I6	~~0.4554~~	~~0.4752~~	~~0.4554~~	~~0.4554~~	~~0.4554~~	0.46	0.48	0.46	0.46	0.46
I7	~~0.4554~~	~~0.4752~~	~~0.4554~~	~~0.4554~~	~~0.4554~~	0.46	0.48	0.46	0.46	0.46
I8	~~0.4554~~	~~0.4752~~	~~0.4554~~	~~0.4554~~	~~0.4554~~	0.46	0.48	0.46	0.46	0.46
I9	~~0.4554~~	~~0.4752~~	~~0.4554~~	~~0.4554~~	~~0.4554~~	0.46	0.48	0.46	0.46	0.46
I10	~~0.4554~~	~~0.4752~~	~~0.4554~~	~~0.4554~~	~~0.4554~~	0.46	0.48	0.46	0.46	0.46
I11	~~0.4554~~	~~0.4752~~	~~0.4554~~	~~0.4554~~	~~0.4554~~	0.46	0.48	0.46	0.46	0.46
I12	~~0.4554~~	~~0.4752~~	~~0.4554~~	~~0.4554~~	~~0.4554~~	0.46	0.48	0.46	0.46	0.46
J1	~~0.4554~~	~~0.4752~~	~~0.4554~~	~~0.4554~~	~~0.4356~~	0.46	0.48	0.46	0.46	0.44
J2	~~0.4554~~	~~0.4752~~	~~0.4554~~	~~0.4554~~	~~0.4356~~	0.46	0.48	0.46	0.46	0.44
J3	~~0.4554~~	~~0.4752~~	~~0.4554~~	~~0.4554~~	~~0.4356~~	0.46	0.48	0.46	0.46	0.44
J4	~~0.4554~~	~~0.4752~~	~~0.4554~~	~~0.4554~~	~~0.4356~~	0.46	0.48	0.46	0.46	0.44
J5	~~0.4554~~	~~0.4752~~	~~0.4554~~	~~0.4554~~	~~0.4356~~	0.46	0.48	0.46	0.46	0.44

NIAGARA MOHAWK

CALCULATION SHEET

PAGE 13

NUCLEAR ENGINEERING & LICENCING

DISCIPLINE STRUCTURAL

PROJECT: NINE MILE POINT NUC. STA.-UNIT I	CALC. NO. S22-4-WW198 -STAT Φ1 REV. 0
SUBJECT: TORUS WALL THINNING TRENDING. ANALYSIS	ORIG. AH / DRW DATE: 5/20/88
INDEX: 3-N2.1-S22-4	CHK'D. FJF DATE: 5/23

J6	0.44	0.46	0.46	0.48	0.46	*	0.4356	0.4554	0.4554	0.4752	0.4554
J7	0.44	0.46	0.46	0.48	0.46	*	0.4356	0.4554	0.4554	0.4752	0.4554
J8	0.44	0.46	0.46	0.48	0.46	*	0.4356	0.4554	0.4554	0.4752	0.4554
J9	0.44	0.46	0.46	0.48	0.46	*	0.4356	0.4554	0.4554	0.4752	0.4554
J10	0.44	0.44	0.46	0.48	0.46	*	0.4356	0.4356	0.4554	0.4752	0.4554
J11	0.44	0.46	0.46	0.48	0.46	*	0.4356	0.4554	0.4554	0.4752	0.4554
J12	0.44	0.46	0.46	0.48	0.46	*	0.4356	0.4554	0.4554	0.4752	0.4554
K1	0.46	0.46	0.46	0.46	0.44	*	0.4554	0.4554	0.4554	0.4554	0.4356
K2	0.46	0.46	0.46	0.46	0.44	*	0.4554	0.4554	0.4554	0.4554	0.4356
K3	0.46	0.46	0.46	0.46	0.44	*	0.4554	0.4554	0.4554	0.4554	0.4356
K4	0.46	0.46	0.46	0.46	0.44	*	0.4554	0.4554	0.4554	0.4554	0.4356
K5	0.46	0.46	0.46	0.46	0.44	*	0.4554	0.4554	0.4554	0.4554	0.4356
K6	0.46	0.46	0.46	0.46	0.44	*	0.4554	0.4554	0.4554	0.4554	0.4356
K7	0.46	0.46	0.46	0.46	0.44	*	0.4554	0.4554	0.4554	0.4554	0.4356
K8	0.46	0.46	0.46	0.46	0.44	*	0.4554	0.4554	0.4554	0.4554	0.4356
K9	0.46	0.46	0.46	0.46	0.44	*	0.4554	0.4554	0.4554	0.4554	0.4356
K10	0.46	0.46	0.46	0.46	0.44	*	0.4554	0.4554	0.4554	0.4554	0.4356
K11	0.46	0.46	0.46	0.46	0.44	*	0.4554	0.4554	0.4554	0.4554	0.4356
K12	0.46	0.46	0.46	0.46	0.44	*	0.4554	0.4554	0.4554	0.4554	0.4356
L1	0.46	0.46	0.46	0.46	0.44	*	0.4554	0.4554	0.4554	0.4554	0.4356
L2	0.46	0.46	0.46	0.46	0.44	*	0.4554	0.4554	0.4554	0.4554	0.4356
L3	0.46	0.46	0.46	0.46	0.44	*	0.4554	0.4554	0.4554	0.4554	0.4356
L4	0.46	0.46	0.46	0.46	0.44	*	0.4554	0.4554	0.4554	0.4554	0.4356
L5	0.46	0.46	0.46	0.46	0.44	*	0.4554	0.4554	0.4554	0.4554	0.4356
L6	0.46	0.46	0.46	0.46	0.44	*	0.4554	0.4554	0.4554	0.4554	0.4356
L7	0.46	0.46	0.46	0.46	0.44	*	0.4554	0.4554	0.4554	0.4554	0.4356
L8	0.46	0.46	0.46	0.46	0.44	*	0.4554	0.4554	0.4554	0.4554	0.4356
L9	0.46	0.46	0.46	0.46	0.44	*	0.4554	0.4554	0.4554	0.4554	0.4356
L10	0.46	0.46	0.46	0.46	0.44	*	0.4554	0.4554	0.4554	0.4554	0.4356
L11	0.46	0.46	0.46	0.46	0.44	*	0.4554	0.4554	0.4554	0.4554	0.4356
L12	0.46	0.46	0.46	0.46	0.44	*	0.4554	0.4554	0.4554	0.4554	0.4356
1986							~~0.453062~~	~~0.454987~~	~~0.454987~~	~~0.4719~~	~~0.4521~~
	0.457638	0.459583	0.459583	0.476666	0.456666						
	0.007636	0.004389	0.002856	0.007453	0.007453						
	0.450002	0.455193	0.456726	0.469213	0.449213						
	~~0.453062~~	~~0.454987~~	~~0.454987~~	~~0.4719~~	~~0.4621~~						

(SEE PAGE 6)

CALCULATION SHEET

NIAGARA MOHAWK

NUCLEAR ENGINEERING & LICENCING

DISCIPLINE STRUCTURAL

PROJECT: NINE MILE POINT NUC. STA.-UNIT I

SUBJECT: TORUS WALL THINNING TRENDING. ANALYSIS

INDEX: 3-N2.1-S22-4

CALC. NO. S22.4-WW198 -STAT Φ1 REV. 0

ORIG. AH/DRW DATE: 5/20/88

CHK'D. FUF DATE: 6/23

DAN. WR3

Dan's Analysis #3

YEAR 1988

~~INSTR. ERROR 0.004~~

POINT	AREA 1	2	3	4	5	AREA 1	2	3	4	5
A1	0.452	0.455	0.456	0.460	0.462	0.450192	0.45318	0.454176	0.45816	0.460152
A2	0.458	0.459	0.460	0.463	0.462	0.456168	0.457164	0.45816	0.461148	0.460152
A3	0.459	0.459	0.460	0.455	0.462	0.457164	0.457164	0.45816	0.45318	0.460152
A4	0.460	0.459	0.460	0.455	0.462	0.45816	0.457164	0.45816	0.45318	0.460152
A5	0.460	0.459	0.460	0.455	0.462	0.45816	0.457164	0.45816	0.45318	0.460152
A6	0.460	0.459	0.460	0.455	0.462	0.45816	0.457164	0.45816	0.45318	0.460152
A7	0.460	0.459	0.460	0.455	0.462	0.45816	0.457164	0.45816	0.45318	0.460152
A8	0.460	0.459	0.460	0.455	0.462	0.45816	0.457164	0.45816	0.45318	0.460152
A9	0.460	0.459	0.460	0.455	0.462	0.45816	0.457164	0.45816	0.45318	0.460152
A10	0.460	0.459	0.460	0.455	0.462	0.45816	0.457164	0.45816	0.45318	0.460152
A11	0.460	0.459	0.460	0.455	0.462	0.45816	0.457164	0.45816	0.45318	0.460152
A2	0.460	0.459	0.460	0.455	0.462	0.45816	0.457164	0.45816	0.45318	0.460152
B1	0.461	0.458	0.459	0.456	0.459	0.459156	0.456168	0.457164	0.454176	0.457164
B2	0.459	0.458	0.459	0.456	0.459	0.457164	0.456168	0.457164	0.454176	0.457164
B3	0.459	0.458	0.459	0.456	0.459	0.457164	0.456168	0.457164	0.454176	0.457164
B4	0.459	0.458	0.459	0.456	0.452	0.457164	0.456168	0.457164	0.454176	0.450192
B5	0.459	0.458	0.459	0.456	0.452	0.457164	0.456168	0.457164	0.454176	0.450192
B6	0.459	0.458	0.459	0.456	0.452	0.457164	0.456168	0.457164	0.454176	0.450192
B7	0.459	0.458	0.459	0.456	0.452	0.457164	0.456168	0.457164	0.454176	0.450192
B8	0.459	0.458	0.459	0.456	0.452	0.457164	0.456168	0.457164	0.454176	0.450192
B9	0.459	0.458	0.459	0.456	0.452	0.457164	0.456168	0.457164	0.454176	0.450192
B10	0.459	0.458	0.459	0.456	0.452	0.457164	0.456168	0.457164	0.454176	0.450192
B11	0.459	0.458	0.459	0.456	0.452	0.457164	0.456168	0.457164	0.454176	0.450192
B12	0.459	0.458	0.459	0.456	0.452	0.457164	0.456168	0.457164	0.454176	0.450192
C1	0.458	0.458	0.459	0.460	0.453	0.456168	0.456168	0.457164	0.45816	0.451188
C2	0.458	0.458	0.459	0.456	0.459	0.456168	0.456168	0.457164	0.454176	0.457164
C3	0.458	0.458	0.459	0.456	0.459	0.456168	0.456168	0.457164	0.454176	0.457164
C4	0.458	0.458	0.459	0.456	0.456	0.456168	0.456168	0.457164	0.454176	0.454176
C5	0.458	0.458	0.459	0.456	0.456	0.456168	0.456168	0.457164	0.454176	0.454176
C6	0.458	0.458	0.459	0.456	0.456	0.456168	0.456168	0.457164	0.454176	0.454176
C7	0.458	0.458	0.459	0.456	0.456	0.456168	0.456168	0.457164	0.454176	0.454176
C8	0.458	0.458	0.459	0.456	0.456	0.456168	0.456168	0.457164	0.454176	0.454176
C9	0.458	0.458	0.459	0.456	0.456	0.456168	0.456168	0.457164	0.454176	0.454176
C10	0.458	0.458	0.459	0.456	0.456	0.456168	0.456168	0.457164	0.454176	0.454176
C11	0.458	0.458	0.459	0.456	0.456	0.456168	0.456168	0.457164	0.454176	0.454176
C12	0.458	0.458	0.459	0.456	0.456	0.456168	0.456168	0.457164	0.454176	0.454176
D1	0.454	0.458	0.460	0.458	0.451	0.452184	0.456168	0.45816	0.456168	0.449196
D2	0.454	0.458	0.460	0.458	0.452	0.452184	0.456168	0.45816	0.456168	0.450192
D3	0.454	0.458	0.460	0.458	0.452	0.452184	0.456168	0.45816	0.456168	0.450192
D4	0.454	0.458	0.460	0.458	0.452	0.452184	0.456168	0.45816	0.456168	0.450192
D5	0.454	0.458	0.460	0.458	0.452	0.452184	0.456168	0.45816	0.456168	0.450192
D6	0.454	0.458	0.460	0.458	0.452	0.452184	0.456168	0.45816	0.456168	0.450192
D7	0.454	0.458	0.460	0.458	0.452	0.452184	0.456168	0.45816	0.456168	0.450192
D8	0.454	0.458	0.460	0.458	0.452	0.452184	0.456168	0.45816	0.456168	0.450192
D9	0.454	0.458	0.460	0.458	0.452	0.452184	0.456168	0.45816	0.456168	0.450192
D10	0.454	0.458	0.460	0.458	0.452	0.452184	0.456168	0.45816	0.456168	0.450192
D11	0.454	0.458	0.460	0.458	0.452	0.452184	0.456168	0.45816	0.456168	0.450192
D12	0.454	0.458	0.460	0.458	0.452	0.452184	0.456168	0.45816	0.456168	0.450192
E1	0.456	0.458	0.460	0.453	0.452	0.454176	0.456168	0.45816	0.451188	0.450192
E2	0.459	0.458	0.460	0.455	0.452	0.457164	0.456168	0.45816	0.45318	0.450192
E3	0.459	0.458	0.460	0.455	0.452	0.457164	0.456168	0.45816	0.45318	0.450192
E4	0.459	0.458	0.460	0.455	0.452	0.457164	0.456168	0.45816	0.45318	0.450192
E5	0.459	0.458	0.460	0.455	0.452	0.457164	0.456168	0.45816	0.45318	0.450192

NIAGARA MOHAWK

CALCULATION SHEET

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NUCLEAR ENGINEERING & LICENCING

DISCIPLINE STRUCTURAL

PROJECT: NINE MILE POINT NUC. STA.-UNIT 1

CALC. NO. S22.4-WW198 - STAT Ø1

REV. 0

SUBJECT: TORUS WALL THINNING TRENDING. ANALYSIS

ORIG. AH/DRW

DATE: 5/20/88

INDEX: 3-N2.1-S22.4

CHK'D. FHF

DATE: 5/23

E6	0.459	0.458	0.460	0.455	0.452	#	0.457164	0.456168	0.45816	0.45318	0.450192	#
E7	0.459	0.458	0.460	0.455	0.452	#	0.457164	0.456168	0.45816	0.45318	0.450192	#
E8	0.459	0.458	0.460	0.455	0.452	#	0.457164	0.456168	0.45816	0.45318	0.450192	#
E9	0.459	0.458	0.460	0.455	0.452	#	0.457164	0.456168	0.45816	0.45318	0.450192	#
E10	0.459	0.458	0.460	0.455	0.452	#	0.457164	0.456168	0.45816	0.45318	0.450192	#
E11	0.459	0.458	0.460	0.455	0.452	#	0.457164	0.456168	0.45816	0.45318	0.450192	#
E12	0.459	0.458	0.460	0.455	0.452	#	0.457164	0.456168	0.45816	0.45318	0.450192	#
F1	0.459	0.460	0.464	0.455	0.452	#	0.457164	0.45816	0.462144	0.45318	0.450192	#
F2	0.459	0.460	0.462	0.458	0.452	#	0.457164	0.45816	0.460152	0.456168	0.450192	#
F3	0.459	0.460	0.462	0.458	0.452	#	0.457164	0.45816	0.460152	0.456168	0.450192	#
F4	0.459	0.460	0.462	0.458	0.452	#	0.457164	0.45816	0.460152	0.456168	0.450192	#
F5	0.459	0.460	0.462	0.458	0.452	#	0.457164	0.45816	0.460152	0.456168	0.450192	#
F6	0.459	0.460	0.462	0.458	0.452	#	0.457164	0.45816	0.460152	0.456168	0.450192	#
F7	0.459	0.460	0.462	0.458	0.452	#	0.457164	0.45816	0.460152	0.456168	0.450192	#
F8	0.459	0.460	0.462	0.460	0.452	#	0.457164	0.45816	0.460152	0.45816	0.450192	#
F9	0.459	0.460	0.462	0.460	0.452	#	0.457164	0.45816	0.460152	0.45816	0.450192	#
F10	0.459	0.460	0.462	0.460	0.452	#	0.457164	0.45816	0.460152	0.45816	0.450192	#
F11	0.459	0.460	0.462	0.460	0.452	#	0.457164	0.45816	0.460152	0.45816	0.450192	#
F12	0.459	0.460	0.462	0.460	0.452	#	0.457164	0.45816	0.460152	0.45816	0.450192	#
G1	0.458	0.459	0.460	0.454	0.449	#	0.456168	0.457164	0.45816	0.452184	0.447204	#
G2	0.458	0.459	0.460	0.452	0.452	#	0.456168	0.457164	0.45816	0.450192	0.450192	#
G3	0.458	0.459	0.460	0.452	0.452	#	0.456168	0.457164	0.45816	0.450192	0.450192	#
G4	0.458	0.459	0.460	0.452	0.452	#	0.456168	0.457164	0.45816	0.450192	0.450192	#
G5	0.458	0.459	0.460	0.452	0.452	#	0.456168	0.457164	0.45816	0.450192	0.450192	#
G6	0.458	0.459	0.460	0.452	0.452	#	0.456168	0.457164	0.45816	0.450192	0.450192	#
G7	0.458	0.459	0.460	0.452	0.452	#	0.456168	0.457164	0.45816	0.450192	0.450192	#
G8	0.458	0.459	0.460	0.452	0.452	#	0.456168	0.457164	0.45816	0.450192	0.450192	#
G9	0.458	0.459	0.460	0.452	0.452	#	0.456168	0.457164	0.45816	0.450192	0.450192	#
G10	0.458	0.459	0.460	0.452	0.452	#	0.456168	0.457164	0.45816	0.450192	0.450192	#
G11	0.458	0.459	0.460	0.452	0.452	#	0.456168	0.457164	0.45816	0.450192	0.450192	#
G12	0.458	0.459	0.461	0.452	0.452	#	0.456168	0.457164	0.459156	0.450192	0.450192	#
H1	0.458	0.459	0.461	0.452	0.455	#	0.456168	0.457164	0.459156	0.450192	0.45318	#
H2	0.458	0.459	0.461	0.452	0.455	#	0.456168	0.457164	0.459156	0.450192	0.45318	#
H3	0.458	0.459	0.461	0.452	0.455	#	0.456168	0.457164	0.459156	0.450192	0.45318	#
H4	0.458	0.459	0.461	0.452	0.455	#	0.456168	0.457164	0.459156	0.450192	0.45318	#
H5	0.458	0.459	0.461	0.452	0.455	#	0.456168	0.457164	0.459156	0.450192	0.45318	#
H6	0.458	0.459	0.461	0.452	0.455	#	0.456168	0.457164	0.459156	0.450192	0.45318	#
H7	0.458	0.459	0.461	0.452	0.455	#	0.456168	0.457164	0.459156	0.450192	0.45318	#
H8	0.458	0.459	0.461	0.452	0.455	#	0.456168	0.457164	0.459156	0.450192	0.45318	#
H9	0.458	0.459	0.461	0.452	0.455	#	0.456168	0.457164	0.459156	0.450192	0.45318	#
H10	0.458	0.459	0.461	0.452	0.455	#	0.456168	0.457164	0.459156	0.450192	0.45318	#
H11	0.458	0.459	0.461	0.452	0.455	#	0.456168	0.457164	0.459156	0.450192	0.45318	#
H12	0.458	0.459	0.461	0.452	0.455	#	0.456168	0.457164	0.459156	0.450192	0.45318	#
I1	0.455	0.458	0.462	0.454	0.452	#	0.45318	0.456168	0.460152	0.452184	0.450192	#
I2	0.457	0.458	0.461	0.454	0.452	#	0.455172	0.456168	0.459156	0.452184	0.450192	#
I3	0.459	0.458	0.461	0.454	0.452	#	0.457164	0.456168	0.459156	0.452184	0.450192	#
I4	0.459	0.458	0.461	0.454	0.452	#	0.457164	0.456168	0.459156	0.452184	0.450192	#
I5	0.459	0.458	0.461	0.454	0.452	#	0.457164	0.456168	0.459156	0.452184	0.450192	#
I6	0.459	0.458	0.461	0.454	0.452	#	0.457164	0.456168	0.459156	0.452184	0.450192	#
I7	0.459	0.458	0.461	0.454	0.452	#	0.457164	0.456168	0.459156	0.452184	0.450192	#
I8	0.459	0.458	0.461	0.454	0.452	#	0.457164	0.456168	0.459156	0.452184	0.450192	#
I9	0.459	0.458	0.461	0.454	0.452	#	0.457164	0.456168	0.459156	0.452184	0.450192	#
I10	0.459	0.458	0.461	0.454	0.452	#	0.457164	0.456168	0.459156	0.452184	0.450192	#
I11	0.459	0.458	0.461	0.454	0.452	#	0.457164	0.456168	0.459156	0.452184	0.450192	#
I12	0.459	0.458	0.461	0.454	0.452	#	0.457164	0.456168	0.459156	0.452184	0.450192	#
J1	0.452	0.458	0.461	0.454	0.455	#	0.450192	0.456168	0.459156	0.452184	[illegible]	#
J2	0.452	0.458	0.461	0.454	0.452	#	0.450192	[illegible]	0.459156	0.452184	0.450192	#
J3	0.452	0.458	0.461	0.454	0.455	#	[illegible]	0.456168	0.459156	0.452184	0.45318	#
J4	0.452	0.458	0.461	0.454	[illegible]	#	0.450192	0.456168	0.459156	0.452184	0.45318	#
J5	0.452	0.458	0.461	[illegible]	0.455	#	0.450192	0.456168	0.459156	0.452184	0.45318	#

NIAGARA MOHAWK

NUCLEAR ENGINEERING & LICENCING

CALCULATION SHEET

DISCIPLINE STRUCTURAL

PROJECT: NINE MILE POINT NUC. STA.-UNIT 1

CALC. NO. S22-4-WW198 -STAT Φ1 REV. 0

SUBJECT: TORUS WALL THINNING TRENDING. ANALYSIS

ORIG. AH/DRW DATE: 5/20/88

INDEX: 3-N2.1-S22-4

CHK'D. FJF DATE: 5/23

J6	0.452	0.458	0.461	0.454	0.455	*	0.450192	0.456168	0.459156	0.452184	0.45318
J7	0.452	0.458	0.461	0.454	0.455	*	0.450192	0.456168	0.459156	0.452184	0.45318
J8	0.452	0.458	0.461	0.454	0.455	*	0.450192	0.456168	0.459156	0.452184	0.45318
J9	0.452	0.458	0.461	0.454	0.455	*	0.450192	0.456168	0.459156	0.452184	0.45318
J10	0.452	0.458	0.461	0.454	0.455	*	0.450192	0.456168	0.459156	0.452184	0.45318
J11	0.452	0.458	0.461	0.454	0.455	*	0.450192	0.456168	0.459156	0.452184	0.45318
J12	0.452	0.458	0.461	0.454	0.455	*	0.450192	0.456168	0.459156	0.452184	0.45318
K1	0.458	0.458	0.460	0.458	0.452	*	0.456168	0.456168	0.45816	0.456168	0.450192
K2	0.458	0.458	0.460	0.458	0.452	*	0.456168	0.456168	0.45816	0.456168	0.450192
K3	0.458	0.458	0.460	0.458	0.452	*	0.456168	0.456168	0.45816	0.456168	0.450192
K4	0.458	0.458	0.460	0.458	0.452	*	0.456168	0.456168	0.45816	0.456168	0.450192
K5	0.458	0.458	0.460	0.458	0.452	*	0.456168	0.456168	0.45816	0.456168	0.450192
K6	0.458	0.458	0.460	0.458	0.452	*	0.456168	0.456168	0.45816	0.456168	0.450192
K7	0.458	0.458	0.460	0.458	0.452	*	0.456168	0.456168	0.45816	0.456168	0.450192
K8	0.458	0.458	0.460	0.458	0.452	*	0.456168	0.456168	0.45816	0.456168	0.450192
K9	0.458	0.459	0.460	0.458	0.452	*	0.456168	0.456168	0.45816	0.456168	0.450192
K10	0.458	0.459	0.460	0.458	0.452	*	0.456168	0.456168	0.45816	0.456168	0.450192
K11	0.459	0.458	0.460	0.458	0.452	*	0.457164	0.456168	0.45816	0.456168	0.450192
K12	0.458	0.458	0.460	0.458	0.452	*	0.456168	0.456168	0.45816	0.456168	0.450192
L1	0.457	0.460	0.460	0.454	0.452	*	0.455172	0.45816	0.45816	0.452184	0.450192
L2	0.459	0.456	0.460	0.454	0.452	*	0.457164	0.454176	0.45816	0.452184	0.450192
L3	0.457	0.456	0.460	0.454	0.452	*	0.455172	0.454176	0.45816	0.452184	0.450192
L4	0.457	0.458	0.460	0.454	0.452	*	0.455172	0.456168	0.45816	0.452184	0.450192
L5	0.457	0.460	0.460	0.454	0.452	*	0.455172	0.45816	0.45816	0.452184	0.450192
L6	0.457	0.460	0.460	0.454	0.452	*	0.455172	0.45816	0.45816	0.452184	0.450192
L7	0.457	0.460	0.460	0.454	0.452	*	0.455172	0.45816	0.45816	0.452184	0.450192
L8	0.457	0.460	0.460	0.454	0.452	*	0.455172	0.45816	0.45816	0.452184	0.450192
L9	0.457	0.460	0.460	0.454	0.452	*	0.455172	0.45816	0.45816	0.452184	0.450192
L10	0.457	0.460	0.460	0.454	0.452	*	0.455172	0.45816	0.45816	0.452184	0.450192
L11	0.457	0.460	0.460	0.454	0.452	*	0.455172	0.45816	0.45816	0.452184	0.450192
L12	0.457	0.460	0.460	0.454	0.452	*	0.455172	0.45816	0.45816	0.452184	0.450192
1988											
	0.457479	0.458486	0.46025	0.455333	0.453854		~~0.455649~~	~~0.456652~~	~~0.458409~~	~~0.453612~~	~~0.452038~~
	0.002263	0.000841	0.000953	0.002303	0.003197						
	0.455215	0.457644	0.459296	0.453029	0.450657						
	~~0.455649~~	~~0.456652~~	~~0.458409~~	~~0.453612~~	~~0.452038~~						

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NIAGARA MOHAWK

CALCULATION SHEET

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NUCLEAR ENGINEERING & LICENCING — DISCIPLINE STRUCTURAL

PROJECT: NINE MILE POINT NUC. STA.-UNIT I — CALC. NO. S22-4-WW198 - STAT Φ1 — REV. 0

SUBJECT: TORUS WALL THINNING TRENDING: ANALYSIS — ORIG. AH/DRW — DATE: 5/20/88

INDEX: 3-N2.1-S22-4 — CHK'D. FHF — DATE: 5/73

DAN. WR 4

Dan's Analvsis #4

YEAR 1988 BOTTOM

~~INSTR. ERROR 0.004~~

POINT	AREA 0 DEG	90 DEG	180 DEG	270 DEG	AREA 0 DEG	90 DEG	180 DEG	270 DEG	
A1	0.465	0.456	0.465	0.464	0.46314	0.454176	0.46314	0.462144	0
A2	0.464	0.455	0.465	0.455	0.462144	0.45318	0.46314	0.45318	0
A3	0.465	0.454	0.466	0.455	0.46314	0.452184	0.464136	0.45318	0
A4	0.466	0.454	0.467	0.457	0.464136	0.452184	0.465132	0.455172	0
A5	0.463	0.454	0.465	0.458	0.461148	0.452184	0.46314	0.456168	0
A6	0.466	0.453	0.468	0.457	0.464136	0.451188	0.466128	0.455172	0
A7	0.464	0.455	0.468	0.46	0.462144	0.45318	0.466128	0.45816	0
A8	0.465	0.455	0.467	0.457	0.46314	0.45318	0.465132	0.455172	0
A9	0.465	0.456	0.467	0.456	0.46314	0.454176	0.465132	0.454176	0
A10	0.464	0.455	0.469	0.452	0.462144	0.45318	0.467124	0.450192	0
A11	0.464	0.454	0.465	0.457	0.462144	0.452184	0.46314	0.455172	0
A2	0.464	0.456	0.468	0.455	0.462144	0.454176	0.466128	0.45318	0
B1	0.465	0.455	0.468	0.453	0.46314	0.45318	0.466128	0.451188	0
B2	0.465	0.455	0.466	0.457	0.46314	0.45318	0.464136	0.455172	0
B3	0.463	0.455	0.467	0.455	0.461148	0.45318	0.465132	0.45318	0
B4	0.462	0.456	0.465	0.457	0.460152	0.454176	0.46314	0.455172	0
B5	0.46	0.455	0.469	0.458	0.45816	0.45318	0.467124	0.456168	0
B6	0.464	0.454	0.466	0.458	0.462144	0.452184	0.464136	0.456168	0
B7	0.464	0.459	0.47	0.459	0.462144	0.457164	0.46812	0.457164	0
B8	0.463	0.456	0.462	0.458	0.461148	0.454176	0.460152	0.456168	0
B9	0.462	0.454	0.469	0.458	0.460152	0.452184	0.467124	0.456168	0
B10	0.463	0.455	0.466	0.458	0.461148	0.45318	0.464136	0.456168	0
B11	0.464	0.456	0.465	0.456	0.462144	0.454176	0.46314	0.454176	0
B12	0.463	0.456	0.466	0.458	0.461148	0.454176	0.464136	0.456168	0
C1	0.465	0.455	0.465	0.458	0.46314	0.45318	0.46314	0.456168	0
C2	0.464	0.454	0.466	0.458	0.462144	0.452184	0.464136	0.456168	0
C3	0.463	0.454	0.466	0.454	0.461148	0.452184	0.464136	0.452184	0
C4	0.463	0.455	0.469	0.458	0.461148	0.45318	0.467124	0.456168	0
C5	0.463	0.455	0.469	0.458	0.461148	0.45318	0.467124	0.456168	0
C6	0.464	0.459	0.466	0.456	0.462144	0.457164	0.464136	0.454176	0
C7	0.464	0.452	0.467	0.457	0.462144	0.450192	0.465132	0.455172	0
C8	0.462	0.455	0.465	0.457	0.460152	0.45318	0.46314	0.455172	0
C9	0.463	0.456	0.469	0.458	0.461148	0.454176	0.467124	0.456168	0
C10	0.463	0.457	0.463	0.458	0.461148	0.455172	0.461148	0.456168	0
C11	0.462	0.457	0.463	0.457	0.460152	0.455172	0.461148	0.455172	0
C12	0.464	0.455	0.463	0.456	0.462144	0.45318	0.461148	0.454176	0
D1	0.466	0.455	0.466	0.457	0.464136	0.45318	0.464136	0.455172	0
D2	0.466	0.454	0.465	0.456	0.464136	0.452184	0.46314	0.454176	0
D3	0.464	0.454	0.46	0.457	0.462144	0.452184	0.45816	0.455172	0
D4	0.465	0.456	0.46	0.456	0.46314	0.454176	0.45816	0.454176	0
D5	0.465	0.466	0.465	0.455	0.46314	0.464136	0.46314	0.45318	0
D6	0.465	0.457	0.465	0.454	0.46314	0.455172	0.46314	0.452184	0
D7	0.463	0.454	0.464	0.456	0.461148	0.452184	0.462144	0.454176	0
D8	0.463	0.454	0.465	0.457	0.461148	0.452184	0.46314	0.455172	0
D9	0.466	0.454	0.462	0.458	0.464136	0.452184	0.460152	0.456168	0
D10	0.464	0.455	0.467	0.459	0.462144	0.45318	0.465132	0.457164	0
D11	0.462	0.457	0.465	0.457	0.460152	0.455172	0.46314	0.455172	0
D12	0.463	0.455	0.464	0.458	0.461148	0.45318	0.462144	0.456168	0
E1	0.462	0.457	0.466	0.459	0.460152	0.455172	0.464136	0.457164	0
E2	0.462	0.455	0.465	0.458	0.460152	0.45318	0.46314	0.456168	0
E3	0.465	0.455	0.464	0.45	0.46314	0.45318	0.462144	0.4482	0
E4	0.464	0.456	0.469	0.451	0.462144	0.454176	0.467124	0.449196	0
E5	0.464	0.454	0.466	0.451	0.462144	0.452184	0.464136	0.449196	0

NIAGARA MOHAWK

CALCULATION SHEET

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NUCLEAR ENGINEERING & LICENCING

DISCIPLINE STRUCTURAL

PROJECT: NINE MILE POINT NUC. STA.-UNIT 1

CALC. NO. S22.4-WW198 -STAT Φ1 REV. 0

SUBJECT: TORUS WALL THINNING TRENDING. ANALYSIS

ORIG. AH/DRW DATE: 5/20/88

INDEX: 3-N2.1-S22.4

CHK'D. FJF DATE: 5/23

#	0.464136	0.454176	0.46314	0.4482	0	#
#	0.46314	0.451188	0.466128	0.45816	0	#
#	0.460152	0.451188	0.467124	0.456168	0	#
#	0.461148	0.45318	0.464136	0.44322	0	#
#	0.462144	0.45318	0.465132	0.45318	0	#
#	0.460152	0.456168	0.464136	0.449196	0	#
#	0.460152	0.456168	0.455172	0.45816	0	#
#	0.460152	0.45318	0.45816	0.464136	0	#
#	0.46314	0.45816	0.46314	0.46314	0	#
#	0.460152	0.457164	0.466128	0.464136	0	#
#	0.461148	0.451188	0.467124	0.462144	0	#
#	0.462144	0.454176	0.467124	0.462144	0	#
#	0.467124	0.45816	0.464136	0.461148	0	#
#	0.464136	0.460152	0.465132	0.465132	0	#
#	0.460152	0.446208	0.47808	0.461148	0	#
#	0.464136	0.460152	0.46314	0.46314	0	#
#	0.464136	0.456168	0.45816	0.45816	0	#
#	0.465132	0.45816	0.46314	0.462144	0	#
#	0.460152	0.460152	0.457164	0.461148	0	#
#	0.451188	0.460152	0.452184	0.466128	0	#
#	0.461148	0.457164	0.460152	0.476088	0	#
#	0.452184	0.464136	0.461148	0.476088	0	#
#	0.456168	0.46314	0.465132	0.47808	0	#
#	0.456168	0.460152	0.467124	0.47808	0	#
#	0.45816	0.464136	0.464136	0.475092	0	#
#	0.45816	0.464136	0.45318	0.47808	0	#
#	0.460152	0.464136	0.461148	0.47808	0	#
#	0.464136	0.46314	0.454176	0.472104	0	#
#	0.457164	0.460152	0.45816	0.471108	0	#
#	0.456168	0.459156	0.455172	0.472104	0	#
#	0.457164	0.459156	0.45318	0.4731	0	#
#	0.459156	0.46314	0.460152	0.457164	0	#
#	0.460152	0.45816	0.457164	0.462144	0	#
#	0.462144	0.459156	0.457164	0.46314	0	#
#	0.461148	0.462144	0.455172	0.46314	0	#
#	0.46314	0.461148	0.460152	0.467124	0	#
#	0.460152	0.461148	0.460152	0.465132	0	#
#	0.461148	0.460152	0.456168	0.466128	0	#
#	0.46314	0.46314	0.456168	0.466128	0	#
#	0.46314	0.462144	0.452184	0.46314	0	#
#	0.46314	0.460152	0.455172	0.461148	0	#
#	0.460152	0.46314	0.454176	0.460152	0	#
#	0.462144	0.460152	0.452184	0.462144	0	#
#	0.461148	0.45816	0.452184	0.466128	0	#
#	0.461148	0.460152	0.45318	0.466128	0	#
#	0.461148	0.460152	0.454176	0.452184	0	#
#	0.460152	0.459156	0.454176	0.454176	0	#
#	0.462144	0.45816	0.45318	0.465132	0	#
#	0.460152	0.459156	0.456168	0.465132	0	#
#	0.461148	0.460152	0.455172	0.465132	0	#
#	0.46314	0.460152	0.460152	0.45318	0	#
#	0.462144	0.459156	0.459156	0.46314	0	#
#	0.460152	0.459156	0.45816	0.465132	0	#
#	0.461148	0.460152	0.455172	0.462144	0	#
#	0.464136	0.45816	0.459156	0.464136	0	#
#	0.460152	0.45816	0.457164	0.4[illegible]136	0	#
#	0.462144	0.460152	0.460152	0.465132	0	#
#	0.464136	0.460152	0.460152	0.465132	0	#
#	0.46314	0.460152	0.464136	0.460152	0	#
#	0.46314	0.460152	0.464136	0.465132	0	#

E6	0.466	0.456	0.465	0.45
E7	0.465	0.453	0.468	0.46
E8	0.462	0.453	0.469	0.458
E9	0.463	0.455	0.466	0.445
E10	0.464	0.455	0.467	0.455
E11	0.462	0.458	0.466	0.451
E12	0.462	0.458	0.457	0.46
F1	0.462	0.455	0.46	0.466
F2	0.465	0.46	0.465	0.465
F3	0.462	0.459	0.468	0.466
F4	0.463	0.453	0.469	0.464
F5	0.464	0.456	0.469	0.464
F6	0.469	0.46	0.466	0.463
F7	0.466	0.462	0.467	0.467
F8	0.462	0.448	0.48	0.463
F9	0.466	0.462	0.465	0.465
F10	0.466	0.458	0.46	0.46
F11	0.467	0.46	0.465	0.464
F12	0.462	0.462	0.459	0.463
G1	0.453	0.462	0.454	0.468
G2	0.463	0.459	0.462	0.478
G3	0.454	0.466	0.463	0.478
G4	0.458	0.465	0.467	0.48
G5	0.458	0.462	0.469	0.48
G6	0.46	0.466	0.466	0.477
G7	0.46	0.466	0.455	0.48
G8	0.462	0.466	0.463	0.48
G9	0.466	0.465	0.456	0.474
G10	0.459	0.462	0.46	0.473
G11	0.458	0.461	0.457	0.474
G12	0.459	0.461	0.455	0.475
H1	0.461	0.465	0.462	0.459
H2	0.462	0.46	0.459	0.464
H3	0.464	0.461	0.459	0.465
H4	0.463	0.464	0.457	0.465
H5	0.465	0.463	0.462	0.469
H6	0.462	0.463	0.462	0.467
H7	0.463	0.462	0.458	0.468
H8	0.465	0.465	0.458	0.468
H9	0.465	0.464	0.454	0.465
H10	0.465	0.462	0.457	0.463
H11	0.462	0.465	0.456	0.462
H12	0.464	0.462	0.454	0.464
I1	0.463	0.46	0.454	0.468
I2	0.463	0.462	0.455	0.468
I3	0.463	0.462	0.456	0.454
I4	0.462	0.461	0.456	0.456
I5	0.464	0.46	0.455	0.467
I6	0.462	0.461	0.458	0.467
I7	0.463	0.462	0.457	0.467
I8	0.465	0.462	0.462	0.455
I9	0.464	0.461	0.461	0.465
I10	0.462	0.461	0.46	0.467
I11	0.463	0.462	0.457	0.464
I12	0.466	0.46	0.461	0.466
J1	0.462	0.46	0.459	0.466
J2	0.464	0.462	0.462	0.467
J3	0.466	0.462	0.462	0.467
J4	0.465	0.462	0.466	0.462
J5	0.465	0.462	0.466	0.467

NIAGARA MOHAWK

NUCLEAR ENGINEERING & LICENCING

CALCULATION SHEET

DISCIPLINE STRUCTURAL

PROJECT: NINE MILE POINT NUC. STA.-UNIT 1 — CALC. NO. S22.4-WW198-STAT Φ1 — REV. 0

SUBJECT: TORUS WALL THINNING TRENDING. ANALYSIS — ORIG. AH/DRW — DATE: 5/20/88

INDEX: 3-N2.1-S22.4 — CHK'D. FJF — DATE: 6/23

J6	0.462	0.462	0.463	0.467		#	~~0.460152~~	~~0.460152~~	~~0.461148~~	~~0.465132~~	~~0~~	#
J7	0.463	0.46	0.461	0.467		#	~~0.461148~~	~~0.45816~~	~~0.459156~~	~~0.465132~~	~~0~~	#
J8	0.462	0.462	0.463	0.466		#	~~0.460152~~	~~0.460152~~	~~0.461148~~	~~0.464136~~	~~0~~	#
J9	0.462	0.463	0.46	0.465		#	~~0.460152~~	~~0.461148~~	~~0.45816~~	~~0.46314~~	~~0~~	#
J10	0.462	0.46	0.459	0.464		#	~~0.460152~~	~~0.45816~~	~~0.457164~~	~~0.462144~~	~~0~~	#
J11	0.463	0.462	0.459	0.458		#	~~0.461148~~	~~0.460152~~	~~0.457164~~	~~0.456168~~	~~0~~	#
J12	0.465	0.462	0.462	0.461		#	~~0.46314~~	~~0.460152~~	~~0.460152~~	~~0.459156~~	~~0~~	#
K1	0.464	0.462	0.459	0.467		#	~~0.462144~~	~~0.460152~~	~~0.457164~~	~~0.465132~~	~~0~~	#
K2	0.463	0.461	0.454	0.468		#	~~0.461148~~	~~0.459156~~	~~0.452184~~	~~0.466128~~	~~0~~	#
K3	0.462	0.462	0.454	0.466		#	~~0.460152~~	~~0.460152~~	~~0.452184~~	~~0.464136~~	~~0~~	#
K4	0.464	0.462	0.456	0.464		#	~~0.462144~~	~~0.460152~~	~~0.454176~~	~~0.462144~~	~~0~~	#
K5	0.466	0.467	0.462	0.468		#	~~0.464136~~	~~0.465132~~	~~0.460152~~	~~0.466128~~	~~0~~	#
K6	0.463	0.467	0.459	0.466		#	~~0.461148~~	~~0.465132~~	~~0.457164~~	~~0.464136~~	~~0~~	#
K7	0.464	0.46	0.458	0.467		#	~~0.462144~~	~~0.45816~~	~~0.456168~~	~~0.465132~~	~~0~~	#
K8	0.463	0.463	0.455	0.467		#	~~0.461148~~	~~0.461148~~	~~0.45318~~	~~0.465132~~	~~0~~	#
K9	0.465	0.461	0.456	0.465		#	~~0.46314~~	~~0.459156~~	~~0.454176~~	~~0.46314~~	~~0~~	#
K10	0.465	0.46	0.458	0.462		#	~~0.46314~~	~~0.45816~~	~~0.456168~~	~~0.460152~~	~~0~~	#
K11	0.463	0.462	0.458	0.461		#	~~0.461148~~	~~0.460152~~	~~0.456168~~	~~0.459156~~	~~0~~	#
K12	0.463	0.462	0.453	0.461		#	~~0.461148~~	~~0.460152~~	~~0.451188~~	~~0.459156~~	~~0~~	#
L1	0.463	0.462	0.463	0.465		#	~~0.461148~~	~~0.460152~~	~~0.461148~~	~~0.46314~~	~~0~~	#
L2	0.464	0.464	0.454	0.467		#	~~0.462144~~	~~0.462144~~	~~0.452184~~	~~0.465132~~	~~0~~	#
L3	0.462	0.464	0.457	0.468		#	~~0.460152~~	~~0.462144~~	~~0.455172~~	~~0.466128~~	~~0~~	#
L4	0.463	0.462	0.454	0.464		#	~~0.461148~~	~~0.460152~~	~~0.452184~~	~~0.462144~~	~~0~~	#
L5	0.462	0.463	0.455	0.465		#	~~0.460152~~	~~0.461148~~	~~0.45318~~	~~0.46314~~	~~0~~	#
L6	0.466	0.463	0.455	0.467		#	~~0.464176~~	~~0.461148~~	~~0.45318~~	~~0.465132~~	~~0~~	#
L7	0.462	0.461	0.458	0.467		#	~~0.460152~~	~~0.459156~~	~~0.456168~~	~~0.465132~~	~~0~~	#
L8	0.462	0.461	0.454	0.465		#	~~0.460152~~	~~0.459156~~	~~0.452184~~	~~0.46314~~	~~0~~	#
L9	0.463	0.461	0.454	0.465		#	~~0.461148~~	~~0.459156~~	~~0.452184~~	~~0.46314~~	~~0~~	#
L10	0.462	0.465	0.455	0.464		#	~~0.460152~~	~~0.46314~~	~~0.45318~~	~~0.462144~~	~~0~~	#
L11	0.463	0.467	0.452	0.462		#	~~0.461148~~	~~0.465132~~	~~0.450192~~	~~0.460152~~	~~0~~	#
L12	0.461	0.461	0.455	0.459		#	~~0.459156~~	~~0.459156~~	~~0.45318~~	~~0.457164~~	~~0~~	#
	0.463263	0.459104	0.462125	0.462138	0		~~0.003984~~	~~0.00498~~	~~0.00996~~	~~0.00498~~	~~0~~	
	0.002111	0.004013	0.005060	0.006592	0							
	0.461152	0.455090	0.457064	0.455545	0							

SEE PAGE 6

0.461657
~~0.004979~~

AVERAGE OF MEAN VALUES PLOTTED AS 'RADIAL' ON PAGE 23 & 24

NIAGARA MOHAWK

CALCULATION SHEET

PAGE 20

NUCLEAR ENGINEERING & LICENCING

DISCIPLINE STRUCTURAL

PROJECT: NINE MILE POINT NUC. STA.-UNIT I	CALC. NO. S22-4-WW198 -STAT Φ1 REV. 0
SUBJECT: TORUS WALL THINNING TRENDING. ANALYSIS	ORIG. AH/DRW DATE: 5/20/88
INDEX: 3-N2.1-S22-4	CHK'D. FHF DATE: 5/23

DAN. WR5

Dan's Analysis #5

YEAR 1988 NRC DATA

~~INSTR. ERROR 0.001~~

POINT	AREA 1	2	3	4	5
A1	0.453	0.483	0.448		
A3	0.451	0.452	0.45		
A5	0.45	0.459	0.446		
A7	0.449	0.456	0.451		
A9	0.448	0.457	0.448		
A11	0.448	0.458	0.449		
B1	0.447	0.456	0.45		
B3	0.449	0.456	0.453		
B5	0.451	0.452	0.452		
B7	0.45	0.451	0.449		
B9	0.449	0.454	0.448		
B11	0.45	0.465	0.449		
C1	0.449	0.459	0.453		
C3	0.45	0.453	0.452		
C5	0.45	0.453	0.453		
C7	0.449	0.458	0.452		
C9	0.451	0.455	0.458		
C11	0.451	0.454	0.452		
D1	0.45	0.453	0.453		
D3	0.45	0.453	0.45		
D5	0.451	0.458	0.45		
D7	0.451	0.454	0.452		
D9	0.448	0.455	0.454		
D11	0.449	0.458	0.456		
E1	0.448	0.462	0.454		
E3	0.451	0.448	0.447		
E5	0.451	0.456	0.45		
E7	0.451	0.457	0.452		
E9	0.45	0.455	0.454		
E11	0.451	0.454	0.451		
F1	0.449	0.454	0.454		
F3	0.453	0.457	0.45		
F5	0.45	0.458	0.454		
F7	0.449	0.456	0.453		
F9	0.451	0.457	0.453		
F11	0.45	0.454	0.456		
G1	0.45	0.441	0.452		
G3	0.451	0.459	0.452		
G5	0.449	0.459	0.45		
G7	0.45	0.454	0.455		
G9	0.449	0.458	0.454		
G11	0.449	0.457	0.451		
H1	0.45	0.458	0.452		
H3	0.455	0.452	0.448		
H5	0.449	0.461	0.457		
H7	0.45	0.454	0.453		
H9	0.449	0.459	0.454		
H11	0.45	0.457	0.454		
I1	0.445	0.456	0.449		
I3	0.457	0.455	0.452		
I5	0.448	0.455	0.452		
I7	0.449	0.461	0.454		
I9	0.448	0.453	0.454		

AREA 1	2	3	4	5
0.451188	0.481068	ERR	0	0
0.449196	0.450192	ERR	0	0
0.4482	0.457164	ERR	0	0
0.447204	0.454176	ERR	0	0
0.446208	0.455172	ERR	0	0
0.446208	0.456168	ERR	0	0
0.445212	0.454176	ERR	0	0
0.447204	0.454176	ERR	0	0
0.449196	0.450192	ERR	0	0
0.4482	0.449196	ERR	0	0
0.447204	0.452184	ERR	0	0
0.4482	0.46314	ERR	0	0
0.447204	0.457164	ERR	0	0
0.4482	0.451188	ERR	0	0
0.4482	0.451188	ERR	0	0
0.447204	0.456168	ERR	0	0
0.449196	0.45318	ERR	0	0
0.449196	0.452184	ERR	0	0
0.4482	0.451188	ERR	0	0
0.4482	0.451188	ERR	0	0
0.449196	0.456168	ERR	0	0
0.449196	0.452184	ERR	0	0
0.446208	0.45318	ERR	0	0
0.447204	0.456168	ERR	0	0
0.446208	0.460152	ERR	0	0
0.449196	0.446208	ERR	0	0
0.449196	0.454176	ERR	0	0
0.449196	0.455172	ERR	0	0
0.4482	0.45318	ERR	0	0
0.449196	0.452184	ERR	0	0
0.447204	0.452184	ERR	0	0
0.451188	0.455172	ERR	0	0
0.4482	0.456168	ERR	0	0
0.447204	0.454176	ERR	0	0
0.449196	0.455172	ERR	0	0
0.4482	0.452184	ERR	0	0
0.4482	0.439236	ERR	0	0
0.449196	0.456168	ERR	0	0
0.447204	0.457164	ERR	0	0
0.4482	0.452184	ERR	0	0
0.447204	0.456168	ERR	0	0
0.447204	0.455172	ERR	0	0
0.4482	0.456168	ERR	0	0
0.45318	0.450192	ERR	0	0
0.447204	0.459156	ERR	0	0
0.4482	0.452184	ERR	0	0
0.447204	0.456168	ERR	0	0
0.4482	0.455172	ERR	0	0
0.44322	0.454176	ERR	0	0
0.455172	0.45318	ERR	0	0
0.446208	0.454176	ERR	0	0
0.447204	0.459156	ERR	0	0
0.446208	0.456168	ERR	0	0

NIAGARA MOHAWK

CALCULATION SHEET

PAGE 21

NUCLEAR ENGINEERING & LICENCING

DISCIPLINE STRUCTURAL

PROJECT: NINE MILE POINT NUC. STA.-UNIT 1

SUBJECT: TORUS WALL THINNING TRENDING. ANALYSIS

INDEX: 3-N2.1-522.4

CALC. NO. 522-4-WW198-STATΦ1 REV. 0

ORIG. AH/DRW DATE: 5/20/88

CHK'D. FWF DATE: 5/23

I11	0.45	0.457	0.455			#	0.4482	0.455172	ERR	0	0	#
J1	0.449	0.453	0.447			#	0.447204	0.451188	ERR	0	0	#
J3	0.45	0.459	0.452			#	0.4482	0.457164	ERR	0	0	#
J5	0.449	0.461	0.452			#	0.447204	0.459156	ERR	0	0	#
J7	0.449	0.456	0.452			#	0.447204	0.454176	ERR	0	0	#
J9	0.45	0.456	0.453			#	0.4482	0.454176	ERR	0	0	#
J11	0.449	0.461	0.454			#	0.447204	0.459156	ERR	0	0	#
K1	0.449	0.459	0.452			#	0.447204	0.457164	ERR	0	0	#
K3	0.45	0.463	0.453			#	0.4482	0.461148	ERR	0	0	#
K5	0.45	0.454	0.453			#	0.4482	0.452184	ERR	0	0	#
K7	0.448	0.456	0.453			#	0.446208	0.454176	ERR	0	0	#
K9	0.451	0.456	0.452			#	0.449196	0.454176	ERR	0	0	#
K11	0.45	0.453	0.452			#	0.4482	0.451188	ERR	0	0	#
L1	0.45	0.459	0.454			#	0.4482	0.457164	ERR	0	0	#
L3	0.45	0.461	0.456			#	0.4482	0.459156	ERR	0	0	#
L5	0.451	0.46	0.451			#	0.449196	0.45816	ERR	0	0	#
L7	0.449	0.462	0.453			#	0.447204	0.460152	ERR	0	0	#
L9	0.45	0.458	0.454			#	0.4482	0.456168	ERR	0	0	#
L11	0.452	0.46	0.456			#	0.450192	0.45816	ERR	0	0	#
SEE PAGE 6	0.449888	0.456763	0.452125	ERR	ERR		ERR	ERR	ERR	ERR	ERR	
	0.001629	0.004724	0.002426	ERR	ERR							
	0.448259	0.452039	0.449698	ERR	ERR							

0.452925
~~0.004299~~

AVERAGE OF MEAN VALUE PLOTTED AS 'NRC' ON PAGE 23 & 24

SEE COMMENTS ON PAGE 4

[illegible]

NIAGARA MOHAWK

NUCLEAR ENGINEERING & LICENCING

CALCULATION SHEET

PAGE 22

DISCIPLINE STRUCTURAL

PROJECT: NINE MILE POINT NUC. STA.-UNIT I

CALC. NO. S22.4-WW198 - STAT Φ1 REV. 0

SUBJECT: TORUS WALL THINNING TRENDING. ANALYSIS

ORIG. AH/DRW DATE: 5/20/88

INDEX: 3-N2.1-S22.4

CHK'D. FAF DATE: 5/23

SUMMARY OF RESULTS

AREA NUMBER	1	2	3	4	5
PLOTTED ON PAGE	23 & 24	24A	24B	24C	24D
1975	0.490714	0.476285	0.490285	0.492142	0.485285
	0.004333	0.002185	0.001665	0.003440	0.004462
	0.486381	0.474106	0.488619	0.488702	0.480822
1977	0.469633	0.468866	0.47	0.47	0.47
	0.003124	0.002376	0.000000	0.000000	0.000000
	0.466508	0.466489	0.469999	0.469999	0.469999
1979	0.48325	0.482944	0.487722	0.487222	0.488277
	0.005203	0.003929	0.005236	0.004353	0.004127
	0.478046	0.479014	0.482485	0.482868	0.484150
1981	0.479611	0.473388	0.482277	0.480833	0.4835
	0.006791	0.004650	0.003708	0.003954	0.004106
	0.472819	0.468738	0.478568	0.476878	0.479393
1984	0.489722	0.499444	0.502777	0.483611	0.500277
	0.008655	0.006643	0.010700	0.004803	0.008970
	0.481066	0.492800	0.492077	0.478807	0.491306
1986	0.457638	0.459583	0.459583	0.476666	0.456666
	0.007636	0.004389	0.002856	0.007453	0.007453
	0.450002	0.455193	0.456726	0.469213	0.449213
1988	0.457479	0.458486	0.46025	0.455333	0.453854
	0.002263	0.000841	0.000953	0.002303	0.003197
	0.455215	0.457466	0.459296	0.453029	0.450657

1988	BOTTOM	RADIAL	1988	NRC
	0.46166			0.45293
	0.00498			0.0043

CHART ON PG 24 DONOT INCLUDE THIS DATA

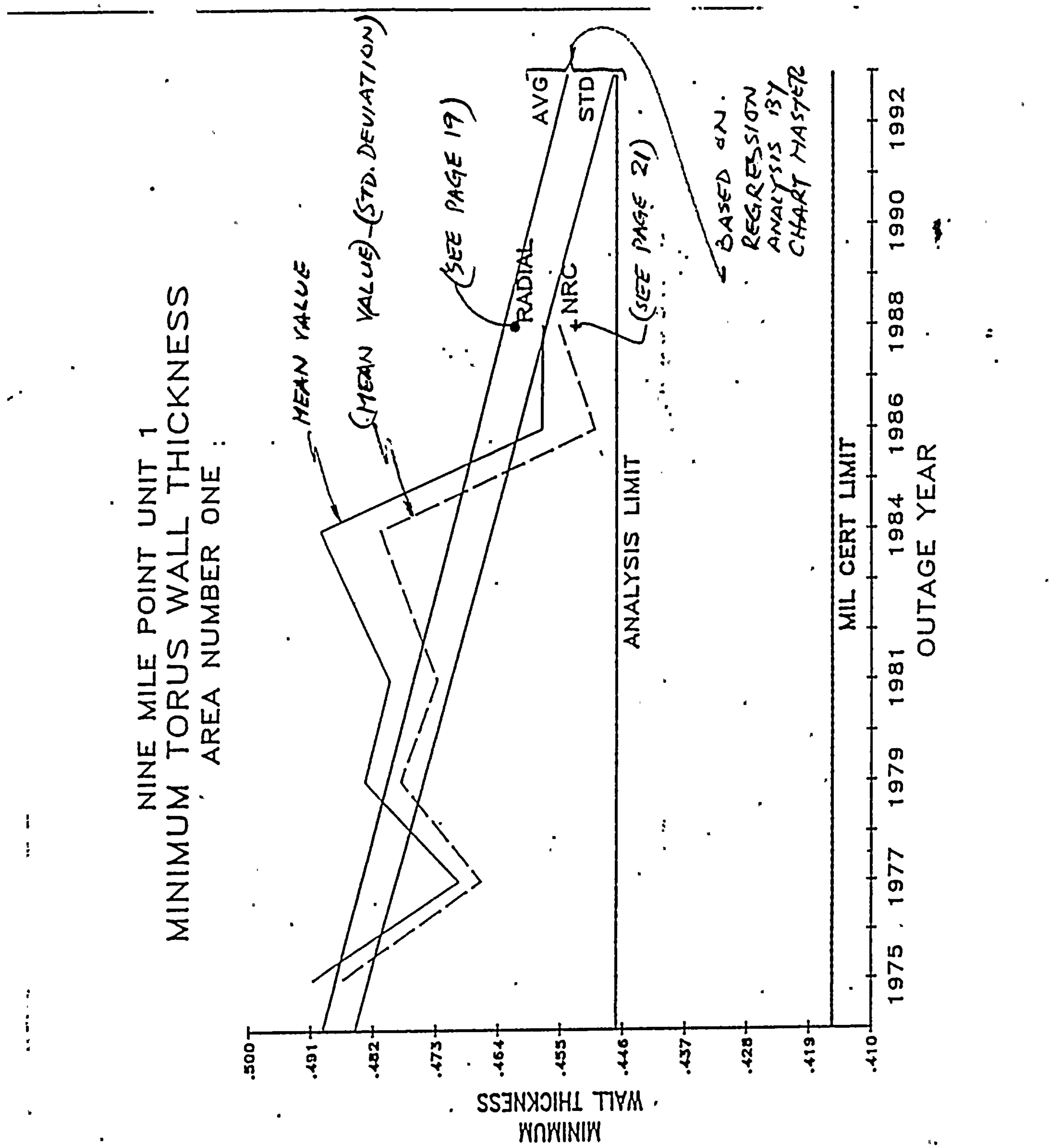
NIAGARA MOHAWK

CALCULATION SHEET

NUCLEAR ENGINEERING & LICENCING

DISCIPLINE STRUCTURAL

PROJECT: NINE MILE POINT NUC. STA.-UNIT 1	CALC. NO. S22-4-WW198-STATΦ1 REV. 0
SUBJECT: TORUS WALL THINNING TRENDING ANALYSIS	ORIG. AH/DRW DATE: 5/20/88
INDEX: 3-N2.1-S22.4	CHK'D. FHF DATE: 5/23



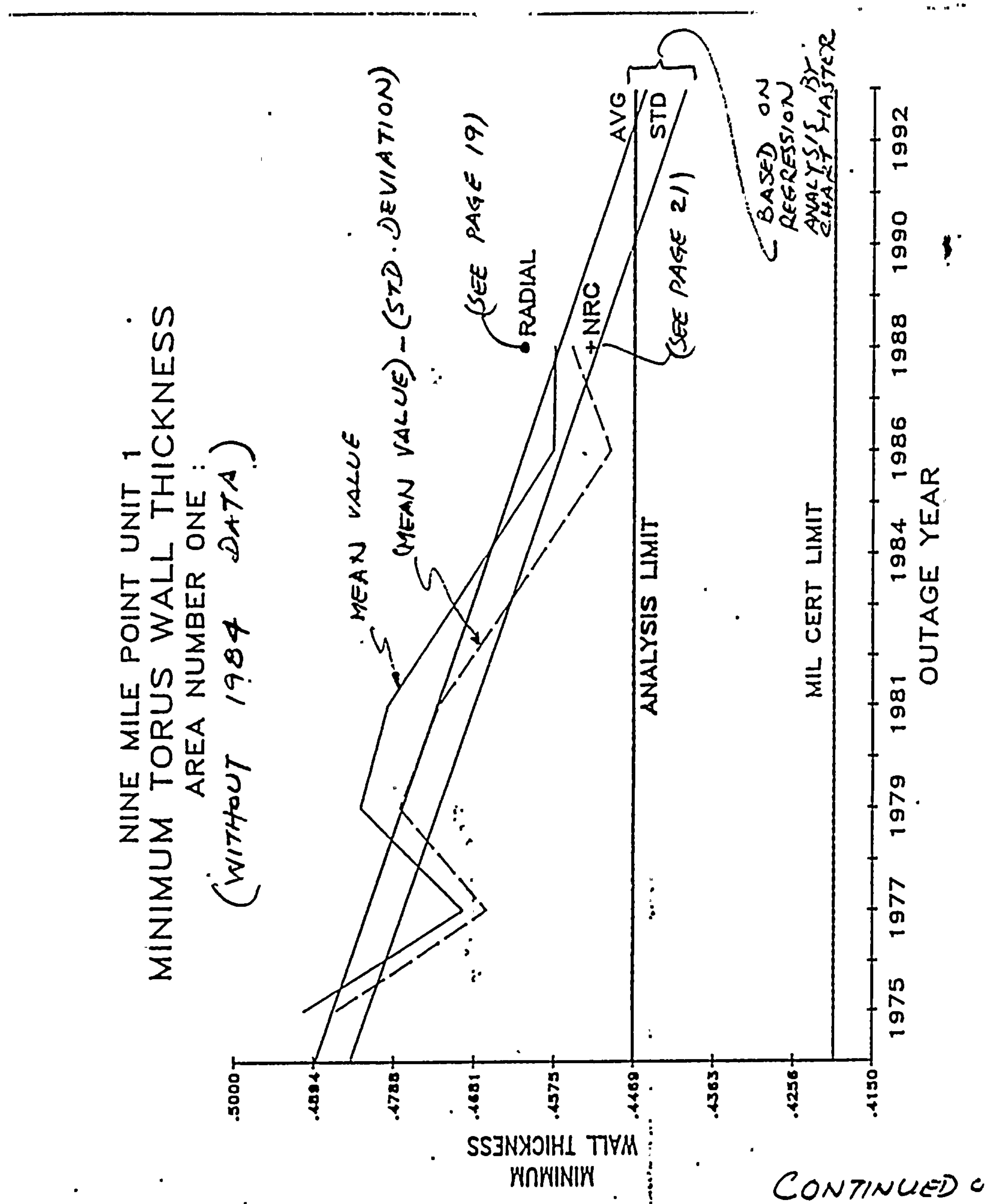
NIAGARA MOHAWK

CALCULATION SHEET

NUCLEAR ENGINEERING & LICENCING

DISCIPLINE STRUCTURAL

PROJECT: NINE MILE POINT NUC. STA.-UNIT 1	CALC. NO. S22-4-WW198 -STATΦ1 REV. 0
SUBJECT: TORUS WALL THINNING TRENDING ANALYSIS	ORIG. AH/DRW DATE: 5/20/88
INDEX: 3-N2.1-S22-4	CHK'D. FHF DATE: 5/23



CONTINUED ON 24A

NIAGARA MOHAWK

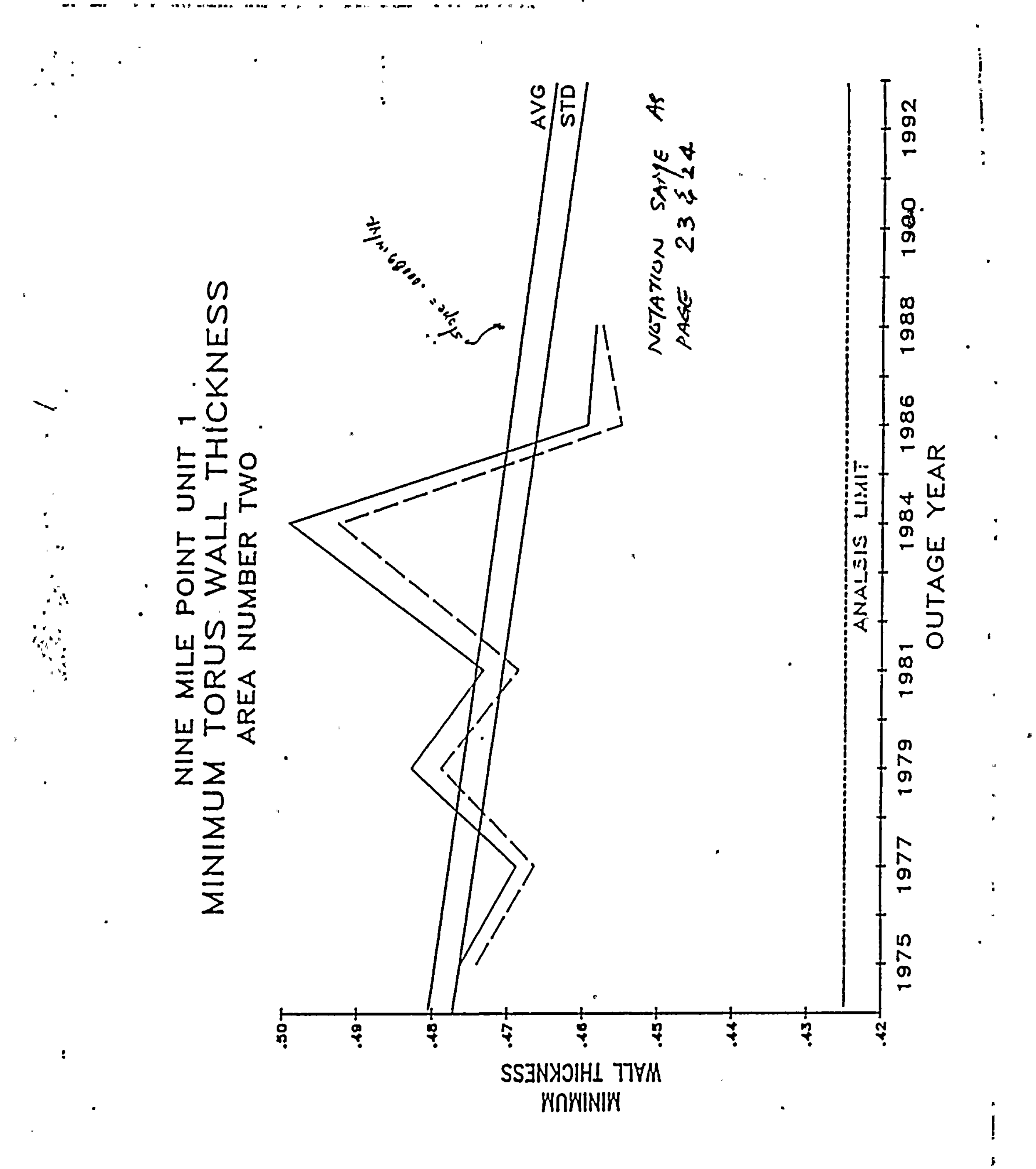
CALCULATION SHEET

PAGE 24A

NUCLEAR ENGINEERING & LICENCING

DISCIPLINE STRUCTURAL

PROJECT: NINE MILE POINT NUC. STA.-UNIT 1		CALC. NO. S22.4-WW198-STAT Ø1	REV. 0
SUBJECT: TORUS WALL THINNING TRENDING ANALYSIS		ORIG. AH / DRW	DATE: 5/23/88
INDEX: 3-N2.1-S22.4		CHK'D. FJF	DATE: 5/23



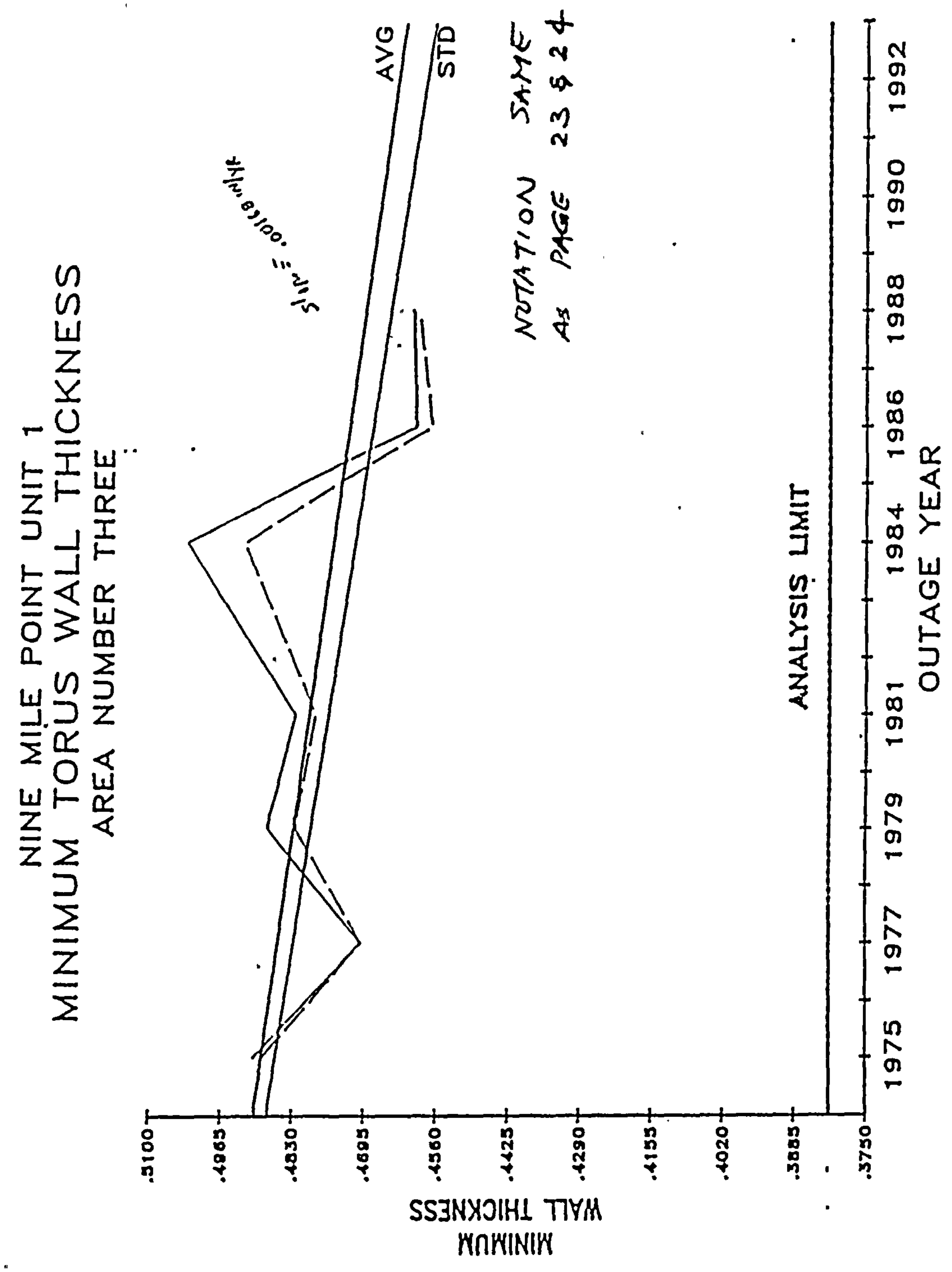
NIAGARA MOHAWK

CALCULATION SHEET

NUCLEAR ENGINEERING & LICENCING

DISCIPLINE STRUCTURAL

PROJECT: NINE MILE POINT NUC. STA.-UNIT 1	CALC. NO. 522-4-WW198 -STATØ1 REV. 0
SUBJECT: TORUS WALL THINNING TRENDING ANALYSIS	ORIG. AH / DRW DATE: 5/23/88
INDEX: 3-N2.1-522-4	CHK'D. RHF DATE: 5/23



NIAGARA MOHAWK

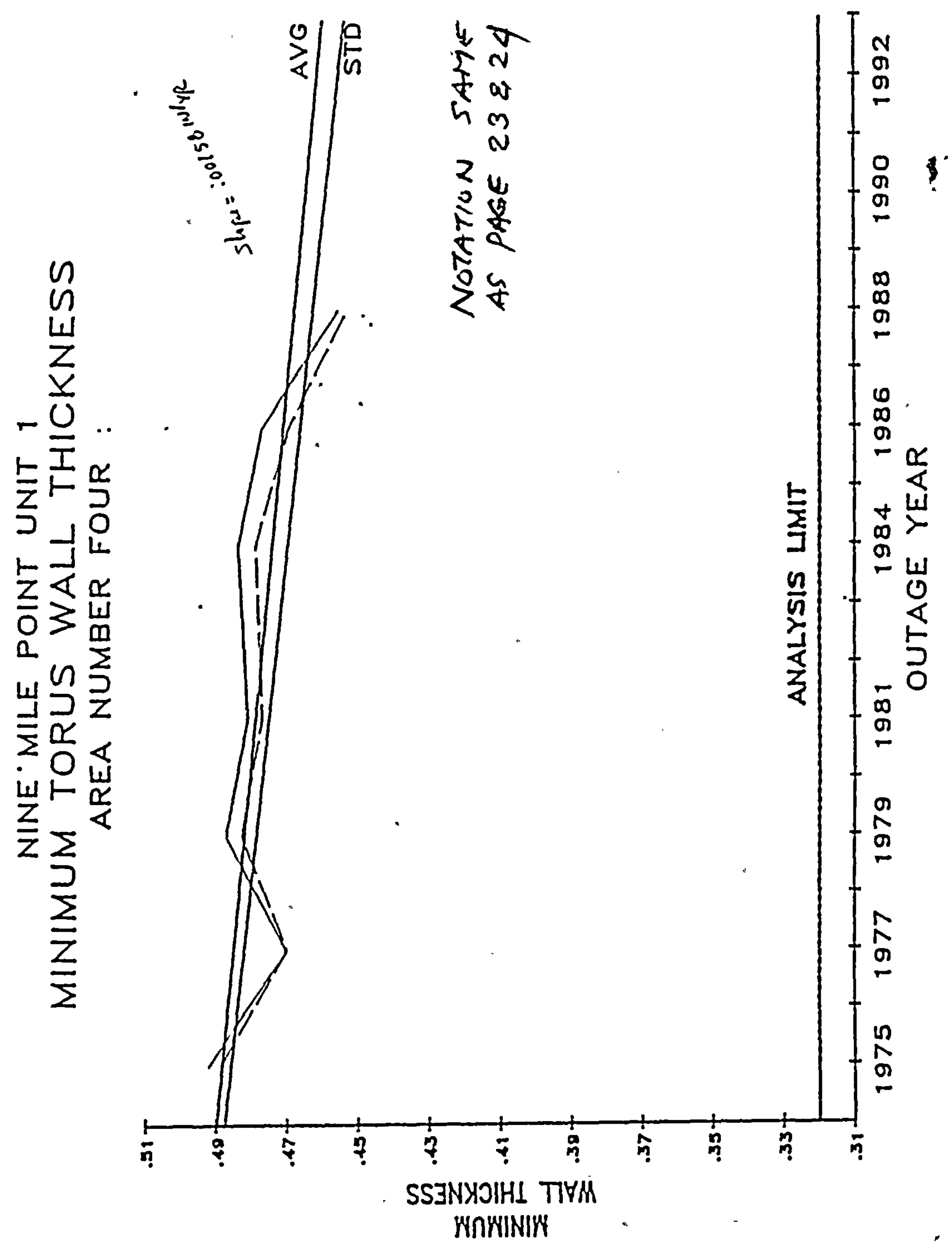
NUCLEAR ENGINEERING & LICENCING

CALCULATION SHEET

PAGE 24 C

DISCIPLINE STRUCTURAL

PROJECT: NINE MILE POINT NUC. STA.-UNIT I		CALC. NO. 522·4-WW198 -STAT Ø1	REV. 0
SUBJECT: TORUS WALL THINNING TRENDING · ANALYSIS		ORIG. AH / DRW	DATE: 5/23/88
INDEX: 3-N2.1-522·4		CHK'D. FHF	DATE: 5/23



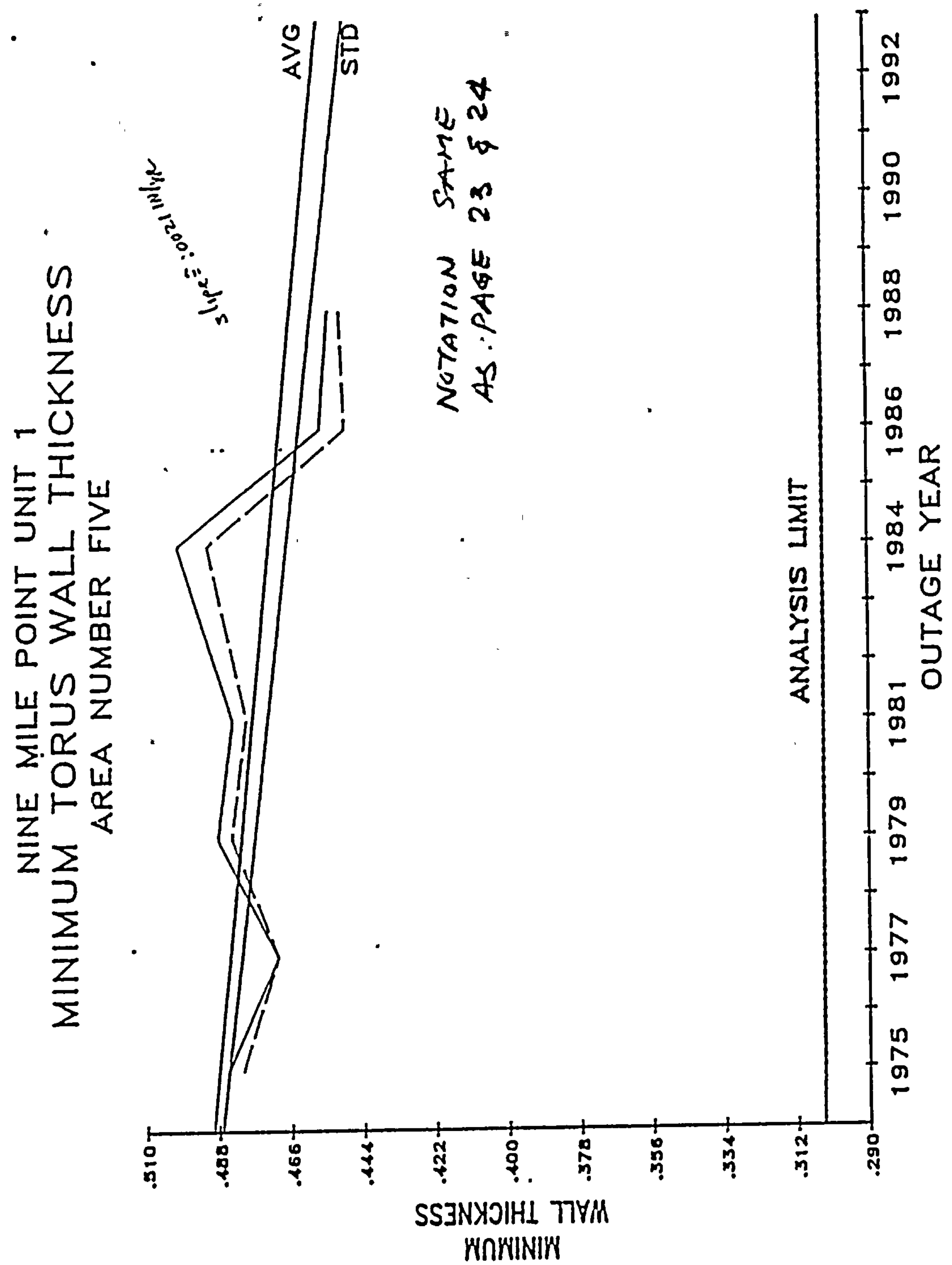
NIAGARA MOHAWK

CALCULATION SHEET

NUCLEAR ENGINEERING & LICENCING

DISCIPLINE STRUCTURAL

PROJECT: NINE MILE POINT NUC. STA.-UNIT 1		CALC. NO. S22.4-WW198-STAT Ø1	REV. 0
SUBJECT: TORUS WALL THINNING TRENDING · ANALYSIS		ORIG. AGT / DRW	DATE: 5/23/88
INDEX: 3-N2.1-S22.4		CHK'D. FWF	DATE: 5/23



NIAGARA MOHAWK

CALCULATION SHEET

NUCLEAR ENGINEERING & LICENCING

DISCIPLINE STRUCTURAL

PROJECT: NINE MILE POINT NUC. STA.-UNIT 1	CALC. NO. S22.4-WW198-STAT01 REV. 0
SUBJECT: TORUS WALL THINNING TRENDING ANALYSIS	ORIG. AH/DRW DATE: 5/20/88
INDEX: 3-N2.1-S22-4	CHK'D. FHF DATE: 5/23

APPENDIX 'A'

TORUS DATA SHEET

Vessel NINE MILE POINT Calibration Block No. 121

Procedure No. ISE-QAI-48 Rev. 0 WITH SUPP Calib. Sheet No. # 13

Date 10-15-75

Examiner LINDEMAN ASNT Level II

Data Taker MUIR ASNT Level II

Equipment Data: Instrument Model No. KRAUTKRAMER Shoe No. N/A

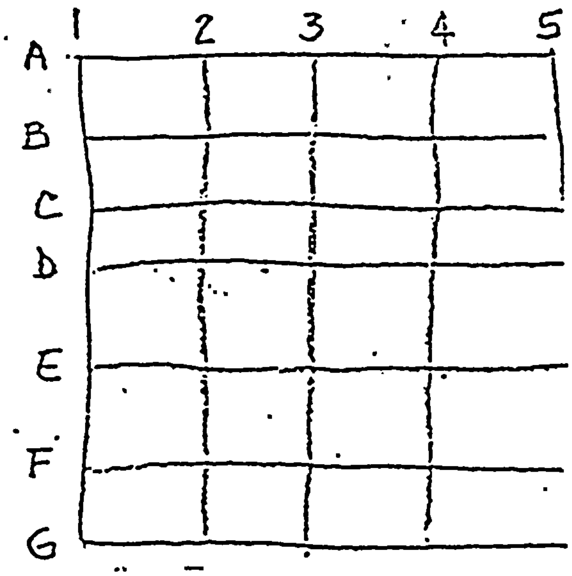
Instrument Serial No. 508305 Cable No. N/A

Transducer Size ½" Frequency N/A MHz

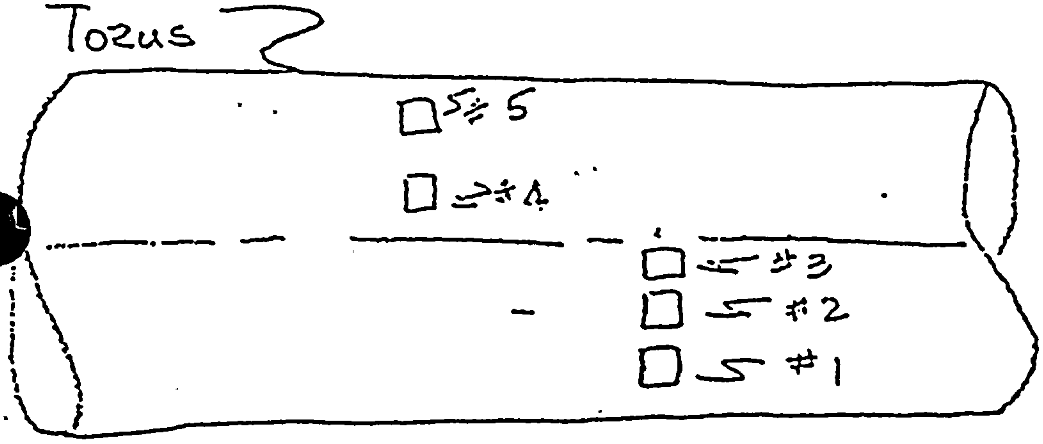
Transducer Serial No. KMS 4 Beam Angle 0° IIW-2

EXAM AREA #1

*		1	2	3	4	5
A		.485	.495	490	.500	.490
B		.485	.495	.490	.490	.495
C		.490	.495	.490	.490	.495
D		.490	495	.490	.485	.490
E		.490	.480	.485	.490	.485
F		.490	.485	.490	.490	.490
G		.495	.495	.495	.500	.490



TORUS



* ALL READINGS WERE TAKEN AT INTERSECTIO

TORUS DATA SHEET

Vessel: NINE MILE POINT — Calibration Block No.: # 121

Procedure No.: ISE-QAI-43 — Rev.: 0 WITH SUPP. — Calib. Sheet No.: # 13

Date: 10-15-75

Examiner: LINDEMAN — ASNT Level: II

Data Taker: MUITE — ASNT Level: II

Equipment Data:

Instrument Model No.: KRAUTKRAMER — Shoe No.: N/A

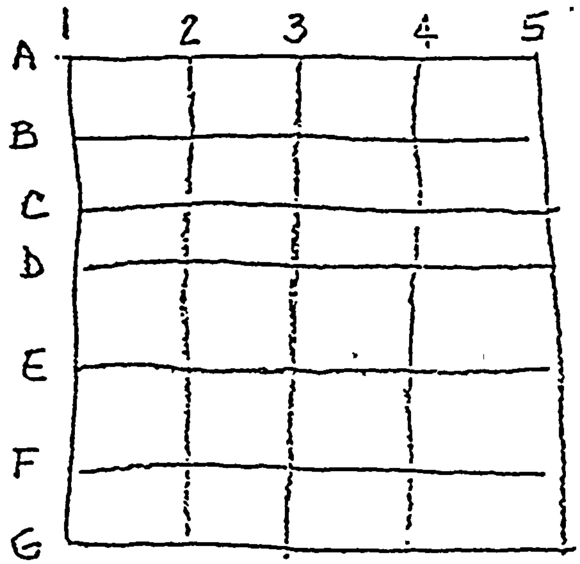
Instrument Serial No.: 508305 — Cable No.: N/A

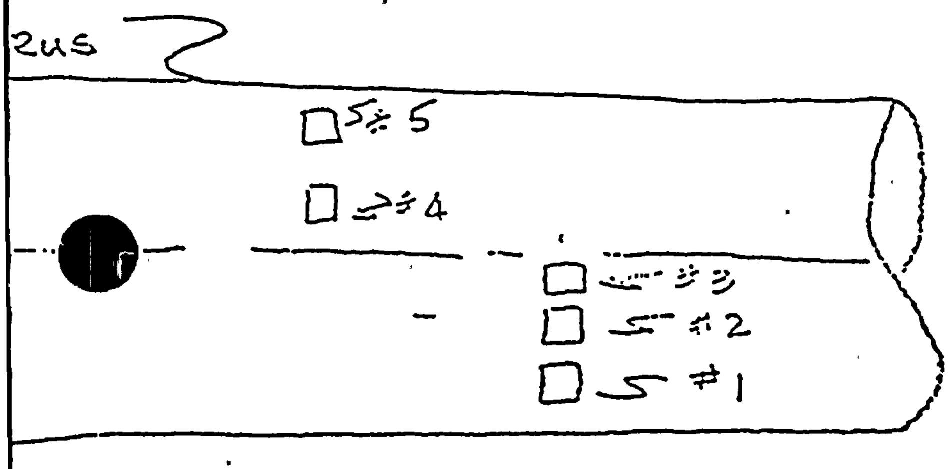
Transducer Size: 1/2" — Frequency: N/A MHz

Transducer Serial No.: KMS-4 — Beam Angle: 0° IIW-2

EXAM AREA #2

	1	2	3	4	5
	.475	.480	.475	.475	.480
	.480	.480	.475	.475	.475
	.475	.475	.475	.475	.480
	.475	.475	.480	.475	.475
	.475	.475	.475	.475	.475
	.475	.480	.480	.475	.475
	.475	.475	.480	.475	.475





* ALL READINGS WERE TAKEN AT INTERSECTION

TORUS DATA SHEET

Vessel NINE MILE POINT Calibration Block No. #121

Procedure No. ISE-QAI-48 Rev. 0 WITH SUPP. Calib. Sheet No. #13

Date 10-15-75

Examiner LINDEMAN ASNT Level II

Data Taker MUIR ASNT Level II

Equipment Data: Instrument Model No. KRAUTKRAMER Shoe No. N/A

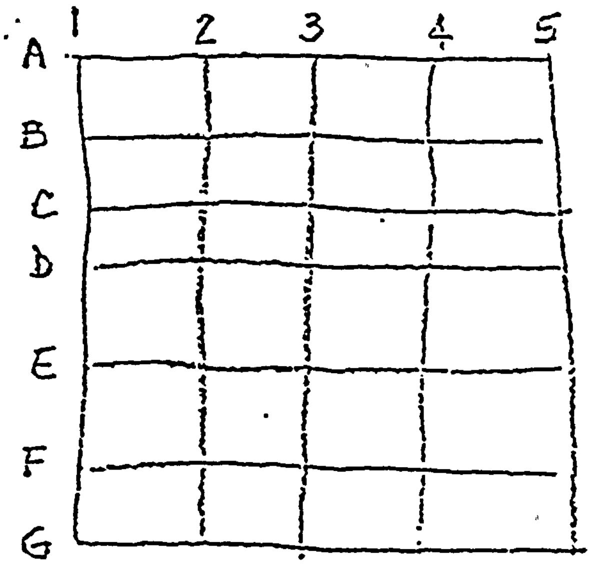
Instrument Serial No. 508 305 Cable No. N/A

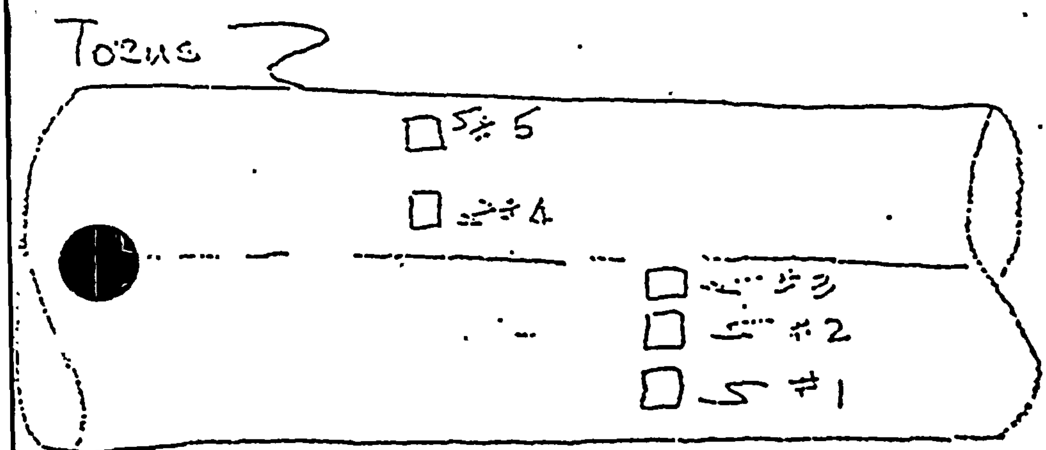
Transducer Size 1/2" Frequency N/A MHz

Transducer Serial No. KMS-4 Beam Angle 0° IIW-2

EXAM AREA #3

		1	2	3	4	5
A		485	.490	.490	.490	.495
B		.490	.490	.490	.490	.490
C		.490	.490	.490	.490	.490
D		.495	.490	.490	.490	.490
E		.490	.490	.490	.490	.490
F		.490	.490	.490	.490	.490
G		.490	.490	.495	.490	.490





* ALL READINGS WERE TAKEN AT INTERSECTION

[illegible]

[illegible]

TORUS DATA SHEET

Vessel NINE MILE POINT Calibration Block No. # 121

Procedure No. ISE-QAI-48 Rev. 0 WITH SUPP. Calib. Sheet No. # 13

Date 10-15-75

Examiner LINDEMAN ASNT Level II

Data Taker MUIR ASNT Level II

Equipment Data: Instrument Model No. KRAUTKRAMER Shoe No. N/A

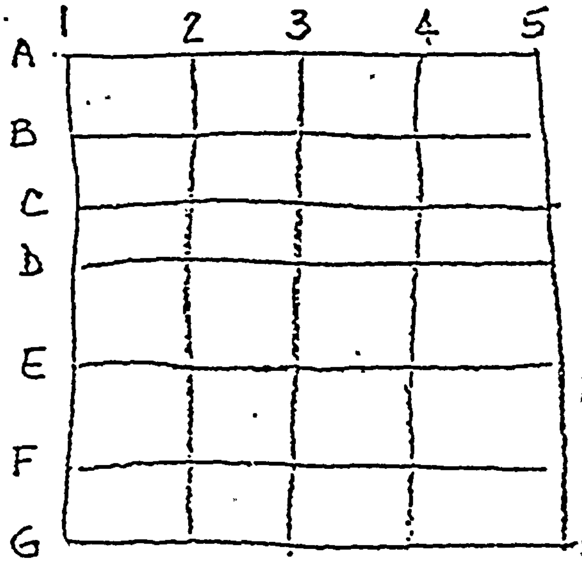
Instrument Serial No. 508 305 Cable No. N/A

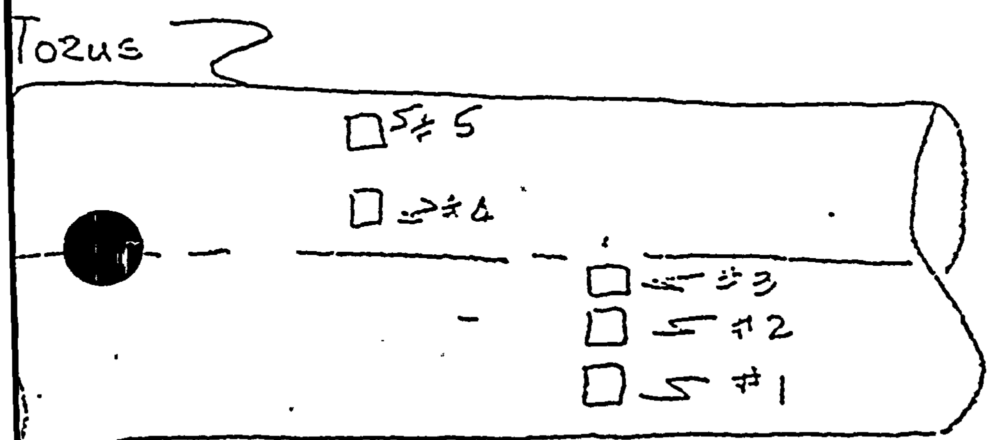
Transducer Size ½" Frequency N/A MHz

Transducer Serial No. KMS-4 Beam Angle 0° IIW-2

EXAM AREA #4

		1	2	3	4	5
A		.490	.485	.495	.495	.495
B		.490	.490	.495	.495	.495
C		.485	.490	.495	.495	.490
D		.490	.495	.495	.495	.490
E		.490	.495	.495	.495	.495
F		.485	.495	.495	.495	.490
G		.485	.495	.490	.490	.490





* ALL READINGS WERE TAKEN AT INTERSECTION

TORUS DATA SHEET

Vessel NINE MILE POINT Calibration Block No. #121

Procedure No. 5E-QAI-48 Rev. 0 WITH SU-P Calib. Sheet No. #13

Date 10-15-75

Examiner LINDSMAN ASNT Level II

Data Taker HUIR ASNT Level II

Equipment Data: Instrument Model No. KRAUTKRAMER Shoe No. N/A

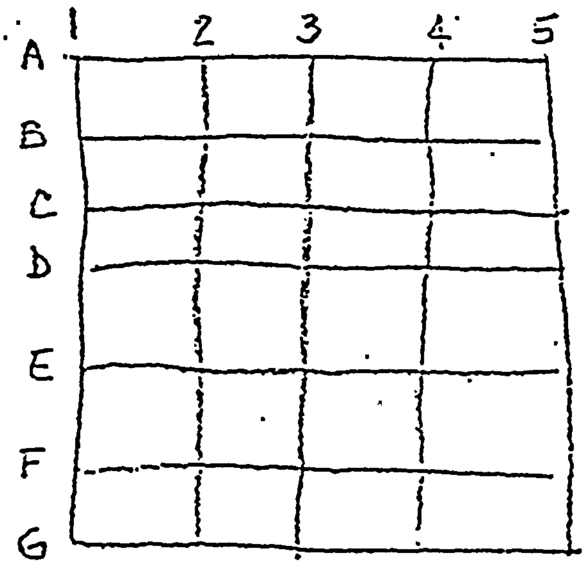
Instrument Serial No. 508305 Cable No. N/A

Transducer Size 1/2" Frequency N/A MHz

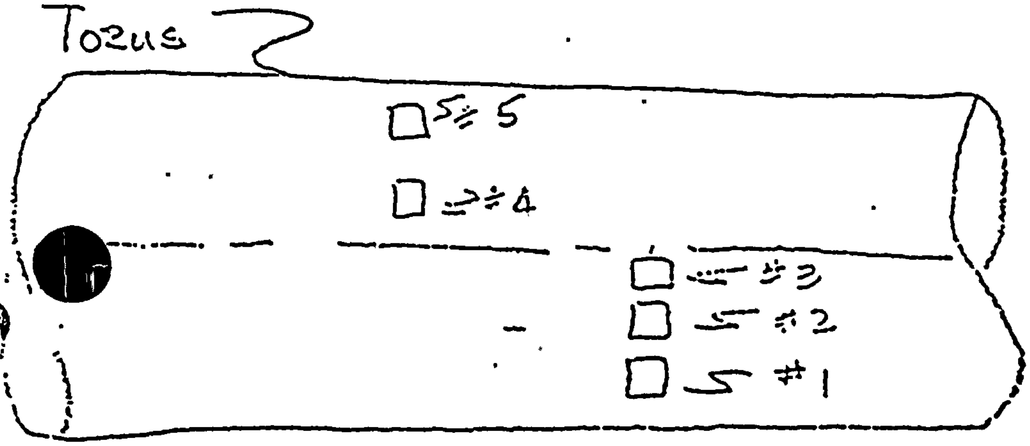
Transducer Serial No. KMS-4 Beam Angle 0° IIW-2

EXAM AREA #5

		1	2	3	4	5
A		.485	.490	.490	.485	.435
B		.485	.485	.485	.435	.485
C		.490	.490	.485	.435	.435
D		.485	.435	.435	.485	.485
E		.490	.485	.485	.435	.480
F		.490	.485	.490	.485	.470
G		.490	.490	.485	.485	.410



TORUS



*ALL READINGS WERE TAKEN AT INTERSECTIONS

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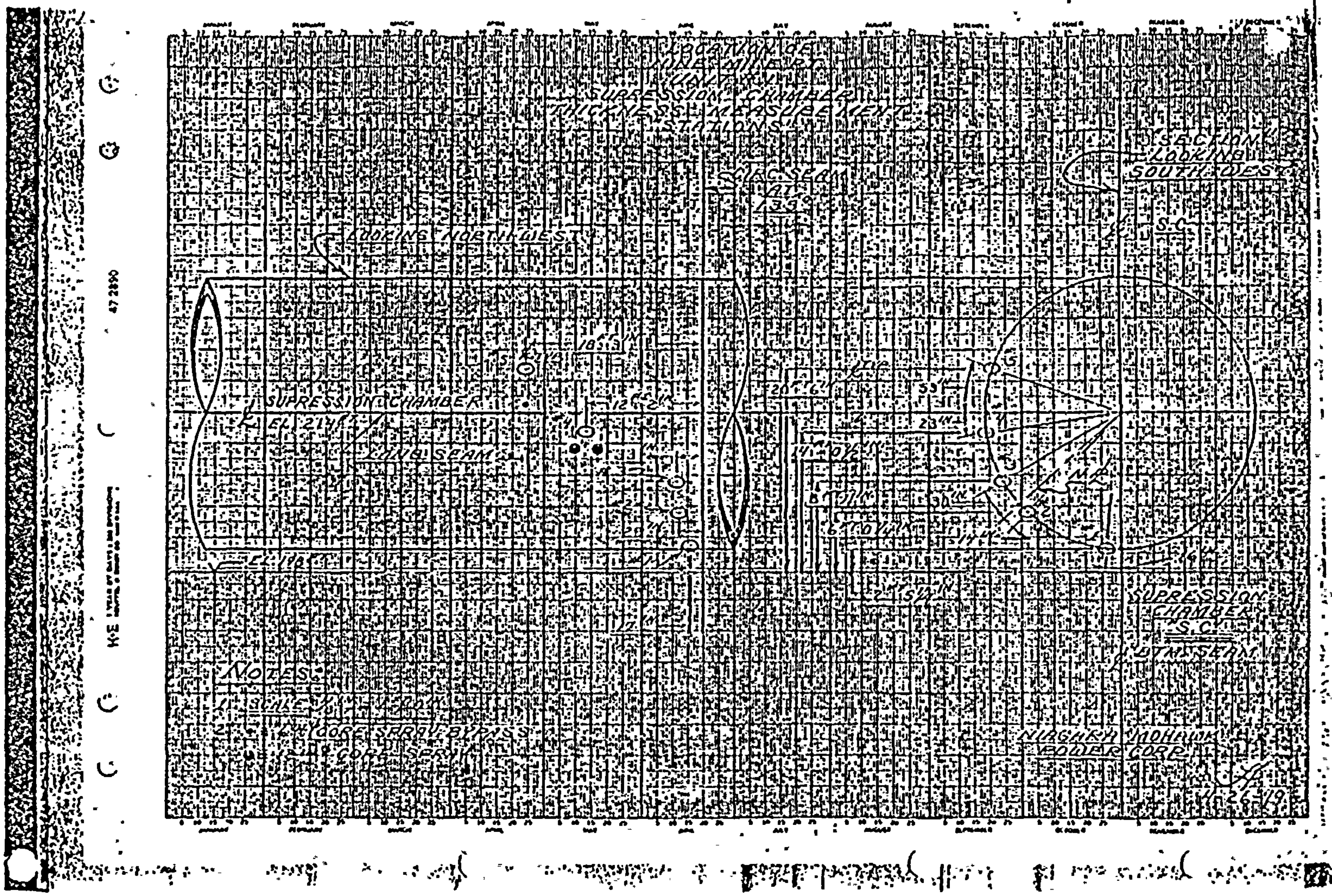

SUPPRESSION CHAMBER
THICKNESS MEASUREMENT
STATIONS
LOOKING NORTHWEST
LOOKING SOUTHWEST
SUPRESSION CHAMBER
LONG. SEAM
SUPRESSION CHAMBER
S.C.
BTM. SEAM
NOTES
NIAGARA MOHAWK
POWER CORP.

ULTRASONIC
THICKNESS
MEASUREMENT

SITE LOCATION NINE MILE POINT UNIT #1

PROCEDURE NO. IST-02 NISCO

AREA OF EXAM. TORUS WALL

DRAWING NO. B-4, B-5

CAL. BLOCK NO. PIF TORUS 1012 2612

EXAM METHOD U.T.

GRID AREA EXAMINED AREA #1

	1	2	3	4	5	6
A	.470"	.470"	.465"	.470"	.470"	
B	.470"	.470"	.475"	.470"	.470"	
C	.468"	.470"	.468"	.470"	.470"	
D	.470"	.470"	.470"	.470"	.470"	
E	.470"	.478"	.470	.475"	.460"	
F	.470"	.465	.465"	.470"	.470"	

EXAMINER(S) SIGNATURE(S) REQD.

Rodney S. Barnes SNT-TC-1A LEVEL II

Arthur Pursaik SNT-TC-1A LEVEL I

DATE 4-15-77 TIME 1230

REVIEWED

ULTRASONIC
THICKNESS
MEASUREMENT

SITE LOCATION Nine Mile Point Unit #1

PROCEDURE NO. ISI-02 Nisco

AREA OF EXAM. Torus Wall

DRAWING NO. B-4-, B-5

CAL. BLOCK NO. PIF Torus 10/2 26/2

EXAM METHOD UT

GRID AREA EXAMINED Area #2

	1	2	3	4	5	6
A	.470"	.465"	.470"	.470"	.470"	
B	.468"	.468"	.470"	.470"	.470"	
C	.470"	.465"	.465"	.465"	.470"	
D	.470"	.470"	.470"	.470"	.470"	
E	.460"	.470"	.470"	.470"	.470"	
F	.470"	.470"	.470"	.470"	.470"	

EXAMINER(S) SIGNATURE(S) REQD.

Rodney S Barnes SNT-TC-1A LEVEL II

Arthur Pieniak SNT-TC-1A LEVEL I

DATE 4-15-77 TIME 1230

REVIEWED

[illegible]

ULTRASONIC THICKNESS MEASUREMENT

SITE LOCATION Nine Mile Point Unit 1

PROCEDURE NO. ISI-02 N.SCO

AREA OF EXAM. Torus Wall

DRAWING NO. B-4, B-5

CAL. BLOCK NO. NMP Torus 10/2 26/2

EXAM METHOD U.T.

GRID AREA EXAMINED Area #3

	1	2	3	4	5	6
A	.470"	.470"	.470"	.470"		
B	.470"	.470"	.470"	.470"		
C	.470"	.470"	.470"	.470"		
D	.470"	.470"	.470"	.470"		
E	.470"	.470"	.470"	.470"		
F	.470"	.470"	.470"	.470"		

EXAMINER(S) SIGNATURE(S) REQD.

Rodney S. Barnes SNT-TC-1A LEVEL II

Arthur Pinsick SNT-TC-1A LEVEL I

DATE 4-15-77 TIME 1230

REVIEWED

ULTRASONIC
THICKNESS
MEASUREMENT

SITE LOCATION Nine Mile Point Unit 1

PROCEDURE NO. ISI-02 NISCO

AREA OF EXAM. Torus Wall

DRAWING NO. B-4, B-5

CAL. BLOCK NO. PIF Torus 10/2 26/2

EXAM METHOD UT

GRID AREA EXAMINED Area #4

	1	2	3	4	5	6
A	.470"	.470"	.470	.470"		
B	.470"	.470"	.470"	.470"		
C	.470"	.470"	.470"	.470"		
D	.470"	.470"	.470"	.470"		
E	.470"	.470"	.470"	.470"		
F	.470"	.470"	.470"	.470"		

EXAMINER(S) SIGNATURE(S) REQD.

Rodney S Barnes SNT-TC-1A LEVEL II

Arthur Piesiak SNT-TC-1A LEVEL I

DATE 4-15-77 TIME 1230

REVIEWED

[illegible]

[illegible]

[illegible]

ULTRASONIC THICKNESS MEASUREMENT

SITE LOCATION Nine Mile Point Unit #1

PROCEDURE NO. ISI-02 NISCO

AREA OF EXAM. Torus Wall

DRAWING NO. B-4, B-5

CAL. BLOCK NO. PIF Torus 10/2 2C/2

EXAM METHOD UT

GRID AREA EXAMINED AREA #5

	1	2	3	4	5	6
A	.470"	.470"	.470"	.470"	.470"	
B	.470"	.470"	.470	.470"	.470"	
C	.470"	.470"	.470"	.470"	.470"	
D	.470"	.470"	.470"	.470"	.470"	
E	.470"	.470	.470"	.470"	.470"	
F	.470"	.470"	.470"	.470	.470"	

EXAMINER(S) SIGNATURE(S) REQD.

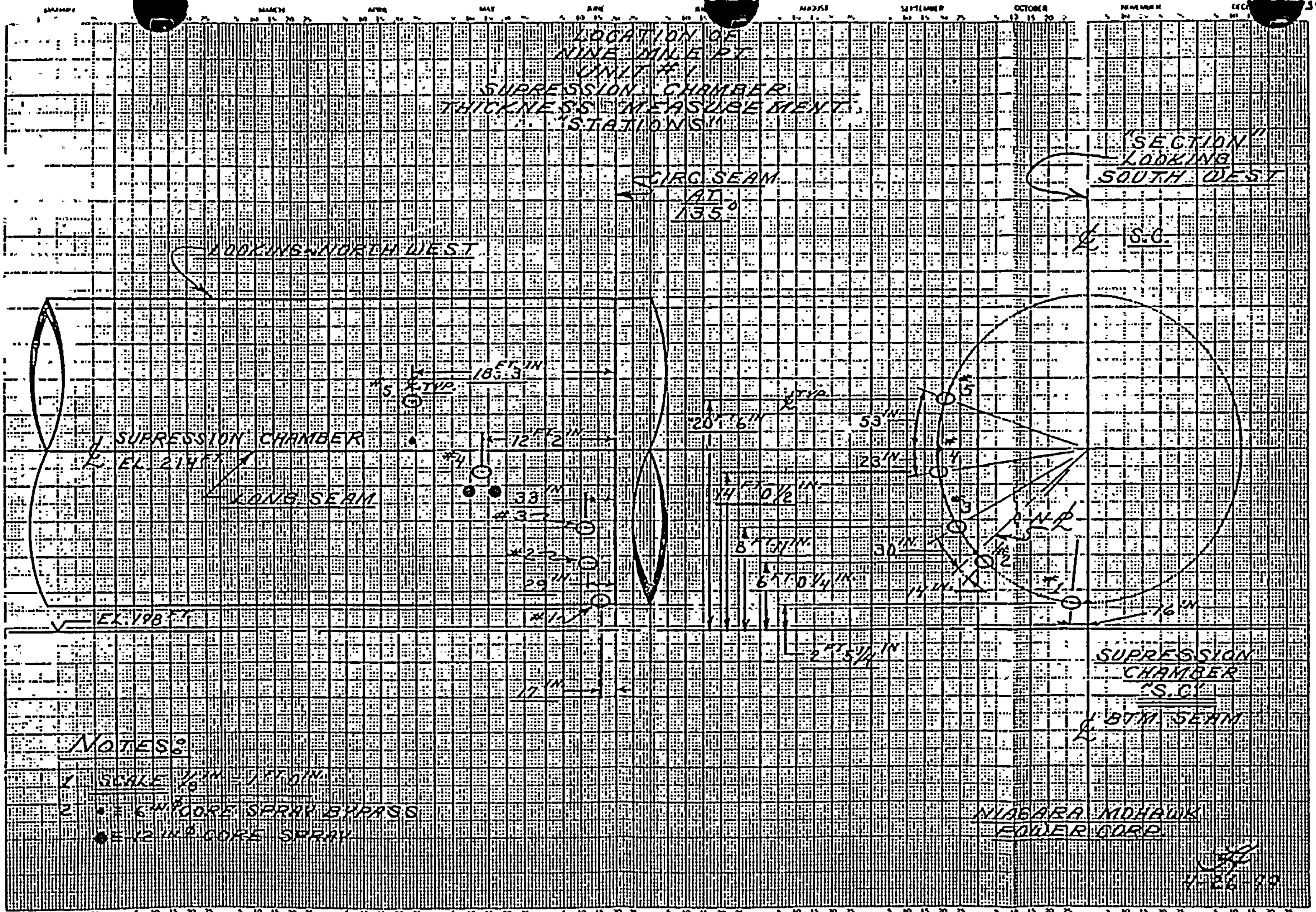
Rodney S. Barnes SNT-TC-1A LEVEL II

Arthur Piesiak SNT-TC-1A LEVEL I

DATE 4-15-77 TIME 1330

REVIEWED

TO REPRODUCE = SELECT ... COPY F... URE ...34-7



2434-1.

F.A. HAWKSLEY
INFO
ONLY

38

ULTRASONIC
THICKNESS
MEASUREMENT

SITE LOCATION NINE MILE POINT UNIT 1

PROCEDURE NO. 40A2434

AREA OF EXAM. TORUS WALL

DRAWING NO. B-4, B-5

CAL. BLOCK NO. PIF -1-.5 NMPC

EXAM METHOD U.T.

GRID AREA EXAMINED AREA #1

	1	2	3	4	5	6
A	-491	-491	-487	-482	-488	-484
B	-482	-486	-480	-482	-479	-485
C	-485	-483	-484	-487	-479	-485
D	-480	-487	-481	-486	-482	-483
E	-487	-482	-460	-485	-488	-482
F	-484	-485	-488	-479	-475	-483

EXAMINER(S) SIGNATURE(S) REQD.

Rodney S. Bomer SNT-TC-1A LEVEL II

Keith A. Dew SNT-TC-1A LEVEL I

DATE 4-9-79 TIME 1715

REVIEWED

ULTRASONIC THICKNESS MEASUREMENT

SITE LOCATION NINE MILE POINT UNIT 1

PROCEDURE NO. SOA2434

AREA OF EXAM. TORUS WALL

DRAWING NO. R-4, R-5

CAL. BLOCK NO. PIF -4--5 NMPC

EXAM METHOD U.T.

GRID AREA EXAMINED AREA #2

	1	2	3	4	5	6
A	-483	-476	-482	-483	-485	-483
B	-481	-486	-483	-486	-481	-486
C	-484	-483	-478	-483	-480	-484
D	-480	-482	-484	-482	-477	-490
E	-487	-493	-482	-481	-485	-485
F	-475	-484	-492	-480	-480	-476

EXAMINER(S) SIGNATURE(S) REQD.

Rodney J. Bonner SNT-TC-1A LEVEL II

Keith A. Dean SNT-TC-1A LEVEL I

DATE 4-9-79 TIME 1715

REVIEWED

2434-3

40

ULTRASONIC
THICKNESS
MEASUREMENT

SITE LOCATION NINE MILE POINT UNIT 1

PROCEDURE NO. 80A2434

AREA OF EXAM. TORUS WALL

DRAWING NO. B-4; B-5

CAL. BLOCK NO. PIF-1--5 NMPC

EXAM METHOD UT

GRID AREA EXAMINED AREA #3

	1	2	3	4	5	6
A	-495	-495	-495	-480	-486	-485
B	-485	-489	-482	-484	-500	-494
C	-492	-487	-483	-483	-488	-490
D	-495	-487	-478	-490	-486	-493
E	-487	-480	-483	-487	-480	-489
F	-490	-487	-480	-486	-483	-484

EXAMINER(S) SIGNATURE(S) REQD.

Rodney S Barnes SNT-TC-1A LEVEL II

Keith A Dean SNT-TC-1A LEVEL I

DATE 4-9-79 TIME 1715

REVIEWED

2434-4.

41

ULTRASONIC
THICKNESS
MEASUREMENT

SITE LOCATION NINE MILE POINT UNIT 1

PROCEDURE NO. 40A2434

AREA OF EXAM. TORUS WALL

DRAWING NO. A-4; A-5

CAL. BLOCK NO. PIF .1-.5 NMPC

EXAM METHOD 4-T-

GRID AREA EXAMINED AREA #4

	1	2	3	4	5	6
A	.491	.483	.495	.498	.487	.490
B	.489	.490	.496	.490	.492	.488
C	.490	.491	.485	.489	.482	.485
D	.487	.478	.480	.489	.486	.486
E	.488	.487	.484	.488	.487	.480
F	.486	.485	.487	.483	.488	.480

EXAMINER(S) SIGNATURE(S) REQD.

Rodney S. Bonner SNT-TC-1A LEVEL II

Keith A. Dew SNT-TC-1A LEVEL I

DATE 4-9-79 TIME 1715

REVIEWED

[illegible]

2434-5 42

ULTRASONIC
THICKNESS
MEASUREMENT

SITE LOCATION NINE MILE POINT UNIT 1

PROCEDURE NO. 40A2434

AREA OF EXAM. TORUS WALL

DRAWING NO. B-4, B-5

CAL. BLOCK NO. PIF -1--5 NMPC

EXAM METHOD U.T.

GRID AREA EXAMINED AREA #5

	1	2	3	4	5	6
A	-485	-487	-483	-483	-497	-498
B	-498	-486	-493	-490	-480	-487
C	-485	-489	-490	-486	-489	-488
D	-490	-489	-488	-492	-485	-489
E	-493	-489	-483	-492	-490	-490
F	-486	-491	-485	-485	-488	-485

EXAMINER(S) SIGNATURE(S) REQD.

Rodney S. Barnes SNT-TC-1A LEVEL II

Heath A. Dean SNT-TC-1A LEVEL I

DATE 4-9-79 TIME 1715

REVIEWED

[illegible]

ULTRASONIC THICKNESS MEASUREMENT

SITE LOCATION NINE MILE POINT UNIT 1

PROCEDURE NO. 80A2434

AREA OF EXAM. TORUS WALL

DRAWING NO. B4, B5

CAL. BLOCK NO. P1F-1-5 NMPC

EXAM METHOD UT

GRID AREA EXAMINED AREA 1

	1	2	3	4	5	6
A	481	480	482	481	470	471
B	479	481	488	484	467	471
C	483	487	486	479	474	467
D	487	489	479	480	474	476
E	483	482	486	482	491	468
F	488	483	486	482	472	467

EXAMINER(S) SIGNATURE(S) REQD..

ARTHUR PENNANEN
Arthur Pennanen SNT-TC-1A LEVEL II

Edmund R Donovan SNT-TC-1A LEVEL I

DATE 3-19-81 TIME 1800

REVIEWED

ULTRASONIC THICKNESS MEASUREMENT

SITE LOCATION NINE MILE POINT UNIT 1

PROCEDURE NO. 80A 2434

AREA OF EXAM. TORUS WALL

DRAWING NO. B4, B5

CAL. BLOCK NO. P1F-1-5 NMPC

EXAM METHOD UT

GRID AREA EXAMINED AREA 2

	1	2	3	4	5	6
A	466	472	468	468	470	485
B	469	470	468	470	469	480
C	473	468	473	471	469	480
D	471	474	478	469	475	480
E	471	474	470	475	475	482
F	473	476	478	475	476	481

EXAMINER(S) SIGNATURE(S) REQD..

ARTHUR PENNAWEN
Arthur Penn[illegible] SNT-TC-1A LEVEL II

Edmund R. Donovan SNT-TC-1A LEVEL I

DATE 3-19-81 TIME 1700

REVIEWED

[illegible]

ULTRASONIC
THICKNESS
MEASUREMENT

SITE LOCATION NINE MILE POINT UNIT 1

PROCEDURE NO. 80A2434

AREA OF EXAM. TORUS WALL

DRAWING NO. B4, B5

CAL. BLOCK NO. P1F-1-5 NMPC

EXAM METHOD UT

GRID AREA EXAMINED AREA 3

	1	2	3	4	5	6
A	479	481	478	483	481	482
B	478	477	479	480	487	478
C	481	482	479	482	485	488
D	484	481	483	483	482	478
E	485	484	485	484	480	483
F	483	490	489	482	478	478

EXAMINER(S) SIGNATURE(S) REQD..

ARTHUR PENNANEN
Arthur Pennanen SNT-TC-1A LEVEL I

Edmund R Dorman SNT-TC-1A LEVEL I

DATE 3-19-81 TIME 1715

REVIEWED

[illegible]

ULTRASONIC
THICKNESS
MEASUREMENT

SITE LOCATION NINE MILE POINT UNIT 1

PROCEDURE NO. 80A2434

AREA OF EXAM. TORUS WALL

DRAWING NO. B4, B5

CAL. BLOCK NO. P1F-1-5 NMPC

EXAM METHOD UT

GRID AREA EXAMINED AREA 4

	1	2	3	4	5	6
A	482	483	487	483	489	489
B	483	481	485	486	482	488
C	479	480	481	475	482	477
D	479	481	479	480	479	483
E	480	483	473	477	477	481
F	475	483	475	475	479	479

EXAMINER(S) SIGNATURE(S) REQD..

ARTHUR PENNANEN
Arthur Pennanen SNT-TC-1A LEVEL II

Edmund R. Donovan SNT-TC-1A LEVEL I

DATE 3-19-81 TIME 1730

REVIEWED

ULTRASONIC THICKNESS MEASUREMENT

SITE LOCATION NINE MILE POINT UNIT 1

PROCEDURE NO. 80A 2434

AREA OF EXAM. TORUS WALL

DRAWING NO. B4, B5

CAL. BLOCK NO. P1F-1-5 NMPC

EXAM METHOD UT

GRID AREA EXAMINED AREA 5

	1	2	3	4	5	6
A	490	488	486	487	488	483
B	485	486	483	483	486	490
C	486	484	488	482	483	479
D	485	483	486	482	487	480
E	484	482	483	482	470	479
F	485	483	483	484	472	479

EXAMINER(S) SIGNATURE(S) REQD..

ARTHUR PENNANEN
Arthur Pennanen — SNT-TC-1A LEVEL II

Edmund R. Iannone — SNT-TC-1A LEVEL I

DATE 3-19-81 TIME 1745

REVIEWED

Information Only

Plant/Unit NMP #1
Comp/System [illegible]
ISO N/A Loop N/A

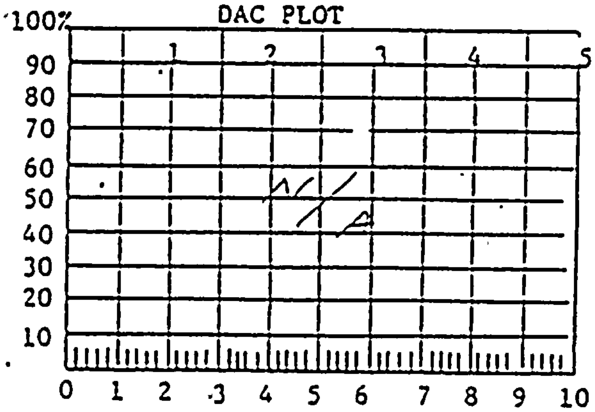
CALIBRATION DATA SHEET

Page 1 of 2
Data Sheet No. 2433-8
Procedure No. 90-2433
Subject: STEAM EROSION
Rev/Change No. 3
Calibration Block No. 1020-CS-9063613
Fabrication No. 17-7100411
Surface OD
Block Temp THERM M23/69 °F
Comp. Temp THERM M23/71 °F
Thickness STEP WEDGE
CRT Calibrated in 1.0 INCHES OF METAL PATH
Each Maj. Screen Div= 0.10"

INSTRUMENT SETTINGS
Mfg/Model No.: KRUSL 32
Serial No. : 211854
Sweep Length : 9.0
Sweep Delay : 760
Pulse Length/Damping: N/A
Freq.: 5.0 Rep. Rate: N/A
Filter: N/A Video: N/A Jack: T&R
DEC/Gate Switch: OFF Range: .5
Mode Select: DUAL Reject: OFF
Gain (coarse): N/A (Fine): N/A
Scan Sensitivity: MAINTAINED 50% BACK REFLECTION

SEARCH UNIT
Scan Angle: 0° Mode: LONG
Fixturing (if any): NONE
Style or Type No. : DUAL GAMMA
Size & Shape: 3/8" ROUND
Frequency : 5.0 MHZ
Serial No/Brand: AEROTECH K61003
Measured Angle : N/A
Cable Type & Length: 2x6' MICRODOT
Couplant Brand: ULTRAGEL II
Couplant Batch: 8433

DAC PLOT



SCAN AREA	
0° WRV	N/A
0° Mat'l	X
= To Weld	N/A
⊥ To Weld	N/A
Calibration	
Axial	N/A
Circ	N/A

INSTR. LINEARITY CAL.

Amplitude

	High	Low		High	Low
1	100	52	5	60	30
2	90	46	6	50	26
3	80	40	7	40	20
4	70	36	8	30	15
				20	10

AMPL. CONTROL LINEARITY

Initial	dB	Result
80	-6	39
80	-12	20
40	+6	81
20	+12	82

EXAMINATION WELD/AREA	Recordable Indications Yes	No	Geom	COMMENTS/REASON FOR INCOMPLETED SCAN (S)
SEE SKETCH	N/A	N/A	N/A	TORUS AREA #2 AND 3

NIAGARA MOHAWK ... OPERATION
N/A REVIEW ... N/A
YES NO

FOR INFORMATION ONLY

CALIBRATION CHECKS	TIME
Initial Cal.	1020
Intermediate	
Intermediate	
Intermediate	
Final Cal.	1140

ADDITIONAL SHEETS Yes ✓ No N/A

EXAMINERS 1 [signature] Date 5-23-94 Level II
2 [signature] Date 5-23-94 Level I

REVIEWERS 1 [signature] Date 5-23-94
2 Date
3 Date

Office Use Only- Leave Blank
ANII REVIEW
SIGNATURE [signature]
DATE: 6/15/94

NES NUCLEAR ENERGY SERVICES, INC.

Data Sheet 1433-3

Grain [illegible] [illegible]
on [illegible] [illegible]
Area #1, 2 and 3

#1	1	2	3	4	5	6
A	48	49	50	49	47	47
B	49	47	50	49	49	49
C	50	47	47	48	49	49
D	51	49	49	49	49	48
E	50	49	49	48	49	49
F	51	49	49	50	50	49

#2	1	2	3	4	5	6
A	51	53	50	49	50	50
B	53	50	49	49	50	50
C	51	50	[illegible]	50	50	50
D	50	51	50	50	51	50
E	50	50	49	50	50	50
F	50	50	49	50	50	50

#3	1	2	3	4	5	6
A	51	49	50	50	50	50
B	51	51	52	50	51	49
C	50	51	50	50	50	49
D	51	50	50	51	50	49
E	50	50	50	50	50	49
F	51	50	51	50	50	49

ANII REVIEW
SIGNATURE [illegible]
DATE [illegible]

Examined [illegible]
Date 5-23-84 Level II

Exam [illegible]
Date 5-23-84 [illegible]

[illegible] 5-23-84

FOR
INFORMATION
ONLY

[illegible] QUALITY CONTROL
N/A REVIEW ACCEPTED N/A
YES NO
Cliff Mots 6/1/84
SIGNATURE & DATE

INFORMATION ONLY

Plant/Unit NMP-1
Comp/System Torus
ISO N/A Loop N/A

CALIBRATION DATA SHEET

Page 1 of 2
Data Sheet No. 2422-7
Procedure No. 80A2433
Subject: Steam Erosion Detection
Rev/Change No. 3
Calibration
Block No. 1020 CS 8CC3613
Fabrication No. 17-76G411
Surface OD
Block Temp m23 69 °F
Comp. Temp m23 71 °F
Thickness Step wedge
CRT Calibrated in 1" of metal path
Each Maj. Screen Div= .1"

INSTRUMENT SETTINGS
Mfg/Model No.: KR1 USL 32
Serial No. : 21564
Sweep Length : 6.77
Sweep Delay : 7.76
Pulse Length/Damping: Fixed
Freq.: 5 Rep. Rate: N/A
Filter: N/A Video: N/A Jack: T/R
DFC/Gate Switch: off Range: 5
Mode Select: Dual Reject: min
Gain (coarse): N/A (fine): N/A
Scan Sensitivity: 32 (maintained 80%)

SEARCH UNIT
Scan Angle: 0 Mode: long
Fixturing (if any): N/A
Style or Type No. Gamma D.E.P.
Size & Shape: 3/8" Round dual
Frequency : 5 MHz
Serial No/Brand: XB1CC9C Aerotech
Measured Angle : N/A
Cable Type & Length: 2 3/4' 115 coax
Couplant Brand: Ultragel II
Couplant Batch: 3439

DAC PLOT

N/A

SCAN AREA	
0° WRV	N/A
0° Mat'l	X
= To Weld	N/A
⊥ To Weld	N/A
Calibration	
Axial	N/A
Circ	N/A

INSTR. LINEARITY CAL.

	Amplitude High	Low		High	Low
1	100	51	5	60	30
2	90	45	6	50	25
3	80	40	7	40	19
4	70	35	8	30	15
				20	10

AMPL. CONTROL LINEARITY

Initial	dB	Result
80	-6	40
80	-12	19
40	+6	82
20	+12	84

EXAMINATION WELD/AREA	Recordable Indications Yes	No	Geom	COMMENTS/REASON FOR INCOMPLETED SCAN (S)
See Sketch	N/A	N/A	N/A	Torus Areas 1 – 5

FOR INFORMATION ONLY

NIAGARA MOHAWK POWER CORPORATION
N/A ... N/A
YES NO
Cliff Moss 6/1/84
SIGNATURE & DATE

CALIBRATION CHECKS	TIME
Initial Cal.	1015
Intermediate	—
Intermediate	—
Intermediate	—
Final Cal.	1145

EXAMINERS 1 [signature] Date 5/23/84 Level II
2 Paul Snook Date 5/23/84 Level I

ADDITIONAL SHEETS Yes ✓ No N/A

REVIEWERS 1 [signature] Date 5-23-84
2 Date
3 Date

Office Use Only- Leave Blank
ANII REVIEW
SIGNATURE [signature]
DATE: 6/15/84

NES NUCLEAR ENERGY SERVICES, INC.

PAGE 2 OF 2

DATE 5-23-84

DATA SHEET 2433

STEAM EROSION EXAM OF TORUS WALL

AREAS 4 + 5

#4

	1	2	3	4	5	6
A	.49"	.48"	.49"	.49"	.48"	.49"
B	.49	.49"	.49"	.49	.49"	.48"
C	.49"	.49"	.48"	.48	.48	.48
D	.48"	.48"	.48"	.49"	.48"	.48"
E	.48"	.48"	.48"	.48"	.48"	.48"
F	.48"	.48"	.48"	.48"	.49"	.48"

#5

	1	2	3	4	5	6
A	.51	.51	.50"	.51"	.51	.50"
B	.49"	.52"	.51"	.50"	.50"	.49"
C	.50"	.50"	.50	.51	.51	.50
D	.50"	.49"	.49"	.49"	.49"	.48"
E	.49"	.51"	.50"	.50"	.50"	.51"
F	.49"	.51"	.51"	.50"	.49"	.49"

LII

5-23-84

BEST COPY

ENCLOSED COPY

PLANT/UNIT NMP1
COMP/SYSTEM TORUS
ID N/A LOOP N/A

1986 OUTAGE CALIBRATION DATA SHEET YEAR 10

PAGE 1 OF 22
DATA SHEET NO. 2434-1
PROCEDURE NO. 80A2434
SUBJECT UT THICKNESS
REV./CHANGE NO. 3/NA

INSTRUMENT SETTING

MFG/MODEL NO.: KBI-USK-7
SERIAL NO.: 27276-807
SWEEP LENGTH: 8.34
SWEEP DELAY: 7.60
PULSE LENGTH/DAMPING: REJL
FREQ.: FIXED REP.RATE: FIXED
FILTER: NA VIDEO: NA
JACK: R DEC/GATE: OFF
RANGE: .5 MODE SELECT: SINGLE
REJECT: MIN
GAIN(COARSE): 0 (FINE): 14
SCAN SENSITIVITY: MAINTAINED 80% BACK REFLECTION

SEARCH UNIT

SCAN ANGLE: 0° MODE: LONG
FIXTURING (if any): NA
STYLE or TYPE NO.: GAMMA
SIZE and SHAPE: .5" ROUND
FREQUENCY: 2.25 MHZ
SERIAL NO/BRAND: C26146/KB AEROTECH
MEASURED ANGLE: NA
CABLE TYPE & LENGTH: BNC to BNC 1x6'
COUPLANT BRAND: ULTRAGEL II
COUPLANT BATCH: 8557

CALIBRATION BLOCK

BLOCK NO.: 80C3613
FAB. NO.: NA
SURFACE: OD
BLOCK TEMP.: A85-11 68° F
COMPONENT TEMP.: A85-11 62° F
BLK. THICKNESS .105" to 1.006"
COMPONENT THICKNESS: .48"

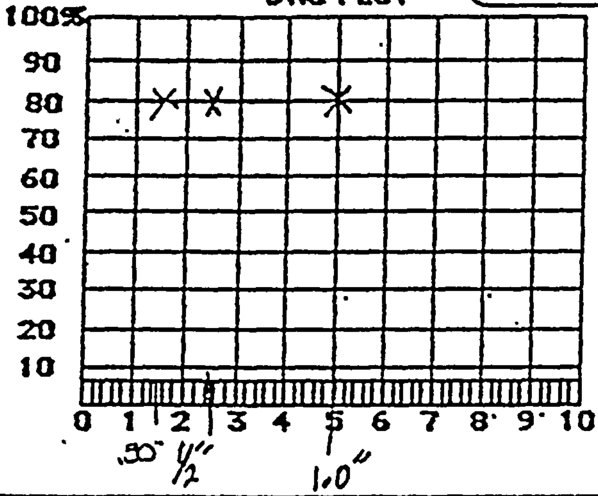
CRT CALIBRATED IN 2.0" OF DEPTH
EACH MAJOR SCREEN DIV. = .20"

INSTRUMENT LINEARITY CAL.

AMPLITUDE

	HIGH	LOW		HIGH	LOW
1	100	50	5	60	30
2	90	45	6	50	25
3	80	40	7	40	20
4	70	35	8	30	15
			9	20	8

DAC PLOT



SCAN AREA

0 WRV	N/A
0 Mat'l	N/A
‖ to WELD	N/A
⊥ to WELD	N/A
CALIBRATION	
AXIAL	N/A
CIRC	N/A

AMPLITUDE CONTROL LINEARITY

INITIAL	dB	RESULT
80	-6	42
80	-12	21
40	+6	78
20	+12	78

CALIBRATION CHECKS

CALIBRATION CHECKS	TIME
INITIAL CALIBRATION	0948
INTERMEDIATE	NA
INTERMEDIATE	NA
INTERMEDIATE	NA
FINAL CALIBRATION	1300

EXAMINATION WELD AREA	RECORDABLE INDICATIONS YES	NO	GEOM	COMMENTS/REASON FOR INCOMPLETED SCANS
TORUS	N/A	N/A	N/A	THICKNESS MEASUREMENTS
				SEE PG 22 of 22 FOR SKETCH

NIAGARA MOHAWK POWER CORPORATION
QUALITY CONTROL
☒ REVIEW ACCEPTED N/A
5/2/86
SIGNATURE & DATE LVL III

ADDITIONAL SHEETS

CONTINUATION N/A BEAM PLOT N/A
SUPPLEMENTS ☒ NONE N/A

WELDS ACCEPTABLE YES N/A NO N/A

EXAMINER 1 [signature] LEVEL II DATE 4-16-86
EXAMINER 2 [signature] LEVEL II DATE 4-16-86
REVIEWER 1 Edmund R. Donovan LEVEL II DATE 4-30-86
REVIEWER 2 ______ LEVEL ______ DATE ______
REVIEWER 3 ______ LEVEL ______ DATE ______

C DISPOSITON
REQUIRED
N/A YES N/A NO
ANII REVIEW
SIGNATURE [signature]

NES NUCLEAR ENERGY SERVICES, INC

TORUS ULTRASONIC THICKNESS MEASUREMENT

DATA SHEET 2434-1
PAGE 2 OF 22

SITE LOCATION NMP1
PROCEDURE NO. 80A2434
AREA OF EXAM See Attached Sketch
DRAWING NO. N/A
CAL. BLOCK NO. Stepwedge #80C3613
EXAM METHOD UT
GRID AREA EXAMINED #1

NIAGARA MOHAWK POWER CORPORATION
QUALITY CONTROL REVIEW ACCEPTED
[X] YES N/A NO
5/2/86
SIGNATURE & DATE UT-III

	1	2	3	4	5	6
A	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"
B	MAX= .48 MIN= .46"	MAX= .48" MIN= .46	MAX= .48" MIN= .46"	MAX= .48" MIN= .46	MAX= .48" MIN= .46"	MAX= .48 MIN= .46"
C	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"
D	MAX= .48" MIN= .46"	MAX= .48" MIN= .46	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"
E	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .48"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"
F	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"

EXAMINER [signature] LEVEL II DATE 4-16-86
EXAMINER [signature] LEVEL II DATE 4-16-86
REVIEWER Edmund R Donovan LEVEL II DATE 4-30-86
REVIEWER LEVEL DATE
REVIEWER LEVEL DATE

ANII REVIEW
SIGNATURE [signature]
DATE

RHB

TORUS ULTRASONIC THICKNESS MEASUREMENT

DATA SHEET 2434-1
PAGE 3 OF 22

SITE LOCATION NMP1
PROCEDURE NO. 80A2434
AREA OF EXAM See Attached Sketch
DRAWING NO. N/A
CAL. BLOCK NO. Stepwedge #80C3613
EXAM METHOD UT
GRID AREA EXAMINED #1

NIAGARA MOHAWK POWER CORPORATION
QUALITY CONTROL REVIEW ACCEPTED
☒ YES ☐ NO N/A
5/2/86
SIGNATURE & DATE UT-III

	7	8	9	10	11	12
A	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"
B	MAX= .48" MIN= .46"	MAX= .48" MIN= .48"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .48"
C	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"
D	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .44"	MAX= .48" MIN= .44"	MAX= .48" MIN= .44"	MAX= .48" MIN= .44"
E	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"
F	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"

EXAMINER [signature] LEVEL II DATE 4-16-86
EXAMINER [signature] LEVEL II DATE 4-16-86
REVIEWER Edmund R. Donovan LEVEL II DATE 4-30-86
REVIEWER ______ LEVEL ____ DATE ______
REVIEWER ______ LEVEL ____ DATE ______

ANII REVIEW
SIGNATURE [signature]

TORUS ULTRASONIC THICKNESS MEASUREMENT

DATA SHEET 2434-1
PAGE 4 OF 22

SITE LOCATION NMP1

PROCEDURE NO. 80A2434

AREA OF EXAM See Attached Sketch

DRAWING NO. N/A

CAL. BLOCK NO. Stepwedge #80C3613

EXAM METHOD UT

GRID AREA EXAMINED #1

NIAGARA MOHAWK POWER CORPORATION
QUALITY CONTROL REVIEW ACCEPTED
YES [X] NO N/A
5/2/86 UT-III
SIGNATURE & DATE

	1	2	3	4	5	6
G	MAX= .48" MIN= .46"	MAX= .48" MIN= .46	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"
H	MAX= .48" MIN= .44"	MAX= .48" MIN= .44"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"
I	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .46" MIN= .46"
J	MAX= .46" MIN= .44"	MAX= .46" MIN= .44"	MAX= .46" MIN= .44"	MAX= .46" MIN= .44"	MAX= .46" MIN= .44"	MAX= .46" MIN= .44"
K	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"
L	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"

EXAMINER [signature] LEVEL II DATE 4-16-86

EXAMINER [signature] LEVEL II DATE 4-16-86

REVIEWER Edmund F. Dineen LEVEL II DATE 4-30-86

REVIEWER ______ LEVEL ______ DATE ______

REVIEWER ______ LEVEL ______ DATE ______

~~ANII REVIEW~~
SIGNATURE [signature]
DATE: 5-2-86

TORUS ULTRASONIC THICKNESS MEASUREMENT

DATA SHEET 2434-1
PAGE 5 OF 22

SITE LOCATION NMP1
PROCEDURE NO. 80A2434
AREA OF EXAM See Attached Sketch
DRAWING NO. N/A
CAL. BLOCK NO. Stepwedge #80C3613
EXAM METHOD UT
GRID AREA EXAMINED #1

NIAGARA MOHAWK POWER CORPORATION
QUALITY CONTROL REVIEW ACCEPTED
X YES N/A NO
Cliff Moss 5/2/86
SIGNATURE & DATE UT-III

	7	8	9	10	11	12
G	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"
H	MAX= .48" MIN= .46"	MAX= .48" MIN= .44"	MAX= .48 MIN= .46"	MAX= .48" MIN= .44"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"
I	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"
J	MAX= .46" MIN= .44"	MAX= .46" MIN= .44"	MAX= .46" MIN= .44"	MAX= .46" MIN= .44"	MAX= .46" MIN= .44"	MAX= .46" MIN= .44"
K	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"
L	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"

EXAMINER [signature] LEVEL II DATE 4.16.86
EXAMINER [signature] LEVEL II DATE 4.16.86
REVIEWER Edward E. Donovan LEVEL II DATE 4-30-86
REVIEWER ______ LEVEL ____ DATE ______
REVIEWER ______ LEVEL ____ DATE ______

ANII REVIEW
SIGNATURE [signature]
DATE

TORUS ULTRASONIC THICKNESS MEASUREMENT

DATA SHEET 2434-1
PAGE 6 OF 22

SITE LOCATION NMP1
PROCEDURE NO. 80A2434
AREA OF EXAM See Attached Sketch
DRAWING NO. N/A
CAL. BLOCK NO. Stepwedge #80C3613
EXAM METHOD UT
GRID AREA EXAMINED #2

QUALITY CONTROL REVIEW ACCEPTED
X YES
N/A NO
5/2/86
SIGNATURE & DATE UT-III

	1	2	3	4	5	6
A	MAX= .48" MIN= .46"	MAX= .46" MIN= .46"	MAX= .48" MIN= .48"	MAX= .46" MIN= .46"	MAX= .48" MIN= .48"	MAX= .46" MIN= .46"
B	MAX= .46" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48 MIN= .46"	MAX= .48" MIN= .46"	MAX= .48 MIN= .46"	MAX= .48" MIN= .46"
C	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48 MIN= .46"	MAX= .49" MIN= .46"
D	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .44"	MAX= .48" MIN= .44"	MAX= .49" MIN= .46"	MAX= .49" MIN= .46"
E	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .49" MIN= .46"
F	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .49" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"

EXAMINER [signature] LEVEL II DATE 4-16-86
EXAMINER [signature] LEVEL II DATE 4-16-86
REVIEWER Edmund [signature] LEVEL II DATE 4-30-86
REVIEWER LEVEL DATE
REVIEWER LEVEL DATE

ANII REVIEW
SIGNATURE [signature]

[illegible]

[illegible]

TORUS ULTRASONIC THICKNESS MEASUREMENT

DATA SHEET 2434-1
PAGE 2 OF 22

SITE LOCATION NMP1
PROCEDURE NO. 80A2434
AREA OF EXAM See Attached Sketch
DRAWING NO. N/A
CAL. BLOCK NO. Stepwedge #80C3613
EXAM METHOD UT
GRID AREA EXAMINED #2

NIAGARA MOHAWK POWER CORPORATION QUALITY CONTROL REVIEW ACCEPTED YES [X] NO [N/A]
SIGNATURE & DATE 5/2/86 UT III

	7	8	9	10	11	12
A	MAX= .46" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"
B	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"
C	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"
D	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"
E	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"
F	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"

EXAMINER [signature] LEVEL II DATE 4-16-86
EXAMINER [signature] LEVEL II DATE 4-16-86
REVIEWER Edmund F. Donovan LEVEL II DATE 4-30-86
REVIEWER LEVEL DATE
REVIEWER LEVEL DATE

ANII REVIEW
SIGNATURE

TORUS ULTRASONIC THICKNESS MEASUREMENT

DATA SHEET 2434-1
PAGE 8 OF 22

SITE LOCATION NMP1
PROCEDURE NO. 80A2434
AREA OF EXAM See Attached Sketch
DRAWING NO. N/A
CAL. BLOCK NO. Stepwedge #80C3613
EXAM METHOD UT
GRID AREA EXAMINED #2

NIAGARA MOHAWK POWER CORPORATION
QUALITY CONTROL REVIEW ACCEPTED
☒ YES N/A NO
SIGNATURE & DATE 5/2/86 UT-III

	1	2	3	4	5	6
G	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"
H	MAX= .48" MIN= .46"	MAX= .48" MIN= .44"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"
I	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"
J	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"
K	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"
L	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"

EXAMINER [signature] LEVEL II DATE 4-16-86
EXAMINER [signature] LEVEL II DATE 4-16-86
REVIEWER Edmund L. Donovan LEVEL II DATE 4-30-86
REVIEWER ______ LEVEL ______ DATE ______
REVIEWER ______ LEVEL ______ DATE ______

ANII REVIEW SIGNATURE [signature]

TORUS ULTRASONIC THICKNESS MEASUREMENT

DATA SHEET 2434-1
PAGE 9 OF 22

SITE LOCATION NMP1
PROCEDURE NO. 80A2434
AREA OF EXAM See Attached Sketch
DRAWING NO. N/A
CAL. BLOCK NO. Stepwedge #80C3613
EXAM METHOD UT
GRID AREA EXAMINED #2

NIAGARA MOHAWK POWER CORPORATION
QUALITY CONTROL REVIEW ACCEPTED
YES X NO N/A
SIGNATURE & DATE [signature] 5/2/86 UT-III

	7	8	9	10	11	12
G	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"
H	MAX= .48" MIN= .44"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"
I	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"
J	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .44"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"
K	MAX= .48" MIN= .46"	MAX= .48 MIN= .46	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"
L	MAX= .48 MIN= .46	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"

EXAMINER [signature] LEVEL II DATE 4.16.86
EXAMINER [signature] LEVEL II DATE 4.16.86
REVIEWER Edmund R Donovan LEVEL II DATE 4-30-86
REVIEWER ______ LEVEL ______ DATE ______
REVIEWER ______ LEVEL ______ DATE ______

ANII REVIEW
SIGNATURE [signature]

TORUS ULTRASONIC THICKNESS MEASUREMENT

DATA SHEET 2434-1
PAGE 10 OF 22

SITE LOCATION NMP1
PROCEDURE NO. 80A2434
AREA OF EXAM See Attached Sketch
DRAWING NO. N/A
CAL. BLOCK NO. Stepwedge #80C3613
EXAM METHOD UT
GRID AREA EXAMINED #3

NIAGARA MOHAWK POWER CORPORATION
QUALITY CONTROL REVIEW ACCEPTED
YES [X] NO [N/A]
SIGNATURE & DATE 5/2/86 UT-III

	1	2	3	4	5	6
G	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"
H	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"
I	MAX= .48" MIN= .46"	MAX= .48" MIN= .48"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"
J	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"
K	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"
L	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .46" MIN= .46"

EXAMINER [signature] LEVEL II DATE 4.16.86
EXAMINER [signature] LEVEL II DATE 4.16.86
REVIEWER Edmund P. Donovan LEVEL II DATE 4-30-86
REVIEWER ______ LEVEL ____ DATE ______
REVIEWER ______ LEVEL ____ DATE ______

ANII REVIEW
SIGNATURE [signature]

TORUS ULTRASONIC THICKNESS MEASUREMENT

DATA SHEET 2434-1
PAGE 11 OF 22

SITE LOCATION NMP1
PROCEDURE NO. 80A2434
AREA OF EXAM See Attached Sketch
DRAWING NO. N/A
CAL. BLOCK NO. Stepwedge #80C3613
EXAM METHOD UT
GRID AREA EXAMINED #3

NIAGARA MOHAWK POWER CORPORATION
QUALITY CONTROL REVIEW ACCEPTED
YES [X] NO N/A
SIGNATURE & DATE 5/2/86 UT-III

	7	8	9	10	11	12
G	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"
H	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"
I	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"
J	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"
K	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"
L	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"

EXAMINER [signature] LEVEL II DATE 4.16.86
EXAMINER [signature] LEVEL II DATE 4.16.86
REVIEWER Edmund R Donovan LEVEL II DATE 4-30-86
REVIEWER LEVEL DATE
REVIEWER LEVEL DATE

ANII REVIEW
SIGNATURE [signature]

TORUS ULTRASONIC THICKNESS MEASUREMENT

DATA SHEET 2434-1
PAGE 12 OF 22

SITE LOCATION NMPI
PROCEDURE NO. 80A2434
AREA OF EXAM See Attached Sketch
DRAWING NO. N/A
CAL. BLOCK NO. Stepwedge #80C3613
EXAM METHOD UT
GRID AREA EXAMINED #3

NIAGARA MOHAWK POWER CORPORATION
QUALITY CONTROL REVIEW ACCEPTED
X YES N/A NO
Cliff Moss 5/2/86
SIGNATURE & DATE UT-III

	1	2	3	4	5	6
A	MAX= .48" MIN= .44"	MAX= .48" MIN= .44"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .48"	MAX= .48" MIN= .46"
B	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"
C	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"
D	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"
E	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .47" MIN= .46"
F	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .47" MIN= .46"

EXAMINER [signature] LEVEL II DATE 4-16-86
EXAMINER [signature] LEVEL II DATE 4-16-86
REVIEWER Edmund R Donovan LEVEL II DATE 4-30-86
REVIEWER LEVEL DATE
REVIEWER LEVEL DATE

ANII REVIEW
SIGNATURE [signature]

TORUS ULTRASONIC THICKNESS MEASUREMENT

DATA SHEET 2434-1
PAGE 13 OF 22

SITE LOCATION NMP1

PROCEDURE NO. 80A2434

AREA OF EXAM See Attached Sketch

DRAWING NO. N/A

CAL. BLOCK NO. Stepwedge #80C3613

EXAM METHOD UT

GRID AREA EXAMINED #3

NIAGARA MOHAWK POWER CORPORATION
QUALITY CONTROL REVIEW ACCEPTED
YES ☒ NO N/A
SIGNATURE & DATE 5/1/86 UT-III

	7	8	9	10	11	12
A	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"
B	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"
C	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"
D	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"
E	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"
F	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"

EXAMINER [signature] LEVEL II DATE 4-16-86
EXAMINER [signature] LEVEL II DATE 4-16-86
REVIEWER Edmund R. Donovan LEVEL II DATE 4-30-86
REVIEWER ______ LEVEL ______ DATE ______
REVIEWER ______ LEVEL ______ DATE ______

ANII REVIEW
SIGNATURE [signature]

(2)

TORUS ULTRASONIC THICKNESS MEASUREMENT

DATA SHEET 2434-1
PAGE 14 OF 22

SITE LOCATION NMP1

PROCEDURE NO. 80A2434

AREA OF EXAM See Attached Sketch

DRAWING NO. N/A

CAL. BLOCK NO. Stepwedge #80C3613

EXAM METHOD UT

GRID AREA EXAMINED #4

NIAGARA MOHAWK POWER CORPORATION
QUALITY CONTROL REVIEW ACCEPTED
☒ YES N/A NO
[signature] 5/2/86
SIGNATURE & DATE UT-III

	1	2	3	4	5	6
A	MAX= MIN= .48"	MAX= MIN= .48"	MAX= MIN= .48"	MAX= MIN= .48"	MAX= MIN= .48"	MAX= MIN= .48"
B	MAX= MIN= .48"	MAX= MIN= .48"	MAX= MIN= .48"	MAX= MIN= .48"	MAX= MIN= .48"	MAX= MIN= .48"
C	MAX= MIN= .48"	MAX= MIN= .48"	MAX= MIN= .48"	MAX= MIN= .48"	MAX= MIN= .48"	MAX= MIN= .48"
D	MAX= MIN= .48"	MAX= MIN= .48"	MAX= MIN= .48"	MAX= MIN= .48"	MAX= MIN= .48"	MAX= MIN= .48"
E	MAX= MIN= .48"	MAX= MIN= .48"	MAX= MIN= .48"	MAX= MIN= .48"	MAX= MIN= .48"	MAX= MIN= .48"
F	MAX= MIN= .48"	MAX= MIN= .48"	MAX= MIN= .48"	MAX= MIN= .48"	MAX= MIN= .48"	MAX= MIN= .48"

EXAMINER [signature] LEVEL II DATE 4-16-86
EXAMINER [signature] LEVEL II DATE 4-16-86
REVIEWER Edmund R Donovan LEVEL II DATE 4-30-86
REVIEWER ______ LEVEL ______ DATE ______
REVIEWER ______ LEVEL ______ DATE ______

ANII REVIEW
SIGNATURE [signature]
DATE: 5-7-87

TORUS ULTRASONIC THICKNESS MEASUREMENT

DATA SHEET 2434-1
PAGE 15 OF 22

SITE LOCATION UMPI
PROCEDURE NO. 80A2434
AREA OF EXAM See Attached Sketch
DRAWING NO. N/A
CAL. BLOCK NO. Stepwedge #80C3613
EXAM METHOD UT
GRID AREA EXAMINED #4

QUALITY CONTROL REVIEW ACCEPTED
☒ YES N/A NO
[signature] 5/2/86
SIGNATURE & DATE UT-III

	7	8	9	10	11	12
A	MAX= .48" MIN= .48"	MAX= MIN= .48"	MAX= MIN= .48"	MAX= MIN= .48	MAX= MIN= .48	MAX= MIN= .48"
B	MAX= MIN= .48	MAX= MIN= .48"	MAX= MIN= .48"	MAX= MIN= .48"	MAX= MIN= .48"	MAX= MIN= .48"
C	MAX= MIN= .48"	MAX= MIN= .48"	MAX= MIN= .48"	MAX= MIN= .48"	MAX= MIN= .48"	MAX= MIN= .48"
D	MAX= MIN= .48"	MAX= MIN= .48"	MAX= MIN= .48"	MAX= MIN= .48"	MAX= MIN= .48"	MAX= MIN= .48"
E	MAX= MIN= .48"	MAX= MIN= .48"	MAX= MIN= .48"	MAX= MIN= .48"	MAX= MIN= .48"	MAX= MIN= .48"
F	MAX= MIN= .48"	MAX= MIN= .48"	MAX= MIN= .48"	MAX= MIN= .48"	MAX= MIN= .48"	MAX= MIN= .48"

EXAMINER [signature] LEVEL II DATE 4-16-86
EXAMINER [signature] LEVEL Ib DATE 4-16-86
REVIEWER Edmund P. Donovan LEVEL II DATE 4-30-86
REVIEWER LEVEL DATE
REVIEWER LEVEL DATE

ANII REVIEW
SIGNATURE [signature]

TORUS ULTRASONIC THICKNESS MEASUREMENT

DATA SHEET 2434-1
PAGE 16 OF 22

SITE LOCATION NMP1
PROCEDURE NO. 80A2434
AREA OF EXAM See Attached Sketch
DRAWING NO. N/A
CAL. BLOCK NO. Stepwedge #80C3613
EXAM METHOD UT
GRID AREA EXAMINED #4

NIAGARA MOHAWK POWER CORPORATION
QUALITY CONTROL REVIEW ACCEPTED
☒ YES N/A NO
Cliff Miss 5/2/86
SIGNATURE & DATE UT-III

	1	2	3	4	5	6
G	MAX= .48" MIN= .48"	MAX= .48" MIN= .48	MAX= .48" MIN= .48"	MAX= .48 MIN= .48	MAX= .48 MIN= .48"	MAX= .48" MIN= .48"
H	MAX= .48" MIN= .48"	MAX= .48" MIN= .48	MAX= .48" MIN= .48"	MAX= .48 MIN= .48"	MAX= .48" MIN= .48"	MAX= .48" MIN= .48
I	MAX= .48" MIN= .48"	MAX= .48 MIN= .48	MAX= .48 MIN= .48	MAX= .48" MIN= .48	MAX= .48 MIN= .48	MAX= .48 MIN= .48
J	MAX= .48" MIN= .48"	MAX= .48" MIN= .48	MAX= .48 MIN= .48	MAX= .48" MIN= .48"	MAX= .48" MIN= .48	MAX= .48 MIN= .48
K	MAX= 48" MIN= .46"	MAX= .47" MIN= .46	MAX= .48 MIN= .46"	MAX= .47" MIN= .46	MAX= .48" MIN= .46"	MAX= .48" MIN= .46
L	MAX= .48" MIN= .46	MAX= .48 MIN= .46"	MAX= .48" MIN= .46	MAX= .48" MIN= .46"	MAX= .48" MIN= .46	MAX= .48 MIN= .46"

EXAMINER [signature] LEVEL II DATE 4-16-86
EXAMINER [signature] LEVEL II DATE 4-16-86
REVIEWER Edmund P. Donovan LEVEL II DATE 4-30-86
REVIEWER ______ LEVEL ______ DATE ______
REVIEWER ______ LEVEL ______ DATE ______

ANII REVIEW
SIGNATURE [signature]
DATE:

[illegible]

TORUS ULTRASONIC THICKNESS MEASUREMENT

DATA SHEET 2434-1
PAGE 17 OF 22

SITE LOCATION NMP1
PROCEDURE NO. 80A2434
AREA OF EXAM See Attached Sketch
DRAWING NO. N/A
CAL. BLOCK NO. Stepwedge #80C3613
EXAM METHOD UT
GRID AREA EXAMINED #4

NIAGARA MOHAWK POWER CORPORATION
QUALITY CONTROL REVIEW ACCEPTED
YES [X] NO [N/A]
5/2/86 UT-III

	7	8	9	10	11	12
G	MAX= .48" MIN= .48"	MAX= .48 MIN= .48	MAX= .48" MIN= .48"	MAX= .48" MIN= .48"	MAX= .48" MIN= .48"	MAX= .48" MIN= .48"
H	MAX= .48" MIN= .48"	MAX= .48" MIN= .48	MAX= .48" MIN= .48"	MAX= .48" MIN= .48	MAX= .48" MIN= .48"	MAX= .48" MIN= .48
I	MAX= .48" MIN= .48"	MAX= .48" MIN= .48"	MAX= .48 MIN= .48"	MAX= .48" MIN= .48"	MAX= .48" MIN= .48	MAX= .48" MIN= .48"
J	MAX= .48" MIN= .48"	MAX= .48" MIN= .48"	MAX= .48" MIN= .48	MAX= .48" MIN= .48"	MAX= .48" MIN= .48"	MAX= .48" MIN= .48"
K	MAX= .48" MIN= .46"	MAX= .48" MIN= .46	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"
L	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"

EXAMINER [signature] LEVEL II DATE 4.16.86
EXAMINER [signature] LEVEL II DATE 4.16.86
REVIEWER Edmund R Donovan LEVEL II DATE 4-30-86
REVIEWER ______ LEVEL ______ DATE ______
REVIEWER ______ LEVEL ______ DATE ______

ANII REVIEW
SIGNATURE [signature]
DATE: 5-7-86

TORUS ULTRASONIC THICKNESS MEASUREMENT

DATA SHEET 2434-1
PAGE 18 OF 22

SITE LOCATION NMP1.
PROCEDURE NO. 80A2434
AREA OF EXAM See Attached Sketch
DRAWING NO. N/A
CAL. BLOCK NO. Stepwedge #80C3613
EXAM METHOD UT
GRID AREA EXAMINED #5

NIAGARA MOHAWK POWER CORPORATION
QUALITY CONTROL REVIEW ACCEPTED
YES [X] NO N/A
5/2/86 UT-III
SIGNATURE & DATE

	1	2	3	4	5	6
A	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"
B	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"
C	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"
D	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"
E	MAX= .48" MIN= .46	MAX= .48" MIN= .46	MAX= .48" MIN= .46	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"
F	MAX= .48" MIN= .46	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"

EXAMINER [signature] LEVEL II DATE 4.16.86
EXAMINER [signature] LEVEL II DATE 4.16.86
REVIEWER Edmund R Donovan LEVEL II DATE 4-30-86
REVIEWER ____ LEVEL ____ DATE ____
REVIEWER ____ LEVEL ____ DATE ____

ANII REVIEW
SIGNATURE [signature]

[illegible]

TORUS ULTRASONIC THICKNESS MEASUREMENT

DATA SHEET 2434-1
PAGE 19 OF 22

SITE LOCATION: NMP1
PROCEDURE NO. 80A2434
AREA OF EXAM: See Attached Sketch
DRAWING NO. N/A
CAL. BLOCK NO. Stepwedge #80C3613
EXAM METHOD: UT
GRID AREA EXAMINED: #5

NIAGARA MOHAWK POWER CORPORATION
QUALITY CONTROL REVIEW ACCEPTED
[X] YES NO N/A
[illegible] 5/2/86 QT-III
SIGNATURE & DATE

	7	8	9	10	11	12
A	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"
B	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"
C	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"
D	MAX= .48" MIN= .46"	MAX= .48" MIN= .46	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"
E	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"
F	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"

EXAMINER [illegible] LEVEL II DATE 4-16-86
EXAMINER [illegible] LEVEL II DATE 4-16-86
REVIEWER Edmund [illegible] Donovan LEVEL II DATE 4-30-86
REVIEWER ______ LEVEL ______ DATE ______
REVIEWER ______ LEVEL ______ DATE ______

ANII REVIEW
SIGNATURE [illegible]

TORUS ULTRASONIC THICKNESS MEASUREMENT

DATA SHEET 2434-1
PAGE 20 OF 22

SITE LOCATION NMP1

PROCEDURE NO. 80A2434

AREA OF EXAM See Attached Sketch

DRAWING NO. N/A

CAL. BLOCK NO. Stepwedge #80C3613

EXAM METHOD UT

GRID AREA EXAMINED #5

NIAGARA MOHAWK POWER CORPORATION
QUALITY CONTROL REVIEW ACCEPTED
YES X NO N/A
Cliff Moss 5/2/86
SIGNATURE & DATE UT-III

	1	2	3	4	5	6
G	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .43"
H	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"
I	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"
J	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"
K	MAX= .48" MIN= .44"	MAX= .48" MIN= .44"	MAX= .48" MIN= .44"	MAX= .48" MIN= .44"	MAX= .48" MIN= .44"	MAX= .48" MIN= .44"
L	MAX= .48" MIN= .44"	MAX= .48" MIN= .44"	MAX= .48" MIN= .44"	MAX= .48" MIN= .44"	MAX= .47" MIN= .44"	MAX= .48" MIN= .44"

EXAMINER [signature] LEVEL II DATE 4.16.86

EXAMINER [signature] LEVEL II DATE 4.16.86

REVIEWER Edmund R Donovan LEVEL II DATE 4-30-86

REVIEWER ______ LEVEL ______ DATE ______

REVIEWER ______ LEVEL ______ DATE ______

ANII REVIEW SIGNATURE [signature]

TORUS ULTRASONIC THICKNESS MEASUREMENT

DATA SHEET 2434-1
PAGE 21 OF 22

SITE LOCATION NMP1
PROCEDURE NO. 80A2434
AREA OF EXAM See Attached Sketch
DRAWING NO. N/A
CAL. BLOCK NO. Stepwedge #80C3613
EXAM METHOD UT
GRID AREA EXAMINED #5

NIAGARA MOHAWK POWER CORPORATION
QUALITY CONTROL REVIEW ACCEPTED
[X] YES [N/A] NO
SIGNATURE & DATE 5/2/86 UT-III

	7	8	9	10	11	12
G	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"
H	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"
I	MAX= .48" MIN= .46"	MAX= .48" MIN= .46	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"
J	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"	MAX= .48" MIN= .46"
K	MAX= .48" MIN= .44"	MAX= .48" MIN= .44"	MAX= .48" MIN= .44"	MAX= .48" MIN= .44"	MAX= .48" MIN= .44"	MAX= .48" MIN= .44"
L	MAX= .48" MIN= .44	MAX= .48" MIN= .44	MAX= .48" MIN= .44"	MAX= .48" MIN= .44"	MAX= .48" MIN= .44"	MAX= .48" MIN= .44"

EXAMINER [signature] LEVEL II DATE 4-16-86
EXAMINER [signature] LEVEL II DATE 4-16-86
REVIEWER Edmund F. Donovan LEVEL II DATE 4-30-86
REVIEWER ____ LEVEL ____ DATE ____
REVIEWER ____ LEVEL ____ DATE ____

ANII REVIEW
SIGNATURE [signature]
DATE

Area #1
Raw Data

73

NIAGARA MOHAWK POWER CORPORATION

TELECOPIER COVER LETTER

PLEASE DELIVER THE FOLLOWING PAGES TO:

NAME ~~Ray [illegible]k~~ + Larry McNeer

COMPANY NMPC - Salina Meadows

FROM:

NAME Dick Shelton

COMPANY NMPC - Nine Mile Point Nuclear Station # 1

NUMBER OF PAGES 4 (INCLUDING COVER SHEET)

DATE 4-22-88 TIME 9:45 A.M. P.M.

IF YOU DO NOT RECEIVE ALL THE PAGES OR THERE IS A PROBLEM WITH THE TRANSMISSION, PLEASE CALL RECEPTIONIST, (315) 349-2833 or 2855.

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BACKUP

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RAPICOM NUMBER (315) 349-2832

PLEASE - COPY + DELIVER
A COPY TO EACH.

THANKS!

[illegible]

[illegible]

[illegible]

[illegible]

74

Plant/Unit: NINE MILE POINT UNIT ONE
ISO: SEE ATTACHED
Comp./Sys.: TORUS
Loop: N/A

ULTRASONIC EXAMINATION CALIBRATION SHEET

Data Pkg.: 2433-88A-73
Page 1 of 3
Exam Item: GRID AREA #1
Procedure: 80A2433
Rev./F.C.: 3 / FC 1
Title: UT EXAM - STEAM EROSION

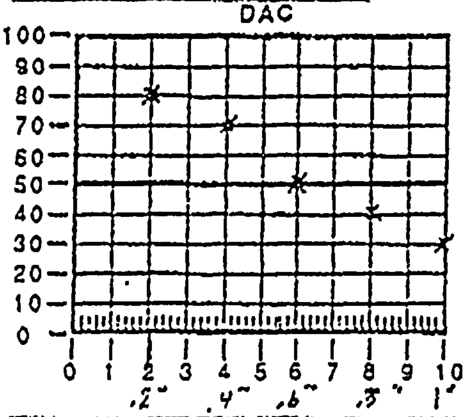
INSTRUMENT SETTINGS			
Serial #	213220-4		
MFG./Model #	KK8-USL-48		
Sweep Length	6.77		
Sweep Delay	6.02		
Pulse Length/Damp.	FIXED		
Freq.	5.0	Range	.5"
DEC/Gate	OFF	Reject	MIN
Jacks	T&R		
Mode Select	DUAL		
Coarse Gain	40	Fine	24
Scan Sens.	80%		

SEARCH UNIT	
Serial #	A31357
Brand	KB-AEROTECH
Frequency	5.0 mHz
Size/Shape	.25" ROUND
Style/Type	GAMMA
Fixture	N/A
Cable	2X6' SELF CONT.
Couplant Batch	6764
Couplant Brand	ULTRAGEL II

Calibration Block	NMP-1SW-1020-CS
Block Thickness	.10-1.0"/1.1-2.0"
Comp. Thickness	SEE ATTACHED
Block Temperature	72 °F
Comp. Temperature	80 °F
Thermometer	KB108
Surface	OD

Calibration Checks	Time
Initial Calib.	2325
Intermediate	0100
Intermediate	N/A
Intermediate	N/A
Final Calib.	0216
Calibration Date	4/22/88

DAC



DAC			
	Reflector	%FSH	Position
1	.2"	80%	2.0
2	.4"	70%	4.0
3	.6"	50%	6.0
4	.8"	40%	8.0
5	1.0"	30%	10
6	N/A	N/A	N/A

CRT Calibrated In
1" OF DEPTH
Each Major Screen Div. = .10"

INSTRUMENT LINEARITY					
1	100	50	6	50	25
2	90	45	7	40	20
3	80	40	8	30	15
4	70	35	9	20	10
5	60	30			

AMPLITUDE LINEARITY	
80 - 6 = 42	80 - 12 = 22
40 + 6 = 74	20 + 12 = 76

Scan Angle	0 DEGREES
Meas. Angle	N/A
Mode	LONG
Calibration	DEPTH
Scan Area	GRID

Exam Item: GRID AREA #1

Comments/Reasons for Incomplete Exams
TORUS CALIBRATION FOR THICKNESS READINGS ONLY. SEE ATTACHED FOR THICKNESS READINGS AND GRID LAYOUT

Remarks
CLEANED OFF COUPLANT RESIDUE WITH DEMIN WATER AND TSP

Examiner 1: Gordon Forster Level: II Date: 4-22-88
GORDON FORSTER LEVEL II

WR#
NCR#
TRAVELER

Examiner 2: Level: Date:
ANDREW BULLOCK LEVEL II

INFORMATION ONLY

NES REVIEWER: LEVEL: DATE:

QA/QC	ANII

WELD ACCEPTABLE?
YES O NO O

NMPC ENG.
DISP. REQ.
YES O NO O

1125

Plant/Unit: NINE MILE POINT UNIT ONE
ISO: N/A
Comp./Sys.: TORUS
Loop: N/A

Data Pkg.: 2433-88A-73
Page 2 of 3
Exam Item: GRID AREA #1
Procedure: 80A2433
Rev./F.C.: 3/FC-1
Title: UT EXAM - STEAM EROSION

	1	2	3	4	5	6	7	8	9	10	11	12
A	.460" .456"	.461" .458	.453" .451"	.455" .451"	.456" .452"	.455" .450"	.457" .456"	.458" .454"	.457" .453"	.457" .455"	.450" .449"	.450" .449"
B	.457" .453"	.455" .453"	.453" .452"	.455" .452"	.457" .454"	.458" .456"	.458" .456"	.467" .462"	.461" .458"	.453" .452"	.450" .449"	.453" .450"
C	.455" .452"	.455" .453	.451" .452"	.456" .453"	.451" .450"	.451" .448"	.455" .447"	.459" .457"	.453" .450"	.455" .453"	.460" .458"	.454" .452"
D	.450" .449"	.454" .452"	.454" .452"	.452" .450"	.454" .452"	.455" .453"	.456" .452"	.457" .454"	.450" .448"	.452" .450"	.454" .452"	.453" .450"
E	.456" .454"	.454" .452"	.454" .453"	.455" .454"	.456" .455"	.458" .455"	.455" .454"	.464" .457"	.456" .454"	.453" .451"	.452" .450"	.455" .451"
F	.455" .453"	.454" .452"	.456" .453"	.458" .453"	.458" .455"	.466" .464"	.462" .460"	.457" .454"	.457" .453"	.458" .454"	.467" .463"	.461" .457"
G	.456" .454"	.454" .452"	.463" .459"	.454" .451"	.454" .451"	.457" .454"	.472" .466"	.452" .451"	.453" .451"	.453" .451"	.461" .464"	.457" .453"
H	.457" .456"	.455" .452"	.455" .452"	.457" .455"	.456" .451"	.457" .453"	.461" .457"	.457" .457"	.465" .461"	.458" .455"	.457" .452"	.456" .451"
I	.457" .455"	.455" .450"	.453" .450"	.461" .456"	.463" .457"	.460" .457"	.458" .455"	.459" .455"	.456" .453"	.461" .456"	.459" .454"	.456" .452"
J	.458" .453"	.455" .454"	.452" .450"	.456" .455"	.456" .455"	.463" .458"	.458" .454"	.456" .451"	.456" .454"	.455" .454"	.456" .453"	.456" .453"
K	.452" .453"	.455" .452"	.457" .456"	.462" .459"	.461" .459"	.453" .450"	.455" .453"	.454" .450"	.462" .459"	.456" .452"	.458" .454"	.462" .458"
L	.454" .451"	.462" .457"	.457" .455"	.455" .453"	.464" .458"	.458" .455"	.454" .453"	.456" .453"	.458" .454"	.454" .451"	.462" .456"	.455" .452"

Examiner 1: Gordon Forster Level: II Date: 4-22-88

Examiner 2: INFORMATION ONLY I Date: 4-22-88

NES REVIEWER: ____________ LEVEL: ___ DATE: ___

QA/QC	ANII

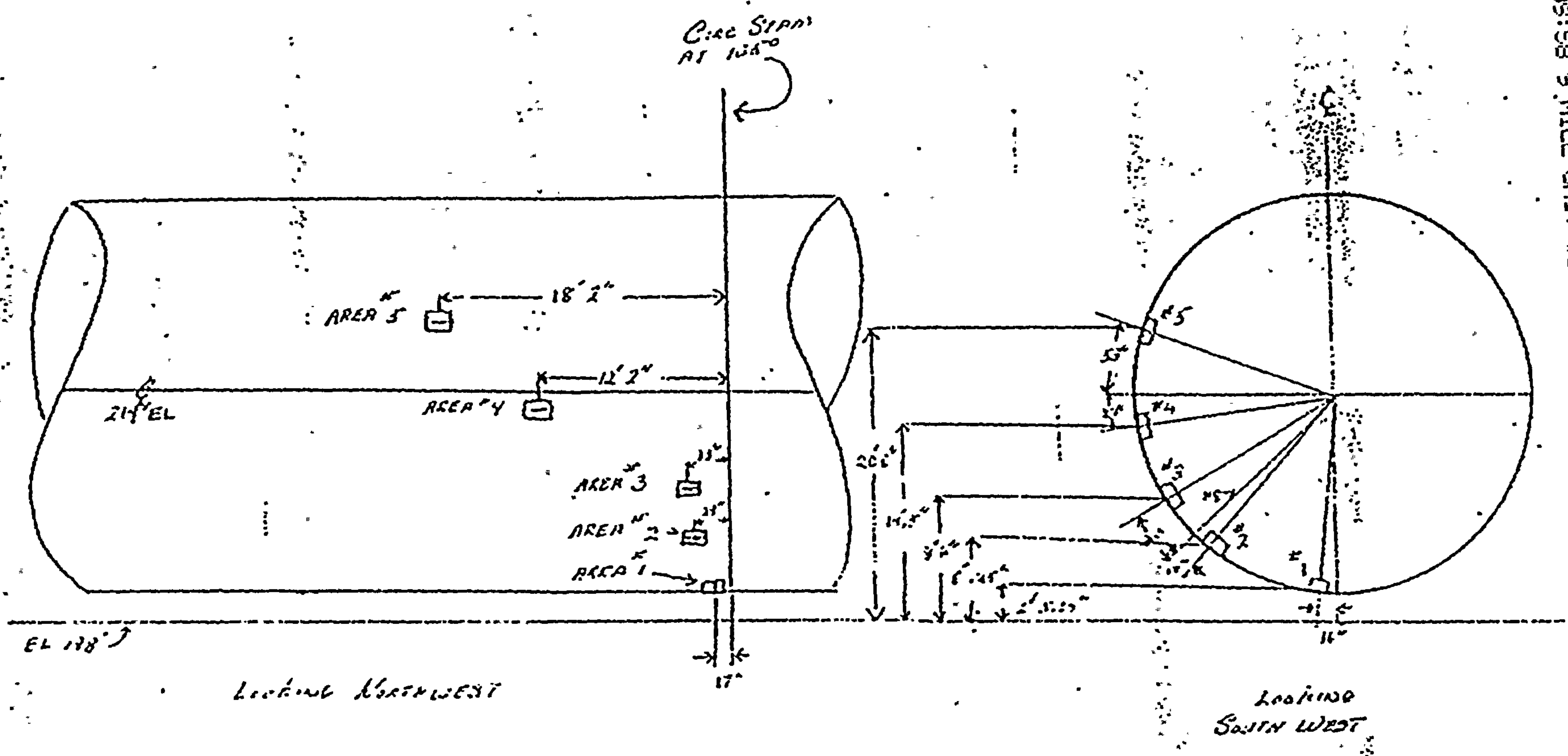
ISO: N/A
Comp./Sys.: [illegible]
…: N/A

SKETCH
S…
…T … SCALE

Date Pkg.: 24… 88A-73
Page 3 of …
Exam Item: … 9 AREA 1
Procedure: 80A 2433
Rev./F.C.: 3 / FC-1
Title: UT EXAM STEAM EROSION

FPL … '88 05:58 9 MILE UNIT #1

THICKNESS MEASUREMENT STATIONS



SOUTH EAST CORNER HATCH

Examiner 1: Gordon Forster Level: II Date: 4-22-88

Examiner 2: INFORMATION ONLY Date: ______

NES REVIEWER: ______ LEVEL: __ DATE: ______

76

Plant/Unit: NINE MILE POINT UNIT ONE
ISO: N/A
Comp./Sys.: TORUS
Loop: N/A

ULTRASONIC EXAMINATION CALIBRATION SHEET

Data Pkg.: 2434-88A-131
Page 1 of 22
Exam Item: TORUS
Procedure: 80A2434
Rev./F.C.: 3/FC-1&2
Title: UT EXAM - THICKNESS

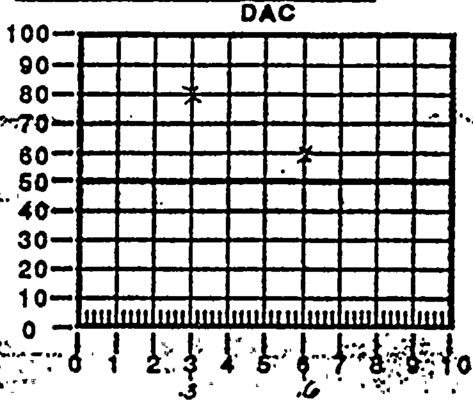
INSTRUMENT SETTINGS			
[illegible]	[illegible]		
MFG/Model #	[illegible]		
Sweep Length	6.74		
Sweep Delay	5.00		
Pulse Length/Damp.	FXD		
Freq. 15.0		Range	50"
DEC/Gate	OFF	Reject	MIN
Jacks	B&T		
Mode Select	DUAL		
Coarse Gain	40	Fine	20
Scan Sens.	SEE REMARKS		

SEARCH UNIT	
Serial #	[illegible]
Brand	KB-AEROTECH
Frequency	5.0 mHz
Size/Shape	.25" ROUND
Style/Type	GAMMA DUFP
Fixture	N/A
Cable	2X6' SELF-CONT.
Couplant Batch	8554
Couplant Brand	ULTRAGEL II

Calibration Block	NMP-1SW-1020-CS
[illegible]	[illegible]
Comp. Thickness	.46
Block Temperature	78 °F
Comp. Temperature	75 °F
Thermometer	KB114
Surface	OD

Calibration Checks	Time
Initial Calib.	1430
Intermediate	N/A
Intermediate	N/A
Intermediate	N/A
Final Calib.	1600
Calibration Date	2-19-88

DAC



DAC	Reflector	%FSH	Position
1	.30"	80	3.0
2	.60"	60	6.0
3	N/A	N/A	N/A
4	N/A	N/A	N/A
5	N/A	N/A	N/A
6	N/A	N/A	N/A

CRT Calibrated in
INCHES OF DEPTH
Each Major Screen Div. = 1.0"

INSTRUMENT LINEARITY

1	100	50	6	50	25
2	90	45	7	40	20
3	80	40	8	30	15
4	70	35	9	20	10
5	60	30			

AMPLITUDE LINEARITY	
80 - 6 = 40	80 - 12 = 20
40 + 6 = 80	20 + 12 = 80

Scan Angle	0°
Meas. Angle	N/A
Mode	LONG
Calibration	THICKNESS
Scan Area	GRID

Exam Item	TORUS

Comments/Reasons for Incomplete Exams

TORUS THICKNESS AREAS 1 THRU 5
SCANNED GRID AREAS 1 THRU 5
REFER TO ATTACHED MAP AND GRIDS FOR THICKNESS READINGS

Remarks

MAINTAINED 80% BACK REFLECTION

Examiner 1: H. M. Hawkins Level: II Date: 2-19-88
HARRY HAWKINS UT LEVEL II

WR# N/A
NCR# N/A
TRAVELER RXBM-88-001

Examiner 2: Gary Jude Level: II Date: 2-19-88
GARY JUDE UT LEVEL II

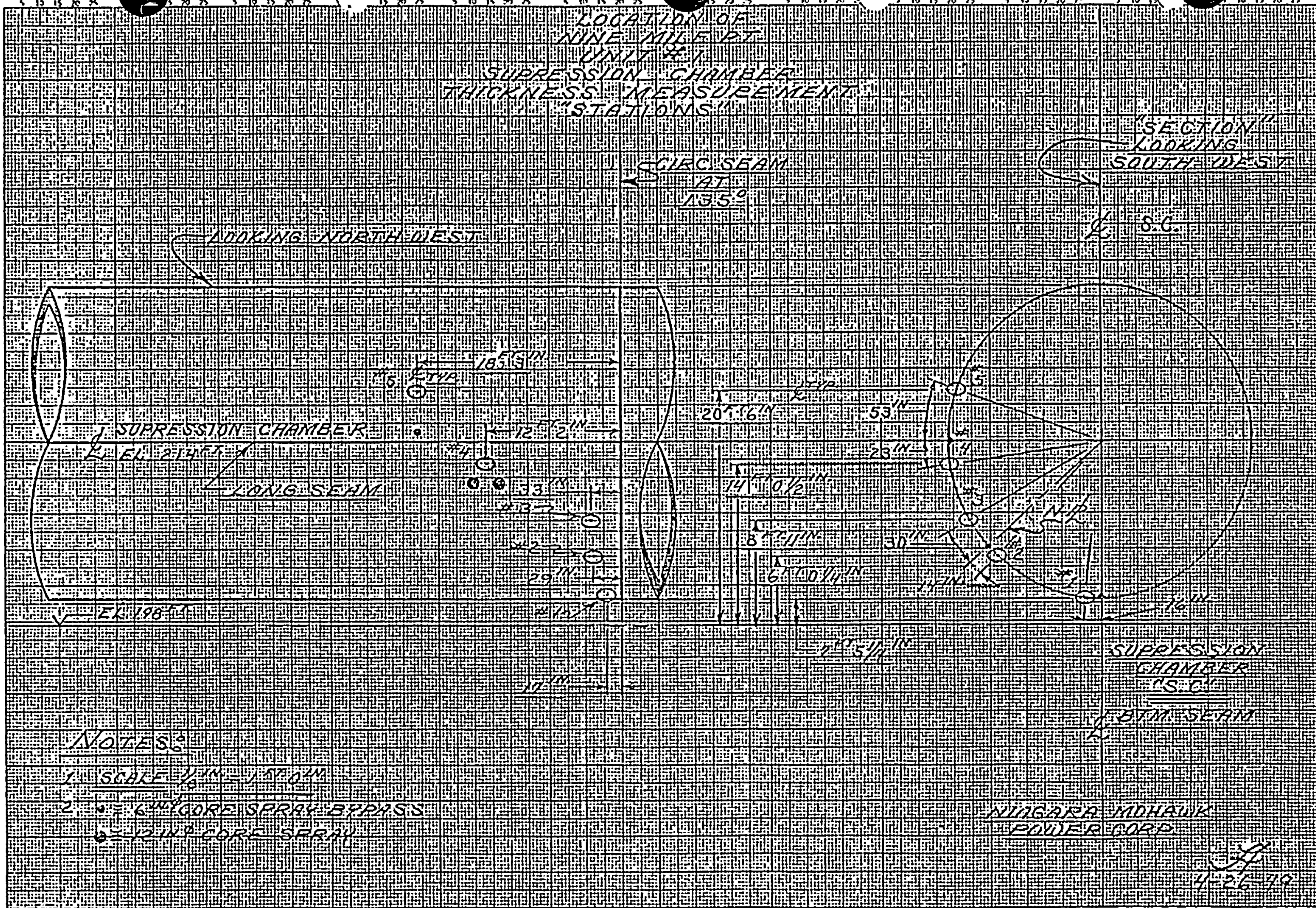
NES REVIEWER: [illegible] LEVEL: III DATE: 2-20-88

QA/QC	ANII

YIELD ACCEPTABLE?
YES N/A NO N/A

NMPC ENG. DISP. REQ.:
YES N/A NO ✓

NES


LOCATION OF
NINE MILE PT
UNIT #1
SUPRESSION CHAMBER
THICKNESS MEASUREMENT
"STATIONS"
"SECTION"
LOOKING
SOUTH WEST
CIRC SEAM
AT
135°
℄ S.C.
LOOKING NORTH WEST
SUPRESSION CHAMBER
℄ EL. 214 FT
LONG SEAM
EL. 198 FT
SUPRESSION
CHAMBER
"S.C."
℄ BTM. SEAM
NOTES:
1. SCALE 1/8 IN = 1 FT 0 IN
2. • = 6 IN CORE SPRAY BYPASS
⊙ = 12 IN CORE SPRAY
NIAGARA MOHAWK
POWER CORP
4-26-79

SE corner

8

Plant/Unit: NMP #I
ISO: N/A
Comp./Sys.: Torus
Loop: N/A

TORUS THICKNESS

Data Pkg.: 2434-88A-131
Page 3 of 22
Exam Item: Torus Grid #1
Procedure: 80A2434
Rev./F.C.: 3 / F.C.-1,2
Title: UT Exam Thickness

Grid Area: [illegible]

---	1	2	3	4	5	6
A	MAX= .465 MIN= .452	MAX= .469 MIN= .458	MAX= .465 MIN= .459	MAX= .469 MIN= .460	MAX= .469 MIN= .460	MAX= .469 MIN= .460
B	MAX= .468 MIN= .461	MAX= .468 MIN= .459	MAX= .468 MIN= .459	MAX= .468 MIN= .459	MAX= .468 MIN= .459	MAX= .468 MIN= .459
C	MAX= .465 MIN= .458	MAX= .465 MIN= .458	MAX= .465 MIN= .458	MAX= .465 MIN= .458	MAX= .465 MIN= .458	MAX= .465 MIN= .458
D	MAX= .465 MIN= .454	MAX= .465 MIN= .454	MAX= .465 MIN= .454	MAX= .465 MIN= .454	MAX= .465 MIN= .454	MAX= .465 MIN= .454
E	MAX= .467 MIN= .456	MAX= .466 MIN= .459	MAX= .466 MIN= .459	MAX= .466 MIN= .459	MAX= .466 MIN= .459	MAX= .466 MIN= .459
F	MAX= .469 MIN= .459	MAX= .469 MIN= .459	MAX= .469 MIN= .459	MAX= .469 MIN= .459	MAX= .469 MIN= .459	MAX= .469 MIN= .459

Examiner 1: H. M. Hawkins Level: II Date: 2-19-88

Examiner 2: Gary Jade Level: II Date: 2-19-88

NES REVIEWER: [illegible] LEVEL: III DATE: 2-20-88

QA/QC	ANII

[illegible]

Plant/Unit: NINE MILE POINT I
ISO: N/A
Comp./Sys.: TORUS
Loop: NA

TORUS THICKNESS

Data Pkg.: 2434-88A-131
Page 4 of 22
Exam Item: TORUS Grid #1
Procedure: 80A2434
Rev./F.C.: Rev. 3 / F.C. 1,2
Title: UT EXAM Thickness

Calibration Block: Step wedge 80C5613
Grid Area: 1 of 5

	7	8	9	10	11	12
A	MAX= .469 MIN= .460	MAX= .469 MIN= .460	MAX= .469 MIN= .460	MAX= .469 MIN= .460	MAX= .469 MIN= .460	MAX= .469 MIN= .460
B	MAX= .468 MIN= .459	MAX= .468 MIN= .459	MAX= .468 MIN= .459	MAX= .468 MIN= .459	MAX= .468 MIN= .459	MAX= .468 MIN= .459
C	MAX= .465 MIN= .458	MAX= .465 MIN= .458	MAX= .465 MIN= .458	MAX= .465 MIN= .458	MAX= .465 MIN= .458	MAX= .465 MIN= .458
D	MAX= .465 MIN= .454	MAX= .465 MIN= .454	MAX= .465 MIN= .454	MAX= .465 MIN= .454	MAX= .465 MIN= .454	MAX= .465 MIN= .454
E	MAX= .466 MIN= .459	MAX= .466 MIN= .459	MAX= .466 MIN= .459	MAX= .466 MIN= .459	MAX= .466 MIN= .459	MAX= .466 MIN= .459
F	MAX= .469 MIN= .459	MAX= .469 MIN= .459	MAX= .469 MIN= .459	MAX= .469 MIN= .459	MAX= .469 MIN= .459	MAX= .469 MIN= .459

Examiner 1: H. M. Hawkins Level: II Date: 2-19-88

Examiner 2: [illegible signature] Level: [illegible] Date: [illegible]

IES REVIEWER: [illegible signature] LEVEL: [illegible] DATE: [illegible]

QA/QC	ANII

Plant/Unit: NINE MILE POINT #1
ISO: N/A
Comp./Sys.: TORUS
Loop: NA

TORUS THICKNESS

Data Pkg.: 2434-88A-131
Page 5 of 22
Exam Item: Torus Grid #1
Procedure: 80A2434
Rev./F.C.: 3 / FC-1,2
Title: UT EXAM Thickness

Grid Area: 1 of 5

	1	2	3	4	5	6
G	MAX= .465 MIN= .458	MAX= .465 MIN= .458	MAX= .465 MIN= .458	MAX= .465 MIN= .458	MAX= .465 MIN= .458	MAX= .465 MIN= .458
H	MAX= .465 MIN= .458	MAX= .465 MIN= .458	MAX= .465 MIN= .458	MAX= .465 MIN= .458	MAX= .465 MIN= .458	MAX= .465 MIN= .458
I	MAX= .466 MIN= .455	MAX= .465 MIN= .457	MAX= .465 MIN= .459	MAX= .465 MIN= .459	MAX= .465 MIN= .459	MAX= .465 MIN= .459
J	MAX= .465 MIN= .452	MAX= .465 MIN= .452	MAX= .465 MIN= .452	MAX= .465 MIN= .452	MAX= .465 MIN= .452	MAX= .465 MIN= .452
K	MAX= .465 MIN= .458	MAX= .465 MIN= .458	MAX= .465 MIN= .458	MAX= .465 MIN= .458	MAX= .465 MIN= .458	MAX= .465 MIN= .458
L	MAX= .465 MIN= .457	MAX= .466 MIN= .459	MAX= .465 MIN= .457	MAX= .465 MIN= .457	MAX= .465 MIN= .457	MAX= .465 MIN= .457

Examiner 1: H.M. Hawkins Level: II Date: 2-19-88

Examiner 2: Gary Jude Level: II Date: 2-19-88

NES REVIEWER: [illegible] LEVEL: III DATE: 2-20-88

QA/QC	ANII

Plant/Unit: NMP #1
ISO: N/A
Comp./Sys.: Torus
Loop: N/A

TORUS THICKNESS

Data Pkg.: 2434-88A-131
Page 6 of 22
Exam Item: Torus Grid #1
Procedure: 80A2434
Rev./F.C.: 3 / FC-1,2
Title: UT Exam Thickness

[illegible]
Grid Area: 1 of 5

	7	8	9	10	11	12
G	MAX= .465 MIN= .458	MAX= .465 MIN= .458	MAX= .465 MIN= .458	MAX= .465 MIN= .458	MAX= .465 MIN= .458	MAX= .465 MIN= .458
H	MAX= .465 MIN= .458	MAX= .465 MIN= .458	MAX= .465 MIN= .458	MAX= .465 MIN= .458	MAX= .465 MIN= .458	MAX= .465 MIN= .458
I	MAX= .465 MIN= .459	MAX= .465 MIN= .459	MAX= .465 MIN= .459	MAX= .465 MIN= .459	MAX= .465 MIN= .459	MAX= .465 MIN= .459
J	MAX= .465 MIN= .452	MAX= .465 MIN= .452	MAX= .465 MIN= .452	MAX= .465 MIN= .452	MAX= .465 MIN= .452	MAX= .465 MIN= .452
K	MAX= .465 MIN= .458	MAX= .465 MIN= .458	MAX= .465 MIN= .458	MAX= .465 MIN= .458	MAX= .465 MIN= .459	MAX= .465 MIN= .458
L	MAX= .465 MIN= .457	MAX= .465 MIN= .457	MAX= .465 MIN= .457	MAX= .465 MIN= .457	MAX= .465 MIN= .457	MAX= .465 MIN= .457

Examiner 1: H. M. Hamlin Level: II Date: 2-19-88

Examiner 2: [illegible] Level: ET Date: 2-19-88

REB REVIEWER: [illegible] LEVEL: III DATE: 2-20-88

QA/QC	ANII

Plant/Unit: NMP #1
ISO: N/A
Comp./Sys.: Torus
Loop: N/A

TORUS THICKNESS

Data Pkg.: 2434-884-131
Page 7 **of** 22
Exam Item: Torus Grid #2
Procedure: 80A2434
Rev./F.C.: 3 / F.C.-1, 2
Title: UT Exam Thickness

Cal/Ref Block: [illegible]
Grid Area: 2'0+5'

	1	2	3	4	5	6
A	MAX= .470 MIN= .455	MAX= .466 MIN= .459	MAX= .466 MIN= .459	MAX= .466 MIN= .459	MAX= .466 MIN= .459	MAX= .466 MIN= .459
B	MAX= .468 MIN= .458	MAX= .468 MIN= .458	MAX= .468 MIN= .458	MAX= .468 MIN= .458	MAX= .468 MIN= .458	MAX= .468 MIN= .458
C	MAX= .468 MIN= .458	MAX= .468 MIN= .458	MAX= .468 MIN= .458	MAX= .468 MIN= .458	MAX= .468 MIN= .458	MAX= .468 MIN= .458
D	MAX= .464 MIN= .458	MAX= .464 MIN= .458	MAX= .464 MIN= .458	MAX= .464 MIN= .458	MAX= .464 MIN= .458	MAX= .464 MIN= .458
E	MAX= .464 MIN= .458	MAX= .464 MIN= .458	MAX= .464 MIN= .458	MAX= .464 MIN= .458	MAX= .464 MIN= .458	MAX= .464 MIN= .458
F	MAX= .467 MIN= .460	MAX= .468 MIN= .460	MAX= .468 MIN= .460	MAX= .468 MIN= .460	MAX= .468 MIN= .460	MAX= .468 MIN= .460

Examiner 1: H. McHawkins **Level:** II **Date:** 2-19-88

Examiner 2: Gary Jude **Level:** II **Date:** 2-19-88

NES REVIEWER: [illegible] **LEVEL:** III **DATE:** 2-20-88

QA/QC	ANII

Plant/Unit: N M P # 1
ISO: N/A
Comp./Sys.: Torus
Loop: N/A

TORUS THICKNESS

Data Pkg.: 2434-88A-131
Page 8 of 22
Exam Item: Torus Grid #2
Procedure: 80A2434
Rev./F.C.: 3 / F.C.-1,2
Title: UT Exam Thickness

Calibration Block: Step Wedge [illegible]
[illegible] Area: 2 of 5

	7	8	9	10	11	12
A	MAX= .466 MIN= .459	MAX= .466 MIN= .459	MAX= .466 MIN= .459	MAX= .466 MIN= .459	MAX= .466 MIN= .459	MAX= .466 MIN= .459
B	MAX= .468 MIN= .458	MAX= .468 MIN= .458	MAX= .468 MIN= .458	MAX= .468 MIN= .458	MAX= .468 MIN= .458	MAX= .468 MIN= .458
C	MAX= .468 MIN= .458	MAX= .468 MIN= .458	MAX= .468 MIN= .458	MAX= .468 MIN= .458	MAX= .468 MIN= .458	MAX= .468 MIN= .458
D	MAX= .464 MIN= .458	MAX= .464 MIN= .458	MAX= .464 MIN= .458	MAX= .464 MIN= .458	MAX= .464 MIN= .458	MAX= .464 MIN= .458
E	MAX= .464 MIN= .458	MAX= .464 MIN= .458	MAX= .464 MIN= .458	MAX= .464 MIN= .458	MAX= .464 MIN= .458	MAX= .464 MIN= .458
F	MAX= .468 MIN= .460	MAX= .468 MIN= .460	MAX= .468 MIN= .460	MAX= .468 MIN= .460	MAX= .468 MIN= .460	MAX= .468 MIN= .460

Examiner 1: [signature] Level: II Date: 2-19-88

Examiner 2: [signature] Level: II Date: 2-19-88

IES REVIEWER: [signature] LEVEL: III DATE: 2-20-88

QA/QC	ANII

Plant/Unit: NMP#1
ISO: N/A
Comp./Sys.: Torus
Loop: N/A

TORUS THICKNESS

Data Pkg.: 2154-88A-131
Page 9 of 22
Exam Item: Torus Grid #2
Procedure: 80A2434
Rev./F.C.: 3 / F.C.-1,2
Title: UT Exam Thickness

Grid Area: 2 of 5

	1	2	3	4	5	6
G	MAX= .463 MIN= .459	MAX= .465 MIN= .459	MAX= .465 MIN= .459	MAX= .465 MIN= .459	MAX= .465 MIN= .459	MAX= .465 MIN= .459
H	MAX= .465 MIN= .459	MAX= .465 MIN= .459	MAX= .465 MIN= .459	MAX= .465 MIN= .459	MAX= .465 MIN= .459	MAX= .465 MIN= .459
I	MAX= .465 MIN= .458	MAX= .465 MIN= .458	MAX= .465 MIN= .458	MAX= .465 MIN= .458	MAX= .465 MIN= .458	MAX= .465 MIN= .458
J	MAX= .468 MIN= .458	MAX= .468 MIN= .458	MAX= .468 MIN= .458	MAX= .468 MIN= .458	MAX= .468 MIN= .458	MAX= .468 MIN= .458
K	MAX= .468 MIN= .458	MAX= .468 MIN= .458	MAX= .468 MIN= .458	MAX= .468 MIN= .458	MAX= .468 MIN= .458	MAX= .468 MIN= .458
L	MAX= .466 MIN= .460	MAX= .466 MIN= .456	MAX= .466 MIN= .456	MAX= .466 MIN= .458	MAX= .469 MIN= .460	MAX= .469 MIN= .460

Examiner 1: H. M. Hawkins Level: II Date: 2-19-88

Examiner 2: Gary Jacks Level: II Date: 2-19-88

REVIEWER: Art Prinman LEVEL: III DATE: 2-20-88

QA/QC	ANII

Plant/Unit: NMP#1
ISO: N/A
Comp./Sys.: Torus
Loop: N/A

TORUS THICKNESS

Data Pkg.: 2434-SPS-151
Page 10 of 22
Exam Item: Torus Grid #2
Procedure: 80A2434
Rev./F.C.: 3 / F.C.-1,2
Title: UT Exam Thickness

[illegible]
Grid Area: 2 of 5

	7	8	9	10	11	12
G	MAX= .465 MIN= .459	MAX= .465 MIN= .459	MAX= .465 MIN= .459	MAX= .465 MIN= .459	MAX= .465 MIN= .459	MAX= .465 MIN= .459
H	MAX= .465 MIN= .459	MAX= .465 MIN= .459	MAX= .465 MIN= .459	MAX= .465 MIN= .459	MAX= .465 MIN= .459	MAX= .465 MIN= .459
I	MAX= .465 MIN= .458	MAX= .465 MIN= .458	MAX= .465 MIN= .458	MAX= .465 MIN= .458	MAX= .465 MIN= .458	MAX= .465 MIN= .458
J	MAX= .468 MIN= .458	MAX= .468 MIN= .458	MAX= .468 MIN= .458	MAX= .468 MIN= .458	MAX= .468 MIN= .458	MAX= .468 MIN= .458
K	MAX= .468 MIN= .458	MAX= .468 MIN= .458	MAX= .468 MIN= .458	MAX= .468 MIN= .458	MAX= .468 MIN= .458	MAX= .468 MIN= .458
L	MAX= .469 MIN= .460	MAX= .469 MIN= .460	MAX= .469 MIN= .460	MAX= .469 MIN= .460	MAX= .469 MIN= .460	MAX= .469 MIN= .460

Examiner 1: [signature] Level: II Date: 2-19-88

Examiner 2: [signature] Level: II Date: 2-19-88

NES REVIEWER: [signature] LEVEL: III DATE: 2-20-88

QA/QC	ANII

Plant/Unit: NMP #I
ISO: N/A
Comp./Sys.: Torus
Loop: N/A

TORUS THICKNESS

Data Pkg.: 2434-88A-131
Page 11 of 22
Exam Item: Torus Grid #3
Procedure: 80A2434
Rev./F.C.: 3 / F.C.-1,2
Title: UT Exam Thickness

	1	2.	3	4	5	6
A	MAX=.465 MIN=.456	MAX=.465 MIN=.460	MAX=.465 MIN=.460	MAX=.465 MIN=.460	MAX=.465 MIN=.460	MAX=.465 MIN=.460
B	MAX=.465 MIN=.459	MAX=.468 MIN=.459	MAX=.468 MIN=.459	MAX=.468 MIN=.459	MAX=.468 MIN=.459	MAX=.468 MIN=.459
C	MAX=.465 MIN=.459	MAX=.465 MIN=.459	MAX=.465 MIN=.459	MAX=.465 MIN=.459	MAX=.465 MIN=.459	MAX=.465 MIN=.459
D	MAX=.469 MIN=.460	MAX=.465 MIN=.460	MAX=.467 MIN=.460	MAX=.467 MIN=.460	MAX=.467 MIN=.460	MAX=.467 MIN=.460
E	MAX=.468 MIN=.460	MAX=.468 MIN=.460	MAX=.468 MIN=.460	MAX=.468 MIN=.460	MAX=.468 MIN=.460	MAX=.468 MIN=.460
F	MAX=.469 MIN=.464	MAX=.469 MIN=.462	MAX=.469 MIN=.462	MAX=.469 MIN=.462	MAX=.469 MIN=.462	MAX=.469 MIN=.462

Examiner 1: H. M. Hawki Level: II Date: 2-19-88

Examiner 2: Gary Jude Level: II Date: 2-19-88

NES REVIEWER: Art Pimm LEVEL III DATE: 2-20-88

QA/QC	ANII

[illegible]

[illegible]

Plant/Unit: NMP #I
ISO: N/A
Comp./Sys.: Torus
Loop: N/A

TORUS THICKNESS

Data Pkg.: 2434-88A-131
Page 12 of 22
Exam Item: Torus Grid #3
Procedure: 80A2434
Rev./F.C.: 3 / FC-1,2
Title: UT Exam Thickness

Calibration Block: Step Wedge 80C3613
Grid Area: 3 of 5

	7	8	9	10	11	12
A	MAX=.465 MIN=.460	MAX=.465 MIN=.460	MAX=.465 MIN=.460	MAX=.465 MIN=.460	MAX=.465 MIN=.460	MAX=.465 MIN=.460
B	MAX=.468 MIN=.459	MAX=.468 MIN=.459	MAX=.468 MIN=.459	MAX=.468 MIN=.459	MAX=.468 MIN=.459	MAX=.468 MIN=.459
C	MAX=.465 MIN=.459	MAX=.465 MIN=.459	MAX=.465 MIN=.459	MAX=.465 MIN=.459	MAX=.465 MIN=.459	MAX=.465 MIN=.459
D	MAX=.467 MIN=.460	MAX=.467 MIN=.460	MAX=.467 MIN=.460	MAX=.467 MIN=.460	MAX=.467 MIN=.460	MAX=.467 MIN=.460
E	MAX=.468 MIN=.460	MAX=.468 MIN=.460	MAX=.468 MIN=.460	MAX=.468 MIN=.460	MAX=.468 MIN=.460	MAX=.468 MIN=.460
F	MAX=.469 MIN=.462	MAX=.469 MIN=.462	MAX=.469 MIN=.462	MAX=.469 MIN=.462	MAX=.469 MIN=.462	MAX=.469 MIN=.462

Examiner 1: H. M. [signature] Level: II Date: 2-19-88

Examiner 2: [signature] Level: II Date: 2-19-88

NES REVIEWER: [signature] LEVEL: III DATE: 2-20-88

QA/QC	ANII

Plant/Unit: NMP # I
ISO: N/A
Comp./Sys.: Torus
Loop: N/A

TORUS THICKNESS

Data Pkg.: 2434-88A-131
Page 13 of 22
Exam Item: Torus Grid #3
Procedure: 80A2434
Rev./F.C.: 3 / F.C.-1,2
Title: UT Exam Thickness

Calibration Block: [illegible]
Grid Area: 3 of B

	1	2	3	4	5	6
G	MAX=.470 MIN=.460	MAX=.470 MIN=.460	MAX=.470 MIN=.460	MAX=.470 MIN=.460	MAX=.470 MIN=.460	MAX=.470 MIN=.460
H	MAX=.470 MIN=.461	MAX=.471 MIN=.461	MAX=.470 MIN=.461	MAX=.470 MIN=.461	MAX=.470 MIN=.461	MAX=.470 MIN=.461
I	MAX=.471 MIN=.462	MAX=.471 MIN=.461	MAX=.471 MIN=.461	MAX=.471 MIN=.461	MAX=.471 MIN=.461	MAX=.471 MIN=.461
J	MAX=.470 MIN=.461	MAX=.470 MIN=.461	MAX=.470 MIN=.461	MAX=.470 MIN=.461	MAX=.470 MIN=.461	MAX=.470 MIN=.461
K	MAX=.470 MIN=.460	MAX=.470 MIN=.460	MAX=.470 MIN=.460	MAX=.470 MIN=.460	MAX=.470 MIN=.460	MAX=.470 MIN=.460
L	MAX=.470 MIN=.460	MAX=.470 MIN=.460	MAX=.470 MIN=.460	MAX=.470 MIN=.460	MAX=.470 MIN=.460	MAX=.470 MIN=.460

Examiner 1: [signature] Level: II Date: 2-19-88

Examiner 2: [signature] Level: II Date: 2-19-88

NES REVIEWER: [signature] LEVEL: III DATE: 2-20-88

QA/QC	ANII

Plant/Unit: NMP#I
ISO: N/A
Comp./Sys.: Torus
Loop: N/A

TORUS THICKNESS

Data Pkg.: 2434-88A-131
Page 14 of 22
Exam Item: Torus Grid #3
Procedure: 80A2434
Rev./F.C.: 3 / F.C.-1,2
Title: UT Exam Thickness

Grid Area: 3115

Examiner

	7	8	9	10	11	12
G	MAX= .470 MIN= .460	MAX= .470 MIN= .460	MAX= .470 MIN= .460	MAX= .470 MIN= .460	MAX= .470 MIN= .460	MAX= .470 MIN= .461
H	MAX= .470 MIN= .461	MAX= .470 MIN= .461	MAX= .470 MIN= .461	MAX= .470 MIN= .461	MAX= .470 MIN= .461	MAX= .470 MIN= .461
I	MAX= .471 MIN= .461	MAX= .471 MIN= .461	MAX= .471 MIN= .461	MAX= .471 MIN= .461	MAX= .471 MIN= .461	MAX= .471 MIN= .461
J	MAX= .470 MIN= .461	MAX= .470 MIN= .461	MAX= .470 MIN= .461	MAX= .470 MIN= .461	MAX= .470 MIN= .461	MAX= .470 MIN= .461
K	MAX= .470 MIN= .460	MAX= .470 MIN= .460	MAX= .470 MIN= .460	MAX= .470 MIN= .460	MAX= .470 MIN= .460	MAX= .470 MIN= .460
L	MAX= .470 MIN= .460	MAX= .470 MIN= .460	MAX= .470 MIN= .460	MAX= .470 MIN= .460	MAX= .470 MIN= .460	MAX= .470 MIN= .460

Examiner 1: N. M. Nash Level: II Date: 2-19-88

Examiner 2: [signature] Level: II Date: 2-19-88

NES REVIEWER: [signature] LEVEL: III DATE: 2-20-88

QA/QC:	ANII

Plant/Unit: NMP #I
ISO: N/A
Comp./Sys.: Torus
Loop: N/A

TORUS THICKNESS

Data Pkg.: 2434-88A-131
Page 15 of
Exam Item: Torus Grid #4
Procedure: 80A2434
Rev./F.C.: 3 / F.C.-1, 2
Title: UT Exam Thickness

Calibration No.: Step Wedge ...
Grid Area: 4 of 5

	1	2	3	4	5	6
A	MAX= .469 MIN= .460	MAX= .468 MIN= .463	MAX= .465 MIN= .455	MAX= .465 MIN= .455	MAX= .465 MIN= .455	MAX= .465 MIN= .455
B	MAX= .469 MIN= .456	MAX= .469 MIN= .456	MAX= .469 MIN= .456	MAX= .469 MIN= .456	MAX= .469 MIN= .456	MAX= .469 MIN= .456
C	MAX= .467 MIN= .460	MAX= .466 MIN= .456	MAX= .466 MIN= .456	MAX= .466 MIN= .456	MAX= .466 MIN= .456	MAX= .466 MIN= .456
D	MAX= .466 MIN= .458	MAX= .466 MIN= .458	MAX= .466 MIN= .458	MAX= .466 MIN= .458	MAX= .466 MIN= .458	MAX= .466 MIN= .458
E	MAX= .465 MIN= .453	MAX= .461 MIN= .455	MAX= .464 MIN= .455	MAX= .464 MIN= .455	MAX= .464 MIN= .455	MAX= .464 MIN= .455
F	MAX= .466 MIN= .455	MAX= .465 MIN= .458	MAX= .465 MIN= .458	MAX= .465 MIN= .458	MAX= .465 MIN= .458	MAX= .465 MIN= .458

Examiner 1: H.M. Hawkins Level: II Date: 2-19-88

Examiner 2: Gary Jacobs Level: II Date: 2-19-88

NES REVIEWER: [illegible] LEVEL: III DATE: 2-20-88

QA/QC	ANII

Plant/Unit: NMP # I
ISO: N/A
Comp./Sys.: Torus
Loop: N/A

TORUS THICKNESS

Data Pkg.: 2434-88A-131
Page 16 of 22
Exam Item: Torus Grid #4
Procedure: 80A2434
Rev./F.C.: 3 / F.C.-1,2
Title: UT Exam Thickness

Calibration Block: Step Wedge ...3675
Grid Area: 4 of 5

	7	8	9	10	11	12
A	MAX= .465 MIN= .455	MAX= .465 MIN= .455	MAX= .465 MIN= .455	MAX= .465 MIN= .455	MAX= .465 MIN= .455	MAX= .465 MIN= .455
B	MAX= .469 MIN= .456	MAX= .469 MIN= .456	MAX= .469 MIN= .456	MAX= .469 MIN= .456	MAX= .469 MIN= .456	MAX= .469 MIN= .456
C	MAX= .466 MIN= .456	MAX= .466 MIN= .456	MAX= .466 MIN= .456	MAX= .466 MIN= .456	MAX= .466 MIN= .456	MAX= .466 MIN= .456
D	MAX= .466 MIN= .458	MAX= .466 MIN= .458	MAX= .466 MIN= .458	MAX= .466 MIN= .458	MAX= .466 MIN= .458	MAX= .466 MIN= .458
E	MAX= .464 MIN= .455	MAX= .464 MIN= .455	MAX= .464 MIN= .455	MAX= .464 MIN= .455	MAX= .464 MIN= .455	MAX= .464 MIN= .455
F	MAX= .465 MIN= .458	MAX= .465 MIN= .460	MAX= .465 MIN= .460	MAX= .465 MIN= .460	MAX= .465 MIN= .460	MAX= .465 MIN= .460

Examiner 1: H. M. Hawk... Level: II Date: 2-19-88

Examiner 2: [signature] Level: II Date: 2-19-88

RES REVIEWER: [signature] LEVEL: III DATE: 2-20-88

QA/QC	ANII

Plant/Unit: N M P # I
ISO: N/A
Comp./Sys.: Torus
Loop: N/A

TORUS THICKNESS

Data Pkg.: 2434-88A-131
Page 17 of 32
Exam Item: Torus Grid #4
Procedure: 80A2434
Rev./F.C.: 3 / FC-1,2
Title: UT Exam Thickness

Grid Area: [illegible]

	1	2	3	4	5	6
G	MAX= .466 MIN= .454	MAX= .465 MIN= .452	MAX= .465 MIN= .452	MAX= .465 MIN= .452	MAX= .465 MIN= .452	MAX= .465 MIN= .452
H	MAX= .465 MIN= .452	MAX= .465 MIN= .452	MAX= .465 MIN= .452	MAX= .465 MIN= .452	MAX= .465 MIN= .452	MAX= .465 MIN= .452
I	MAX= .466 MIN= .454	MAX= .466 MIN= .454	MAX= .466 MIN= .454	MAX= .466 MIN= .454	MAX= .466 MIN= .454	MAX= .466 MIN= .454
J	MAX= .463 MIN= .454	MAX= .463 MIN= .454	MAX= .463 MIN= .454	MAX= .463 MIN= .454	MAX= .463 MIN= .454	MAX= .463 MIN= .454
K	MAX= .463 MIN= .458	MAX= .463 MIN= .458	MAX= .463 MIN= .458	MAX= .463 MIN= .458	MAX= .463 MIN= .458	MAX= .463 MIN= .458
L	MAX= .462 MIN= .454	MAX= .462 MIN= .454	MAX= .462 MIN= .454	MAX= .462 MIN= .454	MAX= .462 MIN= .454	MAX= .462 MIN= .454

Examiner 1: H. McHawkin Level: II Date: 2-19-88

Examiner 2: Gary Guide Level: II Date: 2-19-88

NES REVIEWER: [illegible] LEVEL: III DATE: 2-20-88

QA/QC	ANII

Plant/Unit: N M P #I
ISO: N/A
Comp./Sys.: Torus
Loop: N/A

TORUS THICKNESS

Data Pkg.: 2434-88A-131
Page 18 **of** 22
Exam Item: Torus Grid #4
Procedure: 80A 2434
Rev./F.C.: 3 / FC-1,2
Title: UT Exam Thickness

[illegible]
Grid/Area: 4 of 5

	7	8	9	10	11	12
G	MAX= .465 MIN= .452	MAX= .465 MIN= .452	MAX= .465 MIN= .452	MAX= .465 MIN= .452	MAX= .465 MIN= .452	MAX= .465 MIN= .452
H	MAX= .465 MIN= .452	MAX= .465 MIN= .452	MAX= .465 MIN= .452	MAX= .465 MIN= .452	MAX= .465 MIN= .452	MAX= .465 MIN= .452
I	MAX= .466 MIN= .454	MAX= .466 MIN= .454	MAX= .466 MIN= .454	MAX= .466 MIN= .454	MAX= .466 MIN= .454	MAX= .466 MIN= .454
J	MAX= .463 MIN= .454	MAX= .463 MIN= .454	MAX= .463 MIN= .454	MAX= .463 MIN= .454	MAX= .463 MIN= .454	MAX= .463 MIN= .454
K	MAX= .463 MIN= .458	MAX= .463 MIN= .458	MAX= .463 MIN= .458	MAX= .463 MIN= .458	MAX= .463 MIN= .458	MAX= .463 MIN= .458
L	MAX= .462 MIN= .454	MAX= .462 MIN= .454	MAX= .462 MIN= .454	MAX= .462 MIN= .454	MAX= .462 MIN= .454	MAX= .462 MIN= .454

Examiner 1: H. M. Hawks **Level:** II **Date:** 2-19-88

Examiner 2: Gary Jude **Level:** II **Date:** 2-19-88

NES REVIEWER Art Pecman **LEVEL** III **DATE** 2-20-88

QA/QC	ANII

Plant/Unit: NMP # I
ISO: N/A
Comp./Sys.: Torus
Loop: N/A

TORUS THICKNESS

Data Pkg.: 2434-88A-131
Page 19 of 22
Exam Item: Torus Grid # 5
Procedure: 80A 2434
Rev./F.C.: 3 / F.C.-1,2
Title: UT Exam Thickness

Calibration: Step Block 80...
Grid area: 5 of 5

	1	2	3	4	5	6
A	MAX=.465 MIN=.462	MAX=.465 MIN=.462	MAX=.465 MIN=.462	MAX=.465 MIN=.462	MAX=.465 MIN=.462	MAX=.465 MIN=.462
B	MAX=.462 MIN=.459	MAX=.462 MIN=.459	MAX=.462 MIN=.459	MAX=.462 MIN=.452	MAX=.462 MIN=.452	MAX=.462 MIN=.452
C	MAX=.464 MIN=.453	MAX=.462 MIN=.459	MAX=.465 MIN=.459	MAX=.465 MIN=.456	MAX=.465 MIN=.456	MAX=.465 MIN=.456
D	MAX=.459 MIN=.451	MAX=.465 MIN=.452	MAX=.465 MIN=.452	MAX=.465 MIN=.452	MAX=.465 MIN=.452	MAX=.465 MIN=.452
E	MAX=.465 MIN=.452	MAX=.465 MIN=.452	MAX=.465 MIN=.452	MAX=.465 MIN=.452	MAX=.465 MIN=.452	MAX=.465 MIN=.452
F	MAX=.465 MIN=.452	MAX=.465 MIN=.452	MAX=.465 MIN=.452	MAX=.465 MIN=.452	MAX=.465 MIN=.452	MAX=.465 MIN=.452

Examiner 1: H. M. Heck Level: II Date: 2-19-88

Examiner 2: Gary Jude Level: II Date: 2-19-88

ES REVIEWER: [signature] LEVEL: III DATE: 2-20-88

QA/QC	ANII

Plant/Unit: NMP # I

ISO: N/A

Comp./Sys.: Torus

Loop: N/A

TORUS THICKNESS

Data Pkg.: 2434-88A-131

Page 20 of 22

Exam Item: Torus Grid #5

Procedure: 80A2434

Rev./F.C.: 3 / F.C.-1,2

Title: UT Exam Thickness

[illegible]

Grid Area: 5 of 5

	7	8	9	10	11	12
A	MAX=.465 MIN=.462	MAX=.465 MIN=.462	MAX=.465 MIN=.462	MAX=.465 MIN=.462	MAX=.465 MIN=.462	MAX=.465 MIN=.462
B	MAX=.462 MIN=.452	MAX=.462 MIN=.452	MAX=.462 MIN=.452	MAX=.462 MIN=.452	MAX=.462 MIN=.452	MAX=.462 MIN=.452
C	MAX=.464 MIN=.456	MAX=.465 MIN=.456	MAX=.465 MIN=.456	MAX=.465 MIN=.456	MAX=.465 MIN=.456	MAX=.465 MIN=.456
D	MAX=.465 MIN=.452	MAX=.465 MIN=.452	MAX=.465 MIN=.452	MAX=.465 MIN=.452	MAX=.465 MIN=.452	MAX=.465 MIN=.452
E	MAX=.465 MIN=.452	MAX=.465 MIN=.452	MAX=.465 MIN=.452	MAX=.465 MIN=.452	MAX=.465 MIN=.452	MAX=.465 MIN=.452
F	MAX=.465 MIN=.452	MAX=.465 MIN=.452	MAX=.465 MIN=.452	MAX=.465 MIN=.452	MAX=.465 MIN=.452	MAX=.465 MIN=.452

Examiner 1: H.M. Hawkins Level: II Date: 2-19-88

Examiner 2: [illegible] Level: II Date: 2-19-88

NES REVIEWER: [illegible] LEVEL: III DATE: 2-20-88

QA/QC	ANII

Plant/Unit: NMP # I
ISO: N/A
Comp./Sys.: Torus
Loop: N/A

TORUS THICKNESS

Data Pkg.: 2434-88A-131
Page 21 of 22
Exam Item: Torus Grid # 5
Procedure: 80A2434
Rev./F.C.: 3 / F.C.-1,2
Title: UT Exam Thickness

Grid Area: # 5 of 5

	1	2	3	4	5	6
G	MAX=.461 MIN=.449	MAX=.465 MIN=.452	MAX=.465 MIN=.452	MAX=.465 MIN=.452	MAX=.465 MIN=.452	MAX=.465 MIN=.452
H	MAX=.459 MIN=.455	MAX=.459 MIN=.455	MAX=.459 MIN=.455	MAX=.459 MIN=.455	MAX=.459 MIN=.455	MAX=.459 MIN=.455
I	MAX=.465 MIN=.452	MAX=.465 MIN=.452	MAX=.465 MIN=.452	MAX=.465 MIN=.452	MAX=.465 MIN=.452	MAX=.465 MIN=.452
J	MAX=.478 MIN=.465	MAX=.465 MIN=.452	MAX=.465 MIN=.455	MAX=.465 MIN=.455	MAX=.465 MIN=.455	MAX=.465 MIN=.455
K	MAX=.465 MIN=.452	MAX=.465 MIN=.452	MAX=.465 MIN=.452	MAX=.465 MIN=.452	MAX=.465 MIN=.452	MAX=.465 MIN=.452
L	MAX=.464 MIN=.452	MAX=.465 MIN=.452	MAX=.465 MIN=.452	MAX=.465 MIN=.452	MAX=.465 MIN=.452	MAX=.465 MIN=.452

Examiner 1: H.M. Hawkins Level: II Date: 2-19-88

Examiner 2: Gary Jude Level: II Date: 2-19-88

NES REVIEWER: [signature] LEVEL: III DATE: 2-20-88

QA/QC	ANII

Plant/Unit: NMP#I
ISO: N/A
Comp./Sys.: Torus
Loop: N/A

TORUS THICKNESS

Data Pkg.: 2434 88A-131
Page 22 of 22
Exam Item: Torus Grid #5
Procedure: 80A2434
Rev./F.C.: 3/ F.C.-1,2
Title: UT Exam Thickness

Grid Area: 5 [illegible]

	7	8	9	10	11	12
G	MAX=.465 MIN=.452	MAX=.465 MIN=.452	MAX=.465 MIN=.452	MAX=.465 MIN=.452	MAX=.465 MIN=.452	MAX=.465 MIN=.452
H	MAX=.459 MIN=.455	MAX=.459 MIN=.455	MAX=.459 MIN=.455	MAX=.459 MIN=.455	MAX=.459 MIN=.455	MAX=.459 MIN=.455
I	MAX=.465 MIN=.452	MAX=.465 MIN=.452	MAX=.465 MIN=.452	MAX=.465 MIN=.452	MAX=.465 MIN=.452	MAX=.465 MIN=.452
J	MAX=.465 MIN=.455	MAX=.465 MIN=.455	MAX=.465 MIN=.455	MAX=.465 MIN=.455	MAX=.465 MIN=.455	MAX=.465 MIN=.455
K	MAX=.465 MIN=.452	MAX=.465 MIN=.452	MAX=.465 MIN=.452	MAX=.465 MIN=.452	MAX=.465 MIN=.452	MAX=.465 MIN=.452
L	MAX=.465 MIN=.452	MAX=.465 MIN=.452	MAX=.465 MIN=.452	MAX=.465 MIN=.452	MAX=.465 MIN=.452	MAX=.465 MIN=.452

Examiner 1: H. McHale [illegible] Level: II Date: 2-19-88

Examiner 2: [illegible] Level: II Date: 2-19-88

NES REVIEWER: [illegible] LEVEL: II DATE: 2-20-88

QA/QC	ANII

Plant/Unit: NINE MILE POINT UNIT ONE
ISO: SEE ATTACHED SHEETS & DRWGS
Comp./Sys.: TORUS
Loop: N/A

ULTRASONIC EXAMINATION CALIBRATION SHEET

Data Pkg.: 2433-88A-85
Page 1 of 2
Exam Item: GRID 0 DEGREE-TOP
Procedure: 80A2433
Rev./F.C.: 3 / FC 1
Title: UT EXAM - STEAM EROSION

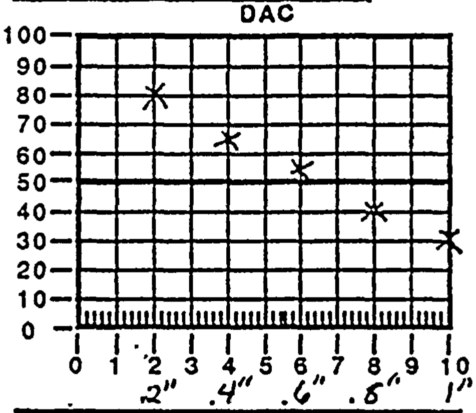
INSTRUMENT SETTINGS			
Serial #	213220-4		
MFG./Model #	KKB-USL-48		
Sweep Length	6.50		
Sweep Delay	6.00		
Pulse Length/Damp.	OFF		
Freq.	5	Range	.5"
DEC/Gate	OFF	Reject	OFF
Jacks	R&T		
Mode Select	DUAL		
Coarse Gain	40	Fine	18
Scan Sens.	80% BR		

SEARCH UNIT	
Serial #	A31357
Brand	KB-AEROTECH
Frequency	5.0 mHz
Size/Shape	.25" ROUND
Style/Type	GAMMA
Fixture	N/A
Cable	2X6' SELF CONT.
Couplant Batch	8764
Couplant Brand	ULTRAGEL II

Calibration Block	NMP-1SW-1020-CS
Block Thickness	.10-1.0"/1.1-2.0"
Comp. Thickness	N/A
Block Temperature	63 °F
Comp. Temperature	62 °F
Thermometer	KB108
Surface	OD

Calibration Checks	:Time
Initial Calib.	1300
Intermediate	1600
Intermediate	1800
Intermediate	N/A
Final Calib.	2000
Calibration Date	4/20/88

DAC



DAC	Reflector	%FSH	Position
1	2"	80%	2
2	4"	65%	4
3	6"	55%	6
4	8"	40%	8
5	1"	30%	10
6	N/A	N/A	N/A

CRT Calibrated In	
DEPTH OF METAL	
Each Major Screen Div. =	.10"

INSTRUMENT LINEARITY					
1	100	50	6	50	25
2	90	45	7	40	20
3	80	40	8	30	15
4	70	35	9	20	10
5	60	30			

AMPLITUDE LINEARITY	
80 - 6 = 40	80 - 12 = 20
40 + 6 = 80	20 + 12 = 80

Scan Angle	0 DEGREES
Meas. Angle	0 DEGREES
Mode	LONG
Calibration	DEPTH
Scan Area	GRID

Exam Item: GRID 0 DEGREE-TOP

Comments/Reasons for Incomplete Exams
GRIDS 0 DEGREE TOP

Remarks
CLEANED WITH DEMIN WATER & TSP
GRID SHEET PER CW GRANT NOT LIKE ACTUAL GRID THAT IS CONSTRUCTED BY C.B.I.
SEE ATTACHED SHEETS.

Examiner 1: H. M. Hawkins — HARRY M. HAWKINS LEVEL II Level: II Date: 4-20-88
WR# N/A
NCR# N/A
TRAVELER RX6m-88-002

Examiner 2: N/A Level: Date:

NES REVIEWER: Briano LEVEL: III DATE: 4/21/88

FOR NMPC INFO.
4/21/88
WELD ACCEPTABLE?
YES NO

QA/QC

ANII

ANII INITIAL REVIEW:
SIGNATURE DATE

ANII FINAL ACCEPTANCE:
SIGNATURE DATE 4/21/88

NMPC ENG.
DISP. REQ.
YES NO

0° Top

	1	2	3	4	5	6	7	8	9	10	11	12
A	.469	.467	.465	.465	.468	.472	.470	.470	.471	.470	.470	.483
	.455	.454	.461	.454	.457	.455	.456	.458	.456	.455	.461	.460
B	.468	.466	.467	.467	.470	.470	.466	.468	.468	.471	.466	.465
	.457	.453	.452	.452	.455	.453	.455	.455	.461	.455	.459	.452
C	.465	.465	.465	.465	.464	.465	.467	.470	.472	.470	.465	.465
	.455	.452	.458	.453	.450	.452	.455	.449	.452	.462	.460	.449
D	.464	.462	.465	.463	.468	.466	.466	.465	.465	.467	.465	.462
	.452	.449	.450	.460	.455	.459	.439	.444	.453	.457	.456	.457
E	.468	.463	.466	.462	.465	.465	.462	.465	.462	.466	.462	.465
	.452	.450	.455	.452	.461	.457	.453	.463	.459	.449	.457	.454
F	.466	.466	.462	.466	.467	.467	.464	.469	.465	.463	.470	.470
	.455	.452	.454	.458	.452	.452	.452	.453	.460	.456	.449	.456
G	.464	.462	.463	.464	.466	.462	.462	.463	.463	.463	.461	.470
	.457	.449	.455	.452	.468	.454	.452	.459	.456	.456	.458	.454
H	.469	.465	.465	.462	.463	.462	.463	.466	.462	.463	.462	.465
	.457	.455	.452	.455	.460	.455	.454	.455	.459	.460	.458	.455
I	.465	.464	.465	.463	.463	.463	.462	.463	.463	.462	.462	.463
	.453	.453	.453	.461	.453	.452	.452	.456	.456	.457	.454	.451
J	.461	.467	.467	.462	.461	.468	.461	.460	.470	.470	.467	.472
	.453	.458	.457	.455	.458	.446	.452	.457	.457	.458	.455	.457
K	.464	.463	.462	.463	.462	.463	.461	.460	.460	.465	.463	.465
	.453	.461	.459	.456	.449	.448	.454	.456	.454	.461	.456	.455
L	.462	.462	.466	.465	.463	.465	.465	.465	.464	.464	.470	.471
	.457	.453	.456	.445	.456	.453	.459	.457	.462	.462	.462	.460

Record min/max thicknesses three decimal places.
H. McHarker III 4-20-88

Briano III 4/21/88

ANII INITIAL REVIEW:
SIGNATURE DATE

ANII FINAL ACCEPTANCE:
R Botting 4/21/88
SIGNATURE DATE

Plant/Unit: NINE MILE POINT UNIT ONE
ISO: SEE ATTACHED SHEETS & DRWGS
Comp./Sys.: TORUS
Loop: N/A

ULTRASONIC EXAMINATION CALIBRATION SHEET

Data Pkg.: 2433-88A-66
Page 1 of 2
Exam Item: GRID 0 DEGREE- BOTTOM
Procedure: 80A2433
Rev./F.C.: 3 / FC 1
Title: UT EXAM - STEAM EROSION

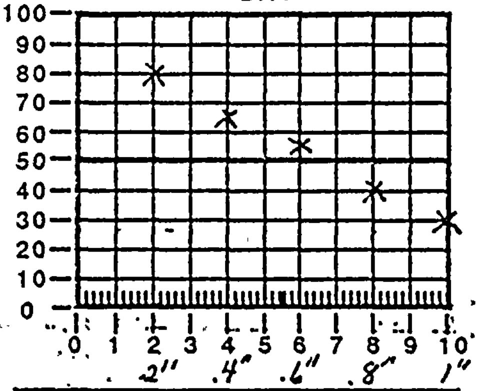
INSTRUMENT SETTINGS			
Serial #	213220-4		
MFG./Model #	KKB-USL-48		
Sweep Length	6.50		
Sweep Delay	6.00		
Pulse Length/Damp.	OFF		
Freq.	5	Range	.5"
DEC/Gate	OFF	Reject	OFF
Jacks	R&T		
Mode Select	DUAL		
Coarse Gain	40	Fine	18
Scan Sens.	80% BR		

SEARCH UNIT	
Serial #	A31357
Brand	KB-AEROTECH
Frequency	5.0 mHz
Size/Shape	.25" ROUND
Style/Type	GAMMA
Fixture	N/A
Cable	2X6' SELF CONT.
Couplant Batch	8764
Couplant Brand	ULTRAGEL II

Calibration Block	NMP-1SW-1020-CS
Block Thickness	.10-1.0"/1.1-2.0"
Comp. Thickness	N/A
Block Temperature	63 °F
Comp. Temperature	62 °F
Thermometer	KB108
Surface	CD

Calibration Checks	:Time
Initial Calib.	1300
Intermediate	1600
Intermediate	1800
Intermediate	N/A
Final Calib.	2000
Calibration Date	4/20/88

DAC



DAC	Reflector	%FSH	Position
1	2"	80%	2
2	4"	65%	4
3	6"	55%	6
4	8"	40%	8
5	1"	30%	10
6	N/A	N/A	N/A

INSTRUMENT LINEARITY					
1	100	50	6	50	25
2	90	45	7	40	20
3	80	40	8	30	15
4	70	35	9	20	10
5	60	30			

AMPLITUDE LINEARITY	
80 - 6 = 40	80 - 12 = 20
40 + 6 = 80	20 + 12 = 80

CRT Calibrated- In: DEPTH OF METAL
Each Major Screen Div. = .10"

Scan Angle	0 DEGREES
Meas. Angle	0 DEGREES
Mode	LONG
Calibration	DEPTH
Scan Area	GRID

Exam Item: GRID 0 DEGREE- BOTTOM

Comments/Reasons for Incomplete Exams:
GRIDS 0 DEGREE BOTTOM

Remarks:
CLEANED WITH DEMIN WATER & TSP.
GRID SHEET PER CW GRANT NOT LIKE ACTUAL GRID THAT IS CONSTRUCTED BY C.B.I.
SEE ATTACHED SHEETS.

Examiner 1: H. M. Hawkins Level: II Date: 4-20-88
HARRY M. HAWKINS LEVEL II

WR# N/A
NCR# N/A
TRAVELER 0x8m-88-002

Examiner 2: N/A Level: Date:

NES REVIEWER: Briano LEVEL: III DATE: 4/21/88

RB 4/21/88
FOR NMPC INFO.

WELD ACCEPTABLE? YES N/A NO N/A

QA/QC

ANII
ANII INITIAL REVIEW:
SIGNATURE DATE
ANII FINAL ACCEPTANCE:
R. Bettinger 4/21/88
SIGNATURE DATE

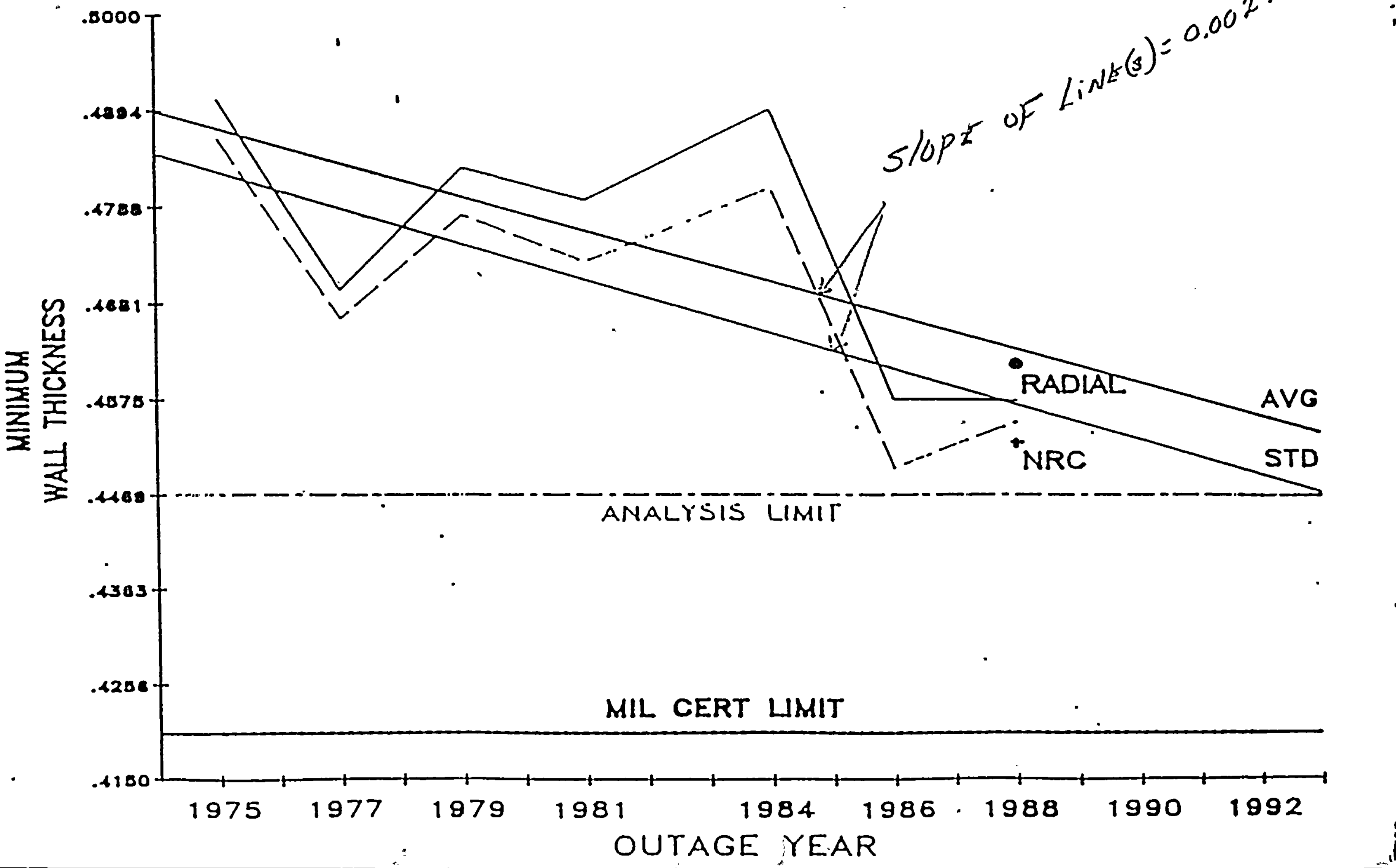
NMPC ENG. DISP. REQ. YES N/A NO ✓

CALC # M79-81-MΦΦ1 REV Φ PAGE 6

NINE MILE POINT UNIT 1

MINIMUM TORUS WALL THICKNESS

AREA NUMBER ONE



[illegible]

0° BOTTOM

	1	2	3	4	5	6	7	8	9	10	11	12
A	.469 .465	.470 .464	.470 .465	.471 .466	.469 .463	.474 .466	.470 .464	.470 .465	.473 .465	.470 .464	.472 .464	.472 .464
B	.470 .465	.472 .465	.475 .463	.470 .462	.470 .460	.469 .464	.470 .464	.470 .463	.471 .462	.472 .463	.473 .464	.471 .463
C	.469 .465	.472 .464	.474 .463	.472 .463	.472 .463	.470 .464	.470 .464	.471 .462	.470 .463	.470 .463	.470 .462	.472 .464
D	.472 .466	.470 .466	.472 .464	.472 .465	.470 .465	.471 .465	.471 .463	.472 .463	.472 .466	.472 .464	.472 .462	.471 .463
E	.470 .462	.473 .462	.472 .465	.474 .464	.474 .464	.475 .466	.474 .465	.473 .462	.472 .463	.472 .464	.469 .462	.470 .462
F →	.531 .462	.565 .465	.545 .462	.543 .463	.550 .464	.530 .469	.545 .466	.537 .462	.556 .466	.521 .466	.531 .467	.523 .462
weld → G	.531 .453	.565 .463	.545 .454	.543 .458	.550 .458	.530 .460	.545 .460	.537 .462	.556 .466	.521 .459	.531 .458	.523 .459
H	.470 .461	.472 .462	.469 .464	.471 .463	.473 .465	.472 .462	.469 .463	.469 .465	.468 .465	.470 .465	.470 .462	.470 .464
I	.475 .463	.472 .463	.472 .463	.473 .462	.470 .464	.470 .462	.470 .463	.469 .465	.469 .464	.469 .462	.470 .463	.473 .466
J	.470 .462	.469 .464	.468 .466	.470 .465	.472 .465	.470 .462	.469 .463	.469 .462	.470 .462	.469 .462	.472 .463	.472 .465
K	.470 .464	.473 .463	.472 .462	.472 .464	.470 .466	.472 .463	.471 .464	.472 .463	.469 .465	.471 .465	.472 .463	.470 .463
L	.470 .463	.473 .464	.472 .462	.471 .463	.474 .462	.469 .466	.475 .462	.473 .462	.472 .463	.474 .462	.473 .463	.472 .461

Record min/max thicknesses three decimal places.

H. A. Hanlin II 4-20-88

Briano III 4/21/88

ANII INITIAL REVIEW:

SIGNATURE DATE

ANII FINAL ACCEPTANCE:

R. Blethrya 4/21/88

SIGNATURE DATE

Plant/Unit: NINE MILE POINT UNIT ONE
ISO: SEE ATTACHED SHEETS & DRWGS
Comp./Sys.: TORUS
Loop: N/A

ULTRASONIC EXAMINATION CALIBRATION SHEET

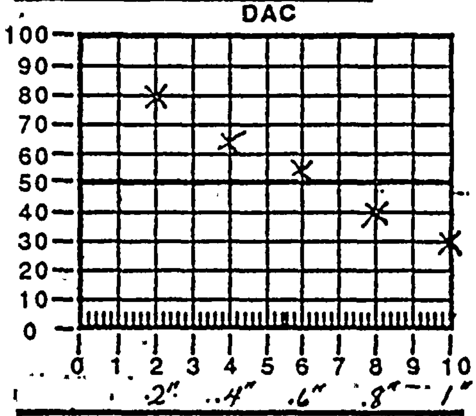
Data Pkg.: 2433-88A-67
Page 1 of 2
Exam Item: GRID 90 DEGREE TOP
Procedure: 80A2433
Rev./F.C.: 3 / FC 1
Title: UT EXAM - STEAM EROSION

INSTRUMENT SETTINGS			
Serial #	213220-4		
MFG./Model #	KKB-USL-48		
Sweep Length	6.50		
Sweep Delay	6.00		
Pulse Length/Damp.	OFF		
Freq.	5	Range	.5"
DEC/Gate	OFF	Reject	OFF
Jacks	R&T		
Mode Select	DUAL		
Coarse Gain	40	Fine	18
Scan Sens.	80% BR		

SEARCH UNIT	
Serial #	A31357
Brand	KB-AEROTECH
Frequency	5.0 mHz
Size/Shape	.25" ROUND
Style/Type	GAMMA
Fixture	N/A
Cable	2X6' SELF CONT.
Couplant Batch	8764
Couplant Brand	ULTRAGEL II

Calibration Block	NMP-1SW-1020-CS
Block Thickness	.10-1.0"/1.1-2.0"
Comp. Thickness	N/A
Block Temperature	63 °F
Comp. Temperature	62 °F
Thermometer	KB108
Surface	OD

DAC



DAC			
	Reflector	%FSH	Position
1	2"	80%	2
2	4"	65%	4
3	6"	55%	6
4	8"	40%	8
5	1"	30%	10
6	N/A	N/A	N/A

Calibration Checks	:Time
Initial Calib.	1300
Intermediate	1600
Intermediate	1800
Intermediate	N/A
Final Calib.	2000
Calibration Date	4/20/88

CRT Calibrated in
DEPTH OF METAL
Each Major Screen Div. = .10"

INSTRUMENT LINEARITY					
1	100	50	6	50	25
2	90	45	7	40	20
3	80	40	8	30	15
4	70	35	9	20	10
5	60	30			

AMPLITUDE LINEARITY	
80 - 6 = 40	80 - 12 = 20
40 + 6 = 80	20 + 12 = 80

Scan Angle	0 DEGREES
Meas. Angle	0 DEGREES
Mode	LONG
Calibration	DEPTH
Scan Area	GRID

Exam Item	GRID 90 DEGREE TOP

Comments/Reasons for Incomplete Exams
GRIDS 90 DEGREE TOP

Remarks
CLEANED WITH DEMIN WATER & TSP
GRID SHEET PER CW GRANT NOT LIKE ACTUAL GRID THAT IS CONSTRUCTED BY C.B.I.
SEE ATTACHED SHEETS

Examiner 1: H. M. Hawkins HARRY M. HAWKINS LEVEL II Level: II Date: 4-20-88

WR# N/A
NCR# N/A
TRAVELER Exam-88-002

Examiner 2: N/A Level: Date:

NES REVIEWER: Briano LEVEL: III DATE: 4/21/88

[illegible] 4/21/88
FOR NMPC INFO.
WELD ACCEPTABLE? YES ~~NA~~ NO ~~NA~~

NMPC ENG. DISP. REQ. YES ~~NA~~ NO ~~Ø~~

QA/QC

ANII

ANII INITIAL REVIEW:

SIGNATURE DATE

ANII FINAL ACCEPTANCE: R. Blatherwick 4/21/88

SIGNATURE DATE

1125

90° TOP

	1	2	3	4	5	6	7	8	9	10	11	12
A	.461	.462	.464	.471	.465	.463	.466	.463	.464	.465	.466	.469
	.457	.460	.462	.458	.460	.455	.453	.454	.462	.450	.452	.456
B	.464	.475	.465	.462	.465	.467	.466	.471	.469	.467	.465	.469
	.462	.461	.450	.454	.456	.451	.461	.458	.453	.456	.464	.460
C	.463	.465	.471	.470	.465	.465	.465	.469	.465	.464	.462	.471
	.454	.456	.454	.456	.450	.453	.461	.457	.455	.462	.456	.466
D	.462	.465	.464	.462	.465	.463	.460	.475	.466	.466	.462	.469
	.456	.462	.462	.455	.461	.460	.457	.458	.454	.460	.457	.459
E	.466	.469	.470	.475	.466	.466	.469	.470	.468	.469	.470	.468
	.457	.464	.455	.457	.458	.451	.462	.461	.459	.462	.465	.457
F	.465	.465	.469	.465	.467	.468	.463	.462	.464	.470	.468	.470
	.459	.451	.464	.461	.465	.467	.457	.457	.458	.456	.455	.458
G	.470	.471	.465	.469	.468	.470	.472	.467	.463	.463	.465	.462
	.455	.457	.457	.458	.453	.461	.452	.450	.450	.457	.455	.451
H	.469	.462	.462	.462	.468	.467	.468	.469	.468	.465	.465	.468
	.451	.454	.457	.453	.461	.460	.453	.449	.453	.450	.459	.452
I	.465	.462	.462	.461	.462	.464	.463	.464	.466	.463	.461	.461
	.455	.450	.451	.452	.457	.455	.449	.448	.455	.450	.451	.451
J	.461	.462	.460	.462	.465	.465	.466	.469	.469	.466	.461	.467
	.458	.451	.450	.449	.450	.453	.446	.458	.452	.448	.448	.450
K	.465	.463	.463	.465	.462	.461	.465	.465	.465	.462	.466	.461
	.445	.448	.448	.449	.449	.456	.450	.463	.446	.454	.451	.447
L	.465	.466	.463	.463	.466	.469	.467	.462	.461	.461	.463	.462
	.449	.451	.446	.457	.454	.443	.446	.452	.451	.457	.457	.456

Record min/max thicknesses three decimal places.
H. M. Hawki II 4-20-88

Briano III 4/21/88

ANII INITIAL REVIEW:

SIGNATURE DATE

ANII FINAL ACCEPTANCE:
R. Blitheryln 4/21/88
SIGNATURE DATE

Plant/Unit: NINE MILE POINT UNIT ONE
ISO: SEE ATTACHED SHEETS & DRWGS.
Comp./Sys.: TORUS
Loop: N/A

ULTRASONIC EXAMINATION CALIBRATION SHEET

Data Pkg.: 2433-88A-68
Page 1 of 2
Exam Item: GRID 90 DEGREE BOTTOM
Procedure: 80A2433
Rev./F.C.: 3 / FC 1
Title: UT EXAM - STEAM EROSION

INSTRUMENT SETTINGS			
Serial #	213220-4		
MFG./Model #	KKB-USL-48		
Sweep Length	6.50		
Sweep Delay	6.00		
Pulse Length/Damp.	OFF		
Freq.	5	Range	.5"
DEC/Gate	OFF	Reject	OFF
Jacks	R&T		
Mode Select	DUAL		
Coarse Gain	40	Fine	18
Scan Sens.	80% BR		

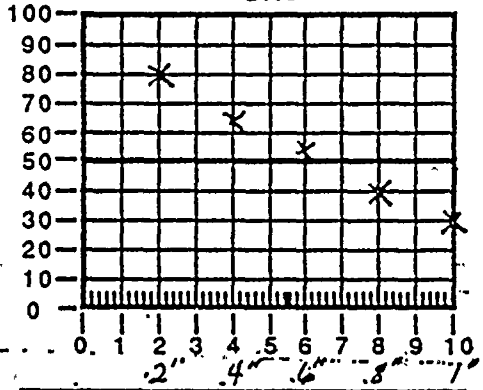
SEARCH UNIT	
Serial #	A31357
Brand	KB-AEROTECH
Frequency	5.0 mHz
Size/Shape	.25" ROUND
Style/Type	GAMMA
Fixture	N/A
Cable	2X6' SELF CONT.
Couplant Batch	8764
Couplant Brand	ULTRAGEL II

Calibration Block	NMP-1SW-1020-CS
Block Thickness	.10-1.0"/1.1-2.0"
Comp. Thickness	N/A
Block Temperature	63 °F
Comp. Temperature	62 °F
Thermometer	KB108
Surface	OD

DAC			
	Reflector	%FSH	Position
1	.2"	80%	2
2	.4"	65%	4
3	.6"	55%	6
4	.8"	40%	8
5	1"	30%	10
6	N/A	N/A	N/A

Calibration Checks	:Time
Initial Calib.	1300
Intermediate	1600
Intermediate	1800
Intermediate	N/A
Final Calib.	2000
Calibration Date	4/20/88

DAC



CRT Calibrated In
DEPTH OF METAL
Each Major Screen Div. = .10"

INSTRUMENT LINEARITY					
1	100	50	6	50	25
2	90	45	7	40	20
3	80	40	8	30	15
4	70	35	9	20	10
5	60	30			

AMPLITUDE LINEARITY			
80 - 6 =	40	80 - 12 =	20
40 + 6 =	80	20 + 12 =	80

Scan Angle	0 DEGREES
Meas. Angle	0 DEGREES
Mode	LONG
Calibration	DEPTH
Scan Area	GRID

Exam Item	GRID 90 DEGREE BOTTOM

Comments/Reasons for Incomplete Exams
GRIDS 90 DEGREE BOTTOM

Remarks
CLEANED WITH DEMIN WATER & TSP.
GRID SHEET PER C.W. GRANT NOT LIKE ACTUAL GRID THAT IS CONSTRUCTED BY C.B.I.
SEE ATTACHED SHEETS.

Examiner 1: H. M. Hawkins HARRY M. HAWKINS LEVEL II Level: II Date: 4-20-88

WR# N/A
NCR# N/A
TRAVELER 2x80-68-C02

Examiner 2: N/A Level: Date:

NES REVIEWER: Briano LEVEL: III DATE: 4/21/88

[signature] 4/21/88
FOR NMP INFO.
WELD ACCEPTABLE? YES NO

QA/QC	ANII
	ANII INITIAL REVIEW: SIGNATURE DATE ANII FINAL ACCEPTANCE: [signature] 4/21/88 SIGNATURE DATE

NMPC ENG. DISP. REQ.
YES NO

90° BOTTOM

	1	2	3	4	5	6	7	8	9	10	11	12
A	.464	.470	.464	.467	.469	.462	.469	.462	.462	.469	.462	.465
	.456	.455	.454	.454	.454	.453	.455	.455	.456	.455	.454	.456
B	.462	.462	.465	.465	.462	.468	.471	.470	.468	.465	.467	.469
	.455	.455	.455	.456	.455	.454	.459	.456	.454	.455	.456	.456
C	.470	.469	.465	.465	.465	.463	.463	.465	.465	.465	.463	.465
	.453	.454	.454	.455	.455	.459	.452	.455	.456	.457	.457	.455
D	.465	.462	.462	.462	.468	.465	.465	.466	.462	.466	.462	.465
	.455	.454	.454	.456	.466	.457	.454	.454	.454	.455	.457	.455
E	.468	.465	.462	.465	.468	.462	.464	.464	.462	.466	.463	.460
	.457	.455	.455	.456	.454	.456	.453	.453	.455	.455	.458	.458
F	.571	.560	.582	.587	.556	.574	.557	.563	.536	.583	.526	.587
	.455	.460	.459	.453	.456	.460	.462	.448	.462	.458	.460	.462
weld → G	.571	.560	.582	.587	.556	.574	.557	.563	.536	.583	.526	.587
	.462	.459	.466	.465	.462	.466	.466	.466	.465	.462	.461	.461
H	.470	.468	.470	.470	.470	.471	.471	.479	.472	.469	.470	.472
	.465	.460	.461	.464	.463	.463	.462	.465	.464	.462	.465	.462
I	.469	.469	.470	.472	.472	.468	.470	.470	.471	.471	.468	.468
	.440	.462	.462	.461	.460	.461	.462	.462	.461	.461	.462	.460
J	.471	.469	.470	.470	.470	.470	.468	.471	.468	.468	.468	.470
	.460	.462	.462	.462	.462	.462	.460	.462	.463	.460	.462	.463
K	.468	.469	.468	.468	.468	.469	.469	.470	.469	.468	.471	.469
	.462	.461	.462	.462	.467	.467	.460	.463	.461	.460	.462	.462
L	.471	.470	.469	.469	.471	.471	.471	.470	.468	.468	.470	.469
	.462	.464	.464	.462	.463	.463	.461	.461	.461	.465	.467	.461

Record min/max thicknesses three decimal places.
H. M. Hawk[illegible] II 4-20-88

ANII INITIAL REVIEW:

SIGNATURE DATE

ANII FINAL ACCEPTANCE:
[illegible signature] 4/21/88
SIGNATURE DATE

Briano III 4/21/88

Plant/Unit: NINE MILE POINT UNIT ONE
ISO: SEE ATTACHED SHEETS & DRWGS.
Comp./Sys.: TORUS
Loop: N/A

ULTRASONIC EXAMINATION CALIBRATION SHEET

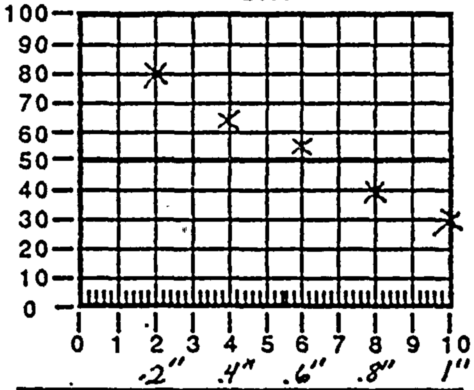
Data Pkg.: 2433-88A-72
Page 1 of 2
Exam Item: GRID 180 DEGREE TOP
Procedure: 80A2433
Rev./F.C.: 3 / FC 1
Title: UT EXAM - STEAM EROSION

INSTRUMENT SETTINGS			
Serial #	213220-4		
MFG./Model #	KKB-USL-48		
Sweep Length	6.50		
Sweep Delay	6.00		
Pulse Length/Damp.	OFF		
Freq.	5	Range	.5"
DEC/Gate	OFF	Reject	OFF
Jacks	R&T		
Mode Select	DUAL		
Coarse Gain	40	Fine	18
Scan Sens.	80% BR		

SEARCH UNIT	
Serial #	A31357
Brand	KB-AEROTECH
Frequency	5.0 mHz
Size/Shape	.25" ROUND
Style/Type	GAMMA
Fixture	N/A
Cable	2X6' SELF CONT.
Couplant Batch	8764
Couplant Brand	ULTRAGEL II

Calibration Block	NMP-1SW-1020-CS
Block Thickness	.10-1.0"/1.1-2.0"
Comp. Thickness	N/A
Block Temperature	63 °F
Comp. Temperature	62 °F
Thermometer	KB108
Surface	OD

DAC



DAC	Reflector	%FSH	Position
1	.2"	80%	2
2	.4"	65%	4
3	.6"	55%	6
4	.8"	40%	8
5	1"	30%	10
6	N/A	N/A	N/A

Calibration Checks	:Time
Initial Calib.	1300
Intermediate	1600
Intermediate	1800
Intermediate	N/A
Final Calib.	2000
Calibration Date	4/20/88

CRT Calibrated In
DEPTH OF METAL
Each Major Screen Div. = .10"

INSTRUMENT LINEARITY					
1	100	50	6	50	25
2	90	45	7	40	20
3	80	40	8	30	15
4	70	35	9	20	10
5	60	30			

AMPLITUDE LINEARITY	
80 - 6 = 40	80 - 12 = 20
40 + 6 = 80	20 + 12 = 80

Scan Angle	0 DEGREES
Meas. Angle	0 DEGREES
Mode	LONG
Calibration	DEPTH
Scan Area	GRID

Exam Item: GRID 180 DEGREE TOP

Comments/Reasons for Incomplete Exams
GRIDS 180 DEGREE TOP

Remarks
CLEANED WITH DEMIN WATER & TSP
GRID SHEET PER CW GRANT NOT LIKE ACTUAL GRID THAT IS CONSTRUCTED BY C.B.I.
SEE ATTACHED SHEETS.

Examiner 1: H. M. Hawkins Level: II Date: 4-20-88
HARRY M. HAWKINS LEVEL II

WR# N/A
NCR# N/A
TRAVELER RKBM-88-002

Examiner 2: ____ Level: ____ Date: ____
N/A

NES REVIEWER: Briano LEVEL: III DATE: 4/21/88

FOR NMPC INFO
[illegible] 4/21/88
WELD ACCEPTABLE?
YES [illegible] NO [illegible]

NMPC ENG.
DISP. REQ.
YES NO

QA/QC

ANII
ANII INITIAL REVIEW:
SIGNATURE DATE
ANII FINAL ACCEPTANCE:
[signature] 4/21/88
SIGNATURE DATE

1125

180° TOP GRID BAY 10 H.M.H. 4-20-88

INSTRUMENT SETTINGS

	1	2	3	4	5	6	7	8	9	10	11	12
A	.470	.470	.472	.472	.471	.472	.472	.473	.474	.472	.473	.478
	.452	.458	.464	.458	.465	.463	.463	.468	.461	.457	.466	.462
B	.475	.474	.474	.477	.477	.481	.477	.470	.473	.472	.471	.472
	.460	.450	.468	.454	.470	.465	.462	.467	.466	.463	.463	.461
C	.477	.474	.479	.475	.485	.471	.470	.471	.472	.472	.473	.472
	.460	.469	.470	.462	.468	.465	.469	.470	.468	.459	.470	.463
D	.473	.474	.481	.474	.477	.479	.471	.472	.470	.474	.474	.474
	.463	.465	.460	.462	.468	.466	.453	.466	.466	.470	.464	.464
E	.477	.477	.469	.471	.476	.475	.470	.472	.471	.475	.470	.470
	.470	.470	.468	.466	.466	.456	.461	.462	.463	.465	[illegible]	.466
F	.484	.475	.475	.480	.479	.472	.470	.473	.475	.472	.477	.472
	.469	.469	.465	.458	.458	.462	.460	.465	.470	.458	.459	.469
G	.471	.471	.477	.477	.472	.474	.472	.470	.475	.470	.470	.471
	.468	.454	.467	.465	.469	.460	.459	.464	.457	.462	.466	.465
H	.474	.472	.473	.470	.470	.470	.472	.470	.474	[illegible]	[illegible]	.474
	.468	.465	.463	.454	.454	.456	.465	.468	.463	[illegible]	[illegible]	[illegible]
I	.470	.470	.469	.470	.470	.470	.471	.472	.470	[illegible]	[illegible]	.469
	.466	.454	.452	.455	.451	.459	.451	.462	.451	.463	.455	.450
J	.472	.470	.471	.472	.475	.475	.474	.472	.471	.470	.471	.472
	.454	.464	.457	.452	.456	.453	.458	.462	.450	.456	.457	.452
K	.477	.480	.475	.476	.477	.470	.477	.470	.472	.472	.473	.470
	.458	.450	.457	.462	.452	.454	.452	.452	.455	.446	.454	.457
L	.476	.470	.474	.470	.475	.473	.480	.472	.473	.470	.472	.473
	.456	.453	.455	.454	.455	.449	.454	.459	.452	.461	.456	.454

Record min/max thicknesses three decimal places.

H. M. Hawkins II 4-20-88

ANII INITIAL REVIEW:

SIGNATURE DATE

ANII FINAL ACCEPTANCE:

R. Blottinger 4/21/88

SIGNATURE DATE

[signature] III 4/21/88

Plant/Unit: NINE MILE POINT UNIT ONE
ISO: SEE ATTACHED SHEETS & DRWGS.
Comp./Sys.: TORUS
Loop: N/A

ULTRASONIC EXAMINATION CALIBRATION SHEET

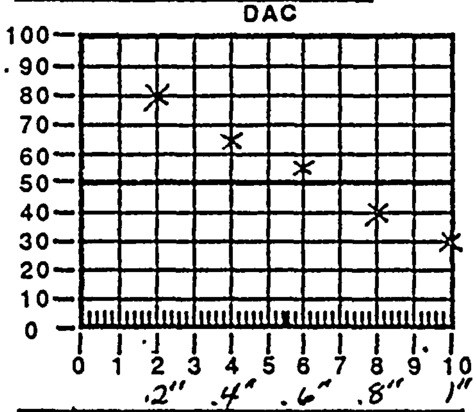
Data Pkg.: 2433-88A-71 109
Page 1 of 2
Exam Item: GRID 180 DEGREE BOTTOM
Procedure: 80A2433
Rev./F.C.: 3 / FC 1
Title: UT EXAM - STEAM EROSION

INSTRUMENT SETTINGS			
Serial #	213220-4		
MFG./Model #	KKB-USL-48		
Sweep Length	6.50		
Sweep Delay	6.00		
Pulse Length/Damp.	OFF		
Freq.	5	Range	.5"
DEC/Gate	OFF	Reject	OFF
Jacks	R&T		
Mode Select	DUAL		
Coarse Gain	40	Fine	18
Scan Sens.	80% BR		

SEARCH UNIT	
Serial #	A31357
Brand	KB-AEROTECH
Frequency	5.0 mHz
Size/Shape	.25" ROUND
Style/Type	GAMMA
Fixture	N/A
Cable	2X6' SELF CONT.
Couplant Batch	8764
Couplant Brand	ULTRAGEL II

Calibration Block	NMP-1SW-1020-CS
Block Thickness	.10-1.0"/1.1-2.0"
Comp. Thickness	N/A
Block Temperature	63 °F
Comp. Temperature	62 °F
Thermometer	KB108
Surface	OD

DAC



DAC			
	Reflector	%FSH	Position
1	.2"	80%	2
2	.4"	65%	4
3	.6"	55%	6
4	.8"	40%	8
5	1"	30%	10
6	N/A	N/A	N/A

Calibration Checks	:Time
Initial Calib.	1300
Intermediate	1600
Intermediate	1800
Intermediate	N/A
Final Calib.	2000
Calibration Date	4/20/88

CRT Calibrated In
DEPTH OF METAL
Each Major Screen Div. = .10"

INSTRUMENT LINEARITY					
1	100	50	6	50	25
2	90	45	7	40	20
3	80	40	8	30	15
4	70	35	9	20	10
5	60	30			

AMPLITUDE LINEARITY	
80 - 6 = 40	80 - 12 = 20
40 + 6 = 80	20 + 12 = 80

Scan Angle	0 DEGREES
Meas. Angle	0 DEGREES
Mode	LONG
Calibration	DEPTH
Scan Area	GRID

Exam Item: GRID 180 DEGREE BOTTOM

Comments/Reasons for Incomplete Exams
GRIDS 180 DEGREE BOTTOM

Remarks
CLEANED WITH DEMIN WATER & TSP.
GRID SHEET PER CW GRANT NOT LIKE ACTUAL GRID THAT IS CONSTRUCTED BY C.B.I.
SEE ATTACHED SHEETS

Examiner 1: H M Hawkins Level: II Date: 4-20-88
HARRY M. HAWKINS LEVEL II

WR# N/A
NCR# N/A
TRAVELER AXBM-88-002

Examiner 2: Level: Date:
N/A

NES REVIEWER: Briano LEVEL: III DATE: 4/21/88

4/21/88
FOR NMPC INFO.
WELD ACCEPTABLE? YES NO

QA/QC

ANII
ANII INITIAL REVIEW:
SIGNATURE DATE
ANII FINAL ACCEPTANCE:
SIGNATURE DATE 4/21/88

NMPC ENG. DISP. REQ.
YES NO

1125

DATA PKG 2433-88A-7[illegible]
PAGE 2 OF 2
110

STRUMENT SETTINGS | SEARCH UNIT | Calibration Block

180° BOTTOM

	1	2	3	4	5	6	7	8	9	10	11	12
A	.478	.472	.469	.478	.472	.472	.474	.469	.471	.474	.472	.474
	.465	.465	.466	.467	.465	.468	.468	.467	.467	.469	.465	.468
B	.474	.469	.474	.474	.475	.469	.480	.468	.480	.470	.481	.479
	.468	.465	.467	.465	.469	.466	.470	.462	.469	.466	.465	.466
C	.468	.470	.469	.471	.473	.472	.469	.470	.474	.467	.467	.472
	.465	.466	.466	.469	.469	.466	.467	.465	.469	.463	.463	.463
D	.475	.468	.468	.469	.470	.470	.468	.470	.467	.471	.467	.465
	.466	.465	.460	.464	.465	.465	.464	.465	.462	.467	.465	.464
E	.472	.480	.467	.470	.486	.469	[illegible]	.477	.468	.468	.468	.465
	.466	.465	.464	.469	.466	.465	.468	.469	.466	.467	[illegible]	.457
F	.530	.555	.567	.585	.578	.588	.539	.577	[illegible]	[illegible]	.555	.556
	.460	.465	.468	.469	.469	.466	.467	.480	.465	.460	.465	.459
G	.530	.555	.567	.585	.578	.588	.539	.517	.554	.554	.555	.556
	.454	.462	.463	.464	.469	.466	.455	.463	.462	.460	.457	.455
H	.464	.465	.462	.465	.465	.464	.462	.463	.462	[illegible]	[illegible]	[illegible]
	.462	.457	.459	.457	.462	.462	.458	.458	.458	[illegible]	[illegible]	[illegible]
I	.460	.460	.460	.465	.464	.461	.461	.465	.458	[illegible]	[illegible]	.464
	.454	.455	.456	.456	.455	.458	.457	.462	.466	.468	.457	.461
J	.461	.465	.465	.472	.475	.474	.475	.469	.463	.466	.462	.466
	.459	.462	.462	.466	.466	.463	.461	.463	.460	.459	.459	.462
K	.467	.464	.457	.462	.466	.466	.467	.465	.462	.462	.460	.462
	.459	.454	.454	.456	~~.462~~ .459		.458	.455	.456	.458	.458	.453
L	.465	.459	.460	.462	.464	.465	.465	.465	.465	.466	.466	.464
	.463	.454	.457	.454	.455	.455	.458	.454	.454	.455	.452	.455

weld →

RT Calibrated

Scan Angle DEGREES

Remarks: CLEANED WITH DEMIN WATER

CONSTRUCTED BY C.B.I.

Record min/max thicknesses three decimal places.
H. M. Hawkins II 4-20-88

ANII INITIAL REVIEW:

SIGNATURE DATE

ANII FINAL ACCEPTANCE:
[signature] 4/21/88
SIGNATURE DATE

[signature] II 4/[illegible]

Plant/Unit: NINE MILE POINT UNIT ONE
ISO: SEE ATTACHED SHEETS & DRWGS.
Comp./Sys.: TORUS
Loop: N/A

ULTRASONIC EXAMINATION CALIBRATION SHEET

Data Pkg.: 2433-88A-69 111
Page 1 of 2
Exam Item: GRID 270 DEGREE TOP
Procedure: 80A2433
Rev./F.C.: 3 / FC 1
Title: UT EXAM - STEAM EROSION

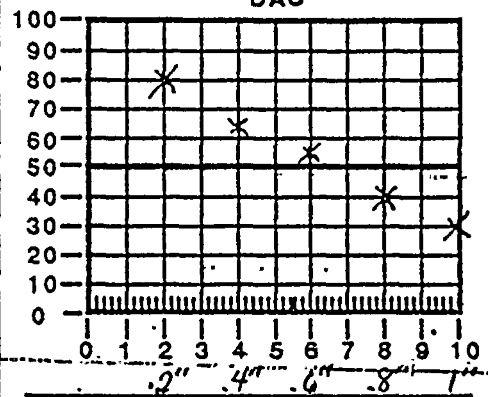
INSTRUMENT SETTINGS			
Serial #	213220-4		
MFG./Model #	KKB-USL-48		
Sweep Length	6.50		
Sweep Delay	6.00		
Pulse Length/Damp.	OFF		
Freq.	5	Range	.5"
DEC/Gate	OFF	Reject	OFF
Jacks	R&T		
Mode Select	DUAL		
Coarse Gain	40	Fine	18
Scan Sens.	80% BR		

SEARCH UNIT	
Serial #	A31357
Brand	KB-AEROTECH
Frequency	5.0 mHz
Size/Shape	.25" ROUND
Style/Type	GAMMA
Fixture	N/A
Cable	2X6' SELF CONT.
Couplant Batch	8764
Couplant Brand	ULTRAGEL II

Calibration Block	NMP-1SW-1020-CS
Block Thickness	.10-1.0"/1.1-2.0"
Comp. Thickness	N/A
Block Temperature	63 °F
Comp. Temperature	62 °F
Thermometer	KB108
Surface	CD

Calibration Checks	:Time
Initial Calib.	1300
Intermediate	1600
Intermediate	1800
Intermediate	N/A
Final Calib.	2000
Calibration Date	4/20/88

DAC



DAC			
	Reflector	%FSH	Position
1	2"	80%	2
2	4"	65%	4
3	6"	55%	6
4	8"	40%	8
5	1"	30%	10
6	N/A	N/A	N/A

CRT Calibrated In
DEPTH OF METAL
Each Major Screen Div. = .10"

INSTRUMENT LINEARITY					
1	100	50	6	50	25
2	90	45	7	40	20
3	80	40	8	30	15
4	70	35	9	20	10
5	60	30			

AMPLITUDE LINEARITY	
80 - 6 = 40	80 - 12 = 20
40 + 6 = 80	20 + 12 = 80

Scan Angle	0 DEGREES
Meas. Angle	0 DEGREES
Mode	LONG
Calibration	DEPTH
Scan Area	GRID

Exam Item: GRID 270 DEGREE TOP

Comments/Reasons for Incomplete Exams
GRIDS 270 DEGREE TOP

Remarks
CLEANED WITH DEMIN WATER & TSP.
GRID SHEET PER CW GRANT NOT LIKE ACTUAL GRID THAT IS CONSTRUCTED BY C.B.I.
SEE ATTACHED SHEETS

Examiner 1: H. M. Hawkins Level: II Date: 4-20-88
HARRY M. HAWKINS LEVEL II

WR# N/A
NCR# N/A
TRAVELER 2KBm-88-002

Examiner 2: N/A Level: Date:

NES REVIEWER: Briano LEVEL: III DATE: 4/21/88

[signature] 4/21/88
FOR NMPC INFO.
WELD ACCEPTABLE?
YES N/A NO N/A

NMPC ENG.
DISP. REQ.
YES Ø NO Ø

QA/QC

ANII
ANII INITIAL REVIEW:
SIGNATURE DATE
ANII FINAL ACCEPTANCE:
R. [signature] 4/21/88
SIGNATURE DATE

1125

270° TOP

	1	2	3	4	5	6	7	8	9	10	11	12
A	.489	.480	.470	.470	.465	.470	.472	.472	.474	.472	.472	.477
	.463	.459	.456	.456	.462	.468	.458	.468	.459	.458	.469	.471
B	.473	.476	.474	.474	.473	.472	.471	.470	.473	.474	.479	.471
	.459	.456	.464	.456	.470	.457	.460	.467	.453	.460	.469	.462
C	.470	.471	.479	.475	.473	.472	.471	.476	.480	.477	.470	.472
	.457	.460	.465	.466	.466	.460	.453	.456	.453	.452	.459	.465
D	.473	.474	.473	.475	.478	.472	.470	.470	.475	.477	.477	.472
	.455	.462	.458	.462	.460	.460	.457	.456	.461	.450	.464	.457
E	.470	.471	.472	.471	.470	.475	.472	.475	.473	.472	.470	.470
	.467	.462	.458	.469	.460	.468	.465	.466	.468	.462	.462	.461
F	.473	.470	.473	.472	.477	.472	.475	.475	.472	.473	.478	.478
	.455	.462	.467	.450	.455	.463	.466	.460	.468	.461	.468	.459
G	.476	.470	.474	.470	.471	.475	.474	.477	.473	.474	.473	.472
	.461	.458	.457	.462	.459	.465	.460	.462	.460	.461	.462	.456
H	.470	.470	.470	.474	.471	.471	.471	.471	.471	.472	.470	.472
	.457	.455	.461	.461	.460	.457	.464	.458	.460	.467	.462	.456
I	.471	.471	.471	.469	.470	.474	.470	.470	.472	.470	.471	.471
	.457	.458	.450	.457	.467	.458	.462	.456	.462	.453	.455	.452
J	.470	.471	.476	.474	.470	.470	.470	.472	.470	.475	.470	.470
	.469	.460	.461	.457	.458	.458	.457	.459	.451	.455	.458	.457
K	.470	.471	.472	.470	.472	.470	.470	.471	.472	.477	.470	.470
	.457	.460	.452	.457	.453	.463	.454	.459	.457	.452	.454	.460
L	.470	.471	.472	.472	.471	.470	.470	.471	.470	.473	.471	.471
	.458	.458	.460	.460	.458	.458	.460	.460	.453	.454	.460	.463

Record min/max thicknesses three decimal places.
H. McHawkins II 4-20-88

Briano III 4/21/88

ANII INITIAL REVIEW:
SIGNATURE DATE

ANII FINAL ACCEPTANCE:
R. Blatchley 4/21/88
SIGNATURE DATE

Plant/Unit: NINE MILE POINT UNIT ONE
ISO: SEE ATTACHED SHEETS & DRWGS
Comp./Sys.: TORUS
Loop: N/A

ULTRASONIC EXAMINATION CALIBRATION SHEET

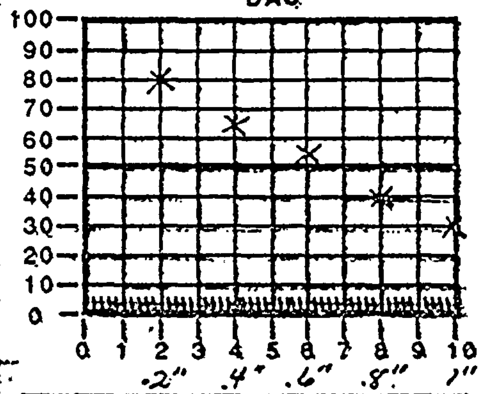
Data Pkg.: 2433-88A-70 113
Page 1 of 7
Exam Item: GRID 270 DEGREE BOTTOM
Procedure: 80A2433
Rev./F.C.: 3 / FC 1
Title: UT EXAM - STEAM EROSION

INSTRUMENT SETTINGS			
Serial #	213220-4		
MFG./Model #	KKB-USL-48		
Sweep Length	6.50		
Sweep Delay	6.00		
Pulse Length/Damp.	OFF		
Freq.	5	Range	.5"
DEC/Gate	OFF	Reject	OFF
Jacks	R&T		
Mode Select	DUAL		
Coarse Gain	40	Fine	18
Scan Sens.	80% BR		

SEARCH UNIT	
Serial #	A31357
Brand	KB-AEROTECH
Frequency	5.0 mHz
Size/Shape	.25" ROUND
Style/Type	GAMMA
Fixture	N/A
Cable	2X6' SELF CONT.
Couplant Batch	8764
Couplant Brand	ULTRAGEL II

Calibration Block	NMP-1SW-1020-CS
Block Thickness	.10-1.0"/1.1-2.0"
Comp. Thickness	N/A
Block Temperature	63 °F
Comp. Temperature	62 °F
Thermometer	KB108
Surface	OD

DAC



DAC			
	Reflector	%FSH	Position
1	2"	80%	2
2	4"	65%	4
3	6"	55%	6
4	8"	40%	8
5	1"	30%	10
6	N/A	N/A	N/A

CRT Calibrated In
DEPTH OF METAL
Each Major Screen Div. = .10"

Calibration Checks	:Time
Initial Calib.	1300
Intermediate	1600
Intermediate	1800
Intermediate	N/A
Final Calib.	2000
Calibration Date	4/20/88

INSTRUMENT LINEARITY					
1	100	50	6	50	25
2	90	45	7	40	20
3	80	40	8	30	15
4	70	35	9	20	10
5	60	30			

AMPLITUDE LINEARITY			
80 - 6 =	40	80 - 12 =	20
40 + 6 =	80	20 + 12 =	80

Scan Angle	0 DEGREES
Meas. Angle	0 DEGREES
Mode	LONG
Calibration	DEPTH
Scan Area	GRID

Exam Item: GRID 270 DEGREE BOTTOM

Comments/Reasons for Incomplete Exams
GRIDS 270 DEGREE BOTTOM

Remarks
CLEANED WITH DEMIN WATER & TSP
GRID SHEET PER CW GRANT NOT LIKE ACTUAL GRID THAT IS CONSTRUCTED BY Q.B.I.
SEE ATTACHED SHEETS

Examiner 1: H. M. Hawkins Level: II Date: 4-20-88
HARRY M. HAWKINS LEVEL II

WR# N/A
NCR# N/A
TRAVELER RxB m-88-002

Examiner 2: ______ Level: ___ Date: ______
N/A

NES REVIEWER: Briano LEVEL: III DATE: 4/21/88

FOR NMPC INFO.
TB 4/21/88
WELD ACCEPTABLE?
YES N/A NO N/A

QA/QC

ANII

ANII INITIAL REVIEW:
SIGNATURE ______ DATE ______
ANII FINAL ACCEPTANCE:
R. Blatt... 4/21/88
SIGNATURE DATE

NMPC ENG.
DISP. REQ.
YES N/A NO ✓

1125

ULTRASONIC EXAMINATION CALIBRATION SHEET

EROSION

INSTRUMENT SETTINGS	SEARCH UNIT	Calibration Block
220-4	Serial # A01357	Block Thickness
	Brand AEROTECH	Comp.

270° Bottom

	1	2	3	4	5	6	7	8	9	10	11	12
A	.470	.472	.475	.476	.470	.473	.469	.469	.476	.471	.470	.471
	.464	.455	.455	.457	.458	.457	.460	.457	.456	.452	.457	.455
B	.471	.473	.474	.471	.476	.472	.473	.472	.471	.476	.471	.473
	.453	.457	.455	.457	.458	.458	.459	.458	.458	.458	.456	.458
C	.470	.470	.472	.472	.471	.473	.474	.471	.471	.470	.470	.470
	.459	.458	.454	.458	.459	[illegible]	.457	.457	.458	.458	.457	.456
D	.473	.472	.470	.472	.463	.470	.47[illegible]	.470	.472	.472	.471	.470
	.457	.456	.459	.456	.455	.454	.456	.457	[illegible]	[illegible]	.457	.458
E	.472	.470	.470	.470	.472	.47[illegible]	.47[illegible]	.470	[illegible]	[illegible]	[illegible]	.472
	.459	.458	.450	.451	.451	.450	.460	.458	[illegible]	.465	[illegible]	.460
F	.599	.575	.558	.539	.568	.551	.548	.579	.589	.595	.599	.599
weld	.466	.465	.466	.464	.469	.466	.467	.463	[illegible]	.460	.469	.463
G	.599	.573	.528	.539	.568	.550	.548	.579	.587	.592	.609	.599
	.468	.470	.478	.480	.480	.477	.480	.480	[illegible]	.473	.474	.475
H	.484	.483	.478	.485	.477	.486	.478	.473	.477	.477	.473	.477
	.467	.469	.465	.465	.469	.467	.468	.468	[illegible]	[illegible]	[illegible]	.467
I	.480	.482	.482	.484	.484	.484	.483	.482	[illegible]	[illegible]	[illegible]	.471
	.468	.468	.454	.456	.467	.467	.467	.455	.465	.467	.464	.466
J	.476	.479	.472	.476	.477	.478	.477	.479	.474	.472	.478	.472
	.466	.467	.467	.462	.467	.467	.467	.466	.465	.464	.453	.461
K	.476	.473	.471	.477	.480	.476	.474	.472	.471	.470	.478	.480
	.467	.468	.466	.464	.468	.466	.467	.467	.465	.462	.461	.461
L	.473	.476	.480	.474	.477	.476	.475	.474	.472	.477	.472	.470
	.465	.467	.468	.464	.465	.467	.467	.465	.465	.464	.462	.459

CRT Calibrated In

Each Major Screen Div.

Search Angle DEGREES

Mode

Calibration

Amplitude Linearity

Remarks

CLEANED WITH DEMIN WATER & ISP

SHEET PER CW GRAN NOT CONSTRUCTED BY CBI

ATTACHED SHEETS

Record min/max thicknesses three decimal places.

H.M. Hankins II 4-20-88

[illegible] LEV. [illegible]/88

ANII INITIAL REVIEW:	
SIGNATURE	DATE
ANII FINAL ACCEPTANCE:	
R. [illegible]	4/21/88
SIGNATURE	DATE

N/A
SYSTEM: SUPPRESION CHAMBER
PROCEDURE: BOA2434

NRC DATA ATTACHMENT
Actual Measurements for TORUS Thickness

ATTACHMENT # 1
PAGE OF 115

	A	B	C	D	E	F	G	H	I	J	K	L
GRID 1 OF 5												
1	.453	.447	.449	.450	.448	.449	.450	.458	.445	.449	.449	.450
3	.451	.449	.450	.450	.451	.453	.451	.455	.457	.450	.450	.450
5	.450	.451	.450	.451	.451	.450	.449	.449	.448	.449	.450	.451
7	.449	.450	.449	.451	.451	.449	.450	.450	.449	.449	.448	.449
9	.448	.449	.451	.448	.450	.451	.449	.449	.448	.450	.451	.450
11	.448	.450	.451	.449	.451	.450	.449	.450	.450	.449	.450	.452
GRID 2 OF 5												
1	.483	.456	.459	.453	.462	.454	.441	.458	.456	.453	.459	.459
3	.452	.456	.453	.453	.448	.457	.458	.452	.455	.459	.463	.461
5	.459	.452	.453	.458	.456	.458	.459	.461	.456	.461	.454	.460
7	.456	.451	.458	.454	.457	.456	.454	.454	.461	.456	.456	.462
9	.457	.454	.455	.455	.455	.457	.458	.458	.458	.456	.456	.458
11	.458	.465	.454	.458	.454	.454	.457	.457	.457	.461	.453	.460
GRID 3 OF 5												
2	.448	.450	.453	.453	.454	.454	.452	.452	.449	.447	.452	.454
4	.450	.453	.452	.450	.447	.450	.452	.448	.452	.452	.453	.456
6	.446	.452	.453	.450	.450	.454	.450	.457	.452	.452	.453	.451
8	.451	.449	.452	.452	.452	.453	.455	.463	.454	.452	.453	.453
10	.448	.448	.458	.454	.454	.453	.454	.454	.454	.453	.452	.454
12	.449	.449	.452	.456	.451	.456	.451	.454	.455	.454	.452	.456

INDEPENDANT MEASURMENT TAKEN 3' FROM PENETRATION XS-344

READINGS TAKEN THROUGH PAINT

	1	2	3	4	5	6	7	8	9
A	.471	.469	.465	.469	.470	.473	.470	.464	.469
B	.453	.469	.472	.473	.473	.467	.466	.466	.470
[illegible]	.467	.460	.464	.468	.469	.465	.466	.466	.461

ATTACHMENT E

Niagara Mohawk Calculation M79-81-M001

Core Spray Pumps -

Effects Of Torus Sludge On

NIAGARA MOHAWK

CALCULATION COVER SHEET

NUCLEAR ENGINEERING & LICENSING

DISCIPLINE: NUCLEAR PROJECTS

PAGE 1

PROJECT: NINE MILE POINT NUC. STA.-UNIT I

CALC. NO. M79-81-M001

SUBJECT: CORE SPRAY PUMPS - EFFECT OF TORUS SLUDGE ON SYSTEM #81

BUILDING: REACTOR

FLOOR ELEV.: 198'-0"

INDEX NO.: 3-N2.1-M74

ORIGINATOR(S): L. M. MCNEER

TOTAL SHT'S. 6

CHECKER(S): P. BARTOLINI, A. SMITH

LAST SHT. NO: 6

RECORD OF ISSUES

REV.	DESCRIPTION	M.O.#	BY	DATE	CHKD.	DATE	APPD.	DATE	DATE FILMED:
0	INITIAL ISSUE	1023	LMM	5/19/88	PB	5/20/88	[illegible]	5/23/88	

COMPUTER OUTPUT YES ☐ NO ☒

SAFETY RELATED YES ☐ NO ☒

DRAWINGS REFERENCED:

DWG. NO.	INDEX	SHT.	REV.
C-18364-C	3-N2-S14	—	16
C4237R2 (ANDALE CO.)	—	—	2

REFERENCES:

1. WATER QUALITY AND CORROSION CONTROL OF THE SUPPRESSION POOL AT NINE MILE POINT-1 3/20/80; RCT-8001
2. NINE MILE POINT-1 SUPPRESSION POOL PILOT-SCALE CLEAN-UP TESTS 4/81; RCT-8111

KEYWORDS: NMP I

DISCIPLINE: NUCLEAR PROJECTS

SAFETY CLASS: NON SAFETY

PURPOSE: TORUS SLUDGE CORE SPRAY

CROSS REF.:

NIAGARA MOHAWK

NUCLEAR ENGINEERING & LICENCING

CALCULATION SHEET

DISCIPLINE NUCLEAR PROJECTS

PROJECT: NINE MILE POINT NUC. STA.-UNIT 1 CALC. NO. M79-81-M001 REV. 0

SUBJECT: CORE SPRAY PUMPS - EFFECT OF TORUS SLUDGE ON ORIG. [signature] DATE: 5/19/88

INDEX: 3-N2.1-M79 System #81 CHK'D. P. BARTOLINI DATE: 5/20/88

THIS CALC. ADDRESSES AN NRC CONCERN REGARDING THE EFFECT OF THE IRON OXIDE (SLUDGE), IN THE TORUS, ON ECCS PUMPS IF STIRRED UP BY A LOCA.

ASSUMPTIONS:

1. 100% OF THE SLUDGE BECOMES UNIFORMLY SLURRIED OR SUSPENDED UPON A LOCA AND AVAILABLE FOR SUCTION INTO THE CORE SPRAY LINES AND PUMPS.

2. THE SLUDGE IS THAT PROJECTED TO BE PRODUCED AS A RESULT OF OXIDATION OF ALL UNDER WATER SURFACES (20,000 ft^2)* SINCE 1979 (LAST DESLUDGING OF TORUS) TO 1990, OR 11 YRS. (1),(2).

3. CORROSION/OXIDATION RATE OF UNDER WATER SURFACES IS 2 mils (0.002") PER YR. - SEE ATTACHED GRAPH

4. ALL SLUDGE IS Fe_2O_3

5. THE TOTAL VOLUME OF WATER IN THE TORUS IS 500,000 GAL. (1).

6. THERE WILL BE NO CHUNKS OR PIECES LARGE ENOUGH TO PLUG THE STRAINERS OR NOZZLES (1)(2). - THIS WAS VERIFIED THRU TELECON WITH ROGER ASSAY, RCT - ALSO SEE ATTACHED DWGS.

* ASSUMES TORUS IS HALF FILLED WITH WATER

PROJECT: NINE MILE POINT NUC. STA.-UNIT I	CALC. NO. N1Q-81-M001	REV. 0	
SUBJECT: CORE SPRAY PUMPS - EFFECT OF TORUS SLUDGE ON	ORIG. L.M. M. Nen	DATE: 5/19/88	
INDEX: 3-N2.1-M77	System #81	CHK'D. P. Bartolini	DATE: 5/20/88

CALC. OF TOTAL AMOUNT OF IRON (FE) IN SLUDGE:

$$\frac{20{,}000\ ft^2 \times 0.002\ in/yr. \times 11\ yr. \times 0.26\ lb/in^3 \times 1728\ in^3/ft^3}{12\ in/ft.} = 16{,}474\ lb.$$

CALC. OF TOTAL AMOUNT OF SLUDGE (FE_2O_3):

$$\frac{2(58^{*}) + 3(18^{**})}{2(58^{*})} = 1.465$$

$1.465 \times 16{,}474\ lb.\ FE = 24{,}143\ lb\ FE_2O_3$ (SLUDGE)

CALC. OF SP.GR. OF SLURRY (SLUDGE + H_2O)

$$\frac{500{,}000\ gal. \times 8.347\ lb/gal. + 24{,}143\ lb.\ FE_2O_3}{500{,}000\ gal. \times 8.347\ lb/gal.} = \boxed{1.0058}$$

* ATOMIC WT. OF FE = 58

** ATOMIC WT. OF O = 18

PURPOSE: THE PURPOSE OF THIS SECTION IS TO DETERMINE HOW THE CORE SPRAY PUMPS & TOPPING PUMPS WILL RESPOND TO THE INCREASE IN TORUS WATER SPECIFIC GRAVITY.

GIVEN: BOTH THE CORE SPRAYS PUMPS & THE CORE SPRAY TOPPING PUMPS ARE CENTRIFUGAL TYPE PUMPS. THE CORE SPRAY PUMPS ARE RATED FOR 3400 GPM @ 422 FEET, THE CORE SPRAY TOPPING PUMPS ARE RATED FOR 3600 GPM @ 275 FEET. THE COMBINED PUMP PERFORMANCE FOR ONE SET OF CORE SPRAY PUMPS WITH TOPPING PUMPS IS 3400 GPM @ 697 FEET

ANALYSIS: THE HEAD (IN FEET) DEVELOPED BY A CENTRIFUGAL PUMP IS INDEPENDENT OF SPECIFIC GRAVITY. PUMP CAPACITY (FLOW) IS ALSO INDEPENDENT OF SPECIFIC GRAVITY. THEREFORE HEAD & CAPACITY MAY BE READ DIRECTLY FROM THE PUMP CURVE WITHOUT CORRECTION AS LONG AS THE VISCOSITY IS APPROXIMATELY CONSTANT (THE SLUDGE IN THE TORUS WATER WILL NOT IMPACT TORUS WATER VISCOSITY).

THE WORK PERFORMED IN MOVING A LIQUID DEPENDS ON THE WEIGHT OF THE LIQUID BEING HANDLED, AS DOES THE DISCHARGE PRESSURE FROM THE PUMP.

ANALYSIS (CONT'D)

BASED ON A TORUS WATER SPECIFIC GRAVITY OF 1.0058 THE PUMP DISCHARGE PRESSURE WILL BE:

CORE SPRAY PUMP

$$\text{PRESSURE IN psi} = \frac{(422\ ft)(1.0058)}{2.31\ ft/psi} = 183.74\ psi$$

THIS REPRESENTS AN INCREASE OF 1.06 psi

CORE SPRAY TOPPING PUMP

$$\text{PRESSURE IN psi} = \frac{(275)(1.0058)}{2.31} = 119.74\ psi$$

THIS REPRESENTS AN INCREASE OF 0.7 psi

∴ TOTAL INCREASE IN DISCHARGE PRESSURE = 1.76 psi WHICH IS NEGLIGIBLE

THE INCREASE IN TORUS WATER SPECIFIC GRAVITY WILL ALSO AFFECT THE Water HORSEPOWER ON EACH PUMP. THE INCREASE IN WHP IS DIRECT. THEREFORE THE INCREASE IN EACH PUMP WILL BE 0.58% WHICH AGAIN IS NEGLIGIBLE.

BASED ON THE ABOVE THE CHANGE IN TORUS WATER SPECIFIC GRAVITY WILL HAVE LITTLE TO NO AFFECT ON CORE SPRAY OPERATION.

[illegible]