FLORIDA POWER & LIGHT COMPANY

TURKEY POINT NUCLEAR POWER PLANT

UNIT 3

CONTAINMENT STRUCTURE

POST-TENSIONING SYSTEM

TENTH-YEAR SURVEILLANCE

BECHTEL POWER CORPORATION
Gaithersburg, Maryland
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1.0 INTRODUCTION

The tendon surveillance program is a systematic means of assessing the continued quality of the post-tensioning system for the containment structure. It provides a measure of confidence in the condition and functional capability of the system and an opportunity for timely corrective actions should adverse conditions, such as progressive corrosion, be detected.

The tenth-year tendon surveillance for the Turkey Point Nuclear Power Plant Unit 3 containment structure consisted of the physical inspection of nine tendons as described in Technical Specification, Section 4.4.5. The tendons inspected were 62H18, 42H70, 64H50, 23V1, 45V7, 61V1, 1D53, 2D28, and 3D28. During the current inspection, it was determined that tendon 64H51 (the tendon listed in Technical Specification, Section 4.4.5) had not been surveyed during any of the previous surveillances. On further investigation, it was found that tendon 64H50 had been surveyed during the previous surveillances, and had been incorrectly identified as tendon 64H51 in the fifth-year tendon surveillance report. It was therefore decided that tendon 64H50 would be inspected, since this was the tendon which had been surveyed during previous surveillances.

2.0 SUMMARY AND CONCLUSIONS

2.1 Summary

This report covers the tenth-year tendon surveillance for the post-tensioning system of the Unit 3 containment structure at the Turkey Point Nuclear Power Plant. The surveillance was started in January 1982 and was completed in March 1982.

The lift-off forces in all surveillance tendons were within the range of the predicted design values, taking into account the losses of prestress due to wire relaxation, concrete creep and shrinkage, and the initial elastic structural deformation.

The load-bearing components of the end anchorage assemblies were found to be in good condition with no adverse conditions such as excessive corrosion and cracking. Some of the washer faces appeared to have hammer marks which probably resulted from an attempt to separate buttonheads from washers during the initial installation of the tendons or during one of the previous surveillances; however, these marks do not constitute an adverse impact on the structural integrity of the washers. Buttonheads were in good condition with some traces of visible oxidation. No discontinuous wire was found on any of the tendons inspected.

Wires which were removed from the horizontal and dome tendons for physical testing were found to be in excellent condition. The wire removed from vertical tendon 45V7 had visible signs of oxidation and pitting. This condition of the vertical wire is consistent with that obtained during the fifth-year surveillance. It is possible that some water leaked through the cover plate into the tendon pit located at the top of the dome, and eventually made its way into the tendon sheaths (see recommendations, paragraph 8.1).

In the mechanical testing of the removed tendon wires, no significant change was detected in the physical properties regarding the yield stress, ultimate strength, and percentage of elongation of the wires since the initial acceptance tests.

No presence of water or abnormal discoloration was observed in any of the tendon sheath filler, except for sheath filler in one of the vertical tendons (61V1). The sheath filler in this vertical tendon contained some water, and the color of the filler in the vicinity of the water had changed to light brown; however, laboratory analysis of the filler samples obtained from each surveillance tendon showed that the content of water, chlorides, nitrates, and sulfides was well within the acceptable limits.

There was no sheath filler leakage from any of the grease caps inspected, except for vertical tendon 61V1. The pit for this vertical tendon contained 4 inches of water. The rubber gaskets of both the tendons (61V1 and 61V2) in this pit were cracked, and the grease caps were substantially corroded. The water in the pit indicated the presence of sheath filler which apparently seeped through cracked gaskets from the tendon caps.

Corrective action was taken to prevent recurrence of water leakage into the pits containing tendons 61V1 and 61V2. The corrective action was as follows:

a. The tendon pit was drained of water.

b. Tendons 61V1 and 61V2 were drained of sheath filler and water, then regreased by being pumped full of sheath filler.

c. The filler caps were replaced with better caps, and the gaskets and copper washers were replaced with new gaskets and washers; the filler caps were installed with new nuts.

d. The outsides of the filler caps were coated with sheath filler.

e. The checkered plate pit cover was reinstalled over a silicone rubber caulking compound placed to provide a water seal.

2.2 Conclusions

Based on the inspection and tests described herein, it is concluded that the post-tensioning system in the Unit 3 containment structure at the Turkey Point Nuclear Power Plant is in satisfactory condition and that the stress levels are within predicted values.

3.0 GENERAL

The tenth-year tendon surveillance of the Turkey Point Nuclear Power Plant Unit 3 containment structure post-tensioning system began in January 1982, 4½ years after the completion of the fifth-year surveillance in August 1977. The tenth-year tendon surveillance consisted of the following:

a. Visual and laboratory examination of sheath filler

b. Inspection of anchorage assemblies for deleterious conditions, such as corrosion, cracking, missing wires, and split buttonheads

c. Measurement of shim dimensions to determine tendon lift-off elongations

d. Measurement of tendon lift-off forces.

e. Measurement of tendon elongations at 80 percent of the minimum ultimate strength of wires

f. Detensioning of tendons and checking of wire continuity by visual examination

g. Removal of one wire from each of three preselected tendons for inspection and testing

h. Retensioning of tendons to lift-off forces obtained in item d and measurement of the corresponding elongations

i. Visual inspection of removed tendon wires for corrosion, pitting, and other deleterious conditions

j. Testing of samples obtained from removed tendon wires for yield strength, ultimate strength, and percentage of elongation at ultimate strength

k. Evaluation of surveillance data and test results to assess the general condition of the post-tensioning system, considering the time-dependent factors such as prestress losses and corrosion

The work was performed in accordance with the attached Procedure 5177-187-CP-1, Surveillance Procedure for Containment Structure Post-Tensioning System (Tenth-Year Surveillance) for Turkey Point Unit 3.

The locations and identifications of the dome, vertical, and horizontal surveillance tendons are shown in Figure 3-1.

4.0 SHEATH FILLER AND END ANCHORAGE ASSEMBLIES

The results of the field inspection and laboratory analysis of the sheath filler and the visual examination of the end anchorage assemblies are summarized in Table 4-1.

4.1 Sheath Filler

Two samples of the filler were removed from each of the surveillance tendons and visually examined. With one exception (tendon 61V1), all of the samples taken were dark brown, indicating the lack of water or impurities that may cause discoloration. The sample taken from one of the vertical tendons (61V1) was dark brown mixed with light brown, indicating the presence of some water.

4.2 End Anchorage Assemblies

The end anchorage assemblies of the surveillance tendons were examined and found to be in satisfactory condition. Buttonheads were found to be in their proper position. No splitting of buttonheads was observed. Some of the buttonheads showed visible oxidation. Also, some pitting was observed on the buttonheads for tendon 1D53. A comparison with the fifth-year surveillance data shows that this pitting had existed previously and that the amount and level of pitting has not progressed significantly.

Mill scales and minor corrosion were noted on the mill-stock surfaces of the shims and the bearing plates. Surfaces cut during fabrication of the anchorage components showed slight spotty reddish discoloration. The corrosion levels of some of the shims, bearing plates, and stress washers showed an increase from Level 1 to Level 2. Some of the shims for tendon 3D28 (near buttress 6) showed slight pitting. The amount of corrosion found was not considered excessive.

The end anchorage inspection data are included in the report as Appendix A.

5.0. DETENSIONING AND WIRE INSPECTION

Data obtained during detensioning and wire inspection are shown in Table 5-1.

5.1 Tendon Lift-Off Forces

The lift-off forces obtained from the tendons during detensioning indicated that prestress losses had not exceeded the predicted design values.

The long term (40-year duration) predictions of the normalized wire lift-off forces in the surveillance tendons are shown graphically in Figures 5-1 through 5-3. These predictions had taken into account the prestress losses due to wire relaxation and concrete creep and shrinkage. These curves provide only an estimated trend in the prestress losses, and are used as a means for comparison with the trend of the actual average prestress losses.

The minimum effective design prestress is the required average force per wire at the end of 40 years, including the effects of wire relaxation and concrete creep and shrinkage.

Calculations for the predicted prestress losses are as follows:

a. Initial wire force (F_i) based on a wire stress of 0.70 f's:

$F_i = 0.70\ f's \times A_s$

$= 0.70 \times 240 \times 0.049$

$= 8.25$ kips/wire

where f's = ultimate strength of wire

A_s = area of wire

b. Wire force at 40 years (F_{40}) due to wire relaxation and concrete creep and shrinkage:

The prestress loss at the end of 40 years due to wire relaxation and concrete creep and shrinkage is estimated to be 34.7 ksi (see FSAR Section 5.1.4.4). This value is applicable to all dome, horizontal, and vertical tendons.

$F_{pl} = 34.7 \times A_s$

$= 34.7 \times 0.049$

$= 1.70$ kips/wire

where F_{pl} = prestress loss at 40 years

The minimum effective design prestress is the predicted average wire force after 40 years.

$F_{40} = F_i - F_{pl}$

$= 8.25 - 1.70$

$= 6.55$ kips/wire

In order to compare the actual average prestress losses with predicted values, it was necessary that the wire lift-off forces, from the surveillance data, be normalized to account for the initial structural deformations (which are a function of the post-tensioning sequences), the deviations of initial lift-off forces from the specified value of 0.70 f's, and the changes in lift-off forces resulting from tendon surveillance operations, such as reshimming and wire removal. These normalized wire lift-off forces were then superimposed on the appropriate curves shown on Figures 5-1 through 5-3, providing a comparison between the predicted values and the actual forces at the time of tendon surveillance.

For future convenience, the normalizing factors and the normalized lift-off force for each surveillance tendon for the tenth-year tendon surveillance are listed in Table 5-2.

Formulas for calculating the normalizing factors are given in attached Procedure 5177-187-CP-1.

5.2 Wire Inspection

The results of inspection of each tendon wire removed for inspection are shown in Appendix B.

Wires removed from the horizontal and dome tendons showed no physical imperfection. The wire removed from the vertical tendon had some corrosion and pitting. It is noted that the wire removed from the vertical tendon in the fifth-year surveillance also showed some corrosion and pitting. The vertical tendons were stressed to the full effective force with no observable adverse effect, and the lift-off forces were within the acceptable limits. It may be concluded that the wires in the horizontal and dome tendons are in good condition, and that the wires in the vertical tendons, while in somewhat worse condition, are acceptable.

5.3 Discontinuous Wires

No discontinuous wires were found during this tendon surveillance.

6.0 RETENSIONING AND SHEATH FILLER INSTALLATION

6.1 Retensioning

The data obtained during retensioning are shown in Table 6-1.

The tendons were retensioned to approximately the same stress level indicated by the lift-off forces obtained during detensioning, with allowance made for the tendons where a wire was removed for physical examination and testing.

The retensioning data will be used as input for the next scheduled tendon surveillance.

6.2 Sheath Filler Installation

The volume of sheath filler replaced after retensioning is indicated in Table 6-1. The volume replaced was always equal to or greater than the volume removed.

7.0 WIRE TESTING AND ANALYSIS OF SHEATH FILLER

7.1 Wire Testing

7.1.1 Specimen Selection and Preparation

The locations of the specimens selected from each tendon wire for tensile testing are shown in Appendix B. The specimens were obtained from each end and the middle of each tendon wire removed. The specimens were cut to a length of approximately 126 inches.

After the specimens were cut from the pulled wires, they were tagged with the following information:

a. Tendon identification number

b. Location of the specimen; i.e., middle or end section

c. Containment unit number and the year of surveillance (1982)

These tags remained with the specimens through completion of the testing.

The remaining portions of the wires, after the specimens had been obtained, were also tagged and retained at the plant site until testing indicated that the tensile strength and elongation of all specimens were in compliance with the specification.

7.1.2 Test Procedure

Except for the gage length, the test procedure used was the same as that specified in ASTM Specification A 421-80, "Standard Specification for Uncoated Stress-Relieved Wire for Prestressed Concrete." A gage length of 100-inch (±1.0 inch) was used instead of the 10-inch gage length specified.

The 100-inch-gage-length specimen may indicate a lower ultimate strength and lesser ductility (elongation) than a 10-inch-gage-length specimen. Since failure will occur at the weakest point in the wire, the ultimate strength obtained is equivalent to the lowest value that would be obtained from ten 10-inch specimens. Elongation at failure will also tend to be less due to the distribution of the elongation at the neck-down area over a length of wire 10 times that of the nominal 10-inch specimen.

7.1.3 Test Equipment

The apparatus used for the tensile testing of the specimens was the Tinius Olsen Universal Testing machine with a 1,200,000-pound capacity, of the Pittsburgh Testing Laboratory, Pittsburgh, Pennsylvania. For the machine calibration report, see Appendix E.

7.1.4 Test Results

The results of the tensile testing on the 100-inch-gage-length wire specimens are shown in Appendix C and Table 7-1.

7.1.4.1 Yield Strength

The yield strength of all wire specimens tested exceeded the specified minimum yield strength of 192 ksi at 1-percent elongation.

7.1.4.2 Ultimate Strength

The ultimate strength of all wire specimens tested exceeded the specified minimum ultimate strength of 240 ksi as specified by ASTM A 421-80.

7.1.4.3 Elongation

Since 100-inch-gage-length specimens were used in the tensile testing, a lesser percentage of elongation may be expected than from the testing of 10-inch-gage-length specimens of identical wire, as discussed in paragraph 7.1.2. Previous test data[1] indicated that a wire which showed a 4-percent elongation at ultimate strength in a 10-inch-gage-length testing could be expected to exhibit a somewhat lower (no less than 3-percent) elongation at ultimate strength in a 100-inch-gage-length testing.

The percentage of elongation of all wire specimens tested met this requirement.

7.1.4.4 Fracture Characteristics

The fracture of all wire specimens was of the cusp-cone shape.

7.2 Analysis of Sheath Filler

7.2.1 Specimen Preparation

A quart-size sample of the sheath filler was obtained from each end of all surveillance tendons prior to detensioning. Each metal container containing the sheath filler sample was marked with the tendon identification number. One sample from each surveillance tendon was shipped to an independent laboratory for analysis of water content, neutralization number, and water soluble impurities, and the remaining samples were retained at the jobsite.

7.2.2 Test Procedures

Test procedures for water content, neutralization number, and chlorides, nitrates, and sulfides concentrations are given in attached Procedure 5177-187-CP-1. The test procedure originally used for determining the neutralization number was a modification of ASTM D 974, as shown in Attachment 7 to attached Procedure 5177-187-CP-1. This test showed a neutralization number of zero, so the second set of samples was shipped to the testing laboratory and the tests were redone using ASTM D 974 (without modification). Discussions with Viscosity Oil Company (the supplier of the sheath filler) confirmed that the modified test procedure is only applicable to Visconorust 2090P-4 sheath filler, and that ASTM D 974 is to be used for testing Visconorust 2090P-2.

7.2.3 Test Results

The results of the laboratory analysis of the sheath filler are shown in Appendix D.

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(1) "Containment Building Post-Tensioning System One-Year Surveillance, Palisades Plant Unit 1," Consumers Power Company, AEC Docket No. 50-255.

These data indicated (1) that the contents of chlorides, nitrates, and sulfides in the grease were well within the acceptance limits, (2) that the amount of water present was negligible, and (3) that the sheath filler had retained its alkaline characteristics.

8.0 RECOMMENDATIONS

8.1 Presence of Water in Vertical Tendon Pits

The pit for vertical tendons 61V1 and 61V2 was discovered to contain 4 inches of water. Corrective action was taken as described in Paragraph 2.1. Also, the wire removed from vertical tendon 45V7 showed visible signs of oxidation and pitting, which may have been caused by leakage of water into the tendon pit. In order to verify that the corrective action has been effective, and to ensure that no additional water will seep into the tendon pits, the following actions are recommended:

a. The water seal for the tendon pit covers for vertical tendons 23V1 and 45V7 should be inspected and replaced if found to be inadequate or damaged.

b. The pits for vertical tendons 23V1, 45V7, and 61V1 should be inspected at 6-month intervals to ensure that no water is seeping through the covers into the pits. A maintenance program should be established to carry out this inspection.

c. If the presence of water is observed in any of these tendon pits, immediate corrective action should be taken to remove the water and replace any damaged materials. In addition, the water sealing of the pits should be upgraded in accordance with details to be provided by Engineering.

8.2 Pitting of Wires in Vertical Tendons

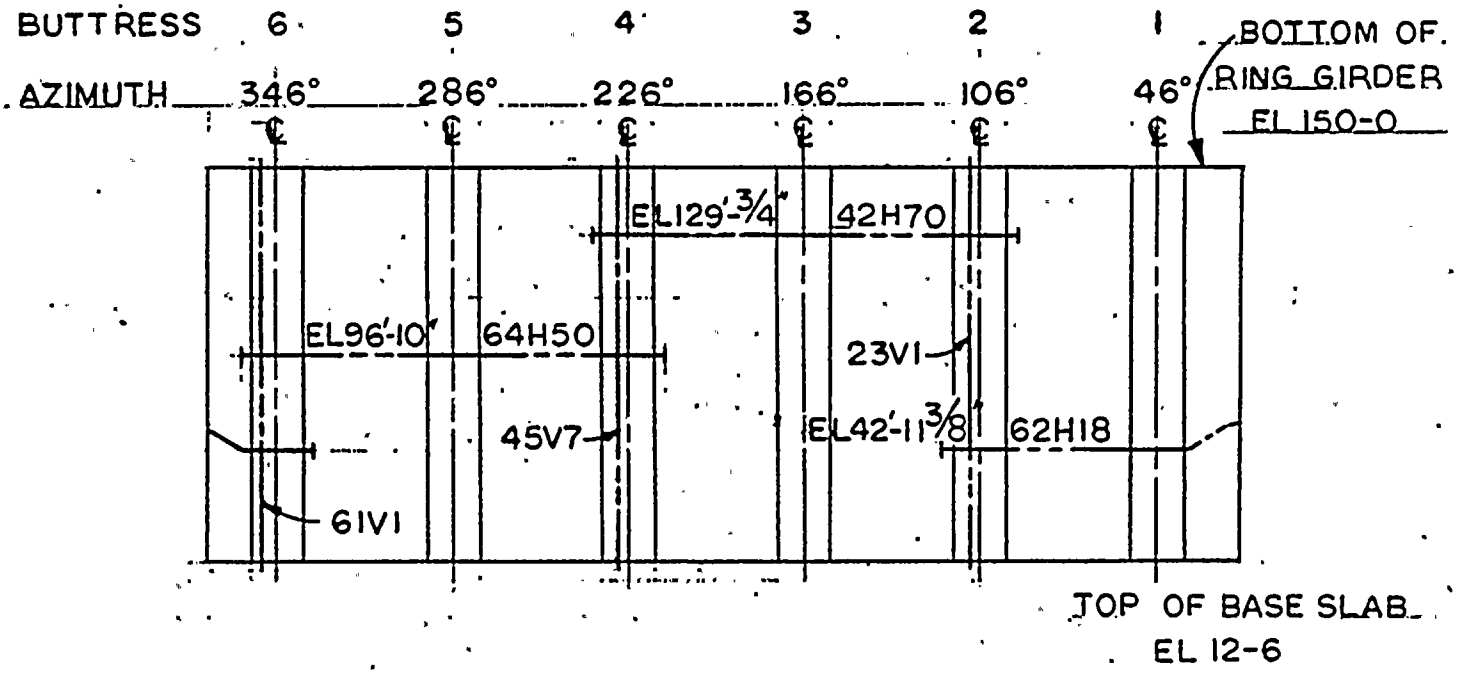
In both the fifth-year and tenth-year surveillances, water was observed in the sheath filler of some of the vertical tendons. During the tenth-year surveillance, water was found in the pit for tendons 61V1 and 61V2 and in the tendon sheath of tendon 61V1. Also, the inspection of wires removed from the vertical tendons for the fifth-year and tenth-year surveillances showed Level 3 pitting. It is possible that the presence of water in the vertical tendon sheaths may be affecting the corrosion levels of the wires. In order to verify that the corrosion of the wires in the vertical tendons is not worsening, the following action is recommended:

a. During the next scheduled tendon surveillance, remove one wire each from tendons 61V1 and 61V2. If the level of corrosion in both of these wires is acceptable (i.e., Level 1 or 2), no further action is required.

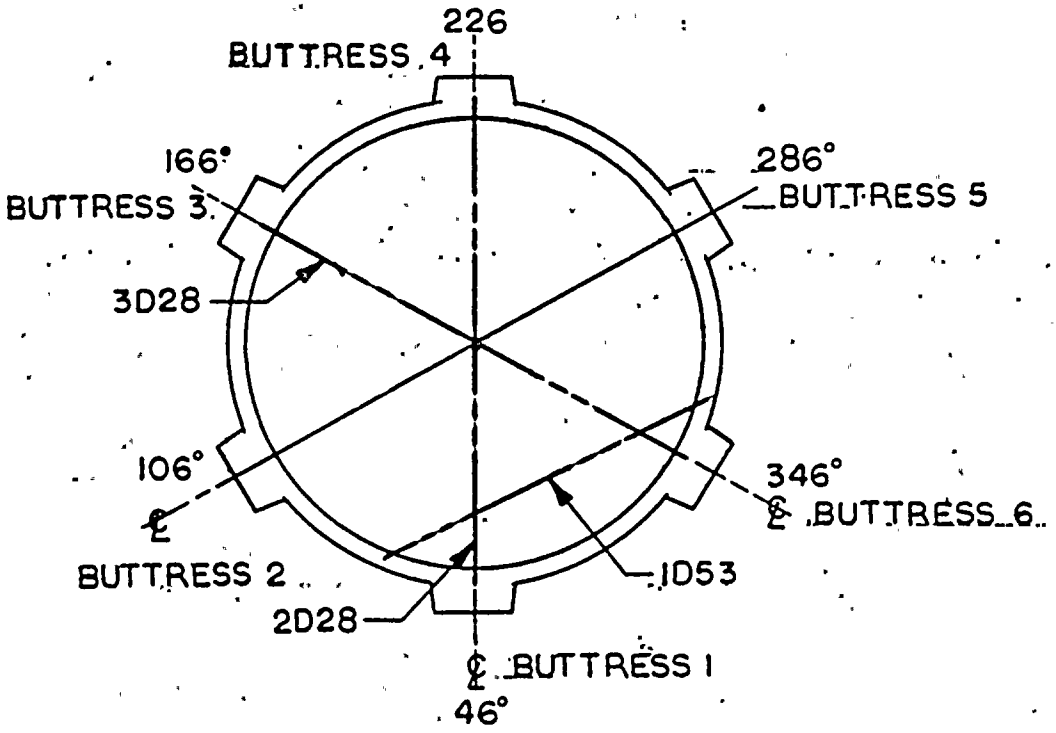
b. If pitting of Level 3 or greater is observed on either of these wires, metallurgical examination of the test samples should be made to determine the cause of deterioration. Corrective action should be determined by Engineering, based on the results of the metallurgical examination.

8.3 Pitting of Buttonheads

Even though buttonheads for tendon 1D53 (close to buttress 1) were completely covered with sheath filler, some pitting of these buttonheads has been observed. If in the next tendon surveillance the level and/or amount of pitting is seen to have progressed, Engineering should evaluate this condition and recommend corrective action at that time.



DEVELOPED EXTERIOR ELEVATION
HOOP AND VERTICAL TENDONS



PLAN

DOME TENDONS

FLORIDA POWER & LIGHT CO.
TURKEY POINT NUCLEAR POWER PLANT UNIT 3
POST-TENSIONING SYSTEM SURVEILLANCE TENDONS LOCATION AND IDENTIFICATION
FIGURE 3-1

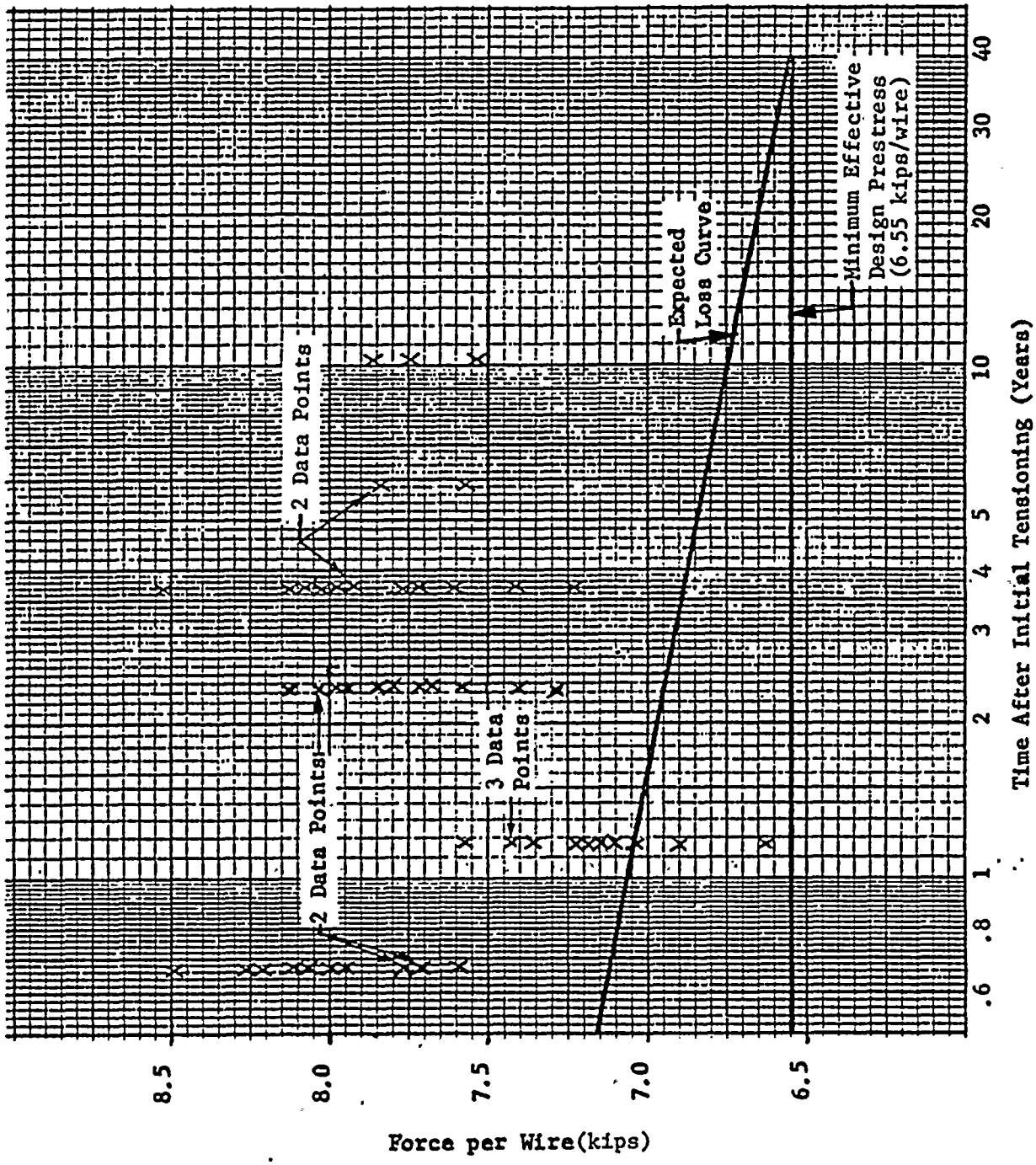


FIGURE 5-1
DOME TENDON AVERAGE
NORMALIZED LIFT-OFF WIRE FORCE
VERSUS TIME

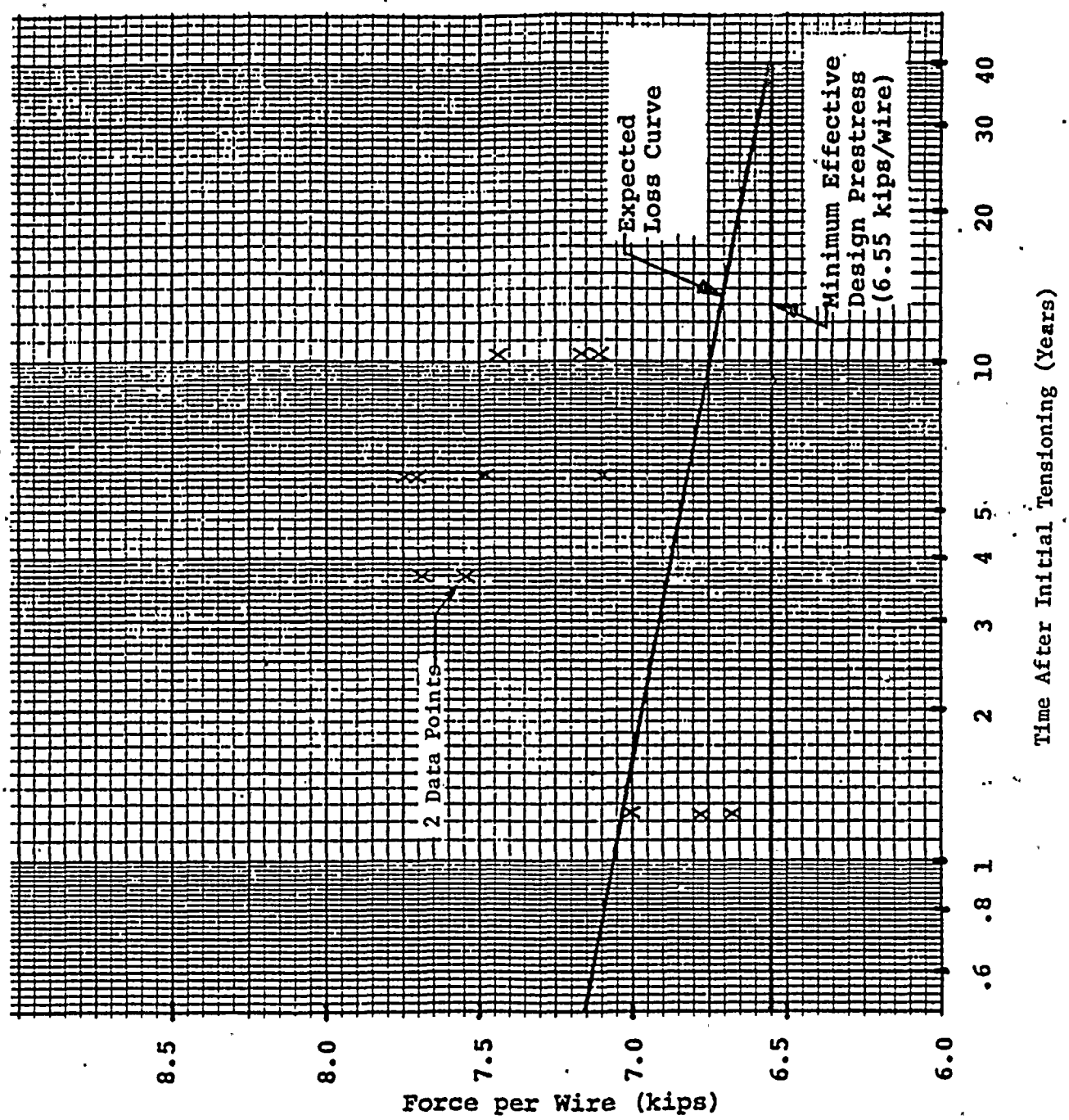


FIGURE 5-2
HORIZONTAL TENDON AVERAGE
NORMALIZED LIFT-OFF WIRE FORCE
VS
TIME

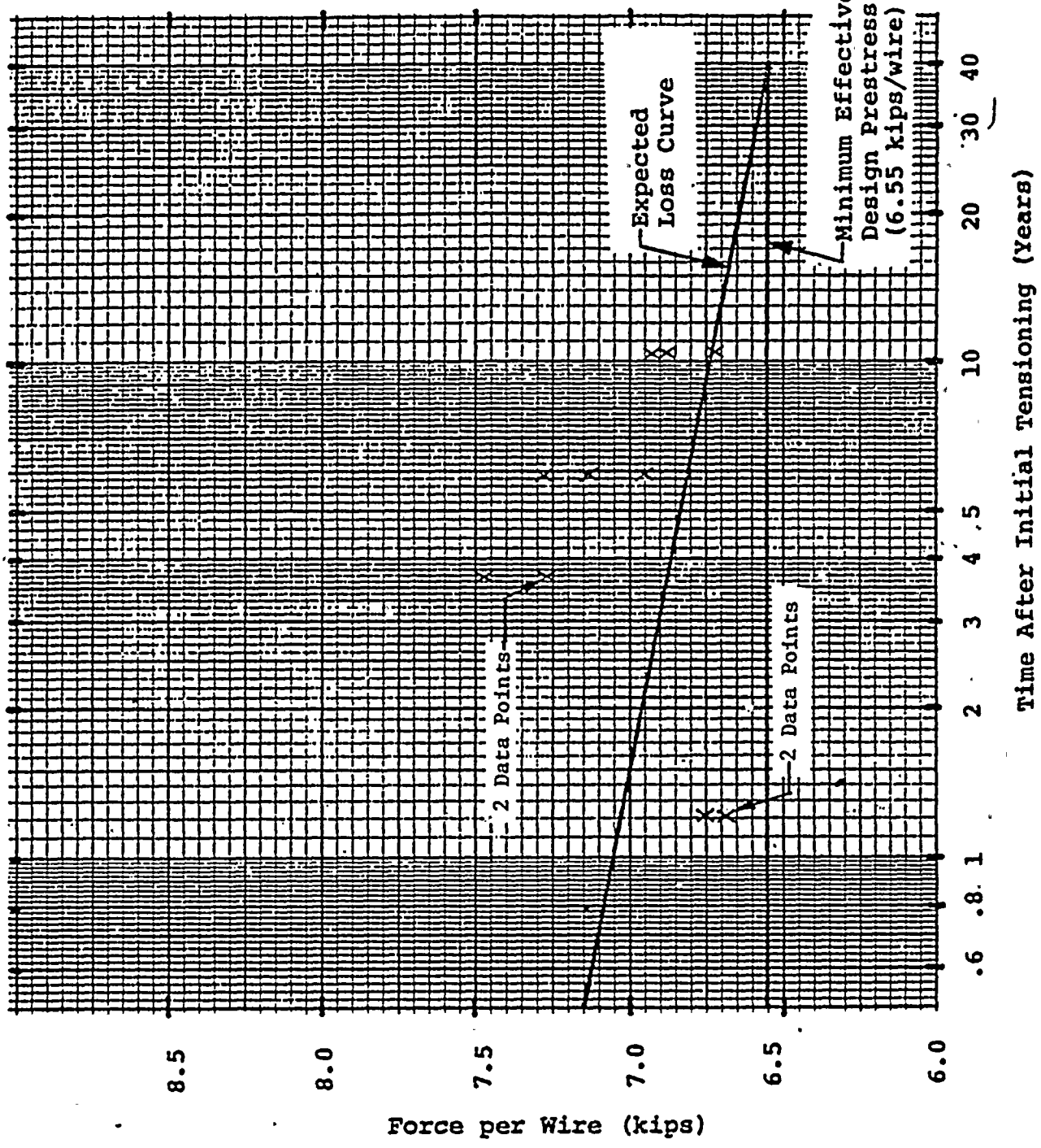


FIGURE 5-3
VERTICAL TENDON
NORMALIZED LIFT-OFF WIRE FORCE
VS
TIME

TABLE 4-1
SUMMARY OF DATA
SHEATH FILLER AND END ANCHORAGE ASSEMBLIES

TENDON			FILLER COATING ACCEPTABLE (YES/NO)					FILLER MAT'L		ANCHORAGE COMPONENTS									TEMP. °F			
										BUTTONHEADS			STRESS WASHERS		SHIMS		BEARING PLATES					
IDENT.	TYPE	LOCATION	FILLER CAP	BUTTON HEAD	STRESS WASHER	SHIMS	BEARING PLATE	COLOR CHANGE	SAMPLE NO.	NUMBER	CORROSION LEVEL(3)	SPLITS	CORROSION LEVEL	CRACKS	CORROSION LEVEL	CRACKS	CORROSION LEVEL	CRACKS	INTERIOR	EXTERIOR	DATE INSPECTED	REMARKS
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
62H18	WALL	2	YES	YES	YES	YES	YES	NO		87	1	NONE	2	NONE	1	NONE	1	NONE	88	81	2-15-82	
	HORIZ	6	YES	YES	YES	YES	YES	NO		87	1	NONE	1	NONE	2	NONE	2	NONE		80	2-15-82	
64H50	WALL	4	YES	YES	YES	YES	YES	NO		88	1	NONE	1	NONE	1	NONE	1	NONE	110	78	2-24-82	One wire removed for examination.
	HORIZ	6	YES	YES	YES	YES	YES	NO		88	1	NONE	2	NONE	1	NONE	2	NONE		72	2-24-82	
42H70	WALL	4	YES	YES	YES	YES	YES	NO		88	1	NONE	2	NONE	1	NONE	1	NONE	115	80	2-26-82	
	HORIZ	2	YES	YES	YES	YES	YES	NO		88	2	NONE	2	NONE	2	NONE	2	NONE		73	2-26-82	
1D53	DOME	1	YES	YES	YES	YES	YES	NO	SEE NOTE 4	90	3(5)	NONE	2	NONE	1	NONE	1	NONE	127	64	3-1-82	One wire removed for examination.
		6	YES	YES	YES	YES	YES	NO		90	2	NONE	2	NONE	2	NONE	1	NONE		65	3-2-82	
2D28	DOME	1	YES	YES	YES	YES	YES	NO		87	1	NONE	2	NONE	2	NONE	2	NONE	120	80	2-27-82	
		4	YES	YES	YES	YES	YES	NO		87	1	NONE	1	NONE	1	NONE	1	NONE		79	2-27-82	
3D28	DOME	3	YES	YES	YES	YES	YES	NO		89	1	NONE	2	NONE	1	NONE	1	NONE	131	81	2-28-82	
		6	YES	YES	YES	YES	YES	NO		89	1	NONE	2	NONE	3	NONE	1	NONE		80	2-28-82	
23V1	WALL	2/T	YES	YES	YES	YES	YES	NO		87	1	NONE	2	NONE	1	NONE	1	NONE	86	72	2-3-82	
	VERT	2/B	YES	YES	YES	YES	YES	NO		87	1	NONE	2	NONE	-	--	1	NONE		--	2-3-82	
45V7	WALL	4/T	YES	YES	YES	YES	YES	NO		86	1	NONE	2	NONE	2	NONE	1	NONE	87	70	2-4-82	One wire removed for examination.
	VERT	4/B	YES	YES	YES	YES	YES	NO		86	1	NONE	2	NONE	-	--	1	NONE		--	2-4-82	
61V1	WALL	6/T	NO**	NO**	NO**	NO**	NO**	YES*		88	1	NONE	1	NONE	2	NONE	2	NONE	93	72	2-10-82	
	VERT	6/B	YES	YES	YES	YES	YES	YES*		88	2	NONE	1	NONE	-	--	2	NONE		-	2-10-82	

NOTES:

1. Location-Indicates the buttress at which the tendon is anchored; or the nearest buttress to the tendon (for vertical tendons).
   T = Top
   B = Bottom

2. Anchorage Components
   A) For stressing washers, the corrosion levels indicate the condition of the surface where the buttonheads are anchored.
   B) For shims, the corrosion levels indicate the condition of the surfaces perpendicular to the tendons.

3. Corrosion Levels
   Level 1-No visible oxidation or light spotty oxidation.
   Level 2-Visible oxidation; no pitting.
   Level 3-0 < Pitting ≤ 0.003" Depth
   Level 4-0.003" < Pitting ≤ 0.006"
   Level 5-0.006" < Pitting ≤ 0.010"

4. Each sample was identified with tendon number and closest buttress number.

5. About 30% pitting, 70% no visible oxidation.

*SOME CHANGE IN COLOR DUE TO PRESENCE OF WATER.
**10% COVERAGE ONLY.

TABLE 5-1
SUMMARY OF DATA-DETENSIONING AND WIRE REMOVAL

TENDON		NUMBER OF EFFECTIVE WIRES	DATE DETENSIONED	AIR TEMPERATURE °F		@ LIFT-OFF			@ 1000 LBS./WIRE			TENSIONING EQUIPMENT		INITIAL WIRE LENGTH (FT)	WIRE REMOVAL			
						TENSION		ELONGATION(1)	TENSION		ELONGATION(1)						CORROSION LEVEL(2)	
IDENTIFICATION	ANCHORAGE LOCATION			INT.	EXT.	GAGE (PSI)	FORCE (KIPS)	(IN)	GAGE (PSI)	FORCE (KIPS)	(IN)	RAM NO.	GAGE NO.		END CUT	LENGTH NOW (FT)	PREVIOUS(3)	NEW
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
62H18	2	87	2-16-82	88	74	5470	690	4-3/4	750	82	15/16	4045010	CH38557	-	-	-	-	-
	6				78	6017	735	4-5/16	780	94	7/16	4045005	CH38556					
64H50	4	88	2-24-82	110	80	5620	688	4-3/16	750	82	-7/16	4045010	CH38557	140.33	4	140.40	1	1
	6				72	5440	663	4"	780	94	11/16	4045005	CH38556					
42H70	4	88	2-26-82	115	84	6020	735	3-1/16	750	82	-9/16	4045010	CH38557	-	-	-	-	-
	2				73	5753	700	4-13/16	700	88	7/8	4045005	CH38556					
1D53	1	90	3-2-82	104	52	6140	760	4-1/16	750	82	7/8	4045010	CH38557	97.31	6	97.35	1	1
	6				70	6063	750	3-3/8	750	94	1	4045005	CH38556					
2D28	1	87	2-27-82	120	80	6300	770	5-9/16	600	75	1-5/8	4045005	CH38556	-	-	-	-	-
	4				79	6350	780	4-15/16	750	82	1/4	4045010	CH38557					
3D28	3	89	2-28-82	131	81	6230	765	4-3/16	750	82	1/2	4045010	CH38557	-	-	-	-	-
	6				84	6100	745	4-1/2	730	90	3/4	4045005	CH38556					
23V1	2/T*	87	2-3-82	86	84	5507	650	9-1/8	350	44	-1-3/8	4045012	CH38558	-	-	-	-	-
	2/B*				-	-	-	-	-	-	-	-	-					
45V7	4/T	86	2-4-82	87	72	5507	650	8-1/2	790	94	-9/16	4045012	CH38558					
	4/B				-	-	-	-	-	-	-	-	-	169.38	B	169.80	3	3
61V1	6/T	88	2-10-82	93	78	5813	680	8-1/2	800	88	-3/4	4045012	CH38560		-	-	-	-
	6/B				-	-	-	-	-	-	-	-	-					

*T - Denotes Top B - Denotes Bottom

NOTES:

(1) Elongation - The clear distance between the outside face of the bearing plate and the inside face of the stressing washer. A negative number is indicated when the stressing washer is inside the trumpet.

(2) Corrosion Levels: 1. No visible oxidation 2. Visible oxidation; no pitting. 3. $0.000 < \text{pitting} \leq 0.003"$ 4. $0.003 < \text{pitting} \leq 0.006"$ 5. $0.006 < \text{pitting} \leq 0.010"$

(3) Previous surveillance or initial condition, whichever applies.

Table 5-2

NORMALIZING FACTORS AND NORMALIZED
TENDON LIFT-OFF FORCES

Tendon No.	Anchorage Location	Normalizing Factor	Normalized Lift-off Force/Wire(k)	
			Each end	Average per wire
62H18	6	0.853	7.21	7.16
	2	0.897	7.11	
64H50	6	0.938	7.06	7.10
	4	0.912	7.13	
42H70	4	0.926	7.73	7.43
	2	0.896	7.12	
1D53	6	0.895	7.46	7.53
	1	0.900	7.60	
2D28	4	0.963	8.64	7.86
	1	0.800	7.08	
3D28	6	0.935	7.83	7.74
	3	0.891	7.66	
23V1	T*	0.900	6.72	6.72
45V7	T*	0.915	6.92	6.92
61V1	T*	0.892	6.90	6.90

*T denotes top

TABLE 6-1
SUMMARY OF DATA-RETENSIONING AND
SHEATH FILLER INSTALLATION

TENDON		NO. OF EFFECTIVE WIRES	DATE RETENSIONED	AIR TEMPERATURE °F		@ 1000 LBS./WIRE				@ 0.8f's				@ LIFT-OFF				TENSIONING EQUIPMENT		SHEATH FILLER		
						TENSION		ELONGATION (IN)(1)		TENSION		ELONGATION (IN)(1)		TENSION		ELONGATION (IN)(1)						
IDENTIFICATION	ANCHORAGE LOCATION			INT.	EXT.	GAGE (PSI)	FORCE (KIPS)	NOW(2)	CHANGE(3)	GAGE (PSI)	FORCE (KIPS)	NOW(2)	CHANGE(3)	GAGE (PSI)	FORCE (KIPS)	NOW(2)	CHANGE(3)	RAM NO.	GAGE NO.	DATE FILLED	VOLUME REPLACED (GALS.)	FILLER TEMPERATURE @ OUTLET
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
62H18	2	87	2-16-82	88	74	750	85	1/2	-7/16	6700	825.0	5-13/16	1-1/8	5575	688	4-7/8	3/16	4045010	CM38557	2-17-82	15	79
	6				78	750	90	7/16		6600	810	4-5/8		5925	725	4-3/8		4045005	CM38556			
64H50	4	87	2-24-82	110	80	750	85	1/4	-1/4	6650	810	4-3/4	7/16	5550	680	4-1/4	-1/16	4045010	CM38557	2-25-82	16	80
	6				72	750	90	-1/4		6640	813	4-15/16		5900	720	3-7/8		4045005	CM38556			
42H70	4	88	2-26-82	115	84	750	85	-7/8	-1/16	6700	825	4-1/6	15/16	6210	750	3-5/8	1/2	4045010	CM38557	2-27-82	7	80
	2				73	700	85	1-1/8		6800	831	15/16		5790	710	4-3/4		4045005	CM38556			
1D53	1	89	3-2-82	104	52	740	85	7/8	-1/4	6800	835	4-1/8	-1/16	6440	790	4-1/8	7/16	4045010	CM38557	3-2-82	11	110
	6				70	750	90	3/4		5980	735	3-3/4		6250	765	3-3/4		4045005	CM38556			
2D28	1	87	2-27-82	120	80	600	77	1-1/2	-1/16	6650	810	6-3/4	1	6500	810	5-3/4	0	4045005	CM38556	2-28-82	23	86
	4				79	750	85	5/16		6680	820	4-15/16		6500	800	4-3/4		4045010	CM38557			
3D28	3	89	2-28-82	131	81	750	85	1/2	1/8	6650	835	4-13/16	9/16	6325	775	4-3/8	3/16	4045010	CM38557	3-1-82	6	118
	6				84	730	90	7/8		6800	830	5-1/4		6180	755	4-1/2		4045005	CM38556			
23V1	2/T	87	2-3-82	86	84	350	44	-1-5/8	-1/4	6900	815	10-7/16	-9/16	5600	658	9-3/16	1/16	4045012	CM38558	2-8-82	67	76
	2/B				--	--	--	--		--	--	--		--	--	--		--	--			
45V7	4/T	85	2-4-82	87	72	700	75		-5/16	6800	800	10-5/8	-1/4	5550	655	8-9/16	1/16	4045012	CM38558	2-8-82	59	76
	4/B				--	--	--	-7/8		--	--	--		--	--	--		--	--			
61V1	6/T	88	2-10-82	93	78	750	88	-1-1/8	-3/8	7000	820	10-1/4	-1-1/2	5820	685	8-1/2	0	4045012	CM38560	2-11-82	50	81
	6/B				--	--	--	--		--	--	--		--	--	--		--	--			

NOTES:

(1) Elongation - The clear distance between the outside face of the bearing plate and the inside face of the stressing washer. A negative number is indicated when the stressing washer is inside the trumpet.

(2) Now-Denotes elongation at time of retensioning. Measurements are to the nearest 1/16".

(3) Change in elongation as compared to previous measurement under the specified load.

T - Denotes Top
B - Denotes Bottom

TABLE 7-1

WIRE TEST RESULTS - 100-INCH GAGE LENGTH

Tendon No.	Sample No. (1)	Load at 1% Ext. (lbs)	Stress at 1% Ext. (psi)	Load at Fracture (lbs)	Stress at Fracture (psi)	Elongation at Fracture (in.)	Fracture Location Moving Head (in.)
45V7	C.E.	10,350	210,800	12,300	250,500	5.77	83.38
	B.E.	10,325	210,300	12,250	249,500	4.67	49.25
	M.S.	10,600	215,900	12,300	250,500	4.35	33.06
64H50	C.E.	10,625	216,400	12,400	252,550	5.39	77.50
	B.E.	10,050	204,700	12,300	250,500	5.53	56.50
	M.S.	10,375	211,300	12,200	248,450	5.34	89.75
1D53	C.E.	10,950	221,200	12,100	244,450	4.50	74.75
	B.E.	10,100	205,700	12,050	245,400	4.41	52.00
	M.S.	10,500	212,100	12,350	249,500	5.74	37.94

(1) C.E. denotes cut end of wire
B.E. denotes buttonhead end of wire
M.S. denotes middle section of wire

TENDON SURVEILLANCE PROCEDURE

FOR

CONTAINMENT STRUCTURE

POST-TENSIONING SYSTEM

(TENTH YEAR SURVEILLANCE)

Q

All items and services specified herein which are designated Category I are classified nuclear safety items and services and are required to comply with the requirements of 10 CFR 21.

No.	DATE	REVISION	BY	CH'K	GS	CE	PE
5	7-20-82	Revised pp i, ii, 3, and Attachment 2	P. Desai		KG		
4	3-17-82	Revised pp. i, ii, 2, 7, and Attachments 3 & 6; Added Attachment 7	KG	P. Desai			
3	2-11-82	Revised pp i, ii, 1, 9, 13, 17 and Attachments 2, 5, and 6; Added Attachment 8	KG	P. Desai			
2	1-21-82	Revised pp i, ii, 1, 7, & 11; Revised Attachment 4; Added Attachment 6	KG	P. Desai			
1	12-28-81	Revised pp i, ii, 2, 3, 9, 10, Added p. 2.A Revised Attachment 2, Added Attachment 5	KG	P. Desai			
0	10-2-81	Issued for Use	P. Desai				

GAITHERSBURG POWER DIVISION	FLORIDA POWER & LIGHT COMPANY TURKEY POINT UNIT 3	Procedure No. 5177-187-CP-1	REV. 5

Latest Procedure Revision No. 5
Individual Page Revision Index Sheet

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TENDON SURVEILLANCE PROCEDURE FOR CONTAINMENT STRUCTURE POST-TENSIONING SYSTEM

(Tenth Year Surveillance)

Table of Contents

ATTACHMENTS

1.0 PURPOSE

The purpose of this surveillance procedure is to provide instructions to perform the testing, analysis and data reporting of the Unit 3 containment structure post-tensioning system (tenth year surveillance).

2.0 QUALITY REQUIREMENTS

Owner's quality assurance program shall govern all field, procurement and testing activities. Bechtel's Quality Assurance Program shall govern all project engineering activities at Gaithersburg office and at the jobsite. QA/QC hold points shall be as listed in Attachment 6. | 2

3.0 PERSONNEL TRAINING AND QUALIFICATIONS

The Resident Engineer in charge for this work shall have similar prior experience and shall provide indoctrination and training per EDP 5.34 for the personnel assigned to him to perform this work.

4.0 SCOPE

4.1 The surveillance for each tendon shall consist of the following:

4.1.1 Removing and visually inspecting sheath filler, and obtaining samples for laboratory testing.

4.1.2 Inspecting anchorage assemblies and measuring the thickness of shims.

4.1.3 Obtaining tendon lift-off force and elongation.

4.1.4 Detensioning, removing shims, and inspecting wires for breakage and damage.

4.1.5 Removing wires, where required, for visual examination and laboratory testing.

4.1.6 Retensioning, installing shims, and obtaining tendon lift-off force.

4.1.7 Installing sheath filler.

4.1.8 Testing wire samples per Attachment 1

4.1.9 Testing sheath filler per Attachment 2

4.1.10 Evaluating surveillance data and test results to assess the general condition of the post-tensioning system.

4.2 Temporary protection shall be provided for the tendons and anchorages during surveillance. The end anchors and wires removed shall be protected by applying a coating of Visconorust 1601, Amber over the surfaces. The elapsed time between removing and replacing sheath filler from one tendon shall not exceed 2 weeks.

4.3 Tendon surveillance may be conducted during reactor operation.

4.4 Quality assurance provisions for Visconorust 2090P-4, Visconorust 1601 Amber, and Viscosity Oil Company's Industrial Solvent No. 16 purchased for the tenth year surveillance shall be in accordance with Attachment 5.

5.0 SURVEILLANCE TENDONS

Surveillance tendons for the Unit 3 containment structure shall consist of 3 dome tendons, 3 horizontal tendons, and 3 vertical tendons. The identification numbers of these tendons are listed below:

5.1 Dome Tendons: 1D53, 2D28, 3D28

One wire shall be removed from Tendon 1D53.

5.2 Horizontal Tendons: 62H18, 64H50, 42H70

One wire shall be removed from Tendon 64H50.

5.3 Vertical Tendons: 23V1, 45V7, 61V1

One wire shall be removed from Tendon 45V7

6.0 INITIAL INSTALLATION RECORDS AND PREVIOUS SURVEILLANCE DATA

Original records of initial tendon installation, and of subsequent surveillances, are maintained by Florida Power & Light Company. The original installation records are in card form and contain information pertaining to tendon pulling, button-heading, tensioning, and sheath filling. The surveillance data consists of the raw data recorded during surveillances and the surveillance reports.

7.0 PREINSPECTION REQUIREMENTS

7.1 The jacking rams and gages shall be in good working condition and shall have been calibrated in accordance with a written procedure prepared by the equipment vendor and approved by the Owner. Such a procedure shall be prepared based on the criteria given in Attachment 4. The jacking rams and gages shall be calibrated as matched sets. Gages used must have at least 1/4 % of full scale accuracy and 20 psig dial increments. Pre-surveillance and post-surveillance calibrations shall be witnessed by Bechtel Project Engineering.

7.2 A testing laboratory approved by Owner shall be contracted to perform the wire tensile tests.

7.3 A testing laboratory approved by Owner shall be contracted to perform the sheath filler tests.

8.0 SURVEILLANCE PROCEDURES

8.1 Removal and Inspection of Sheath Filler

The sheath filler, manufactured by Viscosity Oil Company, may be liquid, gel, or solid. All states may occur at a particular tendon. Complete removal of the sheath filler is not required, provided that all filler drained or removed during the surveillance is replaced. The sheath filler shall be removed as follows: 5

8.1.1 Record air temperature outside the containment near the surveillance tendon and inside the containment.

8.1.2 Remove the grease caps from both ends of the tendon and allow the filler to flow into containers of known volume.

8.1.3 Obtain a one-quart sample of filler from each end of the tendon for examination per Section 8.7.2.

8.1.4 Record any lack of grease coverage on end anchors, signs of moisture or any other signs of deterioration.

8.1.5 Record any discoloration of sheath filler on the Sheathing Filler Inspection Form (Figure A-5). (The color of the filler should be dark brown.)

8.1.6 Measure and record the amount of grease removed on the Sheathing Filler Inspection Form as shown in Figure A-5.

8.1.7 Removed sheath filler shall have label showing date and location (i.e., tendon no., end anchorage location, etc.).

8.1.8 Look for any broken buttonheads in sheath filler and document the findings.

8.2 Inspection of Anchorage Components

8.2.1 Thoroughly clean the anchorage components with Viscosity Oil Company's Industrial Solvent No. 16 in accordance with the manufacturer's instructions. Chlorinated hydrocarbon solvents shall not be used.

8.2.2 Inspect and record the buttonheads for splits and cracks and corrosion status. Compare the number of buttonheads with the number at the previous surveillance. Identify missing, broken, damaged, unseated or improperly formed (e.g., double) buttonheads on the End Anchorage Inspection Form as shown in Figure A-2. The width of all buttonhead splits shall be measured with a .06" feeler gage. Document splits greater than .06".

8.2.3 Inspect and record the stressing washers for corrosion status and cracks. If any cracks are observed, show the locations and sizes on the End Anchorage Inspection Form.

8.2.4 Inspect and record the shims for corrosion and cracks. If cracks are observed, prepare a sketch showing their locations.

8.2.5 Inspect and record the bearing plates at the contact surfaces with the shims for corrosion and cracks. If cracks are observed, prepare a sketch showing their locations.

8.2.6 Definitions of corrosion levels for the tendon wires and anchorage components for the surveillance are as follows:

Corrosion Level	Description
1	No visible corrosion
2	Visible Oxidation; no pitting
3	$0.000" < \text{pitting} \leq 0.003"$
4	$0.003" < \text{pitting} \leq 0.006"$
5	$0.006" < \text{pitting} \leq 0.010"$

The corrosion levels for the surveillance as compared to the criteria used during the field installation are indicated below:

Corrosion Level		Acceptability at
Surveillance	Field Installation	Installation
1	A*	Acceptable
2	B*, C*, D*, E*	Acceptable
3, 4, 5	F*	Unacceptable

8.3 Detensioning and Lift-off Forces

8.3.1 Safety

All personnel on work platforms during detensioning and retensioning operations shall be familiar with, and abide by, the following safety rules:

a. Do not stand behind the jacking ram while they are pressurized.

b. Keep fingers away from the tendons and jacking ram, except when required to read lift-off forces, and remove or install shims.

c. Visually examine the jack prior to each use for damage or deformation.

*Prescon symbols identifying Corrosion Level (no longer used)

d. When coupling the jack to the anchorage head, make sure that the threads on the anchorage head are fully engaged by the jack.

8.3.2 Lift-Off Verification

8.3.2.1 Determine the number of effective wires for each tendon from the previous surveillance less any broken wire found in the current surveillance. The number of effective wires shall be determined by subtracting from the total possible number of wires (90) those which are broken, missing, or not buttonheaded.

8.3.2.2 Calculate and record the jacking forces required to obtain the specified 80 percent minimum ultimate strength ($0.8f'_s$) per wire. These forces are obtained by multiplying the number of effective wires by 9.43 kips. Use these values with the jack calibration chart to obtain the gage readings equivalent to the forces. Note that the applied jacking force for each tendon shall not exceed the value thus determined. If lift-off has not been achieved at this maximum force, the jacking ram shall be unloaded and the Resident Engineer in-charge shall be notified for resolution.

8.3.2.3 Attach the jacking ram to the anchorage head and the bearing plate. Note that if the initial stressing was done from both ends of a tendon, the surveillance shall be performed in the same manner.

8.3.2.4 Install the pressure gages to the jacking ram and record their identification numbers. Check the gages for zero pressure reading.

8.3.2.5 Measure and record the depth of the existing shims.

8.3.2.6 Begin applying pressure to the jack and determine the lift-off force by tensioning the tendon until all shims are loosened. Lift-off is achieved when the sound produced by tapping on shims with a small hammer changes to indicate release from compression; also, all accessible shims can be moved by tapping with an approximately 24 oz. weight hammer.

8.3.2.7 Read and record in the form shown in Figure A-3, the gage pressure, ram extension and the corresponding tendon elongation ($\pm$ 1/16") which is defined as the distance between the outside

face of bearing plate and the inside face of the anchorage head.

8.3.2.8 Slowly decrease the pressure on the jack to allow the anchorage head to reseat on the shims. No additional shimming is added at this time. Repeat steps 8.3.2.6 and 8.3.2.7 until three consecutive measurements of the lift off forces show a variation of ± 50 psig or less.

8.3.2.9 Calculate and record the lift off force for each end of the tendon using the appropriate jacking ram calibration constants. Calculate and record the average lift off force for the tendon and the average force per effective wire.

8.3.2.10 Verify that the average lift off force per wire is greater than the minimum effective design prestress.

8.3.3 Detensioning

8.3.3.1 On completion of the lift off verification, increase the jacking ram pressure until the shims can be removed. Then slowly decrease the pressure on the jacking ram to detension the tendon until the gage reading on the jacking ram corresponds to 1000 lbs/wire. Record the jacking force and the tendon elongation (± 1/16").

8.3.3.2 Depressurize the jack until the gages read zero. If necessary for tendon anchorage area inspection or wire removal, detach the gage from the jack and remove the jack. | 3

Notes: 1. Do not exceed the jacking force calculated in Section 8.3.2.2 corresponding to 80% of the minimum ultimate strengh of the tendon. | 3

2. Both ends of a tendon should be detensioned in unison (± 100 psig jacking ram pressure) holding at 1000 psig increments to equalize jack pressures. This will assist in correct positioning of the stressing washer.

3. During uncoupling of the jack, twisting of the tendon shall be limited to one half of a revolution.

8.3.3.3 Carefully inspect the tendon anchorage area again as per Section 8.2.2. Visually inspect the tendon anchorage assembly for missing, bent, broken or damaged wires protruding from the anchorage head.

8.4 Wire Inspection

8.4.1 Remove one test wire from each of the following tendons:

Dome Tendon: 1D53
Horizontal Tendon: 64H50
Vertical Tendon: 45V7

The tool for pulling wires is shown in Figure A-1.

Caution: As some tendons may not be completely detensioned on each end, personnel should not stand directly in front of either end of the tendon when the wire is being cut.

All wires removed and/or cut shall be coiled (approximately 6'-0" diameter) and wrapped with protective cover and shall have an identification metal tag attached close to one end. This metal tag will identify date, the tendon from which wire was removed, and the location of the specimen relative to the buttonhead end of the tendon wire. These tags shall remain with the specimens through completion of testing.

The locations of the buttonheads of the wires to be removed shall be recorded on the End Anchorage Inspection Form as shown in Figure A-2.

8.4.2 Pull the test wire at the end to be cut away from the stressing washer and notch approximately 2 inches from the end. Record the end that is cut and the distance from the notch to the outside of the buttonhead within $\pm$ 0.02 inches.

8.4.3 Cut the wire between the buttonhead and the notch. Remove the remaining portion of the wire and clean it with solvent (Viscosity Oil Co. Industrial Solvent No. 16).

8.4.4 Inspect the wire and record on the Wire Inspection Form (Figure A-4), the locations of any damages, corrosion, and corrosion levels.

8.4.5 Compare the corrosion levels with those of the previous surveillance. If the corrosion has progressed one or more levels, remove one additional wire at approximately 120° from the first wire, repeating Paragraph 8.4.2, 8.4.3, and 8.4.4.

If the second wire has progressed one or more levels, repeat this procedure for a third wire selected at approximately 120° from the first two. Do not remove more than three wires from any one tendon during one surveillance period.

8.5 Retensioning and Lift-off Forces

8.5.1 Safety

The safety rules as specified in Paragraph 8.3.1 shall apply.

8.5.2 Retensioning Tendons

Retensioning shall be performed in a similar manner as detensioning; that is, if detensioning is done from both ends of a tendon, retensioning shall be performed accordingly.

8.5.2.1 Determine the number of effective wires in the tendon for retensioning. Deduct any discontinuous or surveillance test wires removed and recalculate the new jacking forces as outlined in Paragraph 8.3.2.2.

8.5.2.2 Attach the jacking ram to the bearing plate.

8.5.2.3 Install the pressure gages to the jacking ram and record their identification numbers. Check the gages for zero pressure reading.

8.5.2.4 Pressurize the jacking ram to a force equivalent to 1,000 lbs per wire. Record the gage reading, ram extension, and the corresponding tendon elongation.

8.5.2.5 Stress the tendon holding at 1000 psig increments to equalize the jack pressures until the average wire stress is equal to 80% (+ 0%, -. 1%) of the minimum ultimate strength of the wires, as determined in Paragraph 8.5.2.1. Record the gage reading, ram extension and the corresponding tendon elongation.

8.5.2.6 Reduce the jacking force from the equivalent of 80 percent of the minimum ultimate strength of the wires, to the initial lift-off reading as obtained in Paragraph 8.3.2.6.

For any discontinuous or test wires removed, deduct 75 psi from the initial lift-off gage readings.

8.5.2.7 Install shims to the nearest one-eight inch of the full shim depth.

8.5.2.8 Obtain new lift-off force. The reading should be between minus zero and plus eight percent (8%) of the initial lift-off force (corrected for missing wires). If not, repeat the procedures as stated in Paragraphs 8.5.2.5 and 8.5.2.6. Install shims and obtain new lift-off force.

8.5.2.9 Measure and record new shim depth.

8.5.2.10 Detach the jacking ram and apply a coating of Viscosity Oil Co. 2090P-4 or 1601 Amber to the tendon and anchorages.

8.5.2.11 Observations required as described herein shall be recorded on the form as shown in Figure A-3.

8.6 Installing Sheath Filler

8.6.1 Reinstall tendon filler caps using new gaskets, copper washers, and teflon nuts as used in the initial installation and record on Sheathing Filler Inspection Form as shown in Figure A-5. Nuts with nylon inserts may be used instead of teflon nuts. Nuts and copper washers are non-Category I. | 3

8.6.2 Refill the tendon sheathing with Vicosity Oil Co. Visconorust 2090P-4 sheath filler. The sheath filler shall be heated to its melting point prior to pumping (approximate melting point is 135° - 145° F). The temperature of the filler at the filler pump shall be approximately 120°F (± 10°F). Do not reuse filler that has been removed from the tendons. Pumping shall continue from one end of the tendon, until approximately 5 gallons of filler, without any air bubbles or visible foreign substances, flow out of the outlet at the opposite end of the tendon. | 3

8.6.3 Record the temperature of the sheath filler at the drum and at the outlet. Also, record on the Sheath Filler Inspection Form (Figure A-5) the volume of sheath filler replaced for each surveillance tendon.

8.7 Laboratory Testing of Tendon Wire Samples and Sheath Filler Samples.

8.7.1 Tendon Wire Sample Testing

8.7.1.1 Tensile test shall be performed on at least three specimens from each surveillance wire removed. Tensile test specimens, each approximately 126 inches long, shall be taken from near the center and each end of the wires. Additional specimens shall be taken from the portions of the wire that appear to have a corrosion rating one or more levels greater than the average descriptions of the wires.

8.7.1.2 Remaining wires not used for testing shall be protected against corrosion and retained until test results have been finalized.

8.7.1.3 Tensile tests also shall be made on at least one specimen from each broken wire removed. The test specimen shall be taken near the break and shall be approximately 126 inches long.

8.7.1.4 All tensile tests shall be performed in accordance with Attachment 1. "Specification for Tensile Testing of Post-Tensioning Tendon Wire."

8.7.1.5 For acceptance criteria see Paragraph 9.3.

8.7.2 Sheath Filler Sample Testing

8.7.2.1 Analytical testing shall be performed on at least one specimen, each one quart in size, from each surveillance tendon.

8.7.2.2 Additional specimen obtained from the surveillance tendons, but not used for testing, shall be retained until test results have been finalized.

8.7.2.3 All sheath filler testing shall be performed in accordance with Attachment 2, "Specification for Laboratory Testing of Sheath Filler."

9.0 ACCEPTANCE CRITERIA

9.1 Sheath Filler

The following shall be the acceptance criteria:

a. Chlorides - 2 ppm maximum
b. Nitrates - 4 ppm maximum
c. Sulfides - 2 ppm maximum
d. Water (H_2O) - 10% dry weight maximum

1

9.2 Corrosion Level

Acceptable corrosion levels for tendon wires and anchorage components shall be in accordance with Section 8.2.6.

9.3 Tendon Physical Condition Test

The acceptance criteria for the wire tensile test shall be no failure below the guaranteed ultimate stress of 240,000 psi.

9.4 Tendon Lift-off Force

The lift-off forces for all surveillance tendons shall be greater than the minimum effective design prestress per Figures 5-1, 5-2,and 5-3 in fifth year surveillance report.

9.5 If the above criteria are not met, an evaluation by Project Engineering shall be conducted to determine if corrective measures are necessary.

9.6 Missing, Broken and/or Damaged Wires

9.6.1 Missing, broken and/or damaged wire criteria is based on original quantity of 90 wires per tendon.

9.6.2 The buttonheads with splits greater than 0.06 inches wide will be identified as defective buttonheads.

9.6.3 The broken and missing wires will be treated as ineffective wires for system evaluation. Broken wires will be removed for examination and laboratory testing if conditions are feasible. (See Section 8.4.1 for identification tags)

9.6.4 Record information obtained per Paragraphs 9.6.2 and 9.6.3 on the form as shown in Figure A-2 for an engineering evaluation. | 2

10.0 REPORT

10.1 Data

Data obtained during the surveillance shall be summarized in a report. The original data and records of the surveillance shall be submitted to Florida Power and Light Company within 90 days of completion of the tendon surveillance at the Turkey Point Plant. Any deviations and nonconforming items shall be reported to Project Engineering for evaluation and disposition.

10.2 Evaluation

The surveillance data for each tendon shall be compared with previous records to determine if:

a. Additional wires have broken since last surveillance.

b. The lift-off force for the tendon is below the minimum effective design prestress.

c. Changes in wire corrosion level, or anchorage assembly corrosion level, have occurred.

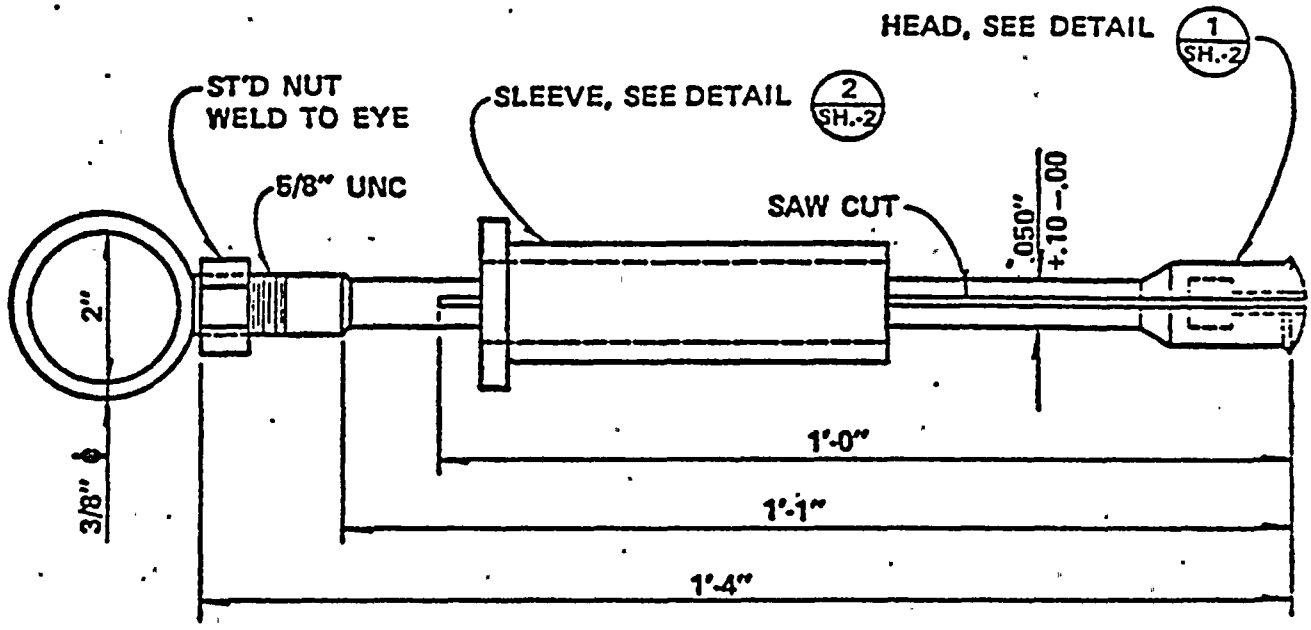
d. Deterioration of sheath filler has occurred.

e. Significant changes in wire elongation, yield, and ultimate strength have occurred.

If any of these conditions exists, the report shall include an evaluation by Project Engineering of condition, and where necessary, recommendations for remedial actions.

10.3 Formulas

Formulas for normalizing factors and normalized forces are given in Attachment 3.

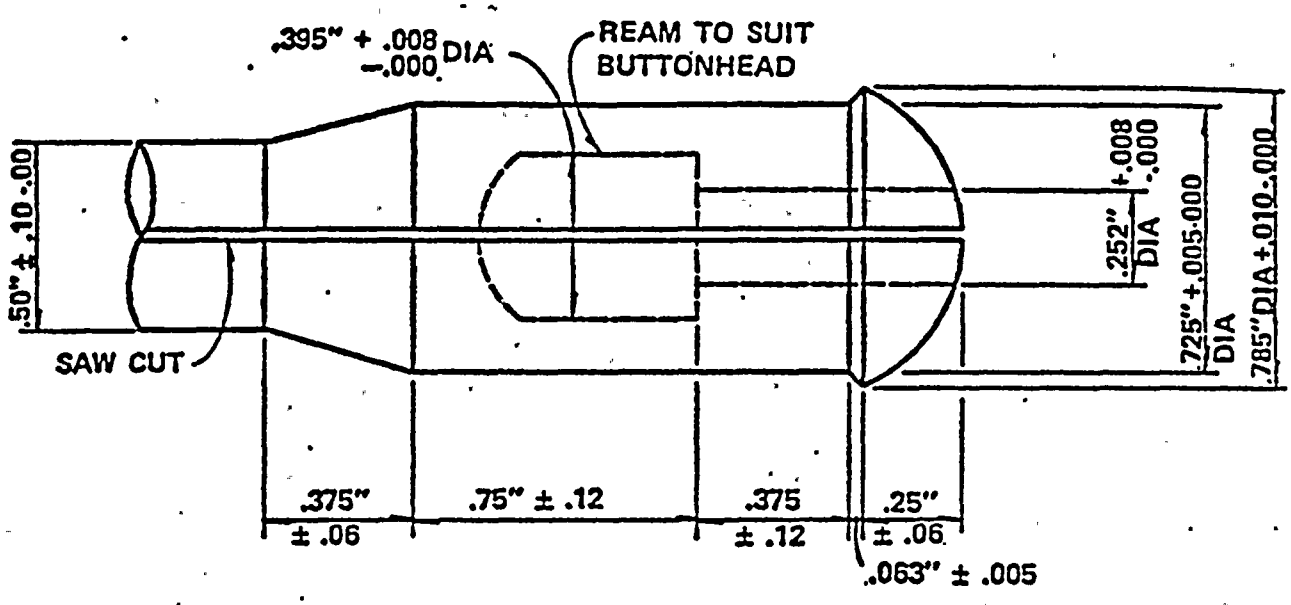


NOTES:

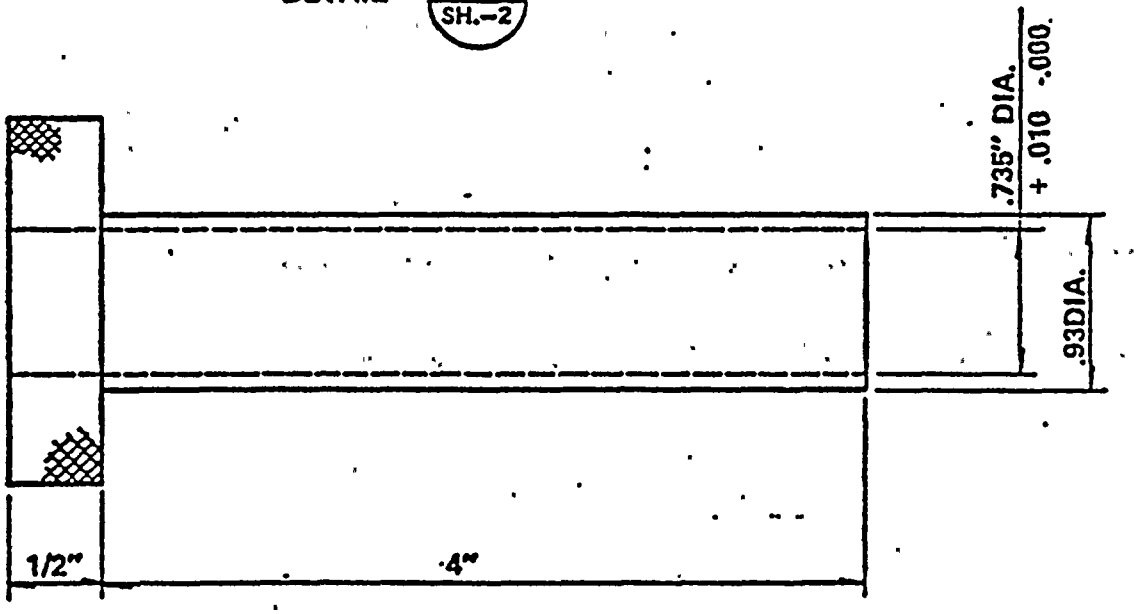
1. The nut with the pulling ring welded to it may be replaced with an eye nut.
2. The hardness of this tool shall not exceed Rockwell C40.

FIGURE A-1 SHEET 1 OF 2 (Rev.0)

FLORIDA POWER & LIGHT CO.
TURKEY POINT NUCLEAR POWER PLANT
TENDON SURVEILLANCE
UNIT 3
WIRE PULLER



HEAD DETAIL 1 SH.-2

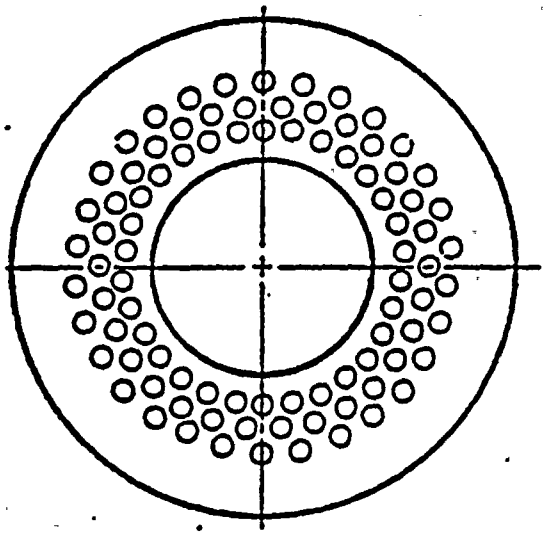


MOVABLE SLEEVE DETAIL 2 SH.-2

FIGURE A-1 SHEET 2 OF 2 (Rev.0)

FLORIDA POWER & LIGHT CO.
TURKEY POINT NUCLEAR POWER PLANT
TENDON SURVEILLANCE
UNIT 3
WIRE PULLER

TENDON NO. _____ LOCATION (CLOSEST BUTTRESS) _____



END ANCHORAGE A

(CLOSEST BUTTRESS___)

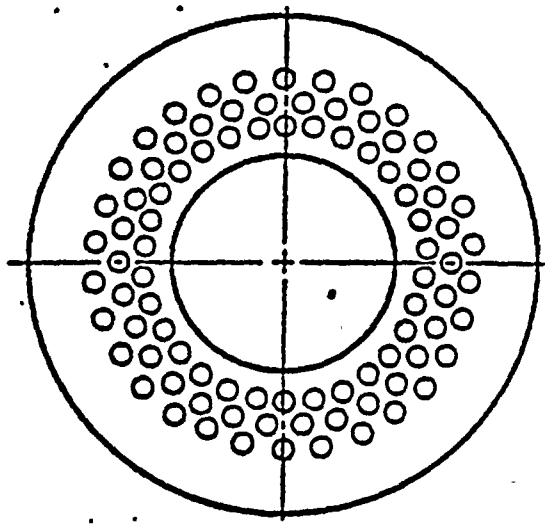
CORROSION LEVEL

WASHER _____

BUTTONHEADS _____

SHIMS _____

BEARING PLATE _____



END ANCHORAGE B

(CLOSEST BUTTRESS___)

CORROSION LEVEL

WASHER _____

BUTTONHEADS _____

SHIMS _____

BEARING PLATE _____

LEGEND:

BUTTONHEADS: (BH)

- ◑ OFF-SIZE BUTTONHEAD
- ◐ BUTTONHEAD WITH SPLIT
- ● WIRE REMOVED PREVIOUSLY
- ⌀ DISCONTINUOUS WIRE REMOVED THIS SURVEILLANCE
- ⊠ WIRE REMOVED FOR INSPECTION AND TESTING THIS SURVEILLANCE

Total No. BH _____
No. of Broken, Damaged or Missing BH _____
No. of BH with Splits > 0.06" _____
No. of Improperly Formed BH _____

CORROSION LEVELS:

#1 NO VISIBLE OXIDATION
#2 VISIBLE OXIDATION, NO PITTING
#3 0" < PITTING ≤ 0.003"
#4 0.003" < PITTING ≤ 0.006"
#5 0.006" < PITTING ≤ 0.010"

Total No. of BH _____
No. of Broken, Damaged or Missing BH _____
No. of BH with Splits > 0.06" _____
No. of Improperly Formed BH _____

INSPECTED BY

END ANCHORAGE A _____ DATE_____
END ANCHORAGE B _____ DATE_____

FIGURE A-2 (Rev. 0)

FLORIDA POWER & LIGHT
TURKEY POINT NUCLEAR POWER PLANT
UNIT 3
POST-TENSIONING SYSTEM
TENDON SURVEILLANCE
END ANCHORAGE INSPECTION

SHEET__OF__

TENDON NO. _____ BUTTRESS _____ INSPECTED BY _____ DATE _____

JACKING RAM NO. _____ NUM. EFF. WIRES

GAGE NO. _____ @ DETENSIONING _____

@ RETENSIONING _____

EXTERIOR TEMPERATURE _____

INTERIOR TEMPERATURE _____

	DESCRIPTION	OBJECTIVE	ACTUAL MEASURED
DETENSIONING	CHECK GAGES (ZERO)		
	MEASURE SHIMS		
	CALCULATED JACKING FORCE (Section 8.3.2.2)		
	OBTAIN LIFT-OFF (ii) Gage Reading		
	(ii) Jacking Force		
	MEASURE ELONGATION AT LIFT-OFF (Section 8.3.2.6)		
	JACK PRESSURE & ELONGATION AT 1000 lbs/wire		
	(Section 8.3.3.1)		
	DEPRESSURIZE TO ZERO		
	REMOVE RAM (if necessary)		
	REMOVE WIRE		
	WAS THIS END CUT?		
	CHECK CONTINUITY		
RETENSIONING	PRESSURIZE AT 1000 LB/WIRE		
	MEASURE ELONGATION ••		
	PRESSURIZE TO .8f'_s		
	MEASURE ELONGATION AT .8f'_s ••		
	PRESSURE @ RESHIM •		
	A) NEW LIFT-OFF		
	B) NEW SHIMS		

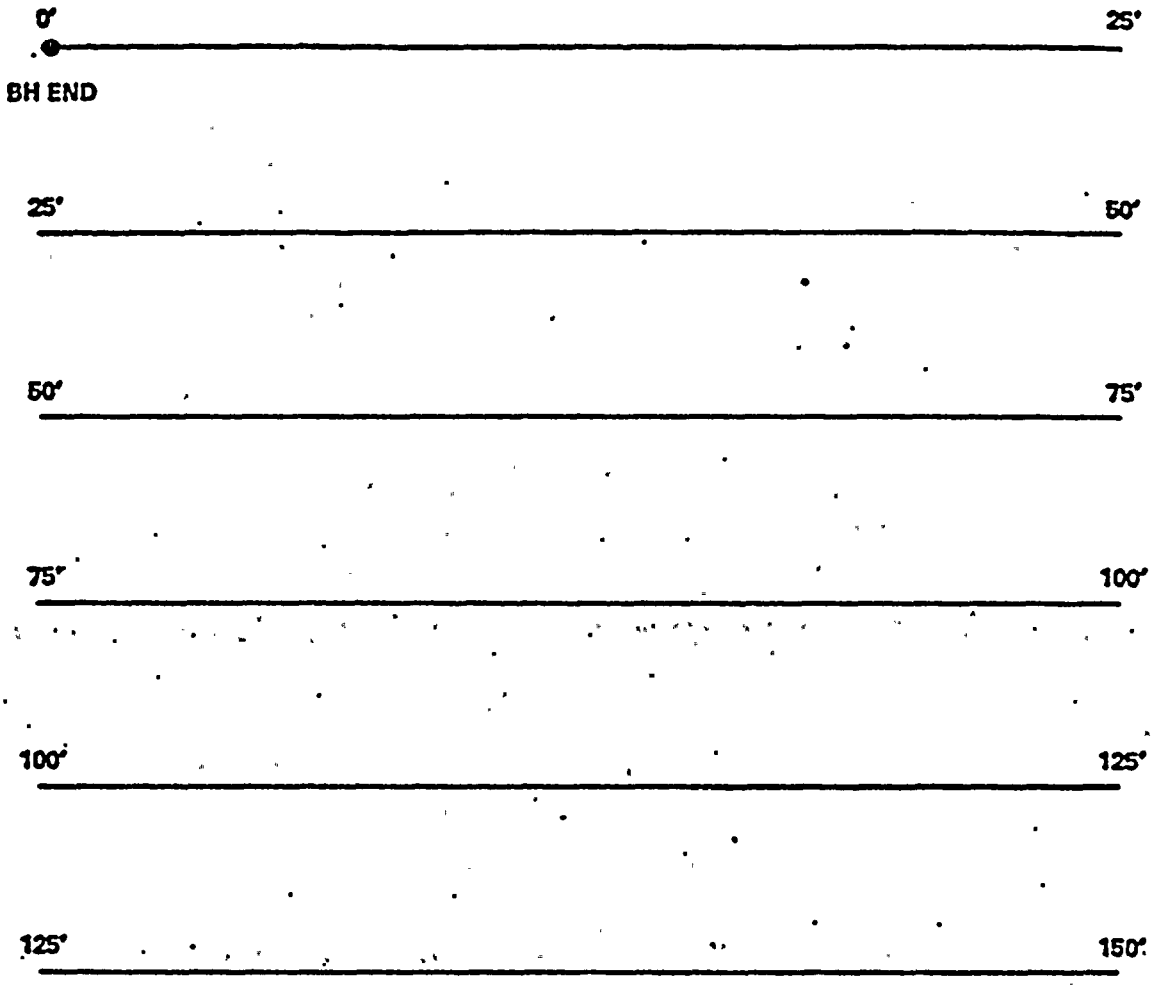
3

• PRESSURE SHALL NOT DROP BELOW THIS LEVEL AFTER PRESSURIZATION TO .8f'_s

•• ELONGATION IS THE DISTANCE FROM THE OUTSIDE FACE OF THE BEARING PLATE TO THE INSIDE FACE OF THE STRESSING WASHER. (THIS WILL BE A NEGATIVE NUMBER IF THE WASHER IS INSIDE THE TRUMPET.)

FIGURE A-3 (Rev.3)

TENDON NO. _____ CLOSEST BUTTRESSES _____



TOTAL LENGTH OF WIRE _____

CORROSION LEVEL:

- ☐ #1 NO VISIBLE OXIDATION
- ☐ #2 VISIBLE OXIDATION, NO PITTING
- ☐ #3 0" < PITTING ≤ 0.003"
- ☐ #4 0.003" < PITTING ≤ 0.006"
- ☐ #5 0.006" < PITTING ≤ 0.010"

NOTE:
Record location and identify any damage or corrosion and corrosion levels.

INSPECTED BY _____

DATE _____

BH. - BUTTONHEAD

FIGURE A-4 (Rev. 0)

FLORIDA POWER & LIGHT CO.
TURKEY POINT NUCLEAR POWER PLANT
UNIT 3
POST TENSIONING SYSTEM
TENDON SURVEILLANCE
WIRE INSPECTION
& TENSION SAMPLE LOCATIONS

SHEET __ OF __

SHEATHING FILLER INSPECTION

TENDON NO. _____

END ANCHORAGE A	END ANCHORAGE B
CLOSEST BUTTRESS _____	CLOSEST BUTTRESS _____
DETENSIONING:	DETENSIONING:
TEMPERATURE:	TEMPERATURE:
OUTSIDE _____	OUTSIDE _____
INSIDE _____	INSIDE _____
Vol. of GREASE REMOVED _____	Vol. of GREASE REMOVED _____
COLOR _____	COLOR _____
BY: _____	BY: _____
DATE: _____	DATE: _____

VISUAL EXAMINATION OF SHEATH FILLER _____

RETENSIONING:	RETENSIONING:
TEMPERATURE:	TEMPERATURE:
OUTSIDE _____	OUTSIDE _____
INSIDE _____	INSIDE _____
INLET _____	INLET _____
OUTLET _____	OUTLET _____
Vol. of GREASE REPLACED _____	Vol. of GREASE REPLACED _____
BY: _____	BY: _____
DATE: _____	DATE: _____

REINSTALLED:	REINSTALLED:
(i) TENDON FILLER CAPS USING NEW GASKETS _____	(i) TENDON FILLER CAPS USING NEW GASKETS _____
(ii) COPPER WASHERS _____	(ii) COPPER WASHERS _____
(iii) TEFLON NUTS, OR NUTS WITH NYLON INSERTS _____	(iii) TEFLON NUTS, OR NUTS WITH NYLON INSERTS _____
BY: _____	BY: _____
DATE: _____	DATE: _____

3

FIGURE A-5 (Rev. 3)

FLORIDA POWER & LIGHT CO.
TURKEY POINT NUCLEAR POWER PLANT
UNIT 3
POST-TENSIONING SYSTEM
TENDON SURVEILLANCE

SHEET OF

PROCEDURE

FOR

TENSILE TESTING

OF

POST-TENSIONING TENDON WIRE (ASTM A-421)

FOR

FLORIDA POWER & LIGHT COMPANY

TURKEY POINT NUCLEAR POWER PLANT

UNIT 3

POST-TENSIONING SYSTEM

TENDON SURVEILLANCE

1.0 GENERAL

This document specifies the general procedures which shall be used for the tensile testing of the 1/4"-diameter post-tensioning tendon wires (ASTM A-421, Type BA). This document does not relieve the testing laboratory of the responsibility for conducting the tensile tests in a manner consistent with the industry standards.

2.0 WORK INCLUDED

Nine (9) 1/4"-diameter wire specimens, approximately 10'-6" long, will be sent to the laboratory for testing in accordance with Section 3.0. Each of these specimens will have an identification tag attached close to one end; this tag will identify the tendon from which the wire was removed and the location of the specimen with respect to the wire. Specimens shall be disposed of in accordance with Section 4.0 and a report meeting the requirements of Section 5.0 shall be prepared.

3.0 TEST DESCRIPTION

Tendon wires shall be tested in accordance with ASTM A-421-80, "Standard Specification for Uncoated Stress-Relieved Wire for Prestressed Concrete", except that the gage length shall be 100 (± 1.0) inches, instead of the 10 inches as specified. This test shall include the following:

3.1 Measurement of wire diameter with an accuracy of ± 0.0005".

3.2 Measurement of gage length with an accuracy of ± 0.05".

3.3 Application of an initial load corresponding to 29,000 psi.

3.4 Application of additional load to obtain the force corresponding to 1.0 percent extension.

3.5 Application of additional load and obtaining load at failure and elongation under load at failure (± 0.05").

4.0 DISPOSAL OF TESTED SPECIMENS

A sample approximately 6" long on each side of the break of each specimen shall be bound and returned as a unit with the identification tag attached. Specimens shall be returned to:

Bechtel Power Corporation
15740 Shady Grove Road
Gaithersburg, Maryland 20877

Attention: Mr. A. W. Wilk
Project Engineer

REPORT

Three (3) copies of the report on tendon wire testing shall be submitted to:

Bechtel Power Corporation
15640 Shady Grove Road
Gaithersburg, Maryland 20877

Attention: Mr. A. W. Wilk
Project Engineer

The report shall contain the following information:

5.1 Testing machine calibration report.

5.2 Wire identification.

5.3 Wire diameter (± 0.0005 inches).

5.4 Gage length (± 0.05 inches).

5.5 Force and elongation (± 0.001 inches) at initial load.

5.6 Force and elongation (± 0.01 inches) at 1% extension.

5.7 Force and elongation under load (± 0.05 inches) at failure.

5.8 Location of failure relative to the grip in the moving head (± 0.005 inches).

PROCEDURE

FOR

LABORATORY TESTING

OF

SHEATH FILLER

FOR

FLORIDA POWER & LIGHT COMPANY

TURKEY POINT NUCLEAR POWER PLANT

UNIT 3

POST-TENSIONING SYSTEM

TENDON SURVEILLANCE

3

Rev. 3

1.0 GENERAL

This document specifies the procedures which shall be used for laboratory testing of sheath filler (manufactured by Viscosity Oil Company) removed from surveillance tendons to determine: | 3

a. The amount of water soluble chlorides, nitrates and sulfides which are leached from a given contact area between water and the sheath filler under standard conditions.

b. The water content of the sheath filler.

c. The reserve alkalinity of the sheath filler.

This document does not relieve the testing laboratory of responsibility for conducting the necessary laboratory tests in a manner consistent with the industry standards.

2.0 WORK INCLUDED

Nine (9) one-quart test samples will be sent to the laboratory for testing in accordance with Section 3.0. The concentration of water soluble impurities and water in these samples will likely not exceed the following:

2.1 Chlorides - 2 ppm

2.2 Nitrates - 4 ppm

2.3 Sulfides - 2 ppm

2.4 Water (H_2O) - 10% Dry Weight

A report meeting the requirements of Section 4.0 shall be prepared.

3.0 TEST DESCRIPTIONS

Each sample of sheath filler shall be mixed and then tested as follows:

3.1 Water Soluble Impurities

A water extraction of each sample of sheath filler shall be made and tested as indicated below:

3.1.1 Using a spatula, coat the inside (bottom and sides) of a 1 liter glass beaker with a 1/4-inch layer of sheath filler.

3.1.2 Fill the beaker with distilled water at room temperature.

3.1.3 Heat the water to a controlled temperature of 100°F and maintain for four hours. Do not heat on a hot plate. Heat either in an oven or by use of an immersion heater so that the water will remain clear for tests.

3.1.4 Run a blank on distilled water. If titrate, use a micro-buret, 1 ml or 5 ml, with 0.01 - 0.05 ml graduation intervals.

3.1.5 Decant water and analyze for soluble ions. Test only for salts in leached water. The water analyses shall be as follows:

3.1.5.1 Chlorides (Cl) by ASTM D-512.

3.1.5.2 Nitrate (NO_3) by ASTM D-992, Brucine Method or Cadmimum Reduction Method by Hach Chemical Co., Ames, Iowa.

3.1.5.3 Sulfides (S) by APHA (American Public Health Association) Standard Method - Methylene Blue - or the method by Hach Chemical Company, Ames, Iowa.

3.2 Water Content

Water content (H_2O as percent of dry weight) shall be determined in accordance with ASTM D-95.

3.3 Neutralization Number

Neutralization number shall be determined in accordance with ASTM D-974. 3

4.0 REPORT

Three copies of the report on laboratory testing of the sheath filler shall be submitted to:

Bechtel Power Corporation
15740 Shady Grove Road
Gaithersburg, Maryland 20877

Attention: Mr. A. W. Wilk
Project Engineer

The report shall contain the following information:

4.1 Sample identification.

4.2 Concentration of water soluble chlorides, nitrates and sulfides within an accuracy of 0.1 ppm.

4.3 Concentration of water (H_2O) within an accuracy of 0.1 percent of dry weight of the filler.

4.4 Neutralization number within an accuracy of 0.01 mg reagent per gram of filler.

FORMULAS

FOR

NORMALIZING FACTORS AND NORMALIZED FORCES

FOR

FLORIDA POWER & LIGHT COMPANY

TURKEY POINT NUCLEAR POWER PLANT

UNIT 3

POST-TENSIONING SYSTEM

TENDON SURVEILLANCE

1.0 GENERAL

In order to provide a common base for comparison, tendon lift-off forces must be normalized to account for elastic stress loss during initial installation (a function of the post-tensioning sequence), the lift-off force deviation from the base value, and the number of effective tendon wires or strands. The base value for evaluating the normalized tendon force is assumed to be the force which produces an average tendon wire or strand stress of 0.7fpu. In cases where the same tendon is subjected to two or more surveillances, the base value for the ith surveillance is the normalized force for the i-1 surveillance.

The normalized force is equal to the measured lift-off forces multiplied by the normalizing factors.

2.0 NORMALIZING FORMULAE

2.1 Normalizing Formulae for First Surveillance (i = 1)

2.1.1 Vertical Tendons

$$N_{F_1} = \frac{0.7f_{pu}}{\frac{L_c}{N_{wc}A_w} - \left(\frac{N_v - n_v}{N_v}\right)S_{E_V} + V\left(\frac{N_h - n_h}{N_h}\right)S_{E_H}} \qquad \text{(Eq. 1)}$$

2.1.2 Hoop Tendons

$$N_{F_1} = \frac{0.7f_{pu}}{\frac{L_c}{N_{wc}A_w} - \left(\frac{N_h - n_h}{N_h}\right)S_{E_H} + V\left(\frac{N_v - n_v}{N_v}\right)S_{E_V}} \qquad \text{(Eq. 2)}$$

2.1.3 Dome Tendons

$$N_{F_1} = \frac{0.7f_{pu}}{\frac{L_c}{N_{wc}A_w} - \left(\frac{N_d - n_d}{N_d}\right)\left(2 - v\sqrt{3}\right)S_{E_D}} \qquad \text{(Eq. 3)}$$

2.2 Normalized Lift-Off Force Per Wire or Strand

$$F_{N_i} = F_{w_i} \times N_{F_i} \qquad \text{(Eq. 4)}$$

2.3 Normalizing Factor for Subsequent Surveillances ($i > 1$)

The following equation is used for vertical-dome, hoop-wall, or hoop-dome tendon:

$$N_{F_i} = N_{F_{(i-1)}} \left(\frac{L_{(i-1)} \times N_{wr(i-1)}}{L_{r(i-1)} \times N_{w(i-1)}} \right) \qquad \text{(Eq. 5)}$$

3.0 NOMENCLATURE

L_c = initial lift-off force of surveillance tendon (kips)

$L_{(i-1)}$ = lift-off force obtained at the i-1 surveillance (kips)

$L_{r_{(i-1)}}$ = lift-off force during retensioning at the i-1 surveillance (kips)

n_h = number of hoop tendons tensioned prior to tensioning surveillance tendon

N_h = total number of hoop tendons

n_v = number of vertical tendons tensioned prior to tensioning surveillance tendon

N_v = total number of vertical tendons in one group

n_d = number of dome tendons in one group tensioned prior to tensioning surveillance tendon

N_d = total number of dome tendons

N_{wc} = number of effective wires or strands in surveillance tendon at initial installation

N_{wi} = number of effective wires or strands in surveillance tendon at ith surveillance

$N_{w_{(i-1)}}$ = number of effective wires or strands in surveillance tendon at i-1 surveillance

$N_{wr_{(i-1)}}$ = number of effective wires or strands in surveillance tendon when retensioned during the i-1 surveillance

S_{E_h} = total elastic stress loss in hoop tondons during initial tensioning (ksi) = 15.3 ksi

S_{E_v} = total elastic stress loss in vertical tendons during initial tensioning (ksi) = 6.6 ksi

F_{wi} = lift-off force per wire or strand at i^{th} surveillance (kips)

$F_{wr_{(i-1)}}$ = lift-off force per wire or strand after retensioning at the i-1 surveillance (kips)

F_{N_i} = normalized lift-off force per wire or strand for the i^{th} surveillance (kips)

N_{F_i} = normalizing factor for the i^{th} surveillance

$N_{F_{(i-1)}}$ = normalizing factor for the i-1 surveillance

S_{E_d} = total elastic loss in dome tendons during initial tensioning (ksi) due to one group = 14.7 ksi

V = Poisson's ratio for concrete = 0.16

f_{pu} = minimum specified ultimate strength of tendon wire or strand (ksi)

A_w = cross-sectional area of one tendon wire or strand (in^2)

CRITERIA FOR

STRESSING RAM CALIBRATION

CRITERIA FOR STRESSING RAM CALIBRATION

1.0 OBJECTIVE

The following criteria shall be used in a preparing a detailed procedure for the calibration of the stressing rams.

2.0 CALIBRATION SCHEDULE

The stressing rams shall be calibrated not more than one month prior to the first tendon lift-off force measurement and not more than twenty days following the completion of the surveillance. Additional calibrations during the surveillance may be performed at the discretion of the Owner and if there is reason to believe that the ram has been damaged. | 1

3.0 CALIBRATION EQUIPMENT

The stressing rams shall be calibrated in a universal or compression testing machine having an adequate capacity (1000 kips). The testing machine shall be one owned and operated by a recognized testing organization and shall have been calibrated not more than one year prior to or two weeks after the date of the ram calibration using an NBS traceable standard. The accuracy of the testing machine shall be within 1% of the reading in the 500-1000 kip load range. | 1

The seals of the stressing rams shall be inspected prior to the calibration and shall be replaced if found to have deteriorated.

4.0 PROCEDURE

4.1 Setup

4.1.1 The ram and the pressure gage shall be calibrated as a matched set. The accuracy of pressure gage shall also be verified independently.

4.1.2 The laboratory setup for calibration shall resemble as closely as possible the field setup during the surveillance. The hydraulic pump to be used during the surveillance shall also be used during the calibration unless it can be shown that the calibration constants are independent of the pump size and flow rate. For smoother operation, electric pumps are preferred.

4.2 Calibration

4.2.1 Each ram shall be calibrated at different piston extensions to envelop the entire range of piston extensions expected

during the surveillance. At each extension, the ram pressure shall be cycled at least three times from zero to the maximum value in increments of 1000 psi. Readings shall be taken on increasing loads only. Readings taken on decreasing loads may provide erroneous data thereby invalidating the calibration.

4.2.2 Prior to performing the calibration, cycle the ram three times from zero to the maximum piston extension.

4.2.3 A least square straight line shall be fitted through the calibration data points and the ram shall be considered acceptable if no point deviates from the straight line by more then 2%. A similar criteria shall be used during the recalibration. If this criteria is not met, an evaluation by Project Engineering shall be conducted to determine if corrective measures are necessary. | 1

QUALITY ASSURANCE PROVISIONS

FOR

VISCONORUST 2090 P-4

VISCONORUST 1601 AMBER,

AND

VISCOSITY OIL COMPANY'S

INDUSTRIAL SOLVENT NO. 16

PURCHASED FOR

TENTH-YEAR SURVEILLANCE

FLORIDA POWER & LIGHT COMPANY

TURKEY POINT NUCLEAR POWER PLANT

UNIT 3

POST-TENSIONING SYSTEM

TENDON SURVEILLANCE

1.0 GENERAL

This document specifies the quality assurance provisions required for the purchase of the following:

a. Visconorust 2090 P-4 tendon sheath filler

b. Visconorust 1601 Amber

c. Viscosity Oil Company's Industrial Solvent No. 16

2.0 DOCUMENTATION REQUIRED FROM SELLER

2.1 The Seller of the tendon sheath filler shall furnish certificates of compliance stating that the sheath filler meets the following requirements:

a. Water Soluble Chlorides - 2 ppm (maximum), as determined by ASTM D512.

b. Water Soluble Nitrates - 4 ppm (maximum), as determined by ASTM D992, Brucine Method or Cadminum Reduction Method by Hach Chemical Company, Ames, Iowa.

c. Water Soluble Sulfides - 2 ppm (maximum), as determined by APHA (American Public Health Association) Standard Method - Methylene Blue - or the method by Hach Chemical Company, Ames, Iowa.

d. Water Content - Maximum of 10% of dry weight, as determined by ASTM D95.

e. Neutralization Number - Total base number not less than 35, as determined by ASTM D974 (as modified by the procedure described in Attachment 7).

2.2 Preparation and testing of the sheath filler samples shall be as described in Attachment 2, Section 3.0. 1

2.3 If Seller uses testing procedures other than those specified above, the said procedures shall be submitted by the Seller for review and approval by Project Engineering.

2.4 Certificates of compliance shall be submitted with every batch of sheath filler received at the jobsite.

2.5 Viscosity Oil Company's Industrial Solvent No. 16 and Visconorust 1601 Amber require only Certificates of Compliance as quality assurance documentation.

3.0 ACCEPTANCE TESTS

3.1 For every shipment of tendon sheath filler received at the jobsite, the Buyer will conduct acceptance tests through an independent laboratory. One test sample shall be taken from every 300 gallons received; at least one test sample shall be taken from each batch received. The following tests shall be performed:

a. Water Soluble Chlorides

b. Water Soluble Nitrates

c. Water Soluble Sulfides

d. Water Content

e. Neutralization Number

Methods of tests and allowable limits shall be per Paragraphs 2.1 and 2.2 above. If any alternate test methods proposed by Seller are accepted by Project Engineering, these methods may be used to test jobsite samples. Failure of the sheath filler to meet these requirements shall be cause for rejection of the material. The Seller will bear the cost of removal and disposal of the material.

3.2 Jobsite samples shall be at least one quart in volume. Samples shall be labelled to indicate batch numbers.

3.3 Mixing and testing of sheath filler (jobsite samples) shall be in accordance with Attachment 2, Section 3.0.

QA/QC HOLD POINTS

FOR

FLORIDA POWER & LIGHT COMPANY

TURKEY POINT NUCLEAR, POWER PLANT

UNIT 3

POST-TENSIONING SYSTEM

TENDON SURVEILLANCE

TURKEY POINT NUCLEAR POWER PLANT
UNIT 3
TENTH YEAR SURVEILLANCE
QA/QC HOLD POINTS

			SIGN OFF	
a.	Indoctrination and training (per EDP 5.34) of personnel assigned to Resident Engineer prior to commencement of surveillance. (Ref. Paragraph 3.0)			
b.	Receipt of pre-surveillance ram and gage calibration documentation prior to use of rams. (Ref. Paragraph 7.1; Attachment 4)			
c.	Receipt of vendor's material documentation for Visconorust 2090P-4, Visconorust 1601 Amber, and Viscosity Oil Company's Industrial Solvent No. 16 prior to use. (Ref. Paragraph 4.4; Attachment 5, Paragraph 2.0)			
d.	Completion of all information required on surveillance inspection forms (Figures A-2, A-3, A-4 and A-5) for each tendon prior to completion of surveillance. (Ref. Paragraphs 8.1, 8.2, 8.3. 8.4, 8.5, 8.6, and 9.6)	Tendon #		2
		1D53		
		2D28		
		3D28		
		62H18		
		64H50		
		42H70		
		23V1		
		45V7		
		61V1		
e.	Removal of correct number of wires (as determined by corrosion levels) prior to retensioning tendon. (Ref. Paragraph 8.4.5)	Tendon #		2
		1D53		
		64H50		
		45V7		
f.	Test samples (wire and sheath filler) for any tendon properly identified and labelled/tagged prior to proceeding to next tendon. (Ref. Paragraph 8.1.7 and 8.4.1)	Tendon #		2
		1D53		
		2D28		
		3D28		
		62H18		
		64H50		
		42H70		
		23V1		
		45V7		
		61V1		

BASE DETERMINATION

FOR

VISCONORUST 2090P-4

CASING FILLER

BASE DETERMINATION
FOR VISCONORUST 2090P-4 CASING FILLER

This method, a Modified ASTM D-974 procedure, should be used to determine the titratable alkalinity because of highly alkaline characteristic of this product.

Base Number (Modified ASTM D-974)

1. Place 10g of sample in a 500 ml Erlenmeyer flask.
2. Add 10cc isopropyl alcohol and 5cc benzene. Heat until sample goes into solution.
3. Add 90cc distilled water and 20cc 1 N H_2SO_4. Place solution in a steam bath for ½ hour. Stir well.
4. Add a few drops of indicator (1% phenolphthalein) and titrate with 1 N NaOH until the endpoint goes to pink.
5. If acid or basic solutions are not exactly 1 N, the exact normality should be used.
6. ASTM D-974 equation for calculating the Total Base Number (TBN), expressed as milligrams of KOH per gram of casing filler, is calculated as follows:

$$TBN = \frac{[(20 \times N_A) - (B \times N_B)]}{W} \times 56.1$$

where:

B = milliliters NaOH

N_A = normality of H_2SO_4 solution

N_B = normality of NaOH solution

W = weight of sample in grams

APPENDIX A

END ANCHORAGE INSPECTION DATA SHEETS

FOR

CONTAINMENT STRUCTURE

POST-TENSIONING SYSTEM

TENTH-YEAR SURVEILLANCE

FOR

FLORIDA POWER & LIGHT COMPANY

TURKEY POINT NUCLEAR POWER PLANT

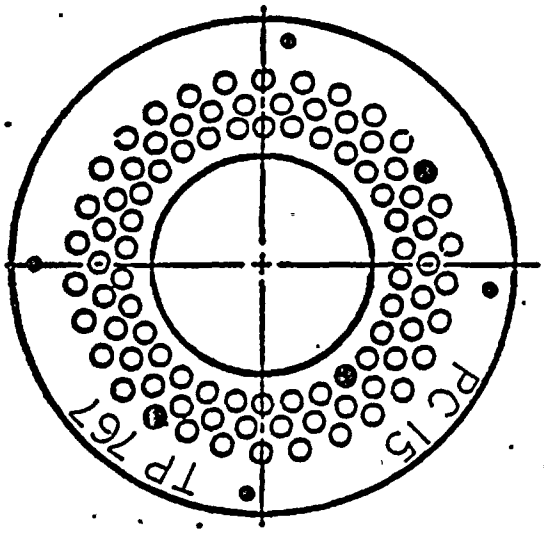
UNIT 3

BECHTEL POWER CORPORATION
Gaithersburg, Maryland

July 1982

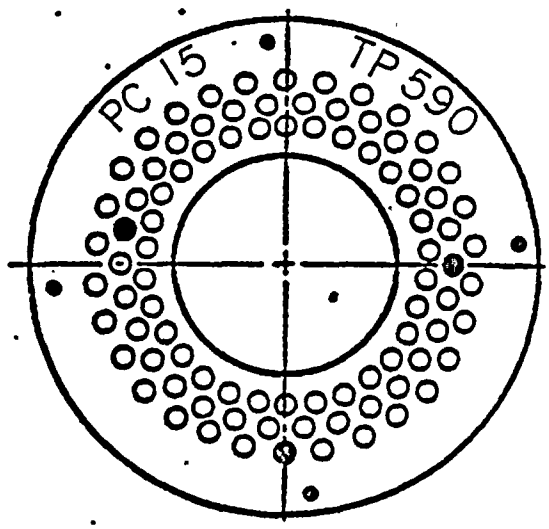
Procedure 5177-187-CP-1

TENDON NO. 62H18 LOCATION (CLOSEST BUTTRESS) 2&6



END ANCHORAGE A

(CLOSEST BUTTRESS 6)



END ANCHORAGE B

(CLOSEST BUTTRESS 2)

CORROSION LEVEL

WASHER 1

BUTTONHEADS 1

SHIMS 2

BEARING PLATE 2

CORROSION LEVEL

WASHER 2

BUTTONHEADS 1

SHIMS 1

BEARING PLATE 1

LEGEND:

BUTTONHEADS: (BH)

~~OFF-SIZE BUTTONHEAD~~

◐ BUTTONHEAD WITH SPLIT

● WIRE REMOVED PREVIOUSLY

Ø DISCONTINUOUS WIRE REMOVED THIS SURVEILLANCE

⊠ WIRE REMOVED FOR INSPECTION AND TESTING THIS SURVEILLANCE

CORROSION LEVELS:

#1 NO VISIBLE OXIDATION
#2 VISIBLE OXIDATION, NO PITTING
#3 0" < PITTING ≤ 0.003"
#4 0.003" < PITTING ≤ 0.006"
#5 0.006" < PITTING ≤ 0.010"

Total No. BH 87
No. of Broken, Damaged or Missing BH 3
No. of BH with Splits > 0.06" None
No. of Improperly Formed BH None

Total No. of BH 87
No. of Broken, Damaged or Missing BH 3
No. of BH with Splits > 0.06" None
No. of Improperly Formed BH None

INSPECTED BY

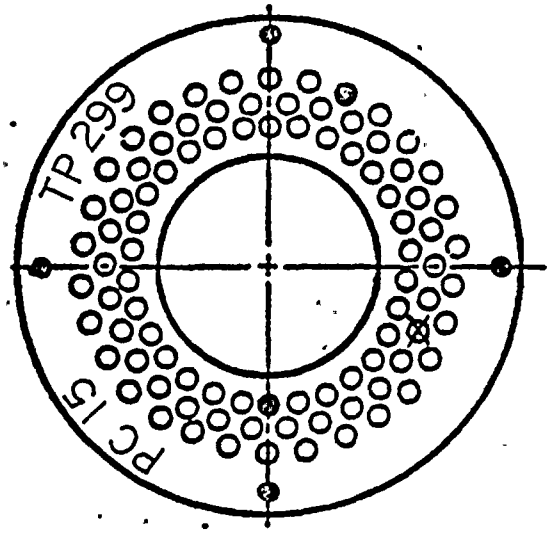
END ANCHORAGE A MRS DATE 2/15/82
END ANCHORAGE B RB DATE 2/15/82

FIGURE A-2 (Rev. 0)

FLORIDA POWER & LIGHT
TURKEY POINT NUCLEAR POWER PLANT
UNIT 3
POST-TENSIONING SYSTEM
TENDON SURVEILLANCE
END ANCHORAGE INSPECTION

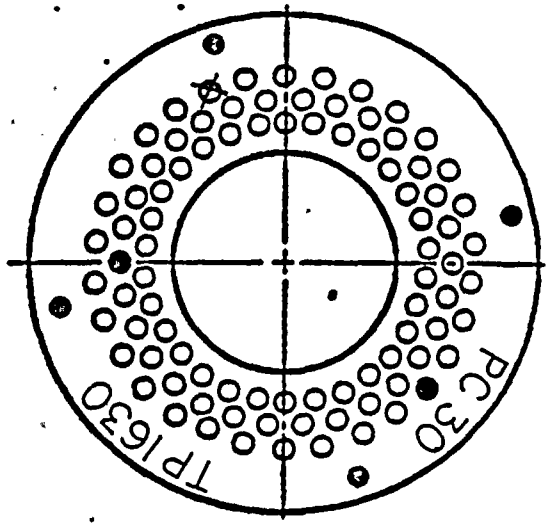
Procedure 5177-187-CP-1

TENDON NO. 64H50 LOCATION (CLOSEST BUTTRESS) 4&6



END ANCHORAGE A

(CLOSEST BUTTRESS 6)



END ANCHORAGE B

(CLOSEST BUTTRESS 4)

CORROSION LEVEL

WASHER 2

BUTTONHEADS 1

SHIMS 1

BEARING PLATE 2

CORROSION LEVEL

WASHER 1

BUTTONHEADS 1

SHIMS 1

BEARING PLATE 1

LEGEND:

BUTTONHEADS: (BH)

~~OFF SIZE BUTTONHEAD~~

◐ BUTTONHEAD WITH SPLIT

● WIRE REMOVED PREVIOUSLY

Ø DISCONTINUOUS WIRE REMOVED THIS SURVEILLANCE

⊗ WIRE REMOVED FOR INSPECTION AND TESTING THIS SURVEILLANCE

CORROSION LEVELS:

#1 NO VISIBLE OXIDATION
#2 VISIBLE OXIDATION, NO PITTING
#3 0" < PITTING ≤ 0.003"
#4 0.003" < PITTING ≤ 0.006"
#5 0.006" < PITTING ≤ 0.010"

Total No. BH 88
No. of Broken, Damaged or Missing BH 2
No. of BH with Splits > 0.06" 0
No. of Improperly Formed BH 0

Total No. of BH 88
No. of Broken, Damaged or Missing BH 2
No. of BH with Splits > 0.06" 0
No. of Improperly Formed BH 0

INSPECTED BY

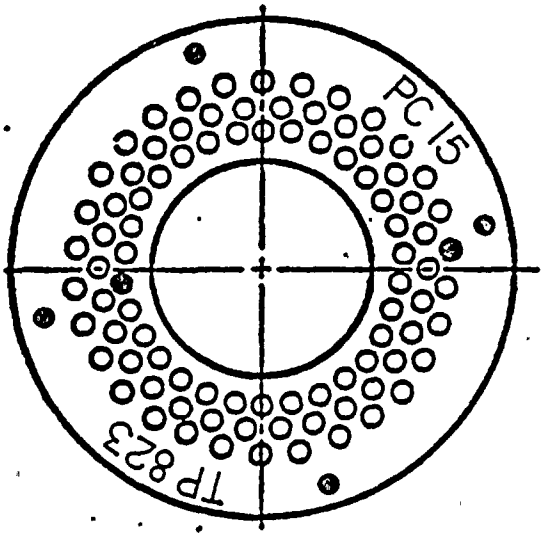
END ANCHORAGE A HTW DATE 2/24/82
END ANCHORAGE B RB DATE 2/23/82

FIGURE A-2 (Rev. 0)

FLORIDA POWER & LIGHT
TURKEY POINT NUCLEAR POWER PLANT
UNIT 3
POST-TENSIONING SYSTEM
TENDON SURVEILLANCE
END ANCHORAGE INSPECTION

Procedure 5177-187-CP-1

TENDON NO. 42H70 LOCATION (CLOSEST BUTTRESS) 2&4



END ANCHORAGE A

(CLOSEST BUTTRESS 4)

CORROSION LEVEL

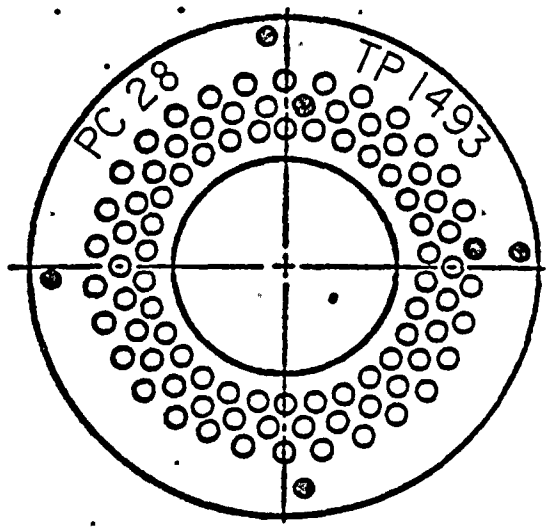
WASHER 1 (Side #2)

BUTTONHEADS 1

SHIMS 1

BEARING PLATE 1

Total No. BH 88
No. of Broken, Damaged or Missing BH 2
No. of BH with Splits > 0.06" 0
No. of Improperly Formed BH 0



END ANCHORAGE B

(CLOSEST BUTTRESS 2)

CORROSION LEVEL

WASHER 2

BUTTONHEADS 2

SHIMS ½ PC 103 #3; rest #2.

BEARING PLATE 2

Total No. of BH 88
No. of Broken, Damaged or Missing BH 2
No. of BH with Splits > 0.06" 0
No. of Improperly Formed BH 0

LEGEND:

BUTTONHEADS: (BH)

~~OFF SIZE BUTTONHEAD~~

- BUTTONHEAD WITH SPLIT
- WIRE REMOVED PREVIOUSLY
- DISCONTINUOUS WIRE REMOVED THIS SURVEILLANCE
- WIRE REMOVED FOR INSPECTION AND TESTING THIS SURVEILLANCE

CORROSION LEVELS:

#1 NO VISIBLE OXIDATION
#2 VISIBLE OXIDATION, NO PITTING
#3 0" < PITTING ≤ 0.003"
#4 0.003" < PITTING ≤ 0.006"
#5 0.006" < PITTING ≤ 0.010"

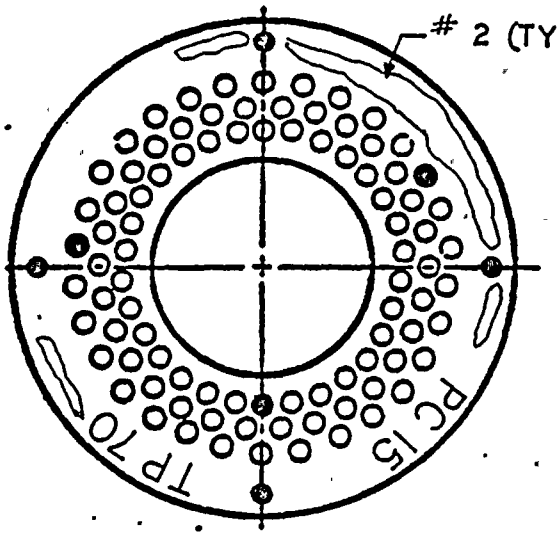
INSPECTED BY

END ANCHORAGE A RB DATE 2/26/82
END ANCHORAGE B HTW DATE 2/26/82

FIGURE A-2 (Rev. 0)

FLORIDA POWER & LIGHT
TURKEY POINT NUCLEAR POWER PLANT
UNIT 3
POST-TENSIONING SYSTEM
TENDON SURVEILLANCE
END ANCHORAGE INSPECTION

TENDON NO. 23V1 LOCATION (CLOSEST BUTTRESS) 2



END ANCHORAGE A

(CLOSEST BUTTRESS 2)

TOP

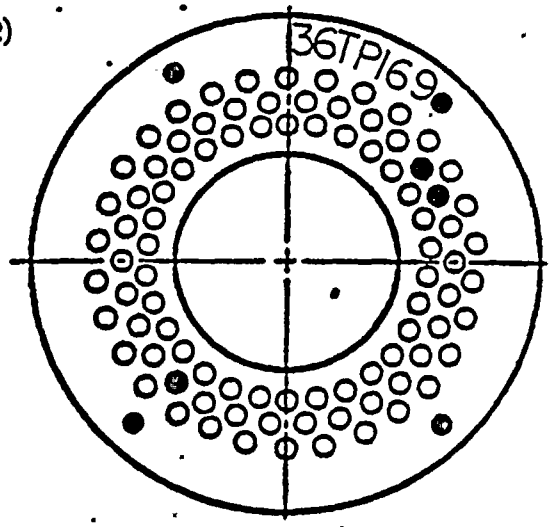
CORROSION LEVEL

WASHER 2 (sides show signs of pitting)

BUTTONHEADS 1

SHIMS 1 (some scaling)

BEARING PLATE 1



END ANCHORAGE B

(CLOSEST BUTTRESS 2)

BOTTOM

CORROSION LEVEL

WASHER 2

BUTTONHEADS 1

SHIMS No shims

BEARING PLATE 1

LEGEND:

BUTTONHEADS: (BH)

~~OFF SIZE BUTTONHEAD~~

◐ BUTTONHEAD WITH SPLIT

● WIRE REMOVED PREVIOUSLY

Ø DISCONTINUOUS WIRE REMOVED THIS SURVEILLANCE

⊠ WIRE REMOVED FOR INSPECTION AND TESTING THIS SURVEILLANCE

CORROSION LEVELS:

#1 NO VISIBLE OXIDATION
#2 VISIBLE OXIDATION, NO PITTING
#3 0" < PITTING ≤ 0.003"
#4 0.003" < PITTING ≤ 0.006"
#5 0.006" < PITTING ≤ 0.010"

Total No. BH 87
No. of Broken, Damaged or Missing BH 3
No. of BH with Splits > 0.06" 0
No. of Improperly Formed BH 0

Total No. of BH 87
No. of Broken, Damaged or Missing BH 3
No. of BH with Splits > 0.06" 0
No. of Improperly Formed BH 0

INSPECTED BY

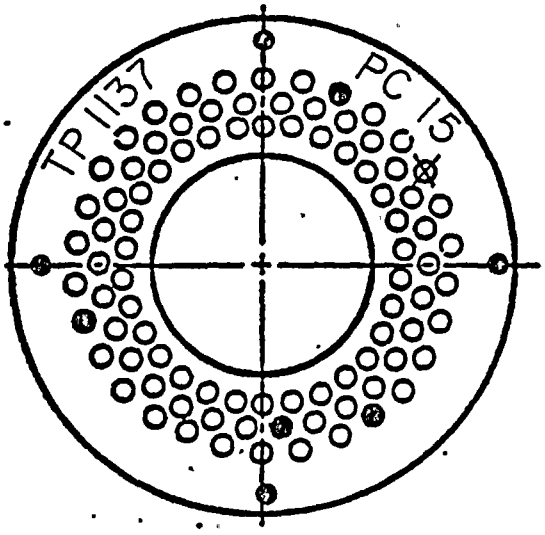
END ANCHORAGE A HTW DATE 2/3/82
END ANCHORAGE B RB DATE 2/3/82

FIGURE A-2 (Rev. 0)

FLORIDA POWER & LIGHT
TURKEY POINT NUCLEAR POWER PLANT
UNIT 3
POST-TENSIONING SYSTEM
TENDON SURVEILLANCE
END ANCHORAGE INSPECTION

Procedure 5177-187-CP-1

TENDON NO. 45V7 LOCATION (CLOSEST BUTTRESS) 4



END ANCHORAGE A

(CLOSEST BUTTRESS 4 TOP)

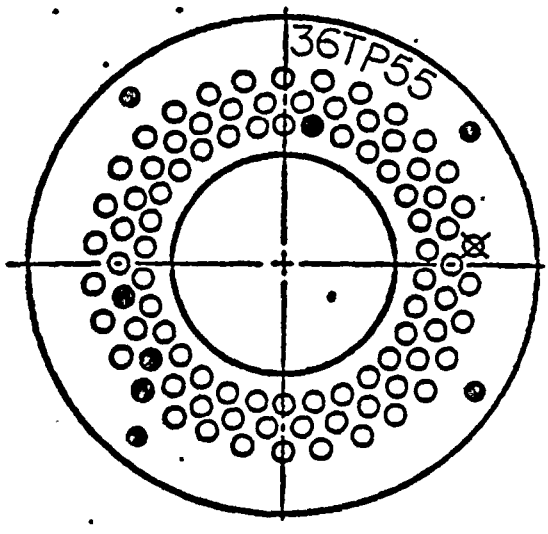
CORROSION LEVEL

WASHER 2

BUTTONHEADS 1

SHIMS 2 (signs of some pitting)

BEARING PLATE 1



END ANCHORAGE B

(CLOSEST BUTTRESS 4 BOTTOM)

CORROSION LEVEL

WASHER 2

BUTTONHEADS 1

SHIMS No shims

BEARING PLATE 1

LEGEND:

BUTTONHEADS: (BH)

~~OFF SIZE BUTTONHEAD~~

◐ BUTTONHEAD WITH SPLIT

● WIRE REMOVED PREVIOUSLY

Ø DISCONTINUOUS WIRE REMOVED THIS SURVEILLANCE

⊠ WIRE REMOVED FOR INSPECTION AND TESTING THIS SURVEILLANCE

CORROSION LEVELS:

#1 NO VISIBLE OXIDATION
#2 VISIBLE OXIDATION, NO PITTING
#3 0" < PITTING ≤ 0.003"
#4 0.003" < PITTING ≤ 0.006"
#5 0.006" < PITTING ≤ 0.010"

Total No. BH 86
No. of Broken, Damaged or Missing BH 4
No. of BH with Splits > 0.06" None
No. of Improperly Formed BH None

Total No. of BH 86
No. of Broken, Damaged or Missing BH 4
No. of BH with Splits > 0.06" 0
No. of Improperly Formed BH 0

INSPECTED BY

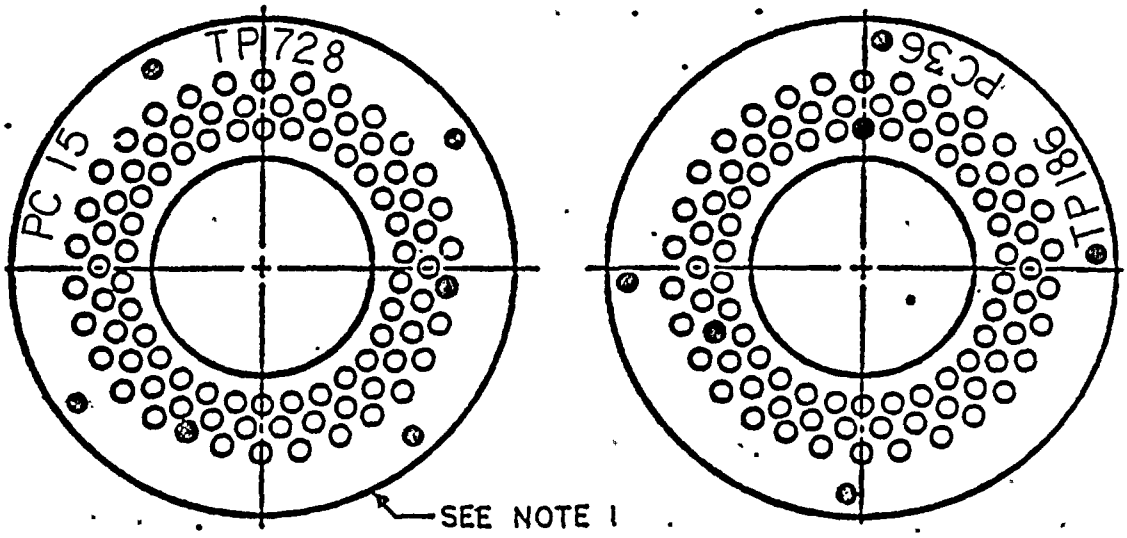
END ANCHORAGE A HTW DATE 2/4/82
END ANCHORAGE B RB DATE 2/4/82

FIGURE A-2 (Rev. 0)

FLORIDA POWER & LIGHT
TURKEY POINT NUCLEAR POWER PLANT
UNIT 3
POST-TENSIONING SYSTEM
TENDON SURVEILLANCE
END ANCHORAGE INSPECTION

Procedure 5177-187-CP-1

TENDON NO. 61V1 LOCATION (CLOSEST BUTTRESS) 6



END ANCHORAGE A

(CLOSEST BUTTRESS 6 TOP)

CORROSION LEVEL

WASHER 1

BUTTONHEADS 1

SHIMS 2

BEARING PLATE 2

LEGEND:

BUTTONHEADS: (BH)

~~OFF SIZE BUTTONHEAD~~

① BUTTONHEAD WITH SPLIT

⑤ WIRE REMOVED PREVIOUSLY

Ø DISCONTINUOUS WIRE REMOVED THIS SURVEILLANCE

⊗ WIRE REMOVED FOR INSPECTION AND TESTING THIS SURVEILLANCE

Total No. BH 88

No. of Broken, Damaged or Missing BH 2

No. of BH with Splits > 0.06" None

No. of Improperly Formed BH None

END ANCHORAGE B

(CLOSEST BUTTRESS 6 BOTTOM)

CORROSION LEVEL

WASHER 1

BUTTONHEADS 2

SHIMS N/A

BEARING PLATE 2 (very minor oxidation).

CORROSION LEVELS:

#1 NO VISIBLE OXIDATION
#2 VISIBLE OXIDATION, NO PITTING
#3 0" < PITTING ≤ 0.003"
#4 0.003" < PITTING ≤ 0.006"
#5 0.006" < PITTING ≤ 0.010"

Total No. of BH 88

No. of Broken, Damaged or Missing BH 2

No. of BH with Splits > 0.06" None

No. of Improperly Formed BH None

INSPECTED BY

END ANCHORAGE A RB DATE 2/10/82

END ANCHORAGE B HTW DATE 2/10/82

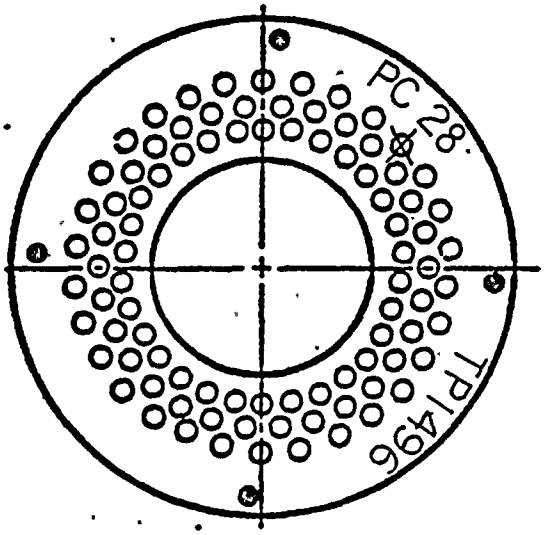
NOTE: 1. Top washer has oxidation at sides.
2. Existing gasket at top was cut.
3. 4" of grease and water on top inside the pit.

FIGURE A-2 (Rev. 0)

FLORIDA POWER & LIGHT
TURKEY POINT NUCLEAR POWER PLANT
UNIT 3
POST-TENSIONING SYSTEM
TENDON SURVEILLANCE
END ANCHORAGE INSPECTION

Procedure 5177-187-CP-1

TENDON NO. 1D53 LOCATION (CLOSEST BUTTRESS) 1&6



END ANCHORAGE A

(CLOSEST BUTTRESS 6)

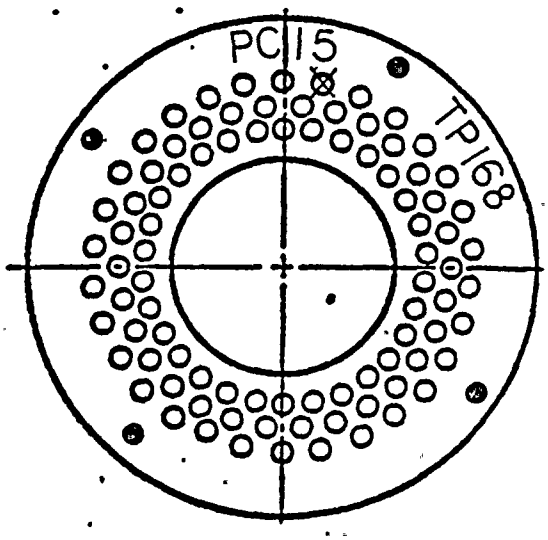
CORROSION LEVEL

WASHER 1 (sides #2)

BUTTONHEADS 2

SHIMS 2

BEARING PLATE 1



END ANCHORAGE B

(CLOSEST BUTTRESS 1)

CORROSION LEVEL

WASHER 2 & 3

BUTTONHEADS 70% #1 & 30% #3

SHIMS 1

BEARING PLATE 1

LEGEND:

BUTTONHEADS: (BH)

~~OFF SIZE BUTTONHEAD~~

◐ BUTTONHEAD WITH SPLIT

● WIRE REMOVED PREVIOUSLY

Ø DISCONTINUOUS WIRE REMOVED THIS SURVEILLANCE

⊠ WIRE REMOVED FOR INSPECTION AND TESTING THIS SURVEILLANCE

CORROSION LEVELS:

#1 NO VISIBLE OXIDATION
#2 VISIBLE OXIDATION, NO PITTING
#3 0" < PITTING ≤ 0.003"
#4 0.003" < PITTING ≤ 0.006"
#5 0.005" < PITTING ≤ 0.010"

Total No. BH 90
No. of Broken, Damaged or Missing BH 0
No. of BH with Splits > 0.06" 0
No. of Improperly Formed BH 0

Total No. of BH 90
No. of Broken, Damaged or Missing BH 0
No. of BH with Splits > 0.06" 0
No. of Improperly Formed BH 0

INSPECTED BY

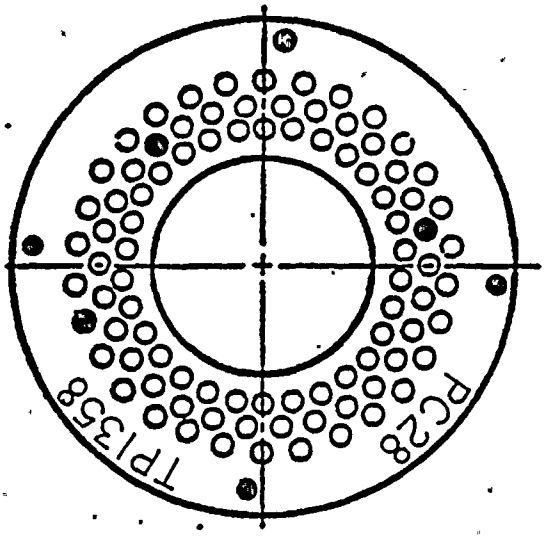
END ANCHORAGE A JV DATE 3/2/82
END ANCHORAGE B RB DATE 3/1/82

FIGURE A-2 (Rev. 0)

FLORIDA POWER & LIGHT
TURKEY POINT NUCLEAR POWER PLANT
UNIT 3
POST-TENSIONING SYSTEM
TENDON SURVEILLANCE
END ANCHORAGE INSPECTION

Procedure 5177-187-CP-1

TENDON NO. 2D28 LOCATION (CLOSEST BUTTRESS) 1&4



END ANCHORAGE A

(CLOSEST BUTTRESS 4)

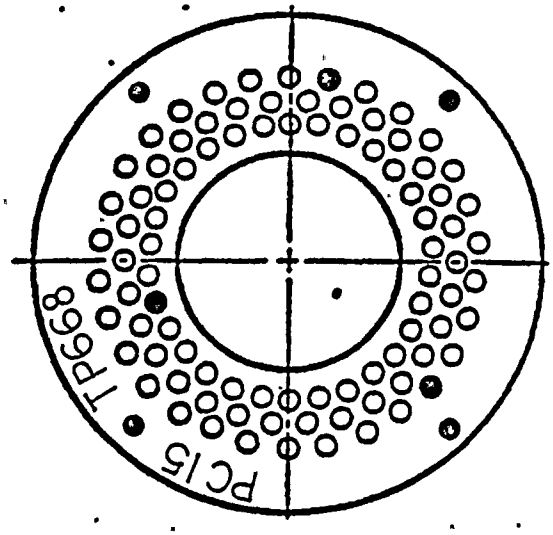
CORROSION LEVEL

WASHER 1

BUTTONHEADS 1

SHIMS 1

BEARING PLATE 1



END ANCHORAGE B

(CLOSEST BUTTRESS 1)

CORROSION LEVEL

WASHER 2

BUTTONHEADS 1

SHIMS 2

BEARING PLATE 2

LEGEND:

BUTTONHEADS: (BH)

- ~~OFF SIZE BUTTONHEAD~~
- BUTTONHEAD WITH SPLIT
- WIRE REMOVED PREVIOUSLY
- DISCONTINUOUS WIRE REMOVED THIS SURVEILLANCE
- WIRE REMOVED FOR INSPECTION AND TESTING THIS SURVEILLANCE

CORROSION LEVELS:

#1 NO VISIBLE OXIDATION
#2 VISIBLE OXIDATION, NO PITTING
#3 0" < PITTING ≤ 0.003"
#4 0.003" < PITTING ≤ 0.006"
#5 0.006" < PITTING ≤ 0.010"

Total No. BH 87
No. of Broken, Damaged or Missing BH 3
No. of BH with Splits > 0.06" 0
No. of Improperly Formed BH 0

Total No. of BH 87
No. of Broken, Damaged or Missing BH 3
No. of BH with Splits > 0.06" 0
No. of Improperly Formed BH 0

INSPECTED BY

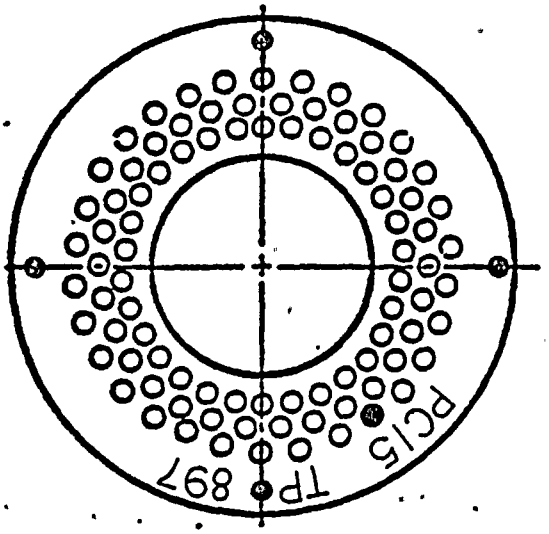
END ANCHORAGE A RB DATE 2/27/82
END ANCHORAGE B MV DATE 2/27/82

FIGURE A-2 (Rev. 0)

FLORIDA POWER & LIGHT
TURKEY POINT NUCLEAR POWER PLANT
UNIT 3
POST-TENSIONING SYSTEM
TENDON SURVEILLANCE
END ANCHORAGE INSPECTION

Procedure 5177-187-CP-1

TENDON NO. 3D28 LOCATION (CLOSEST BUTTRESS) 3&6



END ANCHORAGE A

(CLOSEST BUTTRESS 6)

CORROSION LEVEL

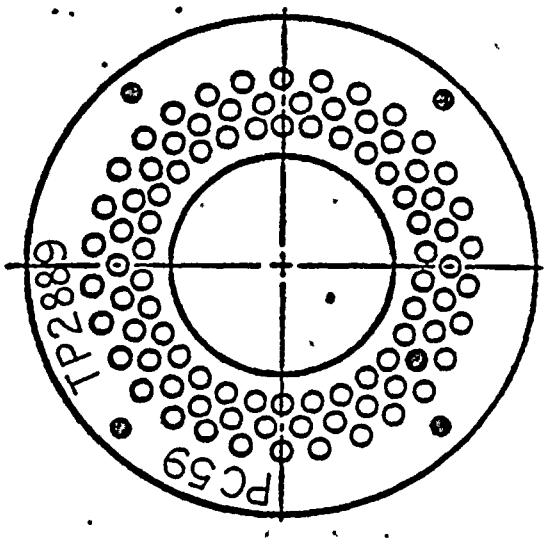
WASHER 2

BUTTONHEADS 1

SHIMS 2 & 3

BEARING PLATE 1

Total No. BH 89
No. of Broken, Damaged or Missing BH 1
No. of BH with Splits > 0.06" 0
No. of Improperly Formed BH 0



END ANCHORAGE B

(CLOSEST BUTTRESS 3)

CORROSION LEVEL

WASHER 2

BUTTONHEADS 1

SHIMS 3

BEARING PLATE 1

Total No. BH 89
No. of Broken, Damaged or Missing BH 1
No. of BH with Splits > 0.06" 0
No. of Improperly Formed BH 0

LEGEND:

BUTTONHEADS: (BH)

- ~~OFF SIZE BUTTONHEAD~~
- BUTTONHEAD WITH SPLIT
- WIRE REMOVED PREVIOUSLY
- DISCONTINUOUS WIRE REMOVED THIS SURVEILLANCE
- WIRE REMOVED FOR INSPECTION AND TESTING THIS SURVEILLANCE

CORROSION LEVELS:

#1 NO VISIBLE OXIDATION
#2 VISIBLE OXIDATION, NO PITTING
#3 0" < PITTING ≤ 0.003"
#4 0.003" < PITTING ≤ 0.006"
#5 0.005" < PITTING ≤ 0.010"

INSPECTED BY

END ANCHORAGE A MV DATE 2/28/82
END ANCHORAGE B RB DATE 2/28/82

FIGURE A-2 (Rev. 0)

FLORIDA POWER & LIGHT
TURKEY POINT NUCLEAR POWER PLANT
UNIT 3
POST-TENSIONING SYSTEM
TENDON SURVEILLANCE
END ANCHORAGE INSPECTION

APPENDIX B

WIRE INSPECTION DATA SHEETS

FOR

CONTAINMENT STRUCTURE

POST-TENSIONING SYSTEM

TENTH-YEAR SURVEILLANCE

FOR

FLORIDA POWER & LIGHT COMPANY

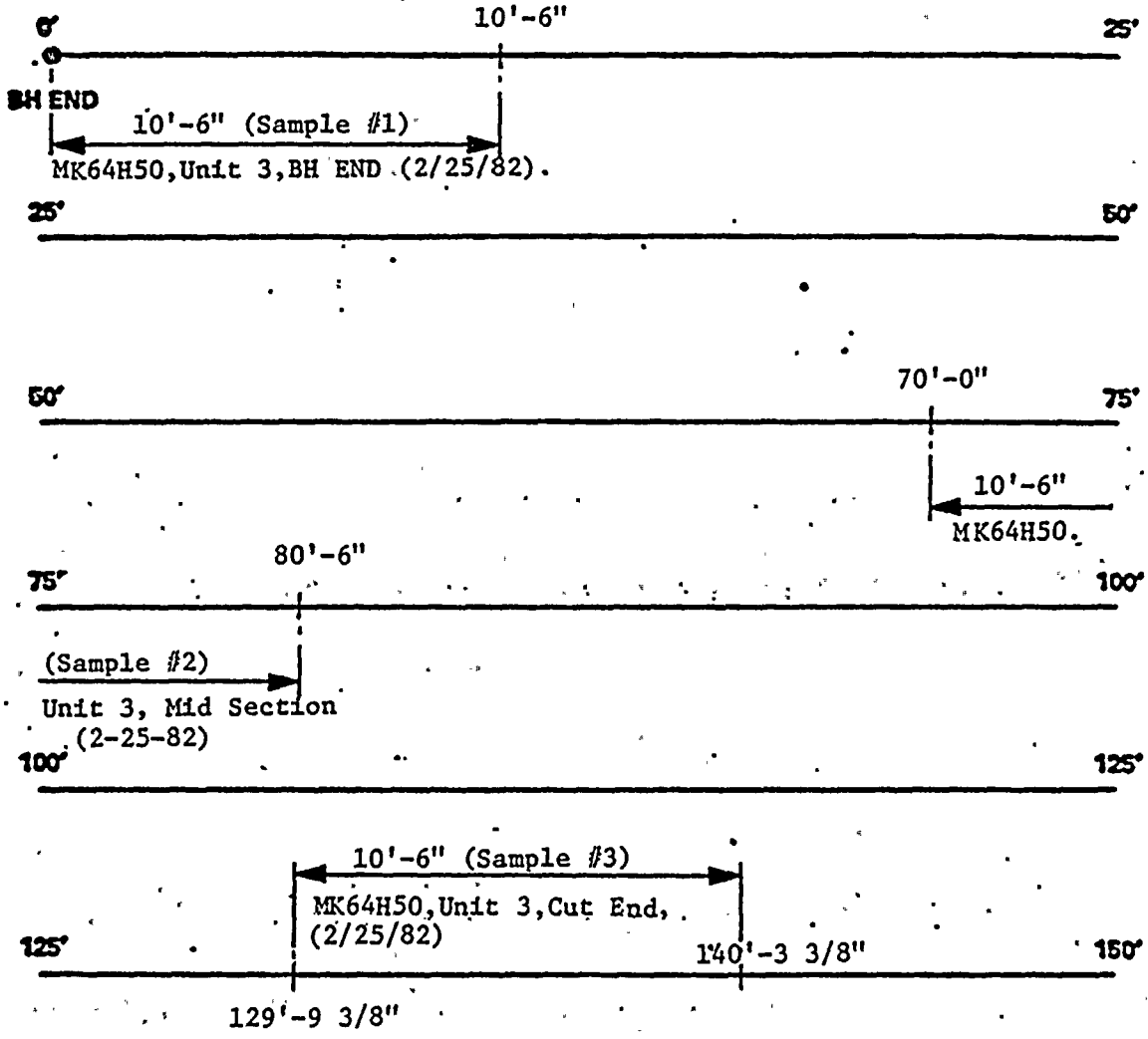
TURKEY POINT NUCLEAR POWER PLANT

UNIT 3

BECHTEL POWER CORPORATION
Gaithersburg, Maryland

July 1982

TENDON NO. 64H50 CLOSEST BUTTRESSES 6&4



TOTAL LENGTH OF WIRE 140'-3 3/8"

CORROSION LEVEL:

- ☒ #1 NO VISIBLE OXIDATION
- ☐ #2 VISIBLE OXIDATION, NO PITTING
- ☐ #3 0" < PITTING ≤ 0.003"
- ☐ #4 0.003" < PITTING ≤ 0.006"
- ☐ #5 0.006" < PITTING ≤ 0.010"

NOTE:
Record location and identify any damage or corrosion and corrosion levels.

INSPECTED BY MV

DATE 2/25/82

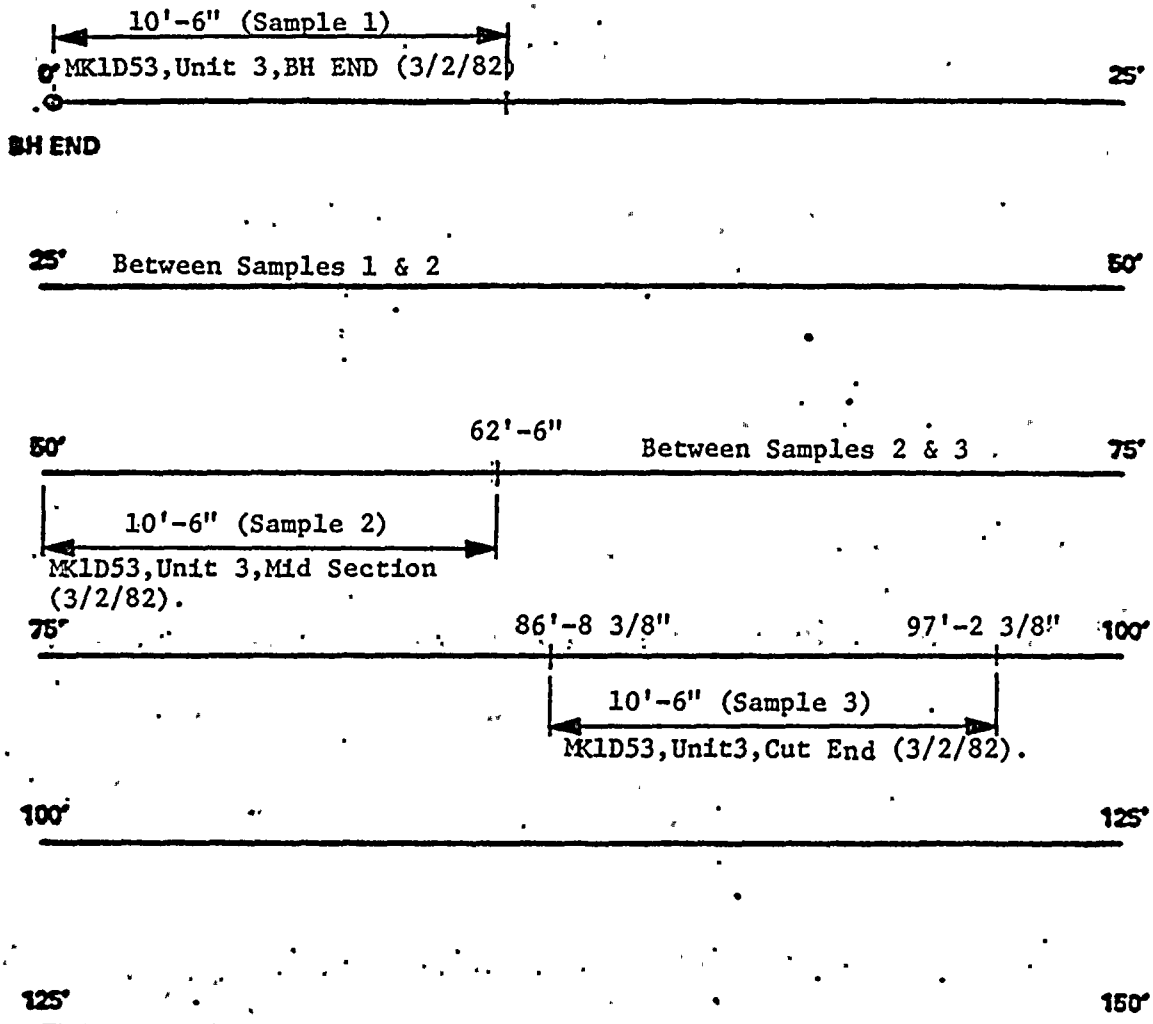
BH. - BUTTONHEAD

FIGURE 5

FLORIDA POWER & LIGHT CO.
TURKEY POINT NUCLEAR POWER PLANT
UNIT 3
POST TENSIONING SYSTEM
TENDON SURVEILLANCE
WIRE INSPECTION
& TENSION SAMPLE LOCATIONS

SHEET 1 OF 3

TENDON NO. 1D53 CLOSEST BUTTRESSES 1&6



TOTAL LENGTH OF WIRE 97'-2 3/8" (1¼" to scribe)

CORROSION LEVEL:

- ☑ #1 NO VISIBLE OXIDATION
- ☐ #2 VISIBLE OXIDATION, NO PITTING
- ☐ #3 0" < PITTING ≤ 0.003"
- ☐ #4 0.003" < PITTING ≤ 0.006"
- ☐ #5 0.006" < PITTING ≤ 0.010"

NOTE:
Record location and identify any damage or corrosion and corrosion levels.

INSPECTED BY JFV

DATE 3/2/82

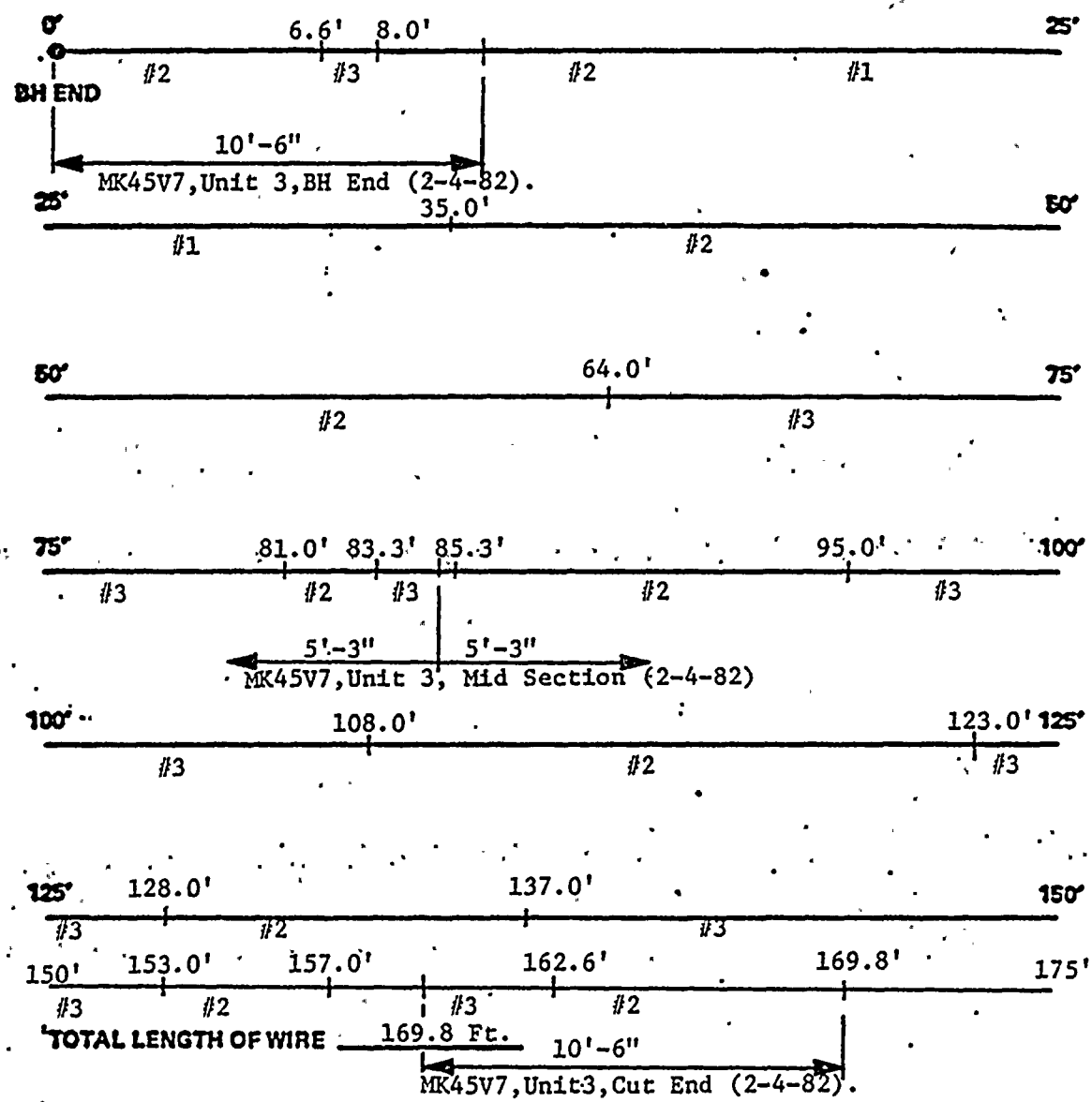
BH. - BUTTONHEAD

FIGURE. 5

FLORIDA POWER & LIGHT CO.
TURKEY POINT NUCLEAR POWER PLANT
UNIT 3
POST TENSIONING SYSTEM
TENDON SURVEILLANCE
WIRE INSPECTION
& TENSION SAMPLE LOCATIONS

SHEET 2 OF 3

TENDON NO. 45V7 CLOSEST BUTTRESSES 4



CORROSION LEVEL:

- ☐ #1 NO VISIBLE OXIDATION
- ☐ #2 VISIBLE OXIDATION, NO PITTING
- ☒ #3 0" < PITTING ≤ 0.003"
- ☐ #4 0.003" < PITTING ≤ 0.006"
- ☐ #5 0.006" < PITTING ≤ 0.010"

NOTE:

Record location and identify any damage or corrosion and corrosion levels.

INSPECTED BY HTW

DATE 2/4/82

BH. - BUTTONHEAD

FIGURE 5

FLORIDA POWER & LIGHT CO.
TURKEY POINT NUCLEAR POWER PLANT
UNIT 3
POST TENSIONING SYSTEM
TENDON SURVEILLANCE
WIRE INSPECTION
& TENSION SAMPLE LOCATIONS

SHEET 3 OF 3

APPENDIX C

RESULTS

OF

LABORATORY TESTING

OF

WIRE SAMPLES

FOR

FLORIDA POWER & LIGHT COMPANY

TURKEY POINT NUCLEAR POWER PLANT

UNIT 3

POST-TENSIONING SYSTEM

TENTH-YEAR SURVEILLANCE

BECHTEL POWER CORPORATION
Gaithersburg, Maryland

July 1982

FORM 407 REV.-PG

PITTSBURGH TESTING LABORATORY

ESTABLISHED 1881

850 POPLAR STREET, PITTSBURGH, PA. 15220

PLEASE REPLY TO:
P. O. BOX 1646
PITTSBURGH, PA. 15230

AREA CODE 412 TELEPHONE 922-4000

LABORATORY No. 828392

CLIENT'S No. P.O. No. 65121-24987-C

ORDER No. PG-19072

REPORT

July 12, 1982

REPORT OF: Tensile Test of Tendon Wire Removed From Turkey Point Plant No. 3.

REPORT TO: Bechtel Power Corporation
15740 Shady Grove Road
Gaithersburg, MD 20877

We received nine (9) samples of 1/4" diameter Type ASTM A421 tendon wires for testing in accordance with Procedure 5177-187-CP-1 & CP1-2 Rev. 0.

Following scope of work was performed.

SCOPE OF WORK:

1. Measure wire diameter.
2. Gage length was 100 ($\pm$ 1.0).
3. Initial load corresponding to 29,000 PSI (1450#) was applied.
4. Apply additional load to obtain the force and corresponding to 1.0 percent extension.
5. Apply additional load to obtain the force pounds at fracture and elongation under load.

On the following page are the test results:

PITTSBURGH TESTING LABORATORY
ESTABLISHED 1881
850 POPLAR STREET, PITTSBURGH, PA. 15220

AREA CODE 412 TELEPHONE 922-4000

FORM 407 REV.-PG

PLEASE REPLY TO:
P. O. BOX 1646
PITTSBURGH, PA. 15230

CLIENTS No. P.O. No. 65121-24987-C

LABORATORY No. 828392

ORDER No. PG-19072

July 12, 1982

REPORT

REPORT OF: Tensile Test of Tendon Wire Removed From Turkey Point Plant No.3.

TENSILE TEST OF TENDON WIRES

Sample Ident.	Diameter Of Wire Inches	Original Area Sq. In.	Elongation At Initial Load Inches	Load Pounds @ 1% Extension	PSI @1% Extension	Maximum Load In Pounds	Tensile Strength PSI	Elong. At Fracture	Location Of Fracture Related To Moving Head
1D53-1	.250	.0491	.16	10,100	205,700	12,050	245,400	4.41	52.00
1D53-2	.251	.0495	.12	10,500	212,100	12,350	249,500	5.74	37.94
1D53-3	.251	.0495	.12	10,950	221,200	12,100	244,450	4.50	74.75
45V7-1	.250	.0491	.11	10,325	210,300	12,250	249,500	4.67	49.25
45V7-2	.250	.0491	.10	10,600	215,900	12,300	250,500	4.35	33.06
45V7-3	.250	.0491	.08	10,350	210,800	12,300	250,500	5.77	83.38
64H50-1	.250	.0491	.09	10,050	204,700	12,300	250,500	5.53	56.50
64H50-2	.250	.0491	.08	10,375	211,300	12,200	248,450	5.34	89.75
64H50-3	.250	.0491	.08	10,625	216,400	12,400	252,550	5.39	77.50

Initial Gage Length: 100.0"
Initial Load Pounds: 1450#

Tests were performed using our Tinius Olsen Universal Testing Machine, with accuracy traceable to the National Bureau of Standards.

PITTSBURGH TESTING LABORATORY

Earl Gallagher

Earl Gallagher, Manager
Physical Testing Department

C-3

PITTSBURGH TESTING LABORATORY

PTL Order No. [illegible] Lab No. 828322

Client [illegible]

Clients Order No. 65121-24987-C

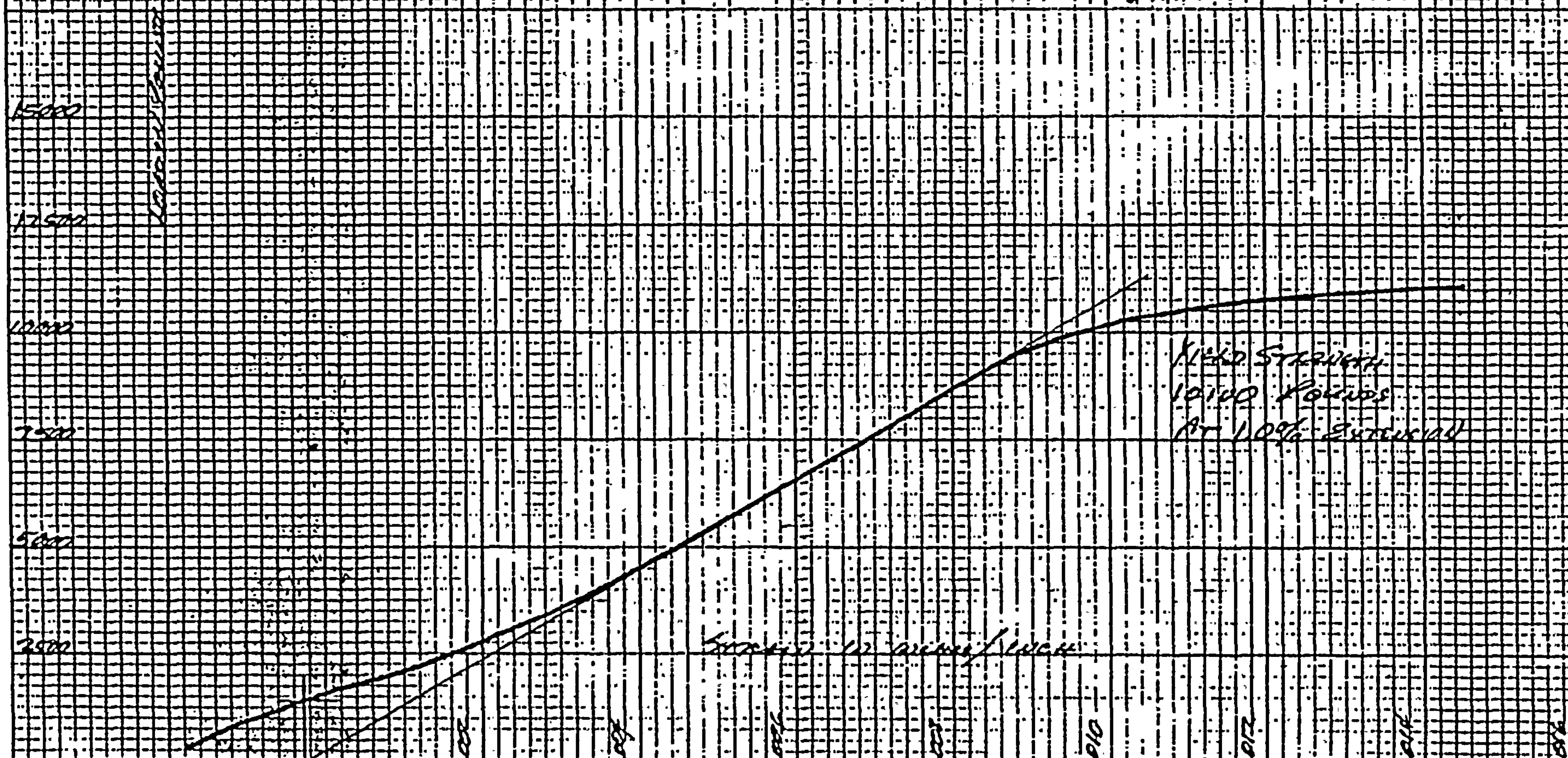
SINGLE RANGE EXTENSOMETER # 164

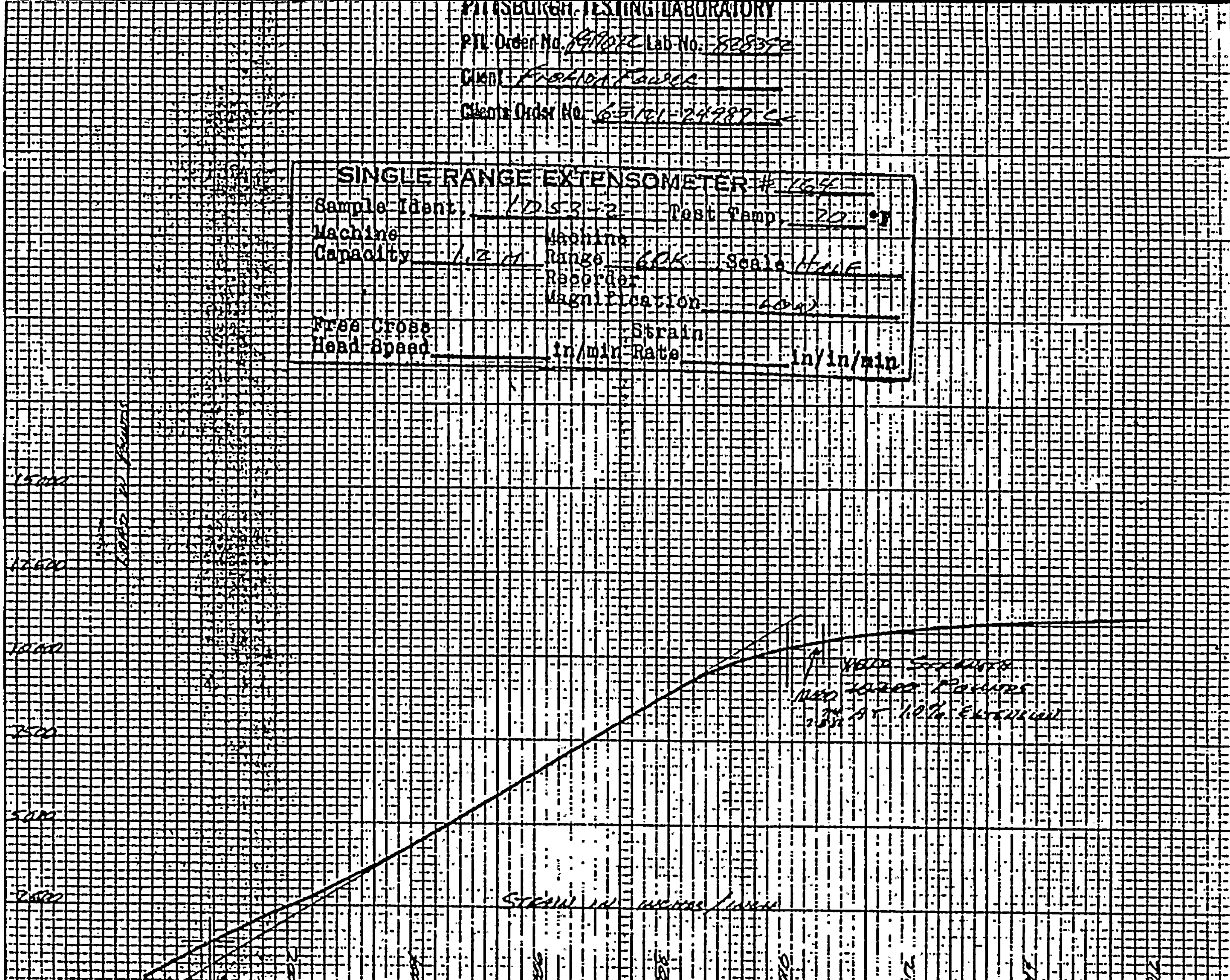
Sample Ident. 125 3-1 Test Temp. 70 °F

Machine Capacity 1.2 M Machine Range 60K Scale Half

Recorder Magnification Low

Free Cross Head Speed ______ in/min Strain Rate ______ in/in/min




PITTSBURGH TESTING LABORATORY
PTL Order No.
Lab No.
Client
Clients Order No.
SINGLE RANGE EXTENSOMETER #
Sample Ident.
Test Temp.
°F
Machine Capacity
Machine Range
Scale
Recorder Magnification
Free Cross Head Speed
in/min
Strain Rate
in/in/min
15000
12500
10000
7500
5000
2500
Load in Pounds
Strain in inches/inch
Yield Strength

PITTSBURGH TESTING LABORATORY

PTL Order No. [illegible] Lab No. [illegible]

Client [illegible]

Client's Order No. [illegible]

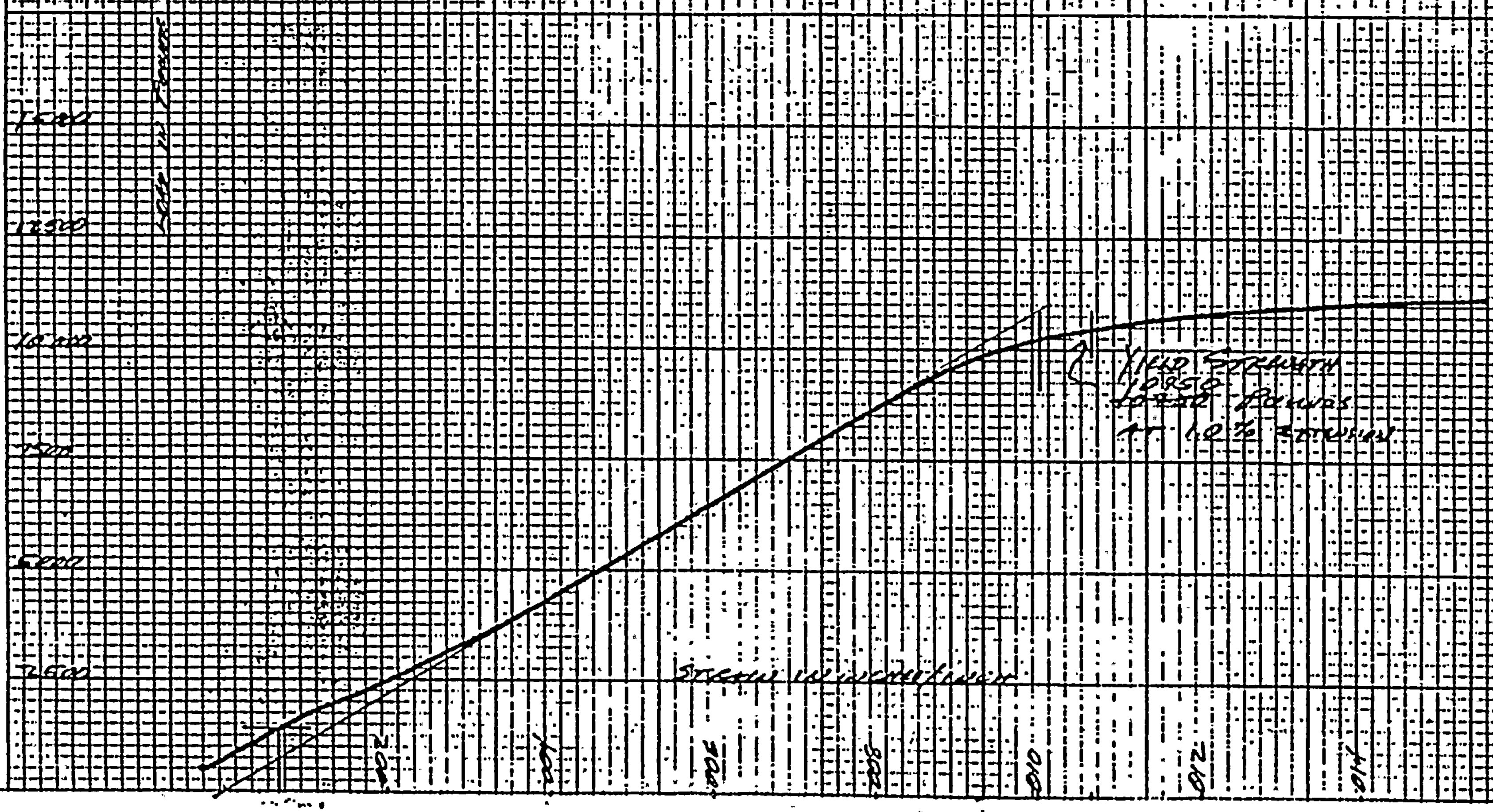
SINGLE RANGE EXTENSOMETER # [illegible]

Sample Ident. [illegible] Test Temp. 70 °F

Machine Capacity [illegible] Machine Range [illegible] Scale [illegible]

Recorder Magnification LOW

Free Cross Head Speed ______ in/min Strain Rate ______ in/in/min



C-6

PITTSBURGH TESTING LABORATORY

PTL Order No. [illegible] Lab No. [illegible]

Client [illegible]

Client's Order No. [illegible]

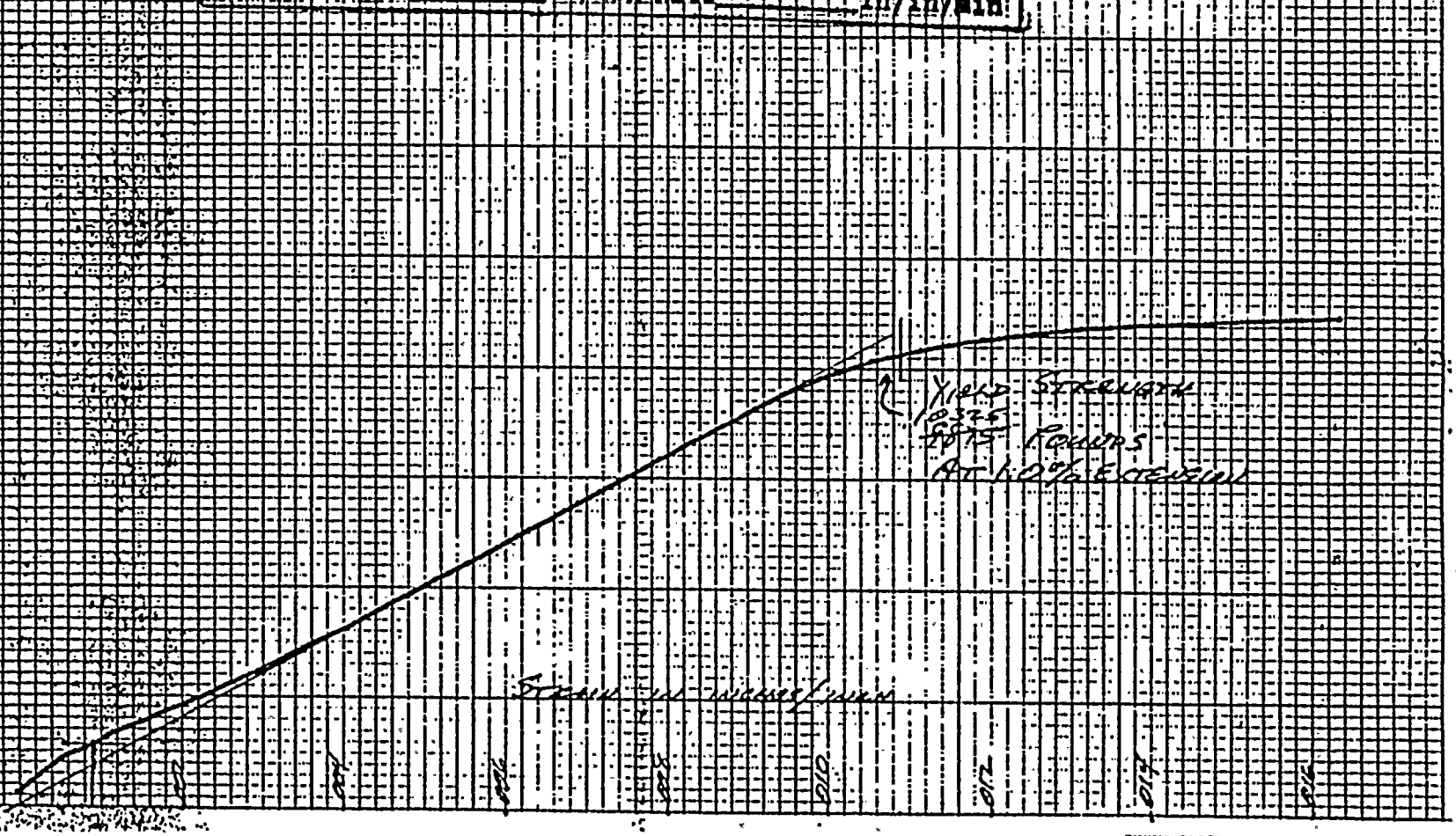
SINGLE RANGE EXTENSOMETER # [illegible]

Sample Ident. [illegible] Test Temp. [illegible] °F

Machine Capacity [illegible] Machine Range [illegible] Scale [illegible]

Recorder Magnification [illegible]

Free Cross Head Speed [illegible] in/min Strain Rate [illegible] in/in/min



C-7

PITTSBURGH TESTING LABORATORY

PTL Order No. [illegible] Lab No. [illegible]

Client [illegible]

Clients Order No. [illegible]

SINGLE RANGE EXTENSOMETER # [illegible]

Sample Ident. [illegible] Test Temp. [illegible] °F

Machine Capacity [illegible] Machine Range [illegible] Scale [illegible]

Recorder Magnification [illegible]

Free Cross Head Speed [illegible] in/min Strain Rate [illegible] in/in/min

C-8

15000

10000

5000

2000

Yield Strength 18500 Pounds at 1.9% Extension

Stress in pounds/square

.010 .015 .020 .025

TINIUS OLSEN TESTING MACHINE CO.

PITTSBURGH TESTING LABORATORY

PTL Order No. 68-0022 Lab No. 828822

Client Florida Cables

Clients Order No. 65184-249870

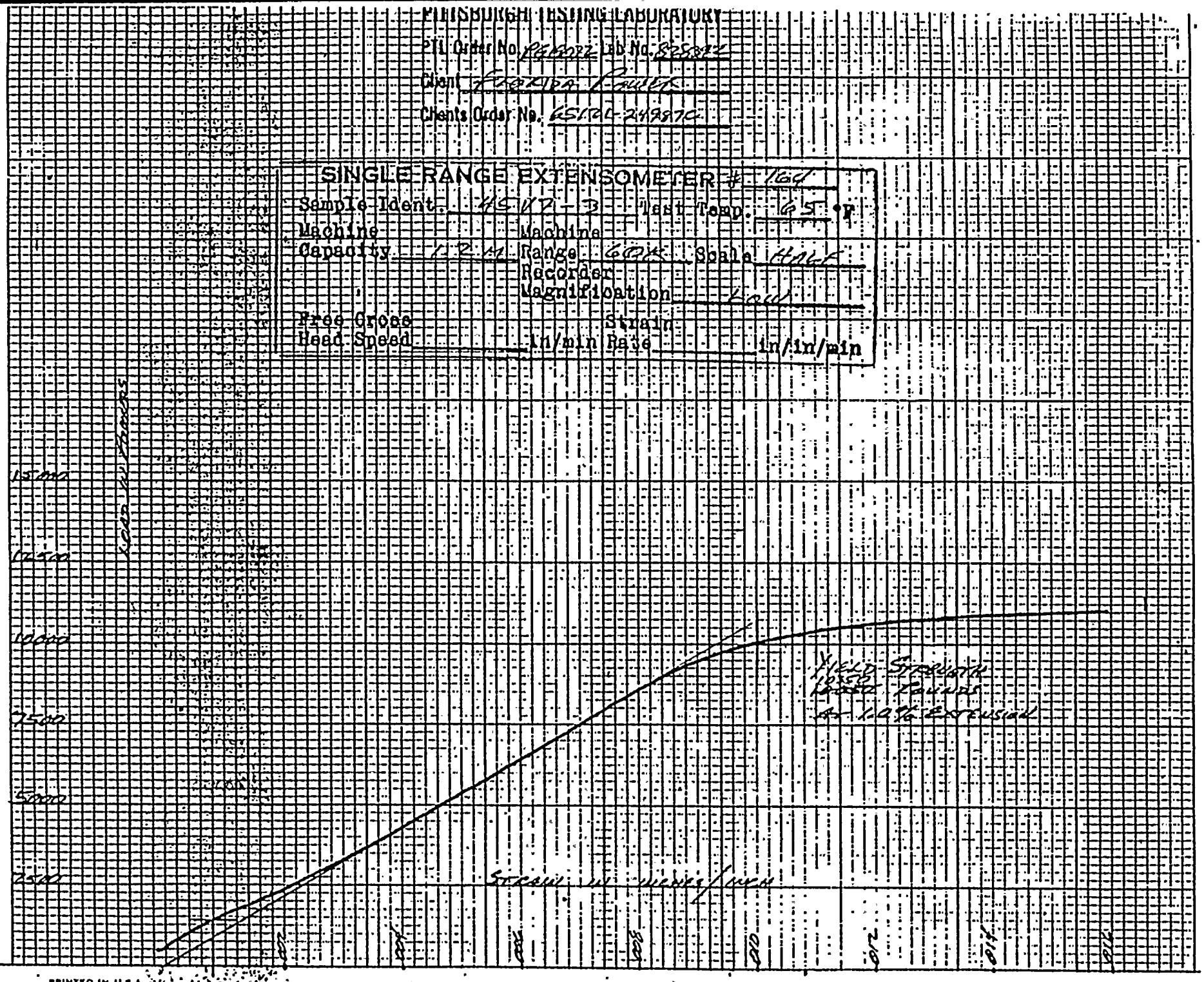
SINGLE RANGE EXTENSOMETER # 764

Sample Ident. 65 HV-3 Test Temp. 65 °F

Machine Capacity 12 M Machine Range 60K Scale Half

Recorder Magnification Load

Free Cross Head Speed .1 in/min Rate Strain .1 in/in/min



C-9

PITTSBURGH TESTING LABORATORY

PTL Order No. 161902 Lab No. 825392

Client Electric Boat

Client's Order No. 65121 2498765

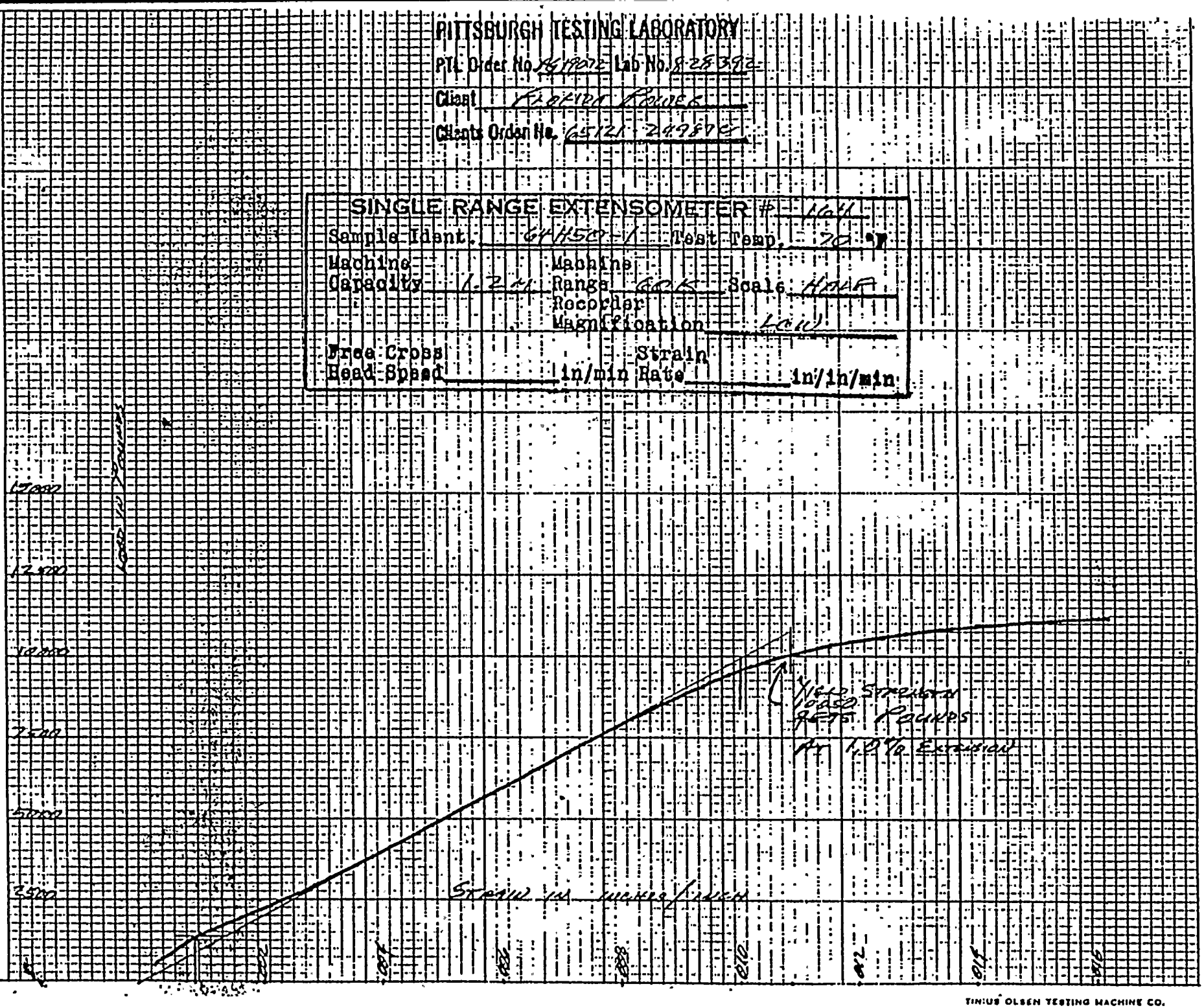
SINGLE RANGE EXTENSOMETER # 1611

Sample Ident. 64H50-1 Test Temp. 70 °F

Machine Capacity 1.2 K# Machine Range 600# Scale HIGH

Recorder Magnification Low

Free Cross Head Speed ____ in/min Strain Rate ____ in/in/min



C-10

PITTSBURGH TESTING LABORATORY

PTL Order No. ______ Lab No. ______

Client ______

Clients Order No. ______

SINGLE RANGE EXTENSOMETER # ______

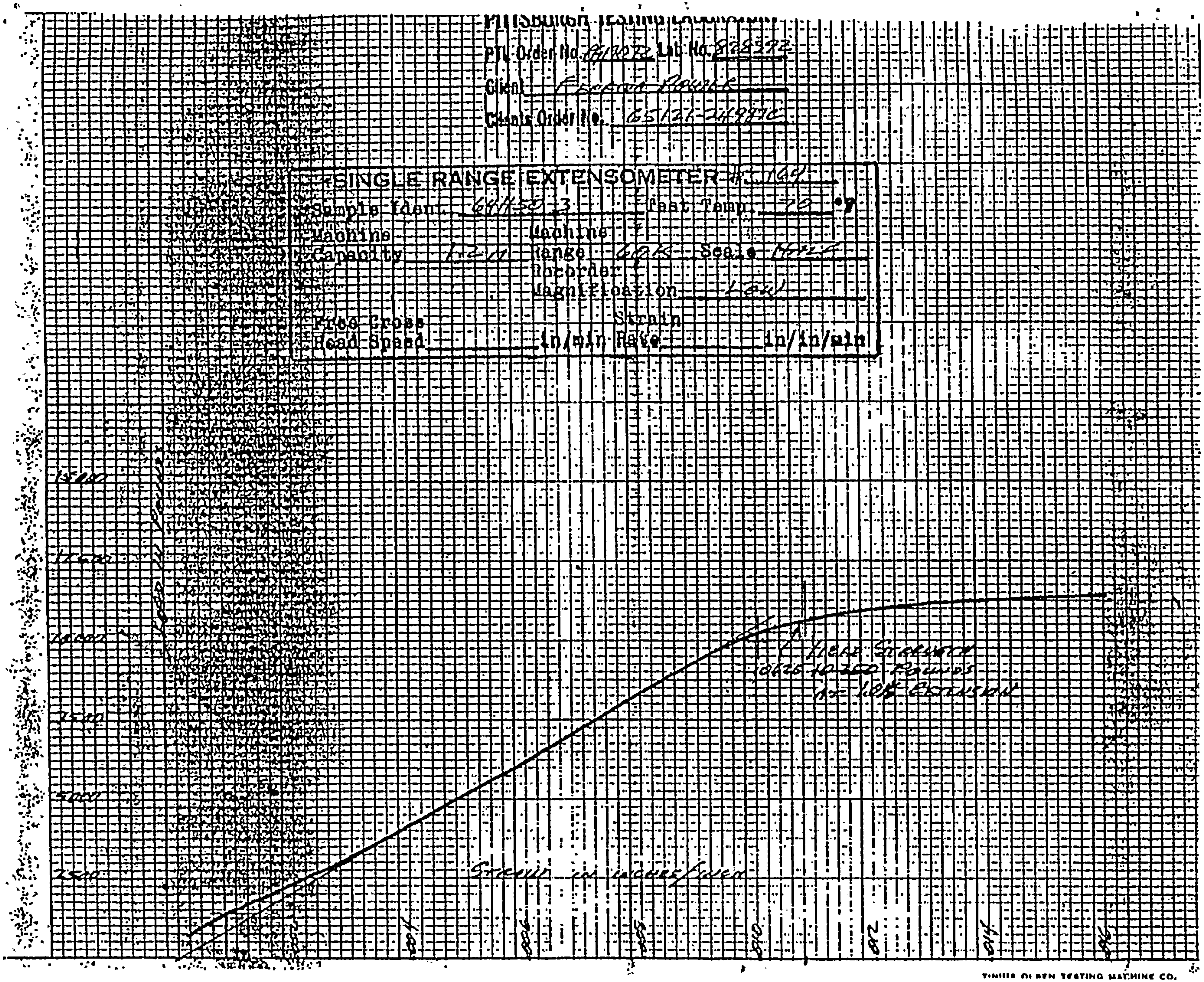
Sample Ident. ______ Test Temp. 70 °F

Machine Capacity ______ Machine Range ______ Scale ______

Recorder Magnification ______

Free Cross Head Speed ______ in/min Strain Rate ______ in/in/min

PRINTED IN U.S.A.


PITTSBURGH TESTING LABORATORY
PTL Order No. Lab No.
Client
Client's Order No.
SINGLE RANGE EXTENSOMETER #
Sample Iden.
Test Temp. 78 °F
Machine Capacity
Machine Range 60K Scale
Recorder Magnification
Free Cross Head Speed in/min
Strain Rate in/in/min
15000
12500
10000
7500
5000
2500
TINIUS OLSEN TESTING MACHINE CO.

C-12

APPENDIX D

RESULTS
OF
LABORATORY ANALYSIS
OF
SHEATH FILLER
FOR
FLORIDA POWER & LIGHT COMPANY
TURKEY POINT NUCLEAR POWER PLANT
UNIT 3
POST-TENSIONING SYSTEM
TENTH-YEAR SURVEILLANCE

BECHTEL POWER CORPORATION
Gaithersburg, Maryland

July 1982

RESULTS OF LABORATORY ANALYSIS OF SHEATH FILLER

The results of the laboratory analysis of the sheath filler are shown on pages D-3 through D-7. The test procedure used in the original tests (pages D-3 through D-5) to determine neutralization numbers was a modification to ASTM D974, as shown in Attachment 7 to attached Procedure 5177-187-CP-1. These tests yielded neutralization numbers of zero for all samples. Discussions with Vicosity Oil Company (the supplier of the sheath filler) disclosed that the modified test procedure is only applicable to Visconorust 2090 P-4 sheath filler, and that ASTM D974 is the applicable test method for Visconorust 2090 P-2. Therefore, a second set of sheath filler samples was shipped to the testing laboratory, and the neutralization number tests were re-done using ASTM D974 (without modification); these results are shown on Pages D-6 and D-7.

Pages D-3 through D-5 contain a notation next to the neutralization number indicating that the results do not comply with the specification requirement that the neutralization number be 35 (minimum). This is an incorrect notation; Procedure 5177-187-CP-1 does not require any minimum value for the neutralization number.

FORM 407 REV.-PG

PITTSBURGH TESTING LABORATORY

ESTABLISHED 1881
850 POPLAR STREET, PITTSBURGH, PA. 15220

PLEASE REPLY TO:
P. O. BOX 1646
PITTSBURGH, PA. 15230

AREA CODE 412 TELEPHONE 922-4000

LABORATORY No. 826853 to 826862

***Revised Report - 5/3/82

CLIENT'S No. 65121-24553C

ORDER No. PG-18999

REPORT

April 28, 1982

Sample Description: O I L

Specification: Provided by Client

Submitted by: Florida Power and Light Co.

Reported to: Florida Power and Light Co.
P.O. Box 3088
Florida City, FLA 33034

64H50 Unit 3 - But 4 - 2/22/82

Test	Method	Results	Specification
Water Soluble Chlorides	ASTM D-512	*1 ppm	2 ppm Max.
Water Soluble Nitrates	ASTM D-992	*1 ppm	4 ppm Max.
Water Soluble Sulfides	APHA Std. Method	*1 ppm	2 ppm Max
Water Content	ASTM D-95	*.01%	10% Max.
Neutralization No.	Mod. ASTM D-974	0	35 Min.

23-V1-A - Unit 3 - 2/3/82

Test	Method	Results	Specification
Water Soluble Chlorides	ASTM D-512	*1 ppm	2 ppm Max.
Water Soluble Nitrates	ASTM D-992	*1 ppm	4 ppm Max.
Water Soluble Sulfides	APHA Std. Method	*1 ppm	2 ppm Max.
Water Content	ASTM D-95	*.01%	10% Max.
Neutralization No.	Mod. ASTM D-974	0	35 Min.

Unit 3 - Butt 3 - 3028 - 2/28/82

Test	Method	Results	Specification
Water Soluble Chlorides	ASTM D-512	*1 ppm	2 ppm Max.
Water Soluble Nitrates	ASTM D-992	*1 ppm	4 ppm Max.
Water Soluble Sulfides	APHA Std. Method	*1 ppm	2 ppm Max.
Water Content	ASTM D-95	*.01%	10% Max.
Neutralization No.	Mod. ASTM D-974	0	35 Min.

FORM 407 REV.-PG

PITTSBURGH TESTING LABORATORY

ESTABLISHED 1881

850 POPLAR STREET, PITTSBURGH, PA. 15220

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AREA CODE 412 TELEPHONE 922-4000

LABORATORY No. 826853 to 826862

CLIENT'S No. 65121-24553C

***Revised Report - 5/3/82

ORDER No. PG-18999

REPORT

April 28, 1982

Unit 3 - 42H70 - Butt 2 - 2/26/82

Test	Methods	Results	Specification
Water Soluble Chlorides	ASTM D-512	*1 ppm	2 ppm Max.
Water Soluble Nitrates	ASTM D-992	*1 ppm	4 ppm Max.
Water Soluble Sulfides	APHA Std. Method	*1 ppm	2 ppm Max.
Water Content	ASTM D-95	*.01%	10% Max.
Neutralization No.	Mod.ASTM D-974	0	35 Min.

Unit 3 - Butt 6 - 1D 53 - 3/1/82

Test	Methods	Results	Specification
Water Soluble Chlorides	ASTM D-512	*1 ppm	2 ppm Max.
Water Soluble Nitrates	ASTM D-992	*1 ppm	4 ppm Max.
Water Soluble Sulfides	APHA Std. Method	*1 ppm	2 ppm Max.
Water Content	ASTM D-95	*.01%	10% Max.
Neutralization No.	Mod.ASTM D-974	0	35 Min.

Unit 3 - 64H51 - But 6 - 2/19/82

Test	Methods	Results	Specification
Water Soluble Chlorides	ASTM D-512	*1 ppm	2 ppm Max.
Water Soluble Nitrates	ASTM D-992	*1 ppm	4 ppm Max.
Water Soluble Sulfides	APHA Std. Method	*1 ppm	2 ppm Max.
Water Content	ASTM D-95	*.01%	10% Max.
Neutralization No.	Mod. ASTM D-974	0	35 Min.

But 1 - 2-D28 - 2/27/82

Test	Methods	Results	Specification
Water Soluble Chlorides	ASTM D-512	*1 ppm	2 ppm Max.
Water Soluble Nitrates	ASTM D-992	*1 ppm	4 ppm Max.
Water Soluble Sulfides	APHA Std. Method	*1 ppm	2 ppm Max.
Water Content	ASTM D-95	*.01%	10% Max.
Neutralization No.	Mod. ASTM D-974	0	35 Min.

FORM 407 REV.-PG

PITTSBURGH TESTING LABORATORY

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AREA CODE 412 TELEPHONE 922-4000

LABORATORY No. 826853 to 826862

CLIENT'S No. 65121-24553C

***Revised Report - 5/3/82

ORDER No. PG-18999

REPORT

April 28, 1982

PTP - Unit 3 - 61V1 Top - 2/10/82

Test	Method	Results	Specification
Water Soluble Chlorides	ASTM D-512	*1 ppm	2 ppm Max.
Water Soluble Nitrates	ASTM D-992	*1 ppm	4 ppm Max.
Water Soluble Sulfides	APHA Std. Method	*1 ppm	2 ppm Max.
Water Content	ASTM D-95	*.01%	10% Max.
*Neutralization No.	Mod. ASTM D-974	0	35 Min.

Unit 3 - 62H15 - Butt 2 - 2/15/82

Test	Method	Results	Specification
Water Soluble Chlorides	ASTM D-512	*1 ppm	2 ppm Max.
Water Soluble Nitrates	ASTM D-992	*1 ppm	4 ppm Max.
Water Soluble Sulfides	APHA Std. Method	*1 ppm	2 ppm Max.
Water Content	ASTM D-95	*.01%	10% Max.
*Neutralization No.	Mod. ASTM D-974	0	35 Min.

Unit 3 - 45V7 Butt - 2/4/82

Test	Method	Results	Specification
Water Soluble Chlorides	ASTM D-512	*1 ppm	2 ppm Max.
Water Soluble Nitrates	ASTM D-992	*1 ppm	4 ppm Max.
Water Solubbe Sulfides	APHA Std. Method	*1 ppm	2 ppm Max.
Water Content	ASTM D-95	*.01%	10% Max.
Neutralization No.	Mod. ASTM D-974	0	35 Min.

*Less Than

These results do not comply with the above specification requirements.

*Revised report to include quality assurance statement.

PITTSBURGH TESTING LABORATORY

William G. Carlson, Level II
Manager, Chemical Department

***All Analysis conducted in accordance with Pittsburgh Testing Laboratory's Quality Assurance Program, Revision 2 Dated 9-21-79 and the specification of this purchase order.

1-Client
Attn: Martin Kossick
1-Mark Feroglia
1-Viscosity Oil Co.
1-Quality Control

fvl

FORM 407 REV.-PG

PITTSBURGH TESTING LABORATORY

ESTABLISHED 1881

850 POPLAR STREET, PITTSBURGH, PA. 15220

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P. O. BOX 1646
PITTSBURGH, PA. 15230

AREA CODE 412 TELEPHONE 922-4000

LABORATORY No. 828981 to 828990

CLIENT'S No. 651-24553C

ORDER No. PG-18999

REPORT

June 23, 1982

Sample Description: LUBRICANT

Test Method: ASTM D974

Submitted by: Florida Power & Light Co.

Reported to: Florida Power & Light Co.
P.O. Box 3088
Florida City, Florida 33034

Markings	Neutralization No. Total Acid No.
But 4 - 42 H 70 Unit 3	.11 mgKOH/g
But 4 - 64H 51 Unit 3	.20 mgKOH/g
2-3-82 - 23V1 Unit 3	Neutralization No. Strong Base No. 1.16 mgKOH/g
2-9-82 61V1 - Unit 3	Neutralization No. Strong Base No. .90 mgKOH/g
But 4 2D28 Unit 3	Neutralization No. Strong Base No. .60 mgKOH/g
Butt 6 3D28 Unit 3	Neutralization No. Strong Base No. 1.44 mgKOH/g
But 1 3-1-82 ID 53	Neutralization No. Strong Base No. .45 mgKOH/g

FORM 407 REV.-PG

PITTSBURGH TESTING LABORATORY

ESTABLISHED 1881

850 POPLAR STREET, PITTSBURGH, PA. 15220

PLEASE REPLY TO:
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PITTSBURGH, PA. 15230

AREA CODE 412 TELEPHONE 922-4000

LABORATORY No. 828981 to 828990

CLIENT'S No. 651-24553C

ORDER No. PG-18999

REPORT

June 23, 1982

	Neutralization No. Strong Base No.
Butt 6 64H50 Unit 3	.62 mgKOH/g
2-4-82 45V7 Unit 3	.45 mgKOH/g
But 6 - 62 H 18 Unit 3	.57 mgKOH/g

PITTSBURGH TESTING LABORATORY

William G. Carlson, Level II
Manager, Chemical Department

1-Client
Attn: Mr. Martin Kossick
1-Mark Feroglia
1-Viscosity Oil Co.
1-Quality Control

fvl

Note: All Analysis were conducted in Accordance with Pittsburgh Testing Laboratory's Quality Assurance Program, Revision #2 - Dated 9-21-79 and the specification of this purchase order.

APPENDIX E

TESTING MACHINE CALIBRATION

REPORT

FOR

FLORIDA POWER & LIGHT COMPANY

TURKEY POINT NUCLEAR POWER PLANT

UNIT 3

POST-TENSIONING SYSTEM

TENTH-YEAR SURVEILLANCE

BECHTEL POWER CORPORATION
Gaithersburg, Maryland

July 1982

Attachment A
Form CAL-4 (2)
Revision 5
DATE 1-8-81

Pittsburgh Testing Laboratory

CALIBRATION OF TESTING MACHINES

Machine Assigned No: 217 Date Calibrated: 9-2-1981

Machine Description: Hydraulic

Manufacturer: Tinius Olsen Model No: Super L

Serial No: 69069 Capacity: 1,200,000 Lbs.

Type: ☐ Compression ☐ Tension ☒ Compression and Tension

Condition of Machine: ☒ Satisfactory ☐ Unsatisfactory

Bearing Face Planeness (0.001") Upper ☐ In ☐ Out Lower ☐ In ☐ Out ☒ Not Applicable

Calibration Frequency: 1 YEAR Accuracy Requirements: ± 1 %

Calibration Standards* Type: Proving Rings

Serial No.*	Capacity*	Class A Lower Limit*	Verification Date*
3258	10,000 #	600 #	1-15-81
437	50,000 #	5440 #	7-14-80
3065	300,000 #	30,400 #	1-14-81
4656	1,000,000 #	80,000 #	9-30-80

Are Standards traceability certificates current and on file? ☒ Yes ☐ No

Calibration Procedure Used: IS-TM-CAL ASTM Reference: ASTM-E-4-79

Results of Calibrations: (See attached pages for calibration data, number of attached pages: _____)

Machine is: ☒ Acceptable ☐ Not Acceptable for Service

Verified Loading Ranges Within ±1% Accuracy

1. 5000 # to 50,000 #
2. 10,000 # to 100,000 #
3. 100,000 # to 500,000 #
4. 100,000 # to 1,000,000 #

Calibrated by: Bill Hudspeth Location: Pittsburgh

PTL Manager/Supervisor: Tom Gallagher Level II Date: 9-2-1981

RECALIBRATION DUE DATE: 9-2-1982

CALIBRATION OF TESTING MACHINES cont.
(PROVING RING METHOD)

Testing Machine No. 217 Date Calibrated: 9-2-1981

Ring No. 3258 Ring Capacity: 10,000#

(Use a separate page 2 for each ring). Thermometer NO. 336

Calibration Data: ☒ As Found ☐ As Adjusted

MACHINE READING (lbs)	OBSERVED RING READING	NET RING READING	TEMP. °C	CORR.* RING READING	RING LOAD (lbs)	MACHINE ERROR	
						lbs.	%
0	199.1		23				
5000	577.6	378.5	23	378.5	5048.5	-48.5	-0.96

* If no correction is required, indicate N.A. (Not Applicable).

Remarks: 60,000# Range

Bill Hendspeth

CALIBRATION OF TESTING MACHINES cont.
(PROVING RING METHOD)

Testing Machine No. 217 Date Calibrated: 9-2-1981

Ring No. 437 Ring Capacity: 50,000 #

(Use a separate page 2 for each ring). Thermometer NO. 336

Calibration Data: ☒ As Found ☐ As Adjusted

MACHINE READING (lbs)	OBSERVED RING READING	NET RING READING	TEMP. °C	CORR.* RING READING	RING LOAD (lbs)	MACHINE ERROR lbs.	MACHINE ERROR %
0	2.5		23				
10,000	137.0	134.5	23	134.5	10027	-27.0	-0.27
20,000	272.1	269.6	23	269.6	20046	-46.0	-0.23
30000	405.2	402.7	23	402.7	29868	+132	+0.44
40,000	540.8	538.8 3 Rot.	23	538.3	39824	+176	+0.44
50,000	678.4	675.9	23	675.9	49877	+123	+0.25

* If no correction is required, indicate N.A. (Not Applicable).

Remarks: 60,000 #

Bill Wagstaff

CALIBRATION OF TESTING MACHINES cont.
(PROVING RING METHOD)

Testing Machine No. 217 Date Calibrated: 9-2-1981

Ring No. 437 Ring Capacity: 50,000#

(Use a separate page 2 for each ring). Thermometer NO. 336

Calibration Data: ☒ As Found ☐ As Adjusted

MACHINE READING (lbs)	OBSERVED RING READING	NET RING READING	TEMP. °C	CORR.* RING READING	RING LOAD (lbs)	MACHINE ERROR	
						lbs.	%
0	2.4		23				
10,000	137.8	135.4	23	135.4	10,094	-94	-0.93
20,000	271.0	268.5	23	268.5	19,965	+35	+0.18

* If no correction is required, indicate N.A. (Not Applicable).

Remarks: 120,000# RANGE

Bill Utsch

CALIBRATION OF TESTING MACHINES cont.
(PROVING RING METHOD)

Testing Machine No. 217 Date Calibrated: 9-2-1981

Ring No. 3065 Ring Capacity: 300,000 #

(Use a separate page 2 for each ring). Thermometer NO. 336

Calibration Data: ☒ As Found ☐ As Adjusted

MACHINE READING (lbs)	OBSERVED RING READING	NET RING READING	TEMP. °C	CORR.* RING READING	RING LOAD (lbs)	MACHINE ERROR	
						lbs.	%
0	0.9		23				
40,000	114.5	113.6	23	113.6	40,048	-48	-0.12
60,000	171.0	170.1	23	170.1	59,939	+61	+0.10
80,000	228.1	227.0	23	227.0	79,956	+44	+0.06
100,000	286.4	285.5	23	285.5	100,518	-518	-0.52

* If no correction is required, indicate N.A. (Not Applicable).

Remarks: 120,000 # Range

Bill Ledsworth

CALIBRATION OF TESTING MACHINES cont.
(PROVING RING METHOD)

Testing Machine No. 217 Date Calibrated: 9-2-1981

Ring No. 4656 Ring Capacity: 1,000,000 #

(Use a separate page 2 for each ring). Thermometer NO. 336

Calibration Data: ☒ As Found ☐ As Adjusted

MACHINE READING (lbs)	OBSERVED RING READING	NET RING READING	TEMP. °C	CORR.* RING READING	RING LOAD (lbs)	MACHINE ERROR	
						lbs.	%
0	4.3		24				
100,000	80.0	75.7	24	75.7	100,733	-733	-0.73
200,000	154.8	150.5	24	150.4	200,012	-12	-0.01
300,000	229.7	225.4	24	225.4	299,487	+513	+0.17
400,000	305.7	301.4	24	301.4	400,223	-223	-0.06
500,000	380.8	376.5	24	376.4	499,826	+174	+0.03

* If no correction is required, indicate N.A. (Not Applicable).

Remarks: 600,000 # Range

Bill Hinsdale

CALIBRATION OF TESTING MACHINES cont.
(PROVING RING METHOD)

Testing Machine No. 217 Date Calibrated: 9-2-1981

Ring No. 4656 Ring Capacity: 1,000,000

(Use a separate page 2 for each ring). Thermometer NO. 336

Calibration Data: ☒ As Found ☐ As Adjusted

MACHINE READING (lbs)	OBSERVED RING READING	NET RING READING	TEMP. °C	CORR.* RING READING	RING LOAD (lbs)	MACHINE ERROR	
						lbs.	%
0	4.0		24				
100,000	79.8	75.8	24	75.8	100,733	-733	-0.73
200,000	153.5	149.5	24	149.4	200,012	-12	-0.01
400,000	304.1	300.1	24	299.9	299,487	+513	+0.17
600,000	454.3	450.3	24	450.1	600,223	-223	-0.06
800,000	605.9	601.9	24	601.6	799826	+174	+0.03
1,000,000	758.0	754.0	24	753.6	998,825	+1175	+0.20

* If no correction is required, indicate N.A. (Not Applicable).

Remarks: 1,200,000 # RANGE

Bill Hempfill
C