

50-204
Ltr dtd 2/9/78
#780440053

SECOND TENDON SURVEILLANCE TEST OF
REACTOR CONTAINMENT BUILDING
#3 yrs AFTER S.I.T.

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THREE MILE ISLAND
NUCLEAR GENERATING STATION
UNIT NO. 1
SECOND TENDON SURVEILLANCE TEST OF
REACTOR CONTAINMENT BUILDING
THREE YEARS AFTER S.I.T.

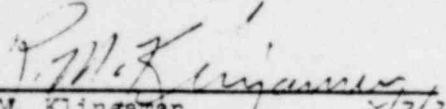
METROPOLITAN EDISON COMPANY

SUBSIDIARY OF GENERAL PUBLIC UTILITIES CORP.

Reviewed by


R. L. Summers
TMI-Cognizant Engineer

proved by:


R. M. Klingaman
Manager-Generation Engineering

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Prepared by: Rick Hansken
VSL Corporation
Los Gatos, Calif.
December 1977

SYNOPSIS

The post-tensioning system of the concrete reactor building at Three Mile Island Nuclear Generating Station Unit #1 was subjected to an in-service surveillance test and inspection during the period from August 8, 1977 to November 11, 1977. The purpose of this surveillance was to verify the structural integrity of the post-tensioning system three years after the initial containment Structural Integrity Test (S.I.T.).

The post-tensioning force for all twenty-one surveyed tendons was verified to be within acceptance limits by testing of the tendon lift-off force.

Inspection of the tendon anchorage assemblies found them to be free of any excessive corrosion. The corrosion prevention system was found to be functioning properly. Laboratory analysis of filler material samples revealed impurities to be within acceptable limits. The concrete surrounding the bearing plates was found to be free of any significant defects.

Three wires were removed from three selected tendons (one from one tendon in each directional group) and inspected for physical condition. Each sample wire was subjected to tensile tests; results demonstrated strengths above the guaranteed ultimate strength of 240,000 psi.

These observations indicate that the containment post-tensioning system is in good condition and is fulfilling the design criteria.

Collection of data, quality assurance and construction management were performed by VSL Corporation, Los Gatos, California, under contract to The Metropolitan Edison Company.

INTRODUCTION

The objective of the tendon surveillance program is the evaluation of data obtained from the testing and inspection of twenty-one randomly selected tendons: ten hoop tendons, six dome tendons and five vertical tendons. Each tendon was evaluated on the following:

- a) Tendon lift-off force
- b) Tendon anchorage assemblies
- c) Tendon physical condition
- d) Tendon corrosion prevention system

The purpose of the tendon surveillance is to assess the condition and functional capability of the system, thereby verifying the adequacy of the system and providing an opportunity to take corrective action should adverse conditions be detected.

The surveillance test conforms to the U. S. Nuclear Regulatory Commission's Regulatory Guide 1.35, Revision 1.

RESULTS

(1) Inspection of corrosion protection system

The grease filler found in the end caps of the twenty-one tendons was visually examined for color and consistency; no evidence of water was discovered. No discoloration of filler material was evident.

Filler material was removed from the surveillance tendons and placed in clean 55-gallon containers. When the containers were near full, they were heated to 150° F, to ensure a homogeneous mixture. Samples were then taken and sent to a lab for testing before the filler grease was returned to the tendons. All new containers of grease were subjected to the same procedure of sampling and testing before being pumped into the tendons.

As part of this surveillance, three tendons were scheduled for a physical test; part of this physical test was the laboratory analysis of the filler grease found in the end caps of the tendons. Collection of a grease sample from both end caps of V-119 was impossible due to the highly liquid state of the grease at the time of inspection. The grease samples for V-119 were taken from the filler grease that was drained into two 55-gallon containers. Subsequent testing found these samples to be within acceptable limits.

(2) Anchorage assemblies

Anchor heads, shims and bearing plates were visually examined for cracking and corrosion; buttonheads were inspected for acceptable shape, cracks and corrosion.

No significant deleterious conditions were found in the buttonheads of the tendon system with the exception of surveillance tendon H51-013 and tendons H51-012 and H51-014. The condition of the buttonheads of H51-013 was brought to the attention of Metropolitan Edison Company for consideration. The decision was made to visually inspect H51-012 and H51-014 for the condition of the buttonheads.

After visual examination of these two tendons (the condition of the buttonheads was found to be similar to H51-013 but not as severe), Gilbert Associates were called in to ascertain the physical condition of the buttonheads of the three tendons, H51-013, H51-012 and H51-014. The condition of the buttonheads of the three tendons was found to be acceptable.

(Evaluation of the button head conditions as performed by Gilbert Associates, is reported in their letter, copy included as Attachment No. 1.)

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Tendon installation cards do not indicate that this condition occurred during installation. See Diagrams 1 through 6 for graphic condition of the buttonheads of H51-013, H51-012 and H51-014. The results of the visual inspection are given in Data Sheets 1, 2 and 3.

Some millscale and minor surface corrosion were found on the edges and face of some of the shims. Due to total coverage of the anchorage assemblies with grease, this condition probably existed at the time of installation.

(3) Tendon lift-off force

Lift-off force was obtained from each end of the ten hoop and six dome tendons; the average value of these forces was within the upper and lower bounds of the predicted value.

The five vertical tendons were single-end stressed so that the lift-off force need only be recorded from one end. Here, too, the force was within the upper and lower bounds of the predicted value. The results are given in Data Sheets 6, 7 and 8.

It was necessary to add shims to various tendons during retensioning in order to obtain the required final lift-off force. This was due to anchor head rotation during detensioning which caused a relaxation in the twist of the tendon, thus showing a decrease in the force when the original shims were replaced. The tendon force after retensioning in all cases is equal to or greater than the initial tendon lift-off force.

The concrete surrounding the bearing plate area of the tendons was examined for any signs of cracking. No evidence of cracking was found in the concrete around the hoop and vertical tendon bearing plates. Cracking patterns were found in the concrete surrounding the bearing plates of some of the dome tendons; none of the cracks in these areas were found to be greater than 0.009" (see Diagram 7 and Data Sheets 9, 10 and 11).

(4) Tendon physical condition

Of the twenty-one surveillance tendons, three were chosen for physical testing. This included laboratory analysis of the filler grease samples from the end caps for traces

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of chlorides, nitrates, sulfides and percent of water content. Analysis results of the grease samples are shown on Data Sheet 12 and separate data sheets from Allentown Testing Laboratories, Inc., Bethlehem, Pennsylvania. All of the samples meet the acceptance criteria.

Part of the physical condition inspection is the tensile testing of a single wire pulled from each of the three tendons. The removed wires were wrapped to protect them from a change in condition and sent to a testing facility for evaluation. Three tensile test samples were cut from each wire, one from each end and one from the center. The ultimate strength of each sample was determined by the testing facilities at Fritz Labs of Lehigh University, Bethlehem, Pennsylvania. The results are summarized on Data Sheet 5, revealing no significant change in the ultimate strength of the wire as compared to results of the initial acceptance tests.

(5) Equipment calibration

Two stressing jacks were used to complete the surveillance: The Metropolitan Edison's ram (1650 kips) and General Atomic's ram (2000 kips). Both rams were calibrated at Fritz Labs, of Lehigh University. The equipment used for calibrations is traceable to the National Bureau of Standards. Calibration data is given on data sheets from Fritz Labs.

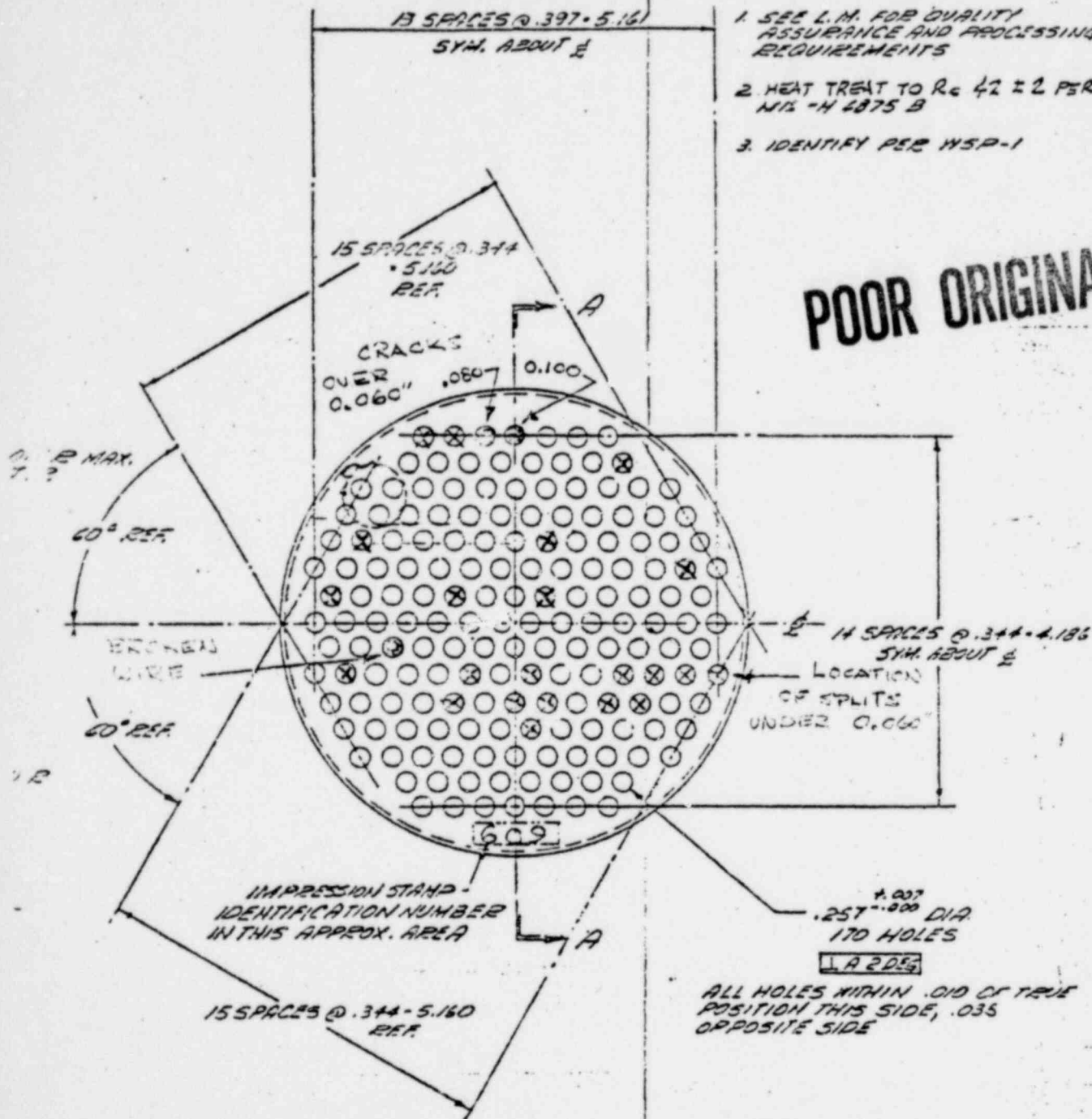
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DIAGRAM #1

NOTES: UNLESS OTHERWISE SPECIFIED

1. SEE L.H. FOR QUALITY ASSURANCE AND PROCESSING REQUIREMENTS
2. HEAT TREAT TO $R_c 42 \pm 2$ PER MIL-H 4875 B
3. IDENTIFY PER WSP-1

POOR ORIGINAL



T- IDAN # H 51-013 BUTTRESS # 1

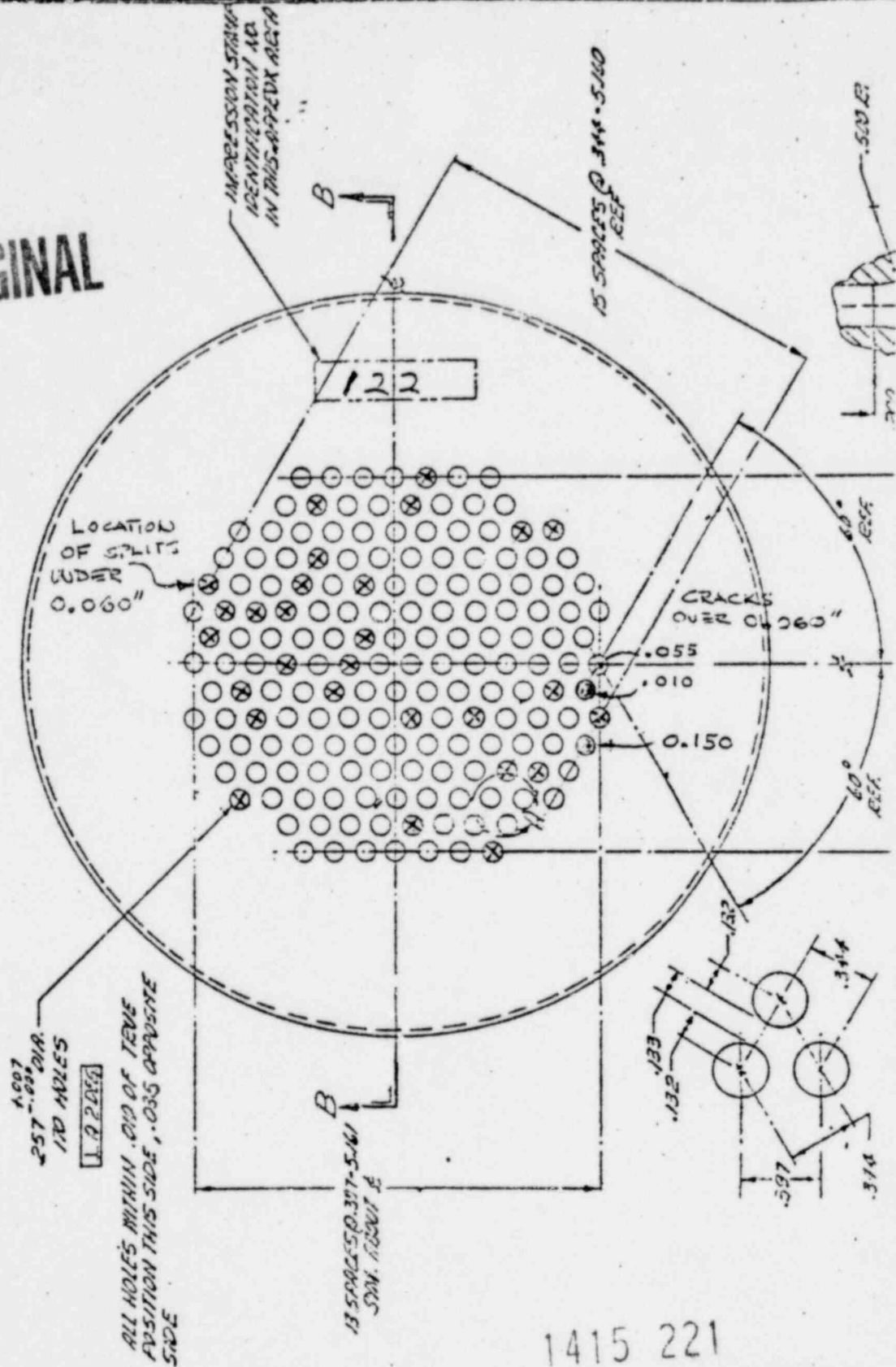
TOLERANCES UNLESS NOTED		MATERIAL	
ALL DIMENSIONS TO 1/16"	UNLESS OTHERWISE NOTED	170 WIRE WASHER	10003
ALL DIMENSIONS TO 1/16"	UNLESS OTHERWISE NOTED	20 WIRE	4140-4.42
ALL DIMENSIONS TO 1/16"	UNLESS OTHERWISE NOTED	20 WIRE	4140-4.42

DIAGRAM #2

POOR ORIGINAL

NOTES: UNLESS OTHERWISE SPECIFIED

1. HEAT TREAT TO EQ 42+D PER MIL-H-48150
2. IDENTIFY PER WSP-1
3. SEE L.M. FOR QUALITY ASSURANCE AND PROCESSING REQUIREMENTS



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TENDO # H 51-013 BUTTRESS # 5

DIAGRAM #3

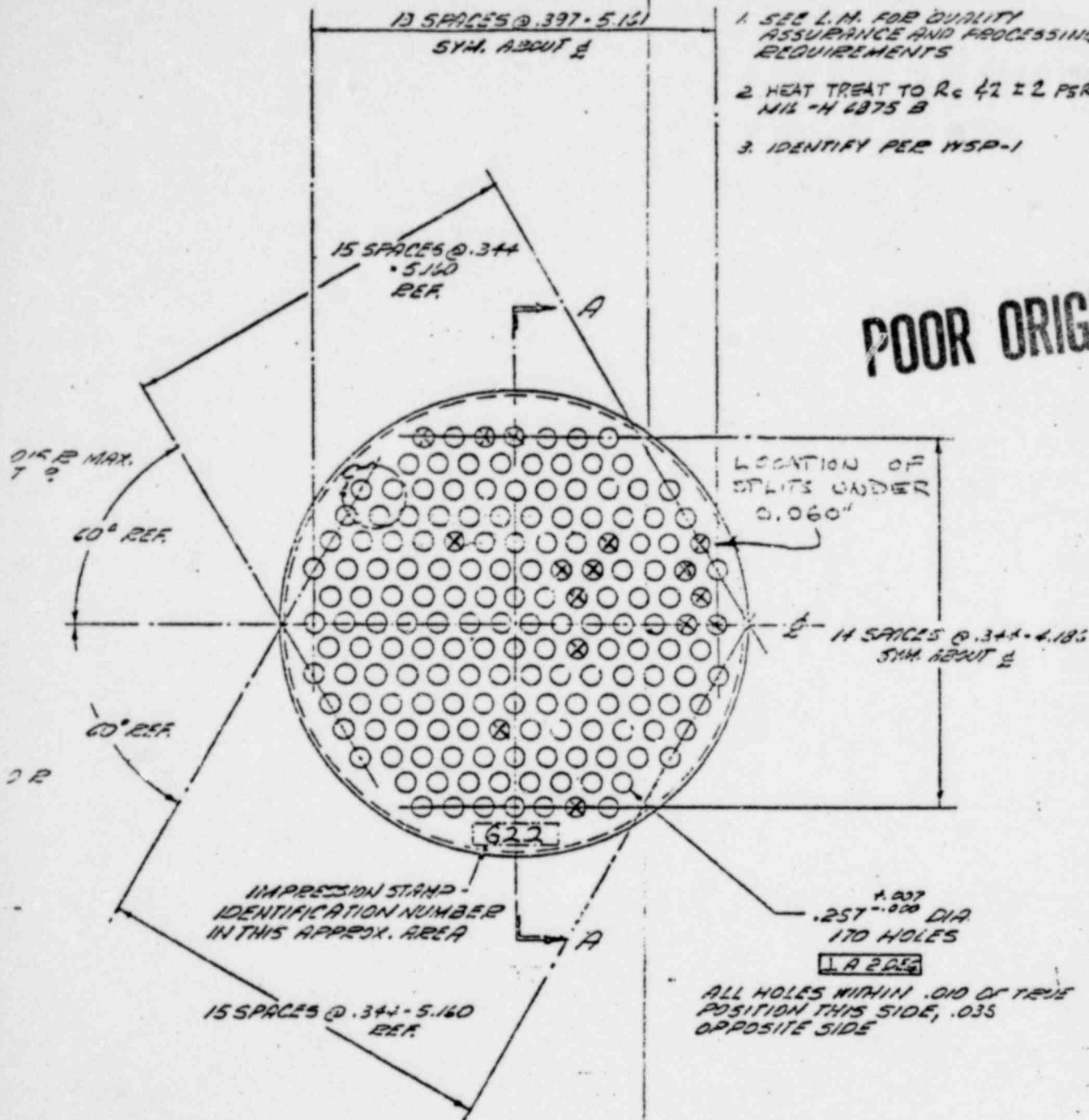
NOTES: UNLESS OTHERWISE SPECIFIED

1. SEE L.M. FOR QUALITY ASSURANCE AND PROCESSING REQUIREMENTS

2. HEAT TREAT TO $R_c 42 \pm 2$ PER MIL-H 6875 B

3. IDENTIFY PER WSP-1

POOR ORIGINAL



TENDON # H 51-012 BUTTRESS # 1

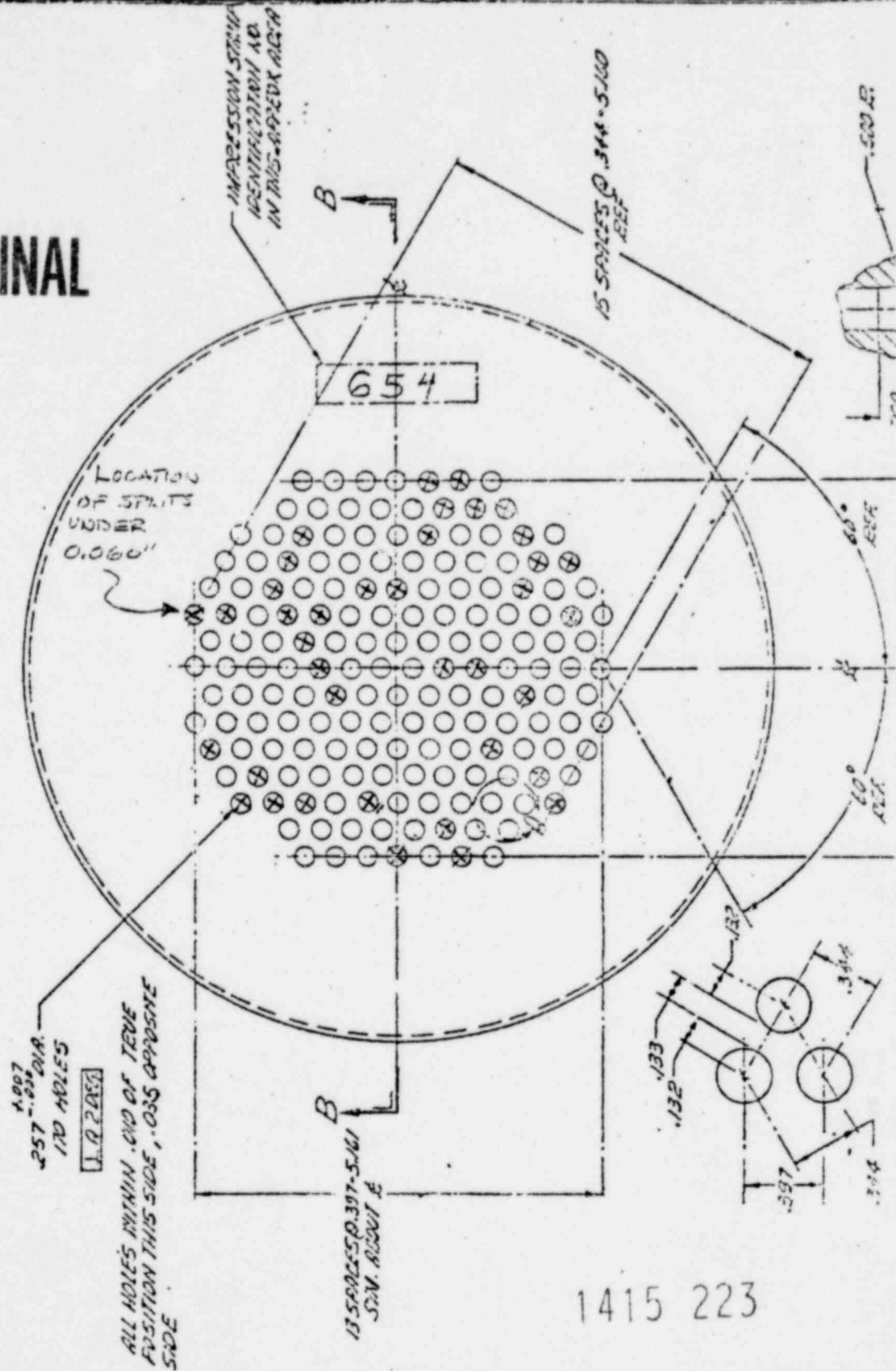
TOLERANCES UNLESS NOTED		MATERIAL	
FINISH	AS FURNISHED	170 WIRE WASHER	170 WIRE WASHER
FUNCTIONAL	AS FURNISHED	170 WIRE WASHER	170 WIRE WASHER
REPAIR	AS FURNISHED	170 WIRE WASHER	170 WIRE WASHER
ALL DIMENSIONS	TO BE CONSIDERED	170 WIRE WASHER	170 WIRE WASHER
UNLESS	NOTED	170 WIRE WASHER	170 WIRE WASHER
OTHERWISE	NOTED	170 WIRE WASHER	170 WIRE WASHER
NOTES	NOTED	170 WIRE WASHER	170 WIRE WASHER

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POOR ORIGINAL

NOTES: UNLESS OTHERWISE SPECIFIED

1. HEAT TREAT TO RT 4250 FEE MILL-N-63750
2. IDENTIFY FEE MSP-1
3. SEE L.M. FOR QUALITY ASSURANCE AND PROCESSING REQUIREMENTS



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TEX Doc # 457-013

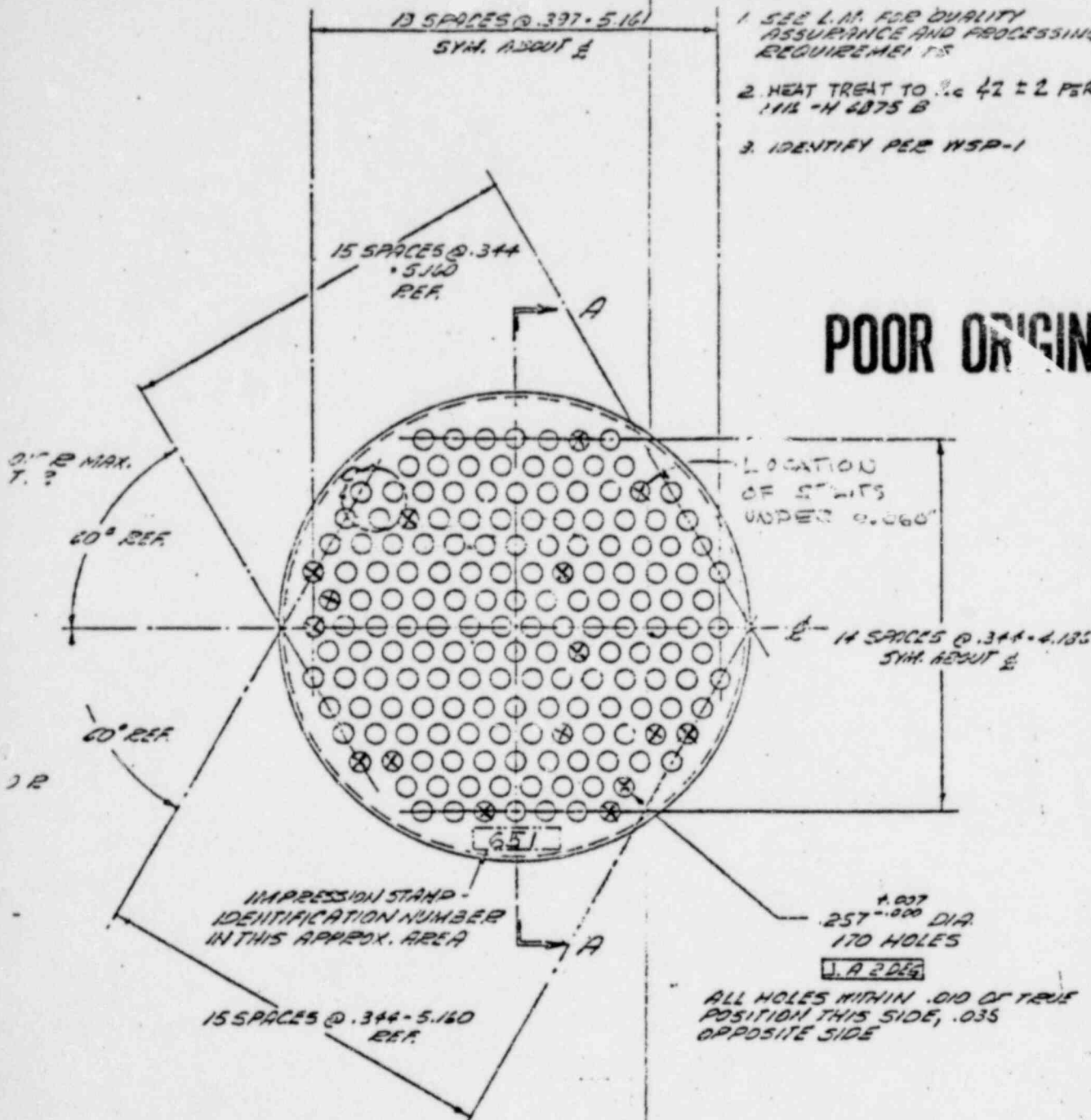
OUTREACH # 5

DIAGRAM #5

NOTES: UNLESS OTHERWISE SPECIFIED

1. SEE L.M. FOR QUALITY ASSURANCE AND PROCESSING REQUIREMENTS
2. HEAT TREAT TO $\pm 42 \pm 2$ PER MIL -H 4875 B
3. IDENTIFY PER WSP-1

POOR ORIGINAL

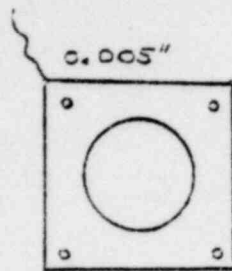


TEUDON # 451-014 ROTTRESS = 1

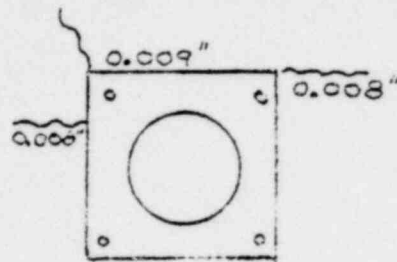
TOLERANCES UNLESS NOTED		MATERIAL		FINISH	
LINEAR	±.010	303	170	WASHED	1
ANGULAR	±.005	303	170	WASHED	1
ROUNDNESS	±.005	303	170	WASHED	1
FLATNESS	±.005	303	170	WASHED	1
THICKNESS	±.005	303	170	WASHED	1
DATA	±.005	303	170	WASHED	1
TO BE CONTAINED	±.005	303	170	WASHED	1
OTHER	±.005	303	170	WASHED	1

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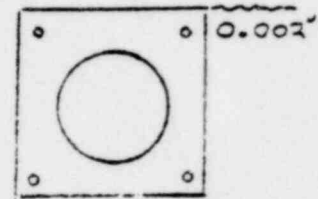
POOR ORIGINAL



D-130 SW

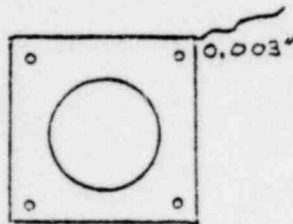


D-130 NE

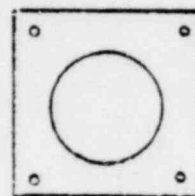


D-334 NW

D-334 SW
NO CRACKS

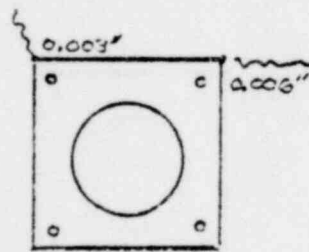


D-148 SW

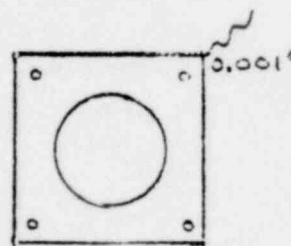


D-148 SE

D-202 NW
NO CRACKS

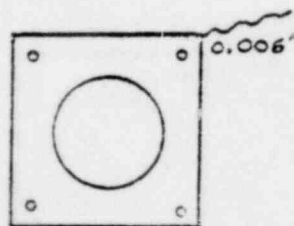


D-202 NE

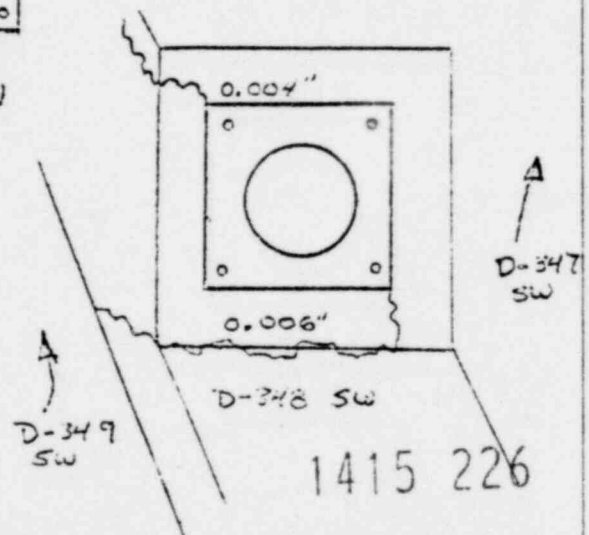


D-219 NW

D-219 SE
NO CRACKS



D-348 NW



D-347 SW

D-348 SW

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DATE 11/11/77	DIAGRAM # 7	VSI Corporation 8006 HAUTE CT. • P.O. BOX 866 SPRINGFIELD, VIRGINIA 22150 TELEPHONE (703) 451-4300	PROJ. NO.
DES. BY			
DWN. BY [Signature]	CRACKING PATTERNS IN CONCRETE SURROUNDING DOME TENDON BEARING PLATES		
CKD. BY			
			SHT. ____ OF ____

D EET 1

ANCHORAGE ASSEMBLY SURVEILLANCE INSPECTION

DOVE TENDONS

INSPECTION PERIOD 2

TENDON		END	BUTTONHEADS					STRESSING WASHER & NUT		SHIMS		SEARING PLATE		DATE INSP.	COMMENTS	INSPECTED BY		
I.D.	LOCATION	CORR. CAT.	NO. OF MISSING, BROKEN, AND/OR DAMAGED WIRES			PROPERLY FORMED	CORR. CAT.	CRACKS SKETCHED	CORR. CAT.	CRACKS SKETCHED	CORR. CAT.	CRACKS SKETCHED	CORR. CAT.	CRACKS SKETCHED	17	18	19	
			CRACKS	SKETCHED	CRACKS													
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1. D-130	5-4	1	0	N	Y	N	1	N	N	1	N	N	1	N	N	11/1/77	No	PH
	2-1	1	0	N	Y	N	1	N	N	1	N	N	1	N	N	11/1/77	No	PH
2. D-148	2-3	1	0	N	Y	N	1	N	N	1	N	N	1	N	N	11/1/77	No	PH
	1-3	1	0	N	Y	N	1	N	N	1	N	N	1	N	N	11/1/77	No	PH
3. D-202	2-1	1	0	N	Y	N	1	N	N	1	N	N	1	N	N	11/1/77	No	PH
	5-1	1	0	N	Y	N	1	N	N	1	N	N	1	N	N	11/1/77	No	PH
4. V-219	2-1	1	0	N	Y	N	1	N	N	1	N	N	1	N	N	11/1/77	No	PH
	5-1	1	0	N	Y	N	1	N	N	1	N	N	1	N	N	11/1/77	No	PH
5. D-334	4-3	1	0	N	Y	N	1	N	N	1	N	N	1	N	N	11/1/77	No	PH
	6-1	1	0	N	Y	N	1	N	N	1	N	N	1	N	N	11/1/77	No	PH
6. D-348	4-5	1	0	N	Y	N	1	N	N	1	N	N	1	N	N	11/1/77	No	PH
	5-6	1	0	N	Y	N	1	N	N	1	N	N	1	N	N	11/1/77	No	PH

LEGEND

GENERAL

Y = YES
N = NO

NOTE:

See Table 4 for corrosion categories.
See Table 5 for criteria for missing, broken, and/or damaged wires;
and Table 5 Note C for acceptance criteria for buttonheads.

TENDON END

1-6 Number of buttress nearest to end of tendon.

COMMENTS

A. PULLED WIRE w/MISSING BUTTON HEAD FOR TENSILE TEST

Reviewed by Donald Gunn Date: 2/2/78
Approved by Donald Gunn Date: 2/2/78

POOR ORIGINAL

DATA SHEET 2

ANCHORAGE ASSEMBLY SURVEILLANCE INSPECTION

VERTICAL TENDONS

INSPECTION PERIOD 2

TENDON	END	BUTTONHEADS					STRESSING WASHER & NUT		SHIMS		BEARING PLATE		DATE INSP.	COMMENTS	INSPECTED BY			
		NO. OF MISSING, BROKEN, AND/OR																
I.D.	LOCATION	CORR. CAT.	DAMAGED WIRES	CRACKS	PROPERLY FORGED	SKETCHED	CORR. CAT.	CRACKS	SKETCHED	CORR. CAT.	CRACKS	SKETCHED	CORR. CAT.	CRACKS	SKETCHED			INITIAL
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1. V-24	T	1	0	N	Y	11	2	11	11	2	11	11	1	11	11	8/22/77	A	RA
	B	1	0	11	Y	11	1	11	11	1	11	11	1	11	11			
2. V-48	T	1	2	11	Y	11	1	11	11	1	11	11	1	11	11	8/24/77	RA	RA
	B	1	0	N	Y	11	1	11	11	1	11	11	1	11	11			
3. V-72	T	1	0	11	Y	11	1	11	11	1	11	11	1	11	11	8/24/77	RA	PA
	B	1	0	N	Y	11	1	11	11	1	11	11	1	11	11			
4. V-97	T	1	0	N	Y	11	1	11	11	2	11	11	1	11	11	8/25/77	A	CA
	B	1	0	N	Y	11	1	11	11	1	11	11	1	11	11			
5. V-119	T	1	0	N	Y	11	1	11	11	1	11	11	1	11	11	8/26/77	RA	CA
	B	1	0	N	Y	11	1	11	11	1	11	11	1	11	11			

LEGEND:

GENERAL

Y = YES
N = NO

NOTE:

See Table 4 for corrosion categories.
See Table 5 for criteria for missing, broken and/or damaged wires;
and Table 5 Note C for acceptance criteria for buttonheads.

TENDON END

T or B - Top or bottom of tendon

COMMENTS

A. CORROSION CATEGORIES #2 - APPEARANCE OF CORROSION WAS THAT OF FIELD RUST DUE TO COMPLETE COVERAGE ANCHORAGE ASSEMBLIES WITH GREAT

Reviewed by: [Signature] Date: 2/2/78
Approved by: [Signature] Date: 2/2/78

POOR ORIGINAL

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VSL Corp. ion Field Report

DATA SHEET 3

ANCHORAGE ASSEMBLY SURVEILLANCE INSPECTION

HOOP TENDONS

INSPECTION PERIOD 2

TENDON	END	BUTTONHEADS					STRESSING WASHER & NUT				SHIMS		SPARING PLATE		DATE INSP.		COMMENTS	INSPECTED BY
I.D.	LOCATION	CORR. CAT.	DAMAGED WIRES	CRACKS	PROPERLY FORMED	SKETCHED	CORR. CAT.	CRACKS	SKETCHED	CORR. CAT.	CRACKS	SKETCHED	CORR. CAT.	CRACKS	SKETCHED	DATE INSP.	COMMENTS	INITIAL
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1.H-62-047	6	1	0	N	Y	N	1	N	N	1	N	N	1	N	N	10/24/77	ONE WIRE REMOVED	PH
	2	1	0	N	1 NOT	N	1	N	N	1	N	N	1	N	N			
2.H-24-048	2	1	0	N	Y	N	1	N	N	1	N	N	1	N	N	10/25/77	100	PH
	4	1	0	N	Y	N	1	N	N	1	N	N	1	N	N			
3.H-24-019	2	1	0	42 SPLITS	Y	N	1	N	N	1	N	N	1	N	N	9/23/77	ALL 20 SPLIT CRACKS ARE WITHIN ACCEPTANCE	PH
	4	1	0	58 SPLITS	Y	N	1	N	N	1	N	N	1	N	N			
4.H-35-011	3	1	0	2 SPLITS	Y	N	1	N	N	1	N	N	1	N	N	10/5/77	100	PH
	5	1	0	3 SPLITS	Y	N	1	N	N	1	N	N	1	N	N			
5.H-35-029	3	1	0	1 SPLIT	Y	N	1	N	N	1	N	N	1	N	N	7/25/77	100	PH
	5	1	0	1 SPLIT	Y	N	1	N	N	1	N	N	1	N	N			
6.H-46-028	4	1	0	1 SPLIT	Y	N	1	N	N	1	N	N	1	N	N	10/13/77	100	PH
	6	1	0	1 SPLIT	Y	N	1	N	N	1	N	N	1	N	N			
7.H-46-024	4	1	0	2 SPLITS	Y	N	1	N	N	1	N	N	1	N	N	10/1/77	100	PH
	6	1	0	1 SPLIT	Y	N	1	N	N	1	N	N	1	N	N			
8.H-51-013	5	1	0	26 SPLITS	Y	N	1	N	N	1	N	N	1	N	N	9/12/77	A	PH
	1	1	3	22 SPLITS	Y	N	1	N	N	1	N	N	1	N	N			
9.H-62-053	6	1	0	1 SPLIT	Y	N	1	N	N	1	N	N	1	N	N	10/25/77	100	PH
	2	1	0	1 SPLIT	Y	N	1	N	N	1	N	N	1	N	N			
10.H-62-011	6	1	0	N	Y	N	1	N	N	1	N	N	1	N	N	7/21/77	100	PH
	2	1	0	4 SPLITS	Y	N	1	N	N	1	N	N	1	N	N			

LEGEND

GENERAL

Y YES

N NO

NOTE:

See Table 4 for corrosion categories.

See Table 5 for criteria for missing, broken, and/or damaged wires; and Table 5 Note C for acceptance criteria for buttonheads.

TENDON END

1-6 Number of buttonheads nearest to end of tendon.

A. SEE ENCLOSED SKETCHES FOR:

H-51-013

H-51-012

H-51-014

Reviewed by:

Date:

Approved by:

Date:

POOR ORIGINAL

FRITZ ENGINEERING LABORATORY #13
LEHIGH UNIVERSITY
BETHLEHEM, PENNSYLVANIA 18015

VSL Corporation Field Report

DATA SHEET 4HTENDON WIRF INSPECTION DATAINSPECTION PERIOD 2TENDON IDENTIFICATION H-62-047

0	Category 1	25'
25'	Category 1	50'
50'	Category 1	75'
75'	Category 1	100'
100'	Category 1	125'
125'	Category 1	150'
150'	Category 1	175'
175'	Category 1	180'

Sample for Tensile Test

Sample 1: 0 ft. to 5 ft. Sample 2: 90 ft. to 95 ft. Sample 3: 175 ft. to 180 f

NOTE: Corrosion Categories (See Table 4), or any signs of deterioration shall be indicated full length as shown on the above chart. Let the end of zero length be tagged per Section 7.3.2.cc.

Inspected by:

Roy, H. Shutt

Date:

11-22-77

Reviewed by:

Robert H. H. H.

Date:

11/23/77

Approved by:

Edward C. Sumner

Date:

2/2/78

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FRITZ ENGINEERING LABORATORY #13
LEHIGH UNIVERSITY
BETHLEHEM, PENNSYLVANIA 18015

VSL Corporation Field Report

DATA SHEET 4VTENDON WIRE INSPECTION DATAINSPECTION PERIOD 2TENDON IDENTIFICATION V-119

0	Category 1	25'
25'	Category 1	50'
50'	Category 1	75'
75'	Category 1	100'
100'	Category 1	125'
125'	Category 1	150'
150'	Category 1	175'
175'	Category 1	180'

Sample for Tensile Test

Sample 1: 0 ft. to 5 ft. Sample 2: 90 ft. to 95 ft. Sample 3: 175 ft. to 180 ft.

NOTE: Corrosion Categories (See Table 4), or any signs of deterioration shall be indicated full length as shown on the above chart. Let the end of zero length be tagged per Section 7.3.2.cc.

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Inspected by: Roger H. Shuttle Date: 11-22-77
 Reviewed by: Richard H. Harker Date: 11/23/77
 Approved by: Donald H. Sumner Date: 2/2/78

FRITZ ENGINEERING LABORATORY #13
LEHIGH UNIVERSITY
BETHLEHEM, PENNSYLVANIA 18015

VSL Corporation Field Report

DATA SHEET 4DTENDON WIRE INSPECTION DATAINSPECTION PERIOD 2TENDON IDENTIFICATION D-202

0	Category 1	25'
25'	Category 1	50'
50'	Category 1	75'
75'	Category 1	100'
100'	Category 1	125'
125'	Category 1	150'
150'	Category 1	175'
175'	Category 1	180'

Sample for Tensile Test

Sample 1: 0 ft. to 5 ft. Sample 2: 90 ft. to 95 ft. Sample 3: 175 ft. to 180 ft.

NOTE: Corrosion Categories (See Table 4), or any signs of deterioration shall be indicated full length as shown on the above chart. Let the end of zero length be tagged per Section 7.3.2.cc.

Inspected by: Roger H. Shuttle Date: 11-22-77
 Reviewed by: Richard H. Hershman Date: 11/23/77
 Approved by: Donald C. Sumner Date: 2/2/78

415 232

POOR ORIGINAL

DATA SHEET 5

TENDON WIRE TEST RESULTS

INSPECTION PERIOD 2 TESTING LAB FRIZ ENGINEERING LABS

TENDON WIRE (1) SAMPLE NO.	LOCATION (2) FROM END OF WIRE	YIELD (3) STRESS (ksi)	ULTIMATE STRESS (ksi)	PERCENT ELONGATION	COMMENTS
<u>DOME</u>					
<u>8</u>	<u>0' TO 5'</u>	<u>217,100 PSI</u>	<u>242,900 PSI</u>	<u>3.75% @ 49" GAGE LENGTH</u>	
<u>9</u>	<u>90' TO 95'</u>	<u>212,700 PSI</u>	<u>243,300 PSI</u>	<u>6.55% @ 47 1/4" GAGE LENGTH</u>	
<u>7</u>	<u>175' TO 180'</u>	<u>216,300 PSI</u>	<u>244,900 PSI</u>	<u>4.12% @ 49" GAGE LENGTH</u>	
<u>VERTICAL</u>					
<u>2</u>	<u>0' TO 5'</u>	<u>213,300 PSI</u>	<u>242,000 PSI</u>	<u>3.11% @ 51 1/2" GAGE LENGTH</u>	
<u>3</u>	<u>90' TO 95'</u>	<u>213,900 PSI</u>	<u>246,300 PSI</u>	<u>3.87% @ 49 3/4" GAGE LENGTH</u>	
<u>1</u>	<u>175' TO 180'</u>	<u>213,900 PSI</u>	<u>242,900 PSI</u>	<u>5.35% @ 48" GAGE LENGTH</u>	
<u>HOOP</u>					
<u>5</u>	<u>0' TO 5'</u>	<u>213,500 PSI</u>	<u>246,100 PSI</u>	<u>3.42% @ 49" GAGE LENGTH</u>	
<u>6</u>	<u>90' TO 95'</u>	<u>213,000 PSI</u>	<u>245,300 PSI</u>	<u>5.23% @ 48 1/2" GAGE LENGTH</u>	
<u>4</u>	<u>175' TO 180'</u>	<u>222,500 PSI</u>	<u>243,700 PSI</u>	<u>3.59% @ 50" GAGE LENGTH</u>	

09/02/78
Revision

NOTES: (1) See Sections 7.3.2.cc. & 7.3.2.ee.

(2) The end starts from the end of zero length as indicated on Data Sheet 4.

(3) The yield stress is defined as the stress at 1% elongation, i.e., 192,000 psi minimum.

Prepared by: Richard H. Hensley

Date: 10/30/77

Received by: Richard H. Hensley

Date: 2/2/78

Approved by: Richard H. Hensley

Date: 2/2/78

VSL Corporation Field Report

DATA SHEET 7

PRESTRESS FORCE CONFIRMATION TEST

VERTICAL TENDONS

INSPECTION PERIOD		2										REACTOR		DATE			
												BLDG TEMP		INSP.		INSP. BY	
		TENDON				LIFT-OFF CONDITION				RETENSIONING							

LEGEND

LOCATION: T or B - top or bottom (vertical tendon).

TYPE OF WASHER: F - Field
S - Shop

SHIM THICKNESS: Clear distance between bearing plate and stressing washer.

PREVIOUS: At time of installation or previous surveillance.

ORIGINAL: At time of starting current surveillance.

Tendon force (column 8) required to achieve lift-off condition shall fall between the upper and lower bounds or prestress forecast. See Figure 11.

Column 7 - Column 8

FORCE CALCULATION: Force @ Lift-Off = Jack Pressure x Jack Piston Area

TWO RAMS WERE USED

(1) MET-ED RAM w/ 165.6 PISTON AREA

(2) GENERAL ATOMIC CO. w/ 210.5 PISTON AREA
PLATTEVILLE, COLORADO.

Reviewed by: Ronald Sumner Date: 2/2/78
Approved by: Ronald Sumner Date: 2/2/78

POOR ORIGINAL

1415 234

INSPECTION PERIOD 2

REACTOR DATE
PLDG TEMP INSP. BY

EXTENDING

LIFT-OFF CONDITION

TENDON

I.D. LOCATION	WASHER	TYPE OF END	PREVIOUS FORCE (kips)	EXPECTED LIFT-OFF FORCE (kips)	GAGE PRESS. (psi)	FORCE (kips)	AVG. OF 2 ENDS (kips)	SHIM THICKNESS (in.)	GAGE PRESS. (psi)	FORCE (kips)	FINAL SHIM THICKNESS (in.)	INT. EXT. °	INITIALS
1. H-62-047	6	S	1406	1250	0 5500	1155	1113	6 3/8"	5600	1179	7 1/4"	123° 50'	12/24/71
2. H-24-048	2	F	1375	1250	0 6450	1065	1174	6 3/8"	6600	1092	6 3/8"	121° 59'	12/24/71
3. H-24-019	2	F	1453	1250	0 6500	1263	1174	7 1/4"	6850	1134	7 1/4"	125° 79'	12/24/71
4. H-35-011	3	F	1453	1250	0 6000	1263	1174	7 1/4"	6300	1326	7 1/4"	124° 76'	12/24/71
5. H-35-024	3	F	1453	1250	0 6000	1263	1174	7 1/4"	6300	1043	2 1/2"	121° 83'	12/24/71
6. H-46-028	4	F	1453	1250	0 5700	1263	1242	10 1/2"	5600	1231	10 1/2"	123° 21'	12/24/71
7. H-46-024	4	F	1453	1250	0 7000	1263	1242	10 1/2"	7000	1300	10 1/2"	124° 28'	12/24/71
8. H-51-013	5	F	1453	1250	0 5800	1263	1242	10 1/2"	5800	1263	10 1/2"	121° 65'	12/24/71
9. H-62-053	6	F	1453	1250	0 7000	1263	1242	10 1/2"	7000	1192	10 1/2"	121° 65'	12/24/71
10. H-62-053	6	F	1453	1250	0 5600	1263	1242	10 1/2"	5600	1221	10 1/2"	121° 65'	12/24/71

LEGEND

LOCATION: 1 to 6 - Number of buttress nearest to end of tendon.

TYPE OF WASHER: F - Field
S - Shop

SHIM THICKNESS: Clear distance between bearing plate and stressing washer.

PREVIOUS: At time of installation or previous surveillance.

ORIGINAL: At time of starting current surveillance.

Tendon force (column 8) required to achieve lift-off condition shall fall between the upper and lower boundaries of prestress force. See Figure 12.

FORCE CALCULATION: Force @ Lift-Off = Jack Pressure x Jack Piston Area

TWO RANS WERE USED

① MET-ED RAM w/ 105.6 PISTON AREA

② GENERAL ATOMIC CO. w/ 410.5 PISTON AREA
PLATTEVILLE, COLORADO

Reviewed by:

Approved by:

Date:

2/2/78

VSL Corporation Field Report

DATA SHEET 9

TENDON ANCHORAGE AREA CONCRETE CRACK INSPECTION

DATE TENDONS

INSPECTION PERIOD 2

TENDON NO.	TYPE OF END WASHER	REMARKS ABOUT CRACKING PATTERN	CRACKS WITH WIDTH > 0.01" LOCATION	WIDTH (in.)	DATE INSP.	INSP BY (INITIALS)
1. D-130	F	1 CRACK MAXIMUM CRACK UPPER LEFT CORNER 0.005"	5-4	N/A	4/6/77	RT
2. D-148	S	3 MAXIMUM CRACK THE LARGEST 0.009"	2-1	N/A	4/6/77	RT
3. D-202	F	1 CRACK UPPER RIGHT CORNER 0.003"	2-3	N/A	4/6/77	RT
	S	1 CRACK 6" FROM BOTTOM LEFT CORNER ALONG BOTTOM 0.002"	4-3	N/A	4/6/77	RT
	F	2 CRACKS UPPER RIGHT CORNER LEFT END MAXIMUM CRACK 0.006"	2-1	N/A	4/6/77	RT
4. D-219	S	N/A CRACKING	6-1	N/A	4/6/77	RT
	F	N/A CRACKING	2-1	N/A	4/6/77	RT
	S	1 SMALL MAXIMUM CRACK UPPER RIGHT CORNER 0.001"	5-6	N/A	4/6/77	RT
5. D-334	F	N/A CRACKING	4-3	N/A	4/6/77	RT
	S	UPPER RIGHT CORNER 1 CRACK CRACK 0.002"	6-1	N/A	4/6/77	RT
	F	2 CRACKS UPPER CORNER 0.006"	4-5	N/A	4/6/77	RT
6. D-348	S	UPPER CORNER EXTENDING LEFT LOWER CORNER CRACK 0.006"	5-6	N/A	4/6/77	RT

NOTE: Type of end washer

F - Field

S - Shop

NOTE: SEE DIAGRAM #7

Reviewed by: [Signature] Date: 2/2/78
 Approved by: [Signature] Date: 2/2/78

POOR ORIGINAL

VSL Corporation Field Report

DATA SHEET 10

TENDON ANCHORAGE AREA CONCRETE CRACK INSPECTION

VERTICAL TENDONS

INSPECTION PERIOD 2

	TENDON NO.	TYPE OF END WASHER	REMARKS ABOUT CRACKING PATTERN	CRACKS WITH WIDTH > 0.01"		DATE INSP.	INSP BY (INITIALS)
				LOCATION	WIDTH (in.)		
1.	V-24	S	NO VISIBLE CRACKING	T	—	8/22/17	RH
		F	NO VISIBLE CRACKING	B	—		
2.	V-48	S	NO VISIBLE CRACKING	T	—	8/23/17	RH
		F	NO VISIBLE CRACKING	B	—		
3.	V-72	S	NO VISIBLE CRACKING	T	—	8/24/17	RH
		F	NO VISIBLE CRACKING	B	—		
4.	V-97	S	NO VISIBLE CRACKING	T	—	8/25/17	RH
		F	NO VISIBLE CRACKING	B	—		
5.	V-119	S	NO VISIBLE CRACKING	T	—	8/26/17	RH
		F	NO VISIBLE CRACKING	B	—		

NOTE: Type of end washer

P = Field

S = Shop

Reviewed by: [Signature] Date: 2/2/78

Approved by: [Signature] Date: 2/2/78

POOR ORIGINAL

1415 237

VSL Corporation Field Report

DATA SHEET 11

TENDON ANCHORAGE AREA CONCRETE CRACK INSPECTION

HOOP TENDONS

INSPECTION PERIOD 2

TENDON NO.	TYPE OF END WASHER	REMARKS ABOUT CRACKING PATTERN	CRACKS WITH WIDTH > 0.01" LOCATION	WIDTH (in.)	DATE INSP.	INSP BY (INITIALS)
1. H-62-047	S	NO CRACKS	6	/	10/24/77	RH
	F	NO CRACKS	2	/		
2. H-24-038	S	NO CRACKS	2	/	10/25/77	RH
	F	NO CRACKS	4	/		
3. H-24-019	S	NO CRACKS	2	/	9/23/77	RH
	F	NO CRACKS	4	/		
4. H-35-011	S	NO CRACKS	3	/	10/5/77	RH
	F	NO CRACKS	5	/		
5. H-35-029	S	NO CRACKS	3	/	9/29/77	RH
	F	NO CRACKING	5	/		
6. H-46-028	S	NO CRACKS	4	/	10/2/77	RH
	F	NO CRACKS	6	/		
7. H-46-024	S	NO CRACKS	4	/	10/6/77	RH
	F	NO CRACKING	6	/		
8. H-51-013	S	NO CRACKS	5	/	9/12/77	RH
	F	NO CRACKING	1	/		
9. H-62-012	S	NO CRACKING	6	/	10/28/77	RH
	F	NO CRACKS	2	/		
10. H-62-011	S	NO CRACKS	6	/	9/21/77	RH
	F	NO CRACKS	5	/		

NOTE: Type of end washer

F - Field

S - Shop

Reviewed by

Date:

Approved by

Date:

[Signature] 2/2/78

1415 238

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DATA SHEET 12

LABORATORY ANALYSIS OF BULK FILLER GREASE

INSPECTION PERIOD 2 TESTING LABORATORY ALLEN TOED TESTING LABS

SAMPLE IDENTIFICATION	TENDON END	CHLORIDES (1) (ppm)	NITRATES (1) (ppm)	SULPHIDES (1) (ppm)	WATER/DRY WEIGHT (2) %
-----------------------	------------	------------------------	-----------------------	------------------------	---------------------------

DOME

1. 203
#2-1 N/E
#6-1 N/W

< 1 PPM
< 1 PPM
< 5 PPM
< 5 PPM
< 1 PPM
< 1 PPM
< 0.1%
< 0.1%

VERTICAL

1. 119
#1 SEE
#2 NOTE
A

< 1 PPM
< 1 PPM
< 5 PPM
< 5 PPM
< 1 PPM
< 1 PPM
< 0.1%
< 0.1%

FOOP

1. 62-047
BUTTER 2
BUTTER 6

< 1 PPM
< 1 PPM
< 5 PPM
< 5 PPM
< 1 PPM
< 1 PPM
< 0.1%
< 0.1%

FRESH SAMPLE

1. LOT # 63813
2. LOT # 7-2762

< 1 PPM
< 1 PPM
< 5 PPM
< 5 PPM
< 1 PPM
< 1 PPM
< 0.1%
< 0.1%

(1) Acceptance criterion is 10 ppm maximum
(2) Acceptance criterion is 5% maximum

Tendon End: T or B - Top or bottom vertical tendons

1 to 6 - Number of buttress nearest to tendon end.

NOTE: A, DUE TO HIGHLY LIQUID STATE OF GREASE SAMPLING FROM END CAPS WAS IMPOSSIBLE. SAMPLES WERE TAKEN FROM COLLECTED BULK FILLER.

Prepared By: Allen Toed Date: 11/21/77

Reviewed By: Allen Toed Date: 11/23/77

Approved By: Allen Toed Date: 2/2/78

POOR ORIGINAL

New York Division
C. T. L. INC.
2626 Halperin Avenue Bronx 61, N. Y.
(Area Code 212) 824-1616

New Jersey, Main Office
CERTIFIED TESTING LABORATORIES, INC.
155 U. S. Route 130, Bordentown, N. J.
(Area Code 609) 298-3255

Central Pennsylvania Division
ASTROTECH INC.
7801 Allentown Blvd. U. S. 22 Harrisburg, Pa.
(Area Code 717) 652-1750

ALLENTOWN

TESTING LABORATORY, INC.

Division of Certified Testing Laboratories, Inc.

Inspection -- Testing -- Research -- Chemical Analysis -- Industrial Radiology -- Soils -- X-Ray -- Water -- Steel

754 East Fairview Street Bethlehem, Pennsylvania Phone 215-865-2674

Certificate of Test and Analysis

Client: V S L Corporation
P. O. Box 412
Middletown, Pa. 17057 Attn: Rick Hansken

Date: Sept. 3, 1977

Lab. No. 77486

On sample of: Twelve (12) Greases (A 2202 Ch)

Received: August 31, 1977

Marked: as below (Part 1)

Examined with the following results:

	<u>Chlorides (D878)</u>	<u>Nitrates (D878)</u>	<u>Sulfides (D878)</u>	<u>% Water (D95)</u>
#1 New Barrel Lot #63813	less than one	less than five	less than one	less than 0.1
#2 New Barrel Lot #63813	"	"	"	"
#3 New Barrel Lot #63813	"	"	"	"
V-24 Barrel #1	"	"	"	"
V-24 Barrel #2	"	"	"	"
V-48 Barrel #1	"	"	"	"
V-72 Barrel #1	"	"	"	"
V-72 Barrel #2	"	"	"	"
V-97 Barrel #1	"	"	"	"
V-97 Barrel #2	"	"	"	"
V-119 Barrel #1	"	"	"	"
V-119 Barrel #2	"	"	"	"

Reported to: above

Respectfully submitted, 1415 240

ALLENTOWN TESTING LABORATORIES, INC.

John J. Desmond



ALLENTOWN TESTING LABORATORIES, INC.

DIVISION OF CERTIFIED TESTING LABORATORIES, INC.

754 EAST FAIRVIEW STREET • BETHLEHEM, PA. PHONE (215)-865-2674

Inspection • Testing • Research • Chemical • Analysis • Industrial • Radiology • Soils • X-Ray • Water • Steel

Certificate of Test and Analysis

Date November 8, 1977

For: V S L Corporation
P. O. Box 412
Middletown, Pa. 17057
Attn: Rick Hansken

Lab. No. 77486-2

On sample of: Twelve Greases

Received: August 31, 1977

Marked: as below

Examined with the following results:

	<u>Flash Point D92</u>	<u>Drop Melt. Point D-127</u>
Sample #1 New Lot #63813	> 480° F	149° F
Sample #2 New Lot #63813	> 480° F	147° F
Sample #3 New Lot #63813	> 480° F	148° F
V 24 Barrel #1	> 480° F	146° F
V 24 Barrel #2	> 480° F	147° F
V 119 Barrel #1	> 480° F	140° F
V 119 Barrel #2	> 480° F	140° F
V-72 Barrel #1	> 480° F	138° F
V-72 Barrel #2	> 480° F	139° F
V-97 Barrel #1	> 480° F	147° F
V-97 Barrel #2	> 480° F	145° F
V-48 Barrel #1	> 480° F	140° F

1415 241

Respectfully submitted,

ALLENTOWN TESTING LABORATORY, INC.
John J. Desmond

Reported to:



ALLENTOWN TESTING LABORATORIES, INC.

DIVISION OF CERTIFIED TESTING LABORATORIES, INC.

754 EAST FAIRVIEW STREET • BETHLEHEM, PA. PHONE (215)-365-2674

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Certificate of Test and Analysis

Date November 11, 1977

For: V S L Corporation
P. O. Box 412
Middletown, Pa. 17057

Lab. No. 77554

(A 2202 Ch)

On sample of: Three greases

Received: September 23, 1977

Marked: as below

Examined with the following results:

	#4 Used	#5 Fresh Lot #7-2762	#6 Fresh Lot #7-2763
Flash Point (D92)	> 480°F	> 480°F	> 480°F
Drop Melting Point (D127)	144°F	144°F	145°F
Chlorides	< 1 ppm	< 1 ppm	< 1 ppm
Nitrates	< 5 ppm	< 5 ppm	< 5 ppm
Sulfides	< 1 ppm	< 1 ppm	< 1 ppm
Water	< 0.1%	< 0.1%	< 0.1%

Reported to: above

1415 242
Respectfully submitted,

ALLENTOWN TESTING LABORATORY, INC.

John J. Desmond



ALLENTOWN TESTING LABORATORIES, INC.

DIVISION OF CERTIFIED TESTING LABORATORIES, INC.

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Certificate of Test and Analysis

Date November 21, 1977

For: V S L Corporation
P. O. Box 412
Middletown, Pa. 17057

Lab. No. 77700

Attn: Rick Hansen

On sample of: Six greases

Received: November 10, 1977

Marked: as below

Examined with the following results:

	<u>Fresh Sample</u> <u>#7 Lot#7-2762</u>	<u>Fresh Sample</u> <u>#8 Lot#7-2762</u>	<u>D202</u> <u>End#2-1</u>	<u>D202</u> <u>End #6-1</u>	<u>H62-047</u> <u>End #2</u>	<u>H62-047</u> <u>End #6</u>
Chlorides (ppm)	< 1	< 1	< 1	< 1	< 1	< 1
Nitrates (ppm)	< 5	< 5	< 5	< 5	< 5	< 5
Sulfides (ppm)	< 1	< 1	< 1	< 1	< 1	< 1
Water %	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Flash Pt.	> 480° F	> 480° F	> 480° F	> 480° F	> 480° F	> 480° F
Drop Melt. Pt.	146° F	144° F	132° F	136° F	143° F	142° F

Reported to: above

Respectfully submitted,

1415 243

ALLENTOWN TESTING LABORATORY, INC.
John J. Desmond

FRITZ ENGINEERING LABORATORY

Lehigh University

File 200.77.530.3

Sheet 1 of 9

Date 11/11/77

Subject TENSILE TEST OF 1/4" DIAMETER PRESTRESSING WIRE

TEST 1

Specimen No. V 119 button to button

Part R.D.

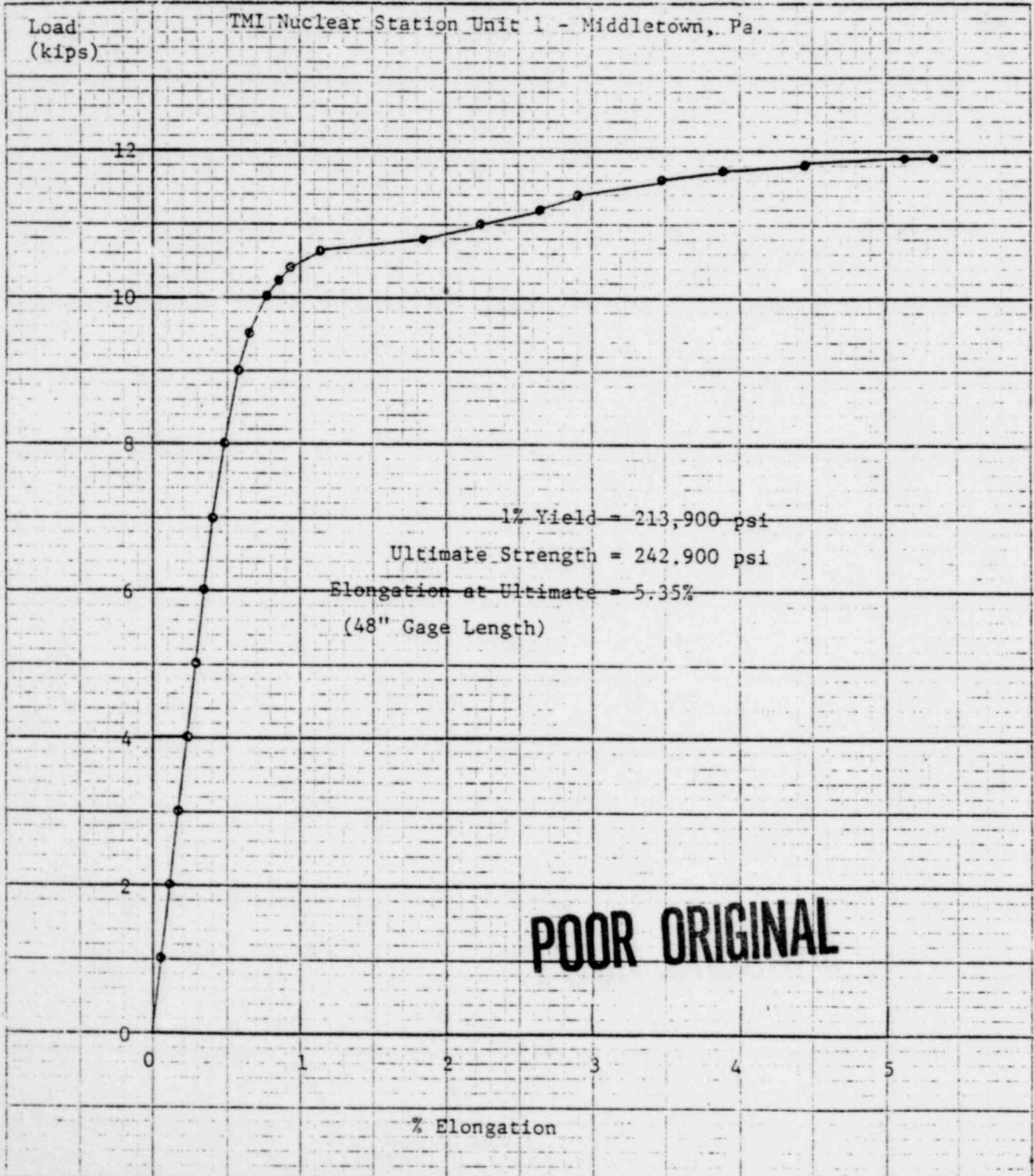
R.G.S.

Notes:

VSL Corporation
236 N. Santa Cruz Avenue
Los Gatos, California 95030

Attn: George Drew

Approved *Roy H. Shultz*
Director-Operations



1415 244

FRITZ ENGINEERING LABORATORY

Lehigh University

File 200.77.530.3

Sheet 2 of 9

Subject TENSILE TEST OF 1/4" DIAMETER PRESTRESSING WIRE

Date 11/11/77

TEST 2

Specimen No. V 119 Top
(Button End)

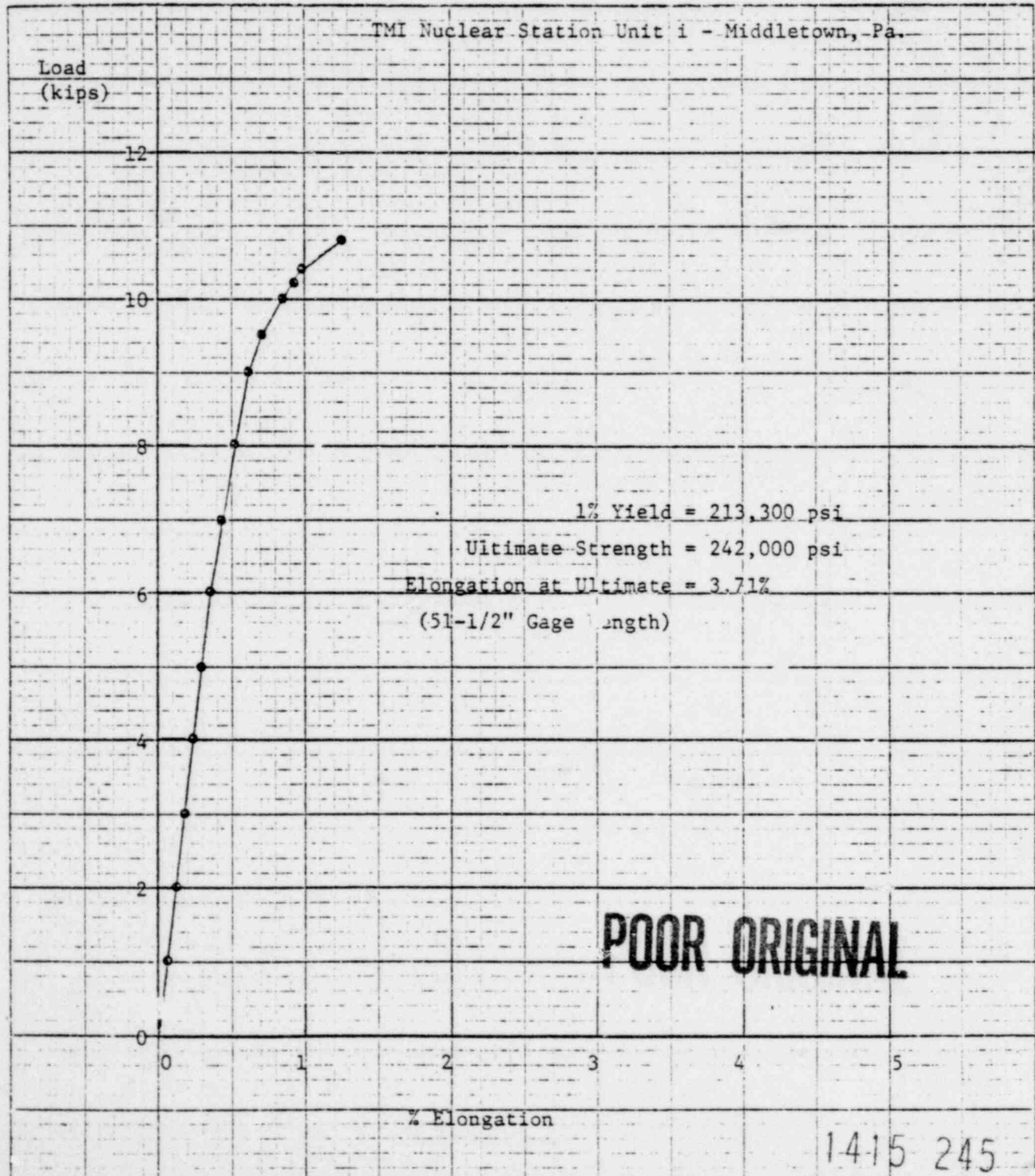
Party R.D.

R.G. S.

Notes:									
	VSL Corporation								
	236 N. Santa Cruz Avenue								
	Los Gatos, California 95030								
Attn:	George Drew								

Approved *Roger S. Shultz*

Director-Operations



FRITZ ENGINEERING LABORATORY

Lehigh University

File 200.77.530.3

Sheet 3 of 9

Subject TENSILE TEST OF 1/4" DIAMETER PRESTRESSING WIRE
TEST 3 Specimen No. V 119 Middle

Date 11/11/77

Party R.D.

R.G.S.

Notes:

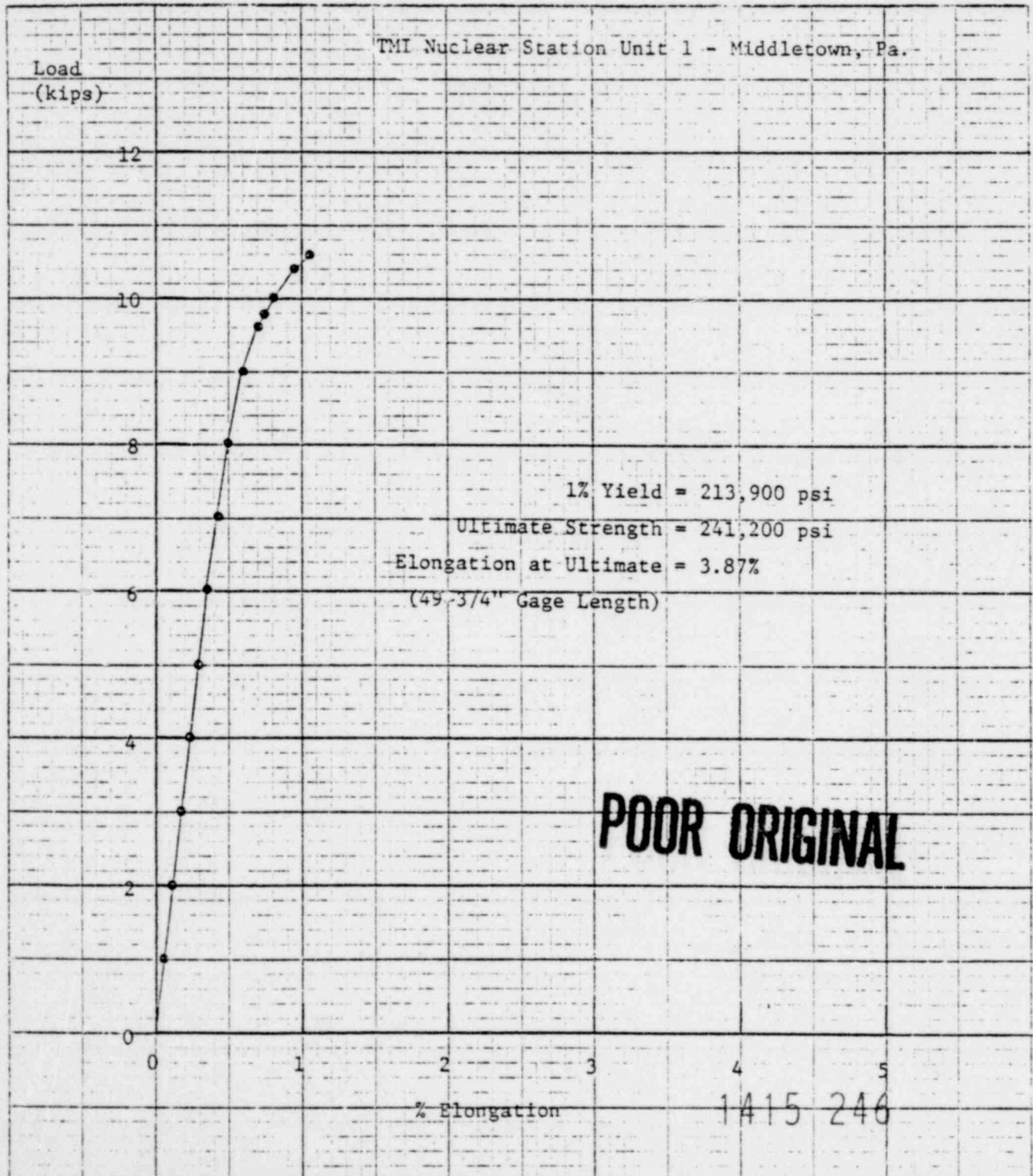
VSL Corporation
236 N. Santa Cruz Avenue
Los Gatos, California 95030

Approved

Roger D. Slattery

Director-Operations

Attn: George Drew



VSL Corporation Id Report

DATA SHEET 6

PRESTRESS FORCE CONFIRMATION TEST

DONE PERSONS

INSPECTION PERIOD 2

TENSION			LIFT-OFF CONDITION					RETENTIONING					REACTOR DATE					
I.D.	LOCATION	WASHER	TYPE OF END FORCE	PREVIOUS (kips)	EXPECTED LIFT-OFF FORCE (kips)	GAGE PRESS. (Tol)	FORCE (kips)	FORCE		SHIM THICKNESS (in.)	GAGE PRESS (Tol)	FORCE (kips)	FINAL SHIM THICKNESS (in.)	OF		INT.	EXT.	INITIALS
								7	8					9	10			
1.	D-130	5-4	F	1427	1225	(3) 5850	1231	1252	5 3/4"	5 1/4"	6000	1263	5 3/4"	126"	120"	11/11/77	11/11/77	11/11/77
2.	D-148	2-1	S	1428	1225	(3) 6050	1273	1226	6 3/4"	6 3/4"	6100	1284	6 3/4"	128"	119"	11/11/77	11/11/77	11/11/77
3.	D-202	2-1	F	1427	1225	(3) 5850	1231	1273	5 3/4"	5 1/2"	6000	1263	5 3/4"	126"	124"	11/11/77	11/11/77	11/11/77
4.	D-219	2-1	S	1416	1225	(3) 6000	1305	1226	4 1/2"	4 1/2"	6300	1326	5 1/4"	132"	125"	11/11/77	11/11/77	11/11/77
5.	D-334	5-5	F	1437	1225	(3) 5850	1231	1247	5 3/4"	6 3/4"	6000	1263	5 3/4"	126"	125"	11/11/77	11/11/77	11/11/77
6.	D-348	4-5	S	1416	1225	(3) 5850	1252	1247	5 3/4"	6"	6000	1263	5 3/4"	126"	126"	11/11/77	11/11/77	11/11/77
7.	D-348	4-5	F	1395	1225	(3) 5850	1231	1216	4 3/4"	4 3/4"	5700	1242	4 3/4"	124"	124"	11/11/77	11/11/77	11/11/77
8.	D-348	5-5	S	1395	1225	(3) 5850	1231	1216	4 1/4"	4 1/4"	5700	1242	4 1/4"	124"	124"	11/11/77	11/11/77	11/11/77

LEGEND

LOCATION: 1 to 6 - Number of buttress nearest to end of tendon.

TYPE OF WASHER: F - Yield
S - Shop

SHIM THICKNESS: Clear distance between bearing plate and stressing member.

PREVIOUS: At time of installation or previous surveillance.

ORIGINAL: At time of starting current surveillance.

Tendon force (column 8) required to achieve lift-off condition shall fall between the upper and lower bounds of prestress force. See Figure 10.

FORCE CALCULATION: Force @ Lift-Off = Jack Pressure x Jack Piston Area

TWO RAMS WERE USED

(1) MET-ED RAM w/ 16.56 PISTON AREA.

(2) GENERAL ATOMIC CO. w/ 210.5 PISTON AREA
PLATTEVILLE, COLORADO

Reviewed by:

Date:

Approved by:

2/2/78

POOR ORIGINAL

1415 247

FRITZ ENGINEERING LABORATORY

Lehigh University

File 200.77.530.3

Sheet 4 of 9

Subject TENSILE TEST OF 1/4" DIAMETER PRESTRESSING WIRE

Date 11/11/77

TEST 4

Specimen No. H 62 047

Party R.D.

End

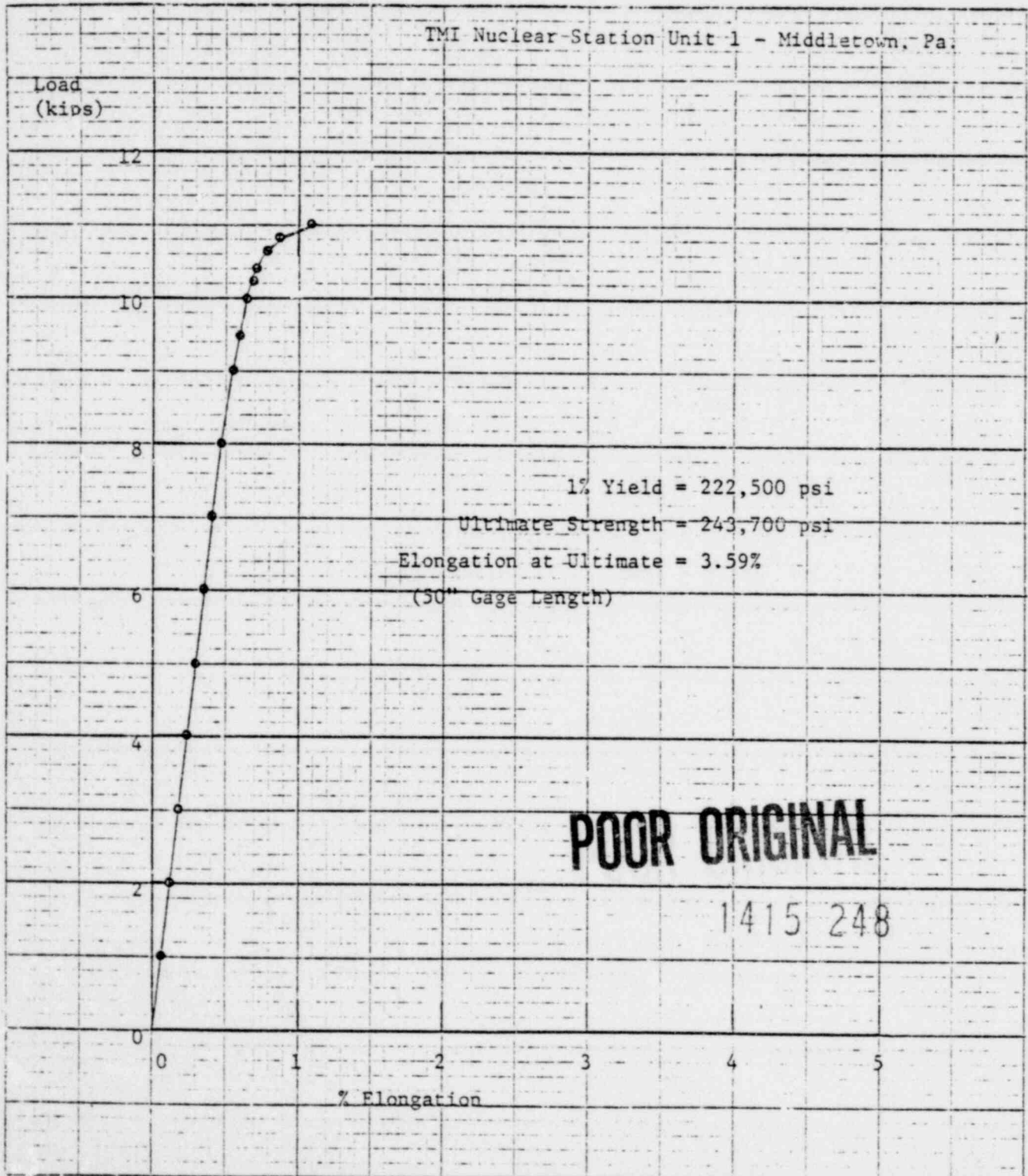
R.G.S.

Notes:

VSL Corporation
236 N. Santa Cruz Avenue
Los Gatos, California 95030

Attn: George Drew

Approved *Roger H. Shultz*
Director-Operations



FRITZ ENGINEERING LABORATORY

Lehigh University

File 200.77.530.3

Sheet 5 of 9

Subject TENSILE TEST OF 1/4" DIAMETER PRESTRESSING WIRE

Date 11/11/77

TEST 5

Specimen No. H 62 047

Party R.D.

End 6 with button

R.G.S.

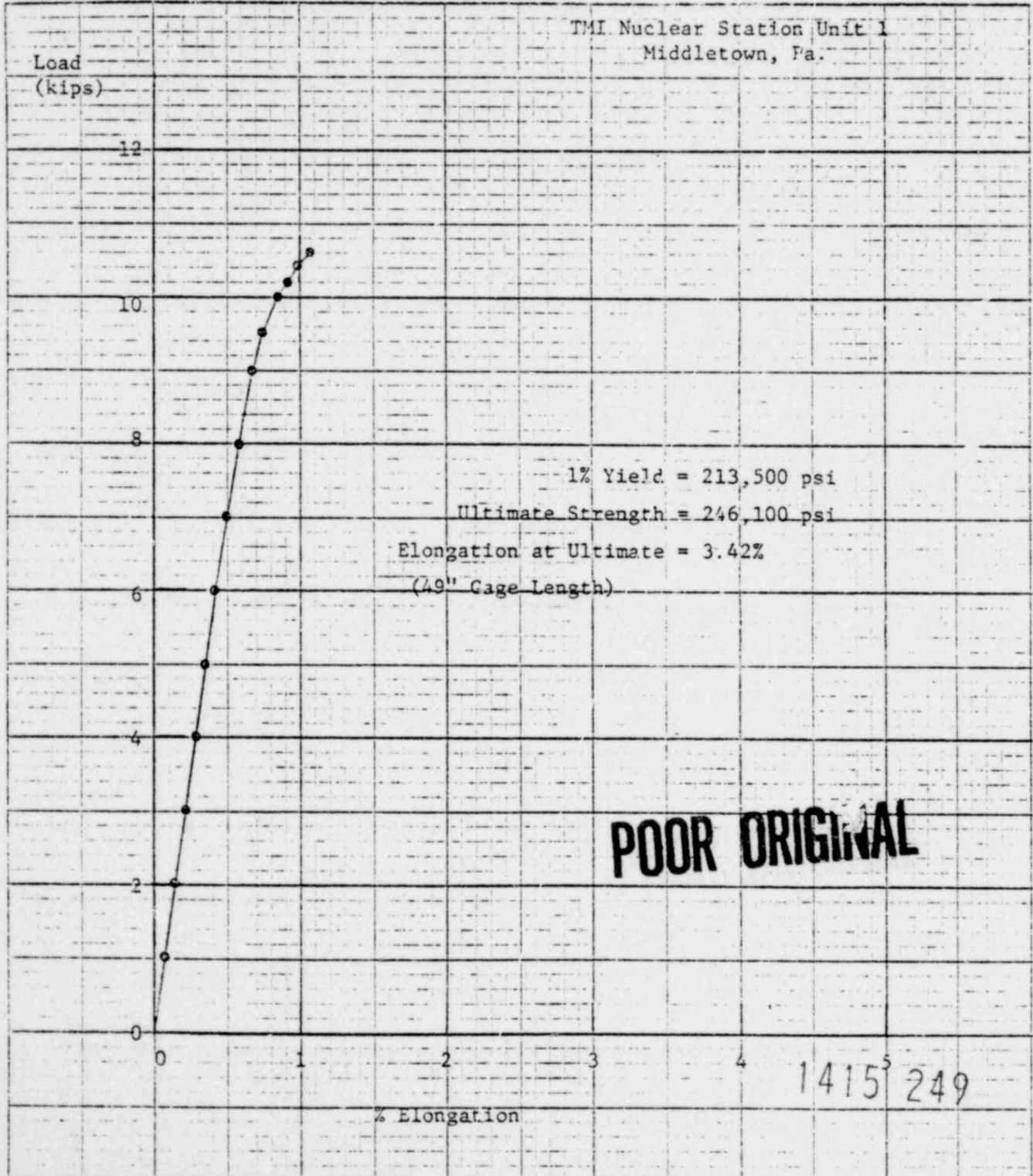
Notes:

VSL Corporation
236 N. Santa Cruz Avenue
Los Gatos, California 95030

Attn: George Drew

Approved *R. G. S.*

Director-Operations



FRITZ ENGINEERING LABORATORY

Lehigh University

File 200.77.530.3

Sheet 6 of 9

Subject TENSILE TEST OF 1/4" DIAMETER PRESTRESSING WIRE

Date 11/11/77

TEST 6

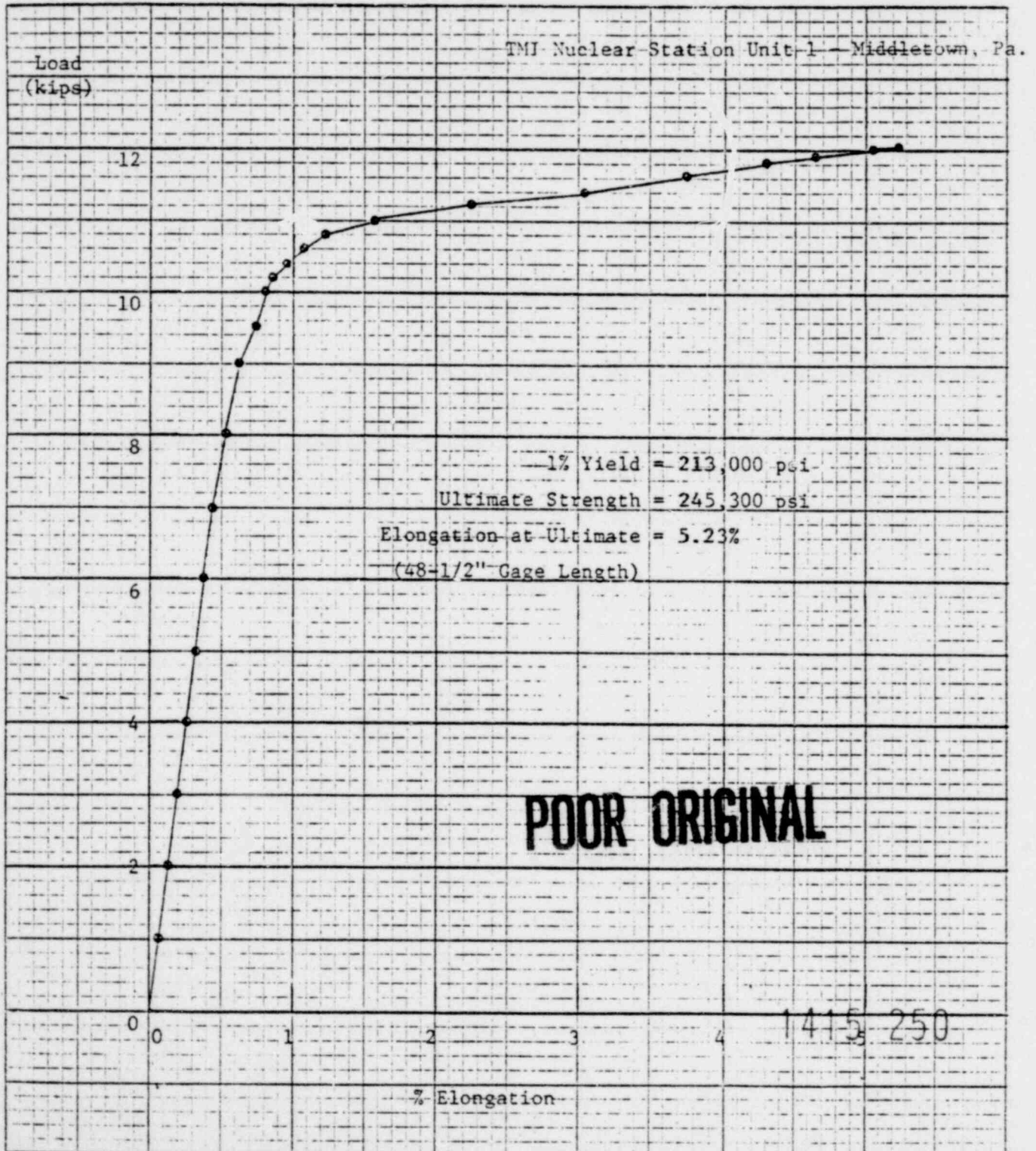
Specimen No. H 62 047 Middle

Party R.D.

R.G.S.

VSL Corporation
236 N. Santa Cruz Avenue
Los Gatos, California 95030
Attn: George Drew

Approved *R. J. G. S.*
Director-Operations



FRITZ ENGINEERING LABORATORY

Lehigh University

File 200.77.530.3

Sheet 7 of 9

Subject TENSILE TEST OF 1/4" DIAMETER PRESTRESSING WIRE

Date 11/11/77

TEST 7

Specimen No. D 202 End 6-1

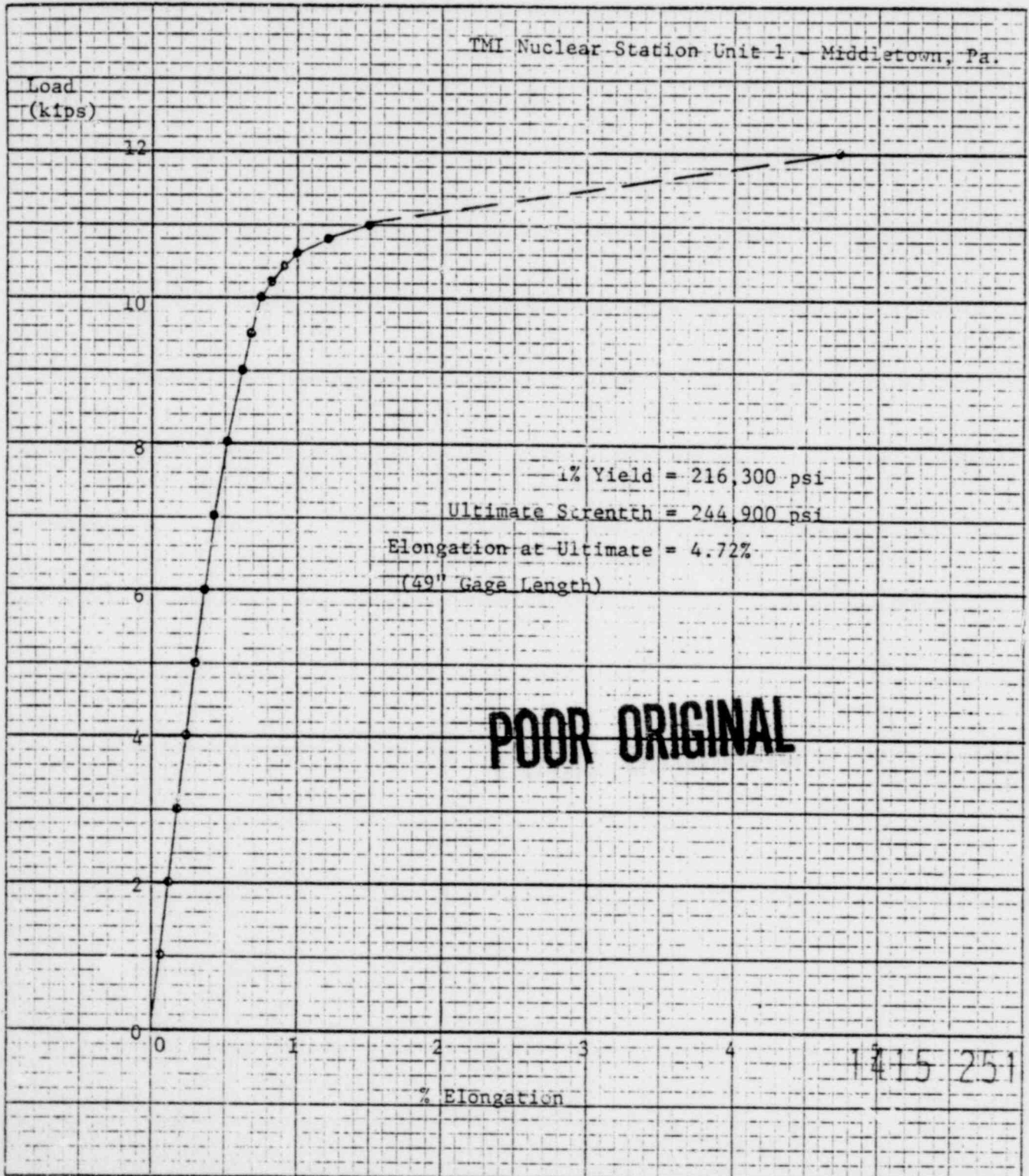
Party R.D.

R.G.S.

VSL Corporation					
236 N. Santa Cruz Avenue					
Los Gatos, California 95030					
Attn: George Drew					

Approved *Roger J. Smith*

Director-Operations



Lehigh University

Sheet 8 of 9

Party.....R.D.....

R.G.S.

TEST 8

Specimen No. D. 202. Opposite.

Burton

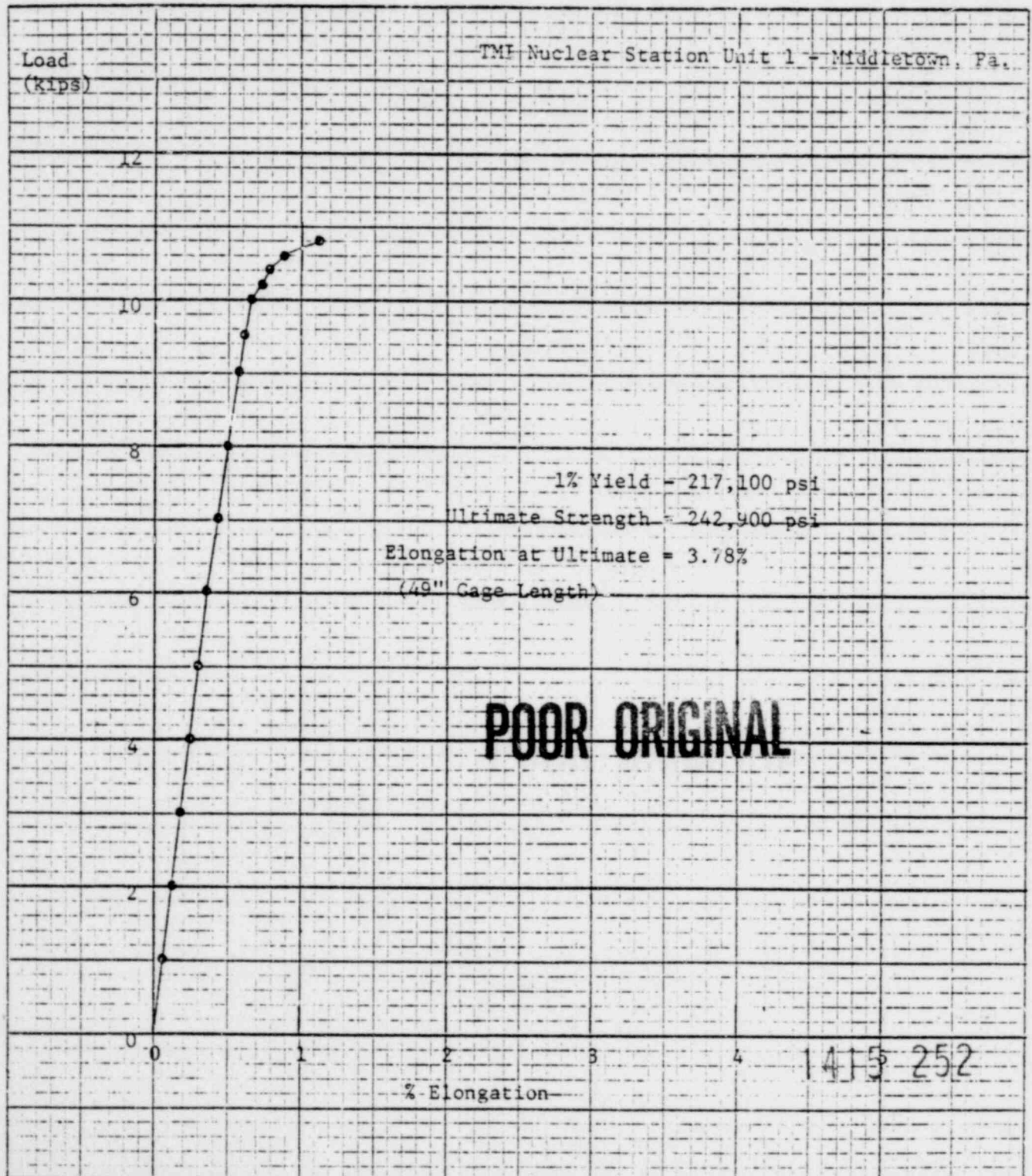
236 N. Santa Cruz Avenue

Los Gatos, California 95030

Approved: Robert A. Hunt

Director-Operations

Attn: George Drew

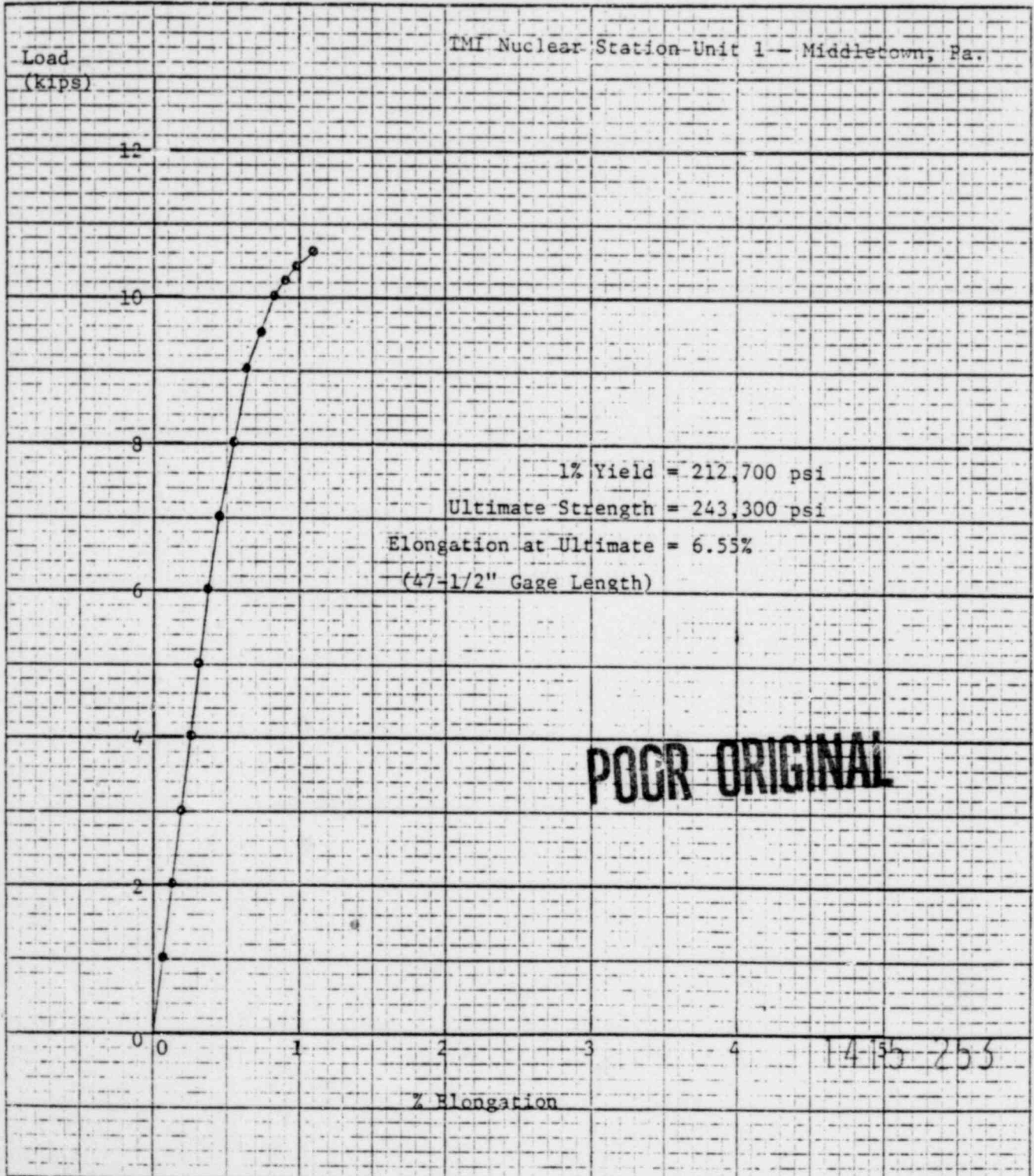


Lehigh University

TEST 9

R.G.S.

Approved *Roger B. Shute*
Director-Operations



FRITZ ENGINEERING LABORATORY

Lehigh University

RECEIVED File 200.77.530.4

DEC 5 1977 Sheet 1 of 1

Subject

COMPRESSIVE STRENGTH OF 2" by 2" GROUT CUBES CORPORATION Date 12/1/77

Specimen No.

Party R.L.

R.G.S.

Notes:

VSL CORPORATION
 236 N. Santa Cruz Avenue
 Los Gatos, California 95030

Approved *Regis J. Hether*
 Director-Operations

Attn: George Drew

Specimen No.	Ultimate Load (lbs.)	Compressive Strength (psi)	Age (days)
1	31,400	7850	7
2	30,700	7680	7
3	29,000	7250	7
Average		7590	7
4	28,200	7050	14
5	27,800	6950	14
6	27,000	6250	14
Average		6920	14
POOR ORIGINAL			
Copy to: Met-Ed			
TMI Nuclear Station			
P. O. Box 480, Route 441 South			
Middletown, Pa. 17057			
Attn: Ron Summers			
1415 25A			



ALLENTOWN TESTING LABORATORIES, INC.

DIVISION OF CERTIFIED TESTING LABORATORIES, INC.

754 EAST FAIRVIEW STREET • BETHLEHEM, PA. PHONE (215)-865-2674

Inspection • Testing • Research • Chemical • Analysis • Industrial • Radiology • Soils • X-Ray • Water • Steel

RECEIVED

OCT 11 1977

Certificate of Test and Analysis

For: V S L Corporation
P. O. Box 412
Middletown, Pa. 17057

Date 9/26/77

Lab. No. 77554

Attn: Rick Hansen

(A 2202 Ch)

On sample of: three (3) Greases

Received: 9/23/77

Marked: as below (Part 1)

Examined with the following results:

	<u>Sample #4</u>	<u>Sample #5</u> <u>Fresh lot #7-2762</u>	<u>Sample #6</u> <u>Fresh lot #7-2767</u>
Chlorides (ppm)	< 1	< 1	< 1
Nitrates (ppm)	< 5	< 5	< 5
Sulfide (ppm)	< 1	< 1	< 1
Water (%)	< 0.1	< 0.1	< 0.1

Reported to:

Respectfully submitted,

ALLENTOWN TESTING LABORATORY, INC.

John J. Desmond

1415 255



VISCOSITY OIL COMPANY

Lubricants

3200 SO. WESTERN AVE.
CHICAGO, ILLINOIS 60608

TELEPHONE:
AREA CODE 312
847-0225

CUSTOMER'S PURCHASE
ORDER NO. Pick Hanger

BATCH NO. 7-2762

QUALITY CONTROL SPECIFICATION SHEET

VISCONORUST 2090P-4 CASING FILLER
NUCLEAR GRADE

<u>PHYSICAL PROPERTIES</u>		<u>TEST RESULTS</u>	<u>REQUIRED</u>
Weight per gallon		7.6	7.3-7.8
Specific Gravity @ 60°F (15°C)	ASTM D-287	0.92	0.88-0.94 (57.2-62.8)
Congealing Point °F (°C)	ASTM D-938	139	135-145
Flash Point °F	ASTM D-92	430	420 Min.
Viscosity SUS @ 210°F (99°C)	ASTM D-88	163	150-225
ASTM Consistency (cone penetration @ 77°F (25°C)	ASTM D-937	210	190-220
Total Base No. Modified	ASTM D-974	50	35 Min.

CHEMICAL PROPERTIES

Water Soluble Chlorides	ASTM D-512 Less than 2ppm	2 ppm Max
Water Soluble Nitrates	HACH CHEMICAL Less than 4ppm	4 ppm Max
Water Soluble Sulfides	HACH CHEMICAL Less than 2ppm	2 ppm Max

BY RL Bias
Control Chemist 475 256
DATE 9/16/77

112475

FRITZ ENGINEERING LABORATORY

Lehigh University

Subject Calibration of 1000-ton Jack

GENERAL ATOMICS

Specimen No. Ram #3

File 200.77.530.1

Sheet 1 of 1

Date 9/16/77

Party B. H.

R. C. S.

Notes:	VSL Corporation 236 N. Santa Cruz Avenue Los Gatos, California 95030
Attn: George Drew	

Approved *Ray D. Blatts*

Gage Pressure (psi)	1st Loading Machine Load (Kips)	2nd Loading Machine Load (Kips)	3rd Loading Machine Load (Kips)	Average Machine Load (Kips)
500	102	94	94	97
1000	198	196	196	197
1500	302	308	300	303
2000	406	406	412	408
2500	508	522	516	515
3000	614	618	618	617
3500	728	732	728	729
4000	832	830	832	831
4500	936	942	942	940
5000	1046	1058	1050	1051
5500	1158	1164	1160	1161
6000	1262	1260	1264	1262
6500	1368	1371	1366	1368
7000	1476	1476	1476	1476
7500	1580	1584	1580	1581
8000	1684	1680	1686	1683
8500	1790	1788	1788	1789
9000	1888	1888	1890	1889
Copy to: Met-Ed				
TMI Nuclear Station P.O. Box 480, Route 441 South Middletown, Pa. 17057				
Attn: Ron Summers				
1415 257				

POOR ORIGINAL

Lehigh University

File 200.77.330.1

Sheet 2 of 2

Date 7/28/77

Party B.D.

R.G. S.

Subject... Calibration of Jack

T.M. 1 UNIT 1WCS 100144

Specimen No. 485S

VSL Corporation 236 N. Santa Cruz Avenue Los Gatos, California 95030 Attn: George Drew

Approved Robert H. Smith

Director-Operations

~~Met-Ed #38087/38388~~

Gage Pressure (Psi)	1st Loading Machine Load (kips)	2nd Loading Machine Load (kips)	3rd Loading Machine Load (kips)	Average Machine Load (kips)
500	94	94	96	95
1000	176	176	182	178
1500	256	258	258	257
2000	340	344	340	341
2500	418	418	422	419
3000	500	500	498	499
3500	580	582	582	581
4000	662	664	664	663
4500	742	746	746	745
5000	826	828	830	828
5500	914	910	912	912
6000	994	998	994	995
6500	1078	1078	1078	1078
7000	1162	1164	1160	1162
7500	1242	1248	1244	1245
8000	1328	1330	1324	1327
8500	1410	1412	1408	1410
9000	1496	1494	1492	1494
9500	1578	1580	1576	1578

POOR ORIGINAL

1415-258