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DUKE POWER COMPANY
POWER BUILDING
422 SOUTH CHURCH STREET, CHARLOTTE, N. C. 28242

WILLIAM O. PARKER, JR.
VICE PRESIDENT
STEAM PRODUCTION

TELEPHONE: AREA 704
373-4083

July 23, 1975

Regulatory Docket File

Mr. Angelo Giambusso, Director
Division of Reactor Licensing
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Re: Oconee Unit 3
Docket No. 50-287

Dear Mr. Giambusso:

Please find attached three copies of the Reactor Building Post-Tensioning System Initial Surveillance Report. This report is submitted in accordance with Oconee Technical Specifications 4.4.2.2 and 6.6.3.5.

Very truly yours,

William O. Parker, Jr.

ROS:vr

Attachments

DUKE POWER COMPANY

OCONEE NUCLEAR STATION

UNIT 3

REACTOR BUILDING

POST-TENSIONING SYSTEM

INITIAL SURVEILLANCE

July 23, 1975

TABLE OF CONTENTS

1.0 INTRODUCTION

The surveillance program for the Oconee Nuclear Station, Unit 3, reactor building post-tensioning system was defined, and is executed, in order to assure the continued quality of the system. The program consists of periodic inspections of nine pre-selected tendons - three horizontal tendons, three vertical tendons and three dome tendons - for symptoms of material deterioration or force reduction. The program assesses the condition and functional capability of the system and, therefore, verifies the adequacy of the system and provides an opportunity to take proper corrective action should adverse conditions be detected.

The requirements for the program are detailed in the Oconee Technical Specifications, Sections 4.4.2.1 and 4.4.2.2. Surveillance was conducted April 7 through April 24, 1975 in accordance with the approved test procedure, Reactor Building Tendon Surveillance Program, and the results of this initial inspection are reported herein.

2.0 SUMMARY AND CONCLUSIONS

2.1 SUMMARY

No abnormal discoloration of the sheathing filler was observed. Laboratory analysis of sheathing filler samples showed impurities to be well within acceptable limits.

The end anchorage components were found to be in excellent condition with no sign of the development of adverse conditions such as cracking or excessive corrosion, or missing or deformed buttonheads.

The lift-off forces for all surveillance tendons were within the range of predicted values, considering the effects of concrete creep and shrinkage, steel relaxation and initial structural deformation.

The tendon wires were in excellent condition and no corrosion along the length of the wires was observed. It was determined that no wire breaks had occurred during the interval since the initial Reactor Building Structural Integrity Test.

Mechanical tests of specimens showed no significant changes in the ultimate strength of the wire as compared to results obtained during initial acceptance tests.

2.2 CONCLUSIONS

Based on the tests and inspections described herein, it is concluded that the post-tensioning system for Oconee Nuclear Station, Unit 3, is in excellent condition, that the functional capability of the system has not diminished, and that the system shows no detectable evidence of the occurrence of any adverse deterioration.

3.0 RESULTS

3.1 SHEATHING FILLER

The sheathing filler at the ends of the nine surveillance tendons was visually examined. The filler coating on the end anchorage components, and the color and consistency of the filler, were found to be acceptable, with no evidence of water being present - see Table 1.

Samples of sheathing filler were obtained from each of three tendons from which a wire was removed. This filler was visually examined and no signs of water nor any discoloration of the sheathing filler was evident. Laboratory analysis of the filler samples found impurities to be within acceptable limits - see Table 2.

3.2 END ANCHORAGE COMPONENTS

The results of the end anchorage component inspections are given in Table 3. Buttonheads were inspected for acceptable shape, general appearance, cracks and corrosion. A button head located on one wire on the field end of tendon 2D28 did not pass the Go-No-Go gage test. This button-head will be re-examined at the next surveillance interval.

Stress washers, shims and bearing plates were visually inspected for cracking and corrosion. Slight corrosion (no pitting) was noted on the upper 25 percent of the anchorage components at the field end of tendon 13H9. This condition was apparently caused by a small air pocket during the initial tendon grease filling. The tendon was repacked with grease.

3.3 LIFT-OFF FORCES

Lift-off forces were obtained for each surveillance tendon - see Table 4. (The field end of tendon 53H10 was not tested due to a physical interference by an emergency feedwater bypass line.) From these readings an average force per wire was determined. The long-term trend of these wire forces is shown graphically in Figure 1. Lift-off forces were within the range of predicted values, considering the effects of concrete creep and shrinkage, steel relaxation and initial structural deformation.

3.4 WIRE SURVEILLANCE AND TESTING

One surveillance tendon of each directional group was relaxed - 1D28, 13H9 and 23V14. One wire was removed from tendons 1D28, 23V14, and 13H9. The wires removed were visually checked for corrosion and pitting and to determine their general condition. The tendon wires were found to contain minor surface scratches, resulting from insertion of the tendons into their sheaths at the time of installation, and heat treating discoloration. The general condition of the wires was determined to be equivalent to their condition at time of initial installation.

Three specimens were cut from each of the extracted wires for tensile testing. The samples were taken from the ends and the middle of each of the wires. The ultimate strength of each of the specimens was determined by tensile testing by the Prescon Corporation, Simpsonville, South Carolina. These tests are summarized in Table 5 and revealed no significant changes in the ultimate strength of the wire as compared to results obtained during initial acceptance tests.

3.5 RETENSIONING AND FILLER REPLACEMENT

Following wire removal the tendons were retensioned to approximately the same stress level indicated by the lift-off force data obtained during this surveillance. The sheathing filler which was removed during the surveillance process was replaced with new filler.

SHEATHING FILLER INSPECTION

Tendon	End	Filler Coating Acceptable					Filler Color and Consistency Acceptable
		Button Heads	Stress Washer	Shims	Bearing Plate	Cap	
1D28	Shop Field	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
2D28	Shop Field	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
3D28	Shop Field	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
13H9	Shop Field	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
51H9	Shop Field	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
53H10	Shop Field	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
23V14	Shop Field	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
45V16	Shop Field	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
61V16	Shop Field	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes

Table 1

LABORATORY ANALYSIS OF SHEATHING FILLER

Tendon	End	Water Soluble CHLORIDES (Limit 5.0 ppm)	Water Soluble NITRATES (Limit 5.0 ppm)	Water Soluble SULFIDES (Limit 5.0 ppm)
1D28	Shop Field	0.40 1.20	0.10 0.20	<2.0 <2.0
23V14	Shop Field	0.75 1.00	0.20 0.50	<2.0 <2.0
13H9	Shop Field	1.00 0.60	0.10 0.10	<2.0 <2.0

Table 2

END ANCHORAGE COMPONENT INSPECTION

Tendon	End	Buttonheads			Stress Washer		Shims		Bearing Plate	
		Corrosion	Cracks	Shape	Corrosion	Cracks	Corrosion	Cracks	Corrosion	Cracks
1D28	Shop Field	None None	None None	Good Good	None None	None None	None None	None None	None None	None None
2D28	Shop Field	None None	None None	Good *	None None	None None	None None	None None	None None	None None
3D28	Shop Field	None None	None None	Good Good	None None	None None	None None	None None	None None	None None
13H9	Shop Field	None **	None None	Good Good	None **	None None	None **	None None	None **	None None
51H9	Shop Field	None None	None None	Good Good	None None	None None	None None	None None	None None	None None
53H10	Shop Field	None None	None None	Good Good	None None	None None	None None	None None	None None	None None
23V14	Shop Field	None None	None None	Good Good	None None	None None	None None	None None	None None	None None
45V16	Shop Field	None None	None None	Good Good	None None	None None	None None	None None	None None	None None
61V16	Shop Field	None None	None None	Good Good	None None	None None	None None	None None	None None	None None

*One buttonhead did not pass Go-No-Go Gauge test
**Reddish brown color on upper 25 percent, no pitting

Table 3

TENDON LIFT-OFF FORCES

Tendon	End	Force (Psi)
1D28	Shop Field	5566 5616
2D28	Shop Field	5666 5800
3D28	Shop Field	5716 5900
13H9	Shop Field	5750 5800
51H9	Shop Field	5700 5583
53H10	Shop Field	5683 *
23V14	Shop Field	6100 6000
45V16	Shop Field	5700 6000
61V16	Shop Field	5766 6000

*Unable to obtain lift-off force due to a physical interference by the Emergency Feedwater Bypass Line.

Table 4

ULTIMATE STRENGTH OF TENDON SPECIMENS

Tendon	Specimen Location	Break Force (Lbs.)	Diameter (In.)	Area (In^2)	Tensile Strength (Psi)
1D28	Shop	12,200	0.250	0.0491	248473
	Center	12,050	0.250	0.0491	245418
	Field	12,150	0.250	0.0491	247454
23V14	Shop	12,750	0.250	0.0491	259674
	Center	12,850	0.250	0.0491	261711
	Field	12,850	0.250	0.0491	261711
13H9	Shop	12,800	0.250	0.0491	260693
	Center	12,800	0.250	0.0491	260693
	Field	12,750	0.250	0.0491	259674

Table 5

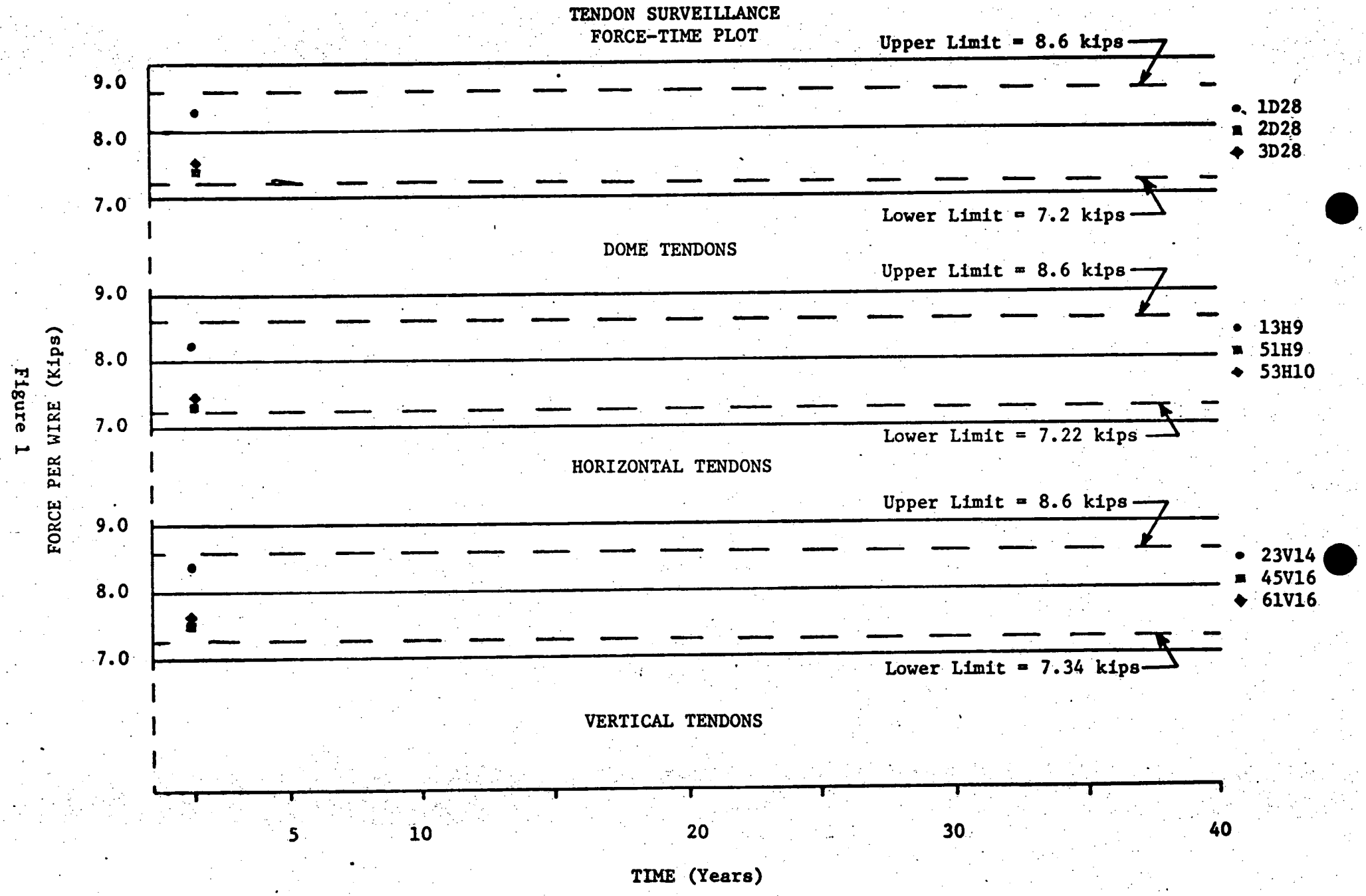
TENDON SURVEILLANCE
FORCE-TIME PLOT
Upper Limit = 8.6 kips
9.0
8.0
7.0
1D28
2D28
3D28
Lower Limit = 7.2 kips
DOME TENDONS
Upper Limit = 8.6 kips
9.0
8.0
7.0
13H9
51H9
53H10
Lower Limit = 7.22 kips
HORIZONTAL TENDONS
Upper Limit = 8.6 kips
9.0
8.0
7.0
23V14
45V16
61V16
Lower Limit = 7.34 kips
VERTICAL TENDONS
FORCE PER WIRE (Kips)
5
10
20
30
40
TIME (Years)

Figure 1