UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA ST., N.W., SUITE 3100
ATLANTA, GEORGIA 30303

Report Nos. 50-348/81-13 and 50-364/81-17

Licensee: Alabama Power Company
600 North 18th Street,
Birmingham, Alabama 35202

Facility Name: Farley Nuclear Plant

Docket Nos. 50-348 and 50-364

License Nos. NPF-2 and NPF-8

Inspection at Farley site near Ashford, Alabama

Inspector: J. R. Harris For
J. J. Lenanan — July 17, 1981 (Date Signed)

Approved by: J. R. Harris For
T. E. Conlon, Section Chief — July 17, 1981 (Date Signed)
Engineering Inspection Branch
Engineering and Technical Inspection Division

SUMMARY

Inspection on June 29- July 2, 1981

Areas Inspected

This special, announced inspection involved 26 inspector-hours onsite in the areas of tendon surveillance QA/QC controls, work activities, and quality records, licensee identified items, and the service water pond.

Results

Of the areas inspected, no violations or deviations were identified.

REPORT DETAILS

1. Persons Contacted

*J. D. Woodard, Assistant Plant Manager
*R. G. Berryhill, Supervisor, System Performance
*G. S. Waymire, Nuclear Engineer, Systems Engineering
*D. M. Varner, Project Manager - Tendon Surveillance
*M. Stinson, Supervisor, Systems Performance

Other Organizations

*D. M. Urciuoli, Civil Engineer, Davcon Corporation
*C. A. Byrd, Civil Engineer, Southern Company Services
*S. T. Burns, Civil Engineer, Southern Company Services
*R. E. Blum, Engineering Specialist, Bechtel
*F. Kleman, Engineering Specialist, Bechtel

NRC Resident Inspectors

W. H. Bradford
T. Peebles

*Attended exit interview

2. Exit Interview

The inspection scope and findings were summarized on July 2, 1981 with those persons indicated in paragraph 1 above. In addition to the exit interview, a meeting was held with plant management personnel to discuss the results of tendon surveillance inspection. The points discussed at this meeting are summarized in paragraph 7.d.(3) of this inspection report.

3. Licensee Action on Previous Inspection Findings

Not inspected.

4. Unresolved Items

Unresolved items were not identified during this inspection.

5. Independent Inspection Effort

a. The inspector examined the service water pond embankment and spillway channel. Details examined included slope stability, slope protection, lack of erosion damage, and absence of seepage through the service water pond embankment.

b. The inspector examined the following surveillance test procedures to ascertain if documented instructions and procedures have been prepared

for compliance with the requirement of Technical Specification 4.7.6.2.2, 4.7.6.2.3, and 4.7.6.2.4:

(1) Surveillance Test Procedure number FNP-0-STP-611.0, "Spillway Channel Inspection"

(2) Surveillance Test Procedure number FNP-0-STP-611.1, "Spillway Channel and Structure Verfication"

(3) Surveillance Test Procedure number FNP-0-STP-125, "Service Water Pond Seepage Test"

c. The inspector reviewed Bechtel report titled "Tendon End Anchorage Concrete Surveillance and Containment Steel Liner Plate Surveillance During First Periodic Type A Integrated Leakage Rate Test (ILRT) for Farley Unit 1," dated May, 1981. The requirements for the tendon end anchorage concrete surveillance and the liner plate surveillance are specified in Unit 1 Technical Specifications 4.6.1.6.2 and 4.6.1.6.3. There were no problems detected during performance of the first Type A ILRT in either the tendon end anchorage and liner plate surveillance inspections.

No violations or deviations are identified.

6. Licensee Identified Items

a. (Open) LER (80-058/036-0): Containment Tendon Surveillance

The licensee is in the process of rechecking the lift-off forces for the tendons inspected during the three year surveillance which was performed in Spring of 1980. After this is completed the five year surveillance will be performed as per the commitment in the LER. This LER remains open pending completion of the Unit 1 tendon surveillance stated in the LER. Additional details concerning this LER are contained in IE Report number 50-348/81-04.

b. (Closed) LER 80-076/01-T (Unit 1) and 80-003/01-T (Unit 2): Masonry Walls not constructed in accordance with design drawings.

The licensee submitted th .inal report on the Unit 1 Masonry Walls on May 22, 1981 and on the Unit 2 Masonry Walls on May 12, 1981. All the Unit 1 and Unit 2 Masonry Walls in the proximity of safety-related equipment have been evaluated and repaired in accordance with the requirement of IE Bulletin 80-11, Masonry Wall Design. Those LERs are closed.

7. Containment Building Tendon Surveillance, Units 1 and 2

The inspector examined procedures and quality records relating to the Units 1 and 2 tendon surveillance and work activities relating to the Unit 1 tendon surveillance. Details of the inspection are as follows:

a. Review of Tendon Surveillance Procedures

The inspector examined the following procedures which control the tendon surveillance activities:

(1) Surveillance Test Procedure FNP-2-STP-609.0, "Containment Tendon Surveillance Test (Unit 2)"

(2) Surveillance Test Procedure FNP-1-STP-609.0 "Containment Tendon Surveillance Test (Unit 1)"

The requirements for the Unit 2 tendon surveillance are specified in Unit 2 Technical Specification 4.6.1.6.1. The requirements for the Unit 1 tendon surveillance are specifided in the Unit 1 Technical specification 4.6.1.6.1 and the licensee's commitment to NRC Region II in LER number 80-058/036-0. This LER is briefly discussed in paragraph 6.a

b. Observation of Tendon Surveillance Work Activities

The inspector witnessed the stressing operations for verification of the lift-off forces at the field (lower) end of vertical tendon V-27. The inspector also witnessed re-greasing of vertical tendon V-86 and V-105. These operations were performed in accordance with the requirements stated in procedure FNP-1-STP-609.0. The inspector examined the field end anchorage assemblies on tendon numbers V-27 and V-86 to verify the inspection of the anchorage assemblies was conducted and documented in accordance with procedure FNP-1-STP-609.0. The inspector verified grease samples were obtained from the field and shop ends of the tendons as per procedure FNP-1-STP-609.0 requirements.

c. Review of Quality Records Relating to Tendon Surveillance Activities

The inspector examined the following records relating to Units 1 and 2 tendon surveillance activities:

(1) Surveillance inspection records for Unit 2 tendon numbers D114, D123, D202, D229, D230, D231, D308, D309, D310, 8FD, 18FD, 24FD, 33DE, V66, and V116. These inspection records include results of the inspector of the anchorage assembly, and tendon re-greasing.

(2) Results of the chemical analysis performed on grease samples obtained from the shop and field ends of tendon numbers V-16, V-39, V-66, V-95, V-116, D-114, D-123, and D-202.

(3) Results of the chemical analysis performed on drum numbers 1 through 10, 20, and 22 through 25 of new grease used to regrease the Unit 2 tendons after completion of the surveillance inspection.

(4) Surviellance inspection records for Unit 1 tendon numbers V-16, V-27, V-86, V-105, and V-126. These records included results of the inspection of the anchorage assembly, lift-off date, and tendon regreasing.

Review of the Unit 1 lift-off force data disclosed that, after correcting for the additional force added to the tendens during the retensioning of the tendons during the three year surveillance, tendon number V-86, V-105, and V-126 had average force per wire slightly below the predicted lower limits specified in Figure 4.6-1 of the Unit 1 Techincal Specification. However these values are well above the 40-year minimums shown in Figure 4.6-1. Additional discussions concerning these tendon lift-off values are contained in the paragraphs below.

d. Unit 1 Tendon Lift-Off Values

(1) Background Information on Tendon Lift-Off Forces

The three-year tendon surveillance inspection was performed in Spring of 1980. Prior to performance of the three year surveillance, the stressing rams which were used to determine the tendon lift-off forces were calibrated. After the contractor (USL Corporation) had completed the tendon surveillance and demoblized their equipment, the stressing rums were recalibrated. The post surveillance ram calibration showed a difference of approximately 5 percent from the initial calibration. Two additional recalibrations were then performed to investigate the reasons for the difference. It was not possible following the additional recalibrations to explain the differences between the precalibration and post calibration values. In Bechtel report entitled "Containment Structure Post-Tensioning System Three-Year Surveillance - Farley Unit 1", dated August, 1980 the lift-off forces are computed based on both the pre and post test ram calibrations. The lift off forces computed using the post surveillance calibration values are approximately 5 percent lower than those using the before surveillance calibration values. However, the lift-off forces calculated from the post surveillance date, for five tendons (1 dome and 4 vertical) were slightly below the predicted lower limit shown in figure 4.6-1 of the Technical Specifications. Though these values were below the predicted lower limit, they are well above the required 40 year minimum prestress. Because of the problems with the ram calibration, and other deficiencies noted in the three-year tendon surveillance inspection, NRC Region II requested a meeting with the licensee and their Architect-Engineer, Becthel, at the Region II Office on October 7, 1980, (See IE Report number 50-348/80-30) during which the results of the three-year surveillance were discussed. After this meeting the licensee submitted LER (80-058/036-0) in which they stated, in part, that the lift-off values for the three year surveillance tendons would be rechecked in the Spring of 1981 and the five-year

surveillance, originally scheduled for Spring of 1982, would be performed in Spring of 1981.

(2) Results of Recheck of Three-year Tendon Lift-off Forces

The recheck of the lift-off forces for the three-year surveillance tendons had been completed for vertical tendon numbers V-16, V-27, V-86, V-105, and V-126 as of the inspection date. These results indicate that the three year post surveillance ram calibration data are the correct values to be used in calculation of the lift-off forces for the three year tendon surveillance. Therefore, it appears that five tendons (1 dome and 4 vertical) had lift-off forces below the predicted lower limit, specified in Figure 4.6-1 of the Technical Specifications. However, the current lift-off forces in the tendons in question are within the limits specified. The reason for this is as follows: After the lift-off forces in the tendon is checked, Technical Specification 4.6.1.6.1 requires that each surveliance tendon be detensioned to determine if any wires or strands in the tendons are broken or damaged. Following this inspection, the tendons are retensioned to a value of 80 percent of the ultimate strength of the wire. The force is then relaxed to the lift-off value, the required shims are added, and the tendon is locked off. When reducing the tendon stress from 80 percent of the ultimate to the lift-off stress, it is not practical to attempt to reduce the stress to an exact figure due to the magnitude of forces involved in the stressing operations.

Therefore, a range of stress values is specified on the stressing card, and the tendon is locked off at a stress level within the specified range. The range of values specified is within the limits specified in Figure 4.6-1. When the five tendons in question were retensioned, they were locked off at approximately 5 percent higher stresses than the lift off values determined before detensioning. Using either the pre or post surveillance calibration data, these tendons had and presently have lift-off stresses within the acceptance limits of the Technical Specification.

(3) Discussions with Plant Management Personnel Concerning Tendon Lift-off Values

The inspector and the NRC senior resident inspector met with the Assistant Plant Manager, the Systems Performance Supervisor, and the Tendon Surveillance Project Manager and discussed the following items:

(a) The results of the recheck of the three-year vertical tendon lift-off values.

(b) The proposed revision to Technical Specification 4.6.1.6.1

(c) The licensee's proposed approach in resolution of the apparent large rate of loss of prestress force measured in tendons between the first (1 year) and second (three year) surveillance inspections. The licensee's present plans are to check the lift-off force in the two tendons adjacent to tendon number V-105 and then have Bechtel evaluate the result.

(d) Compliance with the current Technical Specification 4.6.1.6.1

The current Technical Specification require checking the lift-off forces in the two tendons adjacent to any tendon which has a measured lift-off value outside the allowable bounds shown on Figure 4.6-1.

No deviations or violations were identified.