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PLUNKETT,T.F. Florida Power & Light Co.
RECIP.NAME RECIPIENT AFFILIATION
EBNETER,S.D. Region 2 (Post 820201)

SUBJECT: Special rept:three surveillance tendons,inspected on 920612, 19 & 29 found w/measured normalized lift-off force below predicted lower limit.Lift-off forces restored to required level of integrity.Addl rept will be sent by 920915.

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JUL 10 1992

L-92-203
10 CFR 50.36

Stewart D. Ebneter
Regional Administrator
U. S. Nuclear Regulatory Commission
101 Marietta Street, N.W., Suite 2900
Atlanta, Georgia 30323

Dear Mr. Ebneter:

Re: Turkey Point Unit 3
Docket No. 50-250
Special Report - Twentieth Year Tendon Inspection
Hoop Tendons Low Lift-Off Force

In accordance with Florida Power and Light Company (FPL) Turkey Point Nuclear Plant Technical Specification 3.6.1.6 a., the attached Special Report is provided. This report addresses the low lift-off force inspection results for tendons 13H33, 64H61 and 35H52.

An additional report will be submitted to the Commission by September 15, 1992, summarizing the surveillance testing of all hoop tendons inspected during the Unit 3 Twentieth Year Inspection.

Should there be any questions, please contact us.

Very truly yours,

T F Plunkett

T. F. Plunkett
Vice President
Turkey Point Nuclear

TFP/RJT/rt

cc: USNRC, Document Control Desk, Washington, D.C.
Senior Resident Inspector, USNRC, Turkey Point Plant

NRC Special Report

Turkey Point Unit 3
Twentieth Year Tendon Inspection
Low Lift-Off Force on
Hoop Tendons 13H33, 64H61 and 35H52

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1.0 Purpose/Scope

During the performance of the twentieth year tendon surveillance of the Turkey Point Unit 3 containment post-tensioning system, three surveillance tendons, 13H33 (inspected on June 12, 1992), 64H61 (inspected on June 19, 1992), and 35H52 (inspected on June 29, 1992) of the hoop tendon group, were found to have a measured normalized lift-off force below the predicted lower limit (References 6.4, 6.5, and 6.9). Consequently, in accordance with the requirements of the Turkey Point Plant Technical Specifications 4.6.1.6.1 (a), additional lift-off measurements on a tendon located below and a tendon located above (13H32 & 13H34, inspected on June 15, 1992; 64H60 & 64H62, inspected on June 19, 1992, and 35H51 & 35H53, inspected on June 30, 1992) were taken for each of the applicable surveillance tendons. In each case, since the measured normalized lift-off forces in these tendons were between the predicted lower limit and 90% of the predicted lower limit, Turkey Point Unit 3 entered a 15 day ACTION statement to the Limiting Condition for Operation (Technical Specification 3.6.1.6). This ACTION statement required restoration of the tendon(s) to the required level of integrity within 15 days and performance of an engineering evaluation of the containment, and the submittal of a Special Report to the USNRC within 30 days.

The evaluation of the structural integrity of the containment post-tensioning system is included in this engineering evaluation.

2.0 Engineering Evaluation

The Turkey Point Unit 3 containment is a post-tensioned, reinforced concrete structure comprised of a vertical cylinder with a shallow dome and supported on a conventional reinforced concrete foundation base slab. The vertical cylinder wall is provided with a system of vertical and hoop tendons. Vertical tendons are anchored at the top surface of the ring girder and at the bottom of the base slab. Each hoop tendon is anchored at alternate vertical buttresses nominally 120 degrees apart. Tendons in the dome consist of three groups of tendons oriented at 120 degrees with respect to each other and are anchored at the vertical face of the dome ring girder.

The Turkey Point tendon surveillance is performed every fifth year from the date of the initial structural integrity test. Three dome, five hoop, and four vertical tendons were selected for the twentieth year tendon surveillance on a random basis, excluding those tendons which were previously inspected for earlier surveillances. The Turkey Point twentieth year tendon surveillance is performed in accordance with the requirements of References 6.6 and 6.10.

To date, lift-off forces for all four vertical and all three dome surveillance tendons have been measured. In each case, the measured normalized lift-off force exceeded the predicted lower limit.

Wires have been removed for inspection from hoop tendon 64H61, vertical tendon 34V11, and dome tendon 3D8. In addition, grease samples have been removed for each surveillance tendon inspected to date. The visual inspection of the tendon wires and sheath filler samples have revealed no abnormal wire corrosion or grease discoloration.

Also, the concrete at the tendon anchorage area adjacent to the bearing plates for all subject hoop tendons have been inspected. This inspection has revealed that width of the cracks does not exceed 0.01 inches which is the acceptance limit noted in Reference 6.8, Section IWL-3221.3(d).

The following are the predicted lower limit (PLL) and the minimum required prestress force at the anchorage for hoop tendons:

Twentieth Year Predicted Lower Limit = 6.63 kips/wire
(Reference 6.6)

Minimum Required Prestress Force = 6.29 kips/wire
at Anchorage for Hoop Tendons
(Reference 6.3)

The lift-off forces which are below the predicted lower limit occurred in three of the hoop surveillance tendons (13H33, 64H61, and 35H52) and in six additional adjacent tendons (13H32, 13H34, 64H60, 64H62, 35H51, and 35H53).

From References 6.4, 6.5, and 6.9, the results of the surveillance on hoop tendons are as follows:

Tendon	Measured Normalized Lift-Off Force (kips/wire)		Percentage of PLL
13H32	6.58		99.2%
13H33	6.26		94.4%
13H34	6.48		97.7%
Average (Buttress 1-3)	6.44	kips/wire	97.1%
64H60	6.39		96.4%
64H61	6.33		95.5%
64H62	6.14		92.6%
Average (Buttress 6-4)	6.29	kips/wire	94.9%
35H51	6.32		95.3%
35H52	6.40		96.5%
35H53	6.39		96.4%
Average (Buttress 3-5)	6.37	kips/wire	96.1%

The overall average tendon force for all nine hoop tendons is as follows:

Tendon	Average Measured Normalized Lift-Off Force (kips/wire)	Percentage of PLL
13H32, 13H33, 13H34 64H60, 64H61, 64H62 35H51, 35H52, 35H53	6.37	96.1%

As shown, the average hoop tendon lift-off force for the group (overall or individual buttress group) is equal to or larger than the minimum required prestress force (6.29 kips/wire). Therefore, it is concluded that the subject tendon group will provide adequate prestress force to maintain the containment integrity. This conclusion is consistent with the guidance provided in Section 7.1.5 of Reference 6.7 and Section IWL-3221.1 (a) of Reference 6.8.

2.1 Review Of Regulatory Guides and ASME Code Section XI Acceptance Criteria

Regulatory Guide 1.35 (Reference 6.7), Section 7.0, and ASME Code Section XI (Reference 6.8), Section IWL-3221.1, were reviewed relative to the tendon lift-off acceptance criteria to provide additional justification for the adequacy of the containment post-tensioning system. The following summarizes this review:

a) Section 7.1.5 of Reference 6.7 and Section IWL-3221.1 (a) of Reference 6.8 require that the average of all measured tendon forces be equal to or greater than the minimum required prestress force at the anchorage.

b) Section 7.1.2 of Reference 6.7 implies that, if the measured lift-off force for a surveillance tendon lies above 95% of the predicted lower limit, no additional lift-off testing of adjacent tendons is required and the condition should be considered acceptable.

c) Section 7.1.2 of Reference 6.7 states that if the measured prestressing force of a selected tendon in a group lies between 95% of the predicted lower limit and 90% of the predicted lower limit, two additional tendons, one on each side of the first tendon, should be checked for their prestressing forces. If the prestressing forces of each of the second and third (i.e., adjacent) tendons are above 95% of the predicted lower limit, all three tendons should be restored to the required level of integrity and the tendon group should be considered acceptable.

The measured normalized lift-off forces for tendons 13H32 and 13H34 were above 95% of the predicted lower limit. This meets the requirement of Reference 6.7 (Criterion (c) above).

The measured normalized lift-off force for surveillance tendons 64H61 and 35H52 was above 95% of the predicted lower limit. This meets the requirement of Reference 6.7 (Criterion (b) above), and no additional testing would have been required if this criterion had been applied.

Finally, as shown in Section 2.0, the average tendon lift-off force (overall or individual buttress group) is equal to or larger than the minimum required prestress force (6.29 kips/wire) which satisfies criterion (a) above. Therefore, based on this review, it can also be concluded that the Unit 3 hoop tendon group has sufficient prestress force to maintain the containment integrity and the intent of the acceptance criteria included in References 6.7 and 6.8 is satisfied.

2.2 Design Margins Available in the Post-Tensioning System

Turkey Point UFSAR (Reference 6.1), Section 5.1.2 states that any three adjacent tendons in any tendon group can be lost without significantly affecting the strength of the containment structure. This design feature considers the load redistribution capabilities of the containment shell.

According to Reference 6.1, Section 5.1.1, the containment is structurally designed to withstand a pressure of 59 psig. This section also states that the transient analysis calculated peak accident pressure is 49.9 psig. This provides additional margin of safety.

3.0 Conclusion

Based on the available margins existing in the design of the Turkey Point post-tensioning system and the level of prestress force available in the subject hoop tendons, it is concluded that the Unit 3 hoop tendon group has sufficient prestress force to maintain the containment integrity.

As part of the twentieth year surveillance, lift-off testing will be performed for the remaining two hoop surveillance tendons. These additional lift-off readings will provide additional data to investigate the cause and extent of this condition. Upon completion of the lift-off testing, an engineering evaluation will be prepared to include the additional data and the results of the investigation relative to this condition. A more detailed report will be submitted to USNRC following completion of the tendon surveillance.

4.0 Verification Summary

The engineering evaluation was reviewed to ensure that the overall conclusion meets the applicable UFSAR and Plant Technical Specifications requirements.

The criteria and design inputs required to evaluate the containment building structural integrity were adequately described, reasonable, and appropriately identified for subsequent reverification.

The codes, standards, design bases and regulatory requirements were properly identified and this engineering evaluation was shown to meet those requirements. This engineering evaluation has been correctly specified as Safety Related.

5.0 Corrective Actions

According to the Turkey Point Plant Technical Specifications 3.6.1.6 (a), the lift-off forces in tendons 13H32, 13H33, 13H34, 64H60, 64H61, 64H62, 35H51, 35H52, and 35H53 have been restored to their required level of integrity by retensioning each tendon to a level equal to or above the twentieth year predicted lower limit. The following summarizes the new lift-off forces for the subject tendons:

Tendon	Measured Average Lift-Off (kips)	Percentage of Predicted Lower Limit
13H32	625.5	104.8%
13H33	630	105.6%
13H34	634.5	106.3%
64H60	613.5	102.8%
64H61	606	101.6%
64H62	613	102.7%
35H51	636	106.6%
35H52	612	102.6%
35H53	609	102.1%

6.0 References

6.1 Turkey Point Units 3 and 4 Updated Final Safety Analysis Report (UFSAR), Revision 9, dated July 1991 Section 5.0

6.2 Turkey Point Units 3 and 4 Technical Specifications Amendment 151/146

6.3 Bechtel Calculation No. C-SJ539-05 "Evaluation of the Fifteenth Year Tendon Surveillance Lift-Off Forces", Revision 0

6.4 Non-Conformance Report N-92-0123

6.5 Non-Conformance Report N-92-0128

6.6 Bechtel Technical Requirements Document 21701-539-CP-1, Revision 3 for Unit 3 Twentieth Year Tendon Surveillance

6.7 Regulatory Guide 1.35 "In-service Inspection of Ungrouted Tendons in Prestressed Concrete Containment", Revision 3 Dated July 1990

6.8 ASME Code 1989, Section XI - Division 1, Article IWL-3000 "Acceptance Standards"

6.9 Non-Conformance Report N-92-0136

6.10 Turkey Point Plant Procedure 0-SMM-51.2 "Containment Tendon Inspection" dated May 22, 1992