FPL

L-2001-115

MAY 16 2001

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington D. C. 20555-0001

Re: Turkey Point Units 3 and 4
Docket Nos. 50-250 and 50-251
Soluble Boron Credit for Spent Fuel Pool and Fresh Fuel Rack Criticality Analyses
Fuel Rack Surveillance Testing 2001 Report and Commitment Change for Fuel Rack Surveillance Testing Frequency

As stated in letter L-2000-144, dated July 5, 2000, Florida Power & Light (FPL) committed to perform the next fuel storage rack surveillance by May 2001, and to provide to Nuclear Regulatory Commission (NRC) Staff a report containing the following information within 120 days of completing the surveillance:

- The results of the surveillance
- A summary of the method used to project Boraflex degradation
- The approximate projected date that the degradation of any Boraflex panel will exceed the assumed degradation values for each Spent Fuel Pool Region.
- Frequency change for Fuel Storage Rack Surveillance

The fuel storage rack surveillance for Turkey Point Unit 3 was completed on January 24, 2001. The attached report meets FPL's commitment to provide to the Staff the above-mentioned information. The report concludes that the next Boraflex condition monitoring surveillance will be scheduled in 2004, and every three years thereafter for either one of the Spent Fuel Pools. Therefore, the surveillance is changed from a five-year to a three-year interval. This change constitutes a commitment change for FPL Turkey Point Units 3 and 4. As a result, all affected documents will be revised to reflect this commitment change.

Should there be any questions, please contact Steve Franzone at (305) 246-6228.

Very truly yours,

TFPlunkett

T. F. Plunkett
President
Nuclear Division

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Attachment

cc: Regional Administrator, Region II, USNRC
Senior Resident Inspector, USNRC, Turkey Point

A008

REPORT
Fuel Rack Surveillance Testing
Turkey Point Unit 3 January 24, 2001

This report provides the following information for the Turkey Point Unit 3 Boraflex degradation surveillance testing (Reference 1):

- The results of the surveillance
- A summary of the method used to project Boraflex degradation
- The approximate projected date that the degradation of any Boraflex panel will exceed the assumed degradation values for each Spent Fuel Pool Region.
- Frequency change for Fuel Storage Rack Surveillance

Results of the surveillance

The results of the surveillance for each region are provided in Tables 1 and 2. They are reported in terms of the deviation of the average areal density of the irradiated panel (subscript I) from the average areal density of the unirradiated reference panel (subscript R) i.e.,

$$\% Deviation = \frac{\bar{a}_I - \bar{a}_R}{\bar{a}_R} 100 .$$

For conservatism, the minimum design areal densities of 0.020 gm-B_{10}/cm^2 and 0.012 gm-B_{10}/cm^2 for Regions I and II respectively (Reference 2) were chosen for the reference panel areal densities, since the as-built areal densities associated with specific storage cells are not known.

Based on the information in Tables 1 and 2, the average areal density over the entire length of the worst panels in Regions I and II was calculated to be respectively 0.013 gm-B_{10}/cm^2 and 0.006 gm-B_{10}/cm^2. However, the areal density was not uniform over the length of these panels due to variations in the amount of dissolution along the panel's length.

A conservative estimate of the average areal density in the dissolved region of the Boraflex panel was obtained based on a comparison of the neutron detector signals in the areas of the panel with and without dissolution to the region where no Boraflex is present i.e., within the storage cell but above the panel. The results are as follows:

- The lowest dissolved region areal density for the Region I racks is 0.012 gm-B_{10}/cm^2 and corresponds to a total dissolution length of 54 inches in the west panel of storage cell KK77. The average areal density of all panels tested exceeds the assumed minimum design areal density of 0.009 gm-B_{10}/cm^2.
- The lowest dissolved region areal density for the Region II racks is 0.004 gm-B_{10}/cm^2 and corresponds to a total dissolution length of 96 inches in the west panel of storage cell M16. The average areal density of all panels tested meets or exceeds the assumed minimum design areal density of 0.006 gm-B_{10}/cm^2.

Summary of the method used to project Boraflex degradation

The Boraflex degradation is projected using the percent Boraflex degradation predicted by the EPRI computer code RACKLIFE (Reference 3) for the panel at the time of the test and at intervals of five and ten years later. The average areal density of the panel measured at the time of the test was reduced according to the incremental percent degradation at five and ten years. The areal density of the dissolved region was calculated assuming no change in the length of the dissolved region.

Approximate date the degradation of any Boraflex panel will exceed the assumed degradation values for each Spent Fuel Pool Region

For Region I, it is projected that the average areal density over the entire length of the panel for all panels tested will remain greater than the assumed degradation value of 0.009 gm-B_{10}/cm^2 up to ten years from the time of the surveillance. The average areal density in the dissolved region of the west panel of storage cell KK77 is projected to fall below the assumed degradation value of 0.009 gm-B_{10}/cm^2 in approximately November 2006.

For Region II, significant localized dissolution in some but not all panels begins to occur at a dose of 2.0 E+10 rads. It is conservatively judged that some panels with a dose of greater than 2.0 E+10 rads have already fallen below the assumed degradation value of 0.006 gm-B_{10}/cm^2. Administrative controls have been imposed to limit the use of any cell with dose greater than 2.0 E+10 rads.

The design bases of k-eff < 1.0 with no soluble boron present and k-eff ≤ 0.95 with partial credit for soluble boron were met based on:

- The margin of at least 0.05 k-eff units in the current criticality analysis of record between cases with and without partial credit for soluble boron, and
- Additional criticality analyses performed by Westinghouse that incorporated the measured results (Reference 4).

Conclusion and Frequency Change for Fuel Storage Rack Surveillance

For Region I, the average areal density of all panels is expected to remain above the assumed minimum design value of 0.009 gm-B_{10}/cm^2 through 2010. The average areal density in the dissolved region is projected to fall below this value in approximately November 2006.

For Region II, it is conservatively judged that the average areal density of some panels with a dose of greater than 2.0 E+10 rads has fallen below the assumed analysis of record value of 0.006 gm-B_{10}/cm^2. However, administrative controls are in place to limit the use of the affected cells.

The design bases of k-eff < 1.0 with no soluble boron present and k-eff ≤ 0.95 with partial credit for soluble boron were met.

Based on the above results, FPL has determined that the next fuel storage rack surveillance should be scheduled in 2004, and conducted every three years thereafter.

References

1. Letter from K. Jabbour (USNRC) to T. Plunkett (FPL), "Turkey Point Units 3 and 4 - Issuance of Amendments Regarding Boron Credit in The Spent Fuel Pool" (TAC Nos. MA7262 and MA7263), July 19, 2000.

2. Letter from R. J. Hovey to USNRC, "Soluble Boron Credit for Spent Fuel Pool and Fresh Fuel Rack Criticality Analyses," L-99-176, November 30, 1999.

3. The Boraflex Rack Life Extension Computer Code - RACKLIFE, EPRI TR-107333, September 1997.

4. Letter from Diana B. Robinson to J. L. Perryman, "Region 2 Supplemental Spent Fuel Pool Criticality Analysis," 01FP-G-042, April 16, 2001.

Table 1

Turkey Point Unit 3
Region I Areal Density and Panel Loss

Panel/Face	Predicted Absorbed Dose (Rads)	RACKLIFE Predicted B_4C Loss (%)	% Deviation from Unirradiated Panels	Number of Gaps	Max Gap Size (in)	Total Inches of Dissolution
LL63 North	0.00E+00	1.66	0.3%	0	0.00	10
LL63 South	0.00E+00	1.66	-0.3%	0	0.00	0
JJ73 West	2.45E+09	3.38	-34.0%	0	0.00	32
JJ73 East	2.59E+09	3.81	-3.8%	1	0.17	0
JJ73 South	5.00E+09	7.36	16.8%	0	0.00	2
GG74 East	7.10E+09	9.32	4.0%	2	0.76	2
GG74 South	7.72E+09	9.68	4.8%	0	0.00	0
FF74 East	1.23E+10	10.68	0.8%	2	0.78	0
FF74 South	1.43E+10	11.02	2.5%	3	0.91	2
KK77 South	1.50E+10	12.36	26.9%	2	0.63	0
KK77 West	1.56E+10	12.37	-28.3%	2	0.37	54
EE81 East	2.04E+10	13.23	19.5%	1	0.84	0
EE80 West	2.04E+10	13.27	8.5%	1	0.52	2
FF81 West	2.15E+10	13.30	12.1%	1	0.68	4
DD80 East	2.35E+10	13.36	8.0%	1	0.78	0
DD80 South	2.35E+10	13.36	-4.1%	1	0.66	0
DD80 North	2.38E+10	13.36	15.7%	0	0.00	2
DD80 West	2.40E+10	13.37	21.3%	0	0.00	0

Table 2

Turkey Point Unit 3
Region II Areal Density and Panel Loss

Panel/Face	Predicted Absorbed Dose (Rads)	RACKLIFE Predicted B_4C Loss (%)	% Deviation from Unirradiated Panels	Number of Gaps	Max Gap Size (in)	Total Inches of Dissolution
T53 West	0.00E+00	2.27	1.4%	0	0.00	0
U53 East	0.00E+00	2.27	53.9%	0	0.00	0
U53 West	0.00E+00	2.27	-4.7%	0	0.00	0
U53 West	0.00E+00	2.27	3.4%	0	0.00	2
V53 North	2.23E+08	2.27	42.5%	0	0.00	0
U53 North	6.42E+08	2.46	10.3%	0	0.00	2
V12 North	2.70E+09	6.29	19.8%	2	0.92	10
U11 East	4.50E+09	9.50	56.0%	4	1.24	16
U11 West	5.70E+09	10.89	67.8%	6	0.26	0
U11 North	5.90E+09	11.06	54.2%	5	0.37	2
U13 South	6.78E+09	10.84	44.8%	2	0.28	30
U11 South	8.17E+09	12.20	91.5%	4	0.30	0
U13 North	1.05E+10	12.40	69.5%	4	0.50	0
U13 East	1.23E+10	11.98	30.1%	5	1.30	4
R15 West	1.56E+10	13.32	5.9%	2	0.90	52
R15 East	1.56E+10	13.32	66.6%	4	0.83	8
R15 South	2.11E+10	13.38	36.0%	2	0.42	18
M16 East	2.96E+10	13.44	4.8%	1	1.24	54
P16 West	3.00E+10	13.43	10.5%	1	0.59	56
P16 East	3.11E+10	13.44	13.3%	2	0.74	30
M16 West	3.38E+10	13.49	-48.6%	0	0.00	96
M16 South	3.39E+10	13.46	4.5%	5	0.73	22
P16 South	3.39E+10	13.46	48.1%	4	0.56	6
M16 North	3.43E+10	13.49	31.8%	3	0.88	66