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Subject: Transmittal of Errata Pages for WCAP-18830-P (Proprietary) and WCAP-18830-NP (Non-Proprietary), "Turkey Point Fuel Storage Criticality Analysis for 24 Month Cycles"

- References:
1. Westinghouse to NRC, "Transmittal of WCAP-18830-P/NP "Turkey Point Fuel Storage Criticality Analysis for 24 Month Cycles" to Support a License Amendment Request from FPL - License Amendment Request 277 Updated Spent Fuel Pool Criticality Analysis," September 22, 2023. (ADAMS Accession No. ML23265A548)
 2. Florida Power & Light letter L-2023-077, License Amendment Request 277, Updated Spent Fuel Pool Criticality Analysis, October 12, 2023. (ADAMS Accession No. ML23285A035)

Enclosed are Errata pages 5-3, 5-4, 5-7, 5-11, and 5-12 for both WCAP-18830-P and WCAP-18830-NP, "Turkey Point Fuel Storage Criticality Analysis for 24 Month Cycles" (Reference 1). An error was identified regarding the reactivity ranking of fuel categories relative to Note 1 and Note 2 of Table 4-11 of WCAP-18830-P/NP. To correct the error, final burnup limit generation was re-performed for CFD1 Fuel Category II-3 to provide increasing conservatism to adhere to Note 1 and Note 2 of Table 4-11. A thorough review of all fuel categories and all enrichment, burnup, and decay times allowed led to two minor additional updates to the constant term fitting coefficients for two other fuel categories in Table 5-3 of WCAP-18830-P/NP. As a result of the updates to WCAP-18830-P/NP, corresponding updates to the Technical Specifications markups provided in Reference 2 are required as well.

The updates to the Technical Specifications markups that were provided in Reference 2 will be handled by a supplement to Reference 2 and will be submitted by Florida Power and Light (FPL). Note that the error exists in the proposed markups to the Turkey Point Units 3 and 4 Technical Specifications, not the currently approved Technical Specifications. The updates to WCAP-18830-P/NP are being handled by the transmittal of the enclosed Errata pages.

The corrections are as follows:

1. On page 5-3 of WCAP-18830-P/WCAP-18830-NP, Table 5-2, the fitting coefficients (A1 through A12) listed for CFD1 Fuel Category II-3 are updated accordingly such that the corresponding burnup limits are always greater than the burnup limits for CFD1 Fuel Category II-2.
2. On page 5-4 of WCAP-18830-P/WCAP-18830-NP, Table 5-3, the fitting coefficient (A9) listed for CFD2 Fuel Category II-4 and II-5 is updated as a result of the thorough review of all fitting coefficients.
3. On page 5-7 of WCAP-18830-P/WCAP-18830-NP, Table 5-9, all of the burnup limits for CFD1 Fuel Category II-3 are updated based on the newly generated fitting coefficients

4. On page 5-11 of WCAP-18830-P/WCAP-18830-NP, Table 5-18, all of the burnup limits for CFD2 Fuel Category II-4 are updated based on the newly generated fitting coefficients.
5. On page 5-12 of WCAP-18830-P/WCAP-18830-NP, Table 5-19, all of the burnup limits for CFD2 Fuel Category II-5 are updated based on the newly generated fitting coefficients.

Note that the content of Errata pages 5-3, 5-4, 5-7, 5-11, and 5-12 for both WCAP-18830-P and WCAP-18830-NP is non-proprietary. Therefore, the enclosed Errata pages are based on WCAP-18830-NP but the Errata pages apply to WCAP-18830-P as well.



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Enclosures:

- (1) Errata Pages for WCAP-18830-P (Proprietary) and WCAP-18830-NP (Non-Proprietary)

Enclosure 1

Errata Pages for WCAP-18830-P and WCAP-18830-NP

(Non-Proprietary)

June 2024

(6 pages including this cover page)

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Table 5-2 CFD 1 – Coefficients to Calculate the Minimum Required Fuel Assembly Burnup (Bu) as a Function of Enrichment (En) and Cooling Time (Ct)								
Coeff.	Fuel Category							
	I-3	I-4	II-1	II-2	II-3	II-4	II-5	II-6
A1	46.1221	-15.5280	-2.0590	26.4195	26.4195	-3.7782	-29.0518	-29.0518
A2	-51.4825	13.5960	-2.7964	-23.6884	-23.6884	0.7172	38.3795	38.3795
A3	18.4391	-3.4175	3.0982	6.8587	6.8587	2.1165	-13.3538	-13.3538
A4	-2.0048	0.3637	-0.4715	-0.4980	-0.4980	-0.3342	1.6937	1.6937
A5	-0.4998	-1.0368	0.2161	-1.4442	-1.4442	0.1433	-0.4574	-0.4574
A6	0.3474	1.3335	-0.3773	1.6753	1.6753	-0.1589	0.5477	0.5477
A7	-0.0487	-0.4940	0.1893	-0.5777	-0.5777	0.0725	-0.1803	-0.1803
A8	0.0000	0.0574	-0.0265	0.0632	0.0632	-0.0095	0.0184	0.0184
A9	-38.3233	-96.9847	6.7162	-96.0974	-96.0074	-26.9895	-36.7528	-36.7528
A10	24.6155	94.9777	-18.9681	92.2715	92.2715	23.9367	38.4104	38.4104
A11	-3.5675	-28.3931	10.8797	-25.2863	-25.2863	-2.6264	-5.8631	-5.8631
A12	0.3160	3.0898	-1.2782	2.5516	2.5516	0.1421	0.2201	0.2201
Min. Enrich.	2.00	1.80	1.75	1.55	1.50	1.30	1.15	1.15
Notes:								
<p>1. All relevant uncertainties are explicitly included in the criticality analysis. For instance, no additional allowance for burnup uncertainty or enrichment uncertainty is required. For a fuel assembly to meet the requirements of a Fuel Category, the assembly burnup must exceed the “minimum burnup” (GWd/MTU) given by the curve fit for the assembly “cooling time” and “initial enrichment.” The specific minimum burnup required for each fuel assembly is calculated from the following equation. The equation is applicable at enrichments greater than or equal to the value shown as Minimum Enrichment.</p> $\text{Bu} = (\text{A}_1 + \text{A}_2 * \text{En} + \text{A}_3 * \text{En}^2 + \text{A}_4 * \text{En}^3) * \exp [- (\text{A}_5 + \text{A}_6 * \text{En} + \text{A}_7 * \text{En}^2 + \text{A}_8 * \text{En}^3) * \text{Ct}] + \text{A}_9 + \text{A}_{10} * \text{En} + \text{A}_{11} * \text{En}^2 + \text{A}_{12} * \text{En}^3$ <p>2. Initial enrichment, En, is the nominal ²³⁵U enrichment up to 4.0 wt.%. Decay (cooling) time credit of 15 years may be used for enrichments less than 2.0 wt.%. Decay (cooling) time credit between 15 and 25 years, inclusive, may be used for any enrichment between 2.0 and 4.0 wt.%, inclusive.</p> <p>3. Cooling time, Ct, is in years. Any cooling time between 15 years and 25 years may be used. An assembly with a cooling time greater than 25 years must use 25 years.</p> <p>4. This table applies only for pre-EPU non-blanketed fuel assemblies. If a non-blanketed assembly is depleted at EPU conditions, none of the burnup accrued at EPU conditions can be credited (i.e., only burnup accrued at pre-EPU conditions may be used as burnup credit).</p>								

Table 5-3 CF2 – Coefficients to Calculate the Minimum Required Fuel Assembly Burnup (Bu) as a Function of Enrichment (En) and Cooling Time (Ct)								
Coeff.	Fuel Category							
	I-3	I-4	II-1	II-2	II-3	II-4	II-5	II-6
A1	-14.0214	0.7356	-10.3764	0.3023	-13.6425	-1.9201	-15.6064	16.2892
A2	11.4137	-1.1927	7.6199	-3.1468	13.5164	2.9502	16.3820	-17.6207
A3	-2.7518	1.4318	-1.2005	2.3278	-2.5923	0.3686	-3.6279	7.2596
A4	0.2743	-0.1832	0.0789	-0.2523	0.1973	-0.0636	0.3114	-0.7399
A5	2.6169	-0.0485	4.8088	0.2364	-0.1211	-0.3267	-0.2816	-0.4164
A6	-2.1487	0.0236	-3.8345	-0.0738	0.1969	0.3766	0.3303	0.5335
A7	0.5878	0.0034	1.0085	-0.0001	-0.0571	-0.1090	-0.0953	-0.1669
A8	-0.0522	-0.0004	-0.0863	0.0016	0.0050	0.0099	0.0087	0.0160
A9	-27.8139	-51.8296	-29.1782	-57.7979	-41.6737	-51.9429	-40.4692	-67.4031
A10	15.7630	41.0704	21.6958	55.4896	42.2351	52.1289	41.5363	74.8527
A11	-0.7370	-8.3986	-3.2089	-13.5089	-8.9287	-11.9184	-8.8545	-19.0424
A12	-0.0324	0.7265	0.2488	1.2360	0.7680	1.0595	0.7866	1.7507
Min Enrich.	2.00	1.75	1.75	1.55	1.35	1.30	1.30	1.15

Notes:

- All relevant uncertainties are explicitly included in the criticality analysis. No additional allowance for burnup uncertainty or enrichment uncertainty is required. For a fuel assembly to meet the requirements of a Fuel Category, the assembly burnup must exceed the “minimum burnup” (GWd/MTU) given by the curve fit for the assembly “cooling time” and “initial enrichment.” The specific minimum burnup required for each fuel assembly is calculated from the following equation. The equation is applicable at enrichments greater than or equal to the value shown as Minimum Enrichment.

$$Bu = (A_1 + A_2*En + A_3*En^2 + A_4*En^3) * \exp [- (A_5 + A_6*En + A_7*En^2 + A_8*En^3)*Ct] + A_9 + A_{10}*En + A_{11}*En^2 + A_{12}*En^3$$
- Initial enrichment, En, is the nominal ²³⁵U enrichment up to 5.0 wt.%. Axial blanket material is not considered when determining enrichment. No decay (cooling) time credit may be used for enrichments less than 2.0 wt.%. Decay (cooling) time credit between 0 and 25 years, inclusive, may be used for any enrichment between 2.0 and 5.0 wt.%, inclusive.
- Cooling time, Ct, is in years. Any cooling time between 0 years and 25 years may be used. An assembly with a cooling time greater than 25 years must use 25 years.
- Category I-1 is fresh unburned fuel up to 5.0 wt% ²³⁵U enrichment.
- Category I-2 is fresh unburned fuel that obeys the IFBA requirements in Table 5-1.
- This table applies only for assemblies with a blanket enrichment ≤ 2.6 wt% ²³⁵U.

Table 5-7 CFD 1 Fuel Category II-1 Burnup Requirements (GWd/MTU)				
Decay Time (yr.)	Maximum Initial Enrichment, wt.% ²³⁵U			
	1.75	2.0	3.0	4.0
15	0	2.95	14.81	26.50
20		2.92	14.32	25.89
25		2.89	13.99	25.39

Note:
This table is included as an example, the burnup requirements will be calculated using the coefficients provided.

Table 5-8 CFD 1 Fuel Category II-2 Burnup Requirements (GWd/MTU)				
Decay Time (yr.)	Maximum Initial Enrichment, wt.% ²³⁵U			
	1.55	2.0	3.0	4.0
15	0	8.26	22.99	35.67
20		8.04	22.65	34.66
25		7.91	22.43	33.91

Note:
This table is included as an example, the burnup requirements will be calculated using the coefficients provided.

Table 5-9 CFD 1 Fuel Category II-3 Burnup Requirements (GWd/MTU)				
Decay Time (yr.)	Maximum Initial Enrichment, wt.% ²³⁵U			
	1.50	2.0	3.0	4.0
15	0.17	8.35	23.08	35.76
20		8.13	22.74	34.75
25		8.00	22.52	34.00

Note:
This table is included as an example, the burnup requirements will be calculated using the coefficients provided.

Table 5-17 CFD 2 Fuel Category II-3 Burnup Requirements (GWd/MTU)					
Decay Time (yr.)	Maximum Initial Enrichment, wt.% ²³⁵U				
	1.35	2.0	3.0	4.0	5.0
0	1.33	17.83	34.31	45.13	56.08
2.5		16.95	32.51	43.20	54.13
5		16.24	31.07	41.60	52.46
10		15.21	29.00	39.14	49.79
15		14.52	27.69	37.44	47.82
20		14.08	26.86	36.25	46.37
25		13.78	26.33	35.43	45.29

Note:
This table is included as an example, the burnup requirements will be calculated using the coefficients provided.

Table 5-18 CFD 2 Fuel Category II-4 Burnup Requirements (GWd/MTU)					
Decay Time (yr.)	Maximum Initial Enrichment, wt.% ²³⁵U				
	1.30	2.0	3.0	4.0	5.0
0	0.41	18.06	34.32	45.39	57.28
2.5		17.27	32.61	43.53	55.05
5		16.61	31.24	41.97	53.17
10		15.58	29.27	39.54	50.26
15		14.86	28.02	37.83	48.20
20		14.34	27.21	36.61	46.74
25		13.98	26.70	35.76	45.70

Note:
This table is included as an example, the burnup requirements will be calculated using the coefficients provided.

Table 5-19 CFD 2 Fuel Category II-5 Burnup Requirements (GWd/MTU)					
Decay Time (yr.)	Maximum Initial Enrichment, wt.% ²³⁵U				
	1.30	2.0	3.0	4.0	5.0
0	0.54	18.62	34.98	46.15	58.71
2.5		17.82	33.18	44.22	56.22
5		17.15	31.72	42.60	54.17
10		16.10	29.60	40.12	51.05
15		15.35	28.23	38.38	48.90
20		14.81	27.34	37.17	47.42
25		14.43	26.76	36.32	46.41
Note: This table is included as an example, the burnup requirements will be calculated using the coefficients provided.					

Table 5-20 CFD 2 Fuel Category II-6 Burnup Requirements (GWd/MTU)					
Decay Time (yr.)	Maximum Initial Enrichment, wt.% ²³⁵U				
	1.15	2.0	3.0	4.0	5.0
0	0.66	24.31	41.83	53.98	66.83
2.5		23.30	39.65	51.60	63.76
5		22.53	38.01	49.61	61.24
10		21.51	35.85	46.54	57.47
15		20.93	34.63	44.39	54.92
20		20.59	33.94	42.89	53.21
25		20.40	33.55	41.84	52.05
Note: This table is included as an example, the burnup requirements will be calculated using the coefficients provided.					