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SUBJECT: Responds to request for addl info on TS amend request re refueling operations decay time.

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AEP AMERICAN ELECTRIC POWER

August 1, 1996

AEP:NRC:1202B

Docket Nos.: 50-315
50-316

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D. C. 20555

Gentlemen:

Donald C. Cook Nuclear Plant Units 1 and 2
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION
TECHNICAL SPECIFICATION AMENDMENT REQUEST
REFUELING OPERATIONS DECAY TIME (TAC NOS. M91023 AND M91024)

This letter and its attachments constitute a response to the June 18, 1996, request for additional information concerning our November 16, 1994, submittal (AEP:NRC:1202). Our original submittal requested a change from the present 168 hours to 100 hours after shutdown, for spent fuel movement from the core to the spent fuel pool.

Sincerely,

E. E. Fitzpatrick
Vice President

SWORN TO AND SUBSCRIBED BEFORE ME
THIS 1st DAY OF August 1996

My Commission Expires: 6-28-99

msg

Attachments

A001

cc: A. A. Blind
A. W. Beach
NFEM Section Chief
NRC Resident Inspector - Bridgman
J. R. Padgett

ATTACHMENT 1 TO AEP:NRC: 1202B

TECHNICAL SPECIFICATION AMENDMENT REQUEST - REFUELING OPERATIONS DECAY TIME (TAC NOS. M91023 AND M91024)

1. DECAY HEAT

A. *The decay heat calculated for long term spent fuel assemblies stored in the spent fuel pool (SFP) as of June 24, 2010 is 14,117,944 BTU/HR, as shown in Holtec report HI-951389 on page 6. Provide a detailed list of the individual values of heat generation for each batch (1A-24A and 1B-19B), as shown in Tables 1 and 2 of this Holtec report.*

Attachments 2 and 3 to this letter contain the LONGOR program output files for unit 1 and unit 2 discharges, respectively, as stated in Holtec report HI-951389. The files report the discharge batch size, decay period, equivalent full power days, and decay heat for each discharge batch placed into the Cook Nuclear Plant spent fuel pool. Each row of data in the attached output files corresponds to discharge batch, and the discharge batches are listed in increasing numerical order (i.e. the first row in Attachment 2 is for batch 1A and the last row is for batch 24A). Also note that there are 20 discharges from unit 2.

B. *The list should contain an explanation of the bases for each calculation. You show batches 10B through 20B to have burn-ups of 64,800 (assumed to be MWd/MTU). Explain whether you use this burnup to calculate heat generation rates for unit 2 batches. In any case, explain and justify the burn-ups you did use for these batches if not contained in the response to 1A above.*

Tables 1 and 2 of Holtec Report HI-951389 list the burnup (MWd/MTU) for each batch discharged into the spent fuel pool. The burn-ups listed for all historical discharges (1A-14A and 1B-9B) are the actual batch-average burnup values. The burn-ups for all future discharges (15A-24A and 10B-20B) are calculated from the maximum reactor thermal power, the core fuel uranium weight, and the in-core irradiation period using the relation $B=(Q*T)/W$ where Q is the reactor thermal power (MW), T is the in-core irradiation period (days), and W is the core fuel uranium weight (MTU).

All batches were assumed to have been burned for three cycles of 476 effective full power days (EFPDs) with reactor thermal powers of 3250 MW (current rated power) and 3588 MW (anticipated uprated power) for unit 1 and unit 2, respectively. The fuel weight was selected to provide a lower bound for all likely future fuel assemblies.

Calculations tend to overestimate burnup. The numerator (Q*T) is overestimated (conservative approach) because most assemblies do not see three complete cycle burns of 476 EFPDs. The denominator is underestimated (conservative approach) by selecting a fuel weight to provide a lower bound for all likely future fuel assemblies. The net effect is to increase the magnitude of the calculated burnup, thus conservatively increasing the estimated overall pool heat load.

calculated burnup, thus conservatively increasing the estimated overall pool heat load.

C. *Explain the marked difference in heat generation for the "Old" batches residing in the SFP calculated in Holtec Report HI-941183, dated August 1994 (pages 2-4) in the amount of 18.15 E06 BTU/HR versus that calculated in Holtec Report HI-951389 for the updated Thermal/Hydraulic Analysis (Rev. 1, dated December 22, 1995), on page 6, of 14.118 E06 BTU/HR.*

Two factors affect the magnitude of the "old" batch decay heat generation rate: the batch decay period and the decay heat calculation method. As stated in the introduction to Holtec Report HI-951389, the operating cycle length for the Cook Nuclear Plant reactors is being increased. The increased operating cycle length pushes back the start date of the 25A outage. This results in a longer decay period for "old" assemblies, thereby reducing the in-pool decay heat for "old" fuel batches. Also, the older report (HI-941183) used the method of Branch Technical Position ASB 9-2 to determine the decay heat generation, while the updated report uses the more rigorous and more accurate ORIGEN-2 program.

D. *Provide the units for the column headings "Burnup", "Enrich", and "Weight" in Tables 1 and 2 of Holtec Report HI-951389 if not already contained in response to 1A, above.*

The units for burnup, enrichment, and weight are MWd/MTU, % U235, and kg-U.

2. DEIONIZER RESINS

A. *Explain how the deionizer resins are protected in the event of high SFP coolant temperatures.*

The evaluated worst case (HI-951389 Case 1A) SFP coolant temperature is 155 °F. This evaluated worst case temperature drops to 140 °F in approximately 40 days (Figure 1 of HI-951389, curve extrapolated to 140 °F by performing an exponential least squares fit to the plot data).

The SFP demineralizer uses a mixed bed of cation and anion resins. The cation resins have a recommended maximum operating temperature of 250 °F and are therefore protected in the evaluated worse case. The anion resins stated exchange capacity is lowered by extended exposure to temperatures above 140 °F.

If realized for a duration of 40 days, the evaluated worst case elevated SFP coolant temperature would lower the exchange capacity of the anion resins by less than 15%, as estimated using manufacturer supplied data. This 15% reduction in exchange capacity is conservative as it assumes 24 hour per day operation of the demineralizers (the long term average is 7.2 hours per day) and

a constant SFP coolant temperature of 155 °F over the entire 40 days (even though the SFP coolant temperature would be decreasing to 140 °F).

The demineralizer system function, therefore, would not be significantly impacted by the realization of the worst case SFP coolant temperature scenario.

ATTACHMENT 2 TO AEP:NRC:1202B

COOK NUCLEAR PLANT, UNIT 1, CALCULATION OF OLD FUEL HEAT AT START OF BATCH 25A OUTAGE

D. C. Cook, Unit 1, Calculation of Old Fuel Heat at Start of 25A Outage

Batch	# Assys	Decay Days	EFPD	Watts	Btu/hr
1A	65	12514.00	513.36	12273.61	41889.82
2A	64	12043.81	786.11	18565.74	63364.88
3A	64	11678.56	917.38	21794.35	74384.10
4A	65	11258.88	812.87	20193.45	68920.23
5A	64	10894.63	796.28	19751.64	67412.34
6A	64	10493.56	802.04	20290.90	69252.84
7A	80	10115.31	796.96	25592.71	87347.92
8A	80	9487.06	763.97	25100.35	85667.48
9A	80	8679.75	935.78	32158.66	109757.50
10A	80	8043.50	1032.13	36342.59	124037.30
11A	80	7473.31	973.96	35101.66	119802.00
12A	80	6853.50	1076.75	40828.95	139349.20
13A	80	6254.63	1050.79	40808.45	139279.20
14A	80	5735.31	1004.93	39949.70	136348.30
15A	84	5212.00	1429.35	68207.76	232793.10
16A	84	4689.38	1429.35	70996.49	242311.00
17A	84	4169.06	1429.35	74366.21	253811.90
18A	84	3648.06	1429.35	78704.23	268617.60
19A	84	3127.75	1429.35	84591.56	288711.00
20A	84	2607.13	1429.35	93654.95	319644.30
21A	84	2084.81	1429.35	109341.60	373182.80
22A	84	1564.50	1429.35	140753.50	480391.90
23A	84	1042.88	1429.35	214461.30	731956.40
24A	84	522.56	1429.35	419084.60	1430336.00

Total Watts = 1742915.00
Total Btu/hr = 5948569.00
Power Factor = 0.103502

ATTACHMENT 3 TO AEP:NRC: 1202B

COOK NUCLEAR PLANT, UNIT 2 CALCULATION OF OLD FUEL HEAT AT START OF BATCH 25A OUTAGE

Cook Nuclear Plant, Unit 2, Calculation of Old Fuel Heat at Start of 25A Outage

Batch	# Assys	Decay Days	EFPD	Watts	Btu/hr
1B	80	11482.06	410.12	14708.62	50200.53
2B	92	10969.50	697.16	27581.33	94135.09
3B	72	10353.88	793.23	24506.60	83641.03
4B	92	9878.75	847.23	34675.84	118348.70
5B	88	9160.63	815.38	32772.02	111850.90
6B	80	8365.88	852.40	32755.17	111793.40
7B	77	7576.00	870.79	33426.52	114084.70
8B	76	6977.13	921.07	36101.45	123214.30
9B	76	6047.75	965.67	40429.74	137986.70
10B	84	5490.75	1429.10	79108.68	269997.90
11B	84	4965.38	1429.10	82414.92	281282.10
12B	84	4444.81	1429.10	86237.76	294329.50
13B	84	3923.50	1429.10	90956.04	310433.00
14B	84	3402.75	1429.10	97155.24	331590.80
15B	84	2880.13	1429.10	106006.30	361799.60
16B	84	2360.81	1429.10	119989.00	409522.30
17B	84	1838.25	1429.10	145612.30	496974.80
18B	84	1317.88	1429.10	199579.80	681165.90
19B	84	798.31	1429.10	332277.10	1134062.00
20B	84	276.00	1429.10	777310.80	2652962.00

Total Watts - 2393605.00
Total Btu/hr - 8169375.00
Power Factor - 0.128753