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March 16, 1994

Docket No. 50-213
B14775

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555

Haddam Neck Plant
Spent Fuel and New Fuel Storage Modifications
Response to Request for Additional Information

Connecticut Yankee Atomic Power Company (CYAPCO), via a letter to the NRC Staff dated January 6, 1994,[1] requested an amendment to the Haddam Neck Plant's Operating License. This amendment request would modify the nominal fuel enrichment allowed to be stored in the new fuel storage rack and the spent fuel pool. The NRC Staff, via a letter dated February 4, 1994,[2] provided comments on the CYAPCO submittal of January 6, 1994. Enclosed as Attachment 1 are the NRC Staff questions and accompanying CYAPCO responses. To respond to one of the NRC Staff's questions, Technical Specification 3/4.9.14, "Spent Fuel Pool — Reactivity Condition," has been revised. In addition, CYAPCO has included Technical Specification Figure 5.6.1, "New Fuel Storage Rack Minimum IFBA Requirements," since the Figure's legend required modification.

The Significant Hazards Consideration provided in the January 6, 1994, letter, remains valid. CYAPCO wishes to expand the basis for its request for a categorical exclusion from the requirements for an environmental impact statement. Specifically, CYAPCO has reviewed the proposed license amendment against the criteria of 10CFR51.22 for environmental considerations. The change does increase the weight percent (w/o) of the fuel above the limit of 4 w/o. However, the NRC has reviewed the anticipated widespread use of extended burn-up fuel in commercial light water reactors and has concluded (February 29, 1988, 53FR6041) that there are no significant adverse radiological or nonradiological impacts associated with the use of extended burn-up fuel and that this use will not significantly affect the quality of

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(1) J. F. Opeka letter to the U.S. Nuclear Regulatory Commission, "Proposed Revision to Technical Specifications, Spent Fuel Pool and New Fuel Storage Modifications," dated January 6, 1994.

(2) A. B. Wang letter to J. F. Opeka, "Haddam Neck Plant — Spent Fuel and New Fuel Storage Modifications, Request for Additional Information (TAC No. M88585)," dated February 4, 1994.

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the human environment. Moreover, the NRC has issued NUREG/CR5009, "Assessment of the Use of Extended Burn-up Fuel in Light Water Reactors," which concludes a finding of no significant impact for fuel up to 5 w/o U-235 and burn-up up to 60 Gwd/Mtu.

Based upon the above and the information in our January 6, 1994, letter, there are no significant radiological or nonradiological impacts associated with the proposed changes, and the proposed changes will not have a significant effect on the quality of the human environment.

The Haddam Neck Plant Nuclear Review Board has reviewed and approved the proposed change and has concurred with the above determination.

In accordance with 10CFR50.91(b), we are providing the State of Connecticut with a copy of this proposed amendment to ensure their awareness of this request.

Should the Staff require any additional information to process this request, CYAPCO remains available to promptly provide such information.

Very truly yours,

CONNECTICUT YANKEE ATOMIC POWER COMPANY

J. F. Opeka
Executive Vice President

cc: T. T. Martin, Region I Administrator
A. B. Wang, NRC Projeci Manager, Haddam Neck Plant
W. J. Raymond, Senior Resident Inspector, Haddam Neck Plant

Mr. Kevin T.A. McCarthy, Director
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Subscribed and sworn to before me

this 16 day of March, 1994

Notary Public

Date Commission Expires: 3/31/98

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Attachment 1

Haddam Neck Plant

Response to Request for Additional Information

March 1994

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Question 1: The required Action for proposed Technical Specification 3.9.14 is not appropriate. The k_{eff} of the pool must be no greater than 0.95 without credit for boron in the pool water, as required by Technical Specification 5.6.1.1a. If the placement of fuel assemblies does not meet Figure 3.9-1 or 3.9-2, the required Action should be to correct the loading error.

Response 1: We agree with your comment. The required Action for proposed Technical Specification 3.9.14 has been changed and is attached. The new Action is: Immediately initiate actions to correct the loading error if the placement of fuel assemblies does not meet the requirements of both Figure 3.9-1 and Figure 3.9-2.

Question 2: Westinghouse 15x15 fresh fuel assemblies may be placed in the fresh fuel racks if they either comply with the enrichment-IFBA requirements of Technical Specification Figure 5.6-1 or have a reference k-infinity less than or equal to 1.483. Therefore, why isn't the k-infinity requirement also in the TS?

Response 2: The criticality analysis (last paragraph on Page 12 of the criticality analysis attached to our January 6, 1994, letter) states that "all 15x15 fuel... must comply with the enrichment-IFBA requirements... or have a reference K-infinity less than or equal to 1.483." Meeting either of these requirements is sufficient to be consistent with the criticality analysis assumptions. The enrichment-IFBA requirement curve was generated such that by complying with the enrichment-IFBA curve limits of proposed Technical Specification Figure 5.6-1, the k-infinity limit of 1.483 was also met. This is more restrictive to the Haddam Neck Plant but makes the technical specifications less complicated.

Question 3: Are 61 spaces for new fuel assembly storage sufficient for a reload batch?

Response 3: Yes, 61 spaces are sufficient for storage of a batch of new fuel assemblies. Evaluations of batch sizes for Cycle 19 and future cycles have shown the batch size to range between 52 to 56 fuel assemblies to achieve the desired cycle lengths for the Haddam Neck Plant.

Question 4: Please discuss the number of neutron histories used in the KENO Monte Carlo calculations and why this is sufficient to assure convergence.

Response 4: Westinghouse KENOVa Monte Carlo calculations are always performed with sufficient neutron histories to assure convergence. A typical Westinghouse KENOVa Monte Carlo calculation involves more than 60,000 neutron histories which is significantly more than the KENO default of 30,900. To assure adequate convergence, the KENO edits which show Average K_{eff} per Generation Run and Average K_{eff} by Generation Skipped are examined. These edits provide a visual inspection on the overall convergency of the KENOVa Monte Carlo results.

Question 5: Since nominal boron carbide absorber plate dimensions were assumed, why weren't the uncertainties due to manufacturing tolerances for thickness and length also included in the reactivity analysis?

Response 5: Based on drawings of the Haddam Neck Plant spent fuel rack design, the tolerance on the boron carbide plate width is +0.05/-0.10 inches. The criticality analysis transmitted with our January 6, 1994, letter contains a typographical error on page 15, paragraph 9. The boron carbide plate width tolerance should be stated as +0.05/-0.10 inch. This is the tolerance used in the reactivity calculations for the boron carbide plate width.

Based on drawings of the Haddam Neck Plant spent fuel rack design, there is no negative tolerance on the spent fuel rack boron carbide plate thickness. The tolerance on the boron carbide plate thickness is .210"(+.035", -0) and the minimum value of .210" was conservatively used. Therefore, there is no reactivity increase resulting from the boron carbide plate thickness tolerance.

The boron carbide plate overall length does not show a specific tolerance on the spent fuel rack drawings. The boron carbide length, however, is made up of 4 individual plates each with a ± 0.25 inch tolerance. Therefore, a worst-case tolerance stack-up of one inch can be assumed for the length of the boron carbide plate.

As manufactured, the boron carbide plates are placed into the cell enclosure with no fastener. This means that the boron carbide plate will begin at the lower end of the enclosure and

the length will extend upward from there. The plate length begins 2.62 inches above the bottom of the cell and extends for a nominal 127 inches. If a conservative tolerance stack-up of one inch is assumed on the length, the boron carbide plate extends for 126 inches. This length is sufficient to cover the entire length of the active fuel stack. Therefore, there is no reactivity increase resulting from the boron carbide plate length tolerance.

Question 6: Since the spent fuel assembly storage array was assumed to be infinite in lateral and axial extent, it appears that an average assembly burnup was assumed in the burnup credit reactivity equivalencing. What is the effect of axial burnup distribution on assembly reactivity?

Response 6: The effect of axial burnup distribution on assembly reactivity has been considered in the development of the Haddam Neck Plant burnup credit limit. Previous Westinghouse evaluations have been performed to quantify axial burnup reactivity effects and to confirm that the reactivity equivalencing methodology described in the report results in calculations of conservative burnup credit limits. The Westinghouse evaluations show that axial burnup effects can cause assembly reactivity to increase, but the burnup-enrichment combinations required to cause this are well beyond those required by the reported burnup credit limits. Therefore, additional accounting of axial burnup distribution effects in the Haddam Neck Plant burnup credit limit is not necessary.