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June 7, 1984

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Attention: Ms. E. G. Adensam, Chief
Licensing Branch No. 4

Re: McGuire Nuclear Station
Docket Nos. 50-369, 50-370

Dear Mr. Denton:

Please find attached additional information concerning the McGuire Nuclear Station spent fuel pool two region rerack modifications. This additional information was requested in a May 14, 1984 letter from Elinor G. Adensam, NRC/ONRR, to H. B. Tucker.

Please advise us if there are further questions regarding this matter.

Very truly yours,

Hal B. Tucker

Hal B. Tucker

WHM:glb

cc: Mr. J. P. O'Reilly, Regional Administrator
U. S. Nuclear Regulatory Commission
Region II
101 Marietta Street, NW, Suite 2900
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Mr. W. T. Orders
Senior Resident Inspector
McGuire Nuclear Station

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DUKE POWER COMPANY
MCGUIRE NUCLEAR STATION
Spent Fuel Pool Rerack Modifications
Additional Information

1. The implication from Figures 2.2-1 and 2.2-2 is that a nominal edge-to-edge spacing of 6.25 inches separates the fuel assemblies in Region 1 from those in Region 2. Presumably no neutron absorber is present between these assemblies. Please confirm the above value or provide the value and confirm that effect of the interaction of assemblies in Regions 1 and 2 has been analyzed and shown not be lead to an increase in pool reactivity.

   Response: The nominal edge-toedge spacing between Region 1 and 2 fuel assemblies is 9.15 inches for Unit 1 (Figure 2.2-1) and 6.15 inches for Unit 2 (Figure 2.2-2). No neutron absorber is present between these assemblies. The effect of interaction between Region 1 and 2 fuel assemblies has been analyzed and shown not to lead to an increase in pool reactivity.

2. Please provide similar assurance with regard to the inter-rack spacing in Regions 1 and 2.

   Response: The nominal edge-to-edge spacing between fuel assemblies in Region 1 is 5.97 inches and in Region 2 is 3.64 inches. These spacings, without neutron absorber, similarly have been analyzed and shown not to lead to an increase in pool reactivity.

3. The inference may be drawn form the submittal that there is no difference in reactivity of the Region 1 racks between storage of Westinghouse standard or OFA fuel of the same enrichment. Please confirm or affirm that the quoted results are for the most reactive of the two fuels.

   Response: The analytical results reported are based on the properties of the Westinghouse OFA fuel which is more reactive than the Westinghouse standard fuel.

4. Similarly the curve of burnup vs. initial enrichment for Region 2 is single-valued. Please affirm that this curve is bounding for all three types of fuel.

   Response: Calculations were performed for both Westinghouse and Babcock & Wilcox fuel which established the curve (Figure 2.4-3) as a bounding condition for all of the three fuel types.

5. Please commit to the placement of temporary mechanical restriction on the insertion of fuel assemblies in the unfilled locations in the checkerboard area in Region 2.

   Response: At this time there is no designated area within the proposed Region 2 area of either spent fuel pool for which checkerboard storage will be utilized. Duke Power Company intends and expects to utilize only

Region 1 locations for storage "ofunqualified" fuel assemblies. Checkerboard storage of unqualified assemblies in Region 2 will be utilized only in the unlikely event that all 286 Region 1 spaces are filled and further storage of unqualified assemblies is needed.

In addition to providing storage capacity in Region 1 for a full core off-load (193 spaces) there are 93 additional spaces available for storage of unqualified permanently discharged assemblies. Due to the conservatism included in the burnup criteria for Region 2 storage and the economic incentives for obtaining maximum burnup from each fuel assembly, it is expected that permanent discharges of unqualified spent fuel will be due to fuel failures or defects occuring early in the fuel assembly life. These failures/defects would also need to be significant in order to warrent the premature discharge of the fuel assembly. This scenario is expected to occur very infrequently over the life of the plant. It is highly unlikely that there will be a need for Region 2 checkerboard storage and at this time Duke considers it only as a backup to the Region 1 storage capacity.

Despite the arguments presented above, Duke Power Company accepts the fact that backup checkerboard storage could be needed in the future and therefore, it has been included in the safety analysis. Duke Power feels however that the administrative controls that will be in place to control checkerboard storage in Region 2 would provide enough safety margin to compensate for a lack of commitment to the use of mechanical restrictions on the open locations. These administrative controls would be very similar to those proposed for normal storage of fuel in Region 2. They would include double verification of fuel indentification and location as well as pre-documentation of spaces which are designated for fuel storage. Based on earlier discussions, it would be expected that several years of experience with these administrative controls will have taken place prior to utilizing them for controlling fuel placement under the checkerboard storage mode. Consequently, the transition into a checkerboard storage mode will be simple, safe and routine for fuel handling personnel.

Several other provisions for avoiding fuel misplacement in the checker board storage mode includes the fact that the Region 2 cells form a checkerboard pattern by design thus providing some visual assistance in insuring a checkerboard pattern of fuel storage. Also a commitment in the safety and environmental analysis defines the designated area of Region 2 with a row of empty cells which are administratively maintained until the area is redefined or no longer needed.

In the event that all the above provisions for avoiding fuel misplacement are unsuccessful such that a fuel assembly does get misplaced in the worst case accident (2 fully enriched assemblies placed in adjacent locations), the resulting increase in reactivity will not result in a criticality accident. As discussed in Section 2.4.2.4 of the Safety and Environmental Analysis, accidental placement of an assembly in a space intended to be vacant in the checkerboard storage configuration has been analyzed in the same way that misloading of an assembly in

the wrong region has been analyzed. Aside from the fact that the former is a much more "visible" accident than the latter, these two accidents are actually quite similar. Boron concentration will preclude a criticality accident following either event. Verification of the boron concentration has been committed to in the technical specification changes for this modification.

In summary, the provisions that have been proposed to protect against fuel misplacement and the postulated accidents analyzed are very clearly related between two-region fuel misplacement and checkerboard fuel misplacement. Consequently Duke Power feels that mechanical loading restrictions applied specifically to the "non-fuel" locations of a checkerboard storage area would provide little or no additional safety and would require the unnecessary design of cumbersome components for remote placement in the pool. Based on the above discussion we feel that a commitment request for mechanical restrictions for checkerboard storage is unjustified and propose to maintain our orginal position on this matter.

6. We believe that your quality assurance commitment on page 4.1-1 is too limited and that it should be expanded to include design, purchasing, fabricating, handling, etc. We request that such a commitment be made by you or that you justify why such a commitment is not appropriate.

   Response: The McGuire spent fuel racks are designated QA Condition 1. The Duke Power QA program for QA condition 1 conforms to all applicable sections of 10 CFR 50 Appendix B, "Quality assurance criteria for Nuclear Power Plants", and ANSI N45.2.11-1974, "Quality Assurance Requirements for the Design of Nuclear Power Plants". This QA Condition 1 designation applies to the specifications for rack design and installation; i.e., rack design, purchasing, fabrication, testing, inspection, handling and installation.

7. Provide a discussion of radiation protection training associated with the spent fuel pool modification. This should include any special training, such as the use of mock-ups or training in the use of special tooling, which will be conducted, especially for divers.

   Response: Health Physics and emergency training is administered in accordance with 10CFR19 and Regulatory Guide 8.27. In addition, ALARA preplanning will specify the requirements for mock-up and special tooling training. The job supervisor is responsible for insuring ALARA preplanning requirements are met. A pre-job meeting will be conducted with all individuals involved in the rerack operation. During this meeting the work will be reviewed to ensure that workers are knowledgeable of the task. The H.P. technician responsible for job coverage will review the radiation work permit requirements, the diving procedure, dose minimization techniques and emergency procedure with workers. Daily communication between the job supervisor, diving personnel and health physics will be maintained.

8. Verify that the recent events involving overexposures to divers have been reviewed and the lessons learned incorporated into the McGuire work effort (See IE Information Notice 82-31 and Preliminary Notification 84-27).

Response: The diver overexposure events described in IE Information Notice 82-31 and Preliminary Notification 84-27 have been reviewed. Whenever internal fuel movement occurs the identification and location of fuel assemblies are independently verified by both Control Room personnel and the station Performance Unit. Other irradiated objects are controlled similarly. Verification of fuel and control component location os again obtained prior to each day's diving.

In addition, pre-dive underwater radiation surveys of the work area are performed. Instrument readings, used to set doserates and diver staytimes, are verified through timed TLD and pocket dosimeter measurements. Agreement within ±20% is required prior to diving operations taking place. An alarming dosimeter or detector with remote readout capabilities is required for divers when doserates are fluctuating or water clarity is poor. An underwater vacuum will be used to assist in maintaining water clarity and reduce exposure sources. The above methods, as well as others previously described, will insure positive control is maintained over diver exposures and exposures are ALARA.

9. What are the pre-modification and post-modification dose rates at the surface of the spent fuel pool which were used in your dose estimates in Section 5.4, "Summary of Occupational Dose Associated With Additional Spent Fuel Storage Capacity" of your submittal?

Response: Job dose estimates for the reracking operation were based on actual job dose data from Oconee Nuclear Station. Adjustments were made based on the scope of work projected for the McGuire Nuclear Station reracking operation as well as anticipated doserates. These general area doserates are:

Spent Fuel Pool Operating Deck	2mr/hr
Spent Fuel Pool Water	10mr/hr
Spent Fuel Pool Handling Bridge	5mr/hr

Due to the extent of water cleanup expected for the reracking operations actual doserates may be lower both during and subsequent to the modifications.

The maximum post-modification doserates are anticipated to occur during transfer of newly discharged fuel.

Spent Fuel Pool Operating Deck	2-5 mr/hr
Spent Fuel Pool Handling Bridge	20 mr/hr

The rapid decay and efficient cleanup of deposited activity should maintain doserates at approximately pre-modification levels.