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50-316 Donald C. Cook Nuclear Power Plant, Unit 2, Indiana & 05000316
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RECIP.NAME RECIPIENT AFFILIATION
DENTON,H.R. Office of Nuclear Reactor Regulation

SUBJECT: Forwards further clarification re topics pertinent to evaluation of util application to expand storage capacity of spent fuel pool at site.Topics include boral corrosion data & swelling of storage cells.

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September 26, 1979
AEP:NRC:00213B

Donald C. Cook Nuclear Plant Unit Nos. 1 and 2
Docket Nos: 50-315 and 50-316
License Nos. DPR-58 and DPR-74
Spent Fuel Storage Capacity Expansion Program

Mr. Harold R. Denton, Director
Division of Operating Reactors
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Denton:

At the request of your staff we provide in the attachment to this letter further clarification on several topics pertinent to the evaluation of our application to expand the storage capability of the spent fuel pool at the Donald C. Cook Nuclear Plant. The requests of your staff were transmitted to us over the telephone in conversations held between August 31, 1979 and the date of this letter.

Very truly yours,

G. P. Maloney
Vice President

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ATTACHMENT TO
AEP:NRC:00213B

1. Boral Corrosion Data

The test data from Exxon Nuclear Company's Boral - stainless steel corrosion study is summarized in Report No. XN-NS-TP-009 which has been previously submitted to the NRC in support of Salem No. 1 storage rack licensing, Docket No. 50-272. One copy of each version of the Report, proprietary and non-proprietary, is being sent to you under separate cover.

The properties of stainless steel in the environment of the Donald C. Cook storage racks are well known. There is not a known corrosion mechanism which would adversely affect the integrity of the stainless steel storage cells in the Donald C. Cook rack modules.

Stainless steel-clad boral surveillance specimens will be placed in the spent fuel pool and will be periodically inspected to monitor the integrity of materials. The inspection of the samples will include weighing them.

2. Swelling of the Storage Cells

The design of the Donald C. Cook storage rack cells has taken into consideration the past problems of high density spent fuel rack swelling. In order to prevent the possible operational problem which occurs when a storage cell swells inward, we have instituted very stringent quality control and assurance programs for the leak tightness of the storage cells as stated on page 2 of our previous Submittal No. AEP:NRC:00128 dated January 24, 1979.

The storage cells are also designed to preclude operational problems in the unlikely event of a leaking cell. Unlike previously designed spent fuel racks, the Donald C. Cook storage cells have the thinner stainless steel shroud on the outside and thicker shrouds on the inside of the cell. Since the hydrostatic pressure is the same on both sides of the cell, if swelling occurs at all, the thinner outside shroud will bow outwards under sufficient internal pressure.

Exxon Nuclear Company has performed calculations and done experiments on full scale models to verify that the maximum achievable internal pressure, approximately 5.5 psig, if a leak were to develop at the bottom of a storage location, will not cause interference between two adjacent cells.

Exxon Nuclear Company has also performed criticality calculations to analyze the impact of swelling on k_∞. We reported those results on page 2 of our submittal No. AEP:NRC:00128 dated January 24, 1979.

2. (Continued)

Our normal operational procedures and spent fuel rack dimension inspection at the time of installation serve as a means of monitoring any inward swelling of the storage cells that could exist. Following installation of the storage racks and before insertion of fuel assemblies into the cells, a "dummy" fuel assembly will be inserted into each cell. Drag forces will be monitored during insertion and withdrawal. Storage cells whose measured drag forces exceed 30 pounds will be examined to determine the cause of the excess drag force.

In addition, normal operation procedure calls for drag forces to be monitored while inserting a spent fuel assembly into the storage cell. If the measured insertion force exceeds 50 pounds, the insertion will be halted in that cell until the cause of the larger insertion force is determined and corrected.

3. Commitment to Cut and Plug the 4" Drainage Pipe

The spent fuel pool is equipped with a 4 inch drain pipe which was utilized during construction of the Plant. The drain line enters the pool approximately 20 ft. above the pool bottom and extends down into the pool. The line is equipped with an antisiphoning vent to preclude siphoning of the pool water in the event of a pipe rupture. However, a Request for Change was initiated on September 7, 1979 to cut and plug the 4" drain line of the spent fuel pit such that the line will no longer be able to drain water from the pool.

An engineering evaluation is being made to select a method to accomplish this task. The 4 inch line is located in a low radiation level area of about 2.5 mr/hr. Our present estimate indicates that the job could be accomplished using a 3 man crew working for 30 hours. The resulting man-rem exposure is estimated to be below 0.25.

4. Weight of Spent Fuel Racks

Approximate weight of the current spent fuel racks is 7,000 lbs per rack module. The estimated weights of the new racks are 33,800 and 37,200 lbs per module for the 10 x 10 and for the 10 x 11 modules respectively.

5. Spent Fuel Rack Removal, Disposal and Installation

Discussions of this topic have been provided in our submittals Nos. AEP:NRC:00128 dated January 24, 1979, pages 6 and 7, AEP:NRC:00213A dated July 27, 1979, page 4, and AEP:NRC:00213 dated June 29, 1979 page 3.

5. (Continued)

The responses will be summarized for clarification. Step by step procedures will be used by the installation contractor to control the order of removal of each of the old racks and the order of installation of the new racks. These procedures will specifically prohibit the movement of racks over stored spent fuel in accordance with existing Technical Specifications. Details of these procedures are contained in Exxon Nuclear Company document XN-NS-IP-012. The final procedure will be reviewed and approved by the onsite safety review committee for use at the Donald C. Cook Nuclear Plant. The approved procedure will be made available at the plant for your staff's review.

Due to delays in approval of our licensing application, the detailed removal sequence outlined on page 3 of our submittal AEP:NRC:00213 dated June 29, 1979 may need to be revised. However the basic concept remains the same. Fuel will be moved to one side of the pool to facilitate spent fuel rack removal and installation at the opposite side of the pool. Fuel will then be moved into the new racks to allow the removal and installation of the remainder of the racks.

The removal of the old racks is accomplished by using a long handled tool to remotely unbolt the rack from the spent fuel pool floor. Upper inter-ties on the current racks are unlatched remotely and the racks, after an underwater wash down with a high pressure water jet to remove any surface contamination, will be lifted out of the pool. After the pool bottom is vacuumed and surveyed, the new racks will be set in place and remotely levelled using the adjustable feet of the racks. All operations are done remotely underwater requiring no divers and under the supervision of radiation protection personnel.

It is our intention to measure the dose associated with the disposal of the racks as we prepare to perform the task. Then taking into consideration alternative disposal costs and radiation exposures, we will make the final decision as to disposal of the racks whole or cut up in order to reduce their disposal volume. All estimates of occupational exposures to perform this modification have assumed the current racks to be cut up for disposal since this is the most conservative assumption. It is estimated that cutting up the racks will require 2 man-rem. The cost of disposal of the cut-up racks is estimated at approximately $50,000 which is half as much as the cost of disposal for whole racks.

6. Spent Fuel Pool Floor Supports

In analysis of the spent fuel pool slab for high density fuel rack loading the D. C. Cook Plant FSAR design criteria were followed.

6. (Continued)

As shown on drawing 12-3401, transmitted previously to your staff, the span of the slab has been reduced by the addition of a heavy steel beam and support columns. The reduction of slab span permits the slab to carry loads greater than that for which it was originally designed. Therefore the new supporting structure has been designed to restore the initial design criteria and margins of the spent fuel pool.

7. IE Bulletin 79-17

The make-up water piping of the CVCS hold up tanks to the spent fuel pool does not fall under the requirements of IE Bulletin 79-17 due to the fact that it is not a Seismic Class I system. To date however we have not experienced leaks in this system which would prevent its use. Additionally, make up water to the spent fuel pool could be supplied if needed by other sources such as temporary fire hose lines which could be set up and utilized within a matter of hours. Some further questions asked by your Staff that relate to the Bulletin will be answered in our Submittal No. AEP:NRC:00255A.

8. Boral Verification Program

If during the on-site inspection of the sample of the fuel cells to verify the presence of the boral plates in the fuel racks one plate was found missing we will notify your staff. Our commitment to inspect in such case 100% of all rack modules was described on page 3 of the Attachment to our Submittal No. AEP:NRC:00128, dated January 24, 1979.

9. Movement of Loads Over The Spent Fuel Assemblies

On page 13 of our Submittal No. AEP:NRC:00213 dated June 29, 1979 we provided information concerning the weight and length of tools which are carried over the spent fuel pool. On pages 43 and 44 of our Submittal No. AEP:NRC:00169 dated April 16, 1979 we discussed the dropped fuel assembly accident. The analysis considered a maximum kinetic energy at the point of impact of 24,240 in. - lb. force.

The maximum potential energy of some of the tools handled over the spent fuel could be greater than that of a dropped fuel assembly, the latter from a height of 15 inches. We have had several discussions with your staff with regard to their concern on this matter. Until such time as the NRC develops its generic position on the subject of movement of loads over the spent fuel assemblies we will restrict the height of tool movement over

9. (Continued)

spent fuel such that if the tool were to drop, the impact energy would not exceed that of the analyzed spent fuel drop accident, i.e., 24,240 in.-lbs. In addition, to insure that the handling tools will not drop we will install a backup cable sling.

10. Fuel Cells' Leak Tightness Testing

On page 2 of the Attachment to our Submittal No. AEP:NRC:00128, dated January 24, 1979 we mentioned testing for leak tightness of the fuel storage cells. Here we expand on our previous answer. To insure that the fuel storage cells are leak tight with a 95% confidence level, an alternate non-destructive method has been implemented. The method consists of immersing the fuel storage cell in water while pressurizing the cell annulus with helium gas. Leaks are indicated by helium gas bubbles escaping to the surface of the water. This alternate method has been qualified to be equivalent to the helium mass spectrometer test we originally discussed in the NRC offices on October 31, 1978.