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SUBJECT: Forwards responses to NRC 920113 request for addl info re proposed spent fuel pool reracking.

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Donald C. Cook Nuclear Plant Units 1 and 2
Docket Nos. 50-315 and 50-316
License Nos. DPR-58 and DPR-74
SPENT FUEL POOL RERACKING
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

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

Attn: T. E. Murley

February 4, 1992

Dear Dr. Murley:

Reference: Letter, AEP:NRC:1146, E. E. Fitzpatrick to T. E. Murley, July 26, 1991, and its attachment, "Licensing Report for Storage Densification of D.C. Cook Spent Fuel Pool," Holtec International.

Attached to this letter are our responses to your staff's January 13, 1992 request for additional information regarding the proposed Donald C. Cook Nuclear Plant spent fuel pool reracking (TAC NOS. M80615 and M80616). Please contact us should you require additional information or clarification of our response.

This document has been prepared following Corporate procedures that incorporate a reasonable set of controls to ensure its accuracy and completeness prior to signature by the undersigned.

Sincerely,

E E Fitzpatrick

E. E. Fitzpatrick
Vice President

Attachment

tjw

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1/1

cc: D. H. Williams, Jr.
A. A. Blind - Bridgman
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NFEM Section Chief
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NRC Resident Inspector - Bridgman

1. Heavy loads handling:

Question 1.a

"A 'single failure-proof hook' was mentioned in the report. For heavy loads handling, a single failure proof handling system or an analysis of a load drop is required. Provide documentation of the single failure proof handling system or the analysis of the worst case load drop. Show how the hook complies with the single failure-proof criteria of NUREG-0612."

Response to 1.a.

The auxiliary building cranes were reviewed as part of the 1988 Donald C. Cook Nuclear Plant steam generator replacement project. The Safety Evaluation Report enclosed with Amendment 100 to Facility Operating License No. DPR-74, dated March 8, 1988, concluded that both auxiliary building 150-ton cranes meet the "single-failure-proof" criteria of NUREG-0554 for loads less than 55 tons for the most restrictive crane. No modifications to the cranes have been made which would invalidate this conclusion. The crane hooks will be used to lift no more than 50% of their single-failure-proof rating since the maximum weight of any module and its associated handling tool is 24 tons. This meets the criteria specified in Section 5.1.6 (1) of NUREG 0612. This is iterated in Section 2.4 of the Holtec licensing report (see reference) for the rerack project, with the clarification that the new crane installed for the steam generator project is single failure proof up to 60 tons. The older crane, modified as part of the steam generator replacement project, is rated single failure proof to 55 tons. Also, as committed to in Section 2.4 of the Holtec licensing report, the cranes will be given the necessary preventive maintenance checkup and inspection within three months of the beginning of reracking operations.

Question 1.b.

"The report states: 'A module change-out scheme will be developed which ensures that all modules being handled are empty when the module is moving at a height which is more than 12" above the pool floor.'

"The accident analysis section of the licensing report does not include an analysis of a rack containing fuel being dropped or impacting another rack or the pool wall.

(1) If DC Cook does not have a single failure proof handling system, either provide an analysis of rack movement and rack drop with fuel assemblies in the rack or clarify the rack movement procedure to preclude movement of racks with fuel in them.

(2) If DC Cook has an approved single failure proof handling system, provide an explanation of the rack movement procedure for handling loaded racks, including limitations for the movement of these racks."

Response to 1.b.

As stated above, the crane utilized for handling the old and new rack modules is single failure proof. The rack change-out sequence currently being developed for Cook Nuclear Plant envisages a single step rigging of the module. In other words, the rack module will be upended in the truck bay equipped with the NUREG-0612-compliant lift rig, staged, and pre-leveled on the poolside without rerigging. The "prepped" rack module will be lowered into the fuel pool and emplaced on the pre-placed bearing pads without any other handling maneuvers. As an additional conservatism, at no time will any rack being carried encroach the safety zone around the stored fuel (defined as the 36" planar patch around the outer periphery of the stored fuel). All old racks raised from the pool and new ones lowered into the pool will be empty of fuel assemblies. However, the eastern most row of rack modules located in the eastern end of the pool (Modules A4, C4, and E4) and the rack module in the southwest area of the pool (Module A5) require one intermediate step before their final placement in the pool. In order to avoid accessing the cell row adjacent to the pool wall, this row will be loaded with fuel when the rack is placed in the pool at approximately 12 to 18" from its final location. The rack will then be raised no more than 6" from the pool liner and gently moved over to its final location using the crane and lateral "come-alongs." At no point will the rack be more than 6" from the liner surface during this moving operation.

Despite the unlikelihood of the accidental load drop scenario, the Indiana Michigan Power Company evaluated the consequences of a postulated drop of a rack. The governing scenario is that a rack module loaded with two rows of fuel (the peripheral row at the two ends) is dropped from the maximum (allowable) height of six inches. Under this scenario, the rack is found to impact the liner with a maximum velocity of 23 inch/sec., leading to a peak load of approximately 200,000 lbs. The gross structural integrity of the spent fuel pool structure and the fuel rack is shown to remain unimpaired. The impact load sustained by the fuel assembly is considerably less than its local impact strength.

Analysis shows that the structural integrity of the pool, rack and contained fuel will remain unimpaired should modules A4, C4, D4, or A5 be dropped from a height of 6" while loaded with up to 26 assemblies. All empty modules will be handled single failure proof per NUREG 0554. Therefore, all planned rack movements comply with the criteria specified

in NUREG 0612. Thus, based on NUREG 0612 compliance, the fact that there is no intermediate rerigging, and that all handling operations comply with the nine defense-in-depth criteria delineated in Section 2 of the Holtec licensing report, it is concluded that the safety measures for Cook Nuclear Plant reracking exceed those of other recent rerack projects, which did not employ single-failure-proof cranes.

Question 1.c.

"Show that a single attachment break in the single failure proof handling system will not result in the heavy load (such as a fuel rack loaded with fuel) swinging or rotating, so as to impact the pool of fuel racks. Otherwise, provide an analysis of the results of such swing(s) or rotation(s)."

Response to 1.c.

The single-failure-proof lift rig features redundant lift points that are located in such a manner that failure of any one loaded line (chain or sling) will not allow uncontrolled swinging or rotation of the rack. The center of gravity of the rack will be bounded in the space formed by the remaining locations of load line attachments.

2. Decay Heat Loads:

Question 2.a.

"Standard Review Plan 9.1.3 provides guidelines for cooling and sources of make-up water to the SFP. (1) The SFP cooling system should be designed to seismic Category I requirements or (2) the fuel pool make-up water source, its source, the fuel pool building and its ventilation and filtration system should be designed to seismic Category I requirements. The FSAR for DC Cook does not specify a make-up water system and its source as seismic Category I. Show which alternative, 1 or 2, above, is applicable, and provide the details of compliance with that guideline."

Response to 2.a.

Section 9.1.2, "Spent Fuel Storage," of the September 11, 1973 Safety Evaluation for the Donald C. Cook Nuclear Plant states that the spent fuel storage facility meets the design criteria of Regulatory Guide 1.13, "Fuel Storage Facility Design Basis." The result of this determination is not affected by the proposed spent fuel pool reracking. This regulatory guide does not require that the cooling and clean-up system be Seismic Class I.

In addition, the ventilation and filtration system issue was recently addressed in the Safety Evaluation Report enclosed with Amendments 124 and 111 to Facility Operating License Nos. DPR-58 and DPR-74, respectively. In this safety evaluation the NRC indicates that the spent fuel pool ventilation system, as currently operated, meets the intent of Standard Review Plan (SRP) 9.4.2, "Spent Fuel Pool Area Ventilation System," and SRP 15.7.4, "Radiological Consequences of Fuel Handling Accident." The results of these determinations are not affected by the proposed spent fuel pool reracking.

Make-up water to the pool can be obtained from several reliable, permanently installed sources, including the CVCS hold-up tank recirculation pump, demineralized water supply, and RWST tank. Various temporarily installed options also exist to supply make-up water, including water from the fire protection system, demineralized water system, boric acid blender, and Lake Michigan. With these diverse sources, make-up water will be readily available in the event of loss of spent fuel pool cooling.

Question 2.b.

"Table 5.5.1 of the Holtec report shows that for a normal refueling load including a SFP failure in the cooling system, the temperature of the spent fuel pool will rise to 159.54°F. Justify the deviation from the design basis of below 140°F for a normal refueling and below 130°F for a full core offload with both SFP cooling system trains in operation."

Response to 2.b.

The existing design basis for the Cook Nuclear Plant spent fuel pool cooling system specifies lower peak pool bulk temperatures corresponding to a smaller storage capacity with a concomitant increase in the maximum pool bulk temperature. The higher temperatures reported in the Holtec licensing report arise from the assumption of a much larger stored fuel inventory due to the proposed reracking. The maximum temperatures, however, are lower than those of other recently licensed PWR plants. The table below illustrates the comparison.

Plant	Year Licensed	Maximum Pool Temp., °F for Fuel Core Offload
Diablo Canyon	1987	174.3
Indian Point (Unit Two)	1990	180

The Cook Nuclear Plant cooling system is sized to satisfy the temperature limits of SRP 9.1.3 for the corresponding SRP discharges. The cooling system is adequate to handle the increased storage inventory

because (1) for the normal discharge scenario (with two trains in operation), the maximum pool water temperature is below 150°F, and (2) for the postulated full core offload case (with one cooling train operation), the maximum water temperature is well below 212°F. In both cases the temperatures are well below the limits that might cause structural concerns. Finally, it is noted that the maximum water temperature corresponds to the very conservative assumptions of maximum postulated temperatures of Lake Michigan (90°F), maximum postulated fouling of the spent fuel pool heat exchangers and maximum possible quantity of stored fuel in the pool. The actual maximum temperatures under realistic conditions will be considerably lower.

Question 2.c

"At the maximum pool temperature, what is the concrete temperature? Show that the concrete integrity is maintained for both normal and abnormal conditions."

Response to 2.c

The bulk temperature of the concrete walls and slab typically lag the pool water temperature during ramp condition (heatup or cool down) by at least 20°F. Therefore, the maximum concrete bulk temperature is expected to remain well below the ACI-recommended long-term temperature limit of 150°F at all times.