



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO AMENDMENT NO. 113 TO FACILITY OPERATING LICENSE NO. DPR-58
AND AMENDMENT NO. 96 TO FACILITY OPERATING LICENSE NO. DPR-74

INDIANA AND MICHIGAN POWER COMPANY
DONALD C. COOK NUCLEAR PLANT, UNIT NOS. 1 AND 2
DOCKET NOS. 50-315 AND 50-316

By letter dated January 9, 1987, the Indiana and Michigan Electric Company (the licensee) provided an analysis of the mechanical, radiological, and criticality consequences of dropping the 4.25 ton hook/block assembly into the D. C. Cook spent fuel pit from its full height. The analysis was performed in fulfillment of a condition in the staff Safety Evaluation (SE) dated February 27, 1986 on control of heavy loads at the D. C. Cook plants. The analysis is limited to the considerations of the crane load block as a heavy load and any load carried on the load block must have been previously analyzed or bounded by a previously-approved load drop analysis.

EVALUATION

The mechanical analysis resulted in the conclusion that four fuel assemblies would suffer the rupture of all fuel rods. The radiological consequences of the rupture of all the rods in a single assembly were presented in the original safety evaluation of the racks ("D. C. Cook Units 1 and 2, New and Spent Fuel Storage Array Criticality Safety Analyses," XN-NF-81-97(P) Rev. 2). The results for four assemblies can be obtained by simple scaling and are 7.2 rem to the thyroid and 2.12 rem to the whole body at the site boundary. The staff concludes that the linear scaling is appropriate and that the resultant doses meet the criteria of NUREG-0612 ("Control of Heavy Loads in Nuclear Power Plants," July 1980) and are, therefore, acceptable.

The mechanical analysis showed that the hook will penetrate four fuel assemblies to a depth of approximately 30 inches while the block comes to rest at the top of the fuel-bearing portion of the storage cells. The criticality analysis assumed that the fuel in the full length of the damaged assemblies rearranged so that the rod-to-rod spacing was consistent with a uniform expansion of the assembly to just fill the storage cell. This is the maximum reactivity condition given that constraint. The presence of the loose fuel pellets which fall through the water and are mostly trapped on the first undamaged spacer is ignored.

An infinite array of 10 assembly x 10 assembly storage racks of infinite length was modeled. The KENO-Va Monte Carlo code was used to perform the analysis. This code has been extensively qualified for such calculations and a supplementary qualification was performed to verify its use. The staff concludes that the calculation method and modeling are acceptable.

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The calculated value of K-effective for the configuration described above is 0.94, including all uncertainties. No credit was taken for the presence of dissolved boron in the fuel pool water in performing the analysis and the maximum enrichment (4 percent) was used for the fuel. The calculated K-effective value meets the staff's acceptance criterion for this quantity and is acceptable.

Because the event being analyzed is not anticipated (i.e., is an accident), credit may be taken for the boron in the pool. If such credit is taken, the resulting value of K-effective would be of the order of 0.8 or lower. This is adequate margin to account for any uncertainty in the definition of the maximum reactivity configuration.

SUMMARY

Based on the review which is described above, the staff concludes that the criticality consequences of the drop for the hook and block into the D. C. Cook spent fuel pool are acceptable. This review is limited to the crane load block and any load carried on the load block must have been previously analyzed or bounded by a previously-approved load drop analysis. Based on this review, the proposed Technical Specification revision to remove the footnote provisions for the load block to be unloaded and the hoist deenergized when traveling over the spent fuel is acceptable.

ENVIRONMENTAL CONSIDERATION

These amendments involve a change in the installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The staff has determined that the amendments involve no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously published a proposed finding that these amendments involve no significant hazards consideration and there has been no public comment on such finding. Accordingly, these amendments meet the eligibility criteria for categorical exclusion set forth in 10 CFR §51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of these amendments.

CONCLUSION

The staff has concluded, based on the considerations discussed above, that (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, and (2) such activities will be conducted in compliance with the Commission's regulations, and the issuance of the amendments will not be inimical to the common defense and security or to the health and safety of the public.

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Date: December 17, 1987

