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U.S. NUCLEAR REG. COMM.
ADVISORY COMMITTEE ON
REACTOR SAFEGUARDS

Mr. J. C. McKinley
Advisory Committee on Reactor Safeguards
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. McKinley:

At the LaCrosse Boiling Water Reactor Subcommittee Meeting of October 26, 1979, a request was made for further information on the methods used in the nuclear criticality calculations for the proposed spent fuel storage facility. I have recently received from Mr. Peter Buck of Nuclear Energy Services, Inc. (NES) a document in support of their calculational methods. I have reviewed the document [W. D. Bromley and J. S. Olszewski, "Safety Calculations and Benchmarking of Babcock and Wilcox Designed Close Spaced Fuel Storage Racks", Nuclear Technology, 41, 341 (1978)] and have the following comments to offer.

The LaCrosse criticality calculations were apparently performed with the KENO code with the 16-group Hansen-Roach cross section set, in a manner similar to that reported by Bromley and Olszewski. Although the simulation of a few UO₂ criticals using the calculational scheme over-predicts the effective multiplication factor by 0.024, I still have some concerns over the adequacy of the calculational scheme. One basic concern I have is related to the use of the Hansen-Roach cross sections for thermal reactor criticality calculations. The 16-group set, developed originally for fast and intermediate reactor calculations, has only two energy groups below 0.4 eV, and can not be, in my opinion, expected to accurately represent the spatial self-shielding effects of importance in spent fuel storage designs. In the KENO calculations performed by the NES, a coarse-mesh spatial description was also used to describe the storage rack including the poison plates. In these calculations, the double self-shielding effects associated with poison particles were not apparently represented. These features of the calculational scheme, I believe, present some difficulty in extrapolating from the actual criticals data to the proposed fuel lattices of different configurations.

Based on my understanding of the LaCrosse spent fuel storage facility design, I have no particular reason to think that there might be a potential criticality problem at LaCrosse. Because of the concerns I have over the calculational scheme used, however, I find it difficult to quantitatively assess the accuracy of the criticality calculations performed for the proposed storage facility.

Yours sincerely,

John C. Lee
Associate Professor of Nuclear
Engineering

JCL/pgd
cc: W. Kerr