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WILLIAM O. PARKER, JR.
VICE PRESIDENT
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TELEPHONE: AREA 704
373-4083

May 7, 1982

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: Catawba Nuclear Station
Docket Nos. 50-413 and 50-414

Dear Mr. Denton:

Elinor G. Adensam's letter of March 8, 1982 requested additional information related to the storage of non-Catawba fuel at the Catawba Nuclear Station. My letter of April 2, 1982 provided responses to these questions with the exception of questions 6 and 10c, which are attached.

Very truly yours,

William O. Parker, Jr.

William O. Parker, Jr.

ROS/php
Attachment

cc: Mr. J. P. O'Reilly
Mr. P. K. Van Doorn
Mr. R. Guild
Palmetto Alliance
Mr. J. L. Riley
Mr. H. Pressler

B001
S1/1

Duke Power Company
Catawba Nuclear Station

Response to Questions 6 and 10c of Elinor G. Adensam's letter of March 8, 1982:

6. Provide the verification results of the KENO code used. This should include a description of the experiments which were calculated and the bias and standard deviation of the calculational results. It should be noted that the KENO code was not previously approved by the NRC.

Response:

The calculation method and cross-section values are verified by comparison with critical experiment data obtained from Reference 1. The experimental lattice arrays and structure are similar to what is found in a spent fuel storage rack.

The design method which ensures the criticality safety of fuel assemblies in the spent fuel storage rack uses the Hansen and Roach 16 group cross-section library (Reference 2) for cross-section generation and KENO IV (Reference 3) for reactivity determination.

A set of thirteen (13) critical experiments have been analyzed using the above method to determine its applicability to criticality analysis and to establish the method bias and variability. The experiments consist of water moderated and reflected, 2.35 Wt%^{235}U oxide fuel arrays separated by water and stainless steel that simulate LWR fuel storage conditions.

The results and some descriptive facts about each of the 13 benchmark critical experiments are given in Table 6-1. The average K_{eff} of the benchmarks is 1.0083 which demonstrates that there is a conservative bias of .0083ΔK associated with the method. We do not take credit for this conservative bias in the design calculations. The standard deviation of the K_{eff} values is 0.0043ΔK.

(1) S. R. Biermin, E. C. Clayton, and B. M. Durst, "Critical Separation between Subcritical Clusters of 2.35 Wt%^{235}U Enriched UO_2 Rods in Water with Fixed Neutron Poisons," PNL-2438, Battelle (October 1977).

(2) G. E. Hansen and W. H. Roach, "Six and Sixteen Group Cross Sections for Fast and Intermediate Critical Assemblies," LAMS-2543 (November 1961).

(3) "KENO IV - An Improved Monte Carlo Criticality Program," ORNL-4938 (November 1975).

TABLE 6-1

BENCHMARK CRITICAL EXPERIMENTS

	Experiment Number	Separating Material	Critical Separation Between Fuel Clusters (cm)	K_{eff}
1.	002	Water		1.0057±.0033
2.	015	Water	11.92	1.0141±.0035
3.	005	Water	8.39	1.0065±.0035
4.	022	Water	6.39	1.0100±.0031
5.	045	Water	8.03	1.0069±.0031
6.	021	Water	4.46	1.0171±.0031
7.	028	Stainless Steel	6.88	1.0054±.0029
8.	005	Stainless Steel	7.64	1.0003±.0030
9.	029	Stainless Steel	7.51	1.0058±.0032
10.	027	Stainless Steel	7.42	1.0098±.0030
11.	026	Stainless Steel	7.76	1.0113±.0030
12.	034	Stainless Steel	10.44	1.0069±.0032
13.	035	Stainless Steel	11.47	1.0079±.0030

10.c What is the average population density along each of the proposed routes?

Response:

The following population densities apply to the routes identified in 10.a and are expressed in average persons per square mile.

McGuire to Catawba

Rail Routes	Truck Routes
A - 1125	A - 719
B - 711	B - 675
C - 960	C - 676
	D - 463

Oconee to Catawba - Truck Routes

A - 509
B - 529
C - 312
D - 549
E - 602
F - 362
G - 362
H - 385
I - 154