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November 8, 1982

Docket Nos. 50-277
50-278

Mr. John F. Stolz, Chief
Operating Reactors Branch #4
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, DC 20555

SUBJECT: Revision to High Density Spent Fuel Rack Design Report for Peach Bottom Atomic Power Station

Dear Mr. Stolz:

This letter transmits a revision to page 5-8 of the safety evaluation entitled "Licensing Submital Design Report for High Density Spent Fuel Racks for Philadelphia Electric Company, Peach Bottom Atomic Power Station Unit No. 2 and 3", dated January, 1978, for the purpose of correcting an error in the calculated allowable spent fuel pool floor load. The change is indicated by a vertical bar in the margin. The design report was filed with the January 19, 1978 Application for Amendment to the Peach Bottom Operating Licenses, DPR-44 and DPR-56 relating a planned increase in storage capacity of each spent fuel storage pool from 1110 fuel assemblies to a maximum of 2816 assemblies. The application received NRC approval by an amendment issued December 11, 1978.

In the process of investigating other activities associated with spent fuel storage, a recent reanalysis of the spent fuel pool structure concluded that the allowable uniform floor loading value of 4000 psf is incorrect and should be revised to 2050 psf. The study confirmed that the stresses in the spent fuel pool structure remain within allowable limits when

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subjected to fully loaded high density racks. The Peach Bottom Operating and Safety Review Committee reviewed this issue and concluded that a safety concern does not exist. The unchanged page (5-7) is enclosed for completeness.

Should you have any questions concerning this matter, please do not hesitate to contact us.

Very truly yours,

Attachment

cc: R. Blough
Site Inspector

3. A drop through the full length of a cavity, impacting on the bottom grid.

The following method is used in defining the impact loads: to determine the net impact energy for conditions 1 and 2, the impact energy losses (due to the inertia of the rack, and to the collapsing of the nozzle on the fuel assembly bottom tie plate) were quantified. Using the SAP IV model, spring rates were determined at various impact locations on the rack. A static impact load was then determined for each of these locations by equating the elastic structural strain energy with the net impact energy. These impact loads have been verified by full size tests on an actual top grid casting.

For condition 3, an unimpeded fuel assembly drop through an empty cavity, an equivalent static load was determined to shear out the bottom fuel support. The following presents the equivalent static loads for the three drop conditions.

Condition	Description	Load
1	18 inch drop, corner of rack	58,200 lbs
2	18 inch drop, middle of rack	49,200 lbs
3	Drop through empty cavity of rack	26,500 lbs

Equivalent static loads for different dropped fuel bundle cases were then applied at proper locations to the SAP IV finite element model of the rack and combined with the dead weight vertical load (rack full of fuel). Stresses for each member and plate were then tabulated and were less than the factored allowables of equation 3 Table 5-1.

5.4 Pool Interface Loads

Forces transmitted by the interface elements, which represent the rack legs, are computed for each time step of the analysis. These loads are used to determine the bearing and punching shear stress in the reinforced concrete floor. The allowable stresses are defined by Section 8.10, Alternative Design Method, of American Concrete Institute (ACI 318-71). As described in the Commentary to the Code this section uses the working stress design method of ACI 318-63.

The overall floor load was obtained by taking the force in the floor spring "Kf" on Figure 5-3 and calculating a

total for all racks by a square root-sum of the squares technique. The allowable floor loading is based on Ultimate Strength Design methods contained in Part IV-B of ACI 318-63.

TABLE 5-2

	D & E' Allowable
Bearing on Concrete-Floor (Small Areas)	3170 psi
Punching Shear-Floor	275 psi
Uniform Load-Floor	2050 psf

D = Dead load of structure and equipment plus any other permanent loads contributing stress, such as hydrostatic loads.

E' = Maximum credible earthquake load.

All interface loads were calculated to be below these allowable values.

5.5 Summary and Conclusions

The design clearances leave a safety factor of greater than 3 to 1 between the high density spent fuel racks and the spent fuel pool walls for the calculated maximum seismic displacement condition 1 (p. 5-6), and a safety factor of greater than 2 to 1 between the racks and other unmovable objects on the SFP, including the remaining control rod racks shown in Figure 3-1a and 3-2a.

All member and plate stresses satisfy the stress combination limits and factored allowable stresses of equation 1, 2 and 3, Table 5-1, for the seismic and dropped fuel conditions. The stresses on the concrete floor are below the allowable limits listed in Table 5-2.