April 25, 1986

Docket No. 50-255

Mr. Kenneth W. Berry
Director, Nuclear Licensing
Consumers Power Company
1945 West Parnall Road
Jackson, Michigan 49201

Dear Mr. Berry:

SUBJECT: EXPANSION OF THE SPENT FUEL STORAGE CAPACITY AT PALISADES PLANT

The submittal you made on February 20, 1986 in support of a change to the Design Features section of the Palisades Technical Specifications to increase the storage capacity for spent fuel indicated the analyses that would be completed to show that this modification would meet the appropriate acceptance criteria. We understand that summary reports of these analyses will be submitted in the near future. To ensure an expedited review, we are enclosing a list of questions that we have identified based on our review of your submittal and on our experience of previous similar reviews for spent fuel storage expansion. We ask that you ensure that your summary reports will include this information or that you will make supplemental submittals to provide it.

The information requested by this letter pertains solely to the Palisades Plant. Therefore less than ten respondents are affected and OMB clearance under P.L. 96-511 is not required.

Sincerely,

/S/

Thomas V. Wambach, Project Manager
PWR Project Directorate #8
Division of PWR Licensing-B

Enclosure:
As stated

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See next page

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REQUEST FOR ADDITIONAL INFORMATION
PALISADES SPENT FUEL STORAGE EXPANSION

1. What type of administrative controls are employed to evaluate the burnup of a fuel assembly prior to its placement in Region II?

2. Since the spent fuel burnup requirements for storage in Region II are given in terms of weight percent of U-235, we recommend that the references to 41.24 grams of U-235 per axial centimeter in Tech Spec 5.4.2 be changed to weight percent of U-235 for consistency.

3. Please identify the organization and provide assurance that the organization that performs the criticality analyses has been previously qualified to perform these type of calculations.

4. The standard deviation of the K_{eff} values for the 27 critical experiments used as benchmarks (Table 3-1) is significantly lower than that previously obtained by other licensees using the same calculational method. Describe your derivation of the 95/95 uncertainty in the method bias in more detail.

5. What are the values of the worst case K_{eff} and of the biases and uncertainties referenced in Section 3.1.4.1.1 for Region II?

6. It appears that the only uncertainty accounted for due to reactivity equivalencing is that due to uncertainty in the plutonium reactivity. Justify why the uncertainty in reactivity as a function of burnup was not included also.

7. What is the maximum clad temperature predicted to occur in the spent fuel pool for normal storage conditions and for any abnormal or accident condition?

8. The request for Technical Specification change from Consumers Power Company dated February 20, 1986, does not provide sufficient information to perform an adequate review of certain aspects of material considerations mentioned in (or omitted from) Section 4 of PALSFP-4-NL02. The following information is needed for the staff to complete this review:

    a. Identification of subsections, articles, subarticles and paragraphs of Sections III and IX of the ASME Boiler and Pressure Vessel Code that pertain to spot welding referenced in PALSPF-4-NL02,

    b. The fabrication, control, and inspection methods utilized in spot welding, and

    c. The long term environmental compatibility of the spot welds with fuel pool storage conditions.

9. SPENT FUEL RACK STRUCTURAL ANALYSIS

With respect to the analysis of spent fuel rack modules, please provide the following information:

a. For the Region I racks already in place, provide descriptions and sketches of the fuel racks, their method of lateral restraint (attachment to the pool walls), and a full description of the displacement analysis indicating that the Region I racks will not be displaced to impact the new Region II racks.

b. Document the source of the earthquake data and describe the methods by which the earthquake acceleration time histories were generated for use in the rack displacement analysis.

c. Describe the number of independent horizontal earthquake acceleration components used, as well as the directional orientation of the horizontal components relative to the long and short sides of the racks analyzed.

d. Identify the rack modules chosen for analysis and provide the technical justification that the choice of racks for analysis brackets, or bounds, the response of all the rack modules in the spent fuel pool and tilt pit.

e. Provide the clearance space between each adjacent rack module and between the rack modules and the pool walls.

f. For adjacent rack modules, describe how the clearance space between the rack modules was apportioned to each module for the purposes of comparing the rack displacement to the available apportioned clearance space.

g. Document the computer codes used for the 3-dimensional elastic analysis and for the nonlinear dynamic displacement analysis. Include justification of the choice of the computer codes.

h. Describe the features and limitations (if any) of the frictional model used to compute static and sliding friction in the dynamic displacement analysis.

i. A statement on Page 4-9 indicates that "the hydrodynamic mass of a submerged fuel rack assembly is modeled by general mass matrix elements connected between the cell and the pool wall." Please provide the theoretical premise by which this was modeled, and justify the use of the model for hydrodynamic mass and hydrodynamic coupling between adjacent rack modules, between a rack module and the pool walls and walls, and between a fuel assembly and the storage cell walls. Does this underestimate or overestimate the hydrodynamic coupling?

j. Document the source of the impact spring stiffness and impact damping between a fuel assembly and the storage cell walls, and justify the value of impact damping used.

k. For the nonlinear dynamic displacement analysis, describe the numerical integration method used, as well as the procedures that were employed to assure that the numerical integration remained stable and that the resulting displacements represent a fully converged solution.

l. Provide a summary of rack displacements that includes elastic distortion (if significant), sliding and tipping displacement as well as their sum.

m. Provide tables of computed stresses in the rack structure and support legs, and their comparison to allowable values in accordance with the acceptance criteria cited in the licensing report.

n. Provide the amount and characteristics of mounting foot lift-off from the pool floor associated with dynamic rack displacement, and show that the resulting impacts with the floor were considered in the stress analysis.

o. Provide an analysis of rack module stability in the tipping mode, considering the worst case of off-center fuel load possible.

p. Provide a detailed description of the recessed cask area (cask pit), showing its location in the spent fuel pool and the geometric relationship of the cask pit to any adjacent spent fuel rack modules. Include full descriptions of any structures, or other provisions, present to preclude damage to any adjacent fuel rack modules during cask operations, or to prevent any adjacent fuel rack modules from entering the pit.

10. SPENT FUEL POOL STRUCTURAL ANALYSIS

With respect to analysis of the spent fuel pool under the increased loads of higher density fuel storage, the Licensee is requested to provide the following information to supplement the analysis outline provided in the licensing report:

a. Describe how the dynamic interaction between the pool structure and the rack modules was considered, including the value of any associated dynamic amplification factors.

Include all assumptions made regarding the summation and phase of all rack loads.

b. Provide analysis proving the adequacy of the pool floor and liner under the local maximum rack module dynamic mounting foot loads.

c. Provide identification of the most critical regions of the pool structure. List the stresses (thermal, deadweight, seismic and rack dynamic loads) and their comparison to allowable values, including the source and justification of the use of the allowable values.

11. FUEL ASSEMBLY ACCIDENT ANALYSIS

The following information is requested with respect to the analysis of a dropped fuel assembly covered in Paragraph 4.6.4 of the Licensee's report:

a. For the first accident condition, provide the extent of deformation predicted by the analysis to occur on the top of the spent fuel rack as well as to occur on the dropped fuel assembly. Indicate whether there is a possibility for the damage to release radioactive material.

b. Documentation of the second accident condition should be provided in a manner similar to that requested for question 11.a above.

c. Provide a description of the analysis methods for the third accident condition, including justification of assumptions. Provide the maximum velocity reached by the fuel assembly and verify that the kinetic energy of the fuel assembly can be absorbed as strain energy in the structure without damage to the pool liner or release of radioactive material from the fuel assemblies.