September 29, 1998

MEMORANDUM TO: William H. Bateman, Director
Project Directorate IV-2
Division of Reactor Projects III/IV

FROM: Kristine M. Thomas, Project Manager
Project Directorate IV-2 Original Signed By
Division of Reactor Projects III/IV

SUBJECT: FORTHCOMING MEETING WITH WOLF CREEK NUCLEAR OPERATING CORPORATION AND UNION ELECTRIC COMPANY REGARDING PROPOSED TECHNICAL SPECIFICATION AMENDMENTS FOR THE WOLF CREEK AND CALLAWAY PLANTS

DATE & TIME: October 14 and 15, 1998
8:00 a.m. - 4:00 p.m.

LOCATION: U.S. Nuclear Regulatory Commission
11555 Rockville Pike
Rockville, Maryland 20852-2738
Rooms O 3-B-4 (10/14); T 10-A-1 (10/15)

PURPOSE: To discuss Wolf Creek Nuclear Operating Corporation's and Union Electric Company's proposed technical specification amendments to support a modification to increase the spent fuel pool capacity at the Wolf Creek and Callaway Plants. Attachment 1 contains a list of discussion topics.

PARTICIPANTS*:

NRC	WOLF CREEK	CALLAWAY
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Y. Kim	R. Holloway	
M. Gray		

Docket Nos. 50-482
and 50-483

cc w/att : See next page

CONTACT: Kristine M. Thomas
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*Meetings between NRC technical staff and applicants or licensees are open for interested members of the public, petitioners, intervenors, or other parties to attend as observers pursuant to "Commission Policy Statement on Staff Meetings Open to the Public" 59 Federal Register 48340, 9/20/94. However, portions of this meeting will contain discussions of proprietary information, and therefore, will be closed to the public. Anyone planning to attend this meeting should contact Kristine M. Thomas at (301) 415-1362 by October 5, 1998.

DOCUMENT NAME: WC1014.MTG

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NAME	KThomas:ye	EPeyton
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Attachment

DISCUSSION TOPICS

FOR OCTOBER 14 AND 15, 1998 MEETING

1. Provide detailed fuel rack geometric and physical design data that was not included in the applications, including missing dimensional data (cell wall thickness, sheathing dimensions, baseplate dimensions, etc.) and weld design details (types, sizes, locations and lengths) for the welds between fuel rack cells, between cells and baseplate, between poison sheathing and cells, and between support legs and baseplate.

2. Explain how the welding between cells "detunes" the rack from the seismic input as stated on page 2-12 of the Reference.

3. The safety assessment for Wolf Creek states that the gaps between the racks and pool walls vary from 3/4 inches to 7.43 inches. Figure 1.2 of the Reference shows gaps of 1 inch to 7.43 inches. What are the correct dimensions of the gaps?

4. Are the gaps between the racks and between the racks and the pool wall measured at the baseplates or at a higher elevation? If the gaps between the top and bottom of the fuel rack are different, provide values at both elevations.

5. Provide the dimensions of the bearing pads used to transfer the dead of the racks to the spent fuel pool floor.

6. Provide additional design information on the platforms which will be used to support the spent fuel racks in the cask loading pit. Include a description of how they will be supported and connected to the pool.

7. Identify all interim spent fuel pool configurations including those which will have both existing and new fuel racks. Provide the maximum length of time for which the pool will remain in each interim configuration.

8. Provide a description and sketch of the existing spent fuel racks. Are the current racks free standing or are they attached to the pool floor and/or walls?

9. Figures 7.2.1, 7.2.2 and 7.2.4 in the applications show an additional bar around the top perimeter of a fuel rack. This is not in agreement with Figure 2.1.1 of the applications. What is the current configuration?

10. Provide a detailed description of the methodology used to verify and benchmark all of the computer programs used in the seismic and structural analysis of the spent fuel racks and pool.

11. Provide a description of the formulation used to simulate fluid coupling in a whole pool multi-rack model. Describe the theory, key assumptions, limitations, and verification of the methodology by experiment. In addition, the fluid coupling equations on page 6-11 of the applications include nonlinear terms which are not defined. Do these nonlinear terms account for the change in gap size during a seismic event? Define and explain.

12. With respect to the single safe shutdown earthquake (SSE) artificial time history used for stress analysis as mentioned in the applications, provide the following:

    a) A comparison between the response spectrum (RS) of the artificial time history and the licensing basis design RS in the final safety analysis report (FSAR).

    b) Demonstrate the adequacy of the artificial time history including a demonstration of the extent of conformance to a target power spectral density (PSD) function of the artificial time history in accordance with guidance provided in Standard Review Plan Section 3.7.1.

13. Justify the adequacy of modeling a fuel rack as a 12 degree of freedom structure consisting of single nodes at the top and bottom connected by a single linear elastic element representing beam-like behavior. Include information on the rack stiffness and frequency.

14. Clarify the function of shear and bending springs in Figure 6.5.4 of the applications. They appear to represent hinges at the center elevation (H/2) of the rack.

15. The governing equation of motion given on page 6-15 of the applications does not appear to include a velocity dependent damping term. How is structural damping considered in the analysis? Provide the damping values assumed for linear elastic structures as well as any additional damping associated with impacts.

16. Provide additional information and justification for modeling the fuel assemblies as five unconnected rattling masses versus modeling them as a beam structure. Why are only five impact elevations assumed? Is the full mass of the fuel assemblies assumed to rattle? How are the impact stiffnesses determined? What are their values?

17. How are gap element stiffnesses determined for rack-to-rack and rack-to-pool interfaces? Provide the methods and the values.

18. Provide the specific values of the friction coefficients used in the cases where a random Gaussian distribution was assumed. Were different values assigned to each support leg of each rack? Were any sensitivity studies performed to investigate the limits of response for other randomly selected values? Can any conclusions be drawn with regard to identifying a bounding case by comparing the results of the random case with the results of the cases with upper and lower limits of friction coefficient?

19. Figures 6.5.8 and 6.5.9 of the Reference illustrate a half full spent fuel pool with only 8 of the 15 fuel racks installed. Why was this condition analyzed? Is this an interim configuration?

20. It does not appear that half full or empty fuel rack load cases were considered in the whole pool multi-rack analyses. Such cases may be more bounding with regard to rocking and sliding behavior leading to rack-to-rack or rack-to-wall impacts. Explain why these cases should not be considered.

21. Since the fuel racks rest on bearing pads, was the potential for fuel racks slipping off the pads (due to combined rack and pad motion) and directly impacting the pool floor evaluated? Similarly, was slippage of the platforms in the cask loading pit considered?

22. Provide a brief description of the analytical modeling of the existing spent fuel rack used in the overturning check analysis. Identify the similarities and differences between the existing rack model and the new rack model.

23. Explain how the fuel rack stresses and stress factors are determined directly from the relatively simple DYNARACK model.

24. The table on page 6-31 of the applications provides a summary of the bounding stress factors for the seismic analyses. However, the critical sections (e.g., cellular cross section, pedestal, etc.) and their locations are not identified. Please indicate the sections and locations and provide an example to illustrate how these stress factors were determined.

25. Provide the detailed calculations which define allowable impact loads for fuel assembly to cell, rack-to-rack, rack-to-pool wall, and pedestal-to-pool floor locations. What is the allowable impact load for a fuel assembly?

26. Provide the detailed calculations on the SSE evaluation of welds summarized in Table 6.9.1 of the applications.

27. Were the loads resulting from the local fluid coupling hydrodynamic pressures considered in the evaluation of the fuel racks?

28. The loading combination table on page 6-21 of the applications contains a Service Level B combination that includes load P_f which is the upward force on the racks caused by a postulated stuck fuel assembly. The report does not address this load. Provide an explanation and/or justification for not including this load.

29. The load combination table on page 6-21 of the applications contains thermal loads for normal and accident conditions. However, the report does not provide any information on thermal stress analysis. Explain why thermal stresses were not included in the analyses and load combinations.

30. What is the maximum vertical force developed in the support pedestal resulting from the deep drop of a fuel assembly into a corner cell?

31. How was localized severing of the baseplate/cell wall welds determined in the analysis of the accident scenario involving the fuel assembly deep drop through an interior cell?

32. Define the acceptance criteria for the rack drop accident. Why is a pierced liner and a 4 inch indentation into the pool floor acceptable?

33. Will the increased mass due to the expansion of the spent fuel storage capacity affect the seismic response of the fuel building? If not, provide justification.

34. Provide a description of the analysis method used to demonstrate that the pool liner will not tear or rupture under the limiting load conditions and that there is no fatigue problem under the specified number of earthquake events.

35. In general, a 3-D single-rack (SR) analysis provides more critical information for evaluating structural stability of racks (e.g., tip-over) than a 3-D multi-rack analysis does. However, you did not perform a 3-D SR analysis. Provide justifications for not performing a 3-D SR analysis.

36. Describe the method of leak detection in the fuel pool structure. How are leaks monitored? Is there any existing leakage?

37. Discuss the quality assurance and inspection programs to preclude installation of any irregular or distorted rack structure, and to confirm the actual fuel rack gap configurations with respect to the gaps assumed in the DYNARACK analyses after installation of the racks.

38. Describe the plan and procedure for the post earthquake inspection of fuel rack gap configurations.