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SCHIERLING, H. PWR Project Directorate 3

SUBJECT: Submits questions re proposed spent fuel pool reracking at facility based on technical review of original reracking rept & util 860128 responses to NRC questions. Proposed retrofit departs from std engineering practice.

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Docket Nos.: 50-275
and 50-323

Hans Schierling, Senior Project Manager
PWR Project Directorate No. 3
Division of PWR Licensing-A
Office of Nuclear Reactor Regulation
Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Schierling:

Our organization is reviewing the proposed spent fuel pool reracking at the Diablo Canyon Nuclear Power Plant. We have reviewed both the original reracking report and subsequent responses to questions posed by your office from Pacific Gas and Electric Company dated January 28.

Our own technical review has raised other questions about the proposed reracking which do not seem to have been addressed by your staff in their request for additional information. Any clarification your office could supply regarding these issues would be of assistance in our review.

1) Worst Case Impacts: The Reracking Report (the report) chooses "out of phase" collisions between racks as those leading to maximum stress on the racks and their contents. Without more information, it would seem that a collision between a moving rack and a (moving) wall would be a more serious case. Two or more racks in contact sliding together and impacting with another rack, series of racks, or wall also seems likely and could be expected to produce stresses higher than those considered. Were such collisions analyzed, and if so how, with what results?

2) Impact Stresses: Independent verification of impact stresses cannot be made without data regarding velocities of pool walls, floor and racks. Graphs representing the integration with respect to time of figures 6.1.1, 6.1.2 and 6.1.3 of the report would be useful. Are these available? In addition, what is the length, in real time, of the "time step" used in these figures? Regarding rack velocities, what are the maximum velocities resulting from the solutions of the equations of motion? Presumably these are available from the "DYNAHIS" analysis.

3) Spring Constants: Independent calculation of impact stresses cannot be made without knowing the values of the spring constants used for the nonlinear gap elements at the top and bottom of the racks, but we find no references to these values in the report. What are the (compression only) values of these constants and where did these values come from?

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4) Resonance: While the 8 degree-of-freedom model may or may not accurately describe the motion of the rack, vibrational resonances of the fuel assemblies can be expected to affect the stresses induced on the assemblies themselves. Was this motion analyzed, and if so, how, and with what results?

5) Coefficient of Friction: The coefficients of friction used in the report which range from 0.2 to 0.8 are presumably static coefficients used when there is no relative motion between the two surfaces. To analyze rack sliding, kinetic coefficients would be more appropriate. Have kinetic (sliding) coefficients of friction been measured, what range of values is appropriate for the surfaces involved, and what is the source for these values? Do the calculations in the report use the lower kinetic values when sliding occurs?

6) Coefficient of Friction: Are there any irrigularities which may be expected to occur in the surface of the pool floor liner (seams, sediment, dents, etc.)? What changes can be expected in this surface over the storage lifetime? Are any changes expected from the long-term pressure of the rack supports?

7) Fuel Rack "H": According to the report, fuel rack "H" appears to have a different configuration than other racks (p. 3-4). The base height is listed as 3-3/4 inches lower than others. What is the height of the girdle bar for rack "H"? How different is the height of girdle bar "H" from neighboring racks ("G", "D3", "C", etc)? What are the implications of these differences in rack-rack collisions involving rack "H"?

8) Loss of Cooling: In an event involving loss of cooling and resulting boiling and loss of water, what are the resulting thermal and nuclear effects on the fuel assemblies? How are these effects related to assembly spacing? How much time must elapse before significant damage to fuel assemblies occurs?

9) Statistics: The larger number of racks and their associated parts raises some questions concerning the treatment of confidence levels used in establishing limiting stress values for welds, etc.. Data on limiting values for real welds and materials, standard deviations and confidence levels used would be of assistance in computing failure probabilities. Under stresses expected during an Hosgri event, which rack elements have the highest probablity of failure, what are the probabilities, and how were they calculated?

10) Failure: If the welds on one or more rack legs or rack bases were to fail during Hosgri event, what effects could result from subsequent collisions and seismic accelerations?

11) Rack Density: Does the proposed fuel assembly spacing and density differ significantly from that in place at other reactors? What consideration was given to possible seismic effects when the proposed density was chosen?

12) Alternate Storage: The report fails to consider other on-site storage technologies. Why? Was dry cask storage considered? If not, why not?

13) Anchors: Why was a free-standing rack design chosen over one in which the racks are anchored to the floor and walls, as are existing racks?

14) Boraflex: Would neutron absorber material on all racks improve safety margins in event of accidental compression of fuel assembly arrays due to impacts, etc.?

We understand the problems associated with changing the spent fuel storage system after fuel has been removed from the reactor and the operator's desire to proceed as quickly as possible. However, the proposed retrofit appears to depart considerably from standard engineering practice, involving, as it does, unique seismic considerations. The technical issues raised by the proposed retrofit in the Diablo Canyon environment are difficult to resolve, especially those concerning rack impacts. Even when calculations can be done, it is difficult to know how well the models reflect the real world and what confidence levels should be placed on them. Any help your office can provide in answering the above questions would be highly appreciated.

It is our most sincere desire to have the plant at Diablo Canyon continue to operate safely, and we submit our questions to you in that spirit. Whatever additional information you can provide will further that goal.

Sincerely,

Richard B. Ferguson

Dr. Richard B. Ferguson
Conservation Chair

cc B. Paul Cotter, Jr., Chairman
Atomic Safety and Licensing Board Panel
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Sierra Club Legal Defense Fund