

September 18, 1986

Docket Nos. 50-275
and 50-323

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LICENSEE Pacific Gas and Electric Company (PG&E)
FACILITY: Diablo Canyon Nuclear Power Plant, Units 1 and 2
SUBJECT: MEETING SUMMARY - REINSTALLATION OF ORIGINAL SPENT
FUEL RACKS INTO UNIT 1 FUEL POOL

Background

On September 10, 1986 NRC staff met with staff from Pacific Gas and Electric Company (PG&E), licensee for the Diablo Canyon Nuclear Power Plant, Units 1 and 2, to discuss details of the reinstallation of the original spent fuel racks into the Unit 1 spent fuel pool. Enclosure 1 is the list of attendees. Enclosure 2 is the NRR Daily Highlight announcing the meeting. On September 9, 1986 the Office of the General Counsel informed the parties to the Diablo Canyon rerack case of the meeting.

As stated in the Daily Highlight, PG&E started to reinstall the original racks into the Unit 1 fuel pool on September 5. PG&E had performed a safety evaluation prior to commencing the reinstallation activities in accordance with the requirements of 10 CFR 50.59 and determined that the reinstallation, including certain design changes as discussed below, did not constitute an unreviewed safety question. The safety evaluation and parts of the design change notice (DCN) package for the reinstallation had been provided by PG&E to the NRC Resident Inspector and Project Manager, as requested, on September 8 (Enclosure 3). Based on a cursory review the NRR staff raised a number of questions which were identified to PG&E in a telephone call on September 8. Enclosure 4 is a listing of these questions, which was prepared by PG&E on the basis of the telephone call and in preparation for the September 10, meeting. Enclosure 5 are viewgraphs used by PG&E in the meeting.

Discussion:

At the beginning of the meeting staff stated that the discussion will be limited to those aspects associated with design/installation changes. The following is a summary of the discussions for each item at the meeting:

1. What is the basis for reinstalling the original racks in accordance with the provisions of 10 CFR 50.59?

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PG&E stated that the reinstallation of the original racks involves the following four (4) changes to the original rack design/method of installation:

- (a) racks originally were anchored using bolts welded to embed-plates; racks are being reinstalled by welding the feet to the embed plates.
- (b) the bracing of the rack structure is being reinforced by welding a plate to the braces.
- (c) the lacing (straps welded between individual fuel cell locations) on some racks, which were damaged during the earlier removal of the racks, is being repaired.
- (d) additional weld material is being added to the corner of Rack 8.

PG&E stated the four changes were evaluated using the same acceptance criteria and loading conditions as were originally applied. The loading condition takes into consideration the postulated Hosgri earthquake. PG&E stated that these changes do not involve a change in the Technical Specifications and do not constitute an unreviewed safety question. The staff noted that the PG&E "Design Change Safety Evaluation Summary," DCP Number M-35152 R1 (Enclosure 3) identifies at Item K that a change in the Technical Specifications is required. PG&E stated that this determination was based on an earlier assumption that the amended Technical Specifications for the new, high density racks (i.e. Amendment Nos. 8 and 6 for Units 1 and 2, respectively) are effective. Since, however, the Technical Specifications for the original racks remain in effect no change is required.

The staff commented that the safety evaluation and backup information as submitted in Enclosure 3 were not adequate for the staff to perform its evaluation of the design changes and potential safety significance. The staff requested that PG&E prepare a safety evaluation, similar to those normally submitted in support of a license amendment application, and that this evaluation be submitted as soon as possible (see also at Conclusions).

2. What is the status of reinstallation of the original racks?
How were the original anchor bolts removed?

As of the morning of September 10 five (5) of the eight (8) original racks had been reinstalled, i.e. welded to the embed plates; some of the new, high density racks were still in the Unit 1 pool.

The original anchor bolts (1 inch diameter) had been removed by grinding the bolts down to the embed plates and filling in with weld material any space between the bolt and the embed plates. The embed plates are anchored into the concrete by eight (8) Nelson studs as shown on page 10 of Enclosure 5 (no stud is located under the anchor bolt). When welding a foot of a rack to an embed the equivalent of a 5/8 inch fillet weld, 10.5 inches long is required. In some cases this requires the foot to be cut as shown on page 10 of Enclosure 5. Further discussion is provided at Item 13.

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Regarding the reinforcement of the bracing, in the original analysis it was assumed that the racks would act as rigid bodies with respect to a seismic event. When reanalyzing the racks as non-rigid bodies, it was determined that the seismic forces would exceed the code allowable loads. Consequently additional bracing was added. The re-analysis was performed after the initial decision by the U.S. Court of Appeals on July 2, 1986.

3. When and what revisions will be made to the FSAR to reflect the changes?

The current FSAR Update (Revision 1, September 1985) does not discuss or show details of the original method of mounting the original racks. Revision 2 is forthcoming shortly but will not include the recent changes for reinstallation. PG&E stated that appropriate changes will be included in the 1987 Revision as shown on pages 1 and 2 of Enclosure 5. The staff requested that details of the changes be included in the forthcoming 10 CFR 50.59 safety evaluation.

4. What is meant by the note on page 7 of Enclosure 3 that "this change essentially restores the pool to its originally licensed condition"? (emphasis added)

PG&E stated that this conclusion was based on an evaluation by the Mechanical Department and does not include considerations by the Civil Department. PG&E further stated that "essentially" was intended to reflect the four changes discussed earlier. Staff requested that PG&E address this comment in the forthcoming submittal.

5. What is the basis for the criterion for the 50 pound drag load test?

The original design of the racks is based on a standard Westinghouse design for fuel racks. The 50 pound drag test was a Westinghouse requirement and was originally performed for all fuel cell locations in the eight racks in the dry condition. The same test is now being repeated for all cells after reinstallation. Thus far the load was exceeded for one cell which is currently being evaluated by PG&E.

6. How will the racks be cleaned prior to reinstallation?

The racks are constructed of 304 stainless steel. After removal from the fuel pool in May 1986 each of the original racks was completely covered with a tarp and stored in the open environment. Prior to reinstallation the racks are sandblasted with iron-free sand and steam cleaned. The racks are inspected for structural damage or deterioration. The cleaning and reinstallation at all steps is performed under strict QC requirements and procedures and records are kept.

7. Considering the changes to the racks, why is there no need to change the design calculations for the reinstallation of the racks? Discuss the adequacy of the design with respect to seismic loadings.



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As indicated on page 7 of Enclosure 3 no revisions to the calculations by the Mechanical Department were required. The calculations were repeated by the Civil Department (page 13, Enclosure 3). These revised calculation packages are available for audit. The staff requested that a complete listing of the new calculations be included in the forth coming safety evaluation. The staff might wish to audit the calculations. PG&E stated that since early 1980 the spent fuel rack evaluation effort was directed toward the new, high density rack design, not toward a reevaluation of the original racks. However, subsequent to the initial decision by the U.S. Court of Appeals for the Ninth Circuit in July 1986, PG&E directed its efforts to re-evaluate the original racks. As stated at Item 1 the re-evaluation was performed using the original criteria and loading conditions. With the four design changes the original racks meet the requirements for postulated seismic loadings.

8. How has the load transfer path changed when changing from the bolted to the welded installation?

PG&E discussed the details of the load transfer into the embed plates (pages 7 and 10, Enclosure 5). PG&E stated that from a global perspective there are no changes in the load transfer. The staff requested PG&E to address in the forth coming safety evaluation the effect, if any, on the load conditions of the change in the bolt centroid to the weld centroid configuration. The staff stated that it intends to audit in detail the PG&E evaluation of the global effect as well as local conditions.

9. Are there any asymmetric load conditions?

PG&E stated there is no change in the loading conditions.

10. Why were the braces reinforced by welded plates? What were the specific consideration?

This question is addressed at Items 1,2 and 8. The staff requested that PG&E address any potential impact from the operational environment such as temperature.

11. What is the basis for using the 1983 Edition of ASME Code Section III?

PG&E stated that there is no difference between the earlier and the 1983 version quoted on page 23 of Enclosure 3. The staff was concerned that the more recent version was a relaxation from the earlier version. PG&E will address the details in the forthcoming submittal.

12. What is the installation sequence for reinstalling the original racks?

Preparation and cleaning of the racks is discussed at Item 6, structural changes are made as discussed in Items 1,2 and 8. In order to verify accessibility for welding the racks into place, a wooden model, full size, was constructed. It was determined that all welds can be made. QC will be applied to all welds.

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13. Why were the anchor bolts not restored to the original condition?

As discussed at Item 2, the original anchor bolts had been removed in order to use the now, freestanding racks without bolts. In addition, it was determined in the reanalysis the original method of installation (anchor bolts welded with $\frac{1}{4}$ " fillet weld to plate under embeds as shown on page 10 of Enclosure 5) would not be adequate when using the more conservative, non-rigid body assumption for the fuel racks.

14. Are there any differences in the QC and materials requirements as initially reviewed by the staff?

All activities are performed in conformance with appropriate QC requirements. There are no changes in material employed.

15. What are the details of the embed plates and the liner? Explain the load path for seismic loads between the base slab and the racks.

Details of the embeds and the liner are shown on page 10 of Enclosure 5 and were discussed at Items 1, 2 and 8.

16. Are there any problems anticipated with respect to warping or distortion when welding the racks to the embeds?

Installation precautions and possibilities for distortion or warping are addressed on page 24 of Enclosure 3 (note from Bechtel to Diablo Canyon Project, dated August 15, 1986). As stated no specific problems are expected. The installation will be performed by Bechtel contract personnel. As stated at Item 12, the entire installation will be performed in accordance with applicable QC procedures.

17. How were the feet at the corner of each fuel rack changed from the original changes?

As stated at Item 2 the feet were partially cut in order to provide for the necessary equivalent 10.5 inch long, $\frac{5}{8}$ inch fillet weld. This is also discussed at Item 8.

18. Were warping and distortion considered when changing the rack bracing modification?

The effects were considered and accounted for as discussed at Item 16. Details will be included in forthcoming submittal.

19. How do the new anchorage and other rack modifications affect the seismic analysis and qualification of the unmodified original racks?

The unmodified, original racks were designed with the assumption of a rigid body for a fuel rack. Using the more conservative assumption of a non-rigid body the loads were found to increase and for a brief period in the time history to exceed the allowable loads. The modifications being made to the Unit 1 racks assure that the racks have adequate margin. Similar modification or further analyses would have to be made to the original racks for Unit 2.

20. How can it be assured that the revised anchorage (i.e. welding) is of good quality and capable to transfer the design loads?

The installation process to assure welds of acceptable quality was discussed at Items 12,16 and 18. The type and size of weld required to transfer the load was discussed at Item 2.

21. What type of analysis was originally performed for the racks? Why were the recent changes to the racks necessary to be made? Was interaction between the eight racks considered in the original evaluation?

The original analyses and need for recent changes are addressed in items 1, 2,8,13 and 19.

Interactions between the eight original racks were considered using the assumption of rigid bodies anchored to spent fuel pool fondation.

Conclusion:

NRC staff found the information presented by PG&E very useful and necessary for its evaluation of the design changes. Staff requested PG&E to provide a detailed safety evaluation for the design changes, including a specific response to each of the questions discussed at the meeting. This information should be submitted in a letter report as soon as possible in order for the staff to evaluate the design changes. In addition, the staff intends to audit in the near future the documentation, in particular the detailed calculation packages, for the design changes. PG&E stated that the safety evaluation will be submitted by September 19, 1986 and that the documentation can be audited any time. PG&E further stated that the unloading of spent fuel from the Unit 1 reactor is scheduled to commence on about September 20, 1986.

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ENCLOSURES

1. List of Attendees
2. Daily Highlight - September 9, 1986
3. PG&E Design Changes Safety Evaluation
4. PG&E Telephone Call Summary
5. PG&E Viewgraphs

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