June 6, 2005

MEMORANDUM TO: Robert A. Gramm, Chief
Project Directorate Section IV-2
Division of Licensing Project Management

FROM: A. Louise Lund, Chief ***(/RA by ALLund)***
Steam Generator Integrity and Chemical Engineering Section
Materials and Chemical Engineering Branch
Division of Engineering

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION REGARDING DIABLO CANYON UNITS 1 AND 2 LICENSE AMENDMENT REQUEST TO ALLOW USE OF THE W* ALTERNATE REPAIR CRITERIA FOR STEAM GENERATOR TUBES
(TAC Nos.: MC6409, MC 6410)

By letter dated March 11, 2005 (ML050750134), Pacific Gas and Electric Company, the licensee for Diablo Canyon Units 1 and 2, submitted a License Amendment Request 05-01, Revision to Technical Specifications 5.5.9, "Steam Generator Tube Surveillance Program," and 5.6.10, "Steam Generator Tube Inspection Report," to Allow Use of the W* Alternate Repair Criteria for Indications in the Westinghouse Explosive Tube Expansion Region on a Permanent Basis.

In order for the staff to complete its review, responses to the attached questions are requested.

Docket No.: 50-275
50-323

Attachment: As stated

CONTACT: Paul Klein, NRR/DE/EMCB
301-415-4030

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REQUEST FOR ADDITIONAL INFORMATION
RELATED TO PACIFIC GAS AND ELECTRIC COMPANY
DIABLO CANYON UNITS 1 AND 2
LICENSE AMENDMENT REQUEST 05-01
DOCKET NO. 50-275

By letter dated March 11, 2005 (ML050750134), Pacific Gas and Electric Company, the licensee for Diablo Canyon Units 1 and 2, submitted License Amendment Request 05-01, Revision to Technical Specifications 5.5.9, "Steam Generator Tube Surveillance Program," and 5.6.10, "Steam Generator Tube Inspection Report," to Allow Use of the W* Alternate Repair Criteria for Indications in the Westinghouse Explosive Tube Expansion Region on a Permanent Basis.

In order for the staff to complete its review, responses to the following questions are requested:

1. The staff notes that the constrained crack leak rate model was developed using a simultaneous one-sided 95 percent confidence on the arithmetic average value of the leak rate. Please discuss the rationale for selecting a 95 percent confidence bound on the average and not a 95th percentile prediction interval for the constrained crack leak model. Provide a graph showing leak rate as a function of contact pressure (Enclosure 5, Figure 6) which shows the 95th percentile prediction interval line on the graph.

2. In Section 4.1.2.1, you indicate the 95th percentile F value is 2.221 given 2 regression coefficients and 36 data pairs. Please confirm this value and provide a reference.

3. Figure 1 in Enclosure 5 shows the leak rate versus the contact pressure from the constrained crack specimens. Although one relationship was developed for all the data, it appears there may be two populations of data (e.g., less than 1200 psi contact pressure, greater than 1200 psi contact pressure). Please provide an analysis which demonstrates there is not two or more populations of data. Alternatively, this analysis need not be provided if it can be shown the leak rates developed from the existing treatment of the data is more conservative than leak rates developed using more than one data population.

4. You indicated that two of the leak rates from Table 6.3-3 in WCAP-14797-P were determined to be lower than the value shown since fluid collection times were actually greater than was listed in the data summary. You also indicated that the results were rounded and that for specimens reported with a zero contact pressure there was a gap between the tube and tubesheet, therefore a negative contact pressure was calculated. Please provide an updated Table 6.3-3. In addition, please discuss how the negative contact pressures were determined and the basis for the adjustments.

5. Section 4.1.2.5 states that if greater than or equal to 75 percent of the length of an axial indication is below the bottom of the WEXTEX transition (BWT), the indication will be considered as constrained and 100 percent through-wall, and a 95 percent confidence bound leak rate for zero contact pressure will be assigned using the constrained crack

ATTACHMENT

model. Given that tubesheet dilation resulting from a main steam line break could produce a gap between the tube and tubesheet, the basis for the model is not clear. Please provide the technical basis for this approach. Include in this basis a discussion of (1) the effects of tubesheet bow on the length of crack that could be non-constrained and compare this to the constrained crack test data; and (2) any data supporting the leak rates that could be experienced given the gaps between the tube and tubesheet during a steam line break for these non-constrained crack lengths. With respect to degradation near the BWT or top-of-tubesheet, discuss the effects of severe accident temperatures and pressures on leakage integrity. Include in your response a discussion of potential degradation of the joint or tubesheet related to a jet emanating from a non-constrained crack. Alternatively, modify your technical specifications to indicate that all flaws within the tubesheet that will not be constrained during postulated accidents will be plugged on detection. (The determination of whether a flaw would be non-constrained should address both NDE uncertainty and crack growth during the operating cycle.) The reporting requirements would also need to be modified to reflect this approach.

6. Section 4.14 compares the leak rates obtained with the proposed methodology (based on constrained crack testing) to the existing W* leak methodology (based on the DENTFLO model). In general, the constrained crack methodology calculates higher crack leak rates than the DENTFLO model. In SG 1-1, however, the constrained crack leak rate is less than the DENTFLO leak rate due to an indication near the BWT that accounts for 95 percent of the DENTFLO leakage but has negligible leakage using the constrained crack methodology. This was attributed to a Row 3, Column 2 indication that had negligible constrained crack model leakage using the individual tube contact pressure. If the contact pressure for this particular tube were used in a DENTFLO calculation, would the DENTFLO leakage model calculate less leakage for this indication relative to the constrained crack leak rate methodology? If not, explain why the DENTFLO model leakage is higher than the constrained crack model leakage.

7. The tube inspection definition provided in the Technical Specifications 5.5.9d.1.i does not appear to be consistent with implementation of a W* criteria within the hot leg tubesheet. Please clarify (e.g., the inspection distance will be the greater of 8 inches below the top-of-tubesheet or the distance needed to satisfy a W* (or flexible W*) length below the BWT). Any revisions to the tube inspection definition should be consistent with all aspects of your structural and leakage integrity models. The staff's concern is that the existing wording implies that probes capable of finding cracks are used throughout the tubesheet.

8. Clarify if the W* Length definition provided in Specification 5.5.9d.1.k (ii) should read "W* Length is the distance <u>in</u> the tubesheet below the BWT"...

9. Please confirm the that the leakage model of Section 4.1.2.1 would be applied to all detected degradation below the BWT to 12 inches below the TTS.

10. Clarify (Specification 5.5.9d.1.k (iv)) if all tubes containing degradation within or below the W* length that are left in service and degraded within the limits specified in Specification 5.5.9d.1.k (v) are considered W* tubes. If not, please describe the methodology used to determine the percent through-wall for indications within or below the W* length. Please modify the specification as appropriate.

11. On page 12, you develop a relationship for determining the contact pressure as a function of tubesheet radius (equations 5 and 6). Please discuss the uncertainties in these relationships and their effects on the leakage estimate if a 95% prediction interval curve was used to determine the contact pressure.

12. On page 13, it was indicated that Figure 1 shows the leak rate data as a function of "total" contact pressure. Please clarify what is meant by "total" contact pressure. Please clarify whether the same leakage value (0.0028 gpm) is obtained when evaluating the 95% confidence bound on the data in Figure 4 at an 8 inch distance below TTS. Please explain any differences.

13. Page 14 indicates that the resistance to flow from the crevice is significantly greater than that of the restrained crack. However, evaluation of the "crevice data" at 8 inches into the tubesheet results in a leak rate of approximately 0.0045 gpm whereas an evaluation using the "constrained crack data" for this same location results in a leak rate of 0.0028 gpm. Please clarify this apparent difference in trends.

14. Pages 16 and 17 discuss a methodology for projecting the number of indications located 8 to 12 inches below the TTS (i.e., the more conservative of 2 methods is used to project the number of indications). This methodology is based on historical data. Please discuss whether your proposed requirement to assess whether the results were consistent with expectations (Insert A for TS Page 5.0-30) includes describing the corrective actions should the number of indications detected during an outage be greater than the number of indications projected at the end of the previous cycle. If such an assessment is not included in this proposed requirement, please modify the requirement to include it.