

File Center



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

January 10, 2000

Mr. Gregory M. Rueger
Senior Vice President and General Manager
Pacific Gas and Electric Company
Diablo Canyon Nuclear Power Plant
P. O. Box 3
Avila Beach, CA 94177

SUBJECT: NRC STAFF REVIEW OF WCAP-14707/14708, "MODEL 51 STEAM GENERATOR LIMITED TUBE SUPPORT PLATE DISPLACEMENT ANALYSIS FOR DENTED OR PACKED TUBE-TO-TUBE SUPPORT PLATE CREVICES" - DIABLO CANYON POWER PLANT, UNITS 1 AND 2 (TAC NOS. M99011 AND M99012)

Dear Mr. Rueger:

In a letter dated October 4, 1996, and supplemented by letters dated May 30, 1997, February 23, 1998, November 24, 1998, April 13, 1999, and June 8, 1999, and telephone conversation held on October 21, 1997, Pacific Gas and Electric Company (PG&E), the licensee for Diablo Canyon Power Plant, Units 1 and 2, submitted the subject report WCAP-14707/14708, "Model 51 Steam Generator Limited Tube Support Plate Displacement Analysis for Dented or Packed Tube-to-Tube Support Plate Crevices" for staff review and approval. The report assesses the potential for tube support plate (TSP) displacement during a postulated steam line break (SLB) event and concludes that the TSPs in Model 51 steam generators (SGs) are essentially "locked" in place due to corrosion product buildup in the tube-to-TSP crevices. If the TSPs do not move relative to the tubes under accident conditions, the probability of tube burst resulting from tube degradation located within the TSP intersections drops significantly because of the TSP constraint. The report also concludes that the presence of corrosion product in the tube-to-TSP crevice significantly reduces accident-induced leakage through tube degradation located within the TSP intersections. The licensee plans to apply the conclusions of WCAP-14707/14708 as part of an alternate repair criteria (ARC) for primary water stress corrosion cracking (PWSCC) located in the TSP intersections of the SG tubes. PG&E currently expects to submit the ARC during the summer of 2000 and plans to implement the ARC upon staff approval.

In a meeting held November 20, 1996, PG&E, Westinghouse and NRC staff representatives discussed the influence of corrosion product buildup in the tube-to-TSP crevices on the structural and leakage integrity of degraded SG tubes. The staff noted at the time that such an unconventional approach involved policy implications that would need to be addressed prior to commencing any technical review. In a subsequent meeting held April 10, 1997, between PG&E and NRC staff representatives, the staff informed PG&E that we would take under consideration the argument that corrosion product buildup results in "locking" of the TSPs and greatly reduces accident leak rates. The staff indicated to the licensee that the review process would be very detailed and lengthy because of the unique nature of the proposal and its proposed broad application.

ARC FILE CENTER COPY

PDR ADOCK

DF01

If the approach outlined in the subject WCAP is approved by the staff in future ARC amendments, licensees would be able to justify leaving in service degraded tubes that, under current regulatory requirements, would require repair (by sleeving) or removal from service (by plugging). The primary technical concern with the approach outlined in the subject report is the relatively small database for tube-to-TSP displacement forces and leak rates under accident conditions. The staff believes this difficulty can be overcome with additional plant-specific tube pulls and laboratory leak rate testing as well as through the application of conservative margins.

In addition to the technical issues, a difficult policy-related issue will have to be addressed by the staff, with the assistance of the licensee. The policy-related issue is whether it is appropriate to rely on corrosion product (a non-Code material) to ensure reactor coolant pressure boundary integrity.

The NRC staff has completed an assessment of Section 4.0 of the WCAP having to do with tube pull force and leak rate testing, and has completed an assessment of Sections 8.0, 9.0 and 10.0 of the WCAP having to do with structural modeling. The remaining sections of the WCAP that address the thermal-hydraulic analyses are being reviewed by other NRC technical staff members. In the enclosed assessment, a broad overview of the licensee's approach; a summary of the report highlights regarding tube pull force, leak rate testing and structural modeling; and comments regarding the licensee's assertion that corrosion product buildup in the tube-to-TSP crevices "lock" the TSPs in place and provide significant resistance to leakage through tube degradation located within the TSP intersections are provided. These comments will need to be addressed by PG&E in its upcoming ARC submittal.

Sincerely,

/s/
Steven D. Bloom, Project Manager, Section 2
Project Directorate IV & Decommissioning
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket Nos. 50-275
and 50-323

Enclosure: Assessment

cc w/encl: See next page

DISTRIBUTION:

- File Center
- PUBLIC
- PDIV-2 Reading
- SRichards
- OGC
- ACRS
- LSmith, Region IV
- WBateman
- SCoffin
- JRajan

To receive a copy of this document, indicate "C" in the box					
OFFICE	PDIV-2/PM	C	PDIV-2/LA	C	PDIV-2/SC
NAME	SBloom:am		EPeyton		SDembek
DATE	01/11/00		01/16/00		01/17/00

DOCUMENT NAME: G:\PDIV-2\DiabloCanyon\dc99011.emcb.wpd
OFFICIAL RECORD COPY

Template NRR-104
Topical Report Plant
Specific Not Adams
as of 1/10/00

Mr. Gregory M. Rueger

- 2 -

January 10, 2000

If the approach outlined in the subject WCAP is approved by the staff in future ARC amendments, licensees would be able to justify leaving in service degraded tubes that, under current regulatory requirements, would require repair (by sleeving) or removal from service (by plugging). The primary technical concern with the approach outlined in the subject report is the relatively small database for tube-to-TSP displacement forces and leak rates under accident conditions. The staff believes this difficulty can be overcome with additional plant-specific tube pulls and laboratory leak rate testing as well as through the application of conservative margins.

In addition to the technical issues, a difficult policy-related issue will have to be addressed by the staff, with the assistance of the licensee. The policy-related issue is whether it is appropriate to rely on corrosion product (a non-Code material) to ensure reactor coolant pressure boundary integrity.

The NRC staff has completed an assessment of Section 4.0 of the WCAP having to do with tube pull force and leak rate testing, and has completed an assessment of Sections 8.0, 9.0 and 10.0 of the WCAP having to do with structural modeling. The remaining sections of the WCAP that address the thermal-hydraulic analyses are being reviewed by other NRC technical staff members. In the enclosed assessment, a broad overview of the licensee's approach; a summary of the report highlights regarding tube pull force, leak rate testing and structural modeling; and comments regarding the licensee's assertion that corrosion product buildup in the tube-to-TSP crevices "lock" the TSPs in place and provide significant resistance to leakage through tube degradation located within the TSP intersections are provided. These comments will need to be addressed by PG&E in its upcoming ARC submittal.

Sincerely,



Steven D. Bloom, Project Manager, Section 2
Project Directorate IV & Decommissioning
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket Nos. 50-275
and 50-323

Enclosure: Assessment

cc w/encl: See next page

Diablo Canyon Power Plant, Units 1 and 2

cc:

**NRC Resident Inspector
Diablo Canyon Nuclear Power Plant
c/o U.S. Nuclear Regulatory Commission
P. O. Box 369
Avila Beach, California 93424**

**Dr. Richard Ferguson, Energy Chair
Sierra Club California
1100 11th Street, Suite 311
Sacramento, California 95814**

**Ms. Nancy Culver
San Luis Obispo
Mothers for Peace
P. O. Box 164
Pismo Beach, California 93448**

**Chairman
San Luis Obispo County Board of
Supervisors
Room 370
County Government Center
San Luis Obispo, California 93408**

**Mr. Truman Burns
Mr. Robert Kinosian
California Public Utilities Commission
505 Van Ness, Room 4102
San Francisco, California 94102**

**Mr. Steve Hsu
Radiologic Health Branch
State Department of Health Services
Post Office Box 942732
Sacramento, California 94232**

**Diablo Canyon Independent Safety
Committee
ATTN: Robert R. Wellington, Esq.
Legal Counsel
857 Cass Street, Suite D
Monterey, California 93940**

**Regional Administrator, Region IV
U.S. Nuclear Regulatory Commission
Harris Tower & Pavillion
611 Ryan Plaza Drive, Suite 400
Arlington, Texas 76011-8064**

**Christopher J. Warner, Esq.
Pacific Gas & Electric Company
Post Office Box 7442
San Francisco, California 94120**

**Mr. David H. Oatley, Vice President
Diablo Canyon Operations and
Plant Manager
Diablo Canyon Nuclear Power Plant
P.O. Box 3
Avila Beach, California 93424**

**Telegram-Tribune
ATTN: Managing Editor
1321 Johnson Avenue
P.O. Box 112
San Luis Obispo, California 93406**