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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RESPONSE TO BULLETIN 88-11 PRESSURIZER SURGE LINE THERMAL STRATIFICATION

FACILITY OPERATING LICENSES DPR-80 AND DPR-82

PACIFIC GAS AND ELECTRIC COMPANY

DOCKET NOS. 50-275 AND 50-323

DIABLO CANYON UNITS 1 AND 2

INTRODUCTION

By letter dated February 1, 1990, the Pacific Gas and Electric Company (PG&E) responded to NRC Bulletin 88-11, "Pressurizer Surge Line Thermal Stratification" for Diablo Canyon Units 1 and 2 (Facility Operating Licenses DPR-80 and DPR-82, respectively). The response included a Westinghouse study, WCAP-12415, "Evaluation of Thermal Stratification for the Diablo Canyon Units 1 and 2 Pressurizer Surge Line," dated November 1989.

EVALUATION

NRC Bulletin 88-11 required all operating PWR licensees to take four actions:

1.a Conduct an ASME Section XI VT-3 visual inspection of the pressurizer surge line (PSL) at the first available cold shutdown.

1.b Perform a plant specific bounding analysis to demonstrate that the PSL meets the applicable design codes and other FSAR and regulatory commitments for the licensed life of the plant when stratification effects are included.

1.c If the analysis does not show compliance with the requirements and licensing commitments for the duration of the operating license, the licensee is requested to obtain plant specific data on thermal stratification, thermal striping, and line deflections.

1.d Based on the applicable plant specific or referenced data, licensees are requested to update their stress and fatigue analyses to ensure compliance with applicable code requirements.

PG&E letter DCL-89-021, dated January 30, 1989, responded to the Action 1.a (required inspection activities). With respect to Actions 1.b and 1.d, Westinghouse Energy Systems (W) performed a plant specific analysis of the Diablo Canyon 1 and 2 PSLs. The effect of stratification was taken into consideration by replacing the 250 design heatup-cooldown cycles with new

heatup and cooldown transients developed from the actual monitoring data from several plants, including Diablo Canyon Unit 1. Using the ANSYS and WECAN computer codes, eleven stress analysis cases of PSL thermal stratification were performed for Diablo Canyon. Additional stress analysis cases of stratification were solved by interpolation. The results showed that the existing as-built piping and supports remain in compliance with the applicable code requirements for the design life of the plant, taking into account PSL thermal stratification. The maximum stresses due to thermal expansion (with stratification), pressure, and deadweight meet ANSI B31.1 Code Equation 14 limits for the existing as-built piping layout and support configuration, which was the original licensing commitment.

W also provided a fatigue analysis to demonstrate that Diablo Canyon complies with the applicable Code and license commitments, including the fatigue analysis requirements of Section III of the ASME B&PV Code (Section III). The fatigue usage factors were calculated in accordance with the requirements of Subsections NB-3600 and NB-3200 of Section III. W used its own WECEVAL computer code for this part of the analysis; the maximum usage factor was found to be 0.97 at the reactor coolant loop nozzle safe-end.

CONCLUSION

In a report dated June 1990, the Westinghouse Owners Group submitted WCAP-12639, "Pressurizer Surge Line Thermal Stratification Generic Detailed Analysis" for staff review. By letter dated August 6, 1991, the staff issued its generic safety evaluation of WCAP-12639. The generic safety evaluation concluded that the methodology used to analyze and evaluate the stress and fatigue effects due to thermal stratification and thermal striping was acceptable.

The licensee's submittal of February 1, 1990 (WCAP-12415) described the methodology and transients used in analysis of pressurizer surge line thermal stratification at Diablo Canyon (the transients were developed from data monitored during plant operation). They were then used by the licensee to analyze stress and fatigue effects at Diablo Canyon to ensure compliance with the applicable Code and license commitments. Based on this analysis, the licensee concluded that the existing as-built piping and support layout at Diablo Canyon are in compliance with the applicable Code requirements and will remain in compliance through the design life of the plant.

The NRC staff has evaluated the February 1, 1990 submittal and finds that the methodology and transients used by the licensee are consistent with that described in the WCAP-12639 generic detailed analysis, and are, therefore, acceptable. Accordingly, we find that the licensee has adequately addressed the applicable actions of NRC Bulletin 88-11.

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