



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO AMENDMENT NO. 42 TO FACILITY OPERATING LICENSE NO. DPR-80
AND AMENDMENT NO. 41 TO FACILITY OPERATING LICENSE NO. DPR-82
PACIFIC GAS AND ELECTRIC COMPANY
DIABLO CANYON NUCLEAR POWER PLANT, UNIT NOS. 1 AND 2
DOCKET NOS. 50-275 AND 50-323

1.0 INTRODUCTION

By letter dated January 22, 1988 (Reference LAR 88-02), as supplemented by letter dated May 15, 1989, Pacific Gas and Electric Company (PG&E or the licensee) requested amendments to the combined Technical Specifications (TS) appended to Facility Operating License Nos. DPR-80 and DPR-82 for the Diablo Canyon Nuclear Power Plant, Unit Nos. 1 and 2, respectively. The amendments change the TS by revising the surveillance test frequency of the turbine stop valves, control valves and the intercept valves associated with the turbine overspeed protection system. Surveillance testing of these valves is necessary to assure that they are capable of performing their safety function in protecting against the consequences of a turbine missile ejection accident.

The amendments change TS 3/4.3.4, "Turbine Overspeed Protection," to revise, from weekly to quarterly, the frequency of surveillance testing by cycling the turbine stop valves, control (governor) valves, and intercept valves. The amendments also revise, from monthly to quarterly, the frequency of direct observation of the movement of each of the above valves, through one complete cycle from the running position. The amendments also modify the bases of the TS to be consistent with the above changes, and remove from the TS a footnote which is no longer applicable.

2.0 EVALUATION

The licensee tests ten stop valves, six intercept valves and four control valves for each turbine during a typical weekly test. The operational testing of the turbine valves consists of cycling the valve through at least one complete cycle from the running position. The reactor power level must be reduced to approximately 90% to conduct the test. This cycling of the reactor power places unnecessary thermal and pressure cycles on plant equipment, and increases the likelihood of inadvertent reactor trips during the power reduction and return to full

8907180306 890710
PDR ADOCK 05000275
P CDC

power transients. Based on this, the staff concludes that the margin of safety is reduced when the plant is undergoing turbine valve testing.

In its application for amendments dated January 22, 1988, the licensee stated that the operating experience of both units to date and the performance of these surveillances have disclosed no significant problems relating to the capability or function of the turbine overspeed protection system. During this period the Unit 1 valves have undergone 125 surveillance tests and the Unit 2 valves have undergone 85 tests, with no identified valve sticking or other equipment problems. In addition, four Unit 1 turbine valves were disassembled and inspected in 1986, and eight Unit 2 turbine valves were disassembled and inspected in 1987. No unfavorable observations were made with respect to valve closure functions.

In support of this amendment request, the licensee referenced an evaluation performed by Westinghouse Electric Corporation for the Westinghouse Owners Group Turbine Valve Test Frequency Subgroup. The results of this evaluation are documented in the Westinghouse Electric Corporation Topical Report WCAP-11525, "Probabilistic Evaluation of Reduction in Turbine Valve Test Frequency," dated June 1987. This report provides a detailed probabilistic analysis demonstrating that a significant increase in the interval between turbine valve functional tests can be achieved without exceeding the NRC acceptance criteria for the probability of a turbine missile accident. In WCAP-11525, the calculated probability of a turbine missile ejection is given for the turbines at Diablo Canyon. The effect of extending the time interval of turbine valve testing was included in the analysis. As is discussed below, the methodology and the results have been reviewed by the NRC staff and found acceptable.

The NRC staff has reviewed the methodology described in WCAP-11525 and has found it acceptable. Diablo Canyon and the Prairie Island Nuclear Generating Plant, Units Nos. 1 and 2 were reviewed as joint lead plants for plant-specific implementation of this methodology. The staff's approval of the methodology described in Westinghouse Topical Report WCAP-11525 is documented in a supplemental safety evaluation issued with amendments to the operating licenses for the Prairie Island Nuclear Generating Plant, Units Nos. 1 and 2. See the letter dated February 7, 1989, from Dominic C. DiIanni (NRC) to D. M. Musolf (Northern States Power Company), "Amendments Nos. 86 and 70 to Facility Operating Licenses Nos. DPR-42 and DPR-60: Turbine Valve Test Frequency Reduction - TACS Nos. 66867 and 66868", Docket Nos. 50-282 and 50-306.

The NRC staff's criteria for turbine missile generation probability are given in a letter dated February 2, 1987, to Mr. James A. Martin of the Westinghouse Electric Corporation. In this letter, the NRC staff stated that maintaining, through testing and inspection, an initial small value of the probability of turbine failure resulting in the ejection of fragments through the turbine casing is a reliable means of precluding turbine missiles and unacceptable damage to safety-related structures,

systems, and components. Maintaining an initial small value of the probability of a turbine failure simplifies and improves procedures for evaluation of turbine missile risks and ensures that the public health and safety is maintained. To implement these objectives, the staff proposed turbine failure guidelines for total turbine missile generation probabilities to be used for determining (1) frequencies of turbine disc ultrasonic inspections and (2) maintenance and testing schedules for turbine control and overspeed protection systems.

In the February 2, 1987 letter to Westinghouse, the NRC staff stated that its acceptance criteria for turbine reliability is a turbine missile generation probability of less than 1×10^{-4} per year for a favorably-oriented turbine and less than 1×10^{-5} per year for an unfavorably-oriented turbine. This provides adequate assurance that the guidelines values of Section 2.2.3 of the Standard Review Plan are satisfied.

The mean annual probabilities of turbine missile ejection for Diablo Canyon Units 1 and 2, calculated using WCAP-11525 methodology and the available data, show a small increase in the missile ejection probability as the mean test interval increases from one month to three months. However, the calculated values over this range of test intervals are all well within the applicable acceptance criterion of 1×10^{-5} per year. The staff, therefore, considers that the calculated values for Diablo Canyon contain adequate margins for protection against turbine missiles, and consider the reduction in margin due to increased test interval to be not significant.

While the WCAP-11525 methodology is acceptable, the values calculated using this methodology are external to the methodology and are subject to change as more failure data becomes available. In considering missile ejection probabilities calculated by using the WCAP-11525 methodology based on new failure data, the staff requested that the licensee provide assurance that the test frequencies contain adequate margins for protection against potential adverse effects due to discrepancies in implementation.

In its letter of May 15, 1989, the licensee agreed to work with the turbine vendor to maintain a turbine valve failure database for the purpose of tracking changes in valve failure rate. In its May 15, 1989 letter, the licensee also committed to include information on valve failure rate in the Diablo Canyon Final Safety Analysis Report (FSAR) Update, and to update the failure rate information included in the FSAR at least once every three years. The licensee also committed to review and reevaluate, in accordance with 10 CFR 50.59, the turbine valve testing frequency probabilistic analysis (using WCAP-11525 methodology) any time that major changes in the turbine system have been made, or a significant upward trend in the valve failure rate is identified. These commitments have been reviewed by the staff and constitute an acceptable method of addressing the issue of future changes in failure data.

In conclusion, the licensee has shown that while increasing the frequency of turbine valve testing results in a small increase in turbine missile generation probability, the probability at Diablo Canyon is still well within the staff's acceptance criteria. In addition, this reduction in safety margin due to decreased testing frequency is compensated by the fact that during turbine valve testing, the likelihood of a plant accident is increased, because power must be temporarily reduced to perform the testing. Further, operating experience shows that during plant operation to date, there have been no incidents of unplanned turbine overspeed nor a turbine valve malfunction that could have led to a turbine overspeed condition. Based on this operating experience, the Westinghouse analysis of Diablo Canyon demonstrating that the plant meets the NRC guidelines for turbine missile generation probability, and the safety benefits of a reduction in the frequency of power transients, the staff finds the proposed change in testing frequency to be acceptable.

3.0 ENVIRONMENTAL CONSIDERATION

Pursuant to 10 CFR 51.21, 51.32, and 51.35, an Environmental Assessment and Finding of No Significant Impact was issued for these amendments on May 4, 1989 at 54 FR 19263. Based on the environmental assessment, the Commission has determined that the issuance of the amendments will not have a significant effect on the quality of the human environment.

4.0 CONCLUSION

We have concluded, based on the considerations discussed above, that:

- (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, and
- (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of these amendments will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributor: H. Rood

Dated: July 10, 1989