



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
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ENCLOSURE 1

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELATING TO APPLICABILITY OF NOTRUMP TO SONGS-1 SMALL BREAK LOCA ANALYSIS  
SOUTHERN CALIFORNIA EDISON COMPANY  
SAN ONOFRE NUCLEAR GENERATING STATION UNIT 1  
DOCKET NO. 50-206

1.0 INTRODUCTION

The results of the Small Break LOCA (SBLOCA) analysis for the San Onofre Nuclear Generating Station Unit 1 (SONGS-1) as reported in the SONGS-1 updated final safety analysis report are based on the Westinghouse October 1975 SBLOCA ECCS evaluation model, which used the WFLASH computer code. The WFLASH computer code, however, is not currently available at Westinghouse to perform SBLOCA analysis. The current Westinghouse SBLOCA ECCS evaluation model incorporates the NOTRUMP analysis technology. The NOTRUMP SBLOCA ECCS model was approved by the NRC in May 1985. WCAP-12767 (Ref. 1) presents an evaluation of the applicability of the NOTRUMP SBLOCA model to SONGS-1, and it demonstrates compliance of the ECCS with the requirements of the Interim Acceptance Criteria (IAC) (Ref. 2). We have reviewed Reference 1, and this report presents the summary of our review.

2.0 EVALUATION

The differences in key plant design parameters between the SONGS-1 plant and the typical Westinghouse three-loop PWRs are presented in Reference 1. However, it was observed that only 2 plant design differences are significant to the ability to apply the NOTRUMP SBLOCA ECCS evaluation model to SONGS-1:

- (1) The fuel rod cladding material in SONGS-1 is stainless steel instead of Zircaloy as in typical three-loop plant applications, and

- (2) The ECCS design differences as described below, could result in thermal-hydraulic behavior which differs from that previously calculated using the NOTRUMP SBLOCA ECCS evaluation model. The ECCS design for SONGS-1 differs from typical three-loop plants in the following ways:
- (a) The pumped safety injection flow is provided by switching the main feedwater pumps into the safety injection mode,
  - (b) The safety injection flow shutoff head in the SONGS-1 ECCS design is lower than the shutoff head in typical ECCS designs, but provides substantially higher flow at lower pressures, and
  - (c) The ECCS design does not incorporate passive ECCS flow accumulators.

In order to assess the potential effects of the above mentioned design differences on the capability of NOTRUMP to simulate the SBLOCA for SONGS-1, a scoping analysis was performed simulating a 6-inch equivalent diameter break in the cold leg of the primary reactor coolant system. The 6-inch break was chosen for the following reasons:

- (1) Larger break sizes subjects the calculational model to greater fluid flow and heat transfer regimes thereby posing a greater calculational challenge to the NOTRUMP fluid flow calculations.
- (2) Typical three-loop plants rely upon accumulators to mitigate the consequences of breaks of this size in the reactor coolant system.

The primary focus of the scoping study was to determine the system response to the differences in the ECCS design. The accumulator models were disabled and the ECCS flow used in the scoping analysis was scaled based upon the total core power to mass flow rate to match the SONGS-1 head to flow performance for the core power.

The results of the scoping calculation performed to assess the transient response for some of the key design features in the SONGS-1 plant are

provided in Reference 1. The parameters examined included RCS pressure, SG secondary side pressure, core and downcomer mixture level, total mixture mass of RCS, SI flow rate to the intact loops, total break flow rate, steam break flow rate, and hot rod cladding average temperature. These results indicate that the SONGS-1 small break transient response as calculated with NOTRUMP will be similar to the transient response calculated for other typical three-loop plants.

### 3.0 CONCLUSION

Based upon the information in Reference 1, we conclude that the current Westinghouse SBLOCA ECCS evaluation model incorporating the NOTRUMP analysis technology is applicable to the SONGS-1 plant with only minor modifications. Thus, NOTRUMP SBLOCA ECCS evaluation model analysis calculations can be used to demonstrate compliance with the requirements of the IAC for SONGS-1.

The staff has 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 issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public.

### 4.0 REFERENCES

1. "Applicability of NOTRUMP to the San Onofre Nuclear Generating Station Unit 1," WCAP-12767, November 1990.
2. Atomic Energy Commission Interim Statement of Policy, "Interim Acceptance Criteria (IAC) for Emergency Core Cooling Systems for Light-Water Power Reactors," Federal Register, Volume 36, Number 125, pp. 12247-12250, June 29, 1971.