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SUBJECT: Forwards response to 860103 request for addl info re Cycle 3 reload analysis rept. Assumption of loss of offsite power would not impact quantity of predicted fuel failure & conclusions of analysis would remain unchanged.

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January 21, 1986

Director, Office of Nuclear Reactor Regulation
Attention: Mr. George W. Knighton, Director
PWR Project Directorate No. 7
Division of PWR Licensing - B
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

Gentlemen:

Subject: Docket Nos. 50-361 and 50-362
San Onofre Nuclear Generating Station
Units 2 and 3

Enclosed for your information is a formal response to your second round of questions on the Cycle 3 Reload Analysis Report for San Onofre Nuclear Generating Station Unit 2 transmitted to SCE on January 3, 1986.

If you have any questions regarding the enclosed information, please call me.

Very truly yours,

M. O. Medford

Enclosures

cc: Harry Rood, NRC Project Manager
F. R. Huey, USNRC Senior Resident Inspector, Units 1, 2 and 3

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REQUEST FOR ADDITIONAL INFORMATION
SONGS UNIT 2 CYCLE 3 RELOAD

Question 1:

With reference to the single reactor coolant pump shaft seizure or sheared shaft event, we have previously allowed the number of fuel pins predicted to experience DNB to be calculated by the statistical convolution method described in CENPD-183. However, Standard Review Plan 15.3.3 requires that doses to persons offsite are kept to values which are a small fraction of 10 CFR Part 100 guidelines and that the event should be analyzed assuming turbine trip and coincident loss of offsite power and coastdown of undamaged pumps. Verify that these conditions have been met in the Cycle 3 analysis of the sheared shaft event.

Response

The single reactor coolant pump shaft seizure and sheared shaft events were analyzed for SONGS-2 Cycle 3. A single bounding analysis for sheared shaft/seized rotor events is presented in Reference 1-1. This analysis contained several conservatisms. The minimum DNBR was evaluated at the asymptotic flow of 75% of initial flow with no credit for heat flux decay upon reactor trip. In addition, the analysis used core parameters which bound Cycle 3 and are more adverse than are expected to occur for any future cycle. Further, the initial conditions chosen for the analysis are more adverse than those permitted by the Technical Specification Limiting Condition for Operation.

The amount of fuel failure calculated for the event for the Cycle 3 reload analysis was 4.1%. In order to bound possible future conditions, the radiological consequences were calculated based on 9.0% fuel failure. The resultant doses were determined to be 14.0 REM Thyroid and 1.0 REM whole body. These values are a small fraction (less than 10%) of the 10 CFR 100 limits of 300 REM Thyroid and 25 REM whole body.

A turbine trip and coincident loss of offsite power and coastdown of undamaged pumps was not considered in the analysis. The SONGS 2/3 FSAR (Reference 1-2) did not assume a coincident loss of offsite power and this fact is acknowledged in the SER (Reference 1-3). SCE believes that the FSAR analysis provides the licensing basis for this event and a postulated loss of offsite power need not be assumed. However, the steam releases used to determine the radiological consequences assumed that the steam bypass was unavailable and these steam releases bound those for a loss of offsite power.

CE has demonstrated by analysis for several CE plants that a minimum of 3.0 seconds exists from the time of turbine trip to the time of loss of offsite power. This 3.0 second time delay places the time of the coastdown of the remaining pumps well past the time of minimum DNBR for the SONGS-2 Cycle 3 analysis. The assumption of loss of offsite power would therefore not impact the quantity of predicted fuel failure and the conclusions of the analysis would remain unchanged.

References

1-1 SCE letter from M. O. Medford to G. W. Knighton (NRC) September 5, 1985, SONGS Unit 2, Cycle 3 Reload Analysis Report.

1-2 San Onofre Nuclear Generating Station, Units 2 and 3, Final Safety Analysis Report.

1-3 "Safety Evaluation Report Related to the Operation of San Onofre Nuclear Generating Station Unit 2 and 3," February 1981, NUREG-0712.

Question 2:

A proposed Technical Specification change involves a reduction in the RTD maximum response time from 13 seconds to 8 seconds. What is the value of the built-in RTD response time constant of the CPC and COLSS algorithms for power and DNBR which will be used in Cycle 3? Does the 8 second value refer to the measured response time of the slowest RTD or is it an average value? Since each reactor trip function need only be shown to be within limits every 18 months, how is the possible degradation of the RTD response time during the time involved prior to the next functional test accounted for?

Response

The CPC algorithms for Cycle 3 are designed to provide a conservative response to any design transient, for RTD response times of up to 8 seconds. The 8 second value refers to the measured response time of the slowest RTD.

An explicit allowance is not included in the analysis of the CPC constants for degradation in response time during the time between functional tests. The conservative response of the CPC system, should degradation occur, is assured by the sensor redundancy and the 2-of-4 trip logic. Each of the four CPS's uses two hot leg and two cold leg temperature sensors. Dynamic corrections are provided for a range of RTD response times and the temperature used for any calculation is the conservative limit of available values. Thus, even though the design analysis is based on the slowest possible RTD response, each CPC will respond to the fastest RTD to which it is connected. Furthermore, the use of 2-of-4 trip logic assures that the system as a whole will be insensitive to the degradation of several RTDs since any two CPCs with RTDs within the response time limit will provide adequate core protection.

It should be noted that the actual measured response times at SONGS 2 and 3 have been significantly less than 6 seconds and have shown no evidence of degradation between measurements.

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