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SUBJECT: Forwards responses to NRC questions on MSLB analyses.

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References:
1. Telephone conference call between members of the NRC Staff and ANPP on November 23, 1988. Subject: MSLB Analyses.
2. Letter from E. E. Van Brunt, Jr., ANPP, to USNRC Document Control Desk, dated May 22, 1988 (161-01041). Subject: ANPP Responses to NRC Main Steam Line Break Questions.
3. Letter from E. E. Van Brunt, Jr., ANPP to G. W. Knighton, NRC, dated September 30, 1985 (ANPP-33611). Subject: Main Steam Line Break Analyses Results - Chapter 15 Re-analyses.

Dear Sirs:

Subject: Palo Verde Nuclear Generating Station (PVNGS)
Units 1, 2 and 3
ANPP Responses to NRC Questions on Main Steam Line Break Analyses
File: 88-A-056-026

During the Reference 1 conference call and during a previous conference call held on November 8, 1988, the NRC Staff asked ANPP five separate questions on the Main Steam Line Break (MSLB) analyses. Several of these questions were answered during the November 23, 1988 conference call. During the call, the NRC Staff requested that ANPP formally submit the responses to all of the questions. In accordance with this request, the attachment of this letter provides the ANPP responses to each of the NRC Staff questions.

If you have any additional questions on this matter, please contact Mr. A. C. Rogers at (602) 371-4041.

Very truly yours,

D. B. Karner
D. B. Karner
Executive Vice President

DBK/BJA/pvk
Attachment

cc: G. W. Knighton (all w/a)
T. L. Chan
M. J. Davis
J. B. Martin
T. J. Polich
A. C. Gehr

ATTACHMENT

ANPP RESPONSES TO NRC STAFF QUESTIONS

1. NRC QUESTION

The NRC needs to know what changes were made between previous MSLB analyses and the September 30, 1985 analyses. Specifically, identify the plant performance and modeling changes that caused the analysis results to change. Compare the maximum post-trip reactivity and the minimum DNBR for the different analyses.

ANPP RESPONSE

In response to this question, the following chronological history of MSLB analyses was discussed during the November 23, 1988 conference call. Note that a listing of the plant performance changes and references to previous submittals concerning each change are provided in the letter from ANPP to NRC dated April 15, 1985 (ANPP-32401).

ANALYSIS DATE	ANALYSIS CHANGES	RESULTS
FSAR Amendment 12	(baseline analysis)	-max. reactivity of +0.09% -min. DNBR of 2.7
November 5, 1984 (ANPP-31053)	-FWIV closure times -AFW flowrate -AFW pump start times -AFW time delay	-max. reactivity of -0.03% -min. DNBR of 5.4
December 20, 1984 (ANPP-31534)	-HPSI flowrate -(preliminary analysis)	-max. reactivity of +.035% -min. DNBR of 2.4
September 30, 1985 (ANPP-33611)	-model changes -FSAR Appendix 15C SG water level	-max. reactivity of +0.05% -min. DNBR of 3.86

After reviewing the chronological history, the NRC Staff noted an

inconsistency in the analysis results. Specifically, the December 20, 1984 results do not appear to follow the same trends as the other analyses. The explanation for the inconsistency is that the results presented in the December 20, 1984 letter were preliminary results to assess the impact of reduced HPSI flowrates on the analysis results. The preliminary results were not based on a complete analysis of the event such as the analyses presented in Chapter 15. Instead, a conservative sensitivity analysis was performed to provide results that were expected to bound the results that would have been obtained if the actual analysis had been re-performed. The MSLB analysis that is currently presented in the USAR provides the actual analysis that incorporated the reduced HPSI flowrates. This analysis provides the final results that should be used for comparison purposes.

2. <u>NRC QUESTION</u>

Define what a self-generated plutonium recycle core is and what effect this has on the MSLB analyses.

<u>ANPP RESPONSE</u>

The self-generated plutonium recycle core was an original design basis for the System 80 reactors. The intention was to recycle plutonium that was generated at Palo Verde for use in new fuel. This fuel management strategy is not being used at Palo Verde. However, the core characteristics for the self-generated plutonium recycle core are still being used in MSLB analyses because they represent conservative conditions. The self-generated plutonium recycle core has the fastest reactor kinetics. This tends to maximize the potential for a post-trip return to criticality during MSLB accidents.

3. NRC QUESTION

In the September 30, 1985 analysis submittal (Reference 3), the Case 5 analysis results report that no more than 0.7% of the fuel rods are predicted to experience DNB. Is this fuel pin failure number a predicted or assumed number?

ANPP RESPONSE

The following information was presented to the NRC during the November 23, 1988 conference call. For Case 5, the 0.7% fuel pin failure is not an analysis prediction. For the calculated DNBR of 1.11, the analysis predicts that 0.4% of the fuel pins will experience DNB. The reported result of 0.7% is conservatively high with respect to the actual analysis prediction.

4. NRC QUESTION

Section 15C.3.3.2 of the Palo Verde USAR states that the initial conditions for the MSLB analyses are the same as CESSAR except for the initial Steam Generator (SG) water levels. Explain this deviation from CESSAR.

ANPP RESPONSE

For the previous CESSAR analysis, the initial water level of one SG was artificially lowered to ensure that the SG low water level trip is actuated during the transient. This low level trip will activate auxiliary feedwater flow which will maximize the RCS cooldown and increase the probability of a post-trip return to criticality. The Palo Verde specific analysis changed this initial water level assumption. The Palo Verde specific analysis did not artificially reduce the water level in one of the SGs. This maximized the initial SG water levels which is conservative for the MSLB analyses. Additionally, the conservative assumption was made that auxiliary feedwater actuates at the same time that a main steam isolation signal is received even though the analysis would not predict that auxiliary feedwater actuates this early in the transient. Both of these changes from the CESSAR analysis are conservative assumptions that tend to maximize the post-trip reactivity.

5. <u>NRC QUESTION</u>

Section 15C.2.3 of the Palo Verde USAR documents an exception from CESSAR. The exception is that a three dimensional peaking factor of 100 is used for the post-trip, return to power, DNBR calculations. Explain this CESSAR deviation. Additionally, is the CESSAR pre-trip power distribution used for the Palo Verde specific analyses?

<u>ANPP RESPONSE</u>

Section 15C.2.3 of CESSAR states, "For return to power DNBR calculations, an integrated radial peaking factor of 15 and axial peaking factor of 3 are used to bound all power distributions....." This implies that a three dimensional peaking factor of 45 (15 x 3) was used in CESSAR. The Palo Verde specific value of 100 is clearly conservative with respect to the CESSAR value and is more representative of 3D Hermite calculations. The CESSAR pre-trip power distribution was used for the Palo Verde specific analysis.