10 CFR 50.46

Palo Verde Nuclear
Generating Station

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U.S. Nuclear Regulatory Commission
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Dear Sirs:

Subject: Palo Verde Nuclear Generating Station (PVNGS)
Units 1, 2, and 3
Docket Nos. STN 50-528/529/530
Error in Containment Heat Sink Data Used in LOCA/ECCS
Performance Evaluation Models, 30 Day 10 CFR 50.46 Report

This report is submitted pursuant to 10 CFR 50.46(a)(3)(ii) to provide notification of an error discovered in the input data for the large break loss of coolant accident (LBLOCA) analysis which is employed to calculate performance of PVNGS emergency core cooling systems (ECCS). The error led to less conservative values of peak cladding temperature (PCT) than should have been calculated in the limiting ECCS analysis of record. The analysis has been reperformed using the corrected inputs and revisions to conservative assumptions. The revised analysis resulted in a PCT value that conforms to the acceptance criterion of 10 CFR 50.46.

On July 11, 2000, Arizona Public Service Company (APS) received letter PV-00-017, from Westinghouse Electric Company [Combustion Engineering (CE) Nuclear Power Limited Liability Corporation (LLC)], the fuel vendor for PVNGS, which described an error in the representation of the containment passive heat sinks used in the LBLOCA analysis. This letter indicated that CE had performed an initial evaluation of the impact of the error and concluded that, after accounting for the error, the three PVNGS units in their present configuration continue to meet the ECCS acceptance criteria. On September 08, 2000 CE issued a final calculation that confirmed the above.

The error occurred in a 1994 analysis that implemented the NRC-accepted June 1985 version of the CE Nuclear Power LLC LBLOCA ECCS Performance Evaluation Model and consisted of an incorrect interpretation of the PVNGS containment passive heat sink data. The surface areas and thickness for several concrete and steel heat sinks were treated as total surface areas (i.e., "two-sided" areas) and total thickness. Consequently, to preserve the total volume of the heat sinks, the thicknesses were halved in calculating the dimensions of the composite heat sink walls used in the COMPERC-II code.

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COMPERC-II performs the refill/reflood hydraulic analysis, which includes the calculation of containment pressure. In fact, the thicknesses provided in the heat sink data were already "half-thicknesses" and not total thicknesses. Therefore, by halving the thicknesses, the actual volumes of the impacted heat sinks were incorrectly halved.

This is a non-conservative error since it under-represents the masses of the impacted heat sinks and, therefore, causes an increase in the calculated containment pressure. The resulting increase in containment pressure is non-conservative in the LBLOCA analysis since it improves the core reflood rate and, consequently, decreases the peak cladding temperature. This error was then carried forward in all PVNGS LBLOCA analyses performed since 1994.

The above error was found in response to a request from APS to CE to revise the PVNGS LBLOCA analysis to incorporate updated heat sink data. In addition, CE was requested to include an increased containment spray flow rate assumption and a revision to the minimum hot rod pin-to-box factor to cover future reloads.

CE used the approved LBLOCA 1985 Evaluation Model to perform this analysis. The subject error is an error in the representation of plant design data in the PVNGS LBLOCA analysis. As such, it is not an error in the 1985 Evaluation Model computer codes or in the methodology accepted by the NRC. The PVNGS LBLOCA ECCS performance analysis continues to comply with all constraints and limitations imposed by the 1985 Evaluation Model Safety Evaluation Reports.

The correct representation of the heat sink data increased the PCT by about 190°F. This increase would have resulted in the PCT exceeding the 2200°F limit. To offset the effects of the correction, two additional changes to the analysis were made. The new analysis was performed using the predicted cladding rupture location rather than forcing the rupture to occur at the elevation that resulted in the highest PCT. This is consistent with the licensing basis methodology, inasmuch as the latter practice had been used to reduce engineering and computer time in performing LBLOCA analyses. In addition, the maximum number of plugged steam generator tubes used in the analysis was reduced. These changes provided sufficient margin such that the correction to the containment passive heat sink data as well as the revisions to the maximum containment spray pump flow rate and minimum hot pin-to-box factor could be accommodated while still calculating a PCT less than the current analysis value. The revised analysis results in a PCT of

2174°F for the combined effect and is lower than the Updated Final Safety Analysis Report (UFSAR) value of 2180°F. Maximum cladding oxidation and core-wide cladding oxidation remain bounded by the reported values. Coolable geometry is also maintained, thus satisfying the 10CFR 50.46 criteria.

No commitments are being made to the NRC by this letter.

If you have any questions, please contact Scott A. Bauer at (623) 393-5978.

Sincerely,

David D Mauldin

CDM/SAB/RKR/kg

cc: E. W. Merschoff
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