A Final Technical Evaluation of the Palo Verde Analysis of Fire Barrier Ampacity Derating Factors

A Letter Report to the USNRC

Revision 0

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Prepared by:
Steve Nowlen
Sandia National Laboratories
Albuquerque, New Mexico 87185-0748
(505)845-9850

Prepared for:
Ronaldo Jenkins
Electrical Engineering Branch
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, DC 20555
USNRC JCN J-2503, Task Order 4

ATTACHMENT 2

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FORWARD

The United States Nuclear Regulatory Commission (USNRC) has solicited the support of Sandia National Laboratories (SNL) in the review of utility submittals associated with fire protection and electrical engineering. This report represents the third in a series of reports associated with the Palo Verde Nuclear Generating Station (PVNGS). These submittals deal with the issue of ampacity derating factors associated with localized cable tray fire barrier systems. The current report documents a review by SNL of the licensee response to an USNRC RAI of September 11, 1997. This effort has been conducted under the auspices of USNRC JCN J-2503, Task Order 4, Sub-task 3.

1.0 INTRODUCTION

This report represents the third, and likely the final report, in a series of licensee submittal reviews associated with the assessment of ampacity loads for fire barrier clad cables at the Palo Verde Nuclear Generating Station (PVNGS). The history of this review effort is summarized as follows:

September 27, 1993: In response to Generic Letter 92-08 and a subsequent USNRC RAI (July 21, 1993) the licensee provided initial documentation of the utility position regarding both the fire endurance rating and ampacity derating factors associated with its installed fire barrier systems.

February 7, 1994: The licensee provided a supplemental response to the USNRC RAI of July 21, 1993.

September 27, 1994: SNL completes a review of the ampacity portions of the licensee submittals identified above. The review concludes that the licensee method of ampacity analysis is inappropriate and inadequate and recommends that the USNRC not accept the calculations.

November 3, 1995: A second RAI is forwarded to the licensee. (Note that the date of this RAI cited here is based on the licensee citation and may be in error. The actual RAI date may have been 11/3/94 rather than 11/3/95.)

January 24, 1997: The licensee responds to the 11/95 RAI. The response documents a completely new methodology for ampacity assessments intended to credit load diversity in the calculations.

August 14, 1997: SNL completes a review of the updated licensee calculations.

September 11, 1997: The USNRC forwards a third RAI to the licensee.

October 9, 1997: The licensee responds to the 9/97 RAI.

The objective of the current review is to assess the adequacy of the licensee's 10/9/97 submittal to resolve the technical concerns raised in the RAI of 10/97. The document upon which this review is based is as follows:

- Letter, William E. Ide, APS/PVNGS to the USNRC Document Control Desk, October 9, 1997, Licensee file item 102-04026 - WEI/SAB/RMW including associated enclosure: "Enclosure 1 Response to Request for Additional Information."

2.0 THE LICENSEE RAI RESPONSES

2.1 Overview

The USNRC RAI of 10/11/97 raised just two points of technical concern regarding the licensee's updated calculations. The sections that follow provide an assessment of the licensee's response to each of these two concerns.

2.2 RAI Item 1: Recommended Application Limitations

Synopsis of Concern: SNL had recommended that a clear-cut set of limitations on the methodology be established to ensure that unrealistic results were not credited. The RAI requested the licensee to consider implementation of the following three restrictions or alternately to address the associated concerns:

- It is recommended that in the application of the Leake method to diverse random fill cable trays, the maximum baseline ampacity limit, or the maximum baseline heat intensity, should under no circumstances be assumed to exceed 80% of the corresponding open air limits. That is, any calculation that estimates a baseline ampacity limit (or equivalently the corresponding heat intensity level) that exceeds 80% of the cable's open air ampacity should be discounted and disregarded.

- The Leake method for crediting diversity should not be applied to the analysis of any cable whose diameter is greater than or equal to ½ the tray fill depth as calculated using the ICEA definitions of cable cross-section and fill depth.

- The Leake method should not be applied to any cable tray with a diversity of 50% or more where, in this case, diversity is defined as the ratio of the cross-sectional area of cables which are assumed to carry continuos loads to the total cable mass cross-section.

Summary of the Licensee Response: The licensee response acknowledges the prudence of each of the recommended application limitations, and commits the licensee to implementation of each limit. The licensee does express some reservations regarding the third limitation as listed above, but has agreed to implement the limitation pending further industry research into the identified concerns. It is further cited that a review of the calculations is underway to ensure compliance with the recommended limitations.

Assessment of the Licensee Response: The primary factor in the licensee response is the fact that the licensee agreed to implement the recommended limitations. Hence, SNL finds that the licensee was fully responsive to the identified concern. The implementation of the recommended limitations should provide reasonable assurance that inappropriate results are not credited in the analysis.

Findings and Recommendations: SNL finds that the licensee response is fully adequate to resolve the identified concerns. While the final results of the licensee's review of its own calculations are not available at this time, nonetheless, SNL recommends that further

review is not necessary. The licensee has committed to implementing the recommended application limitations, and this is sufficient to resolve the concerns. No further actions on this RAI item are recommended.

2.3 RAI Item 2: Numerical Discrepancies

Synopsis of the Concern: SNL had been unable to reproduce certain of the licensee calculation results. The licensee was asked to resolve the discrepancies

Summary of the Licensee Response: The licensee has provided an explanation for the source of each of the discrepancies noted by SNL.

Assessment of the Licensee Response: The licensee response does, indeed, resolve the identified discrepancies.

Findings and Recommendations: SNL finds that the licensee response is fully adequate to resolve the identified concern. No further actions on this RAI item are recommended.

3.0 SUMMARY OF FINDINGS AND RECOMMENDATIONS

SNL finds that the licensee was fully responsive to the technical concerns raised in the SNL review report of August 14, 1997 and in the USNRC RAI of September 11, 1997. The licensee fully committed to implementing the recommended application limitations cited in RAI #1, and fully resolved the numerical discrepancies noted in RAI #2. Hence, SNL finds that the licensee has provided adequate documentation to conclude that ampacity loads for fire barrier clad cables at PVNGS have been adequately assessed. No further review nor licensee interactions are recommended.