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102-05182-CDM/SAB/RJR
November 24, 2004

ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

References:
1. APS letter 102-05075-CDM/SAB/RJR, "Relief Request No. 25 – Request for Relaxation of First Revised NRC Order EA-03-009, Section IV.C.(5)(b) Requirements for CEDM Nozzles", dated March 19, 2004.

2. APS letter 102-05086-CDM/SAB/RJR, "Response to Request for Additional Information – Request for Relaxation of First revised NRC Order EA-03-009, Section IV.C(5)(b) Requirements for CEDM Nozzles", dated April 16, 2004.

3. APS letter 102-05094-CDM/SAB/RJR, "Response to Second Request for Additional Information – Request for Relaxation of First revised NRC Order EA-03-009, Section IV.C(5)(b) Requirements for CEDM Nozzles – Relief Request No. 25", dated April 22, 2004.

4. APS letter 102-05123-CDM/TNW/RJR, "First Revised NRC Order EA-03-009 - Additional Analysis Information for Control Element Drive Mechanism (CEDM) Nozzles", dated July 01, 2004.

Dear Sirs:

Subject: Palo Verde Nuclear Generating Station (PVNGS)
Unit 2
Docket No. STN 50-529
Relief Request No. 25 for PVNGS Unit 2: Relaxation From First Revised NRC Order EA-03-009 – Additional Analysis Information for Control Element Drive Mechanism (CEDM) Nozzles

In Reference 1, Arizona Public Service Company (APS) requested relaxation from the requirements of First Revised Order EA-03-009, Section IV.C(5)(b)(i) to perform ultrasonic testing of each control element drive mechanism (CEDM) nozzle penetration. In References 2 and 3, APS provided responses to NRC questions regarding the relaxation request for the CEDM nozzles. In Reference 4, APS provided the updated minimum inspection coverage for PVNGS Units 1 and 3 required by the supporting Westinghouse analysis.

A101

A review of the previous inspection data available for the Unit 2 CEDM penetration nozzles has been performed. Based upon this review, the penetrations in Unit 2, with the exception of penetration number 56, appear to have sufficient inspection coverage below the weld in order to perform the inspection distance identified in References 1 and 2. Nozzle 56 is the only nozzle requiring a revised analysis. The new analysis is described below.

Penetration No. 56

Finite element stress analyses were performed for a CEDM with a penetration nozzle angle of 35.7° using the Palo Verde Unit 2 as-built J-weld configuration obtained from penetration number 56. The as-built J-weld depth on the downhill side determined from the UT examination data for this penetration is 1.76 inches.

The resulting hoop stress distribution is compared with that obtained based on the as-designed J-weld configuration and shown in Figures 1 and 2. The end of the inspection zone on the downhill side for penetration number 56 is 0.36 inch below the weld after taking into account instrumentation measurement uncertainty. As shown in the downhill side figure, with the lower hoop stress magnitudes and the smaller tensile stress zone for the as-built J-weld configuration, none of the postulated through-wall flaws in the regions not inspected for penetration number 56 would propagate. The initial through-wall flaw size is postulated based on the same methodology as used in the relaxation request submittal (Reference 1). In addition, the uphill side hoop stress distributions, utilizing nominal fillet weld dimensions, are not significantly affected by the longer fillet weld leg on the downhill side and therefore there is no significant impact on the uphill side crack growth results. Figure 3 shows the finite element stress contour plots for a penetration nozzle angle of 35.7° using the Palo Verde Unit 2 as-built J-weld configuration. As a result, the minimum inspection coverage required below the weld on the downhill side for penetration number 56 is 0.36 inch.

Westinghouse Electric Corporation, on behalf of APS, has completed a review of the minimum inspection coverage for the Unit 2 CEDM nozzles, and Table 1, provided in References 1 and 2, has been revised accordingly. The revised minimum required inspection coverage below the weld for the Unit 2 CEDM penetrations is shown below in Table 1. The title of the Unit 2 table has also been revised to make the table unit-specific. Revision bars indicate the areas of change.

Table 1

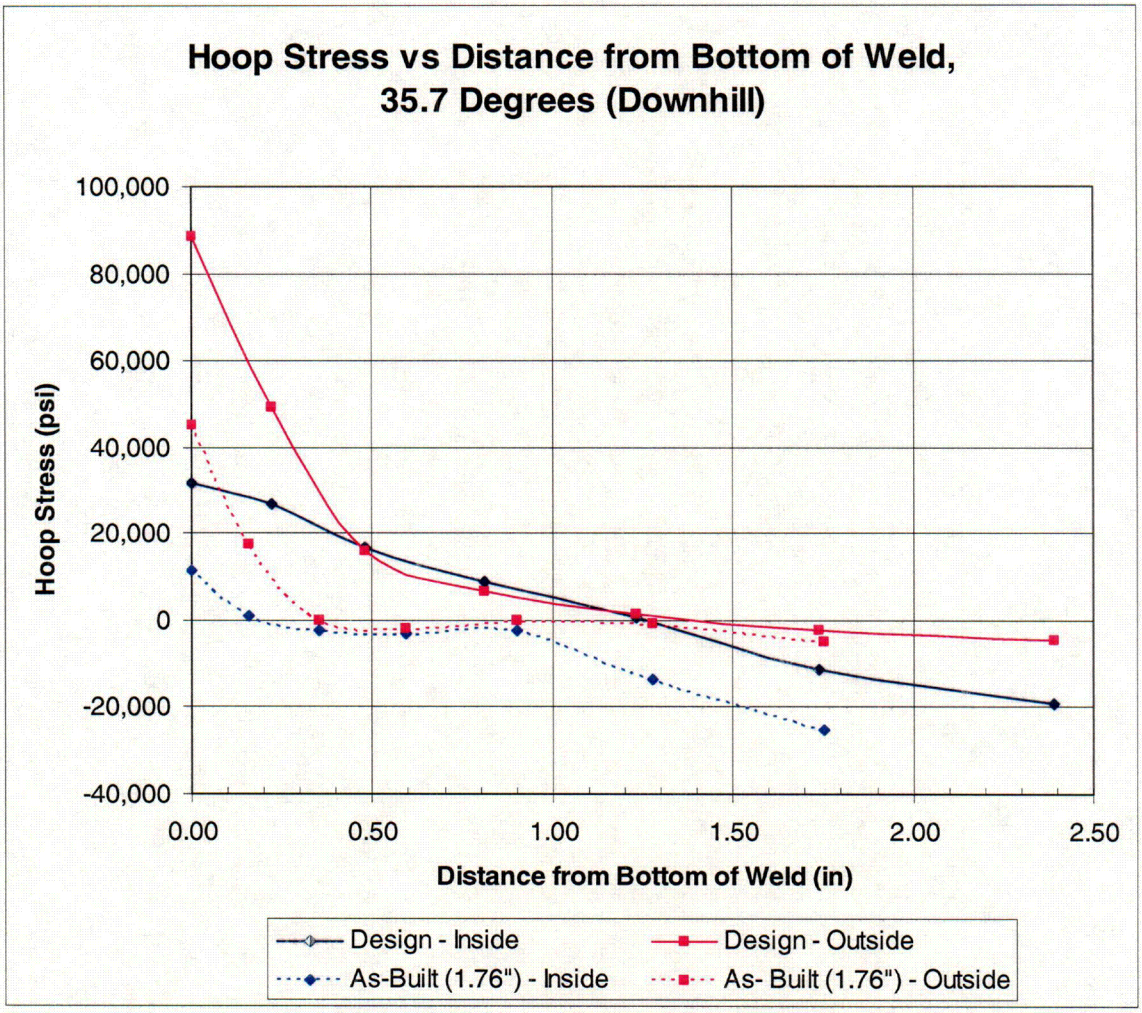
Palo Verde Unit 2 CEDM Nozzle Minimum Required Inspection Coverage Required by Westinghouse Letters LTR-PAFM-04-23 and LTR-PAFM-04-54, Revision 1

Stress Level for Lower Crack Extremity = 0 ksi			
Nozzle Angle (°)	Penetration No. Applicability	Minimum Inspection Coverage Required Below the Weld on the Downhill Side (in)[1]	EFPY for Upper Crack Tip to Reach the Bottom of Weld
0	1	0.45	1.7
7.5	2-21	0.45	1.7
28.0	22-45	0.45	1.8
35.7	46-85[2], 90-97	0.40	1.7
35.7	56	0.36	No Propagation Predicted
51.5	86-89	0.35	1.9

NOTE 1: Nozzles receiving the minimum inspection coverage, but less than 1-inch inspection coverage, will be reported in accordance with First Revised Order EA-03-009, Section IV.E.

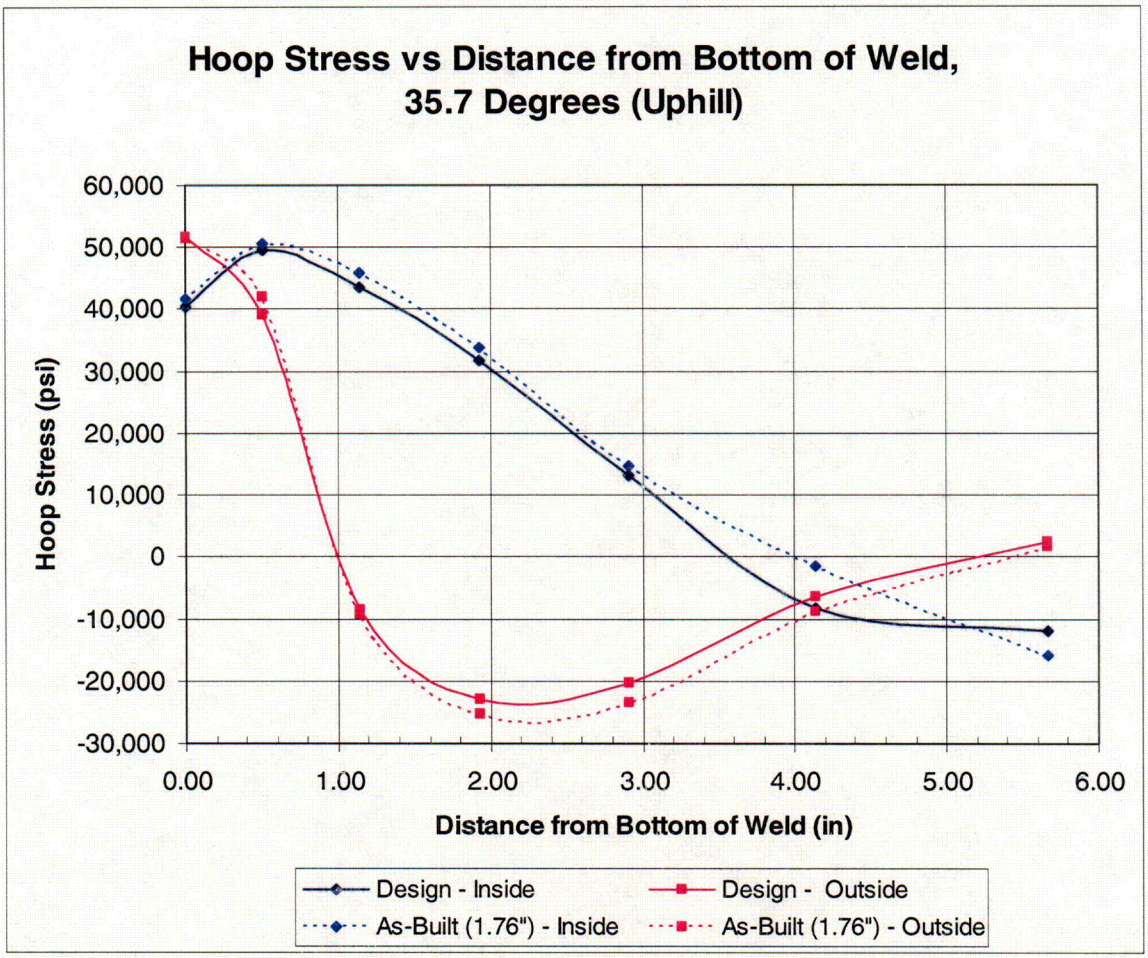
Note 2: Nozzle 56 is treated separately.

Figure 1


Hoop Stress vs Distance from Bottom of Weld, 35.7 Degrees (Downhill)
Hoop Stress (psi)
100,000
80,000
60,000
40,000
20,000
0
-20,000
-40,000
0.00
0.50
1.00
1.50
2.00
2.50
Distance from Bottom of Weld (in)
Design - Inside
Design - Outside
As-Built (1.76") - Inside
As- Built (1.76") - Outside

C01

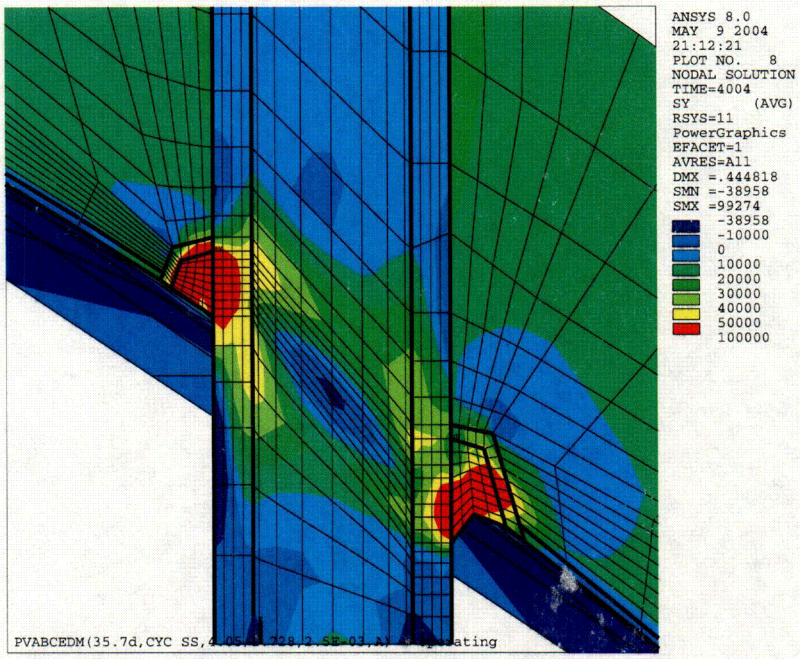
Figure 2

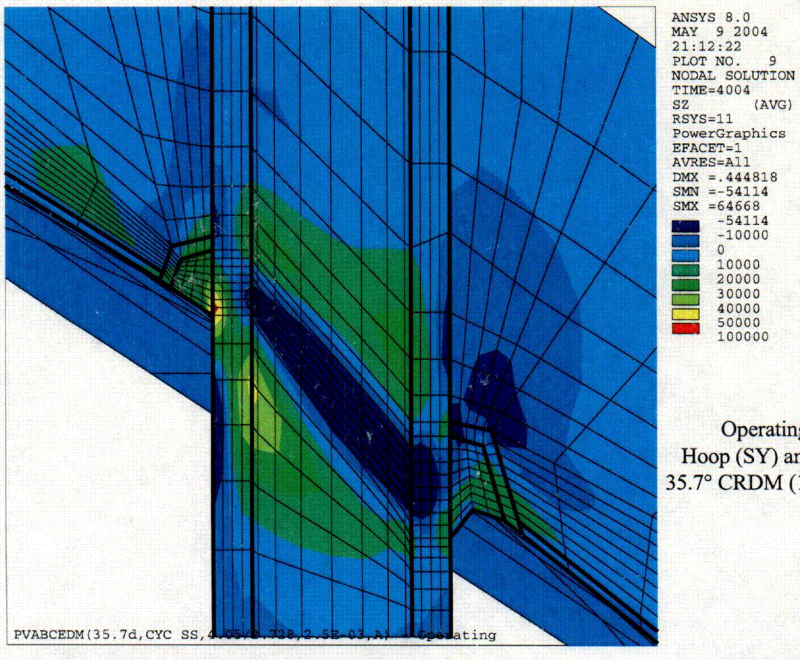

Hoop Stress vs Distance from Bottom of Weld, 35.7 Degrees (Uphill)
Hoop Stress (psi)
60,000
50,000
40,000
30,000
20,000
10,000
0
-10,000
-20,000
-30,000
0.00
1.00
2.00
3.00
4.00
5.00
6.00
Distance from Bottom of Weld (in)
Design - Inside
Design - Outside
As-Built (1.76") - Inside
As-Built (1.76") - Outside

C02

Figure 3

Stress Contour Plots for Penetration Nozzle Angle (35.7°)
with As-Built Weld Depth of 1.76"





Operating plus Residual
Hoop (SY) and Axial (SZ) Stress
35.7° CRDM (1.76-inch weld depth)

C03

APS respectfully requests that your review and approval of the relaxation request submitted to you in Reference 1, as supplemented by References 2, 3, 4, and this letter, be completed for Unit 2 by March 31, 2005.

No commitments are being made to the NRC in this letter. Should you have any questions, please contact Thomas N. Weber at (623) 393-5764.

Sincerely,

David J. Mauldin

CDM/SAB/RJR

cc: J. E. Dyer
B. S. Mallett
M. B. Fields
N. L. Salgado