10 CFR 2.390
EA-03-009

Palo Verde Nuclear Generating Station

David Mauldin
Vice President
Nuclear Engineering and Support

Tel. 623-393-5553
Fax 623-393-6077

Mail Station 7605
PO Box 52034
Phoenix, Arizona 85072-2034

102-05086-CDM/SAB/RJR
April 16, 2004

Secretary,
Office of Secretary of the Commission
U.S. Nuclear Regulatory Commission
ATTN: Rulemakings and Adjudications Staff
Washington, DC 20555-0001

Reference: 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.

Dear Sirs:

Subject: Palo Verde Nuclear Generating Station (PVNGS)
Units 1, 2 and 3
Docket No. STN 50-528, 50-529 and 50-530
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

In the reference above, Arizona Public Service Company (APS) requested relaxation from First Revised NRC Order EA-03-009, Section IV.C(5)(b). The enclosure to this letter contains APS' response to the NRC's request for additional information transmitted to PVNGS via e-mail on April 12, 2004. On April 16, 2004,APS received three additional questions that will be responded to under a separate letter.

APS requests review and approval of this request for Unit 1 prior to Mode 4 entry from the Unit 1 refueling outage. Mode 4 entry is currently scheduled for April 28, 2004. APS also requests that this relaxation be approved for Unit 2 and Unit 3 prior to September 2004.

This letter contains one commitment to the NRC as identified in the response to Question 2 in the enclosure to this letter. Should you have any questions, please contact Thomas N. Weber at (623) 393-5764.

Sincerely,

[Original signed by: David Mauldin]

CDM/SAB/RJR/

B-1

Office of the Secretary of the Commission
Response to the Request for Additional Information for Relaxation of First Revised NRC Order EA-03-009, Section IV.C.(5)(b) Requirements for CEDM Nozzles

Enclosure Response to the Request for Additional Information for Relaxation of First Revised NRC Order EA-03-009, Section IV.C.(5)(b) Requirements for CEDM Nozzles

cc:

J. E. Dyer	(w/Enclosure)
B. S. Mallett	(w/Enclosure)
M. B. Fields	(w/Enclosure)
N. L. Salgado	(w/Enclosure)

Assistant General Counsel for Materials Litigation and Enforcement (w/Enclosure)
U.S. Nuclear Regulatory Commission
Washington, DC 20555

ATTN: Document Control Desk (w/Enclosure)
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Response to the Request for Additional Information for Relaxation of First Revised NRC Order EA-03-009, Section IV.C.(5)(b) Requirements for CEDM Nozzles

Background

On March 19, 2004 APS requested relaxation from First Revised NRC Order EA-03-009, Section IV.C(5)(b). Below is APS' response to the NRC's request for additional information transmitted to PVNGS on April 12, 2004. APS is tracking this relaxation as Relief Request No. 25.

NRC Question 1

The flaw analysis approach provided by the licensee for Units 1, 2, and 3 indicate that the minimum coverage obtained below the J-groove welds will be extremely small, from 0.20" - 0.45", with 1.7 EFPY until cracking reaches the J-groove weld. At these small distances, instrument uncertainties/inaccuracies could have a significant impact on the flaw analysis results. Please discuss the uncertainties that exist in the inspection techniques. Demonstrate that the actual volumetric coverage, with the measurement uncertainties factored in, is equal to or greater than the minimum coverage assumed in the flaw analysis.

APS Response

Tables 1 and 2 represent the minimum required inspection coverage required by Westinghouse letter LTR-PAFM-04-23 crack growth analysis. As requested in Question 4, APS has re-titled the tables to distinguish the difference between the minimum inspection distance required by the Order and that needed for the examination to be bounded by the crack growth analysis.

APS' inspection plan calls for examination to the lowest extent possible above the chamfer face on each CEDM nozzle. The instrument error is minus 0.040", plus 0.040", based on measurements. The UT probes used for the CRDM penetration inspection acquire data while moving in the axial direction. Data is sampled every 0.04" during the scan. The accuracy of our measurement from the toe of the weld to the point where we lose data is a function of the sample rate. Therefore, for 0.20" minimum examination length, we will scan at least 0.24." Actual examination extent below the weld for volumetric coverage is being verified during the examinations, and will be included in the 60 day RVH inspection report.

NRC Question 2

The licensee's analysis in WCAP-15817-P, Rev. 1 used the crack growth formula in Electric Power Research Institute (EPRI) Report Material Reliability Program (MRP) report MRP-55, "Material Reliability Program (MRP) Crack Growth Rates for Evaluating Primary Water Stress Corrosion Cracking (PWSCC) of Thick Wall Alloy 600 Material (MRP-55), Revision 1." The NRC staff has not yet made a final determination on the

acceptability of the subject industry report. Should the NRC staff determine the crack growth formula used by the licensee to be unacceptable, the licensee will be required to revise its analysis to incorporate an acceptable crack growth formula as described below.

If the NRC staff finds that the crack-growth formula in industry report MRP-55 is unacceptable, the licensee shall revise its analysis that justifies relaxation of the First Revised Order within 30 days after the NRC informs the licensee of an NRC-approved crack growth formula. If the licensee's revised analysis shows that the crack growth acceptance criteria are exceeded prior to the end of the current operating cycle, this relaxation is rescinded and the licensee shall, within 72 hours, submit to the NRC written justification for continued operation. If the revised analysis shows that the crack growth acceptance criteria are exceeded during the subsequent operating cycle, the licensee shall, within 30 days, submit the revised analysis for NRC review. If the revised analysis shows that the crack growth acceptance criteria are not exceeded during either the current operating cycle or the subsequent operating cycle, the licensee shall, within 30 days, submit a letter to the NRC confirming that its analysis has been revised. Any future crack-growth analyses performed for this and future cycles for RPV head penetrations must be based on an acceptable crack growth rate formula.

Please formally respond that you accept the described condition.

APS Response

As previously committed to in APS letter 102-04929, dated April 24, 2003, APS understands that the relaxation granted to the order will have the following conditions and has entered them into the Regulatory Commitment Tracking System (RCTS) as RCTSAI 2599526:

- If the NRC staff finds that the crack growth formula in industry report MRP-55 is unacceptable, APS shall revise its analysis that justifies relaxation of the First Revised Order within 30 days after the NRC informs the licensee of an NRC-approved crack growth formula.
- If the revised analysis shows that the crack growth acceptance criteria are exceeded prior to the end of the current operating cycle, this relaxation is rescinded and APS shall, within 72 hours, submit to the NRC written justification for continued operation.
- If revised analysis shows that the crack growth acceptance criteria are exceeded during the subsequent operating cycle, APS shall, within 30 days, submit the revised analysis for NRC review.
- If the revised analysis shows that the crack growth acceptance criteria are not exceeded during either the current operating cycle or the subsequent operating cycle, APS shall, within 30 days, submit a letter to the NRC confirming that its analysis has been revised.
- Any future crack growth analyses performed for this and future cycles for RPV head penetrations must be based on an acceptable crack growth rate formula.

NRC Question 3

The use of term, relief request, is typically used in reference to relief from ASME Code requirements. To assure quick approval of your request from a legal standpoint, please clearly state that this request is a relaxation request, and not use the phrase relief request in the title of the letter.

APS Response

APS identified the request for relaxation as Relief Request No. 25 to provide a means within the PVNGS inservice inspection program to track the request and status in order to facilitate identification and association with specific inspection periods. In the future, APS will not use a relief request number in the letter title. To facilitate APS' internal tracking, a relief request number will be assigned in the body of the letter/enclosure.

NRC Question 4

Tables 1, 2, and 3 are entitled: Table 1: Palo Verde Units 1 & 2 Minimum Required Inspection Coverage." To avoid any confusion with how the phrase, "minimum required inspection coverage," is used in the Order, please clarify the title of these tables to precisely define what these distances actually mean.

APS Response

APS will title the Tables as shown below:

Response to the Request for Additional Information for Relaxation of First Revised NRC Order EA-03-009, Section IV.C.(5)(b) Requirements for CEDM Nozzles

Table 1
Palo Verde Units 1 & 2 Minimum Required Inspection Coverage
Required by Westinghouse Letter LTR-PAFM-04-23

Nozzle Angle (°)	Penetration No. Applicability	Minimum Inspection Coverage Required Below the Weld on the Downhill Side (in)[NOTE 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, 90-97	0.40	1.7
51.5	86-89	0.35	1.9

Table 2
Palo Verde Unit 3 Minimum Required Inspection Coverage
Required by Westinghouse Letter LTR-PAFM-04-23

Nozzle Angle (°)	Penetration No. Applicability	Minimum Inspection Coverage Required Below the Weld on the Downhill Side (in)[NOTE 1]	EFPY for Upper Crack Tip to Reach the Bottom of Weld
0	1-29	0.40	1.7
31.5	30-81	0.35	2.0
47.6	82-85	0.30	2.4
49.5	90-97	0.30	3.4
51.5	86-89	0.20	2.4

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

NRC Question 5

The revised Order included Section IV.C(5)(b)(iii), which allows licensees to use a combination of IV.C(5)(b)(i) and IV.C(5)(b)(ii) to meet the Order inspection requirements. Your response states that since APS will be conducting a volumetric examination of the CEDM nozzles, IV.C(5)(b)(iii) does not apply. This response is incomplete, since you are not able to conduct volumetric examinations over the required distance. Discuss what additional distances can be examined using surface examination techniques discussed in IV.C(5)(b)(ii). If the full inspection length required by the Order cannot be met through a combination of volumetric and surface examinations, then the appropriate section of the Order for which relaxation should be requested is IV.C(5)(b)(iii).

APS Response

Order Requirements for Which Relaxation is Requested:

Section IV.C.(5)(b) of Order EA-03-009 requires, in part, that the following inspections be performed every refueling outage for high susceptibility plants similar to PVNGS Units 1, 2, and 3:

(i) Ultrasonic testing of the RPV head penetration nozzle volume (i.e., nozzle base material) from 2 inches above the highest point of the root of the J-groove weld (on a horizontal plane perpendicular to the nozzle axis) to 2 inches below the lowest point at the toe of the J-groove weld on a horizontal plane perpendicular to the nozzle axis (or the bottom of the nozzle if less than 2 inches (see Figure IV-1 [of the February 20, 2004, Order]); OR from 2 inches above the highest point of the root of the J-groove weld (on a horizontal plane perpendicular to the nozzle axis) to 1.0-inch below the lowest point at the toe of the J-groove weld (on a horizontal plane perpendicular to the nozzle axis) and including all RPV head penetration nozzle surfaces below the J-groove weld that have an operating stress level (including all residual and normal operation stresses) of 20 ksi tension and greater (see Figure IV-2 [of the February 20, 2004, Order]). In addition, an assessment shall be made to determine if leakage has occurred into the annulus between the RPV head penetration nozzle and the RPV head low alloy steel.

(ii) Eddy current testing or dye penetrant testing of the entire wetted surface of the J-groove weld and the wetted surface of the RPV head penetration nozzle base material from at least 2 inches above the highest point of the root of the J-groove

weld (on a horizontal plane perpendicular to the nozzle axis) to 2 inches below the lowest point at the toe of the J-groove weld on a horizontal plane perpendicular to the nozzle axis (or the bottom of the nozzle if less than 2 inches (see Figure IV-3 [of the February 20, 2004, Order]); OR from 2 inches above the highest point of the root of the J-groove weld (on a horizontal plane perpendicular to the nozzle axis) to 1.0-inch below the lowest point at the toe of the J-groove weld (on a horizontal plane perpendicular to the nozzle axis) and including all RPV head penetration nozzle surfaces below the J-groove weld that have an operating stress level (including all residual and normal operation stresses) of 20 ksi tension and greater (see Figure IV-4 [of the February 20, 2004, Order]).

(iii) A combination of (i) and (ii) to cover equivalent volumes, surfaces, and leak paths of the RPV head penetration nozzle base material and J-groove weld as described in (i) and (ii). Substitution of a portion of a volumetric exam on a nozzle with a surface examination may be performed with the following requirements:

1. On nozzle material below the J-groove weld, both the outside diameter and inside diameter surfaces of the nozzle must be examined.

2. On nozzle material above the J-groove weld, surface examination of the inside diameter surface of the nozzle is permitted provided a surface examination of the J-groove weld is also performed.

As discussed in Sections V and VI of the enclosure to letter 102-05075, each CEDM nozzle has a threaded guide cone attached to the bottom of the nozzle. This cone is held in place by a plug weld which would require destructive removal. Once removed the threaded portion of the nozzles could not be effectively examined using any combination of the methods specified in the First Revised Order. Therefore, APS is requesting relaxation from Section IV, paragraphs C.(5)(b)(i), (ii) and (iii) of the First Revised Order. The specific relaxation requested is identified below.

Relaxation from the Order where inspection coverage is limited by inaccessible areas of 97 CEDM penetration nozzles from PVNGS Units 1, 2 and 3 with respect to NDE, including ultrasonic testing (UT), eddy current testing (ET), and dye penetrant testing (PT).

APS proposes to meet the Order requirements, or to examine each CEDM nozzle from 2 inches above the top of the attachment weld to as far down the nozzle as physically possible. The distance shall be at least the minimum inspection distance below the bottom of the attachment weld as shown in Tables 1 and 2 above.

NRC Question 6

The dose estimate of "30 times" the UT is not developed to the point that we can clearly understand this estimate. Please provide sufficient details of the effort required for both inspection options, and the time and doses involved in each, so that we can independently agree with the "30" times" value.

APS Response

Based on repair mock-ups, radiation levels and time estimates for conducting NDE, APS estimates that the dose to perform a liquid penetrant examination of one CEDM nozzle is approximately 500mr. This includes the examiner only working in high radiation fields for performance of cleaning, penetratnt application, cleaning, developer application, and examination. Time between these steps the examiner will move to a lower dose area to keep the dose ALARA. Performance of a liquid penetrant examination of 97 CEDMs would result in an estimated 48.5 Man-rem. APS expects some potential for economy of work for a group of nozzles. However, APS has not performed mock-up practice of attempting to liquid penetrant test a group of nozzles to get a estimate of potential dose savings. The under-head NDE examination is currently estimated to take 1.3 R to complete. Therefore, the difference is closer to 37.3 times greater dose for performing the additional surface examinations. Note that current alpha contamination levels require a respirator use in order to perform manual work under the reactor vessel head.

NRC Question 7

In Tables 1 and 2 of WCAP- 15817-P, the table values which designate the EFPY for Upper Crack Tip to Reach the Bottom of the weld, the 0 ksi model indicates that it takes less time for the crack tip to reach the bottom of the weld than the 20 ksi model. Recognizing that the driving forces are lower and the distances scanned down are lower, why is the time for the cracks to reach the bottom of the weld for the 0 ksi less rather than longer than the 20 ksi model?

APS Response

In reference to the 0 ksi model, the initial assumed flaw size is longer. If we assumed the upper crack tip location to be the same as the 20 ksi model, i.e., using the same required coverage as the 20 ksi model, it would take less time for the crack to reach the weld because of the higher initial stress intensity factor.

Conclusion

Section IV.F of the First Revised Order states that conditions may be relaxed or

rescinded upon demonstration by the Licensee of good cause. A request for relaxation regarding inspection of specific nozzles shall also address the following criteria:

1. The proposed alternative(s) for inspection of specific nozzles will provide an acceptable level of quality and safety, or

2. Compliance with this Order for specific nozzles would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

APS believes that compliance with this Order as written would result in a hardship and require unusual difficulty without a compensating increase in the level of quality and safety. The proposed alternative demonstrates that at least one operating cycle would elapse before a postulated flaw in the un-inspected area of the CEDM penetration nozzle would propagate into the pressure boundary formed by the J-groove weld. Therefore, APS is requesting relaxation from Section IV, paragraphs C.(5)(b)(i), (ii) and (iii) of the First Revised Order pursuant to Order Section IV.F.2.

References

1. APS letter 102-05075, "Relief Request No. 25 – Request for Relaxation of First Revised Order EA-03-009 Section IV.C(5)(b) Requirements for CEDM Nozzles," dated 03/19/04.