



Palo Verde Nuclear
Generating Station

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10 CFR 50.55a

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102-04842-CDM/SAB/RJR
September 25, 2002

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
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11555 Rockville Pike
Rockville, MD. 20852

Dear Sirs:

**Subject: Palo Verde Nuclear Generating Station (PVNGS)
Units 1, 2, and 3
Docket Nos. STN 50-528/529/530
10 CFR 50.55a Alternative Repair Request for the Second 10-Year
Interval of the Inservice Inspection Program (Relief Request 22)**

Pursuant to 10 CFR 50.55a(a)(3)(i), Arizona Public Service Company (APS) is proposing an alternative method to the thermal removal process requirements of ASME Section XI, IWA-4322. This request is for Palo Verde Nuclear Generating Station (PVNGS) Units 1, 2, and 3 during the second 10-Year interval of the Inservice Inspection Program.

Specifically, APS is planning to use an Electrical Discharge Machining (EDM) process if it becomes necessary to perform certain repairs as a result of inspections of the reactor vessel head penetrations (VHP) in accordance with NRC Bulletin 2001-01, "Circumferential Cracking of Reactor Pressure Vessel Head Penetration Nozzles." Later editions of the Code have recognized the different characteristics of the newer processes such as EDM and allow for the alternative of qualifying the process in lieu of requiring additional material to be removed from the thermally cut surfaces. As documented in the attached request, APS proposes to use the alternative rules of later editions of the Code to qualify the EDM process. The details of this 10 CFR 50.55a request are provided in the enclosure to this letter.

APS requests the Staff's review of the proposed relief request prior to February 2003. Should APS identify the need to perform repairs using the proposed relief request as a result of the Reactor Vessel Head inspections being performed in Unit 1 in October 2002, APS may request expedited approval of this Code alternative request.

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ATTN: Document Control Desk
PVNGS Units 1, 2, and 3, Docket Nos. STN 50-528/529/530
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This submittal is consistent with the NRC approval of the Entergy alternative for the use of the EDM process. 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,



Enclosure: 10 CFR 50.55a Alternative Repair Request for the Second 10-Year
Interval of the Inservice Inspection Program (Relief Request 22)

CDM/SAB/RJR/kg

cc: E. W. Merschoff
J. N. Donohew
N. L. Salgado

**10 CFR 50.55a Alternative Repair Request for the Second
10-Year Interval of the Inservice Inspection Program
(Relief Request 22)**

**10 CFR 50.55a Alternative Repair Request for the Second 10-Year Interval of
the Inservice Inspection Program**

Relief Request 22

I. ASME Code Component(s) Affected

Component number: B4.12, B4.11

Description: Control Element Drive Mechanism (CEDM) nozzle penetration (97)
Reactor Head Vent Nozzle penetration (1)

Code Class: 1

II. Applicable Code Addition and Addenda

Second 10-year inservice inspection interval code for Palo Verde Nuclear
Generating Station (PVNGS) Units 1, 2, and 3: The American Society of Mechanical
Engineers (ASME) Code, Section XI, 1992 Edition, 1992 Addenda.

Construction code for PVNGS Units 1, 2, and 3: ASME Section III, 1971 Edition,
1973 Winter Addenda.

Installation code for PVNGS Units 1, 2, and 3: ASME Section III, 1974 Edition, 1975
Winter Addenda.

III. Applicable Code Requirement

IWA-4170 of ASME Section XI, 1992 Edition, 1992 Addenda, states that repairs and
the installation of replacement items shall be performed in accordance with the
Owner's Design Specification and the original construction code of the component or
system. Later editions and addenda of the construction code or ASME Section III,
either in their entirety or portions thereof, and Code Cases may be used.

ASME Section XI also imposes repair requirements that supplement or amend the
repair rules of the construction code. Where applicable, compliance with these
additional requirements is mandatory. When performing defect removal of P-No. 43
(inconel) materials using a thermal removal process, the supplemental requirements
of IWA-4322 apply:

- IWA-4322 "If thermal removal processes are used on P-No. 8 and P-No. 43
materials, a minimum of 1/16" material shall be mechanically removed from the
thermally processed areas."

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IV. Proposed Alternative

A. Background

RPV head penetration nozzles at PVNGS Units 1, 2, and 3 are considered to have a moderate susceptibility to Primary Water Stress Corrosion Cracking (PWSCC) based upon a susceptibility ranking of greater than 5 effective full power years (EFPY) but less than 30 EFPY from the Oconee Nuclear Station 3 using the time-at-temperature method.

Susceptibility rankings for PVNGS Units 1, 2, and 3 have been reported to the NRC in response to NRC Bulletin 2001-01 (Reference 4). RPV head penetration nozzles at PVNGS Units 1, 2, and 3 are manufactured from SB-166 or SB-167 Alloy 600 materials which are P-Number 43 inconel alloys.

Should repairs of RPV head penetration nozzles or J-welds become necessary at PVNGS, APS plans to utilize the electrical discharge machining (EDM) process to excavate PWSCC cracks or defects and remove weld crown surfaces of repair welds to facilitate performance of final NDE. EDM is considered a thermal removal process by the ASME Code (References 2 and 3). As such, a minimum of 1/16" of material must be mechanically removed from all EDM processed areas to comply with IWA-4322. However, use of mechanical removal processes would have adverse affects on the Alloy 600 RPV head penetration nozzles and welds. Specifically, the use of mechanical removal processes such as grinding or machining results in an increased susceptibility of Alloy 600 materials and their associated welds to PWSCC.

B. Proposed Alternative

Pursuant to 10 CFR 50.55a(a)(3)(i), APS proposes an alternative to the thermal removal requirements of IWA-4322 applicable to P-No. 43 materials. Instead of mechanically removing 1/16" of material from all thermally processed areas as required by IWA-4322, APS proposes to qualify the EDM process in accordance with IWA-4461.4 of the 1995 Edition, 1997 Addenda of ASME Section XI. In addition to the requirements of IWA-4461.4, APS will also perform the following:

- Determine the thickness of the resultant oxide layer on the cut surface by metallographic examination during EDM process qualification.
- Based upon the oxide thickness measurements obtained during the EDM qualification process, remove the oxide layer from cut or excavated surfaces when performing repair activities on RPV head penetration nozzles or J-welds.

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the Inservice Inspection Program**

V. Basis of Alternative for Providing Acceptable Level of Quality and Safety

IWA-4322 of the 1992 Edition of ASME Section XI requires the removal of a minimum of 1/16" of material from all thermally processed areas of P-Number 43 materials. The apparent basis of this requirement is to ensure that thermally cut or excavated surfaces are free of unacceptable surface irregularities, oxides, and fissures that were created by the thermal removal process.

Suitability of IWA-4461.4 of ASME Section XI, 1995 Edition, 1997 Addenda

The qualification requirements of IWA-4461.4 ensure that the proposed thermal process is capable of producing a surface finish that is free of cracks or fissures and meets the required surface roughness criteria of the owner. Where the cut surface is exposed to a corrosive medium, then corrosion testing or evaluations must also be performed. The qualification requirements of IWA-4461.4 are summarized below.

- (a) The qualification test shall consist of two coupons of the same P-Number material to be cut in production.
- (b) The qualification coupons shall be cut using the maximum heat input to be used in production.
- (c) The thermally cut surface of each coupon shall be visually examined at 10X and shall be free of cracks. The Owner shall specify surface roughness acceptable for the application and shall verify that the qualification coupon meets the criterion.
- (d) Each qualification test coupon shall be cross-sectioned, and the exposed surfaces shall be polished, etched with a suitable etchant, and visually examined at 10X. All sectioned surfaces shall be free of cracks.
- (e) Corrosion testing of the thermally cut surface and heat affected zone shall be performed if the cut surface is to be exposed to a corrosive media. Alternatively, corrosion resistance of the thermally cut surface may be evaluated. The Owner shall specify the acceptance criteria.

In addition to the qualification testing requirements of IWA-4461.4 of ASME Section XI, 1995 Edition, 1997 Addenda, APS will determine the thickness of the resultant oxide layer on the cut surfaces as part of the EDM qualification. The thickness of the resultant oxide layer will be determined by metallographic examination. Based on the oxide thickness measurements obtained during the EDM process qualification, post-EDM polishing operations will be performed to ensure that the oxide surface layer is removed. The method described above for qualification of this process is consistent with the previously approved ENTERGY request (Section VII, Precedents).

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VI. CONCLUSION

10 CFR 50.55a(a)(3) states:

“Proposed alternatives to the requirements of paragraphs (c), (d), (e), (f), (g), and (h) of this section or portions thereof may be used when authorized by the Director of the Office of Nuclear Reactor Regulation. The applicant shall demonstrate that:

- (i) The proposed alternatives would provide an acceptable level of quality and safety, or
- (ii) Compliance with the specified requirements of this section would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.”

APS believes that compliance with the repair rules as stated in Reference 1 and as described in Section IV.A, “Background,” of this request would result in an increased susceptibility of RPV head penetration nozzles to PWSCC. The proposed alternative would provide an acceptable level of quality and safety. Therefore, we request that the proposed alternative be authorized pursuant to 10 CFR 50.55a(a)(3)(i).

VII. Precedents

This relief request (RR 22) is consistent with the previously approved ENTERGY request identified below.

Accession # ML020920712, Entergy Operations - submittal date: March 14, 2002.
Accession # ML021710191, Entergy Operations - approval date: June 17, 2002.

VIII. References

1. ASME Section XI, 1992 Edition, 1992 Addenda
2. ASME Section XI, 1995 Edition, 1997 Addenda
3. Interpretation X1-1-95-60, Section XI, IWA-4322, EDM and MDM Processes
4. Letter 102-04603-CDM/SAB/RJR, “Response to NRC Bulletin 2001-01: Circumferential Cracking of Reactor Pressure Vessel Head Penetration nozzles,” dated September 4, 2001.