September 25, 2003

Mr. Gregg R. Overbeck
Senior Vice President, Nuclear
Arizona Public Service Company
P. O. Box 52034
Phoenix, AZ 85072-2034

SUBJECT: PALO VERDE NUCLEAR GENERATING STATION, UNITS 1, 2, AND 3 - RELIEF REQUEST NOS. 20 AND 21 RE: ALTERNATIVES TO INSERVICE INSPECTION PROGRAM FLAW REPAIR REQUIREMENTS (TAC NOS. MB4498, MB4499, MB4500, MB4645, MB4646, AND MB4647)

Dear Mr. Overbeck:

By letter dated March 15, 2002, as supplemented by letter dated August 19, 2003, you submitted Relief Request Nos. 20 and 21, requesting relief from requirements in the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (the ASME Code) for the Palo Verde Nuclear Generating Station, Units 1, 2, and 3. In your request, you proposed alternatives to the ASME Code Section XI requirements that preclude welding over or embedding an existing flaw. These requests are based on the use of the Westinghouse repair methodology as documented in WCAP-15987-P, Revision 2, "Technical Basis for the Embedded Flaw Process for Repair of Reactor Vessel Head Penetrations," which was reviewed and approved by the staff in a July 3, 2003 Safety Evaluation (ML031840237).

Based on the enclosed Safety Evaluation, the NRC staff concludes that the proposed alternatives provide an acceptable level of quality and safety. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i) of Title 10 of the *Code of Federal Regulations*, the NRC staff authorizes the proposed alternatives in Relief Request Nos. 20 and 21 to the flaw repair requirements of IWA-4170 and IWA-4310 of ASME Code Section XI at Palo Verde Nuclear Generating Station, Units 1, 2, and 3 for the second 10-year inservice inspection interval.

Sincerely,

/RA/

Stephen Dembek, Chief, Section 2
Project Directorate IV
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket Nos. STN 50-528, STN 50-529,
and STN 50-530

Enclosure: Safety Evaluation

cc w/encl: See next page

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

INSERVICE INSPECTION PROGRAM RELIEF REQUEST NOS. 20 AND 21

ARIZONA PUBLIC SERVICE COMPANY, ET AL.

PALO VERDE NUCLEAR GENERATING STATION, UNITS 1, 2, AND 3

DOCKET NOS. STN 50-528, STN 50-529, AND STN 50-530

1.0 INTRODUCTION

The Inservice Inspection (ISI) of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (Code) Class 1, 2, and 3 components is to be performed in accordance with Section XI of the ASME Code and applicable edition and addenda as required by 10 CFR 50.55a(g), except where specific relief has been granted by the Commission pursuant to 10 CFR 50.55a(g)(6)(i). Section 10 CFR 50.55a(a)(3) of Title 10 of the *Code of Federal Regulations* (10 CFR), states in part that alternatives to the requirements of paragraph (g) may be used, when authorized by the NRC, if the licensee demonstrates that: (i) the proposed alternatives would provide an acceptable level of quality and safety, or (ii) compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

Pursuant to 10 CFR 50.55a(g)(4), ASME Code Class 1, 2, and 3 components (including supports) will meet the requirements, except the design and access provisions and the preservice examination requirements, set forth in the ASME Code, Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," to the extent practical within the limitations of design, geometry, and materials of construction of the components. The regulations require that inservice examination of components and system pressure tests conducted during the first 10-year interval and subsequent intervals comply with the requirements in the latest edition and addenda of Section XI of the ASME Code incorporated by reference in 10 CFR 50.55a(b) 12 months prior to the start of the 120-month interval, subject to the limitations and modifications listed therein. The ISI code of record for Palo Verde Nuclear Generating Station (PVNGS), Units 1, 2, and 3 second 10-year ISI interval is the 1992 Edition, 1992 Addenda of Section XI of the ASME Code.

By letter dated March 15, 2002, as supplemented by letter dated August 19, 2003, Arizona Public Service (the licensee), submitted requests for relief for PVNGS, Units 1, 2, and 3. Specifically, the licensee's Relief Request Nos. 20 and 21 proposed alternatives to use an embedded repair technique if cracks were found on the inside and/or outside diameter of the Palo Verde control element drive mechanism (CEDM) nozzles or on the J-groove attachment welds, respectively. These techniques would be used in lieu of the ASME Code Section XI requirements that preclude welding over or embedding an existing flaw.

2.0 INSERVICE INSPECTION PROGRAM RELIEF REQUEST NOS. 20 AND 21

2.1 ASME Code Components Affected

Relief Request Number 20 would allow repairs on the inside diameter of CEDM penetrations.

Relief Request Number 21 would allow repairs on the outside diameter of the CEDM penetrations as well as on the J-groove attachment welds on Vessel Head Penetrations (VHP).

2.2 Code Requirements for which Relief is Requested

ASME Section XI, IWA-4170 states in part:

> (b) "Repairs 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 of Section III, either in their entirety or portions thereof, and Code Cases may be used..."

ASME Section XI, IWA-4310, "Defect Removal Procedure," states in part:

> "Defects shall be removed or reduced in size in accordance with Paragraph..."

ASME Code, Section XI, sub-articles IWA-4170 and IWA-4310, do not allow welding over or embedding an existing flaw.

2.3 Licensee's Proposed Alternative to Code

As an alternative to the rules contained in the 1992 ASME Code Section XI, subarticles IWA-4170 and IWA-4310, which do not allow welding over or embedding an existing flaw, the licensee requested the NRC to approve the use of the proposed alternative method outlined in Westinghouse Topical Report WCAP-15987-P Revision 2, "Technical Basis for the Embedded Flaw Process for Repair of Reactor Vessel Head Penetrations" dated May 16, 2003 (ML031840237). In an August 19, 2003, letter which responded to the staff's request for additional information, the licensee stated it would follow the guidelines outlined in the Westinghouse topical report, including the Conditions and Limitations identified in Section 5.0 of the NRC's July 3, 2003, Safety Evaluation of the WCAP report (see Section 3.0 below for details).

2.4 Licensee's Basis for Relief

The bases for the alternative requirements [allowing seal weld repairs of circumferential and axial cracks in the VHP nozzle ID (inside diameter) at or above the J-groove weld, in the VHP nozzle ID and OD (outside diameter) below the J-groove weld, and in the J-groove weld] are discussed in detail in WCAP-15987-P Revision 2.

The staff's July 3, 2003, Safety Evaluation found WCAP-15987-P Revision 2 to be acceptable for referencing in licensing applications as an alternative to the 1989 Edition of Section III of the ASME Code, with limitations noted in Section 3.0 below. Since the ISI Code of Record for the PVNGS units differs from the code edition referenced in the WCAP, the licensee performed a

code reconciliation to verify that the bases contained in this WCAP are applicable to the PVNGS units.

3.0 STAFF EVALUATION

The staff has reviewed Westinghouse Topical Report WCAP-15987-P, Revision 2, and in a letter dated July 3, 2003 (ML031840237), the staff accepted the referencing of the topical report for use with the following limitations:

1. Licensee's must follow the NRC flaw evaluation guidelines provided in the R. J. Barrett (NRC) letter to A. Marion (Nuclear Energy Institute), "Flaw Evaluation Guidelines," April 11, 2003. (ML030980322)

2. The crack growth rate referenced in WCAP-15987-P, Revision 2 is not applicable to Alloy 600 or Alloy 690 weld material, i.e., Alloy 52, 82, 152, and 182 filler material.

3. The nondestructive examination (NDE) requirements listed in the table below must be implemented for examinations of repairs made using the embedded flaw process.

Repair Location	Flaw Orientation	Repair Weld	Repair NDE	ISI NDE of the repair, Note 2
VHP Nozzle ID	Axial	Seal	UT and Surface	UT or Surface
VHP Nozzle ID	Circumferential	Note 1	Note 1	Note 1
VHP Nozzle OD above J-groove weld	Axial of Circumferential	Note 1	Note 1	Note 1
VHP Nozzle OD below J-groove weld	Axial or Circumferential	Seal	UT or Surface	UT or Surface
J-groove weld	Axial	Seal	UT and Surface, Note 3	UT and Surface, Note 3
J-groove weld	Circumferential	Seal	UT and Surface, Note 3	UT and Surface, Note 3

Notes: 1. Repairs must be reviewed and approved separately by the NRC.

2. Inspection consistent with the NRC Order EA-03-009 dated February 11, 2003, and any subsequent changes.

3. Inspect with personnel and procedures qualified with UT performance-based criteria. Examine the accessible portion of the repaired region. The UT coverage plus surface coverage must equal 100 percent.

The licensee stated that it would use this Westinghouse topical report and would follow the conditions and limitations identified above.

In addition, the licensee performed a code reconciliation between the 1989 Edition ASME Code version referenced in WCAP-15987-P, Revision 2 and ISI Code of Record for the PVNGS units, the 1992 Edition through the 1992 Addenda, to ensure all related requirements would be met. The licensee concluded that there were no significant differences between the code versions for the applicable code requirements and that the technical findings in WCAP-15987-P, Revision 2 are valid for the PVNGS units. The staff agrees with the licensee's conclusions in this matter.

Therefore, the staff finds the use of the reactor vessel head penetration repair methodology as described in WCAP-15987-P, Revision 2, to be acceptable for the PVNGS Units, 1, 2, and 3, for the second 10-year ISI interval.

4.0 CONCLUSION

The NRC staff concludes that the proposed alternatives as stated in Relief Request Nos. 20 and 21 provide an acceptable level of quality and safety. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i), the NRC staff authorizes the proposed alternatives in Relief Request Nos. 20 and 21 to the flaw repair requirements of IWA-4170 and IWA-4310 of ASME Code Section XI at PVNGS, Units 1, 2, and 3 for the second 10-year ISI interval.

All other requirements of the ASME Code, Section III and XI for which relief has not been specifically requested and approved remain applicable, including third party review by the Authorized Nuclear Inservice Inspector.

Principal Contributor: E. Reichelt

Date: September 25, 2003

cc:

Mr. Steve Olea
Arizona Corporation Commission
1200 W. Washington Street
Phoenix, AZ 85007

Douglas Kent Porter
Senior Counsel
Southern California Edison Company
Law Department, Generation Resources
P.O. Box 800
Rosemead, CA 91770

Senior Resident Inspector
U.S. Nuclear Regulatory Commission
P. O. Box 40
Buckeye, AZ 85326

Regional Administrator, Region IV
U.S. Nuclear Regulatory Commission
Harris Tower & Pavillion
611 Ryan Plaza Drive, Suite 400
Arlington, TX 76011-8064

Chairman
Maricopa County Board of Supervisors
301 W. Jefferson, 10th Floor
Phoenix, AZ 85003

Mr. Aubrey V. Godwin, Director
Arizona Radiation Regulatory Agency
4814 South 40 Street
Phoenix, AZ 85040

Mr. Craig K. Seaman, Director
Regulatory Affairs/Nuclear Assurance
Palo Verde Nuclear Generating Station
P.O. Box 52034
Phoenix, AZ 85072-2034

Mr. Hector R. Puente
Vice President, Power Generation
El Paso Electric Company
2702 N. Third Street, Suite 3040
Phoenix, AZ 85004

Mr. John Taylor
Public Service Company of New Mexico
2401 Aztec NE, MS Z110
Albuquerque, NM 87107-4224

Ms. Cheryl Adams
Southern California Edison Company
5000 Pacific Coast Hwy Bldg DIN
San Clemente, CA 92672

Mr. Robert Henry
Salt River Project
6504 East Thomas Road
Scottsdale, AZ 85251

Terry Bassham, Esq.
General Counsel
El Paso Electric Company
123 W. Mills
El Paso, TX 79901

Mr. John Schumann
Los Angeles Department of Water & Power
Southern California Public Power Authority
P.O. Box 51111, Room 1255-C
Los Angeles, CA 90051-0100

Brian Almon
Public Utility Commission
William B. Travis Building
P. O. Box 13326
1701 North Congress Avenue
Austin, TX 78701-3326