September 14, 2000

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 - EVALUATION OF REQUESTS FOR RELIEF ASSOCIATED WITH THE SECOND 10-YEAR INSERVICE INSPECTION INTERVAL (TAC NOS. MA6338, MA6339, MA6340)

Dear Mr. Overbeck:

The staff, with technical assistance from its contractor, the Idaho National Engineering and Environmental Laboratory (INEEL), has reviewed and evaluated the information provided by Arizona Public Service Company (APS) by letter dated August 24, 1999, proposing two additional requests for relief for the Palo Verde Nuclear Generating Station, Units 1, 2, and 3 second 10-year inservice inspection interval. APS provided additional information on Request for Relief No. 13 in its letter dated August 18, 2000. The staff's evaluation of the initial requests for relief for the second 10-year interval was provided by letter dated April 10, 2000.

Enclosure 1 provides the staff's evaluation and conclusions on the proposed requests for relief from code requirements. Enclosure 2 is the INEEL technical letter report.

Sincerely,

/RA/

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

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

Enclosures: 1. Safety Evaluation
2. Technical Letter Report

cc w/encls: See next page

September 14, 2000

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Senior Vice President, Nuclear
Arizona Public Service Company
P. O. Box 52034
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SUBJECT: PALO VERDE NUCLEAR GENERATING STATION, UNITS 1, 2, AND 3 - EVALUATION OF REQUESTS FOR RELIEF ASSOCIATED WITH THE SECOND 10-YEAR INSERVICE INSPECTION INTERVAL (TAC NOS. MA3559, MA3560, MA3561)

Dear Mr. Overbeck:

The staff, with technical assistance from its contractor, the Idaho National Engineering and Environmental Laboratory (INEEL), has reviewed and evaluated the information provided by Arizona Public Service Company (APS) by letter dated August 24, 1999, proposing two additional requests for relief for the second 10-year inservice inspection interval for the Palo Verde Nuclear Generating Station, Units 1, 2, and 3. APS provided additional information on Request for Relief No. 13 in its letter dated August 18, 2000. The staff's evaluation of the initial requests for relief for the second 10-year interval was provided by letter dated April 10, 2000.

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SECOND 10-YEAR INTERVAL INSERVICE INSPECTION PLAN

REQUESTS FOR RELIEF NOS. 13 AND 14

ARIZONA PUBLIC SERVICE COMPANY

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

By letter dated August 24, 1999, the Arizona Public Service Company (the licensee) submitted two additional requests for relief for the second 10-year inservice inspection (ISI) interval for Palo Verde Nuclear Generating Station (Palo Verde) , Units 1, 2 and 3. The licensee provided additional information in its letter dated August 18, 2000. The Idaho National Engineering and Environmental Laboratory (INEEL) assisted the staff in its evaluation of the subject requests for relief, and INEEL's conclusions are presented in the technical letter report (TLR) (Enclosure 2).

The staff's evaluation of the initial requests for relief for the second 10-year ISI interval was provided by letter dated April 10, 2000.

2.0 BACKGROUND

ISI of the American Society of Mechanical Engineers (ASME) Code Class 1, 2, and 3 components must be performed in accordance with Section XI of the ASME Boiler and Pressure Vessel (B&PV) Code and applicable addenda as required by 10 CFR 50.55a(g), except where specific written relief has been granted by the Commission pursuant to 10 CFR 50.55a(g)(6)(i). Paragraph 50.55a(a)(3) of 10 CFR Part 50 states in part that alternatives to the requirements of paragraph (g) may be used, when authorized by the NRC, if (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) must meet the requirements, except the design and access provisions and the pre-service 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 code of record for the Palo Verde units second 10-year ISI interval is the 1992 Edition with the 1992 Addenda of the ASME Boiler and Pressure Vessel Code. The licensee's use of the 1992 Edition with the 1992 Addenda was approved pursuant to 10 CFR 50.55a(g)(4)(iv) in the staff's Safety Evaluation dated April 10, 2000.

3.0 EVALUATION

The staff and INEEL have evaluated the information provided in the licensee's letter dated August 24, 1999, in support of Requests for Relief Nos. 13 and 14 submitted for the second 10-year intervals for Palo Verde Units 1, 2, and 3. The staff adopts the evaluations and recommendations for authorizing the alternative in Request for Relief No. 13 and granting Request for Relief No. 14 contained in the enclosed TLR, with the exception noted below. Table 1 summarizes the two relief requests and the basis for approval.

The licensee's August 18, 2000, letter was submitted after INEEL had provided the staff with its TLR. The August 18 letter revises Request for Relief No. 13 such that it is only being requested for the first refueling outage of the second 10-year ISI interval for each of the Palo Verde units. The last of these refueling outages was completed on May 2, 2000.

The licensee submitted the August 18, 2000, letter in response to concerns the staff had identified during its review of similar requests for relief for each unit associated with the first 10-year ISI interval, and which were detailed in the NRC letters transmitting the subject safety evaluations to the licensee. The earliest safety evaluation that provided the staff's concerns was in a letter dated July 18, 2000 (Accession No. ML003732843), and these concerns are restated below:

1. Appendix G to 10 CFR Part 50 requires that the VT-2 examination of the reactor vessel be completed prior to the reactor core becoming critical. The purpose of this requirement is to ensure that the reactor vessel boundary is leak tight prior to criticality rather than to bring the reactor to criticality and subsequently verify its leak tightness. It appears that, while some of the six different methods proposed by the licensee as an alternative to the VT-2 examination are capable of providing leakage monitoring prior to reaching Mode 2, this information was not addressed in the request for relief.

2. As the licensee indicated, the purpose of the ASME Code requirement and of the technical specifications for RCS operational leakage is to ensure that there is no pressure boundary leakage. The purpose of this inspection should also be to ensure that vessel bottom head instrument lines are not experiencing leakage and to ensure that boric acid corrosion is not taking place. The licensee's request for relief addresses various methods for detection of leakage but does not indicate how the location of potential leakage would be identified and what actions would be taken and when if leakage were detected. The request for relief did not address how the proposed alternative would address the above-stated purposes for performing a VT-2 examination of the vessel.

In the safety evaluations for the first 10-year ISI interval, the staff stated that, if the licensee intends to rely on a similar alternative for the second 10-year interval, these concerns will have to be addressed in writing as part of a request for approval.

Based on these concerns, the licensee's letter dated August 18, 2000, modified the subject request for relief so that future examinations of the reactor vessel will be conducted in accordance with the applicable ASME Section XI requirements. The staff finds this limitation on the use of Request for Relief No. 13 acceptable.

4.0 CONCLUSION

The staff concludes that the code requirements contained in Request for Relief No. 13, if imposed, would result in a significant hardship or unusual difficulty without a compensating increase in the level of quality and safety. In addition, the licensee's proposed alternative provides reasonable assurance of structural integrity of the subject components specified in the licensee's request for relief. Therefore, the licensee's proposed alternative is authorized pursuant to 10 CFR 50.55a(a)(3)(ii) and is authorized for the first refueling outage for each Palo Verde unit in the second 10-year inspection ISI interval, which began on August 1998 for Palo Verde Nuclear Generating Station, Unit 1, May 1997 for Unit 2, and January 1998 for Unit 3.

The staff concludes that the code requirement contained in Request for Relief No. 14 is impractical. In addition, the alternative provides reasonable assurance of structural integrity of the subject components specified in the licensee's request for relief. Therefore, relief is granted pursuant to 10 CFR 50.55a (g)(6)(i). The grant of relief is authorized by law and will not endanger life or property, or the common defense and security and is otherwise in the public interest giving due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility. In making this determination, the staff has considered the impracticality of performing the required examination and the burden on the licensee if the requirements were imposed. Request for Relief No. 14 is granted for the second 10-year inspection ISI interval, which began on August 1998 for Palo Verde Nuclear Generating Station, Unit 1, May 1997 for Unit 2, and January 1998 for Unit 3.

Principal Contributor: Thomas McLellan

Date: September 14, 2000

TABLE 1

PALO VERDE NUCLEAR GENERATING STATION, UNITS 1, 2, AND 3
Second 10-Year ISI Interval

SUMMARY OF RELIEF REQUESTS

Relief Request Number	INEEL TLR Sec.	System or Component	Exam Category	Item No.	Volume or Area to be Examined	Required Method	Licensee Proposed Alternative	Relief Request Disposition
No. 13	2.1	RPV	B-P	B15.10 B15.11	RPV pressure boundary	VT-2 visual during system pressure testing	VT-2 of accessible portions during Mode 3. Monitor RPV using designed leak detection methods.	Authorize pursuant to 10 CFR 50.55a(a)(3)(ii) for the first refueling outage for each Palo Verde unit in the second 10-year inspection ISI interval.
No. 14	2.2	RPV	B-A	B1.22	Closure head meridional weld	Volumetric	Volumetric exam to extent practical	Grant pursuant to 10 CFR 50.55a(g)(6)(i)

TECHNICAL LETTER REPORT

ON

THE SECOND 10-YEAR INTERVAL INSERVICE INSPECTION

REQUESTS FOR RELIEF

FOR

ARIZONA PUBLIC SERVICES COMPANY

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

DOCKET NUMBERS: 50-528, 50-529, AND 50-530

1. INTRODUCTION

By letter dated August 24, 1999, the licensee, Arizona Public Services Company, submitted two requests for relief for the Palo Verde Nuclear Generating Station (PVNGS), Units 1, 2, and 3, second 10-year inservice inspection (ISI) interval. The Idaho National Engineering and Environmental Laboratory (INEEL) staff's evaluation of the subject requests for relief is in the following section.

2. EVALUATION

The information provided by Arizona Public Services Company in support of the requests for relief from Code requirements has been evaluated and the bases for disposition are documented below. The Code of record for the Palo Verde Nuclear Generating Station (PVNGS), second 10-year ISI interval, which began August 1998 for Unit 1, May 1997 for Unit 2 and January 1998 for Unit 3, is the 1992 Edition, with the 1992 Addenda of Section XI of the ASME Boiler and Pressure Vessel Code.

2.1 Request for Relief No. 13, Examination Category B-P, Items B15.10 and B15.11, Pressure Testing of Reactor Pressure Vessel (RPV)

Code Requirement: Table IWB-2500-1, Examination Category B-P, Items B15.10 and B15.11, requires VT-2 visual examination during system leakage testing and system hydrostatic testing of the RPV. The leakage test is required once each refueling outage and the hydrostatic test is required once each 10-year inspection period.

Licensee's Proposed Alternative (as stated):

“PVNGS will conduct VT-2 examinations on all portions of the reactor vessel, which are accessible during Mode 3 without endangering personnel from undue heat or radiation exposure. However, in lieu of performing VT-2 visual exams in areas that are hazardous to personnel (i.e., under the reactor vessel), PVNGS will monitor for reactor vessel leakage using leak detection methods provided in the design of the plant.”

<u>Licensee's Basis for Proposed Alternative (as stated)</u>:
“Pursuant to 10 CFR 50.55a(g)(5)(iv), relief is requested on the basis that conformance with the code requirement is impractical. Specifically, relief is requested from the requirement to visually inspect the entire reactor vessel while pressurized to the pressure associated with 100 percent rated reactor power based on design limitations which create personnel hazards in certain areas required to be examined.

“The requirement to VT-2 examine the reactor vessel is to ensure that the vessel has been reassembled correctly and that no leakage is present. Because the walls of the reactor vessel are essentially vertical, the code allows the examinations to be limited to the lowest elevation where leakage will accumulate [IWA-5242(a)]. In addition the code requires that the surrounding areas, including the floor areas, be inspected for evidence of leakage [IWA-5242(b)].

“The exams require personnel to access areas where radiation fields are between 2 and 12 Rem/hour.

“Accessing the bottom of the reactor vessel to assess accumulated leakage, while the system is depressurized, is physically possible with the limitations noted above. However, PVNGS is constructed in such a way that reactor vessel leakage which would accumulate at the bottom of the insulation around the vessel or on the floor cannot be distinguished from leakage from other sources such as leakage from the pool seals.

“While direct visual examination may detect gross leakage, more sensitive methods of detecting leakage from the reactor vessel are available, as discussed below, which do not endanger plant personnel.

“Reactor coolant system (RCS) pressure boundary leakage is monitored by the control room staff in several different ways:

1. Monitoring of the space between the double O-ring seal on the reactor vessel closure head.
2. Containment atmosphere particulate radioactivity monitoring.
3. Containment atmosphere gaseous radioactivity monitoring.
4. Containment relative humidity monitoring.
5. Containment sump level rate of change and discharge monitoring.
6. RCS water inventory balance measurements.

“Technical Specification 3.4.14, RCS Operation Leakage, allows for only 1 gpm unidentified leakage and no pressure boundary leakage. The first four methods, above, provide continuous monitoring with alarms. Sump levels are monitored every hour and the RCS water inventory balance is performed every three days.

If greater than 1 gpm leakage is detected, the leakage must be reduced to within limits within four hours or the plant must be shut down to Mode 5 within 36 hours.

“PVNGS believes that the RCS leakage monitoring performed by the control room staff satisfies the requirement for detection of RCS pressure boundary leakage from the reactor vessel. Performing a VT-2 exam on the bottom of the reactor vessel would not provide better information that is possible by other means and does not warrant the risk of injury to plant personnel from the extreme heat and high radiation exposure.”

Evaluation: The Code requires that the reactor pressure vessel be VT-2 examined for leakage at a test pressure not less than the nominal operating pressure associated with 100 percent rated reactor power. In general, the visual examination for leakage is conducted on accessible exposed surfaces or, for inaccessible surfaces, the surrounding areas, including floor areas and equipment surfaces beneath the component. At PVNGS, direct visual examination of these areas presents a significant health hazard to personnel due to high heat and radiation fields (2 to 12 Rem/hour). Therefore, imposition of the Code requirements would result in a significant hardship or unusual difficulty on the licensee.

The licensee has proposed an alternative to a VT-2 examination for RPV leakage using leak detection procedures and methods provided in the design of the plant. These include monitoring the space between the double O-ring seal on the closure head, containment atmosphere particulate radioactivity monitoring, containment atmosphere gaseous radioactivity monitoring, containment relative humidity monitoring and containment sump level rate of change and discharge monitoring, and RCS water inventory balance measurements. In addition, the licensee will conduct VT-2 visual examinations on all portions of the reactor vessel which are accessible during Mode 3 without endangering personnel from undue heat or radiation exposure. The combination of these examinations and monitoring methods are comparable in sensitivity to the Code-required visual VT-2 examinations and should detect any significant areas of RPV leakage. The licensee’s alternative provides reasonable assurance of continued pressure boundary leakage integrity.

Based on the burden associated with performing the Code-required pressure testing on the RPV and the licensee’s proposed alternative monitoring methods, the INEEL staff concludes that imposition of the Code requirements would result in an undue hardship without a compensating increase in quality and safety. Therefore, it is recommended that the proposed alternative be authorized pursuant to 10 CFR 50.55a(a)(3)(ii).

2.2 Request for Relief No.14, Examination Category B-A, Item B1.22 Reactor Pressure Vessel (RPV) Meridional Head Welds

Code Requirement: Examination Category B-A, Item B1.22, requires 100% volumetric examination of the RPV closure head meridional weld, as defined by Figure IWB-2500-3.

Licensee's Proposed Alternative Examination: In accordance with 10 CFR 50.55a(g)(5)(iv), the licensee requested relief from examination of the RPV meridional closure head weld to the extent required by the Code. The licensee stated:

"The ultrasonic examinations of the closure head meridional weld will be performed to the extent possible. A sketch showing the exam limitations is attached. The maximum possible coverage is estimated to be approximately 31% for the closure head meridonal (sic) weld."

Licensee's Basis for Proposed Alternative (as stated):
"Relief is request in accordance with 10 CFR 50.55a(g)(5)(iv). Design and geometry limitations that preclude examination of 100 percent of the closure head meridional weld, make this examination requirement impractical.

"These examinations are limited by physical constraints. The sketches attached depict the limitation. Due to the configuration of the CEDM nozzles with the addition of the support skirt surrounding them, access to the closure head meridonal (sic) weld is significantly limited. Much of the weld is physically inaccessible using current examination technology. Alternative examinations have been reviewed, however, exam technology beyond that currently being used is limited. In addition, the radiation exposure rates while working on the closure head are approximately 2 to 4 Rem/hr."

Evaluation: The Code requires 100% volumetric examination of the accessible portions of all RPV meridional head welds each inspection interval. However, access to the subject weld is restricted by the closure head support skirt and CEDM penetrations which limit examination coverage. These restrictions make volumetric examination impractical to perform to the extent required by the Code. To meet the Code requirements, the RPV closure head would have to be redesigned and modified. Imposition of this requirement would result in a considerable burden on the licensee.

The licensee examined the subject weld to the extent practical which amounted to 31% of the Code-required volume. This limited volumetric examination, in conjunction with the volumetric examination of other shell and head welds, and surface examination of the head-to-flange weld provide reasonable assurance of continued structural integrity of the subject RPV closure head. Therefore, it is recommended that relief be granted pursuant to 10 CFR 50.55a(g)(6)(i).

3. CONCLUSION

The INEEL staff evaluated the licensee's submittal for the second 10-year ISI interval at Palo Verde Nuclear Generating Station, Units 1, 2, and 3, and concludes for Request for Relief No. 13, imposition of the Code requirements would result in a burden without a compensating increase in the level of quality and safety; therefore, it is recommended that the licensee's proposed alternative be authorized pursuant to 10 CFR 50.55a(a)(3)(ii).

For Request for Relief No. 14, it is concluded that the Code coverage requirements are impractical. Therefore, it is recommended that relief be granted pursuant to 10 CFR 50.55a(g)(6)(i).