July 18, 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, UNIT 3 - EVALUATION OF REQUESTS FOR RELIEF ASSOCIATED WITH THE FIRST 10-YEAR INSERVICE INSPECTION INTERVAL (TAC NO. MA5024)

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 letters dated January 11, 1999, and January 12, 2000, proposing Relief Requests 7 and 10 through 15 associated with the first 10-year inservice inspection interval for the Palo Verde Nuclear Generating Station, Unit 3. APS provided additional information on these relief requests in its letters dated October 6, 1999, and March 20, 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 No. STN 50-530

Enclosures: 1. Safety Evaluation
2. Technical Letter Report

cc w/encls: See next page

July 18, 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, UNIT 3 - EVALUATION OF REQUESTS FOR RELIEF ASSOCIATED WITH THE FIRST 10-YEAR INSERVICE INSPECTION INTERVAL (TAC NO. MA5024)

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 letters dated January 11, 1999, and January 12, 2000, proposing Relief Requests 7 and 10 through 15 associated with the first 10-year inservice inspection interval for the Palo Verde Nuclear Generating Station, Unit 3. APS provided additional information on these relief requests in its letters dated October 6, 1999, and March 20, 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 No. STN 50-530

Enclosures: 1. Safety Evaluation
2. Technical Letter Report

cc w/encls: See next page

DISTRIBUTION

PUBLIC
PDIV-2 Rdg
RidsNrrDlpmLpdiv (S. Richards)
RidsNrrDlpmLpdiv2 (S. Dembek)
RidsRgn4MailCenter (P. Harrell, L. Hurley, D. Bujol)
T. Chan
D. Lange
T. McLellan
G. Hill (2)
RidsOgcRp
RidsAcrsAcnwMailCenter
RidsNrrLACJamerson
RidsNrrPMMFields
E. Sullivan

ACCESSION NO: ML003732843 *No major changes made to SE.

OFFICE	PDIV-2/PM	PDIV-D/LA	*EMCB/SC	OGC	PDIV-2/SC
NAME	MFields	CJamerson	ESullivan	LClark	SDembek
DATE	07/06/00	07/06/00	07/03/00	07/14/00	07/17/00

OFFICIAL RECORD COPY

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

Ms. Angela K. Krainik, Director
Regulatory Affairs
Arizona Public Service Company
P.O. Box 52034
Phoenix, AZ 85072-2034

Mr. John C. Horne
Vice President, Power Generation
El Paso Electric Company
2702 N. Third Street, Suite 3040
Phoenix, AZ 85004

Mr. David Summers
Public Service Company of New Mexico
414 Silver SW, #1206
Albuquerque, NM 87102

Mr. Jarlath Curran
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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

FIRST 10-YEAR INTERVAL INSERVICE INSPECTION PLAN

ARIZONA PUBLIC SERVICE COMPANY

PALO VERDE NUCLEAR GENERATING STATION, UNIT 3

DOCKET NO. STN 50-530

1.0 INTRODUCTION

By letters dated January 11, 1999, and January 12, 2000, the Arizona Public Service Company (APS or the licensee) proposed Relief Requests 7 and 10 through 15 associated with the first 10-year inservice inspection (ISI) interval for the Palo Verde Nuclear Generating Station (Palo Verde or PVNGS), Unit 3. The licensee provided additional information in its letters dated October 6, 1999, and March 20, 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).

2.0 BACKGROUND

ISI of the American Society of Mechanical Engineers (ASME) Code Class 1, 2, and 3 components shall 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) shall 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. Based on this, the required code of record for

the Palo Verde Unit 3 first 10-year ISI interval is the 1980 Edition through Winter 1981 Addenda of Section XI of the ASME B&PV Code.

3.0 EVALUATION

The staff, with technical assistance from INEEL, has reviewed the information concerning ISI Relief Requests 7 and 10 through 15, which were submitted for the first 10-year interval for Palo Verde Unit 3 by the licensee in the above-referenced letters.

The staff adopts, with the exception of Relief Requests 7(a), 7(b), 14A, 14E, and 15, the evaluations and recommendations for granting relief or authorizing alternatives contained in the TLR, included as Enclosure 2, prepared by INEEL.

Relief Requests 7(a), 7(b), 14A, 14E, and 15 are evaluated below. Table 1 lists each relief request and the status of approval.

3.1 Relief Request 7(a)

ASME Code, Section XI, Table IWC-2500-1, Examination Category C-H, requires a VT-2 visual examination during system pressure testing for all Class 2 pressure-retaining components, including those segments that penetrate primary containment.

The licensee proposed to perform Appendix J testing in accordance with Code Case N-522, as conditioned by Regulatory Guide (RG) 1.147, “Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1,” Revision 12, in lieu of the code requirements for the Class 2 containment penetrations listed in the contractor’s TLR in Section 2.2.

In a meeting between the licensee and the NRC on February 24, 2000, the licensee indicated that it would detect and locate leakage if the tested leakage for a penetration exceeds its specified allowable limit. However, the condition placed on the use of Code Case N-522 by RG 1.147, Revision 12, states the test should be conducted at the peak calculated containment pressure, and the test procedure should permit the detection and location of through-wall leakage in containment isolation valves (CIVs) and pipe segments between the CIVs. The procedures used by the licensee do not preclude the possibility that some small amount of through-wall leakage could occur without being located. While the procedures would ensure such leakage would be within Appendix J limits, they would not address the possibility that such a through-wall defect could exist without a proper code evaluation.

Leakage measured during an Appendix J test is much more likely to occur through valve seats which are periodically replaced, rather than through a pipe wall or valve body which is designed, fabricated, and inspected to maintain structural integrity throughout the life of the plant. In the unlikely event that a through-wall defect were to occur, the low level of penetration leakage that is allowed under Appendix J could only be a result of a very small through-wall flaw. It is unlikely that the environmental conditions or loading on these containment penetrations could lead to a significantly larger flaw prior to the next Appendix J test. The licensee’s successful completion of several Appendix J tests during the first 10-year period on each of the penetrations included in this relief request provides an adequate level of assurance that no significant through-wall

defects existed in the piping between the CIVs. Therefore, for the first 10-year interval, the staff concludes that the testing performed provided an acceptable level of quality and safety. The licensee's proposed alternative is authorized pursuant to 10 CFR 50.55a(a)(3)(i). However, for any continued use of this alternative in subsequent 10-year intervals, the licensee will need to address the possibility of leakage past through-wall flaws versus seat leakage in a more quantitative fashion.

While INEEL also recommended approval of this request for relief, the staff's basis for approving this request for relief is broader than the basis provided in the TLR. The contractor based its recommendation on the fact that Code Case N-522 has been approved for general use as evidenced by incorporation into RG 1.147, Revision 12. In addition to this information, the staff also considered the information presented by the licensee during the February 24, 2000, meeting, regarding the successful completion of several Appendix J tests during the first 10-year period. The staff considers this information relevant to resolve the issue of locating possible through-wall defects in the piping for the first 10-year ISI interval.

3.2 Relief Request 7(b)

ASME Code, Section XI, Table IWC-2500-1, Examination Category C-H, requires a VT-2 visual examination during system pressure testing for all Class 2 pressure-retaining components, including those segments that penetrate primary containment.

The licensee proposed to perform Appendix J testing in accordance with Code Case N-522, as conditioned by RG 1.147, Revision 12, in lieu of the code requirements for the Class 2 containment penetrations listed in the contractor's TLR in Section 2.3.

In a meeting between the licensee and the NRC on February 24, 2000, the licensee indicated that it would detect and locate leakage if the tested leakage for a penetration exceeds its specified allowable limit. However, the condition placed on the use of Code Case N-522 by RG 1.147, Revision 12, states the test should be conducted at the peak calculated containment pressure, and the test procedure should permit the detection and location of through-wall leakage in CIVs and pipe segments between the CIVs. The procedures used by the licensee do not preclude the possibility that some small amount of through-wall leakage could occur without being located. While the procedures would ensure such leakage would be within Appendix J limits, they would not address the possibility that such a through-wall defect could exist without a proper code evaluation.

Leakage measured during an Appendix J test is much more likely to occur through valve seats which are periodically replaced, rather than through a pipe wall or valve body which is designed, fabricated, and inspected to maintain structural integrity throughout the life of the plant. In the unlikely event that a through-wall defect were to occur, the low level of penetration leakage that is allowed under Appendix J could only be a result of a very small through-wall flaw. It is unlikely that the environmental conditions or loading on these containment penetrations could lead to a significantly larger flaw prior to the next Appendix J test. The licensee's successful completion of several Appendix J tests during the first 10-year period on each of the penetrations included in this relief request provides an adequate level of assurance that no significant through-wall defects existed in the piping between the CIVs. Therefore, for the first 10-year interval, the staff

concludes that the testing performed provided an acceptable level of quality and safety. The licensee's proposed alternative is authorized pursuant to 10 CFR 50.55a(a)(3)(i). However, for any continued use of this alternative in subsequent 10-year intervals, the licensee will need to address the possibility of leakage past through-wall flaws versus seat leakage in a more quantitative fashion.

INEEL recommended that this request for relief not be granted, stating that the piping on either side of the systems in question is not non-classed piping, and therefore not explicitly covered by Code Case N-522. The staff does not believe that the fundamental issue involved with the licensee's proposal was affected by this argument. The contractor also stated that the use of this code case should not be allowed until the licensee has adequately described the burden associated with meeting the code requirements. The staff disagrees with the contractor's statement that the burden associated with meeting the code requirements needs to be addressed by the licensee when relief is requested pursuant to 10 CFR 50.55a(a)(3)(i). Therefore, the staff approves the licensee's relief request.

3.3 Relief Request 14A

ASME Code, Section XI, Examination Category B-G-1, Item B6.190 requires a VT-1 visual examination of reactor coolant pump (RCP) flange mating surfaces when the pump is disassembled. The examination includes the 1-inch annular surface of the flange surrounding each stud hole.

Pursuant to 10 CFR 50.55a(a)(3)(ii), the licensee proposed to perform the VT-1 visual examination of two of the four Unit 2 pump flange ligaments in lieu of the code-required examination of the Unit 3 pumps.

The licensee disassembled all four Unit 2 pumps in the first period of the first 10-year interval and examined two of the four pump flanges. The remaining two pumps were not examined due to as low as reasonably achievable (ALARA) dose concerns. No indications were detected on the flanges that were examined, and the ability to examine for leakage and boric acid accumulation through the piping penetrations of the motor support stand provides reasonable assurance of structural integrity of the subject pumps.

In addition, the Unit 1 pumps were disassembled and examined during refueling outage U1R7, as reported in the licensee's July 15, 1998, letter. There were no abnormal indications noted during this inspection activity. The examinations performed on the Unit 2 pumps, along with the examination of the Unit 1 pumps, provide reasonable assurance of structural integrity for the Unit 3 pumps. Requiring the licensee to visually inspect the Unit 3 RCP flange mating surfaces would result in unnecessary radiation exposure to personnel that would not provide a compensating increase in the level of quality or safety. Therefore, the licensee's proposed alternative is authorized pursuant to 10 CFR 50.55a(a)(3)(ii).

INEEL also recommended approval of this request for relief, but on the basis that the Unit 1 pumps were scheduled to be disassembled and examined during refueling outage U1R7, and that the results of those examinations would be evaluated for potential impact for Unit 3. The staff's basis for approving this request for relief differs from the reasoning provided in the TLR

only with regard to the disassembly and examination of the Unit 1 pumps having been completed, and the examination results which revealed no abnormal indications. The staff considers this information relevant to its determination that there is reasonable assurance of structural integrity of the Unit 3 pumps.

3.4 Relief Request 14E

ASME Code, Section XI, Examination Categories F-A, F-B, and F-C require a VT-3 visual examination of the spray pond piping supports.

The licensee proposed to perform the examination by looking for signs of damage (e.g., indications of bent, missing, or broken components). If damage is found, the support would be cleaned to enable a thorough examination of the welds.

The licensee's proposed alternative is to clean the supports and perform a thorough examination of the welds only when signs of damage are found. The staff recognizes that there is a significant burden involved in cleaning sediment from all the supports. However, this proposed alternative does not address all the conditions intended to be examined by a VT-3 examination. These conditions include clearances, settings, physical displacements, loose or missing parts, debris, corrosion, wear, erosion, or the loss of integrity at bolted or welded connections. The purpose of the code-required examination is to monitor for such degradation and to take appropriate corrective action should degradation occur. The licensee’s proposal to perform a visual exam without removing the layer of sediment would be able to detect some of these conditions but would not detect signs of corrosion or wear and may not detect abnormalities in clearances or settings.

The staff considers the limited examination method proposed by the licensee to be acceptable since erosion/corrosion of spray pond piping supports, as well as significant alterations in clearances or settings, would not be expected to occur during early plant life. In addition, corrective actions would occur if the supports were showing evidence of damage. Requiring the licensee to clean sediment from all the supports for the purpose of performing the code-required examinations would result in hardship or unusual difficulty without a compensating increase in safety. Therefore, the proposed visual examination is authorized pursuant to 10 CFR 50.55a(a)(3)(ii).

However, for the staff to find this alternative acceptable for subsequent 10-year ISI intervals, the licensee will need to supplement the alternative with the code-required VT-3 examination of some percentage of the supports to ensure that all the conditions detectable by a VT-3 are properly monitored. These actions are considered necessary by the staff to accomplish the long-term monitoring objectives of the code requirements to assure that these components will perform their intended safety functions for the remainder of plant life.

3.5 Relief Request 15

This relief request concerns code requirements to perform a VT-2 examination of the reactor vessel for leakage at a test pressure not less than the nominal operating pressure of the reactor coolant system (RCS). INEEL’s evaluation as provided in its TLR concluded that the proposed

alternative should be authorized pursuant to 10 CFR 50.55a(a)(3)(ii) due to the high radiation environment in the area below the vessel where a VT-2 examination would be performed. The staff agrees with this conclusion for closeout of the first ISI inspection interval for the reasons provided in the contractor's report and because the interval was completed without encountering any significant leakage. Since the performance of direct visual examination of the vessel would result in hardship or unusual difficulty without a compensating increase in safety, the proposed alternative examination is authorized pursuant to 10 CFR 50.55a(a)(3)(ii).

However, the staff has a number of concerns with this alternative that will have to be addressed prior to its use again for Unit 3 during the second ISI interval. These concerns are as follows:

> 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 Relief Request 15.
>
> 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 relief request 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. Relief Request 15 did not address how the proposed alternative would address the above-stated purposes for performing a VT-2 examination of the vessel.

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.

4.0 CONCLUSION

The Palo Verde Unit 3 ISI program relief requests from the code requirements have been reviewed by the staff with the assistance of its contractor, INEEL. The TLR provides INEEL's evaluation of these relief requests. The staff has reviewed the TLR and adopts, with the exception of Relief Requests 7(a), 7(b), 14A, 14E, and 15, the evaluations and recommendations for granting relief or authorizing alternatives. Relief Requests 7(a), 7(b), 14A, 14E, and 15 are evaluated above. A summary of the relief request determinations is presented in Table 1.

The staff concludes that the relief requests as evaluated by this safety evaluation provide reasonable assurance of structural integrity of the subject components. The staff has determined that granting relief pursuant to 10 CFR 50.55a(g)(6)(i) for Relief Requests RR-13, RR-14B, and RR-14D 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.

For the alternatives contained in Relief Requests RR-07(a), RR-07(b), RR-10, and RR-11 the staff concludes that the alternatives provide an acceptable level of quality and safety for the first 10-year ISI interval, and are authorized pursuant to 10 CFR 50.55a(a)(3)(i).

For Relief Requests RR-12, RR-14A, RR-14C, RR-14E, and RR-15, the imposition of the code requirements would result in a significant hardship without a compensating increase in the level of quality and safety. The staff concludes that for Relief Requests RR-12, RR-14A, RR-14C, RR-14E, and RR-15, the alternatives provide reasonable assurance of structural integrity of the subject components for the first 10-year ISI interval, and that the alternatives are authorized pursuant to 10 CFR 50.55a(a)(3)(ii).

The ISI program relief requests are granted only for the closure of the first 10-year ISI interval, which concluded on January 7, 1998, for Palo Verde Unit 3.

Principal Contributor: Thomas McLellan

Date: July 18, 2000

TABLE 1

PALO VERDE NUCLEAR GENERATING STATION , UNIT 3
First 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
RR-07(a)	2.2	Class 2 Pressure Retaining Components	C-H	C7.40	Pressure Retaining Piping Penetrations	VT-2 Visual	Perform Appendix J Testing	Authorized 10 CFR50.55a(a)(3)(i)
RR-07(b)	2.3	Class 2 Pressure Retaining Components	C-H	C7.40	Pressure Retaining Piping Penetrations	VT-2 Visual	Perform Appendix J Testing	Authorized 10 CFR 50.55a(a)(3)(i)
RR-10	2.4	Pressure Retaining Nozzle Welds in Vessels	C-B	C2.22	Steam Generator Main Steam Nozzle IR	Volumetric	Surface Examination	Authorized 10 CFR50.55a(a)(3)(i)
RR-11	2.5	Class 1, 2 and 3 Components	B-P, C-H, D-A, D-B & D-C		Pressure Retaining Components	System Hydrostatic Testing	Implement Code Case N-498-1	Allowed by Regulatory Guide 1.147, Revision 12.
RR-12	2.6	Class 1 Piping	B-P	B3.100	Pressure Retaining Components	System Hydrostatic Testing	VT-2 Visual exam in conjunction with Class 1 System Leakage Test	Authorized 10 CFR50.55a(a)(3)(ii)
RR-13	2.7	Pressure Retaining Welds in Reactor Vessel	B-A	B1.22	Meridional Head Welds	Volumetric	Volumetric Examination of Accessible Portions of Welds	Granted 10 CFR50.55a(g)(6)(i)
RR-14A	2.8	Pressure Retaining Bolting	B-G-1	B6.190	RCP Flange Ligaments	VT-1 Visual	VT-1 examination of 2 of 4 pumps	Authorized 10 CFR50.55a(a)(3)(ii)
RR-14B	2.9	Pressure Retaining Welds	B-H	B8.20	Pressurizer Skirt Weld	Volumetric or Surface, as applicable	Examination from the outside surface	Granted 10 CFR50.55a(g)(6)(i)
RR-14C	2.10	RCP Casings	B-L-2	B12.20	Internal Surfaces	VT-3 Visual	Examine accessible portions at next disassembly	Authorized 10 CFR50.55a(a)(3)(ii)
RR-14D	2.11	Integrally Welded Attachments	C-C	C3.20	Welded Attachments	100% Surface Exam	Surface Examination on adjacent integrally welded attachment	Granted 10 CFR50.55a(g)(6)(i)
RR-14E	2.12	Component Supports	F-A, F-B & F-C		Spray Pond Piping Supports	VT-3 Visual	Visual without cleaning structures	Authorized 10 CFR50.55a(a)(3)(ii)
RR-15	2.13	Reactor Vessel	B-P	B15.10 & B15.11	Reactor Vessel	VT-2 Visual	VT-2 on accessible portions and control room monitoring systems	Authorized 10 CFR50.55a(a)(3)(ii)

TECHNICAL LETTER REPORT

ON FIRST 10-YEAR INTERVAL INSERVICE INSPECTION

REQUESTS FOR RELIEF NOS. 7 AND 10 THROUGH 15

FOR

ARIZONA PUBLIC SERVICE COMPANY

PALO VERDE NUCLEAR GENERATING STATION, UNIT 3

DOCKET NUMBER: 50-530

1. INTRODUCTION

By letters dated January 11, 1999, and January 12, 2000, the licensee, Arizona Public Service Company, submitted Requests for Relief Nos. 7, and 10 through 15, from the requirements of the ASME Code, Section XI, for the Palo Verde Nuclear Generating Station, Unit 3, first 10-year inservice inspection (ISI) interval. In response to an NRC Request for Additional Information (RAI), the licensee provided clarification in letters dated October 6, 1999 and March 20, 2000. 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 Service 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 Palo Verde Nuclear Generating Station, Unit 3, first 10-year ISI interval, which began in January 1988, is the 1980 Edition through Winter 1981 Addenda of Section XI of the ASME Boiler and Pressure Vessel Code.

2.1 Request for Relief No. 7, Examination Category C-H, Items C7.10 through C7.80, Pressure Testing of Containment Penetrations

Note: In the October 6, 1999, response to the NRC RAI, the licensee revised Request for Relief No. 7 by separating it into two parts. Relief Request 7(a) is for penetrations for which Code Case N-522 is accepted for use in Regulatory Guide 1.147, Revision 12. Relief Request 7(b) is for penetrations that have Code-class piping on either side for the penetration (i.e., where Code Case N-522 does not apply). These are evaluated below.

2.2 Request for Relief No. 7(a), Examination Category C-H, Item C7.40, Pressure Testing of Containment Penetrations

Code Requirement: Table IWC-2500-1, Examination Category C-H, requires a VT-2 visual examination during system pressure testing for all Class 2 pressure-retaining components.

Licensee's Proposed Alternative: The licensee proposed to perform an Appendix J Leak Rate test in lieu of the Code required examinations for the Class 2 containment penetrations listed in the table below.

Penetration No.	System	Line No.	P&ID
6	DW	055	DWP-002
7	FP	095	FPP-006
9	RD	259	RDP-001
25A/B	HC	008	HCP-001
29	GA	009	GAP-001
30	GA	002	GAP-001
31	IA	069	IAP-001
33	NC	135	NCP-003
34	NC	135	NCP-003
44	CH	283	CHP-003
45	CH	275	CHP-003
50	PC	073	PCP-001
51	PC	072	PCP-001
52	GR	001	GRP-001
56	CP	005	CPP-001
57	CP	007	CPP-001
58	CL	001	CLP-001
59	IA	080	IAP-002
60	WC	039	WCP-001
61	WC	042	WCP-001
62B	CL	009	CLP-001
62C	CL	008	CLP-001
78	CP	006	CPP-001
79	CP	008	CPP-001

Licensee's Basis for Proposed Alternative (as stated):

“Pursuant to 10 CFR 50.55a(a)(3)(i), relief is requested from the Code requirements stated above on the basis that the proposed alternative would provide an acceptable level of quality and safety.

”Code Case N-522, which has been incorporated into Regulatory Guide 1.147, Revision 12, states that using 10 CFR 50, Appendix J testing is an acceptable alternative to pressure testing piping that penetrates containment when the piping and isolation valves that are part of the containment system are Class 2, but the balance of the piping system is outside the scope of Section XI. The

NRC Staff has deemed this acceptable provided the following conditions are met:

'The test should be conducted at the peak containment pressure and the test procedure should permit the detection and location of through-wall leakage in containment isolation valves (CIVs) and pipe segments between CIVs.'

“The PVNGS Appendix J testing meets these conditions. Therefore PVNGS believes that the proposed alternative provides an acceptable level of quality and safety.”

Evaluation: The Code requires a VT-2 visual examination to be performed during system pressure testing for all Class 2 pressure-retaining piping, including those segments that penetrate primary containment. As an alternative, the licensee proposed to implement the requirements of Code Case N-522, *Pressure Testing of Containment Penetration Piping*. Code Case N-522 allows 10 CFR 50, Appendix J testing as an alternative to Section XI pressure tests for containment penetration piping that is non-class beyond the inboard and outboard containment isolation valves (CIVs).

The NRC staff reviewed Code Case N-522 and found it acceptable for general use as evidenced by incorporation into Regulatory Guide 1.147, *Inservice Inspection Code Case Acceptability*, Revision 12, (May 1999) with the following conditions:
“The test should be conducted at the peak containment pressure and the test procedure should permit the detection and location of through-wall leakage in containment isolation valves (CIVs) and pipe segments between CIVs.”

The licensee has committed to adopt the Code Case in its entirety, including the conditions set forth in Regulatory Guide 1.147. Therefore, the proposed alternative provides an acceptable level of quality and safety. Consequently, it is recommended that the licensee's proposed alternative be authorized pursuant to 10 CFR 50.55a(a)(3)(i).

2.3 Request for Relief No. 7(b), Examination Category C-H, Item C7.40, Pressure Testing of Containment Penetrations

Code Requirement: Table IWC-2500-1, Examination Category C-H, requires a VT-2 visual examination during system pressure testing for all Class 2 pressure-retaining components.

Licensee's Proposed Alternative: The licensee proposed to perform Appendix J testing in lieu of the Code requirements for the Class 2 containment penetrations listed in the table below.

Pen. No.	System	Line No.	P&ID
35	Hydrogen Control System Exhaust	A-001-HCBA-2	HPP-001
36	Hydrogen Control System Exhaust	B-002-HCBA-2	HPP-001
38	Hydrogen Control System Supply	A-003-HCBA-2	HPP-001
39	Hydrogen Control System Supply	A-004-HCBA-2	HPP-001

Licensee's Basis for Proposed Alternative (as stated):

“Pursuant to 10 CFR 50.55a(a)(3)(i), relief is requested from the Code requirements stated above on the basis that the proposed alternative would provide an acceptable level of quality and safety.

”Code Case N-522, which has been incorporated into Regulatory Guide 1.147, Revision 12, states that using 10 CFR 50, Appendix J testing is an acceptable alternative to pressure testing piping that penetrates containment when the piping and isolation valves that are part of the containment system are Class 2, but the balance of the piping system is outside the scope of Section XI. The NRC Staff has deemed this acceptable provided the following conditions are met:

'The test should be conducted at the peak containment pressure and the test procedure should permit the detection and location of through-wall leakage in containment isolation valves (CIVs) and pipe segments between CIVs.'

“The PVNGS Appendix J testing meets these conditions. Code Case N-522 cannot be applied in this case without a request for relief because it only allows for penetrations that have non-class piping on either side of the penetration.

“However, in this specific case APS believes that it is reasonable to apply the same philosophy used for Code Case N-522. The Hydrogen Control System (HP) is designed to monitor the hydrogen concentrations in the containment building following a LOCA. The penetration isolates on a Containment Isolation Actuation Signal (CIAS) and is then reopened remotely by the control room operators. As such, the highest pressure the system would be subjected to would be less than containment peak pressure. These penetrations receive an Appendix J test. The test is performed at higher than containment peak pressure and is performed using procedures and techniques capable of detecting and locating through-wall leakage. PVNGS feels that this test meets or exceeds the requirements of any inservice inspection pressure test that could be performed.

“Therefore PVNGS believes that the proposed alternative provides an acceptable level of quality and safety. In accordance with 10 CFR 50.55a(a)(3)(i), relief is requested from the Code requirements on the basis that the proposed alternative would provide an acceptable level of quality and safety.”

Evaluation: The Code requires that a VT-2 visual examination be performed during system pressure testing for all Class 2 pressure-retaining piping, including those segments that penetrate primary containment. As an alternative, the licensee proposed to perform Appendix J testing for the subject piping penetrations.

The subject penetration piping is fabricated and designated as Class 2. As stated by the licensee, the piping on either side of these penetrations is not non-classed, therefore, Code Case N-522, *Pressure Testing of Containment Penetration Piping*, is not applicable. The function of Appendix J testing is to ensure containment integrity and

it may provide an acceptable alternative for those portions of piping systems made Safety Class solely because they penetrate the containment vessel. However, Safety Class piping systems that extend beyond the inboard and outboard containment isolation valves (CIVs) may serve different functions not related to containment isolation. These systems are required to be tested hydrostatically (or pneumatically, as applicable) to ensure their intended safety function. Therefore, portions of these systems that penetrate containment can be tested in conjunction with the remainder of the system.

Consequently, the INEEL staff does not believe Appendix J testing to be appropriate for the containment penetration portions of entire safety class piping systems. The license has not described the burden associated with meeting the Code requirements, nor have they identified the Class of the surrounding piping and why the penetration segment cannot be tested with the balance of the system. Therefore, it is concluded that the proposed alternative has not been adequately justified and should not be authorized.

2.4 Request for Relief No. 10, Examination Category C-B, Item C2.22, Steam Generator Main Steam Nozzle Inner Radius Section

Code Requirement: Examination Category C-B, Item C2.22 requires 100% volumetric examination of the nozzle inside radius sections of those nozzles selected for examination under Examination Category C-F, as defined by Figure IWC-2500-4(a) or (b).

Licensee's Code Relief Request: In accordance with 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from the Code-required volumetric examination of Steam Generator Main Steam nozzle inner radius sections.

Licensee's Basis for Requesting Relief (as stated):

"Due the design of the PVNGS Steam Generator Main Steam Nozzles the volumetric examination is not practical. The nozzles have a protrusion into the steam generator which is not suitable for ultrasonic examination. This area is accessible during outages through the secondary side manway. . . . A surface exam of this area is more sensitive."

Licensee's Proposed Alternative Examination (as stated):

"A surface examination was performed on the nozzles selected for examination."

Evaluation: The Code requires 100% volumetric examination of the subject steam generator nozzle IR sections. However, access to the IR sections from the vessel exterior is not possible because of the nozzle design, i.e., the nozzle extension section protrudes beyond the vessel shell inner surface.

As an alternative to the Code volumetric examination requirements, the licensee proposed to perform a direct surface examination of the subject IR sections (access to the vessel interior is provided via a secondary side man-way). Degradation due to thermal transients would most probably be manifested as inner surface cracking in the

IR region. Therefore, the INEEL staff concludes that the proposed surface examination is capable of detecting any significant patterns of degradation on the IR sections and provides an acceptable level of quality and safety. Consequently, it is recommended that the licensee's proposed alternative be authorized pursuant to 10 CFR 50.55a(a)(3)(i).

2.5 Request for Relief No. 11, Use of Code Case N-498-1, *Alternative Rules for 10-Year System Hydrostatic Testing for Class 1, 2, and 3 Systems*

Code Requirement: Table IWB-2500-1, Examination Category B-P, Table IWC-2500-1, Examination Category C-H, and Table IWD-2500-1, Examination Categories D-A, D-B and D-C, require system hydrostatic testing of pressure-retaining components in accordance with IWA-5000 once each 10-year interval.

Licensee's Proposed Alternative: Pursuant to 10 CFR 50.55a(a)(3)(ii), the licensee has requested authorization to use Code Case N-498-1, *Alternate Rules for 10-Year Hydrostatic Pressure Testing for Class 1, 2, and 3 Systems, Section XI, Division 1*. The licensee stated:

"System Leakage Tests for Class 1 and System Pressure Tests for Class 2 and 3 were performed in accordance with the requirements of N-498-1."

Licensee's Basis for Proposed Alternative (as stated):

"Code Case N-498 includes all ASME Class 1 and 2 systems and has been accepted by the USNRC in Regulatory Guide 1.147. The N-498-1 Code Case is essentially identical to the accepted Code Case, with the exception that it includes ASME Class 3 Systems. Therefore, the basis for acceptance would be the same."

Evaluation: The Code requires a system hydrostatic test once per interval in accordance with the requirements of IWA-5000 for Class 3 pressure-retaining systems. In lieu of the Code-required hydrostatic testing, the licensee has requested authorization to use Code Case N-498-1*, Alternative Rules for 10-Year System Hydrostatic Testing for Class 1, 2, and 3 Systems*, dated May 11, 1994.

The NRC staff recently reviewed Code Case N-498-1 and found the Code Case acceptable for general use as evidenced by incorporation into Regulatory Guide 1.147, *Inservice Inspection Code Case Acceptability*, Revision 12, (May 1999). Therefore, Code Case N-498-1 is acceptable for use at PVNGS.

2.6 Request for Relief 12, Examination Category B-P, System Pressure Testing of Vent and Drain Lines

Code Requirement: Examination Category B-P, Items B15.11, B15.21, B15.31, B15.41, B15.51, B15.61 and B15.71, require a system hydrostatic pressure test on the entire Class 1 system once each interval in accordance with IWB-5222. In accordance with Code Case N-498-1, the pressure test can be performed at system operating pressure during the system leakage test. The boundary subject to test pressurization during the

system leakage test shall extend to all Class 1 pressure retaining components within the system boundary.

Licensee's Proposed Alternative: The licensee proposed to perform the Code-required VT-2 visual examination of the pipe segments listed below with the first isolation valve closed. The licensee stated:

“The visual examination performed during the System Leakage Test will be extended to include the small portion of pipe and downstream valve or blind flange. The first valve will not be opened. A list of these areas is as follows:”

Line No.	Description	Line No.	Description
CH026	3PCHNV848	RC200	3PRCNV900
CH024	3PCHNV849	RC203	3PRCNV903
CH022	3PCHNV859	RC024	3PRCNVR30
CH020	3PCHNV860	RC024	3PRCNV753
CH026	3PRCNV752	RC022	3PRCNV754
CH520	3PCHEVM41	RC112	3PRCNV869
CH001	3PCHEV853	RC106	3PRCNV868
RC091	3PRCEV061	RC118	3PRCNV871
RC091	3PRCEV063	RC124	3PRCNV870
RC089	3PRCEV332	SI207	3PSIEV882
RC096	3PRCEV333	SI217	3PSIEV974
RC062	3PRCEV001	SI223	3PSIEV883
RC017	3PRCEV062	SI240	3PSIAV892
RC099	3PRCEV057	SI248	3PSIAV902
RC005	3PCHEV939	SI248	3PSIAV055
RC005	3PCHEVM42	SI248	3PSIAV906
RC005	3PCHEV096	SI156	3PSIAV880
RC098	3PRCEV056	SI156	3PSIAV804
RC098	3PRCEV060	SI179	3PSIEV881
RC069	3PRCEV214	SI175	3PSIEV803
RC070	3PRCEV215	SI193	3PSIBV879
RC060	3PRCEV334	SI225	3PSIEV975
RC018	3PRCEV058	SI203	3PSIEV064
RC179	3PRCEV392	SI199	3PSIBV057
RC058	3PRCEV335	SI248	3PSIAV056
RC020	3PRCNV755	SI221	3PSIEV063
RC202	3PRCNV902	SI199	3PSIBV907
RC201	3PRCNV901	SI240	3PSIAV801

.

Licensee's Basis for Proposed Alternative (as stated):

“The normal reactor pressure boundary is examined during each refueling outage and no pressure boundary leakage has been noted. Currently these valves are independently verified closed prior to plant start-up and are not manipulated during any procedurally guided plant evolutions while at power. Since these valves are not cycled at NOP/NOT, the opportunity to experience an

incident where a valve will not reseat is increased. This can be due to several mechanisms, foreign material moving into the seating surface, stem failure while opening and closing, packing shifting, or valve binding. The opportunity for a packing leak will also present itself, with the added challenge of normal RCS pressure behind it. Cycling of these valves and the resulting compensatory actions due to a leak can easily result in leakage and a forced unit shutdown or cooldown. Current operating procedures require these valves to remain closed with no exceptions. Valves that need to be operated are specifically identified to manipulate only in mode 5 (to prevent RCP seal damage)."

In the October 6, 1999, response to the NRC RAI, the licensee stated:

"The functions of the subject piping segments are venting and draining. The piping between the first isolation valve and the second isolation valve/blind flange are all one inch or less NPS and extend less than two feet. None of these valves are procedurally required to be opened during normal operations at normal pressure. The valves are closed to achieve operational readiness. Therefore, the line segments downstream of the first isolation valve serve no operational function and do not impact the system operational readiness."

In the March 20, 2000 response to NRC questions, the licensee stated:

"...An APS ISI Engineer reviewing the relief request identified that the following five lines for which relief is requested are two-inch NPS:"

System	Line No.	P&ID No.	Valve Description
RC	RC089	RCP001	XPRCEV332
RC	RC096	RCP001	XPRCEV333
RC	RC058	RCP001	XPRCEV335
RC	RC070	RCP001	XPRCEV215
RC	RC060	RCP001	XPRCEV334

Evaluation: The Code requires a system hydrostatic test of the entire Class 1 system boundary once each 10-year ISI interval. The subject lines are small diameter (1 and 2 inch) drain and vent lines with no piping downstream from the second isolation valve. To test these lines, the first isolation valves, which normally only operate in Mode 5 (cold shutdown), must be opened to pressurize the short section of piping beyond the valve. Cycling these valves for the sole purpose of performing the 10-year hydrostatic test could result in a forced unit shutdown or cooldown if the valves do not reseat correctly. Therefore, imposition of the Code hydrostatic pressure testing requirements on the subject lines could result in an undue hardship on the licensee.

In lieu of the Code requirements, the visual examination will be extended to include the small portion of pipe and downstream valve or blind flange, with the first valve closed, once each period during the system leakage test. Since these lines are not used while the plant is at power, performing the proposed testing provides reasonable assurance that these small diameter vent and drain lines will remain free from leakage during normal operating conditions. If leakage is detected during the system leakage test, both valves will have to be repaired and tested. Requiring the licensee to cycle the first isolation valve to test limited portions of these small-diameter vent and drain lines imposes a hardship without a compensating increase in quality and safety. Therefore, it is recommended that the licensee's proposed alternative be authorized pursuant to 10 CFR 50.55a(a)(3)(ii).

2.7 Request for Relief No. 13, Examination Category B-A, Item B1.22, RPV Meridional Head Welds

Code Requirement: Examination Category B-A, Item B1.22 requires that the accessible length of all meridional head welds be examined during the first 10 year interval as defined by Figure IWB-2500-3..

Licensee's Code Relief Request: In accordance with 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from the Code-required volumetric examination of RPV meridional closure head and bottom head welds.

Licensee's Basis for Requesting Relief (as stated):

"These examinations are both limited by physical constraints. The sketches attached attempt to depict each limitation."[1]

Licensee's Proposed Alternative Examination (as stated):

"The ultrasonic examinations of both the Closure Head and Bottom Head Meridional weld was performed to the extent possible. . . . The total coverage is estimated to be 31% for the closure head and 20% for the bottom head welds."

Evaluation: The Code requires 100% volumetric examination for the subject RPV meridional head welds. However, access to these welds is restricted by the control element drive mechanism penetrations, in-core instrumentation penetrations, and the support skirt. As a result, the volumetric examinations are impractical. Design modifications would be required to provide access for the Code-required examinations. Imposition of this requirement would cause a considerable burden on the licensee.

The licensee is examining approximately 31% of the closure head and 20% of the bottom head meridional welds, and the complete Code-required volume of other RPV welds. These examinations, in conjunction with the periodic system pressure tests, should detect any significant patterns of degradation and provide reasonable assurance of continued structural integrity. Therefore, based on the impracticality of the Code-

1. Sketches provided in the licensee's submittal are not included in this report.

required volumetric examination, it is recommended that relief be granted, pursuant to 10 CFR 50.55a(g)(6)(i).

2.8 Request for Relief No. 14A, Examination Category B-G-1, Item B6.190, Reactor Coolant Pump Flange Ligaments

Code Requirement: Examination Category B-G-1, Item B6.190 requires a VT-1 visual examination of RCP flange surface when the pump is disassembled.

Licensee's Proposed Alternative: In accordance with 10 CFR 50.55a(a)(3)(ii), the licensee proposed to use the VT-1 visual examination of 2 of the 4 Unit 2 pump flange ligaments in lieu of the Code-required examination of the Unit 3 pumps.

Licensee's Basis for Proposed Alternative (as stated):

"All four of the Unit 2 Reactor Coolant Pumps were disassembled during the first period, two of the required visual examinations were performed at that time. The other pumps were not examined due mainly to ALARA concerns. Further basis for not examining two of the pumps is the lack of any indication being detected during the examinations that were performed and the ability to examine for leakage and boric acid accumulation through the piping penetrations of the motor support stand. In addition, these disassemblies were performed early in the plant life. All four of the Unit 1 RCPs will be disassembled during the upcoming U1R7 outage and the flange examinations will all be performed. The results of these examinations will be evaluated for potential impact for Unit 3."

Evaluation: The Code requires that the 1-inch annular surface around each stud hole in the RCP flanges receive VT-1 visual examination when the pumps are disassembled. The licensee disassembled all four pumps in the first period of the first 10-year interval, but due to ALARA concerns did not perform the VT-1 of the flange ligament surfaces. Two of the Unit 2 pumps had been previously examined during the first period with no indications observed. The remaining two pumps on Unit 2 were not examined due to ALARA concerns. To examine the Unit 3 pumps would result in excessive radiation exposure to personnel that would not provide a compensating increase in the level of quality and safety.

The licensee has examined a significant portion of the RCP flange surfaces. In addition, the Unit 1 pumps are scheduled to be disassembled and examined during refueling outage U1R7. The results of these examinations will be evaluated for potential impact for Unit 3. The examinations performed along with the examination of the Unit 1 pumps will provide reasonable assurance of continued structural integrity. Therefore, it is recommended that the proposed alternative be authorized pursuant to 10 CFR 50.55a(a)(3)(ii).

2.9 Request for Relief No. 14B, Examination Category B-H, Item B8.20, Pressurizer Integrally Welded Attachments

Code Requirement: Examination Category B-H, Item B8.20 requires 100% volumetric or surface examination, as applicable, of the pressurizer skirt weld as defined by Figure IWB-2500-13, 14, and 15.

Licensee's Code Relief Request: In accordance with 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from the Code-required examination of the inside surface area of the pressurizer skirt weld.

Licensee's Basis for Requesting Relief (as stated):

"Limitations were noted for the Pressurizer Skirt weld due mainly to the design. The attached sketch identifies the limitations for both volumetric and surface examinations. It should be noted that the ASME Code requires either volumetric or surface examinations be performed as applicable. Both examination techniques were applied to the weld from the outside. The inside surface area is considered inaccessible due to the pressurizer heaters, drain/instrumentation lines, insulation, and ALARA concerns. A volumetric examination was performed to augment the surface exam, but it also is limited to scans from the skirt side of the weld only."

Licensee's Proposed Alternative Examination: The licensee examined the subject weld from the outside surface.

Evaluation: The Code requires 100% volumetric or surface examination, as applicable, for the pressurizer skirt weld. As depicted in the sketches provided by the licensee, the joint configuration is similar to Figure IWB-2500-13, which requires 100% surface examination of the inside and outside surfaces of the pressurizer skirt weld. Access to the inside surface is restricted by the design, pressurizer heaters, drain/instrumentation lines, insulation, and ALARA concerns. Therefore, the surface examination is impractical to perform to the extent required by the Code. To examine this weld from the inside, as required by the Code, the pressurizer support skirt would have to be redesigned and modified, causing a considerable burden on the licensee.

The licensee performed a surface examination of the subject weld from the outside surface as required by the Code. In addition, the licensee performed a supplemental volumetric examination using a technique that is capable of detecting service-induced degradation initiating from the inside surface of the support skirt weld. These examinations should detect any significant patterns of degradation, if present, and provide reasonable assurance of structural integrity. Based on the impracticality of performing an ID surface examination, and considering the examinations that were completed from the OD, it is recommended that relief be granted pursuant to 10 CFR 50.55a(g)(6)(i).

2.10 Request for Relief No. 14C, Examination Category B-L-2, Item B12.20, Pump Casings and Valve Bodies (Internal Surfaces)

Code Requirement: Examination Category B-L-2, Item B12.20 requires VT-3 visual examination of internal surfaces of RCP casings.

Licensee's Proposed Alternative: In accordance with 10 CFR 50.55a(a)(3)(ii), the licensee proposed to perform the examinations that were not completed to the extent practical on all Unit 3 pumps at the next disassembly.

Licensee's Basis for Proposed Alternative (as stated):

"All four Unit 3 Reactor Coolant Pumps were disassembled during the first period. No examinations were performed at that time. The pumps were not disassembled during the remainder of the first interval.

"All four Unit 3 pumps were examined remotely. The examinations were performed by Wesdyne International using a submersible robotic camera system. The examinations were accomplished by directing the submersible from the reactor vessel thru the cold leg piping and into the pump. The examinations were limited and 100% coverage of the internal surfaces could not be obtained. No abnormal conditions were detected during the examinations.

"All four Unit 1 pumps were examined during refueling outage #7. These examinations were performed from the top of the pumps with the diffusers installed. No abnormal conditions were detected during the examinations.

"Examination of the internal pressure boundary shall be performed to the extent practical on all Unit 3 pumps at the next disassembly."

Evaluation: Examination Category B-L-2, Item B12.20 requires a VT-3 visual examination of internal surfaces of RCP casings. The licensee disassembled all four pumps in the first period of the first 10-year interval, however, no direct visual examinations were performed at that time. Instead, all four Unit 3 pumps were examined remotely by Wesdyne International using a submersible robotic camera system. The examinations were accomplished by directing the submersible from the reactor vessel through the cold leg piping and into the pump. The examinations were limited and 100% coverage of the internal surfaces could not be obtained. However, no abnormal conditions were detected during the examinations. In addition, all four Unit 1 pumps were examined during refueling outage #7. These examinations were performed from the top of the pumps with the diffusers installed. No abnormal conditions were detected during any of these examinations.

The licensee has remotely examined portions of the Unit 3 RCP casing internal surfaces. Examination of the internal pressure boundary shall be performed to the extent practical on all Unit 3 pumps at the next disassembly. In addition, the Unit 1 pumps were examined during refueling outage U1R7. The results of these examinations were evaluated for potential impact for Unit 3.

Considering that Unit 3 is now into the second interval, performance of first interval examinations is no longer possible. In order for the licensee to perform the Code required examinations, the plant would have to be taken off-line, resulting in a considerable hardship to the licensee with no compensating increase in the level of quality and safety. The examinations performed along with the examination of the Unit 1 pumps will provide reasonable assurance of continued inservice structural integrity. Therefore, it is recommended that the proposed alternative be authorized pursuant to 10 CFR 50.55a(a)(3)(ii).

2.11 Request for Relief No. 14D, Examination Category C-C, Item C3.20, Integrally Welded Attachments in Piping

Code Requirement: Examination Category C-C, Item C3.20 requires 100% surface examination of each welded attachment.

Licensee's Code Relief Request: In accordance with 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from the Code-required surface examination for the integrally welded attachment for SG-52-H5.

Licensee's Basis for Requesting Relief (as stated):

"The integrally welded attachment for SG-52-H5 is limited due to proximity with structural steel and concrete."

Licensee's Proposed Alternative Examination (as stated):

"Due to this physical limitation, an adjacent integrally welded attachment (<3/4") will be examined next outage."

Evaluation: Examination Category C-C, Item C3.20, requires 100% surface examination of integrally welded attachments whose base material design thickness is 3/4 inch or greater. Due to the proximity of the associated structural steel and concrete, the licensee is unable to perform this examination on the subject component. Surface examination of this weld is, therefore, impractical to perform. Examination of this weld to the extent required by the Code would require redesign and modification, causing a considerable burden on the licensee.

The licensee has proposed an alternative surface examination on an adjacent integrally welded attachment during the next outage. In addition, other similar integrally welded attachments have been examined. These examinations would have detected any significant patterns areas of degradation, if present, and provide reasonable assurance of continued structural integrity. Therefore, it is recommended that relief be granted pursuant to 10 CFR 50.55a(g)(6)(i).

2.12 Request for Relief No. 14E, Examination Categories F-A, F-B, and F-C, Spray Pond Piping Supports

Code Requirement: Examination Categories F-A, F-B, and F-C require a VT-3 visual examination of the Spray Pond Piping Supports.

Licensee's Proposed Alternative: In accordance with 10 CFR 50.55a(a)(3)(ii), the licensee proposed to perform the examination by looking for signs of damage (e.g., indications of bent, missing or broken components), and if damage is found, the support would be cleaned to enable a thorough examination of the welds.
The licensee stated:

"...due to the environment in the spray ponds, a deposit layer covers a majority of the examination area."

Licensee's Basis for Proposed Alternative (as stated):

"The examination of the Spray Pond (Ultimate Heat Sink) piping supports was performed utilizing trained and certified divers. However, due to the environment in the spray ponds, a deposit layer covers a majority of the examination area. If these examinations reveal indications of bent, missing, broken, etc. components; then that support was cleaned to enable a thorough examination of the welds."

Evaluation: The Code requires a VT-3 visual examination of the Spray Pond piping supports. These components are subject to heavy deposition of sediment. As the divers are performing the Code-required examinations, deposits must be removed to perform 100% visual examinations of the welded supports. Removal of the deposits puts the sediment into the surrounding water, degrading visibility and limiting the usefulness of the examination. Therefore, the burden associated with removal of the deposits would not provide a compensating increase in quality and safety. The proposed visual examination should be sufficient to ensure the detection of significantly damaged supports and, therefore, provide reasonable assurance of structural integrity. Therefore, it is recommended that the proposed alternative be authorized pursuant to 10 CFR 50.55a(a)(3)(ii).

2.13 Request for Relief 15, Examination Category B-P, Items B15.10 & B15.11, Pressure Retaining Components

Code Requirement: IWB-5210 and Table IWB-2500-1 of ASME Section XI, require that the reactor vessel (Category B-P, Items B15.10 and B15.11) be VT-2 examined for leakage at a test pressure not less than the nominal operating pressure associated with 100 percent rated reactor power.

Licensee's Proposed Alternative: In accordance with 10 CFR 50.55a(a)(3)(ii), the licensee proposed an alternative to the Code required VT-2 visual examination for portions of the reactor pressure vessel in high radiation areas.

Licensee's Basis for Relief Request (as stated):

"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 examination to be limited to the lowest elevation where leakage will accumulate [IWA-5242(a)]. In addition, the Code requires that the surrounding areas, including floor areas, be inspected for evidence of leakage [IWA-5242(b)].

“PVNGS cannot comply with the Code requirements to perform this inspection at Mode 3 because of high area temperatures and high radiation areas.

“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. 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.”

Licensee’s Proposed Alternative Examination (as stated):

“PVNGS 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. However, in lieu of performing 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.

“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 Operations 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 be in 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 than is possible by other means and does not warrant the risk of injury to plant personnel from extreme heat and high radiation exposure."

Evaluation: IWB-5210 and Table IWB-2500-1 of ASME Section XI, require that the reactor vessel (Category B-P, Items B15.10 and B15.11) be VT-2 examined for leakage at a test pressure not less than the nominal operating pressure associated with 100 percent rated reactor power. Satisfying the Code requirements is a significant burden on the licensee as a portion of these examinations require personnel to access areas where radiation fields are between 2 and 12 Rem/hour.

The licensee has proposed an alternative to a VT-2 examination for reactor vessel leakage using leak detection methods provided in the design of the plant. 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. These examinations should detect any significant areas of leakage, if present, and provide reasonable assurance of continued pressure boundary integrity. Requiring licensee personnel to enter high radiation fields for the purpose of examining the lower portion of the reactor vessel when leakage detection systems are in-place, is a hardship with no compensating increase in quality and safety. Therefore, it is recommended that the alternative be authorized pursuant to 10 CFR 50.55a(a)(3)(ii).

3. CONCLUSION

The INEEL staff evaluated the licensee's submittals and concluded that certain inservice examinations cannot be performed to the extent required by the Code at the Palo Verde Nuclear Generating Station, Unit 3. For Requests for Relief Nos. 7(a) and 10, it is concluded that the licensee's proposed alternatives provide an acceptable level of quality and safety. Therefore, it is recommended that the proposed alternatives contained in these requests be authorized pursuant to 10 CFR 50.55a(a)(3)(i). For Requests for Relief Nos. 12, 14A, 14C, 14E, and 15, it is concluded that 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 proposed alternatives be authorized pursuant to 10 CFR 50.55a(a)(3)(ii). For Requests for Relief Nos. 13, 14B, and 14D, the Code requirements are impractical; therefore, it is recommended that relief be granted pursuant to 10 CFR 50.55a(g)(6)(i). For Request for Relief No. 11, the licensee has requested authorization to use Code Case N-498-1*, Alternative Rules for 10-Year System Hydrostatic Testing for Class 1, 2, and 3 Systems*, dated May 11, 1994. The NRC staff recently reviewed Code Case N-498-1 and found the Code Case acceptable for general use as evidenced by incorporation into Regulatory Guide 1.147, *Inservice Inspection Code Case Acceptability*, Revision 12, (May 1999). Therefore, Code Case N-498-1 is acceptable for use at PVNGS. For Request for Relief No. 7(b) (Revision 1), it is recommended that authorization of the proposed alternative be denied.