August 3, 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 1 - EVALUATION OF REQUESTS FOR RELIEF ASSOCIATED WITH THE FIRST 10-YEAR INSERVICE INSPECTION INTERVAL (TAC NO. MA6186)

Dear Mr. Overbeck:

The staff has reviewed and evaluated the information provided by Arizona Public Service Company (APS) by letter dated July 16, 1999, proposing requests for relief associated with the first 10-year inservice inspection interval for the Palo Verde Nuclear Generating Station, Unit 1. APS provided additional information on these requests for relief in its letters dated October 6, 1999, February 8, 2000, and March 20, 2000.

The enclosure provides the staff's evaluation and conclusions on the proposed requests for relief from code requirements.

Sincerely,

/RA/

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

Docket No. STN 50-528

Enclosure: Safety Evaluation

cc w/encl: See next page

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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 1

DOCKET NO. STN 50-528

1.0 INTRODUCTION

By letter dated July 16, 1999, the Arizona Public Service Company (the licensee) submitted requests for relief for the first 10-year interval inservice inspection (ISI) for Palo Verde Nuclear Generating Station (Palo Verde or PVNGS), Unit 1. The licensee provided additional information in its letters dated October 6, 1999, February 8, 2000, and March 20, 2000. There were 16 requests for relief for Unit 1 during the first 10-year interval. Requests for Relief Nos. 1 through 6 and 8 through 10 were either withdrawn by the licensee, or previously approved by the staff during the first 10-year interval. This evaluation addresses Requests for Relief Nos. 7 and 11 through 16.

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 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. Based on this, the required code of record for the

Palo Verde Unit 1 first 10-year ISI interval is the 1980 Edition through Winter 1981 Addenda of Section XI of the ASME B&PV Code. The components (including supports) may meet the requirements set forth in subsequent editions and addenda of the ASME Code incorporated by reference in 10 CFR 50.55a(b) subject to the limitations and modifications listed therein and subject to Commission approval.

Pursuant to 10 CFR 50.55a(g)(5), if the licensee determines that conformance with an examination requirement of Section XI of the ASME Code is not practical for its facility, information shall be submitted to the Commission in support of that determination and a request made for relief from the ASME Code requirement. After evaluation of the determination, pursuant to10 CFR 50.55a(g)(6)(i), the Commission may grant relief and may impose alternative requirements that are determined to be authorized by law, will not endanger life, property, or the common defense and security, and are 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.

3.0 EVALUATION

The staff has evaluated the information provided by the licensee in support of each of the requests for relief from code requirements contained in the July 16, 1999, submittal, as supplemented by letters dated October 6, 1999, February 8, 2000, and March 20, 2000. A summary of each request for relief, and the basis for disposition is documented below.

3.1 Request for Relief No. 7, Class 2 Systems Pressure Test

Code Class: 2
Reference: ASME Section XI, Division 1, 1980 Edition, Winter 1981 Addenda, IWC-2500, Table IWC-2500-1, Examination Category C-H, Items C7.30 and C7.40
Component: Containment penetrations with code-class piping on either side of penetrations.
Requirement: Table IWC-2500-1, Examination Category C-H, of the applicable code requires a VT-2 visual examination during system pressure test for all Class 2 pressure-retaining components.

Licensee's Proposed Alternative

For all containment penetrations listed in Relief Request No.7, the licensee proposes to perform a 10 CFR Part 50, Appendix J, leak rate test to satisfy the above code requirements.

Licensee's Basis for Alternative

This request for relief addresses system pressure testing of ASME Class 2 piping systems that penetrate the containment using the provisions of Code Case N-498-1 (Alternative Rules for 10-year Hydrostatic Testing for Class 1, 2, and 3 Systems) and Code Case N-522 (Pressure Testing of Containment Penetration Piping) with supplemental conditions. The use of both code cases have been authorized by NRC in Regulatory Guide (RG) 1.147, *Inservice Inspection Code Case Acceptability*, Revision 12, (May 1999). For all the listed penetrations in the relief request, the 10 CFR Part 50, Appendix J, leak rate test was conducted in accordance with the

imposed condition that the test be conducted at peak calculated containment pressure, utilizing procedures that would detect the source and the location of any through-wall leakage. The licensee requests relief from the code requirement on the basis that the proposed alternative would provide an acceptable level of quality and safety.

Staff Evaluation

The licensee proposed to perform Appendix J testing in accordance with Code Case N-522 as conditioned by RG 1.147 in lieu of the code requirements for the Class 2 containment penetrations listed in the relief request. By letter dated October 6, 1999, the licensee separated Request for Relief No. 7 into two parts. Part 7(a) is for those penetrations explicitly addressed by Code Case N-522, and part 7(b) is for those penetrations that have class piping on either side of the penetration (i.e., where the code case does not specifically apply). Even though Code Case N-522 was not explicitly written for the code systems identified in this request for relief, the assurance provided by the proposed alternative is equally applicable to the code systems since a system pressure test of each code (penetration) piping would have required a pressure test at its operating pressure. Therefore, the staff's evaluation discussed below covers both parts of Request for Relief 7.

In a meeting between the licensee and the NRC on February 24, 2000 (see meeting summary, dated March 14, 2000, Accession No. ML003692585), 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 than through a pipe wall or valve body which is designed, fabricated, and inspected to maintain structural integrity through 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.

3.2 Request for Relief No. 11, Reactor Head Vent System

Code Class: 1 and 2
Reference: ASME Section XI, Division 1, 1980 Edition, Winter 1981 Addenda, IWA-5200, IWB-5200, IWC-5200, Examination Categories B-P and C-H, Items B15.51and C7.40
Component: Pressure Retaining Components
Requirement: Table IWB-2500-1, Table IWC-2500-1, and Code Case N-498, require performance of a VT-2 visual examination during system leakage test of code Class 1 system and system pressure test of Class 2 system at or near the end of the inspection interval.

Licensee's Proposed Alternative

The licensee has proposed to defer performance of the system leakage test and the system pressure test of Class 1 and Class 2 reactor head vent system lines to the first refueling outage of the second 10-year interval. In accordance with IWB-2412, the 1-year extension for Unit 1 ended on July 17, 1999; the refueling outage (U1R8) was scheduled for October 2, 1999, to November 18, 1999. This deferral would delay the code-required tests by 114 days beyond the code-allowed extension period. The deferral of these tests will not be credited towards the second 10-year interval. The portions of the vent lines affected are identified in the licensee's July 16, 1999, letter.

Licensee's Basis for Alternative

The licensee's basis for requesting NRC approval of this relief is that the proposed alternative would provide an acceptable level of quality and safety, and should be approved pursuant to 10 CFR 50.55a(a)(3)(i).

The licensee believes that deferring this examination provides an acceptable level of quality and safety for the following reasons.

> Containment entries are typically made on a quarterly basis for other plant maintenance. A general inspection for leakage is performed during those entries per PVNGS's procedure 40DP-9ZZ01, Containment Entry in Modes 1 through 4. Furthermore, [reactor coolant system] pressure boundary leakage is monitored by the control room staff in several additional ways.
>
> 1. Containment atmosphere particulate radioactivity monitoring.
> 2. Containment atmosphere gaseous radioactivity monitoring.
> 3. Containment relative humidity monitoring.
> 4. Containment sump level rates of change and discharge monitoring.
> 5. RCS water inventory balance measurements.
>
> Technical Specification 3.4.14, RCS Operational Leakage, allows for only one gpm unidentified leakage and no pressure boundary leakage. The first three

methods of monitoring RCS leakage 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 action must be taken to be in Mode 5 within 36 hours.

PVNGS believes that the system pressure monitoring and the several methods for detecting RCS leakage provide an adequate level of safety to justify deferring the pressure test for 114 days. Additionally, these required examinations were successfully completed in Units 2 and 3 without any abnormal indications noted.

PVNGS is requesting relief to defer the first interval examinations to the first refueling outage of the second interval. Due to a long refueling outage in Unit 1, Unit 2 has become the lead Unit for implementing the ISI Program Plan. Prior to the end of Interval 1 for Unit 2, it was determined that plant evolutions outside of normal operating practice would be required to perform the required pressure test on the reactor head vent system. Therefore, Relief Request No. 15 was written for Unit 2. Subsequent evaluation determined that the examination could be accomplished and the test was performed in Unit 3 during normal plant shutdown. Also, the test was performed in Unit 2 during the eighth refueling outage. No remaining scheduled plant shutdowns within the first inspection interval are scheduled for Unit 1.

Staff Evaluation

ASME Code, Section XI, Examination Category B-P, Item B15.51 requires 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. Table IWC-2500-1, Examination Category C-H, C7.40, requires a VT-2 examination during system pressure testing for all Class 2 pressure-retaining components.

Pursuant to 10 CFR 50.55a(a)(3)(i), the licensee proposed to defer the VT-2 system leakage test and system pressure test examinations of the ASME Class 1 and Class 2 reactor head vent system lines to the first refueling outage of the second 10-year interval. The licensee did not perform the required examinations during the first ISI interval for Palo Verde, Unit 1, or within the 1-year extension allowed by the code. The affected portions of the vent lines are listed in the licensee's July 16, 1999, letter.

The licensee has performed the required examinations for Unit 3 and identified no degradation mechanisms; the licensee has had no failures associated with the subject components. Additionally, the containment building is monitored continuously and any significant leakage would be detected by the ongoing monitoring systems. The licensee performed the subject examinations for Unit 2 during the first refueling outage in the second 10-year interval, which

occurred in the spring 1999. As reported in the licensee's letter dated February 8, 2000, there were no abnormal indications noted during this inspection activity.

The ongoing containment monitoring systems and examinations performed in Units 2 and 3 provide reasonable assurance of operational readiness of the subject components. Requiring the licensee to take the unit off line for the purpose of performing the subject examinations prior to the scheduled refueling outage would pose a significant hardship on the licensee without a compensating increase in safety. This position is further supported by the successful completion of the remaining examination requirements during the first refueling outage in the second 10-year interval. The licensee's proposed alternative is authorized pursuant to 10 CFR 50.55a(a)(3)(ii).

3.3 Request for Relief No. 12, Main Steam Nozzle Volumetric Examination

Code Class: 2
Reference: ASME Section XI, Division 1, 1980 Edition, Winter 1981 Addenda, IWC-2500 Examination Category C-B, Item No. C2.22
Component: Steam Generator
Requirement: Table IWC-2500-1 of the code requires a volumetric examination of the nozzle inside radius area.

Licensee's Proposed Alternative

In lieu of the volumetric examination, the licensee proposes to perform a surface examination on the nozzle inner inside radius area selected for examination.

Licensee's Basis for Relief

The licensee states that the code-required volumetric examination of the inner radius of the Palo Verde main steam nozzles is not feasible with the existing design of the nozzle.

Staff Evaluation

ASME Code, Section XI, Examination Category C-B, Item C2.22 requires 100 percent 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).

Pursuant to 10 CFR 50.55a(g)(5)(iv), the licensee requested relief from the code-required volumetric examination of steam generator main steam nozzle inner radius sections.

Access to the inner radius sections from the vessel exterior is not possible because the nozzle extension section protrudes beyond the vessel shell inner surface. As an alternative to the code-required volumetric examination, the licensee has proposed to perform a direct surface examination of the subject inner radius sections (access to the vessel interior is provided via a secondary side man-way). The licensee's proposed surface examination is capable of detecting any significant patterns of degradation on the inner radius section and therefore, would provide

an acceptable level of quality and safety. The licensee's proposed alternative is authorized pursuant to 10 CFR 50.55a(a)(3)(i).

3.4 Request for Relief No. 13, Reactor Vessel Head and Closure Head Welds

Code Class: 1
Reference: ASME Section XI, Division 1, 1980 Edition, Winter 1981 Addenda, IWB-2500 Examination Category B-A, Item No. B1.22
Component: Reactor Vessel
Requirement: Table IWB-2500-1, Category B-A of the code requires essentially 100 percent volumetric examination of the meridional head welds.

Licensee's Proposed Alternative

The licensee proposes to perform volumetric examination of the closure head and the bottom head meridional welds to the extent possible. The estimated volumetric coverages from past examinations are 31 percent for the closure head welds and 20 percent for the bottom head welds.

Licensee's Basis for Relief

The licensee states that the volumetric examinations of the closure head and the bottom head meridional welds are limited by physical constraints and current technology. Previous examinations performed in Units 2 and 3 confirm the coverages stated above.

Staff Evaluation

ASME Code, Section XI, 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.

Pursuant to 10 CFR 50.55a(g)(5)(iv), the licensee requested relief from the code-required volumetric examination of reactor pressure vessel meridional closure head and bottom head welds.

Access to these welds is restricted by the control element drive mechanism penetrations, in-core instrumentation penetrations, and the vessel support skirt. As a result, the code examination requirements are impractical for these welds. Design modifications would be required to provide access for the code-required examinations. Imposition of this requirement would cause a significant burden on the licensee.

The licensee's best-effort examination in Units 2 and 3 obtained volumetric coverages of approximately 31 percent of the closure head and 20 percent of the bottom head meridional welds. The extent of examination in detecting existing degradation mechanism, in conjunction with the periodic system pressure tests and the code-required volumetric examination of other reactor vessel welds, would provide reasonable assurance of structural integrity of the subject welds. Therefore, based on the impracticality of complying with the code requirement, relief is

granted and the licensee's proposed alternative imposed pursuant to 10 CFR 50.55a(g)(6)(i) for Palo Verde Unit 1. The staff has determined that the granting of this relief is authorized by law and will not endanger life or property on the common defense and security and is otherwise in the public interest giving due to consideration to the burden on the licensee that could result if the requirements were imposed on the facility.

3.5 Request for Relief No. 14, Class 1 Pressure Test Boundary

Code Class: 1
Reference: ASME Section XI, Division 1, 1980 Edition, Winter 1981 Addenda, IWB-2500 and IWB-5200, Examination Category B-P, Item Nos. B15.11,B15.21,B15.31, B15.41, B15.51, B15.61, & B15.71.
Component: ASME Class 1 ISI Program Items and Components
Requirement: Table IWB-2500-1 of the applicable code and Code Case N-498 require the boundary for the end of interval pressure test to be extended to all Class 1 boundaries. This includes the small portion of pipe between two Class 1 isolation valves or a valve and blind flange.

Licensee's Proposed Alternative

The licensee proposed to perform the code-required VT-2 visual examination of the pipe segments with the first isolation valve closed. These components are listed in licensee's submittal on the above relief request.

Licensee's Basis for Alternative

The licensee believes that the proposed alternative provides an acceptable level of quality and safety for the following reasons.

> 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 procedure guided plant evolutions while at power.

Staff Evaluation

The subject lines are small diameter (the majority are $\leq$1 inch in diameter; there are five lines that are 2-inch diameter lines) drain and vent lines with no piping downstream from the second isolation valve. To test these lines, the first isolation valves, which normally operate only 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.

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. 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 the level of quality and safety. The licensee's proposed alternative provides reasonable assurance of structural integrity of the subject components. The proposed alternative is, therefore, authorized pursuant to 10 CFR 50.55a(a)(3)(ii).

3.6 Request for Relief No. 15, Miscellaneous Code Limited Examinations

Code Class: 1 and 3
Reference: ASME Section XI, Division 1, 1980 Edition, Winter 1981 Addenda, IWB-2500 and IWF-2500, Examination Category B-H, F-A, F-B, and F-C, Item Nos. B8.20, F1.xx, F2.xx, and F3.xx.
Component: Pressurizer skirt weld and Spray Pond piping supports
Requirement: Table IWB-2500-1 of the applicable code requires 100 percent surface examination of the Pressurizer skirt weld and the Table IWF-2500-1 requires 100 percent visual examination of the Spray Pond piping supports.

Licensee's Proposed Alternative:

The licensee proposes the following alternatives to the code requirements.

> A volumetric examination was performed to augment the surface examination, however it was also limited to scans from the skirt side of the weld only. Both examination techniques were applied to the weld from the outside surface of the Pressurizer skirt.
>
> The examination of the Spray Pond (Ultimate Heat Sink) piping supports was performed underwater, utilizing visually trained and certified SCUBA divers. This was done in lieu of draining the ponds and cleaning the algae layer off all the welds.

Licensee's Basis for Alternative:

The licensee provided the following justification for the alternative.

> Limitations were noted for the Pressurizer skirt weld due mainly to the design. The inside surface area of the Pressurizer skirt is considered inaccessible due to the Pressurizer heaters, drain/instrument lines, and insulation.
>
> Due to the environment in the Spray Ponds, a deposited layer covers a majority of examination area. A random sampling of welds were cleaned to reveal any abnormal conditions.

Staff Evaluation

ASME Code, Section XI, Examination Category B-H, Item B8.20 requires 100 percent volumetric or surface examination, as applicable, of the Pressurizer skirt weld as defined by Figure IWB-2500-13, 14, and 15.

Pursuant to 10 CFR 50.55a(g)(5)(iv), the licensee requested relief from the code-required examination of the inside surface area of the Pressurizer skirt weld.

Access to the inside surface is restricted by design due to interference of pressurizer heaters, drain/instrumentation lines, insulation, and ALARA [as low as reasonably achievable] concerns. 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 significant burden on the licensee.

The licensee examined 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 provide a reasonable assurance of structural integrity of the subject components. Therefore, on the basis of the examinations performed, relief is granted pursuant to 10 CFR 50.55a(g)(6)(i) for the first 10-year inspection interval. The staff has determined that the granting of this relief is authorized by law and will not endanger life or property on the common defense and security and is otherwise in the public interest giving due to consideration to the burden on the licensee that could result if the requirements were imposed on the facility.

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.

3.7 Request for Relief No. 16, Restricted Access Under Reactor Vessel for VT-2 Examination

Code Class: 1
Reference: ASME Section XI, Division 1, 1980 Edition, Winter 1981 Addenda, IWB-2500 and IWB-5210, Examination Category B-P, Item Nos. B15.50 and B15.51
Component: Reactor Vessel
Requirement: Table IWB-2500-1 of the applicable code requires that the Category B-P components be VT-2 examined at a test pressure not less than the nominal operation pressure associated with 100 percent rated reactor power.

Licensee's Proposed Alternative

The licensee proposes the following:

> PVNGS will conduct a VT-2 examination 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 examinations in areas that are hazardous to personnel, PVNGS will monitor for reactor vessel leakage by the use of leakage detection methods provided in the design and operation of the plant.

Licensee's Basis for Relief

The licensee provided the following basis for its request for relief.

> The requirement to perform a VT-2 examination of the reactor vessel is to detect leakage of the vessel. 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-5242a). In addition, the Code requires that the surrounding areas including floor areas be inspected for evidence of leakage (IWA-5242b).
>
> PVNGS cannot comply with this Code requirement to perform this inspection at Mode 3 because of extreme temperature and very high radiation areas.
>
> Temperatures under the vessel during Mode 3 reach approximately 500 degrees Fahrenheit. In addition, the examinations require personnel to access areas under the vessel where radiation fields are between 2 to 12 Rems per hour.

Accessing the bottom of the reactor vessel while it is depressurized to assess leakage which has accumulated is possible, but the reactor vessel at Palo Verde is constructed in such a way that 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.
2. Containment atmosphere particulate radioactivity monitoring.
3. Containment atmosphere gaseous radioactivity monitoring.
4. Containment relative humidity monitoring.
5. Containment sump level rates 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 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. The licensee 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 examination 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 very high radiation areas.

Staff Evaluation

The staff has evaluated licensee's basis for relief in Relief Request No.16 concerning restricted access under reactor vessel for VT-2 visual examination at the bottom of the reactor vessel. The licensee states that the VT-2 visual examination during system hydrostatic test or system leakage test is conducted during Mode 3 (hot standby) when the temperature inside the cubicle in the vicinity of the reactor vessel bottom head is in the neighborhood of 500 degrees F with radiation levels of 2 to 12 rems per hour. Thus, the performance of direct visual examination for detection of gross leakage as required during VT-2 examination is a hardship under conditions of high temperature and radiation levels. The staff agrees with this conclusion for closeout of the first ISI inspection interval for the reasons stated above 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 1 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 Request for Relief 16.
>
> 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. Request for Relief 16 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

For Requests for Relief Nos. 7 and 12, the staff concludes that the licensee's proposed 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 Requests for Relief Nos. 11, 14, 16, and the portion of Request for Relief No. 15 that deals with the spray pond piping segments, the staff concludes that compliance with the specified code requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. The staff concludes that the alternatives provide reasonable assurance of structural integrity of the components for the first 10-year ISI interval, and are authorized pursuant to 10 CFR 50.55a(a)(3)(ii).

For Request for Relief No. 13 and the portion of Request for Relief No. 15 that deals with the pressurizer skirt weld, the staff concludes that the code requirements are impractical and the examinations performed provide reasonable assurance of structural integrity of the subject components. Relief is granted pursuant to 10 CFR 50.55a(g)(6)(i). This 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 that could result if the requirements were imposed on the facility.

The ISI program requests for relief are granted only for the closure of the first 10-year ISI interval for Palo Verde Unit 1.

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