10 CFR 50.55a

A subsidiary of Pinnacle West Capital Corporation

Palo Verde Nuclear Generating Station

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ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Dear Sirs:

Subject: Palo Verde Nuclear Generating Station (PVNGS)
Unit 3
Docket No. STN 50-530
Relief Request 42 - Proposed Alternative to the Demonstrated Leak Path Assessment Required by 10 CFR 50.55a(g)(6)(ii)(D)(3)

Pursuant to 10 CFR 50.55a(a)(3) Arizona Public Service Company (APS) requests the Nuclear Regulatory Commission's (NRC) approval of Relief Request 42.

This request for relief proposes an alternative to the requirements of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section XI, Code Case N-729-1as conditioned by 10 CFR 50.55a(g)(6)(ii)(D)(3) for "demonstrated volumetric or surface leak path assessment through all J-groove welds." The proposed alternative is the continued use of the volumetric leak path assessment process used to satisfy the requirements of the First Revised NRC Order, EA-03-009.

The enclosure to this letter contains Relief Request 42 and the basis for the proposed alternative. APS requests approval of this relief request by April 4, 2009, to support the Unit 3 spring 2009 refueling outage.

Should you have questions regarding this relief request or if additional information is needed, please contact Russell A. Stroud, Licensing Section Leader, at (623) 393-5111

Sincerely,

D.C. Mims

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NRR

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Enclosure

cc:	E. E. Collins Jr.	NRC Region IV Regional Administrator
	R. Hall	NRC NRR Project Manager
	R. I. Treadway	NRC Senior Resident Inspector

ENCLOSURE
Relief Request 42

Proposed Alternative in Accordance with 10 CFR 50.55a(a)(3)(ii) Hardship or Unusual Difficulty without a Compensating Increase in the Level of Quality and Safety

Relief Request No. 42

Proposed Alternative
in Accordance with 10 CFR 50.55a(a)(3)(ii)
Hardship or Unusual Difficulty without a Compensating Increase in the Level of Quality and Safety

Applicable Unit

Palo Verde Unit 3

ASME Code Components Affected

ASME Item Number: B3.90
Description: Control Element Drive Mechanism (CEDM) Nozzle Penetrations
Code Class: 1

Applicable Code Editions and Addenda

Third 10-year Inservice Inspection Interval code for Palo Verde Nuclear Generating Station (PVNGS) for Unit 3: American Society of Mechanical Engineers (ASME) Code, Section XI, 2001 Edition through 2003 Addenda.

Applicable Code Requirement

An alternative is requested to the requirement for "demonstrated volumetric or surface leak path assessment through all J-groove welds" as applied to reactor vessel closure head nozzle examinations performed in accordance with ASME Code Case N-729-1 as conditioned by 10 CFR 50.55a(g)(6)(ii)(D)(3).

10 CFR 50.55a(g)(6)(ii)(D)(3) states in part, "Instead of the specified 'examination method' requirements for volumetric and surface examinations in Note 6 of Table 1 of Code Case N-729-1, the licensee shall perform volumetric and/or surface examinations of essentially 100 percent of the required volume or equivalent surfaces of the nozzle tube, as required by Figure 2 of ASME Code Case N-729-1. A demonstrated volumetric or surface leak path assessment through all J-groove welds shall be performed."

Reason for Request

The requirement to perform a demonstrated volumetric or surface leak path assessment through all J-groove welds during the upcoming Palo Verde Unit 3 fourteenth refueling outage (3R14) scheduled to start on April 4, 2009, poses a hardship due to the expedited implementation of the requirement. As a result, Arizona Public Service Company (APS) is requesting approval of Relief Request 42, under 10 CFR 50.55a(a)(3)(ii).

The industry has initiated efforts to accomplish a volumetric leak path demonstration. However, the extent of remaining tasks will likely preclude successful completion in time to support the Unit 3 spring 2009 outage. The optional surface examination of the J-groove welds poses a hardship due to the greatly increased personnel radiation exposure associated with this examination technique and the additional risk of heat stress to inspection personnel.

The supplementary scans and additional robotic tool reconfigurations required to accomplish surface examinations result in a significant extension to the examination duration and the accompanying increase in the total dose received. More importantly, the complicated geometry of the J-groove weld surface, particularly on penetrations other than those very close to the reactor head center, poses an extremely difficult challenge for remote inspection. Furthermore, the guide funnels attached to the outside diameter (OD) of the nozzles obstruct access to the J-groove weld surface. It is known that the requisite surface examination coverage for all Palo Verde Unit 3 J-groove welds cannot be obtained using current robotic inspection technology.

Dose rates under the head near the J-groove weld areas are expected to be in the 1.5 to 3 Rem/hour range based on previous survey data. In addition, the area under the head will be posted as a Locked High Radiation Area, a Hot Particle Contamination Area, and a High Contamination Area which may require personnel to wear additional layers of protective clothing increasing the body heat burden.

The performance of additional manual surface exams under these hazardous radiological conditions, coupled with potential exposure of inspection personnel to heat stress during the examination performance, creates a hardship without a compensating increase in the level of quality and safety.

Proposed Alternative and Basis For Relief

The First Revised NRC Order, EA-03-009, Section IV.C.(5) contained techniques to be used to meet the inspection requirements of Order Section IV.C and included an assessment to determine if leakage has occurred into the annulus between the reactor pressure vessel head (RPV) penetration nozzle and the RPV head low-alloy steel.

In lieu of implementing the demonstrated volumetric or surface leak path assessment through all J-groove welds as imposed by 10 CFR 50.55a(g)(6)(ii)(D)(3), APS is requesting approval to perform the same volumetric leak path assessment used to meet the requirement of the First Revised NRC Order EA-03-009, Section IV.C.(5). The proposed alternative for the 97 control element drive mechanism (CEDM) nozzles is a volumetric leak path examination to determine if leakage has occurred into the annulus between the CEDM nozzles, which have an interference fit, and the RPV head low-alloy steel. The examination area will extend to a minimum of 2 inches above the highest point of the root of the J-groove weld (on a horizontal plane perpendicular to the nozzle axis) on each of the CEDM penetrations.

The volumetric (ultrasonic) leak path assessment technology used on the CEDM nozzles to satisfy the First Revised NRC Order EA-03-009 requirements employs a zero degree incidence longitudinal wave introduced from the tube inside diameter (ID). The response from the tube outside diameter (OD) in the interference fit region is monitored for changes in amplitude due to variations in reflected versus transmitted energy. Because the tube OD is in intimate contact with the reactor head base material as a result of the interference fit, a portion of the ultrasonic energy is transmitted through this interface. In the case that leakage into the annulus area between the tube and head base material results in steam cutting, the intimate contact is disturbed in a localized area. This condition is detectable by distinguishing variations in tube OD response signal amplitude in the reduced intimate contact area as compared to the surrounding areas. Redundantly, leakage resulting in steam cutting would also be detectable by a bare metal visual examination since flow to the atmosphere is inherent.

APS' inspection vendor, WesDyne International, manufactured a mockup for leak path technique development that simulates the steam cutting condition. The mockup consists of a sleeve with machined ID grooves and holes that are installed over a section of penetration tube with a 2 mils interference fit, similar to the Palo Verde reactor heads. Test results demonstrate that the machined areas in the sleeve can be readily detected using the zero degree amplitude discrimination methodology described above when imaged by the analysis software. Filling the machined loss of fit areas with water resulted in no affect on detectability.

In conjunction with the volumetric leak path assessment, APS will also conduct a bare metal visual examination of the head area. To assist in the completeness of the visual exams, APS previously made extensive modifications of the reactor head insulation to provide unobstructed access to the outer head surface.

The efficacy of the bare metal visual examination is addressed in MRP 117, Materials Reliability Program Inspection Plan for Reactor Vessel Closure Head Penetrations in U.S. PWR Plants, dated December 2004, Section 3.4, Protection Against Significant Boric Acid Wastage of the Low Alloy Steel Head, which states in part:

> "Section 7 of the top-level safety assessment report (MRP-110, Materials Reliability Program Reactor Vessel Closure Head Penetration Safety Assessment for U.S. Pressurized Water Reactor (PWR) Plants, dated November 2004) describes the evaluations that verify that protection against boric acid wastage is provided by the bare metal visual examinations for evidence of leakage required by Sections 5 and 6 of this document. This conclusion is supported by the experience with over 50 leaking CRDM nozzles, including the observation that the large wastage cavity at one plant would have been detected relatively early in the wastage progression had bare metal visual examinations been performed at each refueling outage, and likely even if performed less frequently, with appropriate corrective action. In addition, the wastage modeling presented in MRP-110 supports the adequacy of bare metal visual examination performed according to the sensitivity and coverage requirements of Section 5.1 and at the frequency defined in Section 6."

APS has previously completed four volumetric leak path examinations in accordance with the First Revised NRC Order EA-03-009 on all of the 97 CEDM nozzles. The digitally recorded examination results from those examinations provide an excellent baseline for comparison with the pending 3R14 inspections. Moreover, current appraisals indicate that the existing technology used to perform the volumetric leak path assessment in accordance with the First Revised NRC Order EA-03-009 will not need to be significantly altered to meet the new demonstration obligation.

The combination of a volumetric leak path assessment and bare metal visual examination of the reactor closure head outside surface provides a comprehensive approach for detection of leakage past the J-groove weld for the CEDM nozzles.

Duration of Propose Alternative

The duration of the proposed alternative applies only to the reactor head penetration nozzle examinations scheduled to be performed in 3R14.

Palo Verde Unit 3 is in the Third Ten-Year Inservice Inspection Interval.

Commitments

No commitments are being made in this request.

Conclusion

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

> "Proposed alternatives to the requirements of paragraphs (c), (d), (e), (f), (g), and (h) of this section or portions thereof may be used when authorized by the Director of the Office of Nuclear Reactor Regulation. The applicant shall demonstrate that:
>
> (i) The proposed alternatives would provide an acceptable level of quality and safety, or
>
> (ii) Compliance with the specified requirements of this section would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety."

The proposed alternative examination, volumetric leak path assessment performed in accordance with the First Revised NRC Order EA-03-009, when combined with a bare metal visual examination provides confidence that leakage past the J-groove weld into the annulus region would be detected. These techniques provide a defense-in-depth leak path assessment approach that assures the structural integrity of the reactor head remains intact. Consequently, performing a "demonstrated volumetric or surface leak path assessment through all J-groove welds" as required Code Case N-729-1 as conditioned by 10 CFR 50.55a(g)(6)(ii)(D)(3) would result in hardship as the default surface examination will result in undue personnel radiation exposure without providing a compensating increase in the level of quality and safety.

Precedents

A leak path assessment is addressed by the First Revised NRC Order EA-03-009, Section IV.C. (5)(b)(i) which states "In addition, an assessment shall be made to determine if leakage has occurred into the annulus between the RPV head penetration nozzle and the RPV head low-alloy steel."