UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

January 21, 2010

Mr. Randall K. Edington
Executive Vice President Nuclear/
Chief Nuclear Officer
Mail Station 7602
Arizona Public Service Company
P. O. Box 52034
Phoenix, AZ 85072-2034

SUBJECT: PALO VERDE NUCLEAR GENERATING STATION, UNITS 1, 2, AND 3 - RELIEF REQUEST NO. 36, REVISION 1, FOR THE THIRD 10-YEAR INSERVICE INSPECTION INTERVAL (TAC NOS. ME1555, ME1556, AND ME1557)

Dear Mr. Edington:

By letters dated June 4 and August 7, 2009, Arizona Public Service Company (APS, the licensee), requested approval of Relief Request (RR) No. 36, Revision 1, as an alternative to the requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI, 2001 Edition through 2003 Addenda for the installation of full-structural weld overlays (FSWOLs) on dissimilar and similar metal welds at the Palo Verde Nuclear Generating Station (PVNGS), Units 1, 2, and 3.

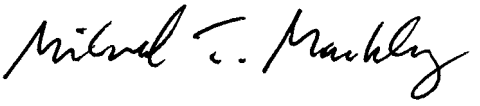
Specifically, the licensee requested relief to add 11 additional dissimilar metal weld locations on the cold-leg loops to the original RR No. 36 request which was approved for the third 10-year inservice inspection (ISI) interval on June 21, 2007, for Unit 2, and on November 10, 2008, for Units 1 and 3. The FSWOLs serve as an alternative to the subarticle IWA-4410 of ASME Code, Section XI, requirements that welds are repaired and defects are removed or reduced to an acceptable size. The licensee's proposed alternative is for the remainder of the third 10-year ISI interval for PVNGS, Units 1, 2, and 3, which ends on July 17, 2018, March 17, 2017, and January 10, 2018, respectively.

The Nuclear Regulatory Commission (NRC) staff has reviewed the licensee's submittal and determined that the licensee's proposed alternative will provide an acceptable level of quality and safety. Therefore, pursuant to paragraph 50.55a(a)(3)(i) of Title 10 of the *Code of Federal Regulations*, the NRC staff authorizes the use of the proposed alternative in RR No. 36, Revision 1, for the installation of FSWOLs on the dissimilar and similar metal welds of various cold-leg branch lines at PVNGS, Units 1, 2, and 3, for the remainder of the third 10-year ISI interval.

Furthermore, in the August 7, 2009, submittal, the licensee made two regulatory commitments described in Section 4.0 of the Enclosure. In summary, the licensee committed to provide to the NRC staff inspection information at the completion of ultrasonic examinations, and summary reports for ASME Code, Section III and XI stress analyses following the installation of the FSWOLs.

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

Sincerely,



Michael T. Markley, Chief
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

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

Enclosure:
Safety Evaluation

cc w/encl: Distribution via Listserv

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

INSERVICE INSPECTION PROGRAM RELIEF REQUEST NO. 36, REVISION 1

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

ARIZONA PUBLIC SERVICE COMPANY

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

1.0 INTRODUCTION

By letter dated June 4, 2009 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML091630062), Arizona Public Service Company (APS, the licensee) submitted Relief Request (RR) No. 36, Revision 1, to install full structural weld overlays (FSWOLs) as a repair method for reactor coolant system (RCS) cold-leg dissimilar metal (DM) welds during the third 10-year inservice inspection (ISI) interval at Palo Verde Nuclear Generating Station, Units 1, 2, and 3. In RR No. 36, Revision 1, the licensee proposes an alternative to the requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI, 2001 Edition through 2003 Addenda.

By letter dated August 7, 2009 (ADAMS Accession No. ML092370293), the licensee responded to the U.S. Nuclear Regulatory Commission (NRC) staff's request for additional information for RR No. 36, Revision 1, and made corresponding revisions to the relief request.

By letters dated June 21, 2007, and November 10, 2008 (ADAMS Accession Nos. ML071560008 and ML083010572, respectively), the NRC staff approved the original RR No. 36, for weld overlay of RCS hot-leg and pressurizer DM welds for the second and third ISI intervals of Units 1 and 3, and for the third ISI interval for Unit 2.

The licensee submitted RR No. 36, Revision 1, which includes the addition of the cold-leg DM welds to the original RR to satisfy the industry's guidance, the Electric Power Research Institute's Materials Reliability Program, MRP-139, Revision 1, "Primary System Piping Butt Weld Inspection and Evaluation Guideline."

2.0 REGULATORY EVALUATION

Pursuant to paragraph 50.55a(g)(4) of Title 10 of the *Code of Federal Regulations*, Part 50 (10 CFR 50.55a(g)(4)), ASME Code Class 1, 2, and 3 components (including supports) will meet the requirements, except the design and access provisions and the preservice examination requirements, set forth in the ASME Code, Section XI, "Rules for Inservice

Inspection (ISI) 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 ISI 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.

Pursuant to 10 CFR 50.55a(a)(3), alternatives to requirements may be authorized by the NRC if the licensee demonstrates that: (i) the proposed alternative provides 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.

The ISI Code of record for the third 10-year ISI interval for all three units is the ASME Code, Section XI, the 2001 Edition through 2003 Addenda.

3.0 TECHNICAL EVALUATION

3.1 Components Affected By the Relief Request

Description: Category B-J Welds
Item numbers: B9.11
Code Class: 1

Unit 1	Description	Size	DM Weld Item Number	SM Weld Item Number
Cold Leg	SI 1A Nozzle to Safe End	14	9-10	23-1
Cold Leg	SI 1B Nozzle to Safe End	14	11-10	24-1
Cold Leg	SI 2A Nozzle to Safe End	14	13-10	25-1
Cold Leg	SI 2B Nozzle to Safe End	14	15-9	26-1
Cold Leg	PZR Spray 1A Nozzle to Safe End	3	9-11	27-44
Cold Leg	PZR Spray 1B Nozzle to Safe End	3	11-11	28-45
Cold Leg	Drain Line 1A Nozzle to Safe End	2	8-18	32-1
Cold Leg	Drain Line 1B Nozzle to Safe End	2	10-18	33-1
Cold Leg	Drain Line 2A Nozzle to Safe End	2	12-18	34-1
Cold Leg	Letdown Line Nozzle to Safe End	2	14-18	36-1
Cold Leg	Charging Line Nozzle to Safe End	2	13-11	37-34

SM = Similar metal

Unit 2	Description	Size	DM Weld Item Number	SM Weld Item Number
Cold Leg	SI 1A Nozzle to Safe End	14	9-10	23-1
Cold Leg	SI 1B Nozzle to Safe End	14	11-10	24-1
Cold Leg	SI 2A Nozzle to Safe End	14	13-10	25-1
Cold Leg	SI 2B Nozzle to Safe End	14	15-9	26-1
Cold Leg	PZR Spray 1A Nozzle to Safe End	3	9-11	27-44
Cold Leg	PZR Spray 1B Nozzle to Safe End	3	11-11	28-45
Cold Leg	Drain Line 1A Nozzle to Safe End	2	8-18	32-1
Cold Leg	Drain Line 1B Nozzle to Safe End	2	10-18	33-1
Cold Leg	Drain Line 2A Nozzle to Safe End	2	12-18	34-1
Cold Leg	Letdown Line Nozzle to Safe End	2	14-18	36-1
Cold Leg	Charging Line Nozzle to Safe End	2	13-11	37-34

Unit 3	Description	Size	DM Weld Item Number	SM Weld Item Number
Cold Leg	SI 1A Nozzle to Safe End	14	9-10	23-1
Cold Leg	SI 1B Nozzle to Safe End	14	11-10	24-1
Cold Leg	SI 2A Nozzle to Safe End	14	13-10	25-1
Cold Leg	SI 2B Nozzle to Safe End	14	15-9	26-1
Cold Leg	PZR Spray 1A Nozzle to Safe End	3	9-11	27-44
Cold Leg	PZR Spray 1B Nozzle to Safe End	3	11-11	28-45
Cold Leg	Drain Line 1A Nozzle to Safe End	2	8-18	32-1
Cold Leg	Drain Line 1B Nozzle to Safe End	2	10-18	33-1
Cold Leg	Drain Line 2A Nozzle to Safe End	2	12-18	34-1
Cold Leg	Letdown Line Nozzle to Safe End	2	14-18	36-1
Cold Leg	Charging Line Nozzle to Safe End	2	13-11	37-34

The material specifications of the above components are provided in the August 7, 2009, submittal. They are summarized as follows:

- The cold-leg piping is made of SA-516, Grade 70 material for all three units.
- The nozzle forgings for the cold-leg pressurizer spray line, cold leg letdown and drain/ drain lines, and cold-leg charging line for all three units are made of SA-541, Class 1 material. The nozzle forgings for the cold-leg safety injection line for Unit 1 is made of SA-182, Grade F1 material; for Units 2 and 3, the material is SA-541, Class 3.

- The safe ends for all subject lines in all three units are made of SA-182, F316 stainless steel material.

- The nozzle-to-safe-end welds and butters of all subject lines for all three units are made of nickel-based Alloy 82/182 material.

- The attached elbows for the cold-leg pressurizer spray line, cold-leg letdown and drain/drain line, and cold-leg charging line for all three units are made of SA-312 or SA-376, Grade TP304 stainless steel material. For the cold-leg safety injection line, the attached elbow is made of SA-403 WP304 material.

- The nominal diameter for the subject pipes are as follows: Cold leg, 30 inches; cold leg pressurizer spray line, 3 inches; cold-leg letdown and drain/drain lines, 2 inches; and cold-leg charging line, 2 inches.

3.2 Applicable Code Edition and Addenda (as stated by the licensee)

The American Society of Mechanical Engineers (ASME) ISI Code of Record for the third 10-year inservice inspection (ISI) interval is the 2001 Edition and Addenda through 2003 [for all three units].

As allowed by 10 CFR 50.55a, ASME Section XI, 2001 Edition will be used for Appendix VIII, "Performance Demonstration for Ultrasonic Examinations."

3.3 Applicable Code Requirements (as stated by the licensee)

Subarticle IWA-4410 of ASME [Code] Section XI, requires that repair of welds shall be performed in accordance with Subarticle IWA-4400. [Subarticle] IWA-4420 requires that defects be removed or reduced to an acceptable size. [...]

3.4 Reason for Request (as stated by the licensee)

Primary Water Stress Corrosion Cracking (PWSCC) has been identified as a degradation mechanism for Alloy 82/182 welds and weld buttering. APS has concluded that the application of a[n] FSWOL over the Alloy 82/182 welds is an appropriate course of action to ensure the integrity of the reactor coolant pressure boundary.

The 2001 Edition and Addenda through 2003 of the ASME Code does not provide rules for the design of weld overlays or for repairs without removal of flaws. In addition, Code Case N-504-3, which had been approved by the NRC for use, does not provide the methodology for overlaying nickel alloy welds joining austenitic and ferritic base materials....

3.5 Proposed Alternative and Basis for Use (as stated by the licensee)

A[n] FSWOL is one of the repair methods that may be required to be applied to any of the Alloy 82/182 dissimilar metal welds identified above. If a[n] FSWOL is

to be applied to any of these welds, a flaw will be assumed to be 100% through the original wall thickness for the entire circumference of the FSWOL design.

In some cases, the application of a[n] FSWOL on a weld ... may preclude the examination of an adjacent similar metal piping weld. In those cases, the overlay will be extended over the adjacent similar metal piping welds. Which similar metal welds will be overlaid will be determined after designing the dimensions of the dissimilar metal FSWOL.

Similar metal welds will not be inspected prior to installing the overlay. If the overlay extends over adjacent similar metal welds, then these welds will be examined in accordance with the proposed alternative. In addition, the overlays will be designed to improve the weld configurations for future examinations.

In lieu of using the existing IWA-4000, Repair Procedures, in the 2001 Edition and Addenda through 2003 Section XI [ASME] Code, APS proposes to use the [proposed] alternative for the design, fabrication, pressure testing, and examination of the weld overlays. This will provide an acceptable methodology for reducing a defect in austenitic nickel alloy welds to an acceptable size by increasing the wall thickness through deposition of a weld overlay.

3.6 Duration of Proposed Alternative

RR No. 36, Revision 1, will be applicable for the remainder of the third 10-year ISI interval for Units 1, 2, and 3. The end date of the third 10-year ISI interval for each of the Palo Verde units is as follows: Unit 1, July 17, 2018; Unit 2, March 17, 2017; and Unit 3, January 10, 2018.

3.7 NRC Staff Evaluation

As noted above, on June 21, 2007, the NRC staff approved the original RR No. 36, including technical basis and requirements on design, analyses, and examinations of the weld overlays for hot-leg and pressurizer DM welds. RR No. 36, Revision 1, is similar to RR No. 36 except that Revision 1 applies to DM welds in the branch lines connected to the cold leg. For RR No. 36, Revision 1, the NRC staff did not repeat the same evaluation to determine the acceptability of the technical basis and requirements. Instead, the staff compared the two versions of the relief request and evaluated the differences. The staff also evaluated RR No. 36, Revision 1, based on the latest developments in the weld overlay technology and changes in the NRC regulatory requirements for the weld overlays. The staff used ASME Code Case N-504-3, N-638-1, and Appendix Q to evaluate the licensee's submittal.

As a result of the staff's request for additional information, the licensee modified RR No. 36, Revision 1, from its June 4, 2009, letter. Therefore, RR No. 36, Revision 1, is referred to in this evaluation with the submittal date to distinguish between the two different versions of Revision 1. The final approved version is RR No. 36, Revision 1, in the August 7, 2009, letter.

3.7.1 Regulatory Requirements

In Section 3.0 of RR No. 36, Revision 1, dated June 4, 2009, the licensee cited the ASME Code, Section XI, Code Case N-504-2 as the applicable Code requirements. The NRC staff noted that Code Case N-504-2 has been superseded by Code Case N-504-3 and the staff has approved Code Case N-504-3 with conditions as shown in NRC Regulatory Guide 1.147, Revision 15, "Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1" (ADAMS Accession No. ML072070419). Code Case N-504-3 is the appropriate Code Case for the subject relief request.

By letter dated August 7, 2009, the licensee responded that it performed a comparison of the differences between Code Cases N-504-2 and N-504-3, and concluded that there were no deficiencies in the proposed relief request as a result of not using Code Case N-504-3 in the June 4, 2009, submittal. Specifically, Code Case N-504-3 incorporated a restriction on submerged arc welding (which the licensee did not use) and incorporated acceptance criteria identified in Section XI, Appendix Q (which the licensee used and cited in the original RR).

The NRC staff noted that the licensee deleted references to Code Case N-504-2 and included Code Case N-504-3 in RR No. 36, Revision 1, dated August 7, 2009. The staff concludes that there is no impact on the RR as a result of using N-504-2 in lieu of N-504-3.

The NRC staff asked the licensee whether a new weld overlay is permitted to be applied on the top of a degraded weld overlay. By letter dated August 7, 2009, the licensee responded that a new weld overlay is not permitted to be applied on the top of a degraded weld overlay. The staff concludes that this requirement is acceptable because, if a weld overlay is degraded to a repairable condition, the staff expects that the degraded weld overlay be removed and a new weld overlay be applied to the DM weld.

3.7.2 Operating Experience Issues

The NRC staff noted that recent operating experience of weld overlay installations has shown that hot cracking occurs in the base metal and/or deposited weld when Alloy 52 or 52M is deposited on stainless steel base metal that contains relatively high sulfur. To solve the problem, licensees have deposited a buffer layer of stainless steel weld metal on the stainless steel base metal (pipe) to minimize hot cracking prior to deposit of the Alloy 52/52M weld. The staff asked the licensee to clarify whether a buffer layer will be applied on the stainless steel pipe prior to depositing Alloy 52 weld metal. The staff also asked the licensee to discuss any other welding or cracking problems that occurred during previous weld overlay installation.

By letter dated August 7, 2009, the licensee responded that:

> During initial weld overlay installations at [Palo Verde] in the spring outage of 2007, cracking was observed in first layer beads installed over stainless steel components associated with the pressurizer surge and hot leg surge nozzles. Palo Verde procedures at that time required Alloy 52M weld filler to be installed directly over the stainless steel components.

> Subsequent to the spring 2007 outage, procedures were revised to utilize a buffer layer of ER308L stainless steel weld filler metal over stainless steel base material prior to weld overlay installation. The use of this stainless steel weld material is in accordance with ASME Code Section III.

In addition, the final dye penetrant testing for three pressurizer safety/relief valve nozzles identified localized indications at the toes of the overlays. Indications were removed or reduced to acceptable limits by light grinding. No other welding issues were identified. Since the spring 2007 outage, no additional cracking issues have been identified. The licensee currently plans to use the same welding procedures for the cold-leg nozzle overlays that were used for the recently completed pressurizer and hot-leg nozzle overlays.

The NRC staff noted that the licensee has used a stainless steel buffer layer prior to applying Alloy 52M weld metal since the spring of 2007 and has obtained good results. The staff concludes that although there were some welding problems in the initial weld overlay installation, the licensee has corrected the welding problems and has implemented the corrective actions in the weld overlay procedures.

Industry operating experience has shown that the ultrasonic testing of cast austenitic stainless steel is not reliable. The NRC staff asked the licensee whether any component in the subject nozzle configurations (e.g., nozzles, safe ends, and pipes) is fabricated with cast austenitic stainless steel (CASS) material. By letter dated August 7, 2009, the licensee responded that there are no components in the subject nozzle configurations (e.g., nozzles, safe ends, and pipes) that are fabricated with CASS material. Therefore, the staff concludes that this issue is not applicable to Palo Verde.

3.7.3 Examination Issues

Section 5.2(b)2 of RR No. 36, Revision 1, dated June 4, 2009, requires that the end transition slope of the overlay not exceed 45 degrees. However, ASME Code Case N-740-2 requires that the transition slope not exceed 30 degrees. The NRC staff approved the 45-degree transition slope in the original RR No. 36 because at the time, the earlier version of Code Case N-740 specified 45 degrees for the transition slope. However, a 30-degree slope would reduce the stress concentration more than a 45-degree slope at the toe of the weld. The staff asked the licensee to discuss the acceptability of the 45-degree slope. The staff has not approved Code Case N-740-2.

In its letter dated August 7, 2009, the licensee stated:

> APS agrees that a 30-degree slope reduces the stress concentration at the toe of the weld when compared to a 45-degree slope. However, due to the configuration of some welds and the location of adjacent welds, slopes greater than 30 degrees may be used. When performing the analysis of the stresses in the toe of the weld, the approach taken by APS is to model the specific weld overlay end configuration, based on dimensions of the overlay design. By using this approach, the finite element model represents and captures the weld overlay end discontinuity impacts on stress and fulfills the Code Case N-740-2 requirement for analysis of the specific end slope geometry when the end

transition slope of the overlay exceeds 30 degrees. In addition, a fatigue strength reduction factor is determined for the maximum (steepest) end slope allowed by the design. This factor is then utilized in the ASME Code, Section III fatigue evaluation and applied to stresses obtained at the end sections.

The NRC staff concludes that although a 30-degree slope is preferable, the proposed 45-degree slope is acceptable in this situation because the licensee will perform a stress analysis to ensure that the stresses at the toe of the weld overlay with a slope 45-degree angle will not exceed the ASME Code allowable.

Sections 5.3(a)2 and 5.3(a)3 of RR No. 36, Revision 1, dated June 4, 2009, state that the liquid penetrant examination and ultrasonic examination shall be conducted at least 48 hours after the completed overlay has returned to ambient temperature when ambient temperature temper bead welding is used. Section 5.3(a)3 also states that "...APS will be using Relief Request 37, previously approved on June 21, 2007, which authorized the 48-hour hold time to begin following the completion of the third layer of the weld overlay." There appears to be a contradiction in Sections 5.3(a)2 and 5.3(a)3 regarding the 48-hour hold time.

By letter dated August 7, 2009, the licensee revised Sections 5.3(a)2 and 5.3(a)3 to require that examination will be performed 48 hours after the completion of the third layer of the weld overlay. Generically, the NRC staff has permitted the 48-hour hold time to begin following the completion of the third layer of the weld overlay. The staff concludes that the licensee's revised Sections 5.3(a)2 and 5.3(a)3 of RR No. 36, Revision 1, dated August 7, 2009, are acceptable.

Sections 5.3(a)4, 5.3(a)5.ii, and 5.3(b)2 of RR No. 36, Revision 1, dated June 4, 2009, require that wall thickness of "t_w" be the thickness of the weld overlays to disposition indications detected in accordance with Table IWB-3514-2 of the ASME Code, Section XI, for the acceptance and pre-service examination. The NRC staff noted that Section 5.3(c)3 of the relief request does not provide a definition of the wall thickness in dispositioning indication(s) detected during inservice examinations. By letter dated August 7, 2009, the licensee revised Section 5.3(c)3 to add a sentence that states: "...In applying the acceptance standards, the wall thickness, "t_w", shall be the thickness of the weld overlay...". The staff concludes that this revision provides a clear definition regarding the wall thickness that will be used to disposition indications detected using Table IWB-3514-2 for inservice examinations and, therefore, Section 5.3(c)3 in RR No. 36, Revision 1, dated August 7, 2009, is acceptable.

Section 5.5 of RR No. 36, Revision 1, dated June 4, 2009, states that "...If a flaw is detected in the upper 25% of the original material during the pre-service examination, the actual flaw size would be used for the crack growth evaluations..." The NRC staff noted that in Section 5.3 of the RR, the licensee states that ultrasonic testing (UT) will not be performed on DM welds prior to overlay installation. In this case, the condition of the DM welds will not be known prior to weld overlay installation. The staff noted that UT is not qualified to detect flaws in the inner 75 percent of the weld thickness of the DM weld once the weld overlay is installed on the DM weld.

Therefore, the condition of the inner 75 percent of the DM weld wall thickness will not be known after overlay installation if pre-installation inspection was not performed. In such a case, the postulated flaw in the above Section 5.5 statement is not conservative. The NRC staff's position

is that a worst case flaw (i.e., 75 percent through-wall depth) should be assumed in the inner 75 percent region of the DM weld at a minimum. If a flaw is detected in the upper 25 percent of the original material during the pre-service or inservice examinations, the flaw depth used for the crack growth evaluations should be the actual detected flaw depth plus the flaw of 75 percent through-wall depth assumed in the inner (lower) 75 percent wall thickness region.

By letter dated August 7, 2009, the licensee stated:

> APS concurs that if a flaw is detected in the upper 25% of the original material during the pre-service or inservice examinations, the flaw depth used for the crack growth evaluations should be the actual detected flaw depth plus the flaw of 75% through-wall depth assumed in the inner (lower) 75% wall thickness region. The crack growth considerations described in Section 5.2(a) [of the RR] reflect this position.

The NRC staff concludes that although Section 5.5 of the RR is not clear regarding the initial flaw size to be used in the flaw growth calculation, Section 5.2(a) of the RR provides the necessary requirement for the initial flaw size (i.e., how the initial flaw size is assumed in the flaw growth calculation).

RR No. 36, Revision 1, dated June 4, 2009, does not provide the technical basis for the alternative examination under the Performance Demonstration Initiative (PDI) program and the differences between the PDI program and the requirements of Supplement 11, Appendix VIII to the ASME Code, Section XI. The NRC staff asked the licensee to demonstrate that its PDI program satisfies Appendix VIII, Supplement 11. By letter dated August 7, 2009, the licensee provided the comparisons and associated technical basis of the PDI program to demonstrate that the requirements of its PDI program comply with Supplement 11. The staff concludes that the proposed PDI program satisfies the requirements of the ASME Code, Appendix VIII, Supplement 11.

3.7.4 NRC Staff Conclusions

In summary, the NRC staff concludes that the licensee has responded adequately to the technical issues that the staff raised and has revised RR No. 36, Revision 1, dated June 4, 2009 according to the staff's request. The staff concludes that RR No. 36, Revision 1, dated August 7, 2009, will provide reasonable assurance that the weld overlay will maintain adequate structural integrity to the primary system pressure boundary.

4.0 REGULATORY COMMITMENTS

By the letter dated August 7, 2009, the licensee committed to two regulatory requests contained in the RAI dated July 10, 2009.

1. Provide the information delineated in question 9 to the NRC Project Manager within 14 days after the completion of the ultrasonic examination of the weld overlay installations.

2. Submit a summary report of the results of the ASME III and ASME XI analyses that demonstrates the full structural weld overlay applications will perform their intended design function. The report will be submitted prior to Mode 4 entry following the outage in which the weld overlays are applied.

In RAI Question 9, the NRC staff requested that the licensee submit the following information within 14 days of completion of the weld overlay examination:

(a) A discussion of any repairs to the overlay material and/or base metal and the reason for the repair.

(b) A listing of indications detected. The recording criteria of the ultrasonic examination procedure to be used for the examination overlays requires that all indications, regardless of amplitude, be investigated to the extent necessary to provide accurate characterization, identity, and location. Additionally, the procedure requires that all indications, regardless of amplitude, that cannot be clearly attributed to the geometry of the overlay configuration be considered flaw indications.

(c) The disposition of all indications using the standards of ASME Code Section XI, IWB-3514-2 and/or IWB-3514-3 criteria and, if possible, the type and nature of the indications need to be submitted. The ultrasonic examination procedure requires that all suspected flaw indications are to be plotted on a cross-sectional drawing of the weld and that the plots should accurately identify the specific origin of the reflector.

In RAI Question 5, the NRC staff requested that the licensee provide a summary report of the installed FSWOL prior to entry into Mode 4 as stated in Section 5.2(b)4.i of the June 4, 2009, submittal:

> ... a stress analysis will be performed that demonstrates that the nozzles will perform their intended design function with the FSWOL installed. The stress analysis report will include results showing that the requirements of Subarticles NB-3200 and NB-3600 of the ASME Code, Section III are satisfied. The stress analysis will also include results showing that the requirements of IWB-3000 of the ASME Code, Section XI, are satisfied. The results will show that the postulated crack including its growth in the nozzles will not adversely affect the integrity of the overlaid welds. This analysis will be performed as part of the overlay design package and will be available for NRC review.

5.0 CONCLUSION

The NRC staff has reviewed the licensee's submittal and determined that revised RR No. 36, Revision 1, dated August 7, 2009, for Palo Verde, Units 1, 2, and 3, will provide an acceptable level of quality and safety. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i), the staff authorizes the use of RR No. 36, Revision 1, dated August 7, 2009, for the installation of FSWOL on the

DM welds of the nozzles specified above at Palo Verde, Units 1, 2, and 3 for the remainder of the third 10-year ISI interval.

All other ASME Code, Section XI, requirements for which relief was not specifically requested and approved in this RR remain applicable, including third-party review by the Authorized Nuclear Inservice Inspector.

Principal Contributor: J. Tsao

Date: January 21, 2010

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

Sincerely,

/RA/

Michael T. Markley, Chief
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

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

Enclosure:
Safety Evaluation

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DATE	1/15/10	1/8/10	11/17/09	1/21/10	1/21/10

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