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10 CFR 50.55a(a)(3)(i)

102-05486-CDM/SAB/RJR
May 04, 2006

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

References:
1. Letter from Nuclear Regulatory Commission to Westinghouse Electric Company, "Summary of teleconference with the Westinghouse Owners Group regarding potential one cycle relief of reactor pressure vessel shell weld inspections at pressurized water reactors related to WCAP-16168-NP, 'Risk-Informed Extension of Reactor Vessel In-Service Inspection Intervals," dated January 27, 2005.

2. Westinghouse Owners Group Topical Report, WCAP-16168-NP, "Risk-Informed Extension of Reactor Vessel In-Service Inspection Interval," December 2005.

Dear Sirs:

**SUBJECT: Palo Verde Nuclear Generating Station (PVNGS)
Units 2 and 3
Docket Nos. STN 50-529/530
Request to Extend the Second 10-Year, American Society of Mechanical Engineers Section XI, Inservice Inspection Program Interval for Reactor Vessel Weld Examinations – Relief Request No. 34**

Pursuant to 10 CFR 50.55a(a)(3)(i), Arizona Public Service Company (APS) is requesting approval to use an alternative to the requirements of the ASME Boiler and Pressure Vessel Code, Section XI, Paragraph IWB-2412, Inspection Program B, for PVNGS Units 2 and 3. The alternative requests relief to defer the reactor vessel weld examinations of Units 2 and 3 for one fuel cycle as described in the enclosure to this letter. The Unit 1 reactor vessel weld examinations are currently scheduled for the fall of 2008 and relief is not required since it is still within the second inspection interval as defined by ASME Section XI.

The NRC communicated to the Westinghouse Owners Group (WOG) in Reference 1 that the staff would agree to licensees submitting a relief request for a one cycle extension of the reactor vessel weld examinations to provide additional time for

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completing evaluations and staff review associated with Reference 2, the Westinghouse Owners Group Topical Report, WCAP - 16168.

The technical justification to extend PVNGS's second inspection interval performance of Category B-A and B-D examinations by one fuel cycle is consistent with the guidance provided in Reference 1. APS's proposed extension of the inservice inspection interval for these examinations will continue to provide an acceptable level of quality and safety, as described in the enclosed relief request.

APS requests staff approval by September 1, 2006 in order to support preparation activities for the fall 2006 2R13 refueling outage. It is also our understanding that APS would have an opportunity to request additional relief if review and approval of the topical report does not support our inspection interval. A separate relief request is being prepared to address a one-cycle extension of the reactor vessel visual examinations for Units 2 and 3.

APS's subject request is similar to other industry requests submitted by letters dated March 31, 2005, June 8, and July 8, 2005 for Palisades, Indian Point, and Sequoyah nuclear plants, respectively.

This letter contains no new commitments and no revisions to existing commitments.

If you have any questions about this change, please telephone Thomas N. Weber at (623) 393-5764.

Sincerely,

CDM/SAB/RJR/gt

Enclosure: Relief Request No. 34 - Request to Extend the Second 10-Year, American Society of Mechanical Engineers Section XI, Inservice Inspection Program Interval for Reactor Vessel Weld Examinations

cc: B. S. Mallett — NRC Region IV Regional Administrator
M. B. Fields — NRC NRR Project Manager
G. G. Warnick — NRC Senior Resident Inspector for PVNGS

ENCLOSURE

Relief Request No. 34
Request to Extend the Second 10-Year Inservice Inspection Program Interval for Palo Verde Units 2, and 3 Reactor Vessel Weld Examinations

1.0 ASME Code Component(s) Affected

The affected components are the PVNGS Unit 2 and 3 Reactor Vessels (RV), specifically the following American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (BPV) Code, Section XI examination categories and item numbers. These examination categories and item numbers are from IWB-2500 and Table IWB-2500-1 of the ASME BPV Code, Section XI.

Examination Category	Item No	Description
B-A	B1.11	Circumferential Shell Welds
B-A	B1.22	Meridional Shell Welds (Bottom Head only)
B-A	B1.30	Shell-to-Flange Weld
B-D	B3.90	Nozzle-to-Vessel Welds
B-D	B3.100	Nozzle Inner Radius Areas

(Throughout this request the above examination categories are referred to as "the subject examinations" and the ASME BPV Code Section XI is referred to as "the Code")

2.0 Applicable Code Edition and Addenda

The PVNGS Unit 2 and 3 second 10-year Interval Inservice Inspection (ISI) Program Plan is prepared to comply with the 1992 Edition 1992 Addenda of the Code.

3.0 Applicable Code Requirement

ASME Section XI – IWA-2432 - Inspection Program B states in part:
"The inspection intervals shall comply with the following, except as modified by IWA-2430(d):" "Successive Inspection Intervals – 10 years following the previous inspection interval."

ASME Section XI – IWA-2430(d) states:
"For components inspected under Program B, each of the inspection intervals may be extended or decreased by as much as 1 year. Adjustments shall not cause successive intervals to be altered by more than 1 year from the original pattern of intervals."

ASME Section XI – IWB-2412(b) states:

"The inspection interval specified in IWB-2412(a) may be decreased or extended by as much as 1 year to enable in inspection to coincide with a plant outage, within the limitations of IWA-2430(d)"

ASME Section XI – Table IWB-2500-1, Examination Category, B-A, requires a volumetric examination on all welds.

ASME Section XI – Table IWB-2500-1, Examination Category, B-D, requires a volumetric examination on all nozzles.

4.0 Reason for Request

The intent of the request is to extend the ISI interval for Examination Category B-A and B-D by one refueling cycle beyond the currently scheduled inspection, to allow time for NRC review of industry efforts to extend the ISI interval for the subject examinations from 10 to 20 years. These efforts use ASME Section XI Code Case N-691 (Reference 1) as a basis for using risk-informed insights to show that extending the inspection interval from 10 to 20 years results in a small change in the RV failure frequency that satisfies the requirements of Regulatory Guide 1.174 (Reference 2). Following NRC approval of these efforts, APS intends to submit a separate request to extend the current 10-year interval for PVNGS to 20 years. The 20-year inspection interval will result in a reduction in man-rem exposure and examination costs.

5.0 Proposed Alternative and Basis for Use

Pursuant to 10 CFR 50.55a(a)(3)(i), Arizona Public Service Company (APS) hereby requests approval to use an alternative to the requirements of the ASME Boiler and Pressure Vessel Code, Section XI, Paragraph IWB-2412, Inspection Program B, for PVNGS Units 2 and 3. The alternative is to defer the Unit 2 and 3 reactor vessel weld examinations for one fuel cycle. The one cycle deferral will allow additional time for completing evaluations and staff review associated with Westinghouse Owners Group Topical Report, WCAP-16168 (Reference 3). The NRC has communicated to the Westinghouse Owners Group that the staff would agree to licensees submitting a one cycle relief request for an extension.

Currently, PVNGS Units 2 and 3 are in the third periods of their second ten-year ISI interval. The second ISI interval is currently scheduled to end on March 17, 2007, for Unit 2 and January 10, 2008, for Unit 3. Applying the extension allowed by IWA-2430(d)] would extend the end of the interval until March 17, 2008, for Unit 2 and January 10, 2009, for Unit 3. The 2R14 and 3R14 refueling outages are currently scheduled for the spring of 2008 and 2009, respectively. However, an additional amount of extension time will be required to capture the 2R14 and 3R14 outages, and the RV examinations, in their respective Second Intervals.

The additional extension being requested is less than 60 days for Unit 2 and less than 150 days for Unit 3. Although the proposed inspection dates are one refueling outage beyond the Code required inspection interval, the net duration between the reactor vessel inspections will not be more that the maximum eleven years allowed by the Code.

The guidance for the technical basis to extend the 10-year RV ISI interval by one refueling cycle are contained in a letter from R. Gramm of the NRC to G. Bischoff of the Westinghouse Owners Group, dated January 27, 2005 (Reference 4). The following information provides APS' technical justification that the current ISI interval can be extended while providing an acceptable level of quality and safety in accordance with 10 CFR 50.55a (a) (3) (i).

APS' technical basis for the relief request addresses the following five topics which were identified in the January 27, 2005 letter.

- Plant specific reactor vessel inservice inspection history.
- Fleetwide reactor vessel inservice inspection history.
- Degradation mechanisms in the reactor vessel.
- Material condition of the reactor vessel relative to embrittlement.
- Operational experience relative to RV structural integrity challenging events.

5.1 Reactor Vessel Inservice Inspection History for Units 2 and 3

PVNGS Unit 2 and 3 are in their second ISI interval for the reactor pressure vessel examinations. The preservice inspections (PSI) and one ISI have been performed on the Examination Category B-A and B-D welds to date. The PSI was performed in accordance with ASME Section XI, 1974 Edition and Summer 1975 Addenda; and the ISI was performed in accordance with ASME Section XI, 1980 Edition, Winter 1981 Addenda, and Regulatory Guide 1.150 (Reference 5). The examinations performed in Units 2 and 3 have achieved acceptable coverage (i.e., >90% or examination of the maximum practical coverage). No reportable indications were found during these examinations. Based on the examination method and coverage obtained, it is reasonable to conclude that the examinations were of sufficient quality to detect any significant flaws that would challenge RV integrity. A detailed inspection history for the welds to which the subject examinations apply are contained tables 1 and 2 attached to this enclosure.

5.2 Fleetwide Reactor Vessel Inservice Inspection History

As part of the technical basis for ASME Code Case N-691, a survey of RV ISI history for 14 pressurized water reactors was performed. These 14 plants represented 301 total years of service and included RVs fabricated by various vendors. The plants reported that no reportable findings had been discovered during examinations of Category B-A and B-D welds of their RVs.

It is widely recognized in the fracture mechanics community that fatigue crack growth of embedded flaws is substantially smaller than that of surface breaking flaws. PVNGS Units 2 and 3 contain one layer cladding. The completed cladding was 100% liquid penetrant (PT) examined during construction to assure freedom from lack of fusion or other linear defects open to the surface. This PT examination lowers the probability of surface breaking flaws propagating due to fatigue.

All Pressurized Water Reactor plants have performed their first 10-year ISI of the subject examinations. No surface-breaking or unacceptable near-surface flaws (i.e., defects) have been reported in any of these inspections performed per the requirements of Regulatory Guide 1.150, or ASME Section XI, Appendix VIII.

5.3 Degradation Mechanisms in the Reactor Vessel

The welds for which the subject examinations are conducted are similar metal low alloy steel welds. The only currently known degradation mechanism for this type of weld is fatigue due to thermal and mechanical cycling from operational transients. Studies have shown that while flaw growth of simulated flaws in a reactor vessel would be small, the operational transient which has the greatest contribution to flaw growth is the cooldown transient. Based on operating experience, the cooldown transient is a low frequency transient and is not expected to occur more than a few instances during the requested inspection extension period. Therefore, any flaw growth during the requested deferral period will be inherently small.

The fatigue usage factors for the welds in the subject examinations are much less than the ASME Code design limit of 1.0 after 40 years of operation. These usage factors are calculated using a very conservative design duty cycle. It is very unlikely that more than a few of these events (e.g. heatup or cooldown) would actually occur during the extension period of this proposed alternative.

It is important to note that this request does not apply to any dissimilar metal welds, including Alloy 600 base metal or Alloy 82/182 weld material where primary water stress corrosion cracking is a concern or any other augmented inspection requirements imposed.

5.4 Material Condition of the Reactor Vessel Relative to Embrittlement

The RV beltline is the limiting area in terms of embrittlement for the subject examinations. The composition of each material in the RV beltline, along with fluence and embrittlement data, can be found in the NRC Reactor Vessel Integrity Database (RVID) (Reference 6). This information is provided for PVNGS Units 2 and 3 in the following tables. Note: The RT_{PTS} values have been updated as discussed below.

Palo Verde Unit 2
Material Values Contained in the RVID

Major Material Region Description			Cu [wt%]	Ni [wt%]	Un-Irradiated RT_{NDT}		RT_{PTS} @32 EFPY
Type	Heat	Location			[°F]	Method	
Plate	F-765-6	Intermediate Shell	0.040	0.670	10	Plant Specific	78
Plate	F-773-2	Lower Shell	0.040	0.640	0	Plant Specific	68
Weld	MIL B-4	Axial Weld 101-142A, B, C	0.090	0.040	-80	Plant Specific	34

Palo Verde Unit 3
Material Values Contained in the RVID

Major Material Region Description			Cu [wt%]	Ni [wt%]	Un-Irradiated RT_{NDT}		RT_{PTS} @32 EFPY
Type	Heat	Location			[°F]	Method	
Plate	F-6407-5	Intermediate Shell	0.050	0.610	-20	Plant Specific	55
Plate	F-6411-2	Lower Shell	0.040	0.650	0	Plant Specific	68
Weld	MIL B-4	Axial Weld 101-142A, B, C	0.040	0.070	-50	Plant Specific	30

10 CFR 50.61 currently provides pressurized thermal shock (PTS) screening criteria of RT_{PTS} equal to 270°F for plates and axial welds and RT_{PTS} equal to 300°F for circumferential welds. Based on current projections, the intermediate shell plate in Unit 2 is the most limiting material for PVNGS Unit 2 and 3. The projected RT_{PTS} value of 78°F at 32 EFPY for this material is well below the PTS screening criteria. Furthermore, it is recognized by the NRC and industry that a large amount of conservatism exists in the current PTS screening criteria (Reference 7). In the NRC PTS Risk Re-evaluation, results have shown that it may be possible to remove an amount of conservatism equivalent to reducing a plant's RT_{PTS} value by at least 70°F. While the exact amount of conservatism that will be removed has not been determined, it is clear that PVNGS Unit 2 and 3 will be well below the current

PTS screening criteria during the extension period and further below the potential revised PTS screening criteria.

5.5 Operational Experience Relative to RV Structural Integrity Challenging Events

It is widely recognized that the greatest possible challenge to reactor pressure vessel integrity for a PWR is PTS. A PTS event can be generally described as a rapid cooling of the RV followed by a late repressurization. Plants (including PVNGS) have taken steps such as implementing emergency operating procedures (EOPs) and operator training to lower the likelihood of a PTS event occurring. Due to the implementation of such measures, industry experience indicates the number of occurrences of PTS events fleetwide is very small. When considered over the combined fleetwide PWR operating history, the frequency of PTS events is very small. When considering the frequency of PTS events and the length of the requested extension, the probability of a PTS event occurring during the requested extension is also very low. Combining the low probability of a PTS event with the low probability of a flaw existing in the RV (given the previously discussed inspection history), the probability of RV failure due to PTS is also very small.

PVNGS Units 2 and 3 have implemented EOPs and operator training to prevent the occurrence of PTS events. Consistent with the Combustion Engineering (CE) Emergency Response Guidelines (ERGs), the PVNGS EOPs allow operators to identify the onset of PTS conditions and provide the steps required to mitigate any cold pressurization challenge to RV integrity. The basic PTS mitigation strategy of the PVNGS EOPs involves 1) termination of the primary system cooldown, 2) termination of emergency core cooling system flow (if proper criteria are met), 3) depressurization of the primary system, 4) establishment of stable primary system conditions in the normal operating range, and 5) implementation of a thermal "soaking" period prior to any cooldown outside of the normal operating region. By combining 1) the basic requirements of the CE ERGs, 2) the use of plant specific setpoints with a defined technical basis, and 3) the formal reconciliation of any differences between the CE ERG reference plant and PVNGS, the PVNGS EOPs provide adequate means for preventing potential PTS transients.

The current requirements for inspection of RV pressure-retaining welds have been in effect since the 1989 Edition of ASME Code, Section XI. The industry has expended significant cost and man-rem exposure that have shown no service-induced flaws in the ASME Section XI Examination Category B-A or B-D RV welds. ASME Section XI, Code Case N-691 and industry efforts have shown that risk insights can be used to extend the reactor vessel ISI interval from 10 to 20 years. The 10-year extension satisfies the change in risk requirements of Regulatory Guide 1.174; and, in accordance with 10 CFR 50.55a (3) (i), maintains an acceptable level of quality and safety. Based on these efforts having shown that the risk of vessel failure with a 10-year

inspection interval extension is low and achieves an acceptable level of quality and safety, it is reasonable to conclude that one refueling cycle extension will also achieve an acceptable level of quality and safety. On the basis of the above discussion, the risk associated with extending the inspection interval by one refueling cycle is small. Therefore, APS considers the proposed alternative for the subject examinations at PVNGS Units 2 and 3 to provide an acceptable level of quality and safety in accordance with 10 CFR 50.55a(3)(i).

6.0 Duration of Proposed Alternative

The proposed alternative requested would extend the second ISI interval of PVNGS Unit 2 and 3 for one refueling cycle and would apply to the Examination Category B-A and B-D RV welds beyond the ASME Code required 10-year inspection interval. This request is applicable to the second inspection interval only. If this relief request is approved, the second ISI interval will end at the conclusion of the spring 2008 and 2009 (2R14 and 3R14) outages for the subject examinations.

7.0 References

1. ASME Boiler and Pressure Vessel Code, Code Case N-691, "Application of Risk-Informed Insights to Increase the Inspection Interval for Pressurized Water Reactor Vessels," Section XI, Division 1, November 2003.

2. Regulatory Guide 1.174, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis," November 2002.

3. Westinghouse Owners Group Topical Report, WCAP-16168-NP, "Risk-Informed Extension of Reactor Vessel In-Service Inspection Interval," December 2005.

4. R. Gramm of the NRC to G. Bischoff of the WOG, "Summary of Teleconference with the Westinghouse Owners Group Regarding Potential One Cycle Relief of Reactor Pressure Vessel Shell Weld Inspections at Pressurized Water Reactors Related to WCAP-16168- NP, 'Risk-Informed Extension of Reactor Vessel In-Service Inspection Intervals,'" dated January 27, 2005.

5. Regulatory Guide 1.150, "Ultrasonic Testing of Reactor Vessel Welds during Preservice and Inservice Examinations," February 1983.

6. Nuclear Regulatory Commission Reactor Vessel Integrity Database, dated July 22, 1995.

7. NRC Memorandum, Thadani to Collins, "Technical Basis for Revision of the Pressurized Thermal Shock (PTS) Screening Criteria in the PTS Rule (10 CFR 50.61)," dated December 31, 2002.

8.0 Precedent

Palisades Nuclear Plant	November 29, 2005	ML053200296
Indian Point, Nuclear Generating Unit No. 2	March 16, 2006	ML060740187
Sequoyah Nuclear Plant, Unit 1	February 3, 2006	ML060100080

Attachment

Table 1
Palo Verde Unit 2 Inservice Inspection Results

Weld ID	ASME Weld Category	Date Last Inspected	% Coverage obtained	# of reportable indications*	# of indications currently being monitored*	Growth of indications currently being monitored* (in)
2-001-001	B-A	09/23/97	22% **	None	None	None
2-001-002	B-A	09/23/97	90.2%	None	None	None
2-001-003	B-A	09/23/97	100%	None	None	None
2-001-004	B-A	09/24/97	100%	None	None	None
2-001-005	B-A	09/23/97	100%	None	None	None
2-001-006	B-A	09/24/97	93%	None	None	None
2-001-007	B-A	09/22/97	95%	None	None	None
2-001-008	B-A	09/22/97	95%	None	None	None
2-001-009	B-A	09/22/97	95%	None	None	None
2-001-010	B-A	09/21/97	91.2%	None	None	None
2-001-011	B-A	09/20/97	100%	None	None	None
2-001-012	B-A	09/20/97	100%	None	None	None
2-001-013	B-A	09/19/97	100%	None	None	None
2-001-014	B-A	09/20/97	92.6%	None	None	None
2-001-016	B-D	09/22/97	96.5% coverage for reflectors parallel to weld. 80.1% coverage for reflectors transverse to weld. ***	None	None	None
2-001-016-IR	B-D	09/24/97	92%	None	None	None
2-001-017	B-D	09/23/97	96.5% coverage for reflectors parallel to weld. 80.1% coverage for reflectors transverse to weld. ***	None	None	None
2-001-017-IR	B-D	09/24/97	92%	None	None	None
2-001-019	B-D	09/22/97	96.5% coverage for reflectors parallel to weld. 80.1% coverage for reflectors transverse to weld. ***	None	None	None
2-001-019-IR	B-D	09/24/97	92%	None	None	None
2-001-020	B-D	09/22/97	96.5% coverage for reflectors parallel to weld. 80.1% coverage for reflectors transverse to weld. ***	None	None	None
2-001-020-IR	B-D	09/24/97	92%	None	None	None

Notes:

* Due to improvement in inspection technology, the most recent inspection is considered to be of the greatest quality of the inspections performed. Therefore, the inspection data provided in this table is for the most recent inservice inspection.

** Coverage of the lower head meridional weld is limited by interference with the flow skirt and ICI nozzles.

*** Coverage of the nozzle to vessel circumferential weld scans limited by saddle geometry and nozzle boss interference.

Table 2
Palo Verde Unit 3 Inservice Inspection Results

Weld ID	ASME Weld Category	Date Last Inspected	% Coverage obtained	# of reportable indications*	# of indications currently being monitored*	Growth of indications currently being monitored* (in)
3-001-001	B-A	10/01/98	20% **	None	None	None
3-001-002	B-A	09/30/98	90.6%	None	None	None
3-001-003	B-A	10/02/98	100%	None	None	None
3-001-004	B-A	10/02/98	100%	None	None	None
3-001-005	B-A	10/02/98	100%	None	None	None
3-001-006	B-A	10/02/98	93%	None	None	None
3-001-007	B-A	10/02/98	95%	None	None	None
3-001-008	B-A	10/02/98	95%	None	None	None
3-001-009	B-A	10/02/98	95%	None	None	None
3-001-010	B-A	10/01/98	91.2%	None	None	None
3-001-011	B-A	09/30/98	100%	None	None	None
3-001-012	B-A	10/01/98	100%	None	None	None
3-001-013	B-A	10/01/98	100%	None	None	None
3-001-014	B-A	09/30/98	92%	None	None	None
3-001-016	B-D	10/03/98	96.5% coverage for reflectors parallel to weld. 80.1% coverage for reflectors transverse to weld. ***	None	None	None
3-001-016-IR	B-D	10/03/98	90% ***	None	None	None
3-001-017	B-D	10/03/98	96.5% coverage for reflectors parallel to weld. 80.1% coverage for reflectors transverse to weld. ***	None	None	None
3-001-017-IR	B-D	10/03/98	90% ***	None	None	None
3-001-019	B-D	10/02/98	96.5% coverage for reflectors parallel to weld. 80.1% coverage for reflectors transverse to weld. ***	None	None	None
3-001-019-IR	B-D	10/02/98	90% ***	None	None	None
3-001-020	B-D	10/02/98	96.5% coverage for reflectors parallel to weld. 80.1% coverage for reflectors transverse to weld. ***	None	None	None
3-001-020-IR	B-D	10/03/98	90% ***	None	None	None

Notes:

* Due to improvement in inspection technology, the most recent inspection is considered to be of the greatest quality of the inspections performed. Therefore, the inspection data provided in this table is for the most recent inservice inspection.

** Coverage of the lower head meridional weld is limited by interference with the flow skirt and ICI nozzles.

*** Coverage of the nozzle to vessel circumferential weld and inner radius scans limited by nozzle saddle geometry and boss interference.