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WILLIAM L. STEWART
EXECUTIVE VICE PRESIDENT
NUCLEAR

102-03448-WLS/SAB/JRP
August 17, 1995

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Mail Station P1-37
Washington, DC 20555-0001

Dear Sirs:

Reference: Letter 102-03047, dated July 26, 1994, from W. F. Conway, Executive Vice President, Nuclear, APS, to USNRC

Subject: Palo Verde Nuclear Generating Station (PVNGS)
Units 1, 2, and 3
Docket Nos. STN 50-528/529/530
Response to NRC Generic Letter 92-01, Rev. 1, Supplement 1

The purpose of this letter is to transmit Arizona Public Service Company's (APS) response to NRC Generic Letter 92-01, Revision 1, Supplement 1, "Reactor Vessel Structural Integrity", dated May 19, 1995. The supplement requires that all addressees identify, collect and report any new data pertinent to analysis of structural integrity of their reactor pressure vessels (RPVs) and to assess the impact of that data on their RPV integrity analyses relative to the requirements of Section 50.60 of Title 10 of the Code of Federal Regulations (10 CFR 50.60), 10 CFR 50.61, Appendices G and H to 10 CFR Part 50, (which encompass pressurized thermal shock (PTS) and upper shelf energy (USE) evaluations) and any potential impact on low temperature overpressure (LTOP) limits or pressure-temperature (P-T) limits.

In addition to the extensive engineering effort to date on the Reactor Vessel Structural Integrity issue, APS as a member of the ABB-Combustion Engineering Owners Group (CEOG), is involved in the Reactor Vessel Working Group (RVWG) under the auspices of the CEOG. This working group will also include members from utilities outside of the CEOG which would allow the evaluation of sister plant chemistries and will support generic initiatives which benefit both APS and the industry.

The enclosure to this letter contains the APS response to NRC Generic Letter 92-01, Revision 1, Supplement 1, for the Palo Verde Nuclear Generating Station Units 1, 2, and 3. This submittal contains the responses to all four requests for additional information listed in the Generic Letter, and is being submitted under oath or affirmation under the provisions of Section 182a, Atomic Energy Act of 1954, as amended, and 10 CFR

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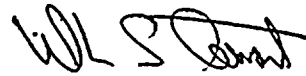
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Response to Generic Letter 92-01,
Rev. 1, Supplement 1
Page 2

50.54(f). As such, a six month written response to parts (2), (3), and (4) of the Generic Letter will not be required.

Should you have any questions, please contact Scott A. Bauer at (602) 393-5978.

Sincerely,

WLS/SAB/JRP/rv
Enclosure



cc: L. J. Callan
K. E. Perkins
B. E. Holian
K. E. Johnston

STATE OF ARIZONA)
) ss.
COUNTY OF MARICOPA)

I, W. L. Stewart, represent that I am Executive Vice President - Nuclear, Arizona Public Service Company (APS), that the foregoing document has been signed by me on behalf of APS with full authority to do so, and that to the best of my knowledge and belief, the statements made therein are true and correct.

W L Stewart
W. L. Stewart

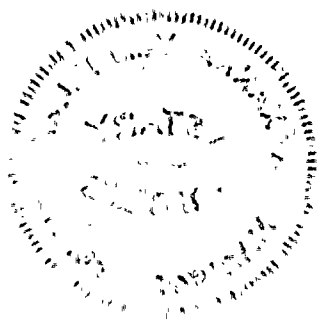
Sworn To Before Me This 17 Day Of August, 1995.

Roxanna Vandiller
Notary Public

My Commission Expires

My Commission Expires June 12, 1997





ENCLOSURE

ARIZONA PUBLIC SERVICE COMPANY (APS)

PALO VERDE NUCLEAR GENERATING STATION

UNITS 1, 2, AND 3

RESPONSE TO NRC GENERIC LETTER 92-01, REVISION 1,

SUPPLEMENT 1

Background

The purpose of this report is to provide the Arizona Public Service Company (APS) response to NRC Generic Letter 92-01, Revision 1, Supplement 1, for the Palo Verde Nuclear Generating Station Units 1, 2, and 3.

The NRC concluded in NUREG-1511, dated December 1994, that; 1) with the exception of Palisades and Beaver Valley 1, most plants will be well below the pressurized thermal shock (PTS) screening limits and, 2) that all reactor pressure vessels (RPVs) will have adequate upper-shelf toughness throughout their current licensed operating life. Additionally, the NRC has also stated that licensees might not necessarily have all of the data pertinent to the evaluation of the structural integrity of their RPVs. This may be the case where the RPV fabricator holds, or has held, the applicable data to be proprietary in nature. Types of data of interest include; chemical composition, heat treatment, plate and forging manufacturing process records, RPV fabrication records, all mechanical property data and surveillance data.

Sources of data identified by the NRC which should be re-examined include material test reports from the steel producer, weld wire manufacturer, RPV fabricator, independent testing laboratories and the NSSS supplier. If needed, the NRC has encouraged utilities to work closely with their respective Owners Groups and NSSS vendor groups to identify and retrieve all sources of information pertinent to the assessment of RPV structural integrity.

Palo Verde Reactor Vessel Manufacturing History

Palo Verde RPVs were manufactured by Combustion Engineering, Inc. The RPVs are made from ASME Class 1, SA-533 Gr. B, Class 1 steel manufactured from electric furnace vacuum degassed steel product. Welds were deposited using non-copper coated wire electrode. During manufacturing, reactor vessel beltline plate and as-deposited weld chemistries were controlled to low weight percentages for the following elements: copper ≤ 0.1 wt.%, phosphorus ≤ 0.012 wt.%, vanadium ≤ 0.01 wt.%, and sulfur ≤ 0.022 wt.%. These practices were imposed to reduce the amount of irradiation induced reduction in fracture toughness resistance which is known to occur throughout the service life of a RPV. ABB-CE provided certification that the core region weld seams met the low chemical requirements.

Required Information

Addressees are required to provide the following information:

NRC Request:

- (1) A description of those actions taken or planned to locate all data relevant to the determination of RPV integrity, or an explanation of why the existing data base is considered complete as previously submitted.

APS Response:

Significant data regarding reactor vessel fabrication were submitted to APS by the vessel manufacturer. Data pertinent to the evaluation of reactor vessel integrity includes; upper, lower, and intermediate shell plate mill test reports, material test reports, heat treatment logs, mechanical property test reports (yield, tensile, charpy tests) and nondestructive examination (NDE) certification reports. Manufacturers weld wire chemistry data, NSSS vendor wet chemical analysis data, weld deposit chemistry and mechanical property data, and weld certification release documentation are also in APS's possession for reactor vessel core belt region welds.

In addition to the comprehensive data package, APS also participated in the ABB-CE Reactor Vessel Group Phase 1 project, which was to identify, assemble and evaluate ABB-CE's original equipment manufacturer design and fabrication records to identify and ensure the retention of valuable information. This task was performed under an integrated quality plan and procedure guidance for personnel performing the work. Fabrication data retrieved as part of this task included:

- | | |
|------------------------------------|--------------------------------|
| . Material Identification Drawings | . Material Purchase Orders |
| . Material Test Reports | . Materials Lab Test Data |
| . Weld Seam ID Drawings | . Weld Inspection Forms |
| . Rejection Notices | . Travellers |
| . Heat Treatment Logs | . Inspection Sketches and Logs |
| . As-Built Drawings | . Inspection Tickets |
| . NDE Reports | . Chart of Repair Cavities |
| . Clad Chemistry Analysis | . ASME Code Data Report |

Based on this review, there were no deficiencies in the Palo Verde Reactor Vessel data records identified at ABB-CE facilities. Note that the NRC recently completed an audit of ABB-CE RPV fabrication records and, based on information APS received from ABB-CE, found no deficiencies in the Reactor Vessel Group Program per 10 CFR 50, Appendix B.

In addition to the above manufacturing and fabrication records identified, APS has also completed the first RPV surveillance capsule tests for each of the three units per the Palo Verde Reactor Vessel Radiation Surveillance Program. The testing, evaluation, and reporting were conducted per 10 CFR 50 Appendix H. The results were also considered with respect to 10 CFR 50, Appendix G requirements.

The results show that for the Palo Verde limiting beltline plate material, Unit 1 intermediate shell plate M-6702-1, the measured average upper shelf energy decrease of plate (and weld) Charpy test results are equal to or less than Regulatory Guide 1.99, Revision 2, predictions.

Therefore, based on recent and past data search actions, the Palo Verde database for assessment of RPV integrity is considered to be complete.

NRC Request:

- (2) An assessment of any change in best-estimate chemistry based on consideration of all relevant data.

APS Response:

- **Beltline Plate Material**

As noted, Palo Verde limiting upper shelf energy material for all three units is the Unit 1 intermediate shell plate M-6702-1. Core beltline region welds, manufactured from non-copper coated wire, are not limiting. APS review of Unit 1 intermediate shell plate material test reports, which include RPV vendor test data and material manufacturer (Lukens) test certificates, indicates that no changes are required to data previously submitted to the staff in the referenced letter and used as the basis for RPV structural evaluations. Note that low copper (0.1 wt.%Cu) plate material was used to construct the RPVs. Review of chemistry data for beltline plate material for all three units indicates zero to negligible copper variability. In all cases, copper content was less than 0.1 wt.%.

- **Beltline Weld Seams**

APS has reviewed weld material certification release forms, weld material certifications, chemical analysis of wire-flux test samples, and wet chemical analysis of wire samples for each Palo Verde unit core belt region weld. These welds include lower shell longitudinal welds (101-142A/C), intermediate shell longitudinal welds (101-124A/C), bottom head to lower shell circumferential weld (101-150), and lower shell to intermediate shell circumferential weld (101-171). APS' review indicates that no changes are required to data previously submitted

by the referenced letter. In all cases reviewed copper contents were measured to be below 0.1 wt.%. Note that beltline welds are not limiting for Palo Verde.

Review of weld wire copper variability confirmed previous NRC conclusions stating that RPVs with less than 0.1 wt.% were considered acceptable because RPVs with this small amount of copper were probably fabricated with copper limits for welds (as in Palo Verde's case) and that the variability of percent copper should not be a concern (Reference NRC Memo to A. C. Thadani from J. R. Strosnider, dated May 5, 1995, re: Assessment of Impacts of Increased Variability In Chemistry On the RT-PTS Value of PWR Reactor Vessels). Review of chemistry data for same heats and flux types but different lots indicates zero to negligible copper variability. In all cases, copper content was less than 0.1 wt.%.

NRC Request:

- (3) A determination of the need for use of the ratio procedure in accordance with the established Position 2.1 of Regulatory Guide 1.99, Revision 2, for those licensees that use surveillance data to provide a basis for the RPV integrity evaluation.

APS Response:

Palo Verde integrity calculations are based on manufacturing material chemistry and mechanical property data. Currently, APS is not using surveillance data for structural assessments. Therefore, there is no need to use the procedures outlined in Position 2.1.

NRC Request:

- (4) A written report providing any newly acquired data as specified above and (1) the results of any necessary revisions to the evaluation of RPV integrity in accordance with the requirements of 10 CFR 50.60, 10 CFR 50.61, Appendices G and H to 10. CFR Part 50, and any potential impact on the LTOP or P-T limits in the technical specifications or (2) a certification that previously submitted evaluations remain valid. Revised evaluations and certifications should include consideration of Position 2.1 of Regulatory Guide 1.99, Revision 2, as applicable, and any new data.

APS Response:

Arizona Public Service Company hereby certifies that previously submitted evaluations remain valid and no changes to the Palo Verde RPV integrity evaluations are necessary. In addition to the information provided in this response to NRC Generic Letter 92-01, Revision 1, Supplement 1, attached please find the Palo Verde Summary File for Upper Shelf Energy and for Pressurized Thermal Shock. This summary file was previously verified and submitted to the NRC by the referenced letter. The attached summary file

has been updated to include the beltline plate heat numbers, and weld wire heat and flux/lot numbers. These updates do not impact data used for RPV structural evaluations, but are provided for use in the Reactor Vessel Integrated Database.

ATTACHMENT

**SUMMARY FILE FOR PALO VERDE UPPER SHELF ENERGY AND
PRESSURIZED THERMAL SHOCK**

PV Summary File for Upper Shell Energy

| Plant Name | Belldline Ident. | Heat No. | Material Type | 1/4T USE at EOL | 1/4T Neutron Fluence at EOL | Unirrad. USE | Method of Determin. Unirrad. USE |
|-------------------------------------|------------------------------------|-----------------------|---------------|-----------------|-----------------------------|------------------|----------------------------------|
| Palo Verde 1 EOL: 12/31/2024 | Lower Shell M-4311-1 | 62467-1 | SA 533B-1 | 104 | 1.91E19 | 134 | Direct |
| | Lower Shell M-4311-2 | 62817-1 | SA 533B-1 | 99 | 1.91E19 | 127 | Direct |
| | Lower Shell M-4311-3 | 62722-1 | SA 533B-1 | 111 | 1.91E19 | 142 | Direct |
| | Int. shell M-6701-1 | C4142-1 | SA 533B-1 | 65 | 1.681E19 | 83 | Direct |
| | Int. shell M-6701-2 | C4188-2 | SA 533B-1 | 75 | 1.681E19 | 96 | Direct |
| | Int. shell M-6701-3 | C4188-1 | SA 533B-1 | 79 | 1.681E19 | 100 | Direct |
| | Int. shell axial welds 101-124A/C | 4P6052 flux 0091/0145 | | 154 | 1.681E19 | 200 ⁵ | Direct |
| | Lower shell axial welds 101-142A/C | 90071 flux 0091/1054 | | 109 | 1.91E19 | 140 | Direct |
| | Circ. weld 101-171 | 4P7869 flux 0124/1061 | | 71 | 1.681E19 | 90 | Direct |

References:

Fluence and IRT_{ndt} data are from January 31, 1989, letter from D. B. Karner (APS) to USNRC Document Control Desk, subject: Palo Verde Nuclear Generating Station (PVNGS) Units 1, 2, and 3, Generic Letter 88-11, Radiation Embrittlement of Reactor Vessel Materials.

Information on plate and weld material types is from FSAR; plate USE data are from Table 5.2-5 of FSAR, and weld USE values are from Charpy curves of FSAR

NOTES:

⁵ Average of three (3) Charpy impact tests for Palo Verde 1 weld wire/flux (Linde 0091 SAW, MIL B-4 sirc, lot #0145, heat 4P6052, RT-NDT=-50° F), data from Palo Verde 1 weld Certified Material Test Report (CMTR).

PV-1 Summary File for Pressurized Thermal Shock

| Plant Name | Beltline Ident. | Heat No. Ident. | ID Neut. Fluence at EOL | IRT _{ndt} | Method of Determin. IRT _{ndt} | Chemistry Factor | Method of Determin. CF | %Cu | %Ni |
|-------------------------------------|------------------------------------|-----------------------|-------------------------|--------------------|--|------------------|------------------------|------|------|
| Palo Verde 1 EOL: 12/31/2024 | Lower shell M-4311-1 | 62467-1 | 3.29E19 | -10°F | Plant Specific | 26 | Table | 0.04 | 0.65 |
| | Lower shell M-4311-2 | 62817-1 | 3.29E19 | -40°F | Plant Specific | 20 | Table | 0.03 | 0.62 |
| | Lower shell M-4311-3 | 62722-1 | 3.29E19 | -20°F | Plant Specific | 20 | Table | 0.03 | 0.64 |
| | Int. shell M-6701-1 | C4142-1 | 3.29E19 | 30°F | Plant Specific | 44 | Table | 0.07 | 0.66 |
| | Int. shell M-6701-2 | C4188-2 | 3.29E19 | 40°F | Plant Specific | 37 | Table | 0.06 | 0.61 |
| | Int. shell M-6701-3 | C4188-1 | 3.29E19 | 40°F | Plant Specific | 37 | Table | 0.06 | 0.61 |
| | Int. shell axial welds 101-124A/C | 4P6052 flux 0091/0145 | 3.29E19 | -50°F | Plant Specific | 35 | Table | 0.07 | 0.03 |
| | Lower shell axial welds 101-142A/C | 90071 flux 0091/1054 | 3.29E19 | -80°F | Plant Specific | 28 | Table | 0.04 | 0.04 |
| | Circ. weld 101-171 | 4P7869 flux 0124/1061 | 3.29E19 | -70°F | Plant Specific | 34 | Table | 0.05 | 0.07 |

References:

Fluence and IRT_{ndt} data are from January 31, 1989, letter from D. B. Karner (APS) to USNRC Document Control Desk, subject Palo Verde Nuclear Generating Stations (PVNGS) Units 1, 2 and 3, Generic Letter 88-11, Radiation Embrittlement of Reactor Vessel Materials

Weld chemical composition values are averages from data in the first reference and data from FSAR.

PV-2 Summary File for Upper Shelf Energy

| Plant Name | Beltline Ident. | Heat No. | Material Type | 1/4T USE at EOL | 1/4T Neutron Fluence at EOL | Unirad. USE | Method of Determin. Unirad. USE |
|------------------------------------|------------------------------------|--------------------------|---------------|-----------------|-----------------------------|-------------|---------------------------------|
| Palo Verde 2 EOL: 12/9/2025 | Lower Shell F-773-1 | 64071-1 | SA 533B-1 | 82 | 1.91E19 | 105 | Direct |
| | Lower Shell F-773-2 | 64065-1 | SA 533B-1 | 99 | 1.91E19 | 127 | Direct |
| | Lower Shell F-773-3 | 63987-1 | SA 533B-1 | 100 | 1.91E19 | 129 | Direct |
| | Int. shell F-765-4 | 63427-1 | SA 533B-1 | 90 | 1.681E19 | 114 | Direct |
| | Int. shell F-765-5 | 63464-1 | SA 533B-1 | 95 | 1.681E19 | 121 | Direct |
| | Int. shell F-765-6 | 63716-1 | SA 533B-1 | 99 | 1.681E19 | 126 | Direct |
| | Int. shell axial welds 101-124A/C | 89833 flux 0091/0951 | | 79 | 1.681E19 | 100 | Direct |
| | Lower shell axial welds 101-142A/C | 3P7317 flux 0091/0662 | | 76 | 1.91E19 | 100 | Direct |
| | Circ. weld 101-171 | 4P7869 flux 0124/0871 | | 75 | 1.681E19 | 95 | Direct |

References:

Fluence and IRT_{ndt} data are from January 31, 1989, letter from D. B. Karner (APS) to USNRC Document Control Desk, subject: Palo Verde Nuclear Generating Station (PVNGS) Units 1, 2, and 3, Generic Letter 88-11, Radiation Embrittlement of Reactor Vessel Materials.

Information on plate and weld material types is from FSAR; plate USE data are from Table 5.2-5A of FSAR, and weld USE values are from Charpy curves of FSAR

PV-2 Summary File for Pressurized Thermal Shock

| Plant Name | Baseline Ident. | Heat No. Ident. | ID Neut. Fluence at EOL | IRT _{ndt} | Method of Determin. IRT _{ndt} | Chemistry Factor | Method of Determin. CF | %Cu | %Ni |
|------------------------------------|------------------------------------|-----------------------|-------------------------|--------------------|--|------------------|------------------------|------|------|
| Palo Verde 2 EOL: 12/9/2025 | Lower shell F-773-1 | 64071-1 | 3.29E19 | 10°F | Plant Specific | 20 | Table | 0.03 | 0.67 |
| | Lower shell F-773-2 | 64065-1 | 3.29E19 | 0°F | Plant Specific | 26 | Table | 0.04 | 0.64 |
| | Lower shell F-773-3 | 63987-1 | 3.29E19 | -60°F | Plant Specific | 31 | Table | 0.05 | 0.66 |
| | Int. shell F-765-4 | 63427-1 | 3.29E19 | -20°F | Plant Specific | 20 | Table | 0.03 | 0.67 |
| | Int. shell F-765-5 | 63464-1 | 3.29E19 | 10°F | Plant Specific | 20 | Table | 0.03 | 0.65 |
| | Int. shell F-765-6 | 63716-1 | 3.29E19 | 10°F | Plant Specific | 26 | Table | 0.04 | 0.67 |
| | Int. shell axial welds 101-124A/C | 89833 flux 0091/0951 | 3.29E19 | -60°F | Plant Specific | 34 | Table | 0.06 | 0.04 |
| | Lower shell axial welds 101-142A/C | 3P7317 flux 0091/0662 | 3.29E19 | -80°F | Plant Specific | 44 | Table | 0.09 | 0.04 |
| | Circ. weld 101-171 | 4P7869 flux 0124/0871 | 3.29E19 | -30°F | Plant Specific | 27 | Table | 0.03 | 0.07 |

References:

Fluence and IRT_{ndt} data are from January 31, 1989, letter from D. B. Karner (APS) to USNRC Document Control Desk, subject Palo Verde Nuclear Generating Stations (PVNGS) Units 1, 2 and 3, Generic Letter 88-11, Radiation Embrittlement of Reactor Vessel Materials

Weld chemical composition values are averages from data in the first reference and data from FSAR.

PV-3 Summary File for Upper Shelf Energy

| Plant Name | Beltline Ident. | Heat No. | Material Type | 1/4T USE at EOL | 1/4T Neutron Fluence at EOL | Unirrad. USE | Method of Determin. Unirrad. USE |
|------------------------------------|------------------------------------|-----------------------|---------------|-----------------|-----------------------------|--------------|----------------------------------|
| Palo Verde 3 EOL: 3/25/2027 | Lower Shell F-6411-1 | 79545-1 | SA 533B-1 | 122 | 1.91E19 | 156 | Direct |
| | Lower Shell F-6411-2 | 79745-1 | SA 533B-1 | 87 | 1.91E19 | 111 | Direct |
| | Lower Shell F-6411-3 | 79659-1 | SA 533B-1 | 83 | 1.91E19 | 107 | Direct |
| | Int. shell F-6407-4 | 65202-1 | SA 533B-1 | 101 | 1.681E19 | 129 | Direct |
| | Int. shell F-6407-5 | 65219-1 | SA 533B-1 | 90 | 1.681E19 | 114 | Direct |
| | Int. shell F-6407-6 | 79011-1 | SA 533B-1 | 105 | 1.681E19 | 133 | Direct |
| | Int. shell axial welds 101-124A/C | 4P7869 flux 0124/0171 | Linde 124 SAW | 79 | 1.681E19 | 100 | Direct |
| | Lower shell axial welds 101-142A/C | 4P7869 flux 0124/0281 | Linde 124 SAW | 78 | 1.91E19 | 100 | Direct |
| | Circ. weld 101-171 | 4P7869 flux 0124/1061 | Linde 124 SAW | 71 | 1.681E19 | 90 | Direct |

References:

Fluence and IRT_{ndt} data are from January 31, 1989, letter from D. B. Karner (APS) to USNRC Document Control Desk, subject: Palo Verde Nuclear Generating Station (PVNGS) Units 1, 2, and 3, Generic Letter 88-11, Radiation Embrittlement of Reactor Vessel Materials.

Information on plate and weld material types is from FSAR; plate LUSE data are from Table 5.2-5B of FSAR, and weld LUSE values are from Charpy curves of FSAR

PV-3 Summary File for Pressurized Thermal Shock

| Plant Name | Baseline Ident. | Heat No. Ident. | ID Neut. Fluence at EOL | IRT _{ndt} | Method of Determin. IRT _{ndt} | Chemistry Factor | Method of Determin. CF | %Cu | %Ni |
|------------------------------------|------------------------------------|-----------------------|-------------------------|--------------------|--|------------------|------------------------|------|------|
| Palo Verde 3 EOL: 3/25/2027 | Lower shell F-6411-1 | 79545-1 | 3.29E19 | -40°F | Plant Specific | 26 | Table | 0.04 | 0.64 |
| | Lower shell F-6411-2 | 79745-1 | 3.29E19 | 0°F | Plant Specific | 26 | Table | 0.04 | 0.65 |
| | Lower shell F-6411-3 | 79659-1 | 3.29E19 | -60°F | Plant Specific | 26 | Table | 0.04 | 0.66 |
| | Int. shell F-6407-4 | 65202-1 | 3.29E19 | -30°F | Plant Specific | 26 | Table | 0.04 | 0.62 |
| | Int. shell F-6407-5 | 65219-1 | 3.29E19 | -20°F | Plant Specific | 31 | Table | 0.05 | 0.61 |
| | Int. shell F-6407-6 | 79011-1 | 3.29E19 | -20°F | Plant Specific | 26 | Table | 0.04 | 0.61 |
| | Int. shell axial welds 101-124A/C | 4P7869 flux 0124/0171 | 3.29E19 | -50°F | Plant Specific | 26 | Table | 0.03 | 0.06 |
| | Lower shell axial welds 101-142A/C | 4P7869 flux 0124/0281 | 3.29E19 | -50°F | Plant Specific | 31 | Table | 0.04 | 0.07 |
| | Circ. weld 101-171 | 4P7869 flux 0124/1061 | 3.29E19 | -70°F | Plant Specific | 34 | Table | 0.05 | 0.07 |

References:

Fluence and IRT_{ndt} data are from January 31, 1989, letter from D. B. Karner (APS) to USNRC Document Control Desk, subject Palo Verde Nuclear Generating Stations (PVNGS) Units 1, 2 and 3, Generic Letter 88-11, Radiation Embrittlement of Reactor Vessel Materials

Weld chemical composition values are averages from data in the first reference and data from FSAR.

