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SUBJECT: Forwards response to 980330 RAI re RPV integrity at PVNGS.
 Best-estimate chemistry data provided in CEOG rept CE
 NPSD-1039, Rev 2, did not change most-limiting matl or have
 significant effect on welds of PVNGS RPVs.

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Generic Letter 92-01
102-04139-JML/SAB/RMW
June 24, 1998

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

Dear Sirs:

**Subject: Palo Verde Nuclear Generating Station (PVNGS)
Units 1, 2 and 3
Docket Nos. STN 50-528/529/530
Response to Request for Additional Information Regarding Reactor
Pressure Vessel Integrity at Palo Verde Nuclear Generating Station**

Enclosure 1 provides the additional information regarding reactor pressure vessel integrity at the Palo Verde Nuclear Generating Station that was requested in your letter to Arizona Public Service Company (APS) dated March 30, 1998. As stated in the Enclosure, the best-estimate chemistry data provided in the Combustion Engineering Owners Group (CEOG) Report, CE NPSD-1039, Revision 2, "Best Estimate Copper and Nickel Values in CE Fabricated Reactor Vessel Welds", did not change the most-limiting material or have a significant effect on the welds of the PVNGS reactor pressure vessels. *11/* *ADD*

This letter does not make any commitments to the NRC. Please contact Mr. Scott Bauer at (602) 393-5978 if you have any questions or would like additional information regarding this matter.

Sincerely,

Chegg R. Overlund
for JML

Enclosure

300034

JML/SAB/RMW/rjh

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ENCLOSURE 1

**Response to Request for Additional Information
Regarding Reactor Pressure Vessel Integrity at Palo
Verde Nuclear Generating Station**



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NRC Request 1

(Please refer to NRC letter to APS, "Request for Additional Information regarding Reactor Vessel Integrity at Palo Verde Nuclear Generating Station (TAC Nos. MA0561, MA0562 and MA0563), dated March 30, 1998 for a full description of the requested information.)

Based on this information, in accordance with the provisions of Generic Letter 92-01, Revision 1, Supplement 1, the NRC requests the following:

1. An evaluation of the information in the reference above and an assessment of its applicability to the determination of the best-estimate chemistry for all of your RPV beltline welds. Based upon this reevaluation, supply the information necessary to completely fill out the data requested in Table 1 for each RPV beltline weld material. Also provide a discussion for the copper and nickel values chosen for each weld wire heat noting what heat-specific data were included and excluded from the analysis and the analysis method chosen for determining the best-estimate. If the limiting material for your vessel's PTS/PT limits evaluation is not a weld, include the information requested in Table 1 for the limiting material also. Furthermore, you should consider the information provided in Section 2.0 of this RAI on the use of surveillance data when responding.

APS Response

APS has reviewed the data submitted under CEOG report, CE NPSD-1039, Revision 2, "Best Estimate Copper and Nickel Values in CE Fabricated Reactor Vessel Welds." The best-estimate chemistry data for the PVNGS reactor pressure vessel weld heats were reviewed for any potential impact on the current design basis assessments for reactor pressure vessel structural integrity and to ensure continued compliance with 10 CFR 50.60, 10 CFR 50.61 and 10 CFR 50 Appendices G and H. The PVNGS-specific data provided in this report were also reviewed to identify any potential impact to the current low-temperature over-pressure (LTOP) limits and pressure-temperature (PT) limits for the PVNGS reactor pressure vessels.

Table 1 lists current PVNGS-reported data for reactor pressure vessel beltline welds for nickel (Ni), copper (Cu), and the corresponding chemistry factor (CF), as listed in the NRC Reactor Vessel Industry Database (RVID). This information was provided to the NRC in previous APS submittals. Table 1 also lists the recommended best-estimate chemistry for Ni and Cu, and corresponding heat numbers for the PVNGS reactor pressure vessel welds from Table 6.1 of CEOG report, CE NPSD-1039, Revision 2, and represents the preferred simple mean or weighted mean chemistry value for that heat. This CEOG report does not address base metal chemistry. APS calculated new CFs

using the same methodology that was utilized for the previous CF calculations. These calculations were performed using the best-estimate chemistry data values for Ni and Cu that were provided in this CEOG report, with the exception that the new values for Cu were rounded off as appropriate for these calculations. The new CFs are listed in Table 1.

As shown in the table, the best-estimate chemistry values for Cu from this CEOG report are lower than, or equivalent to, the previous Cu values submitted by APS to the NRC. Therefore, there was no impact on the PVNGS reactor pressure vessel beltline welds end-of-life (EOL) upper shelf energy (USE) predictions (reference Reg. Guide 1.99, Revision 2, Section 1.2) as a result of this new information. Since the new best-estimate data did not affect the results of the previous analyses for the reactor pressure vessel beltline welds, the most limiting material continues to be Unit 1 intermediate shell plate material, M-6701-1, which has an EOL USE of 65 ft-lbs at 1/4t. The chemistry data previously submitted by APS for this material is considered to be valid and is based on certified material test reports data.

As stated previously, APS has calculated new chemistry factors based on the best-estimate data for Ni and Cu that were provided in CEOG report, CE NPSD-1039, Revision 2. The results from these calculations have determined that the CFs are lower for all but three welds. An assessment of the change in CFs on the adjusted reference temperature (ART) calculations for these non-limiting welds is illustrated in Table 2. For comparison, information regarding the current limiting reactor pressure vessel material for PVNGS is also provided in this Table. Comparing the most limiting material to the revised values for ART and un-irradiated USE of the affected welds demonstrate that the Unit 1 intermediate shell plate continues to be the most limiting material for the PVNGS reactor pressure vessels.

Table 1. Palo Verde Reactor Vessel Chemistry Data

| Unit/Seam No. | Heat Number (Note 1, Page 4) | NRC Reactor Vessel Industry Database Ni Value | NRC Reactor Vessel Industry Database Cu Value | CENPSD -1039, Rev. 2 Table 6.1 Ni Value | CENPSD -1039, Rev. 2 Table 6.1 Cu Value | NRC Reactor Vessel Industry Database Chemistry Factor | APS-Calculated New Chemistry Factor (Note 2, Page 4) |
|---|---------------------------------|---|---|---|---|---|--|
| UNIT 1 INTERMEDIATE SHELL AXIAL WELDS 101-124 A,B,C | 4P6052 | 0.03 | 0.07 | 0.049 | 0.047 | 35.45 | 31.64 |
| UNIT 1 CIRCUMFERENTIAL WELD 101-171 | 4P7869 | 0.07 | 0.05 | 0.096 | 0.031 | 34.05 | 28.24 |
| UNIT 1 LOWER SHELL AXIAL WELDS 101-142 A,B,C | 90071 | 0.04 | 0.04 | 0.079 | 0.035 | 27.8 | 31.05 |
| UNIT 2 INTERMEDIATE SHELL AXIAL WELDS 101-124 A,B,C | 89833 | 0.04 | 0.06 | 0.059 | 0.046 | 33.6 | 32.79 |
| UNIT 2 CIRCUMFERENTIAL WELD 101-171 | 4P7869 | 0.07 | 0.03 | 0.096 | 0.031 | 26.55 | 28.24 |
| UNIT 2 LOWER SHELL AXIAL WELDS 101-142 A,B,C | 3P7317 | 0.04 | 0.09 | 0.067 | 0.074 | 44.20 | 43.37 |
| UNIT 3 INTERMEDIATE SHELL AXIAL WELDS 101-124 A,B,C | 4P7869 | 0.06 | 0.03 | 0.096 | 0.031 | 25.9 | 28.24 |
| UNIT 3 CIRCUMFERENTIAL WELD 101-171 | 4P7869 | 0.07 | 0.05 | 0.096 | 0.031 | 34.05 | 28.24 |
| UNIT 3 LOWER SHELL AXIAL WELDS 101-142 A,B,C | 4P7869 | 0.07 | 0.04 | 0.096 | 0.031 | 30.65 | 28.24 |

Table 2 - Assessment of Increased CFs on Adjusted Reference Temperature

| Weld Identification | Heat Number | NRC Reactor Vessel Industry Database ART | Calculated ART Using New CFs per Reg. Guide 1.99, Rev. 2 | Un-Irradiated USE |
|--|-------------|--|---|-------------------|
| UNIT 1 LOWER SHELL AXIAL WELDS 101-142 A,B,C | 90071 | 32.98 | 37.25 | 140 |
| UNIT 2 CIRCUMFERENTIAL WELD 101-171 | 4P7869 | 39.66 | 41.88 | 95 |
| UNIT 3 INTERMEDIATE SHELL AXIAL WELDS 101-124 A,B,C | 4P7869 | 18.19 | 21.03 | 100 |
| LIMITING MATERIAL - UNIT 1 INTERMEDIATE SHELL PLATE M-6701-1 | NA/PL-A | 61.73 | N/A | 83 |

Notes to Table 1:

1. The heat numbers provided in this Table for the beltline welds may not coincide with the heat numbers provided in the Reactor Vessel Industry Database. Please update the RVID as appropriate to reflect the revised heat numbers.
2. New CF calculated using the best-estimate chemistry data from CE NPSD-1039, Revision 2. The value for Cu was rounded off, as appropriate, for this calculation.

Notes to Table 2:

None

NRC Request 2

(Please refer to NRC letter to APS, "Request for Additional Information regarding Reactor Vessel Integrity at Palo Verde Nuclear Generating Station (TAC Nos. MA0561, MA0562 and MA0563), dated March 30, 1998 for a full description of the requested information.)

Based on this information and consistent with the provisions of Generic Letter 92-01, Revision 1, Supplement 1, the NRC requests the following:

2. that (1) the information listed in Table 2, Table 3, and the chemistry factor from the surveillance data be provided for each heat of material for which surveillance weld data are available and a revision in the RPV integrity analyses (i.e., current licensing basis) is needed or (2) a certification that previously submitted evaluations remain valid. Separate tables should be used for each heat of material addressed. If the limiting material for your vessel's PTS/PT limits evaluation is not a weld, include the information requested in the tables for the limiting material (if surveillance data are available for this material).

APS Response

APS does not currently utilize reactor vessel surveillance data as a consideration in evaluating LTOP limits, PT limits or pressurized thermal shock (PTS) calculations. Therefore, the best-estimate chemistry data presented in the CEOG Report, CE NPSD-1039, Revision 2, as it pertains to reactor pressure vessel surveillance specimens, do not apply to these limits or calculations.

Based on APS review of the information provided in CEOG report CE NPSD-1039, Revision 2, APS hereby certifies that the limiting material for the PVNGS reactor pressure vessels has not changed and that the previously submitted calculations for PTS and PT limits remain valid.

NRC Request 3

(Please refer to NRC letter to APS, "Request for Additional Information regarding Reactor Vessel Integrity at Palo Verde Nuclear Generating Station (TAC Nos. MA0561, MA0562 and MA0563), dated March 30, 1998 for a full description of the requested information.)

3. If the limiting material for your plant changes or if the adjusted reference temperature for the limiting material increases as a result of the above evaluations, provide the revised RT_{PTS} value for the limiting material in accordance with 10 CFR 50.61. In addition, if the adjusted RT_{NDT} value increased, provide a schedule for revising the PT and LTOP limits. The schedule should ensure that compliance with 10 CFR 50 Appendix G is maintained.

APS Response

The limiting material for the PVNGS reactor pressure vessels has not changed. As stated in the APS response to NRC Request 2, the previously submitted calculations for determining LTOP and PT limits remain valid.

Summary

As shown above, APS considered the best-estimate chemistry data presented in the CEOG report, CE NPSD-1039, Revision 2, "Best Estimate Copper and Nickel Values in CE Fabricated Reactor Vessel Welds" as it pertains to the structural integrity of the PVNGS reactor pressure vessels. Of the nine weld locations that were potentially affected by the best-estimate chemistry data provided in the CEOG report, six weld locations were determined to have lower corresponding CFs. Therefore, the current data, as listed in the RVID, for these welds remains valid and is conservative. The three weld locations that have slightly higher calculated CFs remain non-limiting with respect to the PVNGS reactor pressure vessels. The EOL USE values for these welds were not affected by the updated chemistry data provided in the CEOG report. Therefore, the most limiting material for the PVNGS reactor pressure vessels continues to be the Unit 1 intermediate shell plate, M-6701-1.

APS concludes that the information provided in CEOG report, CE NPSD-1039, Revision 2, did not significantly impact the current APS design basis calculations and assessments for reactor vessel structural integrity, nor did it affect the previously submitted calculations for LTOP or PT limits. The calculations for LTOP and PT limits are based on the most-limiting material for the PVNGS reactor pressure vessels, which is Unit 1 intermediate shell plate, M-6701-1. This material remains limiting after considering the data provided in the CEOG report for best-estimate weld chemistries. In addition, the information provided in this CEOG report did not affect PVNGS compliance with 10 CFR 50.60, 10 CFR 50.61, and 10 CFR 50 Appendices G and H. No revisions to the RVID, other than revising the heat numbers for the beltline welds as shown in Table 1, are required for the PVNGS reactor pressure vessel data.

