ORDER EA-03-009
CAL No. NRR-07-004

Palo Verde Nuclear Generating Station

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102-05747-DWM/RJR
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ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Dear Sirs:

Subject: Palo Verde Nuclear Generating Station (PVNGS)
Unit 1
Docket No. STN 50-528
APS's 60-Day after Plant Restart Letter in Response to First Revised NRC Order EA-03-009, Item IV.E and Confirmatory Action Letter, NRR-07-004, Dated March 15, 2007 – U1R13

By letter dated February 20, 2004, the NRC issued to Arizona Public Service Company (APS) the First Revised NRC Order EA-03-009. Item IV.E of EA-03-009 requested that a 60-day report detailing the inspection results of the reactor pressure vessel (RPV) head be submitted to the NRC upon returning each unit to operation.

The enclosure to this letter contains the following requested information for Unit 1's thirteenth refueling outage (U1R13).

- Inspection results for each inspection required by Paragraph C of the Order.
- Inspection results for each inspection required by Paragraph D of the Order.

By letter dated March 15, 2007, the NRC issued to APS a Confirmatory Action Letter (CAL) for PVNGS Units 1, 2, and 3. The CAL confirmed commitments made by APS regarding Alloy 82/182 butt welds on the Palo Verde pressurizers.

This letter is notifying the NRC that the commitments regarding enhanced reactor coolant system (RCS) leakage monitoring frequency, action levels, and actions described in APS letter 102-05643, dated February 16, 2007 (ADAMS Accession No. ML070590212), and docketed APS e-mail dated February 21, 2007 (ADAMS Accession No. ML070660365), were implemented at PVNGS in procedure 40ST-9RC02, Revision 41, on February 20, 2007.

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This letter is also notifying the NRC that the commitment made in APS letter 102-05640, dated January 31, 2007 (ADAMS Accession No. ML070430378), regarding the mitigation of the Palo Verde Unit 1 pressurizer Alloy 82/182 butt welds was completed during U1R13 and post mitigation inspections were performed. The results of these inspections were initially reported to the NRC Project Manager in an e-mail dated June 21, 2007, within 14 days of completion of the overlays as required by the stated action in APS letter 102-05641, dated February 08, 2007 (ADAMS Accession No. ML070470525). This information is repeated below as required by our commitment in APS letter 102-05640.

The seven full-structural weld overlays (FSWOL) on Palo Verde Unit 1 (six pressurizer and one hot leg surge nozzles) were examined using the liquid penetrant (PT) and phased array ultrasonic examination (UT) methods.

On three of the four pressurizer safety valve nozzles, the PT examination revealed shallow, transverse linear indications, which were less than 1/8 inch long at the toe of the FSWOL on the side of the stainless steel safe-end. These indications were removed by grinding without violating minimum wall thickness. No additional welding was required. The fourth pressurizer safety valve nozzle was found acceptable. The PT examinations of the pressurizer spray and surge nozzles and the hot leg surge nozzle were acceptable and therefore, no repairs were needed.

The UT examination of all seven FSWOLs found no recordable indications.

As a result of the completion of the mitigation of the Palo Verde Unit 1 pressurizer Alloy 82/182 butt welds discussed above, APS has satisfied the commitment to mitigate these welds and is no longer performing enhanced RCS leakage monitoring in Palo Verde Unit 1.

APS completed the Palo Verde Unit 1 thirteenth refueling outage on July 19, 2007. No new commitments are being made to the NRC by this letter. Should you have any questions, please contact Glenn A. Michael at (623) 393-5750.

Sincerely,

DCM/TNW/RJR/gt

Enclosure: Palo Verde Unit 1 60-day after Outage Report for the Thirteenth Refueling Outage

Enclosure

Palo Verde Unit 1 60-day after Outage Report for the Thirteenth Refueling Outage

First Revised NRC Order EA-03-009

At the start of the Palo Verde Unit 1 thirteenth refueling outage (U1R13) in the spring of 2007, the effective degradation years (EDY) were calculated as 14.02 EDY, which places Palo Verde Unit 1 reactor pressure vessel (RPV) head in the high susceptibility category.

First Revised NRC Order EA-03-009 Section IV.C.(1) states:

For those plants in the High Susceptibility category, RPV head and head penetration nozzle inspections shall be performed using the techniques of paragraph IV.C.(5)(a) and paragraph IV.C.(5)(b) every refueling outage.

IV.C.(5)(a) Bare metal visual examination of 100 percent of the RPV head surface (including 360° around each RPV head penetration nozzle). For RPV heads with the surface obscured by support structure interferences which are located at RPV head elevations downslope from the outermost RPV head penetration, a bare metal visual inspection of no less than 95 percent of the RPV head surface may be performed provided that the examination shall include those areas of the RPV head upslope and downslope from the support structure interference to identify any evidence of boron or corrosive product. Should any evidence of boron or corrosive product be identified, the licensee shall examine the RPV head surface under the support structure to ensure that the RPV head is not degraded.

(b) For each penetration, perform a nonvisual NDE in accordance with either (i), (ii) or (iii):

(i) Ultrasonic testing of the RPV head penetration nozzle volume (i.e., nozzle base material) from 2 inches above the highest point of the root of the J-groove weld (on a horizontal plane perpendicular to the nozzle axis) to 2 inches below the lowest point at the toe of the J-groove weld on a horizontal plane perpendicular to the nozzle axis (or the bottom of the nozzle if less than 2 inches [see Figure IV-1]); OR from 2 inches above the highest point of the root of the J-groove weld (on a horizontal plane perpendicular to the nozzle axis) to 1.0-inch below the lowest point at the toe of the J-groove weld (on a horizontal plane perpendicular to the nozzle axis) and including all RPV head penetration nozzle surfaces below the J-groove weld that have an operating stress level (including all residual and normal operation stresses) of 20 ksi tension and greater (see Figure IV-2). In addition, an assessment shall be made to determine if leakage has occurred into the annulus between the RPV head penetration nozzle and the RPV head low-alloy steel.

(ii) Eddy current testing or dye penetrant testing of the entire wetted surface of the J-groove weld and the wetted surface of the RPV head penetration nozzle base material from at least 2 inches above the highest point of the root of the J-groove weld (on a horizontal plane perpendicular to the nozzle axis) to 2 inches below the lowest point at the toe of the J-groove weld on a horizontal plane perpendicular to the nozzle axis (or the bottom of the nozzle if less than 2 inches [see Figure IV-3]); OR from 2 inches above the highest point of the root of the J-groove weld (on a horizontal plane perpendicular to the nozzle axis) to 1.0-inch below the lowest point at the toe of the J-groove weld (on a horizontal plane perpendicular to the nozzle axis) and including all RPV head penetration nozzle surfaces below the J-groove weld that have an operating stress level (including all residual and normal operation stresses) of 20 ksi tension and greater (see Figure IV-4).

(iii) A combination of (i) and (ii) to cover equivalent volumes, surfaces and leak paths of the RPV head penetration nozzle base material and J-groove weld as described in (i) and (ii). Substitution of a portion of a volumetric exam on a nozzle with a surface examination may be performed with the following requirements:

1. On nozzle material below the J-groove weld, both the outside diameter and inside diameter surfaces of the nozzle must be examined.

2. On nozzle material above the J-groove weld, surface examination of the inside diameter surface of the nozzle is permitted provided a surface examination of the J-groove weld is also performed.

IV.C.(5)(a) Bare Metal Visual Examination Results

This examination was conduced in accordance with the requirements of the First Revised Order with no relaxations. A visual examination of the "bare-metal" surface of the reactor head found no evidence of boron or corrosive product. No cleaning of the RPV head was necessary during U1R13.

IV.C.(5)(b) Nonvisual Nondestructive Examination (NDE) Results:

Nonvisual NDE was performed in accordance with the requirements of the First Revised NRC Order EA-03-009 Section IV.C.(5)(b) and approved relaxations and commitments. The results are as follows:

First Revised NRC Order EA-03-009

Reactor Head Vent Nozzle:

The head vent nozzles at Palo Verde do not protrude below the surface of the RPV head and as a result, there is no material below the J-groove weld to be examined. The results of the examinations were acceptable with no detectable defects.

Control Element Drive Mechanisms (CEDM):

All 97 CEDM nozzles were examined in accordance with Order requirement IV.C (5)(b). Although all 97 CEDM nozzles examination results were satisfactory, four nozzles (15, 47, 48, and 64) had additional examinations performed as a result of areas of interest identified during the exams.

To reconcile these areas of interest, confirmation was performed in several steps. First, ultrasonic examinations (UT) results were compared to prior historical data. Next, an eddy current test (ECT) on the outer diameter in the areas of interest of the four nozzles was performed. Then an ECT was performed on the associated J-groove welds in those areas.

The ECT scans resulted in three nozzles (15, 47 and 64) with indications none of which were crack like (PWSCC). Nozzle 48 had no indications and was deemed acceptable. However, on two of the nozzles (47 and 64) the ECT indications appeared to be aligned with the initial UT indication at the J-groove welds. On nozzle 15, the ECT was determined to be geometric in nature and acceptable.

As a result of these observations, a dye penetrant test (PT) was performed on the J-groove welds in the specified areas of nozzles 47 and 64. Nozzle 47 results were negative, with no indications noted and determined acceptable. Nozzle 64 had three rounded indications.

On nozzle 64, one of the rounded indications confirmed the ECT results and was determined to be acceptable. The size of the other two indications was recorded as 1/32" and 1/8" rounded. This is less than the ASME Code allowable of 3/16" and minor grinding performed on the rounded indications did not reveal any linear indications. These two indications were determined to be acceptable.

First Revised NRC Order EA-03-009 Section IV.D. states:

During each refueling outage, visual inspections shall be performed to identify potential boric acid leaks from pressure-retaining components above the RPV head. For any plant with boron deposits on the surface of the RPV head or related insulation, discovered either during the inspections required by this Order or otherwise and regardless of the source of the deposit, before returning the plant to operation the Licensee shall perform inspections of the affected RPV head surface and penetrations

appropriate to the conditions found to verify the integrity of the affected area and penetrations.

First Revised NRC Order EA-03-009 Section IV.D. Results:

APS personnel performed a Boric Acid Walkdown (BAW) for the U1R13 refueling outage. Potential boric acid leak sites from pressure retaining components above the RPV Head were examined using PVNGS procedure 70TI-9ZC01, Boric Acid Corrosion Prevention Program. No new boric acid leak sites were found at the start of the outage. The previously identified leak sites listed below were found to be not active and no carbon steel was affected.

- CEDM Versa Vents 5, 11, 26, 81, 88 and valve RC-V212 were previously reported under Special Report 1-SR-2006-002, APS letter 102-05551, dated August 22, 2006 (ADAMS Accession No. ML062430321).

- CEDM Versa Vents 1, 13, 14, 75 and 83 were previously reported under Special Report 1-SR-2006-003, APS letter 102-05608, dated December 08, 2006 (ADAMS Accession No. ML063530681).

The Versa Vent locations listed above were reworked during this outage (U1R13). However, after filling and venting of the CEDMs at the end of the outage, CEDM Versa Vent 75 was found to have a dried boric acid indication. The Versa Vent was inspected. The leak was not active and all of the leakage/boric acid residue stayed in the immediate area of the Versa Vent (the leakage/boric acid residue did not make it down to the reactor head or related insulation). No carbon steel was affected and the dry residue was cleaned.

Since no carbon steel was affected and this site was not an active leak, there is no non-conforming condition. Palo Verde Action Request (PVAR) 3039444 was initiated which resulted in corrective maintenance work order (CMWO) 3039450 being initiated to rework Versa Vent 75 at the next available opportunity during a Palo Verde Unit 1 outage.