



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS  
WASHINGTON, DC 20555 - 0001**

March 1, 2011

The Honorable Gregory B. Jaczko  
Chairman  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555-0001

**SUBJECT: REPORT ON THE SAFETY ASPECTS OF THE LICENSE RENEWAL  
APPLICATION FOR THE PALO VERDE NUCLEAR GENERATING STATION**

Dear Chairman Jaczko:

During the 580<sup>th</sup> meeting of the Advisory Committee on Reactor Safeguards (ACRS), February 10-12, 2011, we completed our review of the license renewal application (LRA) for the Palo Verde Nuclear Generating Station, Units 1, 2, and 3 (PVNGS) and the final Safety Evaluation Report (SER) prepared by the NRC staff. Our Plant License Renewal subcommittee also reviewed this matter during its meeting on September 8, 2010. During these reviews, we met with representatives of the NRC staff, Arizona Public Service Company (APS or the applicant), and a member of the public. We also had the benefit of the documents referenced. This report fulfills the requirement of 10 CFR 54.25 that the ACRS review and report on all license renewal applications.

**CONCLUSION AND RECOMMENDATION**

1. The programs established and committed to by the applicant to manage age-related degradation provide reasonable assurance that the PVNGS units can be operated in accordance with their licensing bases for the period of extended operation without undue risk to the health and safety of the public.
2. The application for the renewal of the operating licenses of the PVNGS units should be approved.

**BACKGROUND AND DISCUSSION**

PVNGS is located approximately 26 miles west of Phoenix, Arizona. The site consists of three pressurized water reactors of Combustion Engineering (CE) design with dry ambient containments. Each of the PVNGS units utilizes a System 80 nuclear steam supply system provided by CE. Each unit operates at a licensed power output of 3,990 megawatt-thermal. APS requested renewal of the PVNGS licenses for 20 years beyond the current license terms,

which expire on June 1, 2025 (Unit 1), April 24, 2026 (Unit 2), and November 25, 2027 (Unit 3). In the final SER, the staff documented their review of the license renewal application and other information submitted by the applicant or obtained during three staff audits and a two-week inspection conducted at the plant site. The staff reviewed the completeness of the applicant's identification of structures, systems, and components (SSCs) that are within the scope of license renewal; the integrated plant assessment process; the applicant's identification of the plausible aging mechanisms associated with passive, long-lived components; the adequacy of the applicant's Aging Management Programs (AMPs); and the identification and assessment of time-limited aging analyses (TLAAs) requiring review.

The applicant identified the SSCs that fall within the scope of license renewal and performed an aging management review for these SSCs. The applicant will implement 40 AMPs for license renewal. These include 29 existing programs and 11 new programs. Of the existing programs, nine AMPs are consistent with guidance in Revision 1 of the Generic Aging Lessons Learned (GALL) Report, five are consistent with exceptions, ten are consistent with enhancements, four are consistent with both enhancements and exceptions, and one is plant-specific. We reviewed the plant-specific programs and the AMP exceptions to the GALL Report.

The applicant identified the systems and components requiring TLAAs and reevaluated them for the period of extended operation. The staff concluded that the applicant has provided an acceptable list of TLAAs, as defined in 10 CFR 54.3. Furthermore, the staff concluded that in all cases the applicant has met the requirements for TLAAs specified in 10 CFR 54.3. We concur with the staff's conclusions that the TLAAs have been properly identified and that the required criteria will be met for the period of extended operation.

The staff conducted three audits and one inspection at PVNGS. The audits verified the appropriateness of the aging management review, scoping and screening methodology, and associated AMPs. The inspection examined the scoping and screening of non-safety related SSCs and verified the adequacy of the guidance, documentation, and implementation of selected AMPs. The audit and inspection teams also performed independent examinations of PVNGS condition reports to confirm that plant-specific operating experience was addressed during the AMP development and implementation processes. Based on the audits and inspections, the staff concluded in the final SER that the proposed activities will adequately manage the aging of SSCs identified in the application and that the intended functions of these SSCs will be maintained during the period of extended operation. We agree with these conclusions.

Following issuance of the draft SER with open items, the applicant submitted additional commitments that expand the scope and/or the means to detect aging effects in several license renewal programs. Among the most significant are those summarized below.

In response to issues identified during the staff's review of the Enhanced Fatigue Aging Management Program, the applicant improved the originally proposed program to track the number of occurrences for comparison to the plant's design basis transients.

The applicant provided a summary of licensing and design information in the LRA and modified its Technical Specifications (TS) to include an administrative program that provides controls to assure that components are maintained within design limits. The staff concluded that the applicant's Component Cycle and Transient Limit Program will be properly described in the applicable Updated Final Safety Analysis Report and TS sections.

The staff has identified industry operating experience which indicates that power cables energized to 480V and higher can experience failures where extended exposure to moisture is a contributing factor. The Inaccessible Medium Voltage Cable Program described in Revision 1 of the GALL Report does not recommend testing for inaccessible cables energized to less than 2kV and does not require testing of inaccessible cables that are not normally energized. The applicant has addressed the staff's concerns by expanding the scope of the Medium Voltage Power Cable Program to include all inaccessible 480V to 2kV power cables, whether energized or not. This expanded scope of cable monitoring is consistent with Revision 2 of the GALL Report.

The staff has concluded that external visual inspections do not provide adequate assurance that cracks are not present at the internal radius of socket welds in Class 1 small bore piping systems. There are currently no approved industry standard methods or qualified techniques to perform volumetric examinations of these welds. The applicant has experienced cracking in two small bore socket welds. In addition to visual inspections, the applicant will enhance the One-Time Inspection Program by committing to perform volumetric examinations of 10 percent of the Class 1 socket welds, up to a maximum of 25 welds for each unit (75 total), prior to the start of the period of extended operation. The applicant will use ultrasonic testing techniques.

The staff has noted a number of recent industry events involving leakage from buried and underground piping and tanks within the scope of license renewal. Buried steel piping is coated, and recent inspections of excavated fire protection and diesel generator fuel oil piping demonstrate that coatings are in very good condition, with appropriate backfill. The applicant has committed to continue to periodically inspect components in soil. The applicant will maintain the availability of cathodic protection of the buried portions of the in-scope buried piping at least 90 percent of the time. Surveys of cathodic protection, consistent with guidance from the National Association of Corrosion Engineers, will be conducted at least annually during the period of extended operation. Visual inspections of in scope piping in a soil environment will be performed each 10 year period starting 10 years prior to the period of extended operation. At least two inspections of stainless steel piping will be conducted at each unit for piping that is not cathodically protected. The staff has concluded that with these enhancements, the proposed programs will adequately monitor and manage the aging of buried piping and tanks.

We agree with the staff that there are no issues related to the matters described in 10 CFR 54.29(a)(1) and (a)(2) that preclude renewal of the operating licenses for PVNGS Units 1, 2, and 3. The programs established and committed to by the applicant provide reasonable assurance that PVNGS can be operated in accordance with their current licensing bases for the period of extended operation without undue risk to the health and safety of the public. The APS application for renewal of the operating licenses for the PVNGS units should be approved.

Harold B. Ray did not participate in the Committee's deliberations regarding this matter.

Sincerely,

/RA/

Said Abdel-Khalik  
Chairman

## REFERENCES

1. U.S. Nuclear Regulatory Commission, "Safety Evaluation Report Related to the License Renewal of Palo Verde Nuclear Generating Station Units 1, 2, and 3," dated August 2010 (ML102210072)
2. Palo Verde Nuclear Generating Station, Units 1, 2 and 3 - License Renewal Application, Part 1 of 3, dated December 11, 2008 (ML083510612)
3. Palo Verde Nuclear Generating Station, Units 1, 2 and 3 - License Renewal Application, Part 2 of 3, dated December 11, 2008 (ML083510614)
4. Palo Verde Nuclear Generating Station, Units 1, 2 and 3 - License Renewal Application, Part 3 of 3, dated December 11, 2008 (ML083510615)
5. NRC Letter, "Audit Report Regarding the Palo Verde Nuclear Generating Station, Units 1, 2, and 3 License Renewal Application (TAC NOS. ME0254, ME0255, ME0256), dated April 7, 2010 (ML100221296)
6. NRC Letter, "Palo Verde Nuclear Generating Station-NRC License Renewal Inspection Report 05000528/2010007; 05000529/2010007; 05000530/2010007," dated April 29, 2010 (ML101190585)
7. NRC Letter, "Scoping and Screening Audit Report for the Palo Verde Nuclear Generating Station, Units 1, 2, and 3, License Renewal Application (TAC NOS. ME0254, ME0255, and ME0256)," dated July 13, 2010 (ML101740217)
8. U.S. Nuclear Regulatory Commission, "Safety Evaluation Report Related to the License Renewal of Palo Verde Nuclear Generating Station Units 1, 2, and 3," dated January 11, 2011 (ML110110411)
9. Comments from a Member of the Public, dated February 7, 2011 (ML110480377)

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1. U.S. Nuclear Regulatory Commission, "Safety Evaluation Report Related to the License Renewal of Palo Verde Nuclear Generating Station Units 1, 2, and 3," dated August 2010 (ML102210072)
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Letter to The Honorable Gregory B. Jaczko, Chairman, from Said Abdel-Khalik, ACRS  
Chairman, dated March 1, 2011

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