UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

December 22, 2021

Mrs. Maria L. Lacal
Executive Vice President/
Chief Nuclear Officer
Mail Station 7605
Arizona Public Service Company
P.O. Box 52034
Phoenix, AZ 85072-2034

SUBJECT: PALO VERDE NUCLEAR GENERATING STATION, UNITS 1, 2, AND 3 - ISSUANCE OF AMENDMENTS REGARDING PERMANENT EXTENSION OF TYPE A AND TYPE C LEAK RATE TEST FREQUENCIES (EPID L-2021-LLA-0006)

Dear Mrs. Lacal:

The U.S. Nuclear Regulatory Commission (the Commission) has issued the enclosed Amendment No. 217 to Renewed Facility Operating License No. NPF 41, Amendment No. 217 to Renewed Facility Operating License No. NPF 51, and Amendment No. 217 to Renewed Facility Operating License No. NPF 74 for the Palo Verde Nuclear Generating Station (Palo Verde), Units 1, 2, and 3, respectively. The amendments consist of changes to the technical specifications (TSs) in the above-referenced licenses and are issued in response to your application dated January 22, 2021, as supplemented by letter dated June 22, 2021.

The amendments change the existing Type A integrated leakage rate test program test interval for containment to 15 years for Palo Verde, Units No. 1, 2, and 3, in accordance with Nuclear Energy Institute (NEI) 94-01, “Industry Guideline for Implementing Performance-Based Option of 10 CFR Part 50, Appendix J,” Revision 3-A, and the Limitations and Conditions specified in NEI 94-01, Revision 2-A, dated October 2008. The documents used by the licensee to implement the performance-based leakage testing program are in accordance with Option B, “Performance-Based Requirements,” of 10 CFR Part 50, Appendix J, “Primary Reactor Containment Leakage Testing for Water-Cooled Power Reactors.”

The amendments also delete the information in TS 5.5.16, “Containment Leakage Rate Testing Program,” regarding the performance of the next Palo Verde Type A tests, as these dates have already occurred, and the associated Type A tests have been performed.

A copy of the related Safety Evaluation is also enclosed. Notice of Issuance will be included in the Commission's monthly *Federal Register* notice.

Sincerely,

/RA/

Siva P. Lingam, Project Manager
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. STN 50-528, STN 50-529,
and STN 50-530

Enclosures:
1. Amendment No. 217 to NPF-41
2. Amendment No. 217 to NPF-51
3. Amendment No. 217 to NPF-74
4. Safety Evaluation

cc: Listserv

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

ARIZONA PUBLIC SERVICE COMPANY, ET AL.

DOCKET NO. STN 50-528

PALO VERDE NUCLEAR GENERATING STATION, UNIT 1

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 217
License No. NPF-41

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by the Arizona Public Service Company (APS or the licensee) on behalf of itself and the Salt River Project Agricultural Improvement and Power District, El Paso Electric Company, Southern California Edison Company, Public Service Company of New Mexico, Los Angeles Department of Water and Power, and Southern California Public Power Authority dated January 22, 2021, as supplemented by letter dated June 22, 2021, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act) and the Commission's regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C(2) of Renewed Facility Operating License No. NPF-41 is hereby amended to read as follows:

(2) Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A, as revised through Amendment No. 217, and the Environmental Protection Plan contained in Appendix B, are hereby incorporated into this renewed operating license. APS shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan, except where otherwise stated in specific license conditions.

3. This license amendment is effective as of the date of issuance and shall be implemented within 90 days of the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Samson S. Lee

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Date: 2021.12.22 11:03:55 -05'00'

Samson S. Lee, Acting Chief
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment:
Changes to Renewed Facility
Operating License No. NPF-41
and the Technical Specifications

Date of Issuance: December 22, 2021

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

ARIZONA PUBLIC SERVICE COMPANY, ET AL.

DOCKET NO. STN 50-529

PALO VERDE NUCLEAR GENERATING STATION, UNIT 2

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 217
License No. NPF-51

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by the Arizona Public Service Company (APS or the licensee) on behalf of itself and the Salt River Project Agricultural Improvement and Power District, El Paso Electric Company, Southern California Edison Company, Public Service Company of New Mexico, Los Angeles Department of Water and Power, and Southern California Public Power Authority dated January 22, 2021, as supplemented by letter dated June 22, 2021, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act) and the Commission's regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C(2) of Renewed Facility Operating License No. NPF-51 is hereby amended to read as follows:

(2) Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A, as revised through Amendment No. 217, and the Environmental Protection Plan contained in Appendix B, are hereby incorporated into this renewed operating license. APS shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan, except where otherwise stated in specific license conditions.

3. This license amendment is effective as of the date of issuance and shall be implemented within 90 days of the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Samson S. Lee

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Date: 2021.12.22 11:12:28 -05'00'

Samson S. Lee, Acting Chief
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment:
Changes to Renewed Facility
Operating License No. NPF-51
and the Technical Specifications

Date of Issuance: December 22, 2021

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

ARIZONA PUBLIC SERVICE COMPANY, ET AL.

DOCKET NO. STN 50-530

PALO VERDE NUCLEAR GENERATING STATION, UNIT 3

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 217
License No. NPF-74

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by the Arizona Public Service Company (APS or the licensee) on behalf of itself and the Salt River Project Agricultural Improvement and Power District, El Paso Electric Company, Southern California Edison Company, Public Service Company of New Mexico, Los Angeles Department of Water and Power, and Southern California Public Power Authority dated January 22, 2021, as supplemented by letter dated June 22, 2021, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act) and the Commission's regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C(2) of Renewed Facility Operating License No. NPF-74 is hereby amended to read as follows:

(2) Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A, as revised through Amendment No. 217, and the Environmental Protection Plan contained in Appendix B, are hereby incorporated into this renewed operating license. APS shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan, except where otherwise stated in specific license conditions.

3. This license amendment is effective as of the date of issuance and shall be implemented within 90 days of the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Samson S. Lee

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Date: 2021.12.22 11:13:00 -05'00'

Samson S. Lee, Acting Chief
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment:
Changes to Renewed Facility
Operating License No. NPF-74
and the Technical Specifications

Date of Issuance: December 22, 2021

ATTACHMENT TO LICENSE AMENDMENT NOS. 217, 217, AND 217 TO

RENEWED FACILITY OPERATING LICENSE NOS. NPF-41, NPF-51, AND NPF-74

PALO VERDE NUCLEAR GENERATING STATION, UNITS 1, 2, AND 3

DOCKET NOS. STN 50-528, STN 50-529, AND STN 50-530

Replace the following pages of Renewed Facility Operating License Nos. NPF-41, NPF-51, and NPF-74, and the Appendix A, Technical Specifications, with the attached revised pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

Renewed Facility Operating License No. NPF-41

REMOVE	INSERT
5	5

Renewed Facility Operating License No. NPF-51

REMOVE	INSERT
6	6

Renewed Facility Operating License No. NPF-74

REMOVE	INSERT
4	4

Technical Specifications

REMOVE	INSERT
5.5-15	5.5-15
5.5.-16	5.5-16

(1) Maximum Power Level

Arizona Public Service Company (APS) is authorized to operate the facility at reactor core power levels not in excess of 3990 megawatts thermal (100% power), in accordance with the conditions specified herein.

(2) Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A, as revised through Amendment No. 217, and the Environmental Protection Plan contained in Appendix B, are hereby incorporated into this renewed operating license. APS shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan, except where otherwise stated in specific license conditions.

(3) Antitrust Conditions

This renewed operating license is subject to the antitrust conditions delineated in Appendix C to this renewed license.

(4) Operating Staff Experience Requirements

Deleted

(5) Post-Fuel-Loading Initial Test Program (Section 14, SER and SSER 2)*

Deleted

(6) Environmental Qualification

Deleted

(7) Fire Protection Program

APS shall implement and maintain in effect all provisions of the approved fire protection program as described in the Final Safety Analysis Report for the facility, as supplemented and amended, and as approved in the SER through Supplement 11, subject to the following provision:

APS may make changes to the approved fire protection program without prior approval of the Commission only if those changes would not adversely affect the ability to achieve and maintain safe shutdown in the event of a fire.

* The parenthetical notation following the title of many license conditions denotes the section of the Safety Evaluation Report and/or its supplements wherein the license condition is discussed.

(1) Maximum Power Level

Arizona Public Service Company (APS) is authorized to operate the facility at reactor core power levels not in excess of 3990 megawatts thermal (100% power) in accordance with the conditions specified herein.

(2) Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A, as revised through Amendment No. 217, and the Environmental Protection Plan contained in Appendix B, are hereby incorporated into this renewed operating license. APS shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan, except where otherwise stated in specific license conditions.

(3) Antitrust Conditions

This renewed operating license is subject to the antitrust conditions delineated in Appendix C to this renewed operating license.

(4) Operating Staff Experience Requirements (Section 13.1.2, SSER 9)*

Deleted

(5) Initial Test Program (Section 14, SER and SSER 2)

Deleted

(6) Fire Protection Program

APS shall implement and maintain in effect all provisions of the approved fire protection program as described in the Final Safety Analysis Report for the facility, as supplemented and amended, and as approved in the SER through Supplement 11, subject to the following provision:

APS may make changes to the approved fire protection program without prior approval of the Commission only if those changes would not adversely affect the ability to achieve and maintain safe shutdown in the event of a fire.

(7) Inservice Inspection Program (Sections 5.2.4 and 6.6, SER and SSER 9)

Deleted

* The parenthetical notation following the title of many license conditions denotes the section of the Safety Evaluation Report and/or its supplements wherein the license condition is discussed.

(4) Pursuant to the Act and 10 CFR Part 30, 40, and 70, APS to receive, possess, and use in amounts required any byproduct, source or special nuclear material without restriction to chemical or physical form, for sample analysis or instrument calibration or associated with radioactive apparatus or components; and

(5) Pursuant to the Act and 10 CFR Parts 30, 40, and 70, APS to possess, but not separate, such byproduct and special nuclear materials as may be produced by the operation of the facility.

C. This renewed operating license shall be deemed to contain and is subject to the conditions specified in the Commission's regulations set forth in 10 CFR Chapter I and is subject to all applicable provisions of the Act and to the rules, regulations, and orders of the Commission now or hereafter in effect; and is subject to the additional conditions specified or incorporated below:

(1) Maximum Power Level

Arizona Public Service Company (APS) is authorized to operate the facility at reactor core power levels not in excess of 3990 megawatts thermal (100% power), in accordance with the conditions specified herein.

(2) Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A, as revised through Amendment No. 217, and the Environmental Protection Plan contained in Appendix B, are hereby incorporated into this renewed operating license. APS shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan, except where otherwise stated in specific license conditions.

(3) Antitrust Conditions

This renewed operating license is subject to the antitrust conditions delineated in Appendix C to this renewed operating license.

(4) Initial Test Program (Section 14, SER and SSER 2)

Deleted

(5) Additional Conditions

The Additional Conditions contained in Appendix D, as revised through Amendment No. 212, are hereby incorporated into this renewed operating license. The licensee shall operate the facility in accordance with the Additional Conditions.

5.5 Programs and Manuals (continued)

5.5.15 Safety Function Determination Program (continued)

b. A required system redundant to system(s) in turn supported by the inoperable supported system is also inoperable; or

c. A required system redundant to support system(s) for the supported systems (a) and (b) above is also inoperable.

The SFDP identifies where a loss of safety function exists. If a loss of safety function is determined to exist by this program, the appropriate Conditions and Required Actions of the LCO in which the loss of safety function exists are required to be entered.

When a loss of safety function is caused by the inoperability of a single Technical Specification support system, the appropriate Conditions and Required Actions to enter are those of the support system.

5.5.16 Containment Leakage Rate Testing Program

a. A program shall be established to implement the leakage rate testing of the containment as required by 10 CFR 50.54(o) and 10 CFR 50, Appendix J, Option B, as modified by approved exemptions. This program shall be in accordance with the guidelines contained in Nuclear Energy Institute (NEI) Topical Report (TR) NEI 94-01, "Industry Guideline for Implementing Performance-Based Option of 10 CFR 50, Appendix J," Revision 3-A, dated July 2012, and the conditions and limitations specified in NEI 94-01, Revision 2-A, dated October 2008, as modified by the following exceptions:

1. The visual examination of containment concrete surfaces intended to fulfill the requirements of 10 CFR 50, Appendix J, Option B testing, will be performed in accordance with the requirements of and frequency specified by ASME Code Section XI, Subsection IWL, except where relief has been authorized by the NRC. The containment concrete visual examination may be performed during either power operation, e.g., performed concurrently with other containment inspection-related activities such as tendon testing, or during a maintenance/refueling outage.

2. The visual examination of the steel liner plate inside containment intended to fulfill the requirements of 10 CFR 50, Appendix J, Option B testing, will be performed in accordance with the requirements of and frequency specified by ASME Code Section XI, Subsection IWE, except where relief has been authorized by the NRC.

(continued)

5.5 Programs and Manuals (continued)

5.5.16 Containment Leakage Rate Testing Program (continued)

b. The peak calculated containment internal pressure for the design basis loss of coolant accident, P_a, is 58.0 psig. The containment design pressure is 60 psig.

c. The maximum allowable containment leakage rate, L_a, at P_a, shall be 0.1 % of containment air weight per day.

d. Leakage Rate acceptance criteria are:

1. Containment leakage rate acceptance criterion is $\leq 1.0\ L_a$. During the first unit startup following testing in accordance with this program, the leakage rate acceptance are $< 0.60\ L_a$ for the Type B and C tests and $\leq 0.75\ L_a$ for Type A tests.

2. Air lock testing acceptance criteria are:

a) Overall air lock leakage rate is $\leq 0.05\ L_a$ when tested at $\geq P_a$.

b) For each door, leakage rate is $\leq 0.01\ L_a$ when pressurized to ≥ 14.5 psig.

e. The provisions of SR 3.0.2 do not apply to the test frequencies in the Containment Leakage Rate Testing Program.

f. The provisions of SR 3.0.3 are applicable to the Containment Leakage Rate Testing Program.

(continued)

UNITED STATES
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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION RELATED TO PALO VERDE NUCLEAR GENERATING STATION, UNITS 1, 2, AND 3 AMENDMENT NO. 217 TO RENEWED FACILITY OPERATING LICENSE NO. NPF-41 AMENDMENT NO. 217 TO RENEWED FACILITY OPERATING LICENSE NO. NPF-51 AMENDMENT NO. 217 TO RENEWED FACILITY OPERATING LICENSE NO. NPF-74 ARIZONA PUBLIC SERVICE COMPANY, ET AL. DOCKET NOS. STN 50-528, STN 50-529, AND STN 50-530

1.0 INTRODUCTION

By application dated January 22, 2021 (Reference 1), as supplemented by letter dated June 22, 2021 (Reference 2), Arizona Public Service Company (the licensee) submitted a license amendment request (LAR) for Palo Verde Nuclear Generating Station, Units 1, 2, and 3 (Palo Verde, PVNGS). The LAR would revise Technical Specification (TS) 5.5.16, "Containment Leakage Rate Testing Program," to adopt Nuclear Energy Institute (NEI) 94-01, Revision 3-A, "Industry Guideline for Implementing Performance-Based Option of 10 CFR [Title 10 of the *Code of Federal Regulations*] Part 50, Appendix J," (Reference 3), and the conditions and limitations specified in NEI 94-01, Revision 2-A, dated October 2008 (Reference 4). The guidance document for implementation of performance-based leaking testing program is in accordance with Option B of 10 CFR Part 50, Appendix J, "Primary Reactor Containment Leakage Testing for Water-Cooled Power Reactors."

This change would allow the maximum interval for the Type A integrated leakage rate test (ILRT) to extend from once in 10 years to once in 15 years. The change would adopt an extension of the containment isolation valve (CIV) Type C leakage rate testing frequency from 60 months to 75 months. The LAR also proposes to delete the dates of the next Palo Verde Type A tests. This change would also adopt a more conservative allowable test interval extension of 9 months, for Type A, Type B, and Type C leakage rate tests in accordance with NEI 94-01, Revision 3-A.

The licensee justified the proposed TS changes by providing historical plant-specific containment leakage testing program results, containment inservice inspection (CISI) program

results and a supporting plant-specific risk assessment, consistent with the guidance in NEI 94-01, Revision 2-A. The U.S. Nuclear Regulatory Commission (NRC) staff reviewed this LAR and provides the following evaluation regarding the acceptability of the requested changes in providing assurance that containment leaktight integrity will continue to be maintained.

The supplemental letter dated June 22, 2021, provided additional information that clarified the application, did not expand the scope of the application as originally noticed, and did not change the NRC staff's original proposed no significant hazards consideration determination as published in the *Federal Register* on March 23, 2021 (86 FR 15504).

2.0 REGULATORY EVALUATION

2.1 Background

Palo Verde is designed with a Combustion-Engineering system 80 pressurized-water reactor enclosed by a large dry ambient pressure containment designed to divert the energy released during a design-basis, large-break loss-of-coolant accident (LOCA). The containment structure contains the reactor coolant system, main steam system, and other high energy piping systems. The inspections associated with the 10 CFR Part 50, Appendix J testing program are limited to the primary containment structure and containment isolation system. The Palo Verde containment is discussed in Section 6.2, "Containment Systems," of the Palo Verde Updated Final Safety Analysis Report (UFSAR) (Reference 5).

Several tests are performed to ensure the integrity of the containment function, including the ILRT. The containment structure provides a "leaktight" barrier against the potential uncontrolled release of fission products during a LOCA. TS 5.5.16 identifies the containment leak rate testing requirements and an overall acceptance criterion for the Type A, Type B, and Type C tests.

Surveillance Requirement (SR) 3.6.1.1 in TS 3.6.1, "Containment," states:

> Perform required visual examinations and leakage rate testing except for containment air lock testing, in accordance with the Containment Leakage Rate Testing Program.

The leakage acceptance criteria for Type A, Type B, and Type C tests are provided in TS 5.5.16.d.1, which states:

> Containment leakage rate acceptance criterion is ≤ [less than or equal to]1.0 L_a [leakage of containment air weight]. During the first unit startup following testing in accordance with this program, the leakage rate acceptance are < 0.60 L_a for the Type B and C tests and ≤ 0.75 L_a for Type A tests.

The primary purpose of the LAR is to extend the allowed maximum interval for the ILRT, Type A, from once in 10 years to once in 15 years and to extend the CIV Type C leakage rate testing frequency from 60 months to 75 months.

2.2 Changes to TS 5.5.16

Currently, TS 5.5.16.a. requires that a program be established to comply with the containment leakage rate testing requirements of 10 CFR 50.54(o) and 10 CFR Part 50, Appendix J,

Option B, as modified by approved exemptions. The program is required to be in accordance with the guidelines contained in Regulatory Guide (RG) 1.163, "Performance Based Containment Leak-Test Program," dated September 1995 (Reference 6). RG 1.163 endorses, with certain exceptions, NEI 94-01, Revision 0, as an acceptable method for complying with the provisions of 10 CFR Part 50, Appendix J, Option B.

TS 5.5.16.a, currently states, in part:

> This program shall be in accordance with the guidelines contained in Regulatory Guide 1.163, "Performance-Based Containment Leak-Test Program," dated September 1995, …"

The licensee proposes the following changes to the above statement:

> This program shall be in accordance with the guidelines contained in Nuclear Energy Institute (NEI) Topical Report (TR) NEI 94-01 "Industry Guideline for Implementing Performance-Based Option of 10 CFR 50, Appendix J," Revision 3-A, dated July 2012, and the conditions and limitations specified in NEI 94-01, Revision 2-A, dated October 2008, …"

The current TS 5.5.16.a exceptions 3, 4, and 5 describe the first Type A test dates. The licensee proposes to delete TS 5.5.16.a exceptions 3, 4, and 5.

2.3 Regulatory Requirements

The regulations in 10 CFR 50.36, "Technical specifications," state that the TSs will include items in five specific categories. These categories include: (1) safety limits, limiting safety system settings, and limiting control settings; (2) limiting conditions for operations; (3) SRs; (4) design features; and (5) administrative controls. In particular, Section 50.36(c)(5) states, "Administrative controls are the provisions relating to organization and management, procedures, recordkeeping, review and audit, and reporting necessary to assure operation of the facility in a safe manner."

The regulations in 10 CFR 50.54(o) of 10 CFR require that primary reactor containments for water cooled power reactors be subject to the requirements set forth in Appendix J to 10 CFR Part 50.

The regulations in 10 CFR 50.55a, "Codes and standards," Section 50.55a(b)(2)(viii), "Section XI condition: Concrete containment examinations," contain CISI program requirements, which, in conjunction with the requirements of 10 CFR Part 50, Appendix J, ensure continued leaktight and structural integrity of the containment during its service life.

The regulations in 10 CFR 50.65, "Requirements for monitoring the effectiveness of maintenance at nuclear power plants," paragraph (a)(1), state, in part, that the licensee

> . . . shall monitor the performance or condition of structures, systems, or components, against licensee-established goals, in a manner sufficient to provide reasonable assurance that these structures, systems, and components, as defined in paragraph (b) of this section, are capable of fulfilling their intended functions. These goals shall be established commensurate with safety and, where practical, take into account industry-wide operating experience.

The licensee requested a change to the renewed facility operating licenses for Palo Verde, in accordance with 10 CFR 50.90, “Application for amendment of license, construction permit, or early site permit.”

Appendix J to 10 CFR Part 50, includes two options: Option A – “Prescriptive Requirements,” and Option B – “Performance-Based Requirements,” either of which may be chosen by a licensee for meeting the requirements in Part 50. In TS 5.5.16, the licensee chose to carry out this requirement by implementing Option B with some modifications. Under the performance-based option of 10 CFR Part 50, Appendix J, the test frequency is based upon an evaluation that reviewed the as-found leakage history to determine the frequency for leakage testing, which provides assurance that leakage limits will be maintained. On February 23, 1996, the NRC approved Amendment Nos. 103, 92, and 75 to the facility operating licenses for Palo Verde, Units 1, 2, and 3, respectively (Reference 7). The amendments allowed the implementation of Option B to 10 CFR Part 50, Appendix J, a performance-based option for determining the test frequency for containment leakage rate testing.

The testing requirements in 10 CFR Part 50, Appendix J ensure that (a) leakage through containments or systems and components penetrating containments does not exceed allowable leakage rates specified in the TS; and (b) proper maintenance and repairs are made during the service life of the containment to ensure the integrity of the containment structure.

Option B of Appendix J to 10 CFR Part 50, specifies performance-based requirements and criteria for preoperational and subsequent leakage rate testing. These requirements are met by performing Type A tests to measure the containment system overall integrated leakage rate; Type B pneumatic tests to detect and measure local leakage rates across pressure-retaining leakage-limiting boundaries such as penetrations; and Type C pneumatic tests to measure CIV containment isolation valve leakage rates. After the preoperational tests, these tests are required to be conducted at periodic intervals based on the historical performance of the overall containment system (for Type A tests), and on the safety significance and historical performance of each penetration boundary and isolation valve (for Type B and C tests) to ensure integrity of the overall containment system as a barrier to fission product release. Option B also requires that a general visual inspection of the accessible interior and exterior surfaces of the containment system, for structural deterioration which may affect the containment leaktight integrity, must be conducted prior to each Type A test and at a periodic interval between tests.

Section V.B.3 of 10 CFR Part 50, Appendix J, Option B, requires that the RG or other implementation document used by a licensee to develop a performance-based leakage testing program is included in the plant TSs by general reference. Furthermore, the submittal for TS revisions must contain justification, including supporting analyses, if the licensee chooses to deviate from methods approved by the Commission and endorsed in a RG.

2.4 Regulatory Guidance

NEI 94-01, Revision 0, “Industry Guideline for Implementing Performance-Based Option of 10 CFR Part 50, Appendix J,” dated July 21, 1995 (Reference 8), provides methods for complying with the provisions of 10 CFR Part 50, Appendix J, Option B, and includes provisions that address the extension of the performance-based Type A test interval for up to 10 years, based upon two consecutive successful tests.

NEI 94-01, Revision 2-A, which incorporates the regulatory positions stated in RG 1.163, includes provisions for extending Type A test intervals up to 15 years. The NRC final Safety Evaluation Report (SER) for NEI 94-01, Revision 2, and Electric Power Research Institute (EPRI) Technical Report (EPRI TR) No. 1009325, Revision 2, August 2007, "Risk Impact Assessment of Extended Integrated Leak Rate Testing Intervals," dated June 25, 2008 (References 9 and 10, respectively), states that NEI 94-01, Revision 2, describes an acceptable approach for implementing the optional performance-based requirements of 10 CFR Part 50, Appendix J, Option B. The NRC staff concluded that NEI 94-01, Revision 2, is acceptable for referencing by licensees proposing to amend their containment leakage rate testing TSs, subject to the specific limitations and conditions listed in Section 4.1 of the associated SER. The SER was incorporated into Revision 2 and subsequently issued as NEI 94-01, Revision 2-A.

NEI 94-01, Revision 3-A, provides guidance for extending Type C local leak rate test (LLRT) intervals beyond 60 months and up to 75 months. Type C testing ensures that individual CIVs are essentially leak tight. In addition, aggregate Type C leakage rates support the leakage tightness of primary containment by minimizing potential leakage paths. The NRC published an SER with limitations and conditions for NEI 94-01, Revision 3, by letter dated June 8, 2012 (Reference 11). In the SER, the NRC concluded that NEI 94-01, Revision 3, describes an acceptable approach for implementing the optional performance-based requirements of 10 CFR Part 50, Appendix J, and is acceptable for reference by licensees proposing to amend their containment leakage rate testing TSs, subject to two conditions. The SER was incorporated into Revision 3 and subsequently issued as NEI 94-01, Revision 3-A, on July 31, 2012.

RG 1.174, Revision 3, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis," dated January 2018 (Reference 12) and RG 1.177, Revision 1, "An Approach for Plant-Specific, Risk-Informed Decisionmaking: Technical Specifications," dated May 2011 (Reference 13) provide the guidelines for risk assessment to support the proposed change.

RG 1.200, Revision 2, "An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities," dated March 2009 (Reference 14), describes one acceptable approach for determining whether the technical adequacy of the probabilistic risk assessment (PRA), in total or the parts that are used to support an application, is sufficient to provide confidence in the results, such that the PRA can be used in regulatory decisionmaking for light-water reactors.

3.0 TECHNICAL EVALUATION

3.1 Integrated Leak Rate Testing History

With the licensee's proposed change, the licensee will implement NEI 94-01, Revision 3-A, and the limitations and conditions of Section 4.1 of the NEI 94-01, Revision 2-A. The SER of NEI 94-01, Revision 3-A endorses the extension of the Type A test interval to 15 years based on two consecutive successful Type A tests (performance history) and other requirements stated in Section 9.2.3, "Extended Test Intervals," of NEI 94-01, Revision 3-A. The basis for acceptability of extending the Type A test interval also includes implementation of robust Type B and Type C testing of the penetration barriers, where most containment leakage has historically been shown to occur and are expected to continue to be the pathways for a majority of potential primary containment leakage; and of a robust containment visual inspection program where

deterioration of the primary containment boundary away from penetrations can be detected and remediated before any significant leakage potential were to develop.

3.1.1 Historical Type A Test (ILRT) Results

In Table 3.3.4-1, "Past Periodic Type A ILRT Results for PVNGS Units 1, 2, and 3," of the enclosure to the LAR, the licensee provided the historical results of ILRTs. In Table 3.3.5-1, "PVNGS ILRT Test Results Verification of Current Extended ILRT Interval," of the enclosure to the LAR, the licensee provided Palo Verde ILRT test results verification of current extended ILRT interval. The latest ILRTs at Palo Verde were performed in November 2014 (Unit 1), October 2015 (Unit 2), and April 2015 (Unit 3).

Palo Verde TS 5.5.16 currently requires Types A, B, and C testing in accordance with RG 1.163, which endorses the methodology for complying with 10 CFR Part 50, Appendix J, Option B. Since the adoption of Option B, the performance leakage rates are calculated in accordance with NEI 94-01, Revision 3-A, Section 9.1.1, "Performance Criteria," for Type A testing.

The current ILRT test interval for Palo Verde Units 1, 2, and 3 is 10 years.

The performance leakage rate is calculated as the sum of the Type A upper confidence limit and as-left minimum pathway leakage rate (MNPLR) for all Type B and Type C pathways that were in service, isolated, or not lined up in their test position (i.e., drained and vented to containment atmosphere) prior to performing the Type A test. In addition, leakage pathways that were isolated during performance of the test because of excessive leakage must be factored into the performance determination.

The NEI 94-01 Revision 3-A (and Revision 2-A) requirement for allowing the extended ILRT interval is that the past two consecutive tests meet the performance criterion by showing a leakage of L_a or less.

NEI 94-01 requires the as-found Type A test leakage rate must be less than the acceptance criterion of 1.0 L_a given in the plant TS. Prior to entering a mode where containment integrity is required, the as-left Type A leakage rate shall not exceed 0.75 L_a. The as-found and as-left values are as determined by the appropriate testing methodology specifically described in American National Standards Institute (ANSI)/American Nuclear Society (ANS)-56.8-2002, "Containment System Leakage Testing Requirements" (Reference 15).

Additionally, the combined leakage rate for all Type B and Type C tested penetrations shall be less than or equal to 0.6 L_a, determined on a maximum pathway basis from the as-left LLRT results prior to entering a mode where containment integrity is required. This regulatory approach results in a 25 percent and 40 percent margin, respectively, to the 1.0 L_a requirements.

According to the Palo Verde UFSAR Table 6.2.6-1, "Type A Test Data," the maximum allowable primary containment leakage rate, L_a, shall be 0.1 percent/day (mass percent) at the calculated peak containment pressure (P_a) where:

- P_a = 52 pounds per square inch gauge (psig) (3954 megawatts thermal (MWt) with original steam generators)
- P_a = 58 psig (4070 MWt with replacement steam generators)

Palo Verde TS 5.5.16.d.1 states:

> Containment leakage rate acceptance criterion is ≤ 1.0 L_a. During the first unit startup following testing in accordance with this program, the leakage rate acceptance are < 0.60 L_a for the Type B and C tests and ≤ 0.75 L_a for Type A tests.

Based on above discussions, the Palo Verde Type A test acceptance criterion is 0.075 wt. percent/day (= 0.75 L_a = 0.75 x 0.1 wt.%/day).

The past two ILRT results (1999 and 2015) for Palo Verde have confirmed that the primary containment leakage rates are acceptable with respect to the design criterion L_a per day. Since the last two Type A tests for Palo Verde had "as-found" test results well within the maximum allowable containment leakage rate in TS 5.5.16 applicable at the time of the tests, a permanent test frequency of 15 years in accordance with NEI 94-01 Revision 3-A and the conditions and limitations of NEI 94-01, Revision 2-A would be acceptable.

3.1.2 Historical Type B and Type C Combined Test (LLRT) Results

In Tables 3.5.6-1, "PVNGS Unit 1 Type B and C LLRT Combined As-Found/As-Left Trend Summary"; 3.5.6-2, "PVNGS Unit 2 Type B and C LLRT Combined As-Found/As-Left Trend Summary"; and 3.5.6-3, "PVNGS Unit 3 Type B and C LLRT Combined As-Found/As-Left Trend Summary," of the enclosure to the LAR, the licensee presented the historical results of the Palo Verde Type B and C test combined leakage totals for as-found minimum pathway, as-left maximum pathway, and as-left minimum pathway. These tables give the as-found minimum pathway total leakage history for the three Palo Verde Units.

Palo Verde Types B and C testing program requires testing of electrical penetrations, airlocks, hatches, flanges and CIVs in accordance with 10 CFR Part 50, Appendix J, Option B and RG 1.163. The Palo Verde TS 5.5.16 criterion for combined Type B and C test total is 0.6 L_a (150,000 standard cubic centimeters per minute (sccm)) where L_a equals 250,000 sccm. As detailed in NEI 94-01, this criterion is evaluated by minimum pathway for as-found values and maximum pathway for as-left values. The as-found minimum pathway total leakage provides an assessment of the leakage testing and corrective action programs effectiveness for ensuring penetration leakage potential is kept acceptable throughout each operating cycle such that margin to L_a is maintained to accommodate some increase in non-penetration leakage potential between ILRTs. The as-left maximum pathway total leakage criterion is a permissive for restoring primary containment operability and ensures margin is available to accommodate increases in leakage potential between outages when leakage testing is performed.

The last seven combined Type B and C testing results show substantial margin to the applicable performance criterion, suggesting that both the ILRT and LLRT performance criteria are unlikely to be exceeded by allowing Palo Verde ILRT maximum interval to be extended to 15 years.

3.2 Containment Inspection Program

3.2.1 Description of Primary Containment

As stated in the LAR, the Palo Verde Units 1, 2, and 3 containments consist of three basic parts:

- Flat base slab with a central cavity and an instrumentation tunnel
- Right circular cylinder
- Hemispherical dome

The containment is constructed of reinforced concrete prestressed by post-tensioned tendons in the cylinder and the dome. The basemat is designed and constructed of conventionally reinforced concrete. Special reinforcing details are provided at discontinuities and at openings in the shell. A welded steel liner attached to the inside face of the concrete limits the release of radioactivity from the containment. The base liner is installed on the top of the basemat and is covered by a thick concrete slab. The containment building provides biological shielding during normal operation and following a LOCA. It also functions as a leaktight barrier following an accident inside the containment.

A welded steel liner plate covers the entire inside surface of the containment (excluding penetrations) to satisfy the leaktight criteria. The liner is thickened locally around penetration sleeves, large brackets, and attachments to the basemat and shell wall. The stability of the liner plate, including the thickened plate, is controlled by anchoring it to the concrete structure.

3.2.2 Non-Risk Based Assessment

Section 3.5, “Non-Risk Based Assessment,” of the enclosure to the LAR states that, consistent with the defense-in-depth philosophy discussed in RG 1.174, Palo Verde has assessed other non-risk-based considerations relevant to the proposed amendment. Palo Verde has multiple inspection and testing programs that ensure the containment structure continues to remain capable of meeting its design functions. The programs are designed to identify any degrading conditions that might affect that capability and they are discussed below.

3.2.2.1 Palo Verde Coatings Program

For “Approved Materials” under Section 3.5.1, “PVNGS Coatings Program,” of the enclosure to the LAR, the licensee stated that materials procured for safety-related applications for Containment shall meet the Quality Assurance Program requirements for coating applications and shall be a design-basis accident (DBA) qualified coating. DBA Qualified Coating Systems are single or multiple coatings applied per the tested configuration that complies with the ANSI and American Society for Testing and Materials standards. Coatings that deviate from these requirements are considered DBA unqualified coatings.

For “Inspections/Verifications” under Section 3.5.1, the licensee stated that coating applications that require verification shall be performed by a qualified applicator and verified by an individual of equivalent qualifications. The Palo Verde Coatings Program shall specify and verify control measures to ensure that inspections and verifications are adequate to achieve the required quality. The licensee further states that coatings systems that have been in service in safety-related areas shall be monitored to determine if degradation to coatings is present, and containment building interior coating system assessments are performed every operating cycle.

For “Unqualified/Degraded Coatings in Containment” under Section 3.5.1, the licensee stated that the Palo Verde Coatings Program requires the amount of degraded and unqualified coatings within containment to be maintained against a margin of 0.15 cubic feet (ft^3). The licensee also stated in this section that the results of the most recent coatings inspections for Palo Verde, Units 1, 2, and 3 are as follows:

- Unit 1, including the Unit 1 spring of 2019 refueling outage (1R21), the current amount of degraded and unqualified coatings is 0.0085 ft^3.
- Unit 2, including the Unit 2 spring of 2020 refueling outage (2R22), the current amount of degraded and unqualified coatings is 0.05186 ft^3.
- Unit 3, including the Unit 3 fall of 2019 refueling outage (3R21), the current amount of degraded and unqualified coatings is 0.0291 ft^3.

In Section 3.5.5, “Results of Recent Containment Examinations,” of the enclosure to the LAR, the licensee stated that the Palo Verde containment coatings condition assessment is conducted during refueling outages and that coated systems, structures and components within the reactor containments are examined, and, when localized areas of coating defects are found, those areas are evaluated and scheduled for touch-up, repair, or replacement as necessary. The periodic Containment Condition assessments, and the resultant repair/replacement activities, assure that the amount of Service Level 1 coatings, which may be susceptible to detachment from the substrate during a DBA event is minimized.

Attachment 4, “Results of Recent Containment Examinations,” of the enclosure to the LAR provides detailed inspection and assessment of the Palo Verde Unit 2 containment coatings in 2R22 (2020 refueling outage), Unit 3 containment coatings in 3R21 (October 2019), and Unit 1 containment coatings in 1R21 (April 2019). The LAR described the detailed inspection results for all three units and noted that the coating work performed during the past outages in all cases was performed in a workman like manner and continues to exhibit good visual quality, with the exception of small areas of mechanical damage. In the LAR, the licensee noted that for Unit 2, the majority of the coating damage in the Palo Verde containment buildings is from mishandling of tools and equipment or improper storage of sharp items along the containment liner plate. For Units 1 and 3, storing sharp insulation, carts, ladders, etc., against the liner plate damaged the coating and the carbon steel and gluing and taping things to the liner compromised the coating resulting in rust.

The NRC staff reviewed the information provided in the LAR and concludes that the licensee’s containment coating program is acceptable because the licensee used DBA qualified coating material, has a coatings program that defined the criteria to ensure that coatings are properly applied, and has an inspection/verification program to ensure coatings are properly maintained. Additionally, the amount of degraded and unqualified coatings identified during the most recent inspection for all three units was less than the allowable value.

3.2.3 Containment Inservice Inspection Program

The CISI requirements mandated by 10 CFR 50.55a are the two programs that ensure the continued structural integrity of the containment during its service life. Therefore, the results of these programs are indications of the containment’s capability to meet its design functions, and the programs are designed to identify any degrading conditions that might affect that capability.

3.2.3.1 Palo Verde Examination Program for ASME BPV Code, Section XI, Subsection IWE

In Section 3.5.2, “PVINGS Examination Program for Subsection IWE,” of the enclosure to the LAR, the licensee stated that this examination program is implemented in accordance with American Society of Mechanical Engineers (ASME) *Boiler and Pressure Vessel Code* (BPV Code), Section XI, Subsection IWE, as modified and supplemented by the requirements in 10 CFR 50.55a(b)(2)(ix).

The results of recent IWE examinations are identified in Attachment 5 of the enclosure to the LAR, Tables 3.5.5-1 and 3.5.5-2 (Palo Verde, Unit 2), Tables 3.5.5-3 and 3.5.5-4 (Palo Verde, Unit 3) and Tables 3.5.5-5 and 3.5.5-6 (Palo Verde, Unit 1). These Tables noted that (1) containment penetrations were examined and no abnormal condition noted, (2) containment liners had minor scratched surface, but no degradation noted, slight surface corrosion, no other notable conditions, and (3) Condition Report 20-05413 identified marks on the containment liner, with no indications measured deeper than 5/32 of an inch. All indications are acceptable per evaluation that allows a minimum wall of 5/32 of an inch.

The NRC staff reviewed these tables containing recent IWE examinations and found that all the examined items in the tables are marked acceptable. Based on the most recent IWE examinations results as identified in these tables and explanations, the NRC staff finds the Palo Verde examination program for ASME BPV Code, Section XI, Subsection IWE to be acceptable.

Based on the above information provided by the licensee and reviewed by the NRC staff, the staff finds that the ASME BPV Code, Section XI, Subsection IWE, examination results indicate that the containment liners and penetrations are all acceptable. Therefore, the NRC staff concludes that the containments meet the ASME BPV Code, Section XI, Subsection IWE, requirements.

3.2.3.2 Palo Verde Examination Program for ASME BPV Code, Section XI, Subsection IWL

In Section 3.5.3, “PVNGS Examination Program for Subsection IWL,” of the enclosure to the LAR, the licensee stated that this examination program is implemented in accordance with ASME BPV Code Section XI, Subsection IWL, as modified and supplemented by the requirements in 10 CFR 50.55a(b)(2)(viii). This section also stated that the inservice inspections of the containment tendon post-tensioning system were performed per the unit specific tendon integrity surveillance test, which comply with the ASME BPV Code, Section XI, 2007 Edition with the 2008 Addenda, Subsection IWL as modified and supplemented by the requirements in 10 CFR 50.55a(b)(2)(viii), “Section XI condition: Concrete containment examinations.”

In Section 3.5.5 of the enclosure to the LAR, the licensee reported the following results:

- Unit 1, 35th year visual examination completed on September 13, 2017. All examinations were performed satisfactory with no unexpected conditions, no abnormal conditions and no identified degradation. All inservice grease samples were within specifications. No free water was identified.

- Unit 2, 30th year visual examination completed on April 14, 2015. All examinations were performed satisfactory with no unexpected conditions, no abnormal conditions, and no identified degradation. All inservice grease samples were within specifications. No free water was identified.

- Unit 3, 30th year visual examination completed on October 25, 2016. All examinations were performed satisfactory with no unexpected conditions, no abnormal conditions, and no identified degradation except for tendon H32-011 as discussed below. All inservice grease samples were within specifications. No free water was identified. On February 11, 2016, while performing a visual examination of the Unit 3 containment concrete surrounding the bearing plate on tendon H32-011, a void was found. The deepest point of the void was 2-3/4 inches deep and 1-3/4 inch across. There were no significant cracks in the base concrete in this transition area and no exposed rebar, tendons, or indication of any corrosion of any metal imbedded in the concrete. Additional evaluations for extent of condition were requested in the original corrective report as well as corrective maintenance work orders to repair the identified void.

Table 3.5.5-7, "PVNGS Unit 1 IWL Concrete Examination, 2016 – 2017"; Table 3.5.5-8, "PVNGS Unit 2 IWL Concrete Examination, 2016 – 2017"; and Table 3.5.5-9, "PVNGS Unit 3 IWL Concrete Examination, 2016 – 2017," in Attachment 6 of the enclosure to the LAR, record detailed examination results of the recent IWL examinations. The licensee performed the examinations in accordance with the IWL requirements and stated that the assessment results were all acceptable.

Based on the NRC staff's review of these tables, the NRC staff finds that the licensee conducted examinations for all three containments in accordance with the ASME BPV Code, Section XI, Subsection IWL, requirements, and all examinations were performed satisfactorily with no unexpected conditions, no abnormal conditions, and no identified degradation. All inservice grease samples were within specifications and no free water was identified. A void was found in Unit 3 near tendon H32-011, and the void was later repaired. Therefore, the NRC staff concludes that the Palo Verde containments meet the ASME BPV Code, Section XI, Subsection IWL, requirements, and the inspection results are acceptable.

3.2.4 Limitations and Conditions Applicable to NEI 94-01, Revision 2-A

In the NRC SER dated June 25, 2008, the NRC staff concluded that the guidance in NEI 94-01, Revision 2-A, is acceptable for reference by licensees proposing to amend their TSs regarding containment leakage rate testing, subject to six conditions. The requirements of NEI 94-01 stayed essentially the same from the original version through Revision 2 except that the regulatory positions of RG 1.163 were incorporated and the maximum ILRT interval extended to 15 years. Palo Verde TS 5.5.16 currently requires Types A, B, and C testing in accordance with RG 1.163, which endorses the methodology for complying with 10 CFR Part 50, Appendix J, Option B.

In Table 3.8.1-1, "NEI 94-01, Revision 2-A, Limitations and Conditions," of the enclosure to the LAR, the licensee described its responses to the six conditions identified in the SER dated June 25, 2008. The NRC staff has evaluated these responses to determine whether the licensee adequately addressed these conditions.

3.2.4.1 NEI 94-01, Revision 2-A, Condition 1

Limitation and Condition 1 of NEI 94-01, Revision 2-A states:

> For calculating the Type A leakage rate, the licensee should use the definition in the NEI TR 94-01, Revision 2, in lieu of that in ANSI/ANS-56.8-2002.

The licensee stated in the LAR that Palo Verde will use the definition in NEI 94-01 Revision 3-A, Section 5.0. This definition has remained unchanged from Revision 2-A to Revision 3-A of NEI 94-01, and is the one identified as acceptable and, therefore, the licensee has addressed and satisfied NRC Condition 1.

3.2.4.2 NEI 94-01, Revision 2-A, Condition 2

Limitation and Condition 2 of NEI 94-01, Revision 2-A states:

> The licensee submits a schedule of containment inspections to be performed prior to and between Type A tests.

The licensee provided a discussion in the LAR of containment inspections program and schedule in Section 3.5.2, "PVNGS Examination Program for Subsection IWE," Table 3.5.2-1, "PVNGS IWE Examination Program Inspection Intervals," and Section 3.5.3, "PVNGS Examination Program for Subsection IWL," Tables 3.5.3-1, -2, and -3, PVNGS IWL Inspection Intervals and Examination Dates for Units 1, 2, and 3, respectively. Based on the NRC staff's review of the licensee's discussion of the containment inspections program and schedule, the NRC staff finds that the licensee has adequately addressed and satisfied NRC Condition 2.

3.2.4.3 NEI 94-01, Revision 2-A, Condition 3

Limitation and Condition 3 of NEI 94-01, Revision 2-A states:

> The licensee addresses the areas of the containment structure potentially subjected to degradation.

The licensee described in LAR Sections 3.5.2 and 3.5.3 the Containment Examination Program, and LAR Tables 3.5.2-2, "PVNGS Third Interval Examination Summary," 3.5.3-4, "Subsection IWL, Examination Category L-A, Concrete Examination Requirements," and 3.5.3-5, "Subsection IWL, Examination Category L-B, Unbonded Post-Tensioning System Inspection Requirements," summarize Code Category IWE and IWL. The NRC staff reviewed Sections 3.5.2 and 3.5.3 of the licensee's submittal and concludes that the containments meet the requirements of ASME BPV Code, Section XI, Subsections IWE and IWL, which would properly identify and address degradation. Therefore, the licensee has adequately addressed and satisfied NRC Condition 3.

3.2.4.4 NEI 94-01, Revision 2-A, Condition 4

Limitation and Condition 4 of NEI 94-01, Revision 2-A states:

> The licensee addresses any tests and inspections performed following major modifications to the containment structure, as applicable.

The licensee's response to Limitation and Condition 4 states that:

> Steam Generator replacements were performed using the installed equipment hatches.

> In the Unit 3 Containment, 80'-100' Level, a patch plate was welded over a gouge in the Containment Liner during Unit 3 Spring of 2017 refueling outage (3R18). The repair was then subject to the subsequent 3R18 ILRT.

The NRC staff finds that the licensee has met Condition 4 because the steam generators were successfully replaced, the patch plate on Unit 3 was successfully welded over a gouge in the containment liner, and the welded plate and the whole containment was able to contain the pressure of the subsequent ILRT. As described in the Palo Verde UFSAR (Reference 5), steam generators are designed to meet ASME BPV Code Section III. ASME BPV Code Section XI inservice inspection is required to perform necessary tests and inspections. Based on this, the licensee has adequately addressed Condition 4, and the licensee's response is acceptable.

3.2.4.5 NEI 94-01, Revision 2-A, Condition 5

Limitation and Condition 5 of NEI 94-01, Revision 2-A states:

> The normal Type A test interval should be less than 15 years. If a licensee has to utilize the provision of Section 9.1 of NEI 94-01, Revision 2, related to extending the ILRT interval beyond 15 years, the licensee must demonstrate to the NRC staff that it is an unforeseen emergent condition.

The licensee's response to Limitation and Condition 5 states:

> PVNGS will follow the requirements of NEI 94-01, Revision 3-A, Section 9.1. This requirement has remained unchanged from Revision 2-A to Revision 3-A of NEI 94-01.
>
> In accordance with the requirements of NEI 94-01, Revision 2-A, SER Section 3.1.1.2, PVNGS will also demonstrate to the NRC staff that an unforeseen emergent condition exists in the event an extension beyond the 15-year interval is required.

As stated above, the licensee will demonstrate to the NRC that an unforeseen emergent condition exists in the event an extension beyond the 15-year interval is required. Because extending the ILRT interval beyond 15 years is not expected at this time, the licensee's statement that a demonstration will be made if warranted serves to adequately address NRC Condition 5.

3.2.4.6 NEI 94-01, Revision 2-A, Condition 6

Limitation and Condition 6 of NEI 94-01, Revision 2-A states:

> For plants licensed under 10 CFR Part 52, applications requesting a permanent extension of the ILRT surveillance interval to 15 years should be deferred until after the construction and testing of containments for that design have been completed and applicants have confirmed the applicability of NEI TR 94-01, Revision 2, and EPRI Report No. 1009325, Revision 2, including the use of past ILRT data.

The NRC staff found that Condition 6 is not applicable to Palo Verde because it was not licensed under 10 CFR Part 52.

3.2.5 NRC SE Conditions in NEI 94-01, Revision 3-A

The NRC staff in its approval of NEI 94-01, Revision 3, found that the guidance in Revision 3 was acceptable for referencing by licensees in the implementation of the optional performance-based requirements of Option B to 10 CFR Part 50, Appendix J. However, the NRC staff identified two conditions on the use of NEI 94-01, Revision 3 (Reference NEI 94-01, Revision 3-A, NRC SER 4.0, Limitations and Conditions):

Condition 1 states:

> NEI TR 94- 01, Revision 3, is requesting that the allowable extended interval for Type C LLRTs be increased to 75 months, with a permissible extension (for non-routine emergent conditions) of nine months (84 months total). The [NRC] staff is allowing the extended interval for Type C LLRTs be increased to 75 months with the requirement that a licensee's post-outage report include the margin between the Type B and Type C leakage rate summation and its regulatory limit. In addition, a corrective action plan shall be developed to restore the margin to an acceptable level. The [NRC] staff is also allowing the non-routine emergent extension out to 84 months as applied to Type C valves at a site, with some exceptions that must be detailed in NEI 94-01, Revision 3. At no time shall an extension be allowed for Type C valves that are restricted categorically (e.g., BWR [boiling-water reactor] MSIVs [main steam isolation valves]), and those valves with a history of leakage, or any valves held to either a less than maximum interval or to the base refueling cycle interval. Only non-routine emergent conditions allow an extension to 84 months.

The licensee’s response to Condition 1

NRC’s Condition 1on the use of NEI 94-01 presents three separate issues:

(1) The allowance of an extended interval for Type C LLRTs of 75 months carries the requirement that a licensee's post-outage report include the margin between the Type B and Type C leakage rate summation and its regulatory limit.

The licensee’s response to Condition 1, Issue 1:

> The post-outage report shall include the margin between the Type B and Type C Minimum Pathway Leak Rate (MNPLR) summation value, as adjusted to include the estimate of applicable Type C leakage understatement, and its regulatory limit of 0.60 L_a.

(2) A corrective action plan shall be developed to restore the margin to an acceptable level.

The licensee’s response, in part, to Condition 1, Issue 2:

> When the potential leakage understatement adjusted Types B and C MNPLR total is greater than the PVNGS Units 1, 2, and 3, administrative leakage summation limit of 0.5 L_a, but less than the regulatory limit of 0.6 L_a, then an

analysis and determination of a corrective action plan shall be prepared to restore the leakage summation margin to less than the PVNGS leakage limit.

(3) Use of the allowed 9-month extension for eligible Type C valves is only authorized for non-routine emergent conditions.

The licensee's response to Condition 1, Issue 3:

> PVNGS Units 1, 2, and 3 will apply the 9-month allowable interval extension period only to eligible Type C components and only for non-routine emergent conditions. Such occurrences will be documented in the record of tests.

The NRC staff has reviewed the Limitations and Conditions of NEI 94 01, Revision 3, against the licensee's responses for Issues (1), (2), and (3) of NEI 94 01, Revision 3, Condition 1. Based on this review, the NRC staff concludes that the licensee acknowledges the conditions NRC has placed on licensee use of NEI 94-01 and that it has established its intent for Palo Verde to comply with Condition 1.

Condition 2 states:

> The basis for acceptability of extending the ILRT interval out to once per 15 years was the enhanced and robust primary containment inspection program and the local leakage rate testing of penetrations. Most of the primary containment leakage experienced has been attributed to penetration leakage and penetrations are thought to be the most likely location of most containment leakage at any time. The containment leakage condition monitoring regime involves a portion of the penetrations being tested each refueling outage, nearly all LLRTs being performed during plant outages. For the purposes of assessing and monitoring or trending overall containment leakage potential, the as-found minimum pathway leakage rates for the just tested penetrations are summed with the as-left minimum pathway leakage rates for penetrations tested during the previous 1 or 2 or even 3 refueling outages. Type C tests involve valves, which in the aggregate, will show increasing leakage potential due to normal wear and tear, some predictable and some not so predictable. Routine and appropriate maintenance may extend this increasing leakage potential. Allowing for longer intervals between LLRTs means that more leakage rate test results from farther back in time are summed with fewer just tested penetrations and that total is used to assess the current containment leakage potential. This leads to the possibility that the LLRT totals calculated understate the actual leakage potential of the penetrations. Given the required margin included with the performance criterion and the considerable extra margin most plants consistently show with their testing, any understatement of the LLRT total using a 5-year test frequency is thought to be conservatively accounted for. Extending the LLRT intervals beyond 5 years to a 75-month interval should be similarly conservative provided an estimate is made of the potential understatement and its acceptability determined as part of the trending specified in NEI TR 94-01, Revision 3, Section 12.1.
>
> When routinely scheduling any LLRT valve interval beyond 60-months and up to 75 months, the primary containment leakage rate testing program trending or monitoring must include an estimate of the amount of understatement in the

> Types B and C total leakage and must be included in a licensee's post-outage report. The report must include the reasoning and determination of the acceptability of the extension, demonstrating that the LLRT totals calculated represent the actual leakage potential of the penetrations.

The licensee's response to Condition 2

NRC's Condition 2 on the use of NEI-94-01 presents two separate issues:

(1) Extending the Type C, LLRT intervals beyond 5 years to a 75-month interval should be similarly conservative provided an estimate is made of the potential understatement and its acceptability determined as part of the trending specified in NEI 94-01, Revision 3, Section 12.1;

The licensee's response, in part, to Condition 2, Issue 1:

> PVNGS Units 1, 2, and 3 will conservatively apply a potential leakage understatement adjustment factor of 1.25 to the actual As-Left leak rate, which will increase the As-Left leakage total for each Type C component currently on greater than a 60-month test interval up to the 75-month extended test interval. This will result in a combined conservative Type C total for all 75-month LLRTs being "carried forward" and will be included whenever the total leakage summation is required to be updated (either while on-line or following an outage).
>
> When the potential leakage understatement adjusted leak rate total for those Type C components being tested on greater than a 60-month test interval up to the 75-month extended test interval is summed with the non-adjusted total of those Type C components being tested at less than or equal to a 60-month test interval, and the total of the Type B tested components, results in the MNPLR being greater than the PVNGS administrative leakage summation limit of 0.50 La, but less than the regulatory limit of 0.6 La, then an analysis and corrective action plan shall be prepared to restore the leakage summation value to less than the PVNGS leakage limit.

(2) When routinely scheduling any LLRT valve interval beyond 60-months and up to 75-month, the primary containment leakage rate testing program trending or monitoring must include an estimate of the amount of understatement in the Type B and C total and must be included in a licensee's post-outage report. The report must include the reasoning and determination of the acceptability of the extension, demonstrating that the LLRT totals calculated represent the actual leakage potential of the penetrations.

The licensee's response, in part, to Condition 2, Issue 2:

> If the potential leakage understatement adjusted leak rate MNPLR is less than the PVNGS administrative leakage summation limit of 0.50 L_a, then the acceptability of the greater than a 60-month test interval up to the 75-month LLRT extension for all affected Type C components has been adequately demonstrated and the calculated local leak rate total represents the actual leakage potential of the penetrations. …

> A post-outage report shall be prepared presenting results of the previous cycle's Type B and Type C tests, and Type A, Type B and Type C tests, if performed during that outage. The technical contents of the report are generally described in ANSI/ANS-56.8-2002…. …
>
> At PVNGS, in the event an adverse trend in the potential leakage understatement adjusted Types B and C summation is identified, then an analysis and determination of a corrective action plan shall be prepared to restore the trend and associated margin to an acceptable level. …
>
> At PVNGS, an adverse trend is defined as three (3) consecutive increases in the final pre-mode change Types B and C MNPLR leakage summation values, as adjusted to include the estimate of applicable Type C leakage understatement, as expressed in terms of L_a.

The NRC staff has reviewed the Limitations and Conditions of NEI 94 01, Revision 3 against the licensee's responses to Issues (1) and (2) of NEI 94 01, Revision 3, Condition 2. Based on this review, the NRC staff concludes that the licensee acknowledges the conditions NRC has placed on licensee use of NEI 94-01 and that it has established its intent for Palo Verde to comply with Condition 2.

Based on the above evaluation of each condition, the NRC staff determined that the licensee has adequately addressed both conditions in Section 4.0 of the NRC SER for NEI 94-01, Revision 3-A. Therefore, the NRC staff finds it acceptable for Palo Verde, Units 1, 2, and 3 to adopt NEI 94-01, Revision 3-A, as the implementation document in TS 5.5.16 for Units 1, 2, and 3.

3.3 Risk Insights

3.3.1 Plant-Specific Risk Evaluation

The licensee provided a plant-specific risk assessment for permanently extending the currently allowed containment Type A ILRT interval from 10 years to 15 years in Attachment 1, "Evaluation of Risk Significance of Permanent ILRT Extension," of the enclosure to the LAR.

The licensee states that the plant-specific risk assessment follows the guidance in NEI 94-01, Revision 3-A; the methodology described in EPRI TR-1018243 (also identified as EPRI TR No. 1009325, Revision 2-A, October 2008); the NRC regulatory guidance on the use of PRA as stated in RG 1.200 as applied to ILRT interval extensions; and the NRC regulatory guidance outlined in RG 1.174. Additionally, the licensee applied the methodology similar in nature to license amendments to extend the Type A Test Frequency to 15 years and the Type C test frequency to 75 months as previously authorized by the NRC for McGuire Nuclear Station, Units 1 and 2, dated January 31, 2018 (Reference 16); Vogtle Electric Generating Plant, Units 1 and 2, dated October 29, 2018 (Reference 17); and Braidwood Station, Units 1 and 2, and Byron Station, Units 1 and 2, issued September 10, 2020. (Reference 18).

3.3.2 PRA Technical Adequacy – Condition 1

The first condition stipulates that the licensee submit documentation indicating that the technical adequacy of its PRA is consistent with the guidance in RG 1.200 relevant to the ILRT extension application. Consistent with RG 1.200 and as described in RG 1.177, Revision 2, Section 2.3.1,

"Acceptability of the Probabilistic Risk Assessment" (Reference 19), which states in part, "[t]he PRA used to support the TS change evaluation is measured in terms of its appropriateness with respect to scope, level of detail, conformance to the technical elements, and plant representation. These aspects of the PRA are to be commensurate with its intended use and the role the PRA results play in justifying the TS change." In Section 3.2.4.1, "Quality of the PRA," of the SER for EPRI Report No. 1009325, the NRC staff states that Capability Category I of the ASME RA-Sa-2003, "Standard for Probabilistic Risk Assessment for Nuclear Power Plant Applications," shall be applied as the standard for assessing PRA quality for ILRT extension applications, since approximate values of core damage frequency (CDF) and large early release frequency (LERF) and their distribution among release categories are sufficient to support the evaluation of changes to ILRT frequencies. The SER also states the assessment of external events can be taken from existing, previously submitted and approved analyses, or other alternate method of assessing an order of magnitude estimate for contribution of the external event to the impact of the changed interval.

The licensee addresses the Palo Verde PRA technical adequacy in Section 3.4.2 of the enclosure to the LAR and stated that the Palo Verde PRA has undergone numerous peer reviews and fact and observation (F&O) closure reviews. All finding level F&Os have been resolved and F&O closure reviews performed to document closures. There are no open finding level F&Os associated with the PRA.

3.3.2.1 Internal Events and Internal Flooding

As discussed in Section 3.4.2 of the enclosure to the LAR, the internal events PRA model was peer reviewed in July 1999 by the Combustion Engineering Owners Group (CEOG) prior to the issuance of RG 1.200. As a result, a self-assessment of the internal events PRA model was conducted for Palo Verde in March 2011 in accordance with Appendix B of RG 1.200, Revision 2, to address the PRA quality requirements not considered in the CEOG peer review. This internal events PRA quality (including the CEOG peer review and self-assessment results) had previously been reviewed by the NRC in requests to extend the Inverter TS Completion Time dated September 29, 2010 (Reference 20) and to implement Technical Specifications Task Force (TSTF) Traveler TSTF-425, "Relocate Surveillance Frequencies to Licensee Control – RITSTF [Risk-Informed TSTF] Initiative 5b," dated December 15, 2011 (Reference 21). All PRA upgrades as defined by the ASME/ANS RA-Sa-2009 PRA Standard, "Addenda to ASME/ANS RA-S-2008, Standard for Level 1/Large Early Release Frequency Probabilistic Risk Assessment for Nuclear Power Plant Applications," dated February 2009 (Reference 22), have been implemented since conduct of the CEOG peer review.

The licensee conducted a focused-scope PRA peer review of the Palo Verde internal flood PRA to determine compliance with the PRA Standard and RG 1.200, Revision 2 in 2010. Focused-scope peer reviews of all F&Os that constituted an upgrade to the PRA were performed in 2017, 2018, and 2020. All F&Os were subsequently reviewed and confirmed closed during the concurrent F&O closure reviews.

3.3.2.2 Fire Hazards

The licensee conducted a full-scope Palo Verde fire PRA peer review in 2012. In 2014, after updating the Palo Verde fire PRA to address selected F&Os identified in the full-scope fire PRA peer review, a focused-scope peer review was performed. For all F&O resolutions that constituted an upgrade to the fire PRA, closure reviews were performed to close all outstanding F&Os.

3.3.2.3 Seismic Hazards

The licensee conducted a full-scope seismic PRA model peer review in February 2013, in accordance with ASME/ANS RA-Sa-2009 PRA Standard and NEI 12-13 “External Hazards PRA Peer Review Process Guidelines,” August 2012 (Reference 23), in which all finding F&Os were resolved. A focused-scope peer review of all F&O resolutions that constituted an upgrade to the PRA were performed and all F&Os were reviewed and confirmed closed during the F&O closure reviews.

3.3.2.4 Other External Hazards

The licensee conducted a full-scope external hazards screening peer review in December 2011, in accordance with RG 1.200, Revision 2. All F&Os were resolved and subsequently confirmed closed during an F&O closure review performed in 2018.

For this application, the licensee also stated that Palo Verde conducted a review of RG 1.200, Revision 3, dated December 2020 (Reference 24), to determine if there were any impacts with implementing a permanent extension of the Palo Verde containment Type A ILRT interval from 10 years to 15 years. The review of RG 1.200 from Revision 2 to Revision 3 did not identify any impacts to the PRA model that is used for the plant-specific risk assessment conducted to support this LAR.

Based on the above, the NRC staff determined that the licensee has assessed PRA models against the ASME/ANS RA-Sa-2009 PRA standard and RG 1.200 as appropriate. There have been many industry peer reviews between 2010 and 2020, with a mix of full-scope and focused-scope reviews, and all F&Os were closed as assessed by the licensee as part of this LAR. Therefore, the NRC staff concludes that the PRA models used by the licensee are of sufficient quality to support the evaluation of changes to ILRT frequencies. Accordingly, the first condition is met.

3.3.3 Estimated Risk Increase – Condition 2

The second condition stipulates that the licensee submit documentation indicating that the estimated risk increase associated with permanently extending the ILRT interval to 15 years is “small,” consistent with the guidance in RG 1.174 and the clarification provided in Section 4.2, “Limitations and Conditions for EPRI Report No. 1009325, Revision 2,” of the NRC SER dated June 25, 2008 for NEI 94-01 and EPRI Report No. 1009325.

The licensee reported the results of the plant-specific risk assessment in Section 3.4, “Plant Specific Confirmatory Analysis,” and Attachment 1 of the enclosure to the LAR. The reported risk impacts are based on a change in the Type A containment ILRT frequency from three tests in 10 years (the test frequency under 10 CFR Part 50 Appendix J, Option A) to one test in 15 years and account for the risk from undetected containment leaks due to steel liner corrosion. The following conclusions can be drawn from the licensee’s analysis associated with extending the Type A ILRT frequency:

1. RG 1.174 provides guidance for determining the risk impact of plant-specific changes to the licensing basis. RG 1.174 defines “small” changes in risk as resulting in increases of CDF greater than 1.0E-06/year and less than 1.0E-05/year and increases in LERF greater than 1.0E-07/year and less than 1.0E-06/yr. RG 1.174 also states that when the

calculated increase in LERF is in the "small" range of 1.0E-07 per reactor year to 1.0E-06 per reactor year, applications will be considered only if it can be reasonably shown that the total LERF is less than 1.0E-05 per reactor year. As discussed in LAR Section 3.4, the extension of the ILRT interval from three in 10 years to one in 15 years does not impact CDF. Since the ILRT does not impact CDF, the relevant criterion is LERF. The increase in LERF resulting from a change in the Type A ILRT test interval is estimated as 1.77E-07/year using the EPRI guidance; this value increases negligibly if the risk impact of corrosion-induced leakage of the steel liners occurring and going undetected during the extended test interval is included. Given that the change in LERF is greater than 1.0E-7/year and less than 1.0E-6/year, RG 1.174 states that applications will be considered only if it can be reasonably shown that the total LERF is less than 1.0E-05/year. Total internal events and internal flood LERF (baseline and change in LERF due to the ILRT extension) is 9.83E-07/year for Palo Verde. Therefore, the estimated change in LERF is determined to be "small" using the acceptance guidelines of RG 1.174.

2. The effect resulting from changing the Type A test frequency to one test in 15 years, measured as an increase to the total integrated plant risk influenced by Type A testing is 0.12 person-rem/year. NEI 94-01 states that a "small" population dose is defined as an increase of ≤ 1.0 person-rem per year, or ≤ 1 percent of the total population dose, whichever is less restrictive for the risk impact assessment of the extended ILRT intervals. Therefore, the results of this calculation meet the above criteria. Moreover, the risk impact for the ILRT extension when compared to other severe accident risks is negligible.

3. The increase in the conditional containment failure (CCFP) probability from the three in 10 years interval to one in 15 years interval is calculated to be 0.881 percent. NEI 94-01 states that increases in CCFP of ≤ 1.5 percent is "small." Therefore, this increase is judged to be "small" since it represents a small change to the Palo Verde risk profile.

Based on the Palo Verde risk assessment results, the NRC staff concludes that the increase in LERF is "small" and within the acceptance guidelines of RG 1.174, and the increase in the total population dose and the magnitude of the change in the CCFP for the proposed change are also "small."

Furthermore, the defense-in-depth and safety margin philosophy is maintained since the extension of testing frequencies of Type A from 10 years to 15 years and Type C from 60 months to 75 months does not involve either a physical change to the plant or a change in the way the plant is operated or controlled, and the use of the quantitative risk metrics collectively ensures that the balance between prevention of core damage, prevention of containment failure, and consequence mitigation is preserved. Accordingly, the second condition is met.

3.3.4 Leak Rate for the Large Pre-Existing Containment Leak Rate Case – Condition 3

The third condition stipulates that the average leak rate for the pre-existing containment large leak rate accident case (i.e., accident case 3b) used by the licensees should be 100 L_a instead of 35 L_a. As noted by the licensee in Table 3.4.1-1 and in Attachment 1 of the enclosure to the LAR, the methodology in EPRI Report No. 1009325, Revision 2-A, incorporated the use of 100 L_a as the average leak rate for the pre-existing containment large leakage rate accident

case (accident case 3b), and this value has been used in the Palo Verde plant-specific risk assessment. Accordingly, the third condition is met.

3.3.5 Containment Over-pressure is Relied Upon for ECCS Performance – Condition 4

The fourth condition stipulates that in instances where containment over-pressure is relied upon for emergency core cooling system (ECCS) performance, a LAR is required to be submitted. In LAR Table 3.4.1-1, the licensee states that Palo Verde does not rely on containment overpressure for ECCS performance. Accordingly, the fourth condition is not applicable.

3.3.6 Adopt the Use of ANSI/ANS 56.8-2002:

Use of NEI 94-02 requires a licensee to adopt the use of ANSI/ANS 56.8-2002 as part of the proposed change to extend the testing frequencies of the Type A ILRT from 10 years to 15 years and Type C from 60 months to 75 months. In previous reviews of NEI 94-01, Revision 2, and EPRI Report No. 1009325, Revision 2, the NRC staff finds that the Type A testing methodology, as described in ANSI/ANS-56.8-2002 and the modified testing frequencies recommended by NEI 94-01 serve to ensure continued leakage integrity of the containment structure, and Type B and Type C testing ensures that individual penetrations are essentially leak tight. In addition, aggregate Type B and Type C leakage rates support the leakage tightness of primary containment by minimizing potential leakage paths. Therefore, the NRC staff concludes that the adoption of ANSI/ANS-56.8-2002 by Palo Verde has no adverse impact on the proposed changes to the testing frequency of Type A and Type C as the use of this methodology was previously reviewed and approved by the NRC.

3.4 Evaluation of CIV Leakage Rate Testing Frequency Extension

The current Code of record for the Inservice Testing (IST) Program at Palo Verde, Units 1, 2, and 3, is the 2012 Edition of the ASME Operation and Maintenance of Nuclear Power Plants, Division 1, OM Code: Section IST (OM Code), as incorporated by reference in 10 CFR 50.55a. ASME OM Code (2012 Edition), Subsection ISTC, “Inservice Testing of Valves in Light-Water Reactor Nuclear Power Plants,” paragraph ISTC-3620, “Containment Isolation Valves,” specifies that CIVs with a leakage rate requirement based on 10 CFR Part 50, Appendix J, shall be tested in accordance with the Owner’s 10 CFR Part 50, Appendix J, program.

In a request for additional information (RAI), the NRC staff requested the licensee to discuss the basis for not including an alternative request to the ASME OM Code requirements in accordance with 10 CFR 50.55a(z), “Alternatives to codes and standards requirements,” as part of the LAR to extend the leakage rate test interval for the applicable CIVs at Palo Verde, Units 1, 2, and 3. In its supplemental letter dated June 22, 2021, the licensee stated that testing will continue to be performed in accordance with the applicable provisions of 10 CFR Part 50, Appendix J, as required by the ASME OM Code. The licensee clarified its LAR to specify that it proposes an extension of the Type C test interval for Palo Verde, Units 1, 2, and 3. In particular, the LAR notes that Type C tests are currently required to be performed at no longer than 60-month intervals in accordance with NEI 94-01, Revision 0. The proposed amendment and adoption of NEI 94-01, Revision 3-A, would extend the Type C test interval to no longer than 75 months from the last Type C test, with a permissible extension period of 9 months (total of 84 months) for non-routine emergent conditions, based on acceptable performance.

In another RAI, the NRC staff requested the licensee to provide a description of the performance of the applicable CIVs that supports the proposed extension of the CIV leakage

rate testing (Type C) interval. In its supplemental letter dated June 22, 2021, the licensee stated that Type C test intervals will be established in accordance with NEI 94-01, Revision 3-A, Section 10.2.3.2, "Extended Test Interval," which specifies, in part, that "Test intervals for Type C valves should be determined by a licensee in accordance with Section 11.0." NEI 94-01, Section 11.1, "Introduction," specifies, in part, that "Additional programmatic controls are discussed in Section 11.3.2 and shall be considered when the extended test intervals are greater than 60 months." The licensee stated that without the completion of the above analysis for any Type C tested component, that component will not be eligible for the extension from a 60-month test interval to a 75-month test interval. As a result, the evaluation for the component testing extensions is a process that is based upon performance at the time of consideration for extension. The licensee stated that none of the CIV leakage rate testing (Type C) intervals have yet been formally evaluated for extension at this time.

Based on the information provided in the LAR and the RAI response, the NRC staff finds that the licensee has provided adequate information to justify the process for extending the CIV leakage rate testing (Type C) interval that may be implemented at Palo Verde, Units 1, 2 and 3, as described in the LAR.

3.5 Evaluation of TS Changes

The licensee proposed to change Palo Verde Units 1, 2, and 3 TS 5.5.16 as described in Section 2.2 of this safety evaluation. Based on the preceding regulatory and technical evaluations, the NRC staff concludes that the proposed changes to Palo Verde TS 5.5.16 to replace the reference to RG 1.163 with a reference to the guidelines contained in NEI 94-01, Revision 3-A, dated July 2012, and the conditions and limitations specified in NEI 94-01, Revision 2-A, dated October 2008 are acceptable and continue to meet 10 CFR 50.36(c)(5).

In addition, the current TS 5.5.16.a exceptions 3, 4 and 5 describe Type A (ILRT) test dates that occurred in the past and were performed. The LAR proposes to delete TS 5.5.16.a exceptions 3, 4 and 5. Specifically, as indicated in LAR enclosure Table 3.3.4-1, the first Unit 1 Type A test after the November 1999 ILRT was completed in November 2014. Similarly, the first Unit 2, Type A test after the November 2000 ILRT was completed in October 2015 and the first Unit 3 Type A test after the April 2000 ILRT was completed in April 2015. Since the Type A tests associated with the three exceptions (i.e., exceptions 3, 4 and 5 associated with Units 1, 2, and 3, respectively) were performed, the NRC staff concludes that the deletion of TS 5.5.16 exceptions 3, 4 and 5 is acceptable.

3.6 Technical Conclusion

Based on its review of the LAR, the NRC staff finds that the licensee has adequately implemented its containment leakage rate testing program consisting of ILRT and LLRT. The results of the recent ILRTs and of LLRT combined totals demonstrate acceptable performance and support a conclusion that the structural and leaktight integrity of the primary containment vessel is adequately managed and will continue to be periodically monitored and managed effectively by the licensee's containment leakage rate testing program. The NRC staff finds that the licensee has addressed the limitations and conditions identified in the NRC staff SER incorporated in NEI 94-01, Revision 2-A. Therefore, the NRC staff finds that the proposed changes to the Palo Verde TS 5.5.16 regarding the primary containment leakage rate testing program are acceptable.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Arizona State official was notified of the proposed issuance of the amendments on November 30, 2021. The State official had no comments.

5.0 ENVIRONMENTAL CONSIDERATION

The amendments change requirements with respect to installation or use of facility components located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendments involve no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendments involve no significant hazards consideration, published in the *Federal Register* on March 23, 2021 (86 FR 15504), and there has been no public comment on such finding. Accordingly, the amendments meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendments.

6.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) there is reasonable assurance that such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendments will not be inimical to the common defense and security or to the health and safety of the public.

7.0 REFERENCES

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2. Rash, B., Arizona Public Service Company, letter to U.S. Nuclear Regulatory Commission, "Response to Request for Additional Information for Permanent Extension of Type A and Type C Leak Rate Test Frequencies," dated June 22, 2021 (ADAMS Accession No. ML21173A360).

3. Nuclear Energy Institute, "Industry Guideline for Implementing Performance-Based Option of 10 CFR Part 50, Appendix J," NEI 94-01, Revision 3-A, dated July 2012 (ADAMS Accession No. ML12221A202).

4. Nuclear Energy Institute, "Industry Guideline for Implementing Performance-Based Option of 10 CFR Part 50, Appendix J," NEI 94-01, Revision 2-A, dated October 2008 (ADAMS Accession No. ML100620847).

5. Arizona Public Service Company, Palo Verde Nuclear Generating Station, Units 1, 2, and 3 Updated Final Safety Analysis Report, Revision 21, Chapter 6, "Engineering Safety Features," dated June 2021 (ADAMS Accession No. ML21201A262).

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7. Thomas, C., U.S. Nuclear Regulatory Commission, letter to W. L., Stewart, Arizona Public Service Company, “Issuance of Amendments for the Palo Verde Nuclear Generating Station Unit No. 1 (TAC No. M94295), Unit No. 2 (TAC No. M94296), and Unit No. 3 (TAC No. M94297),” dated February 23, 1996 (ADAMS Accession No. ML021710536).

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11. Bahadur, S., U.S. Nuclear Regulatory Commission, letter to Biff Bradley, Nuclear Energy Institute, “Final Safety Evaluation of Nuclear Energy Institute (NEI) Report, 94-01, Revision 3, ‘Industry Guideline for Implementing Performance-Based Option of 10 CFR Part 50, Appendix J,’” dated June 8, 2012 (ADAMS Accession No. ML121030286).

12. U.S. Nuclear Regulatory Commission, “An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis,” Regulatory Guide 1.174, Revision 3, dated January 2018 (ADAMS Accession No. ML17317A256).

13. U.S. Nuclear Regulatory Commission, “An Approach for Plant-Specific, Risk-Informed Decisionmaking: Technical Specifications,” Regulatory Guide 1.177, Revision 1, dated May 2011 (ADAMS Accession No. ML100910008).

14. U.S. Nuclear Regulatory Commission, “An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities,” Regulatory Guide 1.200, Revision 2, dated March 2009 (ADAMS Accession No. ML090410014).

15. American National Standards Institute/American Nuclear Society, “Containment System Leakage Testing Requirements,” ANSI/ANS 56.8-2002, dated November 27, 2002.

16. Mahoney, M., U.S. Nuclear Regulatory Commission, letter to T. Ray, Duke Energy Carolinas, LLC, "McGuire Nuclear Station, Units 1 and 2 – Issuance of Amendments to Extend the Containment Type A Leak Rate Test Frequency to 15 Years and Type C Leak Rate Test Frequency to 75 Months (CAC Nos. MF9020 and MF9021; EPID L-2016-LLA-0032)," dated January 31, 2018 (ADAMS Accession No. ML18009A842).

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Date: December 22, 2021

SUBJECT: PALO VERDE NUCLEAR GENERATING STATION, UNITS 1, 2, AND 3 - ISSUANCE OF AMENDMENTS REGARDING PERMANENT EXTENSION OF TYPE A AND TYPE C LEAK RATE TEST FREQUENCIES (EPID L-2021-LLA-0006) DATED DECEMBER 22, 2021

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RidsACRS_MailCTR Resource
RidsNrrDorlLpl4 Resource
RidsNrrDexEmib Resource
RidsNrrDexEseb Resource
RidsNrrDraArcb Resource
RidsNrrDssStsb Resource
RidsRgn4MailCenter Resource
RidsNrrLAPBlechman Resource
RidsNrrPMPaloVerde Resource
CAshley, NRR
NChien, NRR
TDinh, NRR
JMa, NRR
TScarbrough, NRR

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OFFICE	NRR/DORL/LPL4/PM*	NRR/DORL/LPL4/LA*	NRR/DSS/SCPB/BC*	NRR/DEX/ESEB/BC*
NAME	SLingam	PBlechman	BWittick	JColaccino
DATE	12/14/2021	12/15/2021	8/30/2021	11/18/2021
OFFICE	NRR/DRA/ARCB/BC*	NRR/DEX/EMIB/BC (A)*	NRR/DSS/STSB/BC*	OGC NLO*
NAME	KHsueh	ITseng (RWolfgang for)	VCusumano	MWright
DATE	11/22/2021	12/20/2021	12/17/2021	12/21/2021
OFFICE	NRR/DORL/LPL4/BC**	NRR/DORL/LPL4/PM*		
NAME	JDixon-Herrity (SLee for)	SLingam		
DATE	12/22/2021	12/22/2021		

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