



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

September 8, 2016

Mr. Randall K. Edington
Executive Vice President Nuclear/
Chief Nuclear Officer
Mail Station 7602
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 TO REVISE EMERGENCY ACTION LEVELS
TO A SCHEME BASED ON NUCLEAR ENERGY INSTITUTE NEI 99-01,
REVISION 6 (CAC NOS. MF6803, MF6804, AND MF6805)

Dear Mr. Edington:

The U.S. Nuclear Regulatory Commission (NRC) has issued the enclosed Amendment No. 198 to Renewed Facility Operating License No. NPF-41, Amendment No. 198 to Renewed Facility Operating License No. NPF-51, and Amendment No. 198 to Renewed Facility Operating License No. NPF-74 for the Palo Verde Nuclear Generating Station, Units 1, 2, and 3, respectively. The amendments consist of changes to the emergency action level (EAL) scheme in response to your application dated October 9, 2015, as supplemented by letter dated May 12, 2016.

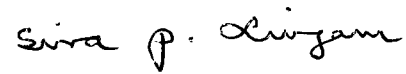
The amendments revise your current EAL scheme based on the Nuclear Energy Institute (NEI) guidance document NEI 99-01, Revision 5, "Development of Emergency Action Levels for Non-Passive Reactors," to one based on NEI 99-01, Revision 6. NEI 99-01, Revision 6, was endorsed by the NRC by letter dated March 28, 2013 (Agencywide Documents Access and Management System Package Accession No. ML13091A209).

R. Edington

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

Sincerely,



Siva P. Lingam, Project Manager
Plant Licensing Branch IV-1
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. 198 to NPF-41
2. Amendment No. 198 to NPF-51
3. Amendment No. 198 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

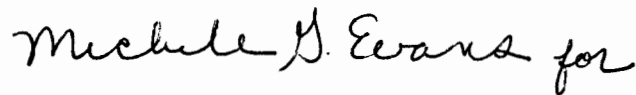
Amendment No. 198
License No. NPF-41

1. The Nuclear Regulatory Commission (NRC, 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 October 9, 2015, as supplemented by letter dated May 12, 2016, 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.

Enclosure 1

2. Accordingly, by Amendment No. 198, Renewed Facility Operating License No. NPF-41 is hereby amended to authorize revision to the Emergency Action Level Technical Bases Document as set forth in APS's application dated October 9, 2015, as supplemented by letter dated May 12, 2016, and evaluated in the NRC staff's safety evaluation enclosed with this amendment.
3. This license amendment is effective as of the date of issuance and shall be implemented within 365 days of the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION



William M. Dean, Director
Office of Nuclear Reactor Regulation

Date of Issuance: September 8, 2016



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

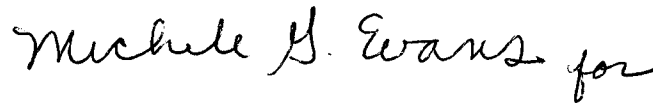
ARIZONA PUBLIC SERVICE COMPANY, ET AL.
DOCKET NO. STN 50-529
PALO VERDE NUCLEAR GENERATING STATION, UNIT 2
AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 198
License No. NPF-51

1. The Nuclear Regulatory Commission (NRC, 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 October 9, 2015, as supplemented by letter dated May 12, 2016, 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, by Amendment No. 198, Renewed Facility Operating License No. NPF-51 is hereby amended to authorize revision to the Emergency Action Level Technical Bases Document as set forth in APS's application dated October 9, 2015, as supplemented by letter dated May 12, 2016, and evaluated in the NRC staff's safety evaluation enclosed with this amendment.
3. This license amendment is effective as of the date of issuance and shall be implemented within 365 days of the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION



William M. Dean, Director
Office of Nuclear Reactor Regulation

Date of Issuance: September 8, 2016



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. 198
License No. NPF-74

1. The Nuclear Regulatory Commission (NRC, 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 October 9, 2015, as supplemented by letter dated May 12, 2016, 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, by Amendment No. 198, Renewed Facility Operating License No. NPF-71 is hereby amended to authorize revision to the Emergency Action Level Technical Bases Document as set forth in APS's application dated October 9, 2015, as supplemented by letter dated May 12, 2016, and evaluated in the NRC staff's safety evaluation enclosed with this amendment.
3. This license amendment is effective as of the date of issuance and shall be implemented within 365 days of the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Michelle G. Evans for

William M. Dean, Director
Office of Nuclear Reactor Regulation

Date of Issuance: September 8, 2016



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO AMENDMENT NOS. 198, 198, AND 198 TO RENEWED FACILITY
OPERATING LICENSE NOS. NPF-41, NPF-51, AND NPF-74
ARIZONA PUBLIC SERVICE COMPANY, ET AL.
PALO VERDE NUCLEAR GENERATING STATION, UNITS 1, 2, AND 3
DOCKET NOS. STN 50-528, STN 50-529, AND STN 50-530

1.0 INTRODUCTION

By application dated October 9, 2015 (Reference 1), as supplemented by letter dated May 12, 2016 (Reference 2), Arizona Public Service Company (APS, the licensee), requested changes to the emergency plan for the Palo Verde Nuclear Generating Station, Units 1, 2, and 3 (PVNGS). The proposed changes would revise the current emergency action level (EAL) scheme based on the Nuclear Energy Institute (NEI) guidance document NEI 99-01, Revision 5, "Development of Emergency Action Levels for Non-Passive Reactors," to one based on NEI 99-01, Revision 6 (Reference 3). NEI 99-01, Revision 6, was endorsed by the U.S. Nuclear Regulatory Commission (NRC or the Commission) by letter dated March 28, 2013 (Reference 4).

The supplemental letter dated May 12, 2016, provided additional information that clarified the application (including incorporation of recent emergency preparedness guidance), 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 December 8, 2015 (80 FR 76318).

2.0 REGULATORY EVALUATION

The NRC staff reviewed the proposed revision for the emergency plans against the regulations and guidance described below.

2.1 Regulations

Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.47, "Emergency plans," sets forth emergency plan requirements for nuclear power plant facilities. The regulations in 10 CFR 50.47(a)(1)(i) state, in part, that:

. . . no initial operating license for a nuclear power reactor will be issued unless a finding is made by the NRC that there is reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency.

Section 50.47(b) establishes the planning standards that the onsite and offsite emergency response plans must meet for NRC staff to make a finding that there is reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency. Planning Standard (4) of this section requires that onsite and offsite emergency response plans meet the following standard:

A standard emergency classification and action level scheme, the bases of which include facility system and effluent parameters, is in use by the nuclear facility licensee, and State and local response plans call for reliance on information provided by facility licensees for determinations of minimum initial offsite response measures.

Section 50.47(b)(4) emphasizes the use of a standard emergency classification and action level scheme, assuring that implementation methods are relatively consistent throughout the industry for a given reactor and containment design while simultaneously providing an opportunity for a licensee to modify its EAL scheme as necessary to address plant-specific design considerations or preferences.

Section IV.B of Appendix E, "Emergency Planning and Preparedness for Production and Utilization Facilities," to 10 CFR Part 50, states, in part, that:

The means to be used for determining the magnitude of, and for continually assessing the impact of, the release of radioactive materials shall be described, including emergency action levels that are to be used as criteria for determining the need for notification and participation of local and State agencies, the Commission, and other Federal agencies, and the emergency action levels that are to be used for determining when and what type of protective measures should be considered within and outside the site boundary to protect health and safety. The emergency action levels shall be based on in-plant conditions and instrumentation in addition to onsite and offsite monitoring. By June 20, 2012, for nuclear power reactor licensees, these action levels must include hostile action that may adversely affect the nuclear power plant.

Section IV.B.2 of Appendix E to 10 CFR Part 50 states, in part, that:

A licensee desiring to change its entire emergency action level scheme shall submit an application for an amendment to its license and receive NRC approval before implementing the change.

2.2 Guidance

The EAL development guidance was initially established in Generic Letter (GL) 79-50, dated October 10, 1979 (Reference 5), and was subsequently revised in NUREG-0654/FEMA-REP-1, Revision 1, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants," November 1980 (Reference 6), which was endorsed as an approach acceptable to the NRC for the development of an EAL scheme by NRC Regulatory Guide 1.101, Revision 2, "Emergency Planning and Preparedness for Nuclear Power Reactors," October 1981 (Reference 7).

As industry and regulatory experience was gained with the implementation and use of EAL schemes, the industry issued revised EAL scheme development guidance to reflect lessons learned, numerous of which have been provided to the NRC for review and endorsement as generic (i.e., non-plant-specific) EAL development guidance. Most recently, the industry provided to the NRC NEI 99-01, Revision 6. By letter dated March 28, 2013 (Reference 4), the NRC endorsed NEI 99-01, Revision 6, as acceptable generic (i.e., non-plant-specific) EAL scheme development guidance.

Although the EAL development guidance contained in NEI 99-01, Revision 6, is generic and may not be entirely applicable for some reactor designs, it bounds the most typical accident/event scenarios for which emergency response is necessary, in a format that allows for industry standardization and consistent regulatory oversight. Licensees may choose to develop plant-specific EAL schemes using NEI 99-01, Revision 6, with appropriate plant-specific alterations as applicable.

NRC Regulatory Issue Summary (RIS) 2003-18, including Supplements 1 and 2, "Use of NEI 99-01, 'Methodology for Development of Emergency Action Levels,'" dated October 8, 2003 (Reference 8), also provides guidance for developing or changing a standard EAL scheme. In addition, this RIS and its supplements provide recommendations to assist licensees, consistent with Section IV.B of Appendix E to Part 50, in determining whether to seek prior NRC approval of deviations from the guidance.

In summary, the NRC staff considers that NEI 99-01, Revision 6, dated November 2012, is an acceptable method to develop plant-specific EALs that meet the requirements of Section IV of Appendix E to 10 CFR Part 50 and 10 CFR 50.47(b)(4).

2.3 NRC Staff Review

The NRC staff verified that the proposed EAL scheme is consistent with the guidance provided in NEI 99-01, Revision 6, to assure that the proposed EAL scheme meets the requirements of Section IV of Appendix E to 10 CFR Part 50 and planning standard 10 CFR 50.47(b)(4). In its application, the licensee proposes to revise the current PVNGS EAL scheme based on

NEI 99-01, Revision 5, to one based on NEI 99-01, Revision 6. In its application and supplemental letter, the licensee submitted the proposed EAL scheme, the technical basis containing an evaluation and rationale for each proposed EAL change, and a comparison matrix providing a line-by-line comparison of the proposed initiating conditions, mode applicability, and EAL wording to that found in NEI 99-01, Revision 6. The comparison matrix also included a description of global changes applicable to the EAL scheme and a justification for any differences or deviations from NEI 99-01, Revision 6. The application states that the licensee used the terms “difference” and “deviation” as defined in RIS 2003-18, as supplemented, when comparing its proposed plant-specific EALs to the generic EALs in NEI 99-01, Revision 6.

The NRC staff reviewed the proposed site-specific EAL scheme, technical basis, comparison matrix, and all additional information provided in the licensee’s application and supplemental letter. The NRC staff found the proposed EALs have modifications from the NEI 99-01, Revision 6, guidance due to specific plant design, licensee preference, and the guidance in emergency preparedness frequently asked questions 2015-14 and 2015-15.

Although the EALs must be plant-specific, the NRC staff reviewed the proposed EALs for the following key characteristics of an effective EAL scheme to ensure consistency and regulatory stability, as outlined in NEI 99-01, Revision 6:

- Consistency, including standardization of intent, if not in actual wording (i.e., the EALs would lead to similar decisions under similar circumstances at different plants);
- Human factors engineering and user friendliness;
- Potential for emergency classification level upgrade only when there is an increasing threat to public health and safety;
- Ease of upgrading and downgrading the emergency classification level;
- Thoroughness in addressing and disposing of the issues of completeness and accuracy raised in Appendix 1 to NUREG-0654 (i.e., the EALs are unambiguous and are based on site-specific indicators);
- Technical completeness for each classification level;
- Logical progression in classification for multiple events; and
- The use of objective and observable values.

Based on its review, the NRC staff verified that the proposed EAL scheme uses objective and observable values, is worded in a manner that addresses human factors engineering and user friendliness concerns, follows logical progressions for escalating events, and allows for event downgrading and upgrading based upon the potential risk to the public health and safety. Risk assessments were appropriately used to set the boundaries of the emergency classification levels and ensure that all EALs that trigger an emergency classification are in the same range of

relative risk. In addition, the NRC staff has verified that the proposed EAL scheme is technically complete and consistent with EAL schemes implemented at similarly designed plants.

A summary of the NRC staff's review of specific EALs is in Section 3.0 (Technical Evaluation) of this safety evaluation.

To aid in understanding the nomenclature used in this safety evaluation, the following conventions are used:

- The scheme's generic information is organized by Recognition Category in the following order:
 - A [R] - Abnormal Radiation Levels/Radiological Effluent,
 - C - Cold Shutdown/Refueling System Malfunction,
 - E - Independent Spent Fuel Storage Installation,
 - F - Fission Product Barrier,
 - H - Hazards and Other Conditions Affecting Plant Safety, and
 - S [M] - System Malfunction.
- The Recognition Category letter is the first letter for EALs.
- The second letter signifies the emergency classification level:
 - U = Notification of Unusual Event (UE),
 - A = Alert,
 - S = Site Area Emergency (SAE), and
 - G = General Emergency (GE).
- The number denotes the sequential subcategory designation from the plant-specific EAL scheme.

An EAL set refers to EALs within an EAL Recognition Category and subcategory that includes an escalation path for one or more classification levels. Not all EAL Recognition Categories require an EAL set.

APS modified the NEI EAL numbering system. For example, NEI EAL AU1 is RU1.1 in the PVNGS scheme. Under this numbering system, in some cases, APS lists an EAL separate from the example EALs listed in NEI 99-01, Revision 6. For example, NEI EAL AA1(2) is RA1.2 in the PVNGS scheme and is listed on a separate page with a corresponding initiating condition, operating mode applicability, and basis. The licensee includes a PVNGS-to-NEI 99-01 Revision 6 EAL cross-reference to assist comparison between the PVNGS and NEI numbering systems.

This safety evaluation uses the numbering system from the proposed plant-specific EAL scheme; however, the numbering system from the generic EAL scheme development guidance contained in NEI 99-01, Revision 6, is annotated in [brackets] to aid in cross-referencing the site-specific EAL numbering convention with that of the guidance.

3.0 TECHNICAL EVALUATION

3.1 Recognition Category 'R' – Abnormal Radiological Release/Radiological Effluent

3.1.1 PVNGS EAL Set RU1/RA1/RS1/RG1 [AU1/AA1/AS1/AG1]

The intent of this EAL set is to ensure that an emergency classification level is declared upon plant-specific indications of a release of radioactivity (gaseous and/or liquid). In recognition of the lower possible radioactivity concentrations, the assessment of liquid releases is limited to the UE and Alert emergency classification levels. This recognition set provides for accident assessments that use pre-calculated values based on assumed conditions, real-time parameters, and field monitoring results.

The NRC staff verified that the following progression from UE to GE is appropriate and consistent with EAL scheme development guidance in NEI 99-01, Revision 6:

- RU1 - This EAL addresses a potential decrease in the level of safety of the plant as indicated by a low-level radiological release that exceeds regulatory commitments for an extended period of time (e.g., an uncontrolled release).
- RA1 - This EAL addresses a release of gaseous radioactivity that results in projected or actual offsite doses greater than or equal to 1 percent of the U.S. Environmental Protection Agency's (EPA's) Protective Action Guides (PAGs). PVNGS is a zero-release plant and does not have EALs associated with liquid radioactive releases.
- RS1 - This EAL addresses a release of gaseous radioactivity that results in projected or actual offsite doses greater than or equal to 10 percent of the EPA PAGs.
- RG1 - This EAL addresses a release of gaseous radioactivity that results in projected or actual offsite doses greater than or equal to the EPA PAGs.

The numbering, sequencing, formatting, instrumentation, and setpoints for this EAL set were verified to be consistent with the overall EAL scheme development guidance in NEI 99-01, Revision 6, address the plant-specific implementation strategies provided, and are, therefore, consistent with a standard EAL scheme, as required by 10 CFR 50.47(b)(4).

The NRC staff concludes that the plant-specific implementation method for this EAL set is in alignment with the key characteristics of an effective EAL scheme (as discussed in Section 2.3 of this safety evaluation), meets the requirements of Section IV of Appendix E to 10 CFR Part 50 and 10 CFR 50.47(b)(4), and is, therefore, acceptable for implementation.

3.1.2 PVNGS EAL Set RU2/RA2/RS2/RG2 [AU2/AA2/AS2/AG2]

The intent of this EAL set is to ensure that an emergency classification level is declared upon plant-specific indications of potential or actual damage to an irradiated fuel assembly or multiple assemblies.

The NRC staff verified that the following progression from UE to GE is appropriate and consistent with EAL scheme development guidance in NEI 99-01, Revision 6:

- RU2 - This EAL addresses a decrease in water level above irradiated fuel sufficient to cause elevated radiation levels.
- RA2 - This EAL addresses events that have caused imminent or actual damage to an irradiated fuel assembly, or a significant lowering of water level within the spent fuel pool.
- RS2 - This EAL addresses a significant loss of spent fuel pool inventory control and makeup capability leading to imminent fuel damage and addresses NRC Order EA-12-051, "Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation," dated March 12, 2012 (Reference 9).
- RG2 - This EAL addresses a significant loss of spent fuel pool inventory control and makeup capability leading to a prolonged uncover of spent fuel and addresses NRC Order EA-12-051.

The SAE and GE emergency classification levels for this specific accident progression are also bounded by Recognition Category 'F,' as well as EALs RS1 and RG1. With the availability of new spent fuel pool level instrumentation, the enhanced EALs will provide a redundant escalation path by including specific SAE and GE initiating conditions.

The numbering, sequencing, formatting, instrumentation, and setpoints for this EAL set were verified to be consistent with the overall EAL scheme development guidance in NEI 99-01, Revision 6, address the plant-specific implementation strategies provided, and are, therefore, consistent with a standard EAL scheme, as required by 10 CFR 50.47(b)(4).

The NRC staff concludes that the plant-specific implementation method for this EAL set is in alignment with the key characteristics of an effective EAL scheme (as discussed in Section 2.3 of this safety evaluation), meets the requirements of Section IV of Appendix E to 10 CFR Part 50 and 10 CFR 50.47(b)(4), and is, therefore, acceptable for implementation.

3.1.3 PVNGS EAL RA3 [AA3]

The intent of this EAL is to ensure that an emergency classification level is declared upon elevated radiation levels in certain plant rooms and areas sufficient to preclude or impede personnel from performing actions necessary to maintain normal plant operation, or to perform a normal plant cooldown and shutdown. This includes equipment in the control room and the central alarm station. An Alert declaration is primarily intended to ensure that the plant emergency response organization (ERO) is activated to support the control room in removing the impediment to normal access, as well as assisting in quantifying potential damage to the fuel. Indications of increasing radiation levels in the plant are bounded by Recognition Category 'F,' as well as EALs RS1 and RG1.

The numbering, sequencing, formatting, instrumentation, and setpoints for this EAL were verified to be consistent with the overall EAL scheme development guidance in NEI 99-01, Revision 6, address the plant-specific implementation strategies provided, and are, therefore, consistent with a standard EAL scheme, as required by 10 CFR 50.47(b)(4).

The NRC staff concludes that the plant-specific implementation method for this EAL is in alignment with the key characteristics of an effective EAL scheme (as discussed in Section 2.3 of this safety evaluation), meets the requirements of Section IV of Appendix E to 10 CFR Part 50 and 10 CFR 50.47(b)(4), and is, therefore, acceptable for implementation.

3.2 Recognition Category 'C' – Cold Shutdown/Refueling System Malfunction

3.2.1 PVNGS EAL Set CU1/CA1/CS1/CG1 [CU1/CA1/CS1/CG1]

The intent of this EAL set is to ensure that an emergency classification level is declared upon a loss of reactor pressure vessel inventory and/or reactor coolant system (RCS) leakage.

The NRC staff verified that the following progression from UE to GE is appropriate and consistent with EAL scheme development guidance in NEI 99-01, Revision 6:

- CU1 - This EAL addresses the inability to restore and maintain water level to a required minimum level (i.e., lower limit of a level band), or a loss of the ability to monitor reactor vessel/RCS level concurrent with indications of coolant leakage.
- CA1 - This EAL addresses conditions that are precursors to a loss of the ability to adequately cool irradiated fuel (i.e., a precursor to a challenge to the fuel clad barrier).
- CS1 - This EAL addresses a significant and prolonged loss of reactor vessel/RCS inventory control and makeup capability leading to imminent fuel damage.
- CG1 - This EAL addresses the inability to restore and maintain reactor vessel level above the top of active fuel with containment challenged.

The numbering, sequencing, formatting, instrumentation, and setpoints for this EAL set were verified to be consistent with the overall EAL scheme development guidance in NEI 99-01, Revision 6, address the plant-specific implementation strategies provided, and are, therefore, consistent with a standard EAL scheme, as required by 10 CFR 50.47(b)(4).

The NRC staff concludes that the plant-specific implementation method for this EAL set is in alignment with the key characteristics of an effective EAL scheme (as discussed in Section 2.3 of this safety evaluation), meets the requirements of Section IV of Appendix E to 10 CFR Part 50 and 10 CFR 50.47(b)(4), and is, therefore, acceptable for implementation.

3.2.2 PVNGS EAL Set CU2/CA2 [CU2/CA2]

The intent of this EAL set is to ensure that an emergency classification level is declared upon a loss of available alternating current (AC) power to emergency power electrical busses.

The NRC staff verified that the following progression from UE to Alert is appropriate and consistent with EAL scheme development guidance in NEI 99-01, Revision 6:

- CU2 - This EAL describes a significant degradation of offsite and onsite AC power sources such that any additional single failure would result in a loss of all AC power to safety systems.
- CA2 - This EAL addresses a total loss of AC power that compromises the performance of all safety systems requiring electric power including those necessary for emergency core cooling, containment heat removal/pressure control, spent fuel heat removal, and the ultimate heat sink.

The SAE and GE classification levels for this specific accident progression are bounded by EALs RS1 and RG1.

The numbering, sequencing, formatting, instrumentation, and setpoints for this EAL set were verified to be consistent with the overall EAL scheme development guidance in NEI 99-01, Revision 6, address the plant-specific implementation strategies provided, and are, therefore, consistent with a standard EAL scheme, as required by 10 CFR 50.47(b)(4).

The NRC staff concludes that the plant-specific implementation method for this EAL set is in alignment with the key characteristics of an effective EAL scheme (as discussed in Section 2.3 of this safety evaluation), meets the requirements of Section IV of Appendix E to 10 CFR Part 50 and 10 CFR 50.47(b)(4), and is, therefore, acceptable for implementation.

3.2.3 PVNGS EAL Set CU3/CA3 [CU3/CA3]

The intent of this EAL set is to ensure that an emergency classification level is declared upon an inability to maintain control of decay heat removal.

The NRC staff verified that the following progression from UE to Alert is appropriate and consistent with EAL scheme development guidance in NEI 99-01, Revision 6:

- CU3 - This EAL addresses an unplanned increase in RCS temperature above the Technical Specification cold shutdown temperature limit, or the inability to determine RCS temperature and level.
- CA3 - This EAL addresses conditions involving a loss of decay heat removal capability or an addition of heat to the RCS in excess of that which can currently be removed.

The SAE and GE classification levels for this specific accident progression are bounded by EALs RS1 and RG1.

The numbering, sequencing, formatting, instrumentation, and setpoints for this EAL set were verified to be consistent with the overall EAL scheme development guidance in NEI 99-01,

Revision 6, address the plant-specific implementation strategies provided, and are, therefore, consistent with a standard EAL scheme, as required by 10 CFR 50.47(b)(4).

The NRC staff concludes that the plant-specific implementation method for this EAL set is in alignment with the key characteristics of an effective EAL scheme (as discussed in Section 2.3 of this safety evaluation), meets the requirements of Section IV of Appendix E to 10 CFR Part 50 and 10 CFR 50.47(b)(4), and is, therefore, acceptable for implementation.

3.2.4 PVNGS EAL CU4 [CU4]

The intent of this EAL is to ensure that an emergency classification level is declared when a loss of vital direct current (DC) power occurs, which compromises the ability to monitor and control operable safety systems when the plant is in the cold shutdown or refueling mode. It is primarily intended to ensure that key ERO members and offsite response organizations (OROs) are aware of the event; resources necessary to respond to the event are mobilized, and any necessary compensatory measures are promptly implemented. The Alert, SAE, and GE emergency classification levels for a protracted loss of vital DC power are bounded by EALs CA1, CA3, CS1, CG1, RA1, RS1, and RG1.

The numbering, sequencing, formatting, instrumentation, and setpoints for this EAL were verified to be consistent with the overall EAL scheme development guidance in NEI 99-01, Revision 6, address the plant-specific implementation strategies provided, and are, therefore, consistent with a standard EAL scheme, as required by 10 CFR 50.47(b)(4).

The NRC staff concludes that the plant-specific implementation method for this EAL is in alignment with the key characteristics of an effective EAL scheme (as discussed in Section 2.3 of this safety evaluation), meets the requirements of Section IV of Appendix E to 10 CFR Part 50 and 10 CFR 50.47(b)(4), and is, therefore, acceptable for implementation.

3.2.5 PVNGS EAL CU5 [CU5]

The intent of this EAL is to highlight the importance of emergency communications by ensuring that an emergency classification level is declared if normal methods for communicating with licensee onsite and offsite personnel, or with OROs, including the NRC, are lost. It is primarily intended to ensure that key ERO members and OROs are aware of the loss of communications capabilities, the resources necessary to restore communications are mobilized, and compensatory measures are promptly implemented. The NRC staff verified that no escalation path is necessary for this EAL.

The communication methods derived for this EAL are consistent with the overall EAL scheme development guidance in NEI 99-01, Revision 6, and are consistent with a standard EAL scheme, as required by 10 CFR 50.47(b)(4).

The numbering, sequencing, and formatting for this EAL were verified to be consistent with the overall EAL scheme development guidance in NEI 99-01, Revision 6, address the plant-specific implementation strategies provided, and are, therefore, consistent with a standard EAL scheme, as required by 10 CFR 50.47(b)(4).

The NRC staff concludes that the plant-specific implementation method for this EAL is in alignment with the key characteristics of an effective EAL scheme (as discussed in Section 2.3 of this safety evaluation), meets the requirements of Section IV of Appendix E to 10 CFR Part 50 and 10 CFR 50.47(b)(4), and is, therefore, acceptable for implementation.

3.2.6 PVNGS EAL CA6 [CA6]

The intent of this EAL is to ensure an emergency classification level is declared when hazardous events lead to potential damage to safety systems. The hazardous events of interest include, but are not limited to, an earthquake, flooding, high winds, tornado strike, explosion, fire, or any other hazard applicable for a specific site. It is primarily intended to ensure that the ERO is activated to support the control room in understanding the event impacts and restoring affected safety system equipment to service. The SAE and GE classification levels for this accident progression are bounded by EALs CS1, CG1, RS1, and RG1.

The numbering, sequencing, and formatting for this EAL were verified to be consistent with the overall EAL scheme development guidance in NEI 99-01, Revision 6, address the plant-specific implementation strategies provided, and are, therefore, consistent with a standard EAL scheme, as required by 10 CFR 50.47(b)(4).

The NRC staff concludes that the plant-specific implementation method for this EAL is in alignment with the key characteristics of an effective EAL scheme (as discussed in Section 2.3 of this safety evaluation), meets the requirements of Section IV of Appendix E to 10 CFR Part 50 and 10 CFR 50.47(b)(4), and is, therefore, acceptable for implementation.

3.3 Recognition Category 'E' – Independent Spent Fuel Storage Installation (ISFSI)

3.3.1 PVNGS EAL EU1 [E-HU1]

The intent of this EAL is to ensure an EAL emergency classification level is declared when an event results in damage to the confinement boundary of a storage cask containing spent fuel, regardless of the cause. It is primarily intended to ensure that key ERO members and OROs are aware of the cask damage, resources necessary to respond to the event are mobilized, and protective measures are promptly implemented.

The numbering, sequencing, and formatting for this EAL were verified to be consistent with the overall EAL scheme development guidance in NEI 99-01, Revision 6; address the plant-specific implementation strategies provided, and are, therefore, consistent with a standard EAL scheme, as required by 10 CFR 50.47(b)(4).

The NRC staff concludes that the plant-specific implementation method for this EAL is in alignment with the key characteristics of an effective EAL scheme (as discussed in Section 2.3 of this safety evaluation), meets the requirements of Section IV of Appendix E to 10 CFR Part 50 and 10 CFR 50.47(b)(4), and is, therefore, acceptable for implementation.

3.4 Category 'F' – Fission Product Barrier Matrix

This recognition category uses plant condition based thresholds as triggers within a particular logic configuration, which reflect a loss or potential loss of a fission product barrier. Light-water nuclear power plants in the United States have three fission product barriers: fuel cladding, the RCS, and the primary containment. Licensees are to develop thresholds that provide EAL decision-makers input into making an event declaration based upon degradation of one or more of these fission product barriers.

There are numerous triggers used as logic inputs to decide on the appropriate classification based upon the number of indicators that are triggered for the loss and/or potential loss of each fission product barrier. By design, these indicators are redundant with other similar indicators in Recognition Categories 'R' and 'S.'

The NRC staff verified that the logic used to determine the appropriate emergency classification level is consistent with the generic EAL scheme development guidance in NEI 99-01, Revision 6. The progression from Alert to GE is appropriate and consistent with EAL scheme development guidance in NEI 99-01, Revision 6, as follows:

- FA1 - Any loss or any potential loss of either the fuel clad or RCS barrier.
- FS1 - Loss or potential loss of any two barriers.
- FG1 - Loss of any two barriers and loss or potential loss of the third barrier.

The numbering, sequencing, formatting, instrumentation, and setpoints for this EAL were verified to be consistent with the overall EAL scheme development guidance in NEI 99-01, Revision 6, address the plant-specific implementation strategies provided, and are, therefore, consistent with a standard EAL scheme, as required by 10 CFR 50.47(b)(4).

The NRC staff concludes that the plant-specific implementation method for this EAL set is in alignment with the key characteristics of an effective EAL scheme (as discussed in Section 2.3 of this safety evaluation), meets the requirements of Section IV of Appendix E to 10 CFR Part 50 and 10 CFR 50.47(b)(4), and is, therefore, acceptable for implementation.

3.5 Category 'H' – Hazards

3.5.1 PVNGS EAL Set HU1/HA1/HS1 [HU1/HA1/HS1/HG1]

The intent of this EAL set is to ensure that an emergency classification level is declared based upon a security-related event. This EAL was developed in accordance with the guidance from NRC Bulletin 2005-02, "Emergency Preparedness and Response Actions for Security-Based Events," dated July 18, 2005 (Reference 10), and RIS 2006-12, "Endorsement of Nuclear Energy Institute Guidance 'Enhancements to Emergency Preparedness Programs for Hostile Action,'" dated July 19, 2006 (Reference 11), for licensees to implement, regardless of the specific version of the generic EAL scheme development guidance used, or if the particular licensee developed its EAL scheme using an alternative approach. Based upon lessons learned from the implementation and use of this EAL set, particularly the insights gained from

combined security and emergency preparedness drills, the NRC staff and the industry worked to enhance the language of these EALs in NEI 99-01, Revision 6.

The NRC staff verified that the following progression from UE to SAE is appropriate and consistent with EAL scheme development guidance in NEI 99-01, Revision 6:

- HU1 - This EAL addresses events that pose a threat to plant personnel or safety system equipment.
- HA1 - This EAL addresses the occurrence of a hostile action within the owner controlled area or notification of an aircraft attack threat.
- HS1 - This EAL addresses the occurrence of a hostile action within the protected area.

APS requested a deviation from NEI 99-01, Revision 6, by deletion of EAL HG1. The deviation is desired in order to eliminate the possible confusion associated with security-related event scenarios as was demonstrated in some drills and exercises throughout the industry. The NRC staff concludes that this deviation is acceptable for the following reasons:

1. A hostile action in the protected area is bounded by EALs HS1 and HS7. A hostile action resulting in a loss of physical control is bounded by EAL HG7, as well as any event that may lead to radiological releases to the public in excess of EPA PAGs as bounded by Recognition Category 'R' EALs. The following factors were also considered:
 - If, for whatever reason, the control room must be evacuated and control of safety functions (e.g., reactivity control, core cooling, and RCS heat removal) cannot be reestablished, then EAL HS6 would apply, as well as EAL HS7 if desired by the EAL decision-maker;
 - As stated above, any event (including hostile action) that could reasonably be expected to have a release exceeding EPA PAGs would be bound by EAL HG7;
 - From a hostile action perspective, EALs HS1, HS7, and HG7 are appropriate, and therefore, make this part of HG1 redundant and unnecessary; and
 - From a loss of physical control perspective, EALs HS6, HS7, and HG7 are appropriate, and therefore, make this part of HG1 redundant and unnecessary.
2. Any event which causes a loss of spent fuel pool level will be bounded by EALs RA2, RS2, and RG2, regardless of whether it was based upon a hostile action or not, thus making this part of HG1 redundant and unnecessary.

3. An event that leads to a radiological release will be bounded by EALs RU1, RA1, RS1, and RG1. Events that lead to radiological releases in excess of EPA PAGs would be bounded by EALs RG1 and HG7, thus making this part of HG1 redundant and unnecessary.
4. EALs RA2, RS2, RG2, RS1, RG1, HS1, HS6, HS7, and HG7 will be implemented as to ensure the intended event is appropriately bound at the correct emergency classification level.

The numbering, sequencing, and formatting for this EAL set were verified to be consistent with the overall EAL scheme development guidance in NEI 99-01, Revision 6, address the plant-specific implementation strategies provided, and are, therefore, consistent with a standard EAL scheme, as required by 10 CFR 50.47(b)(4).

The NRC staff concludes that the plant-specific implementation method for this EAL set is in alignment with the key characteristics of an effective EAL scheme (as discussed in Section 2.3 of this safety evaluation), meets the requirements of Section IV of Appendix E to 10 CFR Part 50 and 10 CFR 50.47(b)(4), and is, therefore, acceptable for implementation.

3.5.2 PVNGS EAL HU2 [HU2]

The intent of this EAL is to ensure that an emergency classification level is declared based upon a seismic event that results in accelerations at the plant site greater than specified for an operating basis earthquake. This EAL is primarily intended to ensure that key ERO members and OROs are aware of the earthquake magnitude at the plant site and that post-event damage assessments are promptly implemented. Indications of earthquake-induced damage to components containing radioactive materials are bounded by Recognition Category 'F,' as well as EALs RA1, RS1, or RG1.

The numbering, sequencing, and formatting for this EAL were verified to be consistent with the overall EAL scheme development guidance in NEI 99-01, Revision 6, address the plant-specific implementation strategies provided, and are, therefore, considered part of a standard EAL scheme. This EAL is considered part of an EAL set containing EALs CA6 and SA8, depending on the operating mode applicable at the time of the event.

The NRC staff concludes that the plant-specific implementation method for this EAL is in alignment with the key characteristics of an effective EAL scheme (as discussed in Section 2.3 of this safety evaluation), meets the requirements of Section IV of Appendix E to 10 CFR Part 50 and 10 CFR 50.47(b)(4), and is, therefore, acceptable for implementation.

3.5.3 PVNGS EAL HU3 [HU3]

The intent of this EAL is to ensure that an emergency classification level is declared based upon the effects that natural or technological hazard events may have on the facility that are considered to be precursors to a more significant event or condition or have potential impacts

that warrant emergency notification to local, State, and Federal authorities. Specific hazards addressed include:

- Tornado strike within the protected area,
- Internal room or area flooding requiring electrical isolation of a safety system component,
- Movement in the protected area impeded by an offsite event (gaseous),
- An external event that prohibits the plant staff from accessing the site, and
- Other site-specific events.

This EAL is primarily intended to ensure that key ERO members and OROs are aware of the hazardous event affecting the plant site, and post-event damage assessments are promptly implemented. In addition, other events that may impact the effective implementation of the site emergency plan are considered in this EAL. Indications of hazard induced damage to components containing radioactive materials are bounded by Recognition Category 'F,' as well as in EALs RA1, RS1, or RG1.

The numbering, sequencing, and formatting for this EAL were verified to be consistent with the overall EAL scheme development guidance in NEI 99-01, Revision 6, address the plant-specific implementation strategies provided, and are, therefore, considered part of a standard EAL scheme. This EAL is considered part of an EAL set containing EALs CA6 and SA8, depending on the operating mode applicable at the time of the event.

The NRC staff concludes that the plant-specific implementation method for this EAL is in alignment with the key characteristics of an effective EAL scheme (as discussed in Section 2.3 of this safety evaluation), meets the requirements of Section IV of Appendix E to 10 CFR Part 50 and 10 CFR 50.47(b)(4), and is, therefore, acceptable for implementation.

3.5.4 PVNGS EAL HU4 [HU4]

The intent of this EAL is to ensure that an emergency classification level is declared based upon the effect that fires may have on the facility that may be indicative of a potential degradation of the level of safety of the plant. It is primarily intended to ensure that key ERO members and OROs are aware of the fire, and post-event damage assessments are promptly implemented. Indications of a protracted fire involving radioactive materials are bounded by Recognition Category 'F,' as well as EALs RA1, RS1, or RG1.

The numbering, sequencing, and formatting for this EAL were verified to be consistent with the overall EAL scheme development guidance in NEI 99-01, Revision 6, address the plant-specific implementation strategies provided, and are, therefore, considered part of a standard EAL scheme. This EAL is considered part of an EAL set containing EALs CA6 and SA8, depending on the operating mode applicable at the time of the event.

The NRC staff concludes that the plant-specific implementation method for this EAL is in alignment with the key characteristics of an effective EAL scheme (as discussed in Section 2.3

of this safety evaluation), meets the requirements of Section IV of Appendix E to 10 CFR Part 50 and 10 CFR 50.47(b)(4), and is, therefore, acceptable for implementation.

3.5.5 PVNGS EAL HA5 [HA5]

The intent of this EAL is to ensure that an emergency classification level is declared based upon the effect that toxic, corrosive, asphyxiant, or flammable gases may have on the facility that precludes or impedes access to equipment necessary to maintain normal plant operation or that are required for a normal plant cooldown and shutdown. This EAL is intended to ensure that the ERO is activated to support the control room in removing the impediment to normal access to the affected area or room.

The licensee provided a mode dependent list of rooms containing equipment, which require a manual/local action normal plant operation, cooldown, and shutdown based on a review of plant procedures per direction in NEI 99-01, Revision 6.

The numbering, sequencing, and formatting for this EAL were verified to be consistent with the overall EAL scheme development guidance in NEI 99-01, Revision 6, address the plant-specific implementation strategies provided, and are, therefore, considered part of a standard EAL scheme.

The NRC staff concludes that the plant-specific implementation method for this EAL is in alignment with the key characteristics of an effective EAL scheme (as discussed in Section 2.3 of this safety evaluation), meets the requirements of Section IV of Appendix E to 10 CFR Part 50 and 10 CFR 50.47(b)(4), and is, therefore, acceptable for implementation.

3.5.6 PVNGS EAL Set HA6/HS6 [HA6/HS6]

The intent of this EAL set is to ensure that an emergency classification level is declared based upon a control room evacuation with the inability to control critical plant systems remotely.

The NRC staff verified that the following progression from Alert to SAE is appropriate and consistent with EAL scheme development guidance in NEI 99-01, Revision 6:

- HA6 – This EAL addresses an evacuation of the control room that results in transfer of plant control to alternate locations outside the control room.
- HS6 - This EAL addresses an evacuation of the control room that results in transfer of plant control to alternate locations, and the control of a key safety function cannot be reestablished in a timely manner.

APS requested a deviation from NEI 99-01, Revision 6. HS6 mode of applicability is requested to be changed to delete the defueled mode, and for the reactivity safety function, the mode of applicability is requested to be changed to Operating Modes 1, 2, and 3 only. These changes were requested to provide clarification for determining actions associated with this EAL.

The NRC staff finds these changes acceptable for the following reasons:

1. The cited safety functions do not apply to a defueled reactor as there is no source of energy in the reactor vessel or RCS.
2. The reactivity safety function is expected to be maintained in Operating Modes 4, 5, and 6 when control is transferred from the control room to the remote shutdown panel.
3. Shutdown margin requirements are a prerequisite for entering Operating Modes 4, 5, and 6.
4. There is no credible method to change control rod position or boron concentration as a result of transferring control from the control room to the remote shutdown panels.

The GE classification level for this specific accident progression is bounded by Recognition Category 'F,' as well as EAL RG1.

The numbering, sequencing, and formatting for this EAL set were verified to be consistent with the overall EAL scheme development guidance in NEI 99-01, Revision 6, address the plant-specific implementation strategies provided, and are, therefore, considered part of a standard EAL scheme.

The NRC staff concludes that the plant-specific implementation method for this EAL set is in alignment with the key characteristics of an effective EAL scheme (as discussed in Section 2.3 of this safety evaluation), meets the requirements of Section IV of Appendix E to 10 CFR Part 50 and 10 CFR 50.47(b)(4), and is, therefore, acceptable for implementation.

3.5.7 PVNGS EAL Set HU7/HA7/HS7/HG7 [HU7/HA7/HS7/HG7]

This intent of this EAL set is to provide decision-makers with EALs to consider when, in their judgment, an emergency classification is warranted.

The NRC staff verified that the following progression from UE to GE is appropriate and consistent with EAL scheme development guidance:

- HU7 – This EAL addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist that are believed by the Emergency Director to fall under the emergency classification level description for a UE.
- HA7 – This EAL addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist that are believed by the Emergency Director to fall under the emergency classification level description for an Alert.

- HS7 – This EAL addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist that are believed by the Emergency Director to fall under the emergency classification level description for an SAE.
- HG7 - This EAL addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist that are believed by the Emergency Director to fall under the emergency classification level description for a GE.

The numbering, sequencing, and formatting for this EAL set were verified to be consistent with the overall EAL scheme development guidance in NEI 99-01, Revision 6, address the plant-specific implementation strategies provided, and are, therefore, considered part of a standard EAL scheme.

The NRC staff concludes that the plant-specific implementation method for this EAL set is in alignment with the key characteristics of an effective EAL scheme (as discussed in Section 2.3 of this safety evaluation), meets the requirements of Section IV of Appendix E to 10 CFR Part 50 and 10 CFR 50.47(b)(4), and is, therefore, acceptable for implementation.

3.6 Category 'S' – System Malfunction

3.6.1 PVNGS EAL Set SU1/SA1/SS1/SG1.1 [SU1/SA1/SS1/SG1]

The intent of this EAL set is to ensure that an emergency classification level is declared based upon a loss of available AC power sources to the emergency busses.

The NRC staff reviewed the licensee's evaluation and justification for plant-specific changes associated with this EAL set and verified that the following progression from UE to GE is appropriate and consistent with EAL scheme development guidance in NEI 99-01, Revision 6:

- SU1 – This EAL addresses a prolonged loss of offsite power.
- SA1 – This EAL describes a significant degradation of offsite and onsite AC power sources such that any additional single failure would result in a loss of all AC power to safety systems.
- SS1 – This EAL addresses a total loss of AC power that compromises the performance of all safety systems requiring electric power including those necessary for emergency core cooling, containment heat removal/pressure control, spent fuel heat removal, and the ultimate heat sink.
- SG1 - This EAL addresses a prolonged loss of all power sources to AC emergency buses.

The numbering, sequencing, formatting, instrumentation, and setpoints for this EAL set were verified to be consistent with the overall EAL scheme development guidance in NEI 99-01,

Revision 6, address the plant-specific implementation strategies provided, and are, therefore, consistent with a standard EAL scheme, as required by 10 CFR 50.47(b)(4).

The NRC staff concludes that the plant-specific implementation method for this EAL set is in alignment with the key characteristics of an effective EAL scheme (as discussed in Section 2.3 of this safety evaluation), meets the requirements of Section IV of Appendix E to 10 CFR Part 50 and 10 CFR 50.47(b)(4), and is, therefore, acceptable for implementation.

3.6.2 PVNGS EAL Set SU3/SA3 [SU2/SA2]

The intent of this EAL set is to ensure that an emergency classification level is declared based upon the effect that a loss of available indicators in the control room has on the facility.

The NRC staff verified that the following progression from UE to Alert is appropriate and consistent with EAL scheme development guidance in NEI 99-01, Revision 6:

- SU3 – This EAL addresses the difficulty associated with monitoring normal plant conditions without the ability to obtain safety system parameters from within the control room.
- SA3 - This EAL addresses the difficulty associated with monitoring rapidly changing plant conditions during a transient without the ability to obtain safety system parameters from within the control room.

The SAE and GE classification levels for this specific accident progression are bounded by Recognition Category 'F,' as well as EALs RS1 and RG1.

The numbering, sequencing, and formatting for this EAL set were verified to be consistent with the overall EAL scheme development guidance in NEI 99-01, Revision 6, address the plant-specific implementation strategies provided, and are, therefore, consistent with a standard EAL scheme, as required by 10 CFR 50.47(b)(4).

The NRC staff concludes that the plant-specific implementation method for this EAL set is in alignment with the key characteristics of an effective EAL scheme (as discussed in Section 2.3 of this safety evaluation), meets the requirements of Section IV of Appendix E to 10 CFR Part 50 and 10 CFR 50.47(b)(4), and is, therefore, acceptable for implementation.

3.6.3 PVNGS EAL SU4 [SU3]

The intent of this EAL is to ensure that an emergency classification level is declared when RCS activity is greater than Technical Specification allowable limits. This EAL is primarily intended to ensure that key ERO members are aware of the elevated reactor coolant activity and support the control room in implementation of appropriate response measures. Escalation of the emergency classification is bounded by Recognition Category 'F,' as well as EALs RA1, RS1, and RG1.

The numbering, sequencing, and formatting for this EAL were verified to be consistent with the overall EAL scheme development guidance in NEI 99-01, Revision 6, address the plant-specific

implementation strategies provided, and are, therefore, consistent with a standard EAL scheme, as required by 10 CFR 50.47(b)(4).

The NRC staff concludes that the plant-specific implementation method for this EAL is in alignment with the key characteristics of an effective EAL scheme (as discussed in Section 2.3 of this safety evaluation), meets the requirements of Section IV of Appendix E to 10 CFR Part 50 and 10 CFR 50.47(b)(4), and is, therefore, acceptable for implementation.

3.6.4 PVNGS EAL SU5 [SU4]

The intent of this EAL is to ensure that an emergency classification level is declared when the plant has indications of RCS leakage. By design, this EAL is redundant with corresponding indicators for a loss or potential loss of fission product barriers, as well as radiation monitoring, to ensure events challenging the reactor and/or fission product barriers are recognized. This EAL is primarily intended to ensure that key ERO members are aware of the RCS leakage and support the control room in implementation of appropriate response measures. Escalation of the emergency classification is bounded by Recognition Category 'F,' as well as EALs RA1, RS1, and RG1.

The numbering, sequencing, and formatting for this EAL were verified to be consistent with the overall EAL scheme development guidance in NEI 99-01, Revision 6, address the plant-specific implementation strategies provided, and are, therefore, consistent with a standard EAL scheme, as required by 10 CFR 50.47(b)(4).

The NRC staff concludes that the plant-specific implementation method for this EAL is in alignment with the key characteristics of an effective EAL scheme (as discussed in Section 2.3 of this safety evaluation), meets the requirements of Section IV of Appendix E to 10 CFR Part 50 and 10 CFR 50.47(b)(4), and is, therefore, acceptable for implementation.

3.6.5 PVNGS EAL Set SU6/SA6/SS6 [SU5/SA5/SS5]

The intent of this EAL set is to ensure that an emergency classification level is declared based upon the effect that a failure of the reactor protection system (RPS) may have on the plant.

The NRC staff verified that the following progression from UE to SAE is appropriate and consistent with EAL scheme development guidance:

- SU6 - This EAL addresses an event where the RPS fails to automatically shut down the reactor when required, yet the reactor is successfully shut down by taking manual action(s) at the reactor control consoles.
- SA6 – This EAL addresses an event where RPS fails to automatically shut down the reactor when required, and operator actions taken at the reactor control consoles to manually shut down the reactor are unsuccessful.
- SS6 - This EAL addresses an event where RPS fails to automatically shut down the reactor when required, all operator actions to manually shut down the reactor

are unsuccessful, and continued power generation is challenging the capability to adequately remove heat from the core, the RCS, or both.

The GE classification level for this event is bounded by Recognition Category 'F,' as well as EAL RG1.

The numbering, sequencing, formatting, instrumentation, and setpoints for this EAL set were verified to be consistent with the overall EAL scheme development guidance in NEI 99-01, Revision 6, address the plant-specific implementation strategies provided, and are, therefore, consistent with a standard EAL scheme, as required by 10 CFR 50.47(b)(4).

The NRC staff concludes that the plant-specific implementation method for this EAL set is in alignment with the key characteristics of an effective EAL scheme (as discussed in Section 2.3 of this safety evaluation), meets the requirements of Section IV of Appendix E to 10 CFR Part 50 and 10 CFR 50.47(b)(4), and is, therefore, acceptable for implementation.

3.6.6 PVNGS EAL SU7 [SU6]

The intent of this EAL is to highlight the importance of emergency communications by ensuring that an emergency classification level is declared if normal methods for communicating with licensee onsite and offsite personnel, or with OROs including the NRC, are lost. It is primarily intended to ensure that key ERO members and OROs are aware of the loss of communications capabilities, the resources necessary to restore communications are mobilized, and compensatory measures are promptly implemented.

The communication methods derived, as well as the numbering, sequencing, and formatting for this EAL were verified to be consistent with the overall EAL scheme development guidance in NEI 99-01, Revision 6, address the plant-specific implementation strategies provided, and are, therefore, consistent with a standard EAL scheme, as required by 10 CFR 50.47(b)(4).

The NRC staff concludes that the plant-specific implementation method for this EAL is in alignment with the key characteristics of an effective EAL scheme (as discussed in Section 2.3 of this safety evaluation), meets the requirements of Section IV of Appendix E to 10 CFR Part 50 and 10 CFR 50.47(b)(4), and is, therefore, acceptable for implementation.

3.6.7 PVNGS EAL Set SS2/SG1.2 [SS8/SG8]

The intent of this EAL set is to ensure that an emergency classification level is declared based upon a loss of site AC and DC sources, as this condition compromises the ability of the licensee to monitor and control the removal of decay heat.

The NRC staff verified that the following progression from SAE to GE is appropriate and consistent with EAL scheme development guidance:

- SS2 - This EAL addresses a loss of vital DC power which compromises the ability to monitor and control safety systems.

- SG1.2 - This EAL addresses a concurrent and prolonged loss of both AC and Vital DC power.

The numbering, sequencing, and formatting for this EAL set were verified to be consistent with the overall EAL scheme development guidance in NEI 99-01, Revision 6, address the plant-specific implementation strategies provided, and are, therefore, consistent with a standard EAL scheme, as required by 10 CFR 50.47(b)(4).

The NRC staff concludes that the plant-specific implementation method for this EAL set is in alignment with the key characteristics of an effective EAL scheme (as discussed in Section 2.3 of this safety evaluation), meets the requirements of Section IV of Appendix E to 10 CFR Part 50 and 10 CFR 50.47(b)(4), and is, therefore, acceptable for implementation.

3.6.8 PVNGS EAL SA8 [SA9]

The intent of this EAL is to ensure that an emergency classification level is declared when a hazardous event leads to potential damage to safety systems needed for the current operating mode. The hazardous events of interest include, but are not limited to, an earthquake, flooding, high winds, tornado strike, explosion, fire, or any other hazard applicable for a specific site. It is primarily intended to ensure that the ERO is activated to support the control room in understanding the event impacts and restoring affected safety system equipment to service. The SAE and GE classification levels for this accident progression are bounded by Recognition Category 'F,' as well as EALs RS1 and RG1.

The numbering, sequencing, and formatting for this EAL were verified to be consistent with the overall EAL scheme development guidance in NEI 99-01, Revision 6, address the plant-specific implementation strategies provided, and are, therefore, consistent with a standard EAL scheme, as required by 10 CFR 50.47(b)(4).

The NRC staff concludes that the plant-specific implementation method for this EAL is in alignment with the key characteristics of an effective EAL scheme (as discussed in Section 2.3 of this safety evaluation), meets the requirements of Section IV of Appendix E to 10 CFR Part 50 and 10 CFR 50.47(b)(4), and is, therefore, acceptable for implementation.

3.7 Review Summary

The NRC staff has reviewed the technical bases for the proposed EAL scheme, the modifications from NEI 99-01, Revision 6, and the licensee's evaluation of the proposed changes. The licensee chose to modify its proposed EAL scheme from the generic EAL scheme development guidance provided in NEI 99-01, Revision 6, in order to adopt a format that is better aligned with how it currently implements its EALs, as well as with plant-specific writer's guides and preferences. The NRC staff verified that these modifications do not alter the intent of any specific EAL within a set, recognition category, or within the entire EAL scheme as described in NEI 99-01, Revision 6. Thus, the NRC staff concludes that the proposed changes meet the requirements in Appendix E to 10 CFR Part 50 and planning standard 10 CFR 50.47(b)(4).

Based on its review, the NRC staff verified that the proposed EAL scheme uses objective and observable values, EALs are unambiguous and are based on site-specific indicators. The staff also verified that the EAL scheme is worded in a manner that addresses human factors engineering and user friendliness concerns, follows logical progressions for multiple-events, and allows for event downgrading and upgrading based upon the potential risk to the public health and safety. Risk assessments were appropriately used to set the boundaries of the emergency classification levels and ensure that all EALs that trigger an emergency classification are in the same range of relative risk. In addition, the NRC staff has verified that the proposed EAL scheme is technically complete and consistent with EAL schemes implemented at similarly designed plants.

Based on its review, the NRC staff verified that the proposed EAL modifications do not alter the intent of any specific EAL described in NEI 99-01, Revision 6. The licensee chose to modify its proposed EAL scheme from the generic EAL scheme development guidance provided in NEI 99-01, Revision 6, in order to adopt a format that is better aligned with how it currently implements its EALs, as well as with plant-specific writer's guides and preferences.

Therefore, the NRC staff concludes that the licensee's proposed EAL scheme is acceptable and provides reasonable assurance that the licensee can and will take adequate protective measures in the event of a radiological emergency. Specifically, the staff concludes that the licensee's site-specific EAL basis document provided by Attachment C of the letter dated May 12, 2016, is acceptable for implementation.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Arizona State official was notified on August 15, 2016, regarding the proposed issuance of the amendments. The State official had no comments.

5.0 ENVIRONMENTAL CONSIDERATION

The amendments change a requirement with respect to installation or use of a facility component 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, and there has been no public comment on such finding published in the *Federal Register* on December 8, 2015 (80 FR 76318). 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

1. Lacal, M. L., Arizona Public Service Company, letter to U.S. Nuclear Regulatory Commission, "Request for NRC Approval of Proposed Changes to PVNGS Emergency Action Levels," dated October 9, 2015 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML15293A335).
2. Lacal, M. L., Arizona Public Service Company, letter to U.S. Nuclear Regulatory Commission, "Response to Request for Additional Information Regarding Proposed Changes to PVNGS Emergency Action Levels," dated May 12, 2016 (ADAMS Accession No. ML16133A621).
3. Nuclear Energy Institute, NEI 99-01, Revision 6, "Development of Emergency Action Levels for Non-Passive Reactors," November 2012 (ADAMS Accession No. ML12326A805).
4. Thaggard, M., U.S. Nuclear Regulatory Commission, letter to Susan Perkins-Grew, Nuclear Energy Institute, "U.S. Nuclear Regulatory Commission Review and Endorsement of NEI 99-01, Revision 6, dated November, 2012 (TAC No. D92368)," dated March 28, 2013 (ADAMS Accession No. ML12346A463).
5. U.S. Nuclear Regulatory Commission, Generic Letter 79-50, dated October 10, 1979 (ADAMS Accession No. ML031320278).
6. U.S. Nuclear Regulatory Commission/Federal Emergency Management Agency, NUREG-0654/FEMA-REP-1, Revision 1, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants," November 1980 (ADAMS Accession No. ML040420012).
7. U.S. Nuclear Regulatory Commission, Regulatory Guide 1.101, Revision 2, "Emergency Planning and Preparedness for Nuclear Power Reactors," October 1981 (ADAMS Accession No. ML090440294); Revision 3, August 1992 (ADAMS Accession No. ML003740302), and Revision 4, July 2003 (ADAMS Accession No. ML032020276).
8. U.S. Nuclear Regulatory Commission, Regulatory Issue Summary (RIS) 2003-18, "Use of NEI-99-01, 'Methodology for Development of Emergency Action Levels,' Revision 4, dated January 2003," dated October 8, 2003 (ADAMS Accession No. ML032580518); RIS 2003-18, Supplement 1, dated July 13, 2004 (ADAMS Accession No. ML041550395); and RIS 2003-18, Supplement 2, dated December 12, 2005 (ADAMS Accession No. ML051450482).
9. U.S. Nuclear Regulatory Commission, Order EA-12-051, "Issuance of Order to Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation," dated March 12, 2012 (ADAMS Accession No. ML12054A679).

10. U.S. Nuclear Regulatory Commission, Bulletin 2005-02, "Emergency Preparedness and Response Actions for Security-Based Events," dated July 18, 2005 (ADAMS Accession No. ML051740058).
11. U.S. Nuclear Regulatory Commission, Regulatory Issue Summary 2006-12, "Endorsement of Nuclear Energy Institute Guidance, 'Enhancements to Emergency Preparedness Programs for Hostile Action,'" dated July 19, 2006 (ADAMS Accession No. ML072670421).

Principal Contributor: Michael Wasem, NSIR/DPR

Date: September 8, 2016

R. Edington

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

Sincerely,

/RA/

Siva P. Lingam, Project Manager
Plant Licensing Branch IV-1
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. 198 to NPF-41
2. Amendment No. 198 to NPF-51
3. Amendment No. 198 to NPF-74
4. Safety Evaluation

cc: Listserv

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ADAMS Accession No. ML16180A109

*SE memorandum dated

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DATE	8/19/16	8/22/16	9/07/16	9/08/16

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