



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

September 14, 2016

Mr. David B. Hamilton
Site Vice President
FirstEnergy Nuclear Operating Company
Mail Stop A-PY-A290 – South Main Street
P.O. Box 97, 10 Center Road
Perry, OH 44081-0097

SUBJECT: PERRY NUCLEAR POWER PLANT, UNIT NO. 1 - ISSUANCE OF
AMENDMENT CONCERNING REVISION TO THE PERRY NUCLEAR POWER
PLANT EMERGENCY PLAN (CAC NO. MF7046)

Dear Mr. Hamilton:

The U.S. Nuclear Regulatory Commission (NRC) has issued the enclosed Amendment No. 173 to Facility Operating License No. NPF-58 for Perry Nuclear Power Plant, Unit No. 1. The amendment consists of changes to the Perry Nuclear Power Plant emergency action level (EAL) scheme in response to your application dated October 29, 2015, as supplemented by letter dated April 22, 2016.

The amendment revises your current EAL scheme to one based on the Nuclear Energy Institute (NEI) guidance in NEI 99-01, Revision 6, "Development of Emergency Action Levels for Non-Passive Reactors," dated November 2012. NEI 99-01, Revision 6, was endorsed by the NRC by letter dated March 28, 2013.

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

Sincerely,

A handwritten signature in cursive script that reads "Kimberly J. Green".

Kimberly J. Green, Senior Project Manager
Plant Licensing Branch III-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-440

Enclosures:

1. Amendment No. 173 to NPF-58
2. Safety Evaluation

cc: ListServ



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

FIRSTENERGY NUCLEAR OPERATING COMPANY

FIRSTENERGY NUCLEAR GENERATION, LLC

DOCKET NO. 50-440

PERRY NUCLEAR POWER PLANT, UNIT NO. 1

AMENDMENT TO FACILITY OPERATING LICENSE

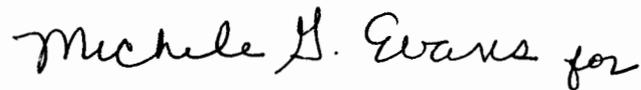
Amendment No. 173
License No. NPF-58

1. The U.S. Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for amendment filed by FirstEnergy Nuclear Operating Company, et al. (the licensee, FENOC), dated October 29, 2015, as supplemented by letter dated April 22, 2016, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and 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. 173, Facility Operating License No. NPF-58 is hereby amended to authorize revision to the Perry Nuclear Power Plant Site Emergency Plan as set forth in the licensee's application dated October 29, 2015, as supplemented by letter dated April 22, 2016, and evaluated in the NRC staff's safety evaluation enclosed with this amendment.
3. This license amendment is effective as of its date of issuance and shall be implemented within 180 days of the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

A handwritten signature in black ink that reads "Michele D. Evans for". The signature is written in a cursive, flowing style.

William M. Dean, Director
Office of Nuclear Reactor Regulation

Date of Issuance: September 14, 2016



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO AMENDMENT NO. 173 TO FACILITY OPERATING LICENSE NO. NPF-58

FIRSTENERGY NUCLEAR OPERATING COMPANY

FIRSTENERGY NUCLEAR GENERATION, LLC

PERRY NUCLEAR POWER PLANT, UNIT NO. 1

DOCKET NO. 50-440

1.0 INTRODUCTION

By application dated October 29, 2015 (Reference 1), as supplemented by letter dated April 22, 2016 (Reference 2), FirstEnergy Nuclear Operating Company (the licensee or FENOC) requested changes to the emergency plan for the Perry Nuclear Power Plant, Unit No. 1 (PNPP or Perry). The proposed changes would revise the emergency action level (EAL) scheme to one based on the Nuclear Energy Institute (NEI) guidance document NEI 99-01, Revision 6, "Development of Emergency Action Levels for Non-Passive Reactors," dated November 2012 (Reference 3). NEI 99-01, Revision 6, was endorsed by the U.S. Nuclear Regulatory Commission (NRC or Commission) by letter dated March 28, 2013 (Reference 4).

The supplemental letter dated April 22, 2016, 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 December 22, 2015 (80 FR 79620).

2.0 REGULATORY EVALUATION

The applicable regulations and guidance for the emergency plans are as follows:

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

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, "Emergency Plans Submittal Dates," 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 (RG) 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 NEI 99-01, Revision 6, to the NRC. By letter dated March 28, 2013, 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. Pursuant to Section IV.B.2 of Appendix E to 10 CFR Part 50, a revision to an entire EAL scheme must receive NRC approval prior to implementation of the revised EAL scheme.

NRC Regulatory Issue Summary (RIS) 2003-18, including Supplements 1 and 2, “Use of NEI 99-01, ‘Methodology for Development of Emergency Action Levels’” (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, 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), with the understanding that licensees may want to develop EALs that differ from the guidance document as allowed in Regulatory Guide 1.101 (Reference 7).

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 10 CFR 50.47(b)(4). In its application, the licensee proposes to revise the current PNPP EAL scheme 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 that both the current and proposed EALs have modifications from the NEI 99-01, Revision 6, guidance due to specific plant designs and licensee preference.

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:

- 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 (Reference 6) (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.

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 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 provided below.

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

- The scheme’s generic information is organized by Recognition Category in the following order.
 - A or 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 - 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. EAL Recognition Categories are comprised of one or more EAL subcategories. EAL sets and EALs are referred to, generically, as EAL subcategories.

This SE 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 PNPP EAL Set RU1/RA1/RS1/RG1 [AU1/AA1/AS1/AG1]

The intent of this EAL set is to ensure that an EAL 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. The set provides for accident assessments using pre-calculated values based on assumed conditions, real-time parameters, and field monitoring results.

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

- 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 or liquid radioactivity that results in projected or actual offsite doses greater than or equal to 1 percent of the U.S. Environmental Protection Agency (EPA) Protective Action Guides (PAGs).
- RS1 - This initiating condition 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 initiating condition 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 subcategory were verified to be consistent with the overall EAL scheme development guidance and 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 also verified that the EAL subcategory is worded in a manner that addresses human factors engineering and user friendliness concerns, addresses the completeness and accuracy issues raised in Appendix 1 to NUREG-0654, and uses objective and observable values.

The NRC staff concludes that the plant-specific implementation method for this EAL subcategory is in alignment with the key characteristics of an effective EAL scheme (as discussed in Section 2.3), 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 PNPP EAL Set RU2/RA2/RS2/RG2 [AU2/AA2/AS2/AG2]

The intent of this EAL set is to ensure that an EAL is declared upon plant-specific indications of potential or actual damage to an irradiated fuel assembly or multiple assemblies. It addresses a lowering of water level over irradiated fuel or fuel uncover (i.e., level below the top of the fuel), a spectrum of fuel handling accidents that result in mechanical damage to irradiated fuel (e.g., a dropped fuel assembly), and NRC Order EA-12-051, "Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation," dated March 12, 2012 (Reference 9).

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

- 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.
- 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 subcategory were verified to be consistent with the overall EAL scheme development guidance and 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 also verified that the EAL subcategory is worded in a manner that addresses human factors engineering and user friendliness concerns, addresses the completeness and accuracy issues raised in Appendix 1 to NUREG-0654, and uses objective and observable values.

The NRC staff concludes that the plant-specific implementation method for this EAL subcategory is in alignment with the key characteristics of an effective EAL scheme (as discussed in Section 2.3), 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 PNPP EAL RA3 [AA3]

The intent of this EAL is to ensure that an EAL is declared upon radiation levels in the plant that limit normal access. The EAL addresses 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. The Alert EAL 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, and formatting for this EAL subcategory were verified to be consistent with the overall EAL scheme development guidance and 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 also verified that the EAL subcategory is worded in a manner that addresses human factors engineering and user friendliness concerns, addresses the completeness and accuracy issues raised in Appendix 1 to NUREG-0654, and uses objective and observable values.

The NRC staff concludes that the plant-specific implementation method for this EAL subcategory is in alignment with the key characteristics of an effective EAL scheme (as discussed in Section 2.3), 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 PNPP EAL Set CU1/CA1/CS1/CG1 [CU1/CA1/CS1/CG1]

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

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

- CU1 - This EAL addresses the inability to restore and maintain water level to a required minimum level (or the 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 subcategory were verified to be consistent with the overall EAL scheme development guidance and 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 also verified that the EAL subcategory is worded in a manner that addresses human factors engineering and user friendliness concerns, addresses the completeness and accuracy issues raised in Appendix 1 to NUREG-0654, and uses objective and observable values.

The NRC staff concludes that the plant-specific implementation method for this EAL subcategory is in alignment with the key characteristics of an effective EAL scheme (as discussed in Section 2.3), 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 PNPP EAL Set CU2/CA2 [CU2/CA2]

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

The NRC staff verified that the progression from UE to Alert is appropriate and consistent with EAL scheme development guidance. The SAE and GE classification levels for this specific accident progression are bounded by EALs RS1 and RG1.

- 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 numbering, sequencing, and formatting for this EAL subcategory were verified to be consistent with the overall EAL scheme development guidance and 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 also verified that the EAL subcategory is worded in a manner that addresses human factors engineering and user friendliness concerns, addresses the completeness and accuracy issues raised in Appendix 1 to NUREG-0654, and uses objective and observable values.

The NRC staff concludes that the plant-specific implementation method for this EAL subcategory is in alignment with the key characteristics of an effective EAL scheme (as discussed in Section 2.3), 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 PNPP EAL Set CU3/CA3 [CU3/CA3]

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

The NRC staff verified that the progression from UE to Alert is appropriate and consistent with EAL scheme development guidance. The SAE and GE classification levels for this specific accident progression are bounded by EALs RS1 and RG1.

- 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 numbering, sequencing, formatting, instrumentation, and setpoints for this EAL subcategory were verified to be consistent with the overall EAL scheme development guidance and 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 also verified that the EAL subcategory is worded in a manner that addresses human factors engineering and user friendliness concerns, addresses the completeness and accuracy issues raised in Appendix 1 to NUREG-0654, and uses objective and observable values.

The NRC staff concludes that the plant-specific implementation method for this EAL subcategory is in alignment with the key characteristics of an effective EAL scheme (as discussed in Section 2.3), 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 PNPP EAL CU4 [CU4]

The intent of this EAL is to ensure that an EAL is declared when there is a loss of vital direct current (DC) power 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 subcategory were verified to be consistent with the overall EAL scheme development guidance and 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 also verified that the EAL subcategory is worded in a manner that addresses human factors engineering and user friendliness concerns, addresses the completeness and accuracy issues raised in Appendix 1 to NUREG-0654, and uses objective and observable values.

The NRC staff concludes that the plant-specific implementation method for this EAL subcategory is in alignment with the key characteristics of an effective EAL scheme (as discussed in Section 2.3), 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 PNPP EAL CU5 [CU5]

The intent of this EAL is to highlight the importance of emergency communications by ensuring that an EAL is declared if normal communication methods for 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 were verified to be consistent with the overall EAL scheme development guidance and with a standard EAL scheme, as required by 10 CFR 50.47(b)(4).

The numbering, sequencing, and formatting for this EAL subcategory were verified to be consistent with the overall EAL scheme development guidance and 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 also verified that the EAL subcategory is worded in a manner that addresses human factors engineering and user friendliness concerns, addresses the completeness and accuracy issues raised in Appendix 1 to NUREG-0654, and uses objective and observable values.

The NRC staff concludes that the plant-specific implementation method for this EAL subcategory is in alignment with the key characteristics of an effective EAL scheme (as discussed in Section 2.3), 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 PNPP EAL CA6 [CA6]

The intent of this EAL is to ensure that an EAL 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 the site. It is primarily intended to ensure that the plant 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 of this EAL subcategory were verified to be consistent with the overall EAL scheme development guidance and 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 also verified that the EAL subcategory is worded in a manner that addresses human factors engineering and user friendliness concerns, addresses the completeness and accuracy issues raised in Appendix 1 to NUREG-0654, and uses objective and observable values.

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

3.3.1 PNPP EAL EU1 [E-HU1]

The intent of this EAL is limited to an event that 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 of this EAL subcategory were verified to be consistent with the overall EAL scheme development guidance and 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 also verified that the EAL subcategory is worded in a manner that addresses human factors engineering and user friendliness concerns, addresses the completeness and accuracy issues raised in Appendix 1 to NUREG-0654, and uses objective and observable values.

The NRC staff concludes that the plant-specific implementation method for this EAL subcategory is in alignment with the key characteristics of an effective EAL scheme (as discussed in Section 2.3), 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 Recognition Category 'F' – Fission Product Barrier Matrix

3.4.1 PNPP EAL Set FA1/FS1/FG1 [FA1/FS1/FG1]

This recognition category uses plant condition based thresholds as triggers within a particular logic configuration needed to 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 loss and/or potential loss indicators that are triggered for each 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 is consistent with the generic EAL scheme development guidance. The progression from Alert to GE is appropriate and consistent with EAL scheme development guidance.

- 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 recognition category were verified to be consistent with the overall EAL scheme development guidance and 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 also verified that the recognition category is worded in a manner that addresses human factors engineering and user friendliness concerns, addresses the completeness and accuracy issues raised in Appendix 1 to NUREG-0654, and uses objective and observable values.

The NRC staff concludes that the plant-specific implementation method for this recognition category is in alignment with the key characteristics of an effective EAL scheme (as discussed in Section 2.3), 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 Recognition Category 'H' – Hazards

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

The intent of this EAL set is to ensure that an EAL is declared based upon a security-related event.

This EAL set was developed in accordance with the guidance from NRC Bulletin 2005-02, "Emergency Preparedness and Response Actions for Security-Based Events," July 18, 2005 (Reference 10), and RIS 2006-12, "Endorsement of Nuclear Energy Institute Guidance 'Enhancements to Emergency Preparedness Programs for Hostile Action,'" 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 progression from UE to GE is appropriate and consistent with EAL scheme development guidance.

- 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.
- HG1 - This EAL addresses an event in which a hostile force has taken physical control of the facility to the extent that the plant staff can no longer operate equipment necessary to maintain key safety functions. It also addresses a hostile action leading to a loss of physical control that results in actual or imminent damage to spent fuel.

The numbering, sequencing, and formatting for this EAL subcategory was verified to be consistent with the overall EAL scheme development guidance and 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 also verified that the EAL subcategory is worded in a manner that addresses human factors engineering and user friendliness concerns, addresses the completeness and accuracy issues raised in Appendix 1 to NUREG-0654, and uses objective and observable values.

The NRC staff concludes that the plant-specific implementation method for this EAL subcategory is in alignment with the key characteristics of an effective EAL scheme (as discussed in Section 2.3), 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 PNPP EAL HU2 [HU2]

The intent of this EAL is to ensure that an EAL 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. 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. 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 of this EAL subcategory were verified to be consistent with the overall EAL scheme development guidance and 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 also verified that the EAL subcategory is worded in a manner that addresses human factors engineering and user friendliness concerns, addresses the completeness and accuracy issues raised in Appendix 1 to NUREG-0654, and uses objective and observable values.

The NRC staff concludes that the plant-specific implementation method for this EAL subcategory is in alignment with the key characteristics of an effective EAL scheme (as discussed in Section 2.3), 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 PNPP EAL HU3 [HU3]

The intent of this EAL is to ensure that an EAL 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); and
- An external event that prohibits the plant staff from accessing the site.

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. 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. Indications of hazard 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 of this EAL subcategory were verified to be consistent with the overall EAL scheme development guidance and 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 also verified that the EAL subcategory is worded in a manner that addresses human factors engineering and user friendliness concerns, addresses the completeness and accuracy issues raised in Appendix 1 to NUREG-0654, and uses objective and observable values.

The NRC staff concludes that the plant-specific implementation method for this EAL subcategory is in alignment with the key characteristics of an effective EAL scheme (as discussed in Section 2.3), 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 PNPP EAL HU4 [HU4]

The intent of this EAL is to ensure that an EAL 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. 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. 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 of this EAL subcategory were verified to be consistent with the overall EAL scheme development guidance and 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 also verified that the EAL subcategory is worded in a manner that addresses human factors engineering and user friendliness concerns, addresses the completeness and accuracy issues raised in Appendix 1 to NUREG-0654, and uses objective and observable values.

The NRC staff concludes that the plant-specific implementation method for this EAL subcategory is in alignment with the key characteristics of an effective EAL scheme (as discussed in Section 2.3), 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 PNPP EAL HA5 [HA5]

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

The numbering, sequencing, and formatting of this EAL subcategory were verified to be consistent with the overall EAL scheme development guidance and 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 also verified that the EAL subcategory is worded in a manner that addresses human factors engineering and user friendliness concerns, addresses the completeness and accuracy issues raised in Appendix 1 to NUREG-0654, and uses objective and observable values.

The NRC staff concludes that the plant-specific implementation method for this EAL subcategory is in alignment with the key characteristics of an effective EAL scheme (as discussed in Section 2.3), 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 PNPP EAL Set HA6/HS6 [HA6/HS6]

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

The NRC staff verified that the progression from Alert to SAE is appropriate and consistent with EAL scheme development guidance.

- 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.

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 of this EAL subcategory were verified to be consistent with the overall EAL scheme development guidance and 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 also verified that the EAL subcategory is worded in a manner that addresses human factors engineering and user friendliness concerns, addresses the completeness and accuracy issues raised in Appendix 1 to NUREG-0654, and uses objective and observable values.

The NRC staff concludes that the plant-specific implementation method for this EAL subcategory is in alignment with the key characteristics of an effective EAL scheme (as discussed in Section 2.3), 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 PNPP EAL Set HU7/HA7/HS7/HG7 [HU7/HA7/HS7/HG7]

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

The NRC staff verified that the 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 Coordinator 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 Coordinator 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 Coordinator to fall under the emergency classification level description for a 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 Coordinator to fall under the emergency classification level description for a GE.

The numbering, sequencing, and formatting of this EAL subcategory were verified to be consistent with the overall EAL scheme development guidance and 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 also verified that the EAL subcategory is worded in a manner that addresses human factors engineering and user friendliness concerns,

addresses the completeness and accuracy issues raised in Appendix 1 to NUREG-0654, and uses objective and observable values.

The NRC staff concludes that the plant-specific implementation method for this EAL subcategory is in alignment with the key characteristics of an effective EAL scheme (as discussed in Section 2.3), 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 Recognition Category 'S' – System Malfunction

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

The intent of this EAL set is to ensure that an EAL 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 progression from UE to GE is appropriate and consistent with EAL scheme development guidance.

- 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.
- SG1.1 - This EAL addresses a prolonged loss of all power sources to AC emergency buses.

The numbering, sequencing, formatting, instrumentation, and setpoints for this EAL subcategory were verified to be consistent with the overall EAL scheme development guidance and 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 also verified that the EAL subcategory is worded in a manner that addresses human factors engineering and user friendliness concerns, addresses the completeness and accuracy issues raised in Appendix 1 to NUREG-0654, and uses objective and observable values.

The NRC staff concludes that the plant-specific implementation method for this EAL subcategory is in alignment with the key characteristics of an effective EAL scheme (as discussed in Section 2.3), 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 PNPP EAL Set SU3/SA3 [SU2/SA2]

The intent of this EAL set is to ensure that an EAL 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 progression from UE to Alert is appropriate and consistent with EAL scheme development guidance. The SAE and GE classification levels for this specific accident progression are bounded by Recognition Category 'F', as well as EALs RS1 and RG1.

- 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 numbering, sequencing, and formatting for this EAL subcategory were verified to be consistent with the overall EAL scheme development guidance and 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 also verified that the EAL subcategory is worded in a manner that addresses human factors engineering and user friendliness concerns, addresses the completeness and accuracy issues raised in Appendix 1 to NUREG-0654, and uses objective and observable values.

The NRC staff concludes that the plant-specific implementation method for this EAL subcategory is in alignment with the key characteristics of an effective EAL scheme (as discussed in Section 2.3), 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 PNPP EAL SU4 [SU3]

The intent of this EAL is to ensure that an EAL 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, formatting, instrumentation, and setpoints for this EAL subcategory were verified to be consistent with the overall EAL scheme development guidance and 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 also verified that the EAL subcategory is worded in a manner that addresses human factors engineering and user friendliness concerns, addresses the completeness and accuracy issues raised in Appendix 1 to NUREG-0654, and uses objective and observable values.

The NRC staff concludes that the plant-specific implementation method for this EAL subcategory is in alignment with the key characteristics of an effective EAL scheme (as discussed in Section 2.3), 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 PNPP EAL SU5 [SU4]

The intent of this EAL is to ensure that an EAL is declared when the plant has indications of RCS leakage. By design, this EAL is redundant with corresponding indicators from a loss or potential loss of fission product barriers, as well as radiation monitoring, to ensure reactor and/or fission product barrier events 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 subcategory were verified to be consistent with the overall EAL scheme development guidance and 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 also verified that the EAL subcategory is worded in a manner that addresses human factors engineering and user friendliness concerns, addresses the completeness and accuracy issues raised in Appendix 1 to NUREG-0654, and uses objective and observable values.

The NRC staff concludes that the plant-specific implementation method for this EAL subcategory is in alignment with the key characteristics of an effective EAL scheme (as discussed in Section 2.3), 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 PNPP EAL Set SU6/SA6/SS6 [SU5/SA5/SS5]

The intent of this EAL set is to ensure that an EAL 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 progression from UE to SAE is appropriate and consistent with EAL scheme development guidance. The GE classification level for this event is bounded by Recognition Category 'F', as well as EAL RG1.

- 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 the 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 the 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 numbering, sequencing, formatting, instrumentation, and setpoints for this EAL subcategory were verified to be consistent with the overall EAL scheme development guidance and 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 also verified that the

EAL subcategory is worded in a manner that addresses human factors engineering and user friendliness concerns, addresses the completeness and accuracy issues raised in Appendix 1 to NUREG-0654, and uses objective and observable values.

The NRC staff concludes that the plant-specific implementation method for this EAL subcategory is in alignment with the key characteristics of an effective EAL scheme (as discussed in Section 2.3), 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 EAL SU7 [SU6]

The intent of this EAL is to highlight the importance of emergency communications by ensuring that an EAL is declared if normal communication methods for 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 for this EAL were verified to be consistent with the overall EAL scheme development guidance and 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 numbering, sequencing, and formatting for this EAL subcategory were verified to be consistent with the overall EAL scheme development guidance and 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 also verified that the EAL subcategory is worded in a manner that addresses human factors engineering and user friendliness concerns, addresses the completeness and accuracy issues raised in Appendix 1 to NUREG-0654, and uses objective and observable values.

The NRC staff concludes that the plant-specific implementation method for this EAL subcategory is in alignment with the key characteristics of an effective EAL scheme (as discussed in Section 2.3), 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 EAL Set SS2/SG1.2 [SS8/SG8]

The intent of this EAL set is to ensure that an EAL is declared when a loss of AC or DC power event occurs, as this condition compromises the ability of the licensee to monitor and control the removal of decay heat.

The NRC staff verified that the 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, formatting, instrumentation, and setpoints for this EAL subcategory were verified to be consistent with the overall EAL scheme development guidance and 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 also verified that the EAL subcategory is worded in a manner that addresses human factors engineering and user friendliness concerns, addresses the completeness and accuracy issues raised in Appendix 1 to NUREG-0654, and uses objective and observable values.

The NRC staff concludes that the plant-specific implementation method for this EAL subcategory is in alignment with the key characteristics of an effective EAL scheme (as discussed in Section 2.3), 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 EAL SA8 [SA9]

The intent of this EAL is to ensure that an EAL 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 the site. This EAL is primarily intended to ensure that the plant 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 subcategory were verified to be consistent with the overall EAL scheme development guidance and 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 also verified that the EAL subcategory is worded in a manner that addresses human factors engineering and user friendliness concerns, addresses the completeness and accuracy issues raised in Appendix 1 to NUREG-0654, and uses objective and observable values.

The NRC staff concludes that the plant-specific implementation method for this EAL subcategory is in alignment with the key characteristics of an effective EAL scheme (as discussed in Section 2.3), 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 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 the planning standards of 10 CFR 50.47(b).

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 verified that the proposed EAL scheme is technically complete and consistent with EAL schemes implemented at similarly designed plants.

Therefore, the NRC staff concludes that the licensee's proposed EAL scheme, as set forth in the licensee's application dated October 29, 2015, as supplemented by letter dated April 22, 2016, 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 updated site-specific EAL bases document provided by Enclosure A of the letter dated April 22, 2016, is acceptable for implementation.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Ohio State official was notified of the proposed issuance of the amendment. The State official had no comments.

5.0 ENVIRONMENTAL CONSIDERATION

The amendment changes requirements with respect to the installation or use of facility components located within the restricted area as defined in 10 CFR Part 20 because the amendment approves an acceptable EAL scheme which is required for operation of the facility. The NRC staff has determined that the amendment involves 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 amendment involves no significant hazards consideration, and there has been no public comment on such finding published in the *Federal Register* on December 22, 2015 (80 FR 79620). Accordingly, the amendment meets 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 amendment.

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 amendment will not be inimical to the common defense and security or to the health and safety of the public.

7.0 REFERENCES

1. Letter from FirstEnergy Nuclear Operating Co., to U.S. Nuclear Regulatory Commission, "Perry Nuclear Power Plant - Request for Licensing Action to Revise the Emergency Plan," October 29, 2015 (ADAMS Accession No. ML15316A508).
2. Letter from FirstEnergy Nuclear Operating Co., to U.S. Nuclear Regulatory Commission, "Perry Nuclear Power Plant - Response to Request for Additional Information Regarding a Request to Revise the Emergency Plan (CAC No. MF7046)," April 22, 2016 (ADAMS Accession No. ML16117A507).
3. NEI 99-01, Revision 6, "Development of Emergency Action Levels for Non-Passive Reactors," November 2012 (ADAMS Accession No. ML13091A209 [package]).
4. Thaggard, M., U.S. Nuclear Regulatory Commission, Letter to Ms. 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)," March 28, 2013 (ADAMS Accession No. ML12346A463).
5. U. S. Nuclear Regulatory Commission, Generic Letter (GL) 79-50, "Emergency Plans Submittal Dates," October 10, 1979.
6. U.S. Nuclear Regulatory Commission and Federal Emergency Management Agency, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants," NUREG-0654/FEMA-REP-1, Revision 1, November 1980 (ADAMS Accession No. ML040420012).
7. U.S. Nuclear Regulatory Commission, "Emergency Planning and Preparedness for Nuclear Power Reactors," Regulatory Guide 1.101, Revision 2, 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 2003-18, with Supplements 1 and 2, "Use of NEI-99-01, 'Methodology for Development of Emergency Action Levels,' Revision 4, dated January 2003," October 8, 2003, July 13, 2004, and December 12, 2005 (ADAMS Accession Nos. ML032580518, ML041550395, and ML051450482, respectively).

9. Leeds, E. and Johnson, M., U.S. Nuclear Regulatory Commission, letter to All Power Reactor Licensees and Holders of Construction Permits in Active or Deferred Status, NRC Order EA-12-051, "Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation (Effective Immediately)," March 12, 2012 (ADAMS Accession No. ML12054A679).
10. NRC Bulletin 2005-02, "Emergency Preparedness and Response Actions for Security-Based Events," July 18, 2005 (ADAMS Accession No. ML051740058).
11. NRC Regulatory Issue Summary 2006-12, "Endorsement of Nuclear Energy Institute Guidance 'Enhancements to Emergency Preparedness Programs for Hostile Action,'" July 19, 2006 (ADAMS Accession No. ML072670421).

Principal Contributor: R. Hoffman, NSIR

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Mr. David B. Hamilton
Site Vice President
FirstEnergy Nuclear Operating Company
Mail Stop A-PY-A290 – South Main Street
P.O. Box 97, 10 Center Road
Perry, OH 44081-0097

SUBJECT: PERRY NUCLEAR POWER PLANT, UNIT NO. 1 - ISSUANCE OF
AMENDMENT CONCERNING REVISION TO THE PERRY NUCLEAR POWER
PLANT EMERGENCY PLAN (CAC NO. MF7046)

Dear Mr. Hamilton:

The U.S. Nuclear Regulatory Commission (NRC) has issued the enclosed Amendment No. 173 to Facility Operating License No. NPF-58 for Perry Nuclear Power Plant, Unit No. 1. The amendment consists of changes to the Perry Nuclear Power Plant emergency action level (EAL) scheme in response to your application dated October 29, 2015, as supplemented by letter dated April 22, 2016.

The amendment revises your current EAL scheme to one based on the Nuclear Energy Institute (NEI) guidance in NEI 99-01, Revision 6, "Development of Emergency Action Levels for Non-Passive Reactors," dated November 2012. NEI 99-01, Revision 6, was endorsed by the NRC by letter dated March 28, 2013.

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

Sincerely,
/RA/
Kimberly J. Green, Senior Project Manager
Plant Licensing Branch III-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-440

Enclosures:

- 1. Amendment No. 173 to NPF-58
- 2. Safety Evaluation

cc: ListServ

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OFFICE	NRR/DORL/LPL3-1/PM	NRR/DORL/LPL3-2/LA	NSIR/DPR/ORLOB/BC	OGC (NLO subject to email comments)
NAME	KGreen	SRohrer	JAnderson	JWachutka
DATE	6/7/16	6/7/16	5/25/16	6/14/16
OFFICE	NRR/DORL/LPL3-1/BC	NRR/DORL/D	NRR/D	NRR/DORL/LPL3-1/PM
NAME	DWrona	ABoland (EBenner for)	WDean (MEvans for)	KGreen
DATE	9/8/16	9/9/16	9/13/16	9/14/16

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