

December 8, 2015

MEMORANDUM TO: Benjamin G. Beasley, Chief  
Plant Licensing Branch 2-2  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

FROM: Joseph D. Anderson, Chief */RA/*  
Operating Reactor Licensing and Outreach Branch  
Division of Preparedness and Response  
Office of Nuclear Security and Incident Response

SUBJECT: SAFETY EVALUATION INPUT ON EMERGENCY ACTION LEVEL  
SCHEME UPGRADE FOR BRUNSWICK STEAM ELECTRIC PLANT  
UNITS 1 AND 2 (TAC NO'S. MF5766 AND MF5767)

By application dated January 30, 2015 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML15044A198), as supplemented by letter dated November 23, 2015 (ADAMS Accession No. MLXXXXXXXX), Duke Energy Progress, Inc. (Duke Energy, the licensee) requested a change to the emergency plan for the Brunswick Steam Electric Plant, Units 1 and 2 (BSEP). The proposed change is to revise the emergency action level (EAL) scheme for each unit based on the Nuclear Energy Institute (NEI) document 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 U.S. Nuclear Regulatory Commission (NRC or Commission) by letter dated March 28, 2013 (ADAMS Accession No. ML13091A209 [package]).

The Operating Reactor Licensing and Outreach Branch has completed its review of the proposed changes to the licensee's EAL scheme and supporting documentation in accordance with Appendix E to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, Section IV.B.(2). We have concluded that the proposed changes meet the standards in 10 CFR 50.47(b) and the requirements of Appendix E to 10 CFR Part 50, and provides reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency. Therefore, the licensee's proposed changes to the EAL scheme, as outlined in the letters referenced above, are considered acceptable. The basis for our conclusion is contained in the attached safety evaluation input.

The NRC expects the licensee to implement the EALs as approved in the enclosed safety evaluation, which includes the implementation of the EAL technical basis document within 180 days of the date of this letter.

This completes our effort under TAC NO's. MF4236-MF4251.

Enclosure:  
Safety Evaluation Input

CONTACT: Don A. Johnson, NSIR/DPR  
(301) 287-9230

This completes our effort under TAC NO's. MF5766 and MF5767.

Enclosure:  
Safety Evaluation Input

CONTACT: Don A. Johnson, NSIR/DPR  
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**ADAMS Accession No: ML15303A396**

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DATE	12/02/15	12/08/15

**OFFICIAL AGENCY RECORD**

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELATED TO AMENDMENT NO. XXX TO FACILITY OPERATING LICENSE NOS.

DPR-71 & DPR-62,

DUKE ENERGY PROGRESS, INC.

BRUNSWICK STEAM ELECTRIC PLANT, UNITS 1 & 2

DOCKET NOS. 50-324 and 50-325

## 1.0 INTRODUCTION

By application dated January 30, 2015 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML15044A198), as supplemented by letter dated November 23, 2015 (ADAMS Accession No. MLXXXXX), Duke Energy Progress, Inc.

(Duke Energy, the licensee) requested a change to the emergency plan for the Brunswick Steam Electric Plant, Units 1 and 2 (BSEP). The proposed change is to revise the emergency action level (EAL) scheme for each unit based on the Nuclear Energy Institute (NEI) document 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 U.S. Nuclear Regulatory Commission (NRC or Commission) by letter dated March 28, 2013.

The supplement dated November 23, 2015, 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 xxxx (xx FR xxxx).

## 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 standards that the onsite and offsite emergency response plans must meet for NRC staff to make a positive 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) to 10 CFR emphasizes 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:

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.

## 2.2 Guidance

The EAL development guidance was initially established in Generic Letter (GL), 79-50 and was subsequently established in NUREG-0654/FEMA-REP-1, which was endorsed as an approach for the development of an EAL scheme via NRC Regulatory Guide (RG) 1.101, Revision 2.

As industry and regulatory experience was gained with the implementation and use of EAL schemes, the industry issued a revised EAL scheme development guidance to reflect lessons learned. To date, NUMARC/NESP-007 and NEI 99-01, Revisions 4, 5, and 6, were provided to the NRC for review and endorsement as generic (non-plant-specific) EAL development guidance. RG 1.101, Revisions 3 and 4, endorsed NUMARC/NESP-007 and NEI 99-01, Revision 4, as acceptable alternatives for licensees to consider in the development of their plant-specific EAL schemes, and allowed licensees to develop plant-specific EALs based upon an alternative approach not endorsed by the NRC. NEI 99-01, Revision 5, was endorsed by the NRC as generic (non-plant-specific) EAL Scheme development guidance via letter dated February 22, 2008. NEI 99-01, Revision 6, was endorsed by the NRC as generic (non-plant-specific) EAL scheme development guidance via letter dated March 28, 2013.

The EAL development guidance contained in GL 79-50, NUREG-0654/FEMA-REP-1, NUMARC/NESP-007, and NEI 99-01, Revisions 4, 5, and 6, are all considered generic EAL scheme development guidance, as they are not plant-specific and may not be entirely

applicable for some reactor designs. However, the guidance contained in these documents 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. Most licensees choose to develop plant-specific EAL schemes using the latest endorsed EAL development guidance with appropriate plant-specific alterations as applicable. Pursuant to 10 CFR Part 50, Appendix E, Section IV.B (2), a revision to an EAL must be approved by the NRC before implementation if the licensee is changing from one EAL scheme to another EAL scheme.

In summary, the NRC staff considers the following methods acceptable for use in developing 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 applicable guidance document as allowed in RG 1.101 and in the applicable endorsement letters:

- Appendix 1, "Emergency Action Level Guidelines for Nuclear Power Plants," to NUREG-0654/FEMA-REP-1, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants," dated November 1980;
- NUMARC/NESP-007, Revision 2, "Methodology for Development of Emergency Action Levels," dated January 1992;
- NEI 99-01, Revision 4, "Methodology for Development of Emergency Action Levels," dated January 2003;
- NEI 99-01, Revision 5, "Methodology for Development of Emergency Action Levels," dated February 2008; and
- NEI 99-01, Revision 6, "Development of Emergency Action Levels for Non-Passive Reactors," dated November 2012.

NRC Regulatory Issue Summary (RIS) 2003-18, with Supplements 1 and 2, "Use of NEI 99-01, Methodology for Development of Emergency Action Levels," also provides guidance for developing or changing a standard emergency classification and action level 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.

Regardless of the generic EAL scheme development guidance document used by a licensee to develop its EAL scheme, or if a licensee chose to develop its EAL scheme using an alternative approach not endorsed by the NRC, or a combination of the two (most typical), the NRC staff reviews the EAL scheme to assure it meets the requirements of Section IV of Appendix E to 10 CFR Part 50 and 10 CFR 50.47(b)(4).

### 3.0 TECHNICAL EVALUATION

In its application, the licensee proposes to revise its current 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, a comparison matrix, the EAL numbering scheme, and an explanation for any difference or deviation from NEI 99-01,

Revision 6. The comparison matrix provided a cross-reference relating the proposed EAL scheme to the EAL scheme in NEI 99-01, Revision 6. The NRC staff's review is based on the proposed site-specific EAL schemes provided by the licensee.

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 notes that both the current and proposed EALs have modifications from the 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 regarding 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
- Objective and observable values.

To aid in understanding the nomenclature used in this safety evaluation, the following convention is used: the first letter signifies the EAL category; the second letter signifies the emergency classification level (G = General Emergency (GE), S = Site Area Emergency (SAE), A = Alert, and U = Notification of Unusual Event (UE)); and the number is the applicable number from the plant-specific EAL scheme. This safety evaluation uses the numbering system from the 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.

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

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

This EAL set is based upon plant-specific indications of a release of radioactivity (gaseous and/or liquid). The NRC staff has determined that the progression from UE to GE is appropriate and consistent with EAL scheme development guidance.

The licensee chose to modify this EAL set by using a site-specific implementation method that uses a modified numbering format and EAL sequence other than that provided in the generic EAL scheme development guidance. However, the NRC staff has determined that the numbering, sequencing, and format of this EAL set are consistent with the overall EAL scheme

development guidance and with the site-specific implementation strategies provided, and are therefore considered part of a standard EAL scheme.

The instrumentation and set points derived for this EAL set are consistent with the overall EAL scheme development guidance, address the plant-specific implementation strategies provided, and are 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, 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 EAL Set RG2/RS2/RA2/RU2 [AG2/AS2/AA2/AU2]

This EAL set is based upon plant-specific indications of fuel uncover, including spent fuel stored in the spent fuel pool or refueling pathway. The NRC staff has determined that the progression from UE to GE is appropriate and consistent with EAL scheme development guidance. The SAE and GE classification levels for this specific accident progression are also bounded by indications available in the fission product barrier matrix, as well as in EALs RS1 and RG1.

The licensee chose to modify this EAL set by using a site-specific implementation method that uses a modified numbering format and EAL sequence other than that provided in the generic EAL scheme development guidance. However, the NRC staff has determined that the numbering, sequencing, and format of this EAL set are consistent with the overall EAL scheme development guidance and with the site-specific implementation strategies provided, and are therefore considered part of a standard EAL scheme.

The instrumentation and set points derived for this EAL set are consistent with the overall EAL scheme development guidance, address the plant-specific implementation strategies provided, and are 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, 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 EAL RA3 [AA3]

This EAL set is based upon radiation levels in the plant that limit normal access. This Alert EAL is primarily intended to ensure that the plant emergency response organization 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 indication of fission product barrier loss or potential loss, as well as in RS1 and RG1.

The licensee chose to modify this EAL by using a site-specific implementation method that uses a modified numbering format and EAL sequence other than that provided in the generic EAL scheme development guidance. However, the NRC staff has determined that the numbering,

sequencing, and format of this EAL is consistent with the overall EAL scheme development guidance and with the site-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, 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 Category 'C' – Cold Shutdown/Refueling System Malfunction

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

This EAL set is based upon a loss of reactor pressure vessel inventory and/or reactor coolant system (RCS) leakage. The NRC staff has determined that the progression from UE to GE is appropriate and consistent with EAL scheme development guidance.

The NRC staff has also determined that the numbering, sequencing, and format of this EAL set are consistent with the overall EAL scheme development guidance and with the plant-specific implementation strategies provided, and are therefore considered part of a standard EAL scheme.

The instrumentation and set points derived for this EAL set are consistent with the overall EAL scheme development guidance, address the plant-specific implementation strategies provided, and are 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, 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 EAL CA2/CU2 [CA2/CU2]

This EAL set is based upon a loss of available power to emergency power electrical busses. The NRC staff has determined 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 indications available in EALs RS1 and RG1.

The NRC staff has also determined that the numbering, sequencing, and format of this EAL set are consistent with the overall EAL scheme development guidance and with the plant-specific implementation strategies provided, and are therefore considered part of a standard EAL scheme.

The instrumentation and set points derived for this EAL set are consistent with the overall EAL scheme development guidance, address the plant-specific implementation strategies provided, and are 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, 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 EAL Set CA3/CU3 [CA3/CU3]

This EAL set is based upon an inability to maintain control of decay heat removal. The NRC staff has determined 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 indications available in EALs RS1 and RG1.

The NRC staff has also determined that the numbering, sequencing, and format of this EAL set are consistent with the overall EAL scheme development guidance and with the plant-specific implementation strategies provided, and are therefore considered part of a standard EAL scheme.

The instrumentation and set points derived for this EAL set are consistent with the overall EAL scheme development guidance, address the plant-specific implementation strategies provided, and are 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, 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 EAL CU4 [CU4]

This EAL is not part of an EAL set within the overall EAL scheme. The EAL's intent is to ensure that an EAL is declared when a loss of direct current (dc) power event occurs, as this condition compromises the ability of the licensee to monitor and control the removal of decay heat during cold shutdown or refueling modes of operation. The Alert, SAE, and GE classification levels for this specific accident progression are bounded by indications available in EALs RA1, RS1, and RG1.

The NRC staff has determined that the numbering, sequencing, and format of this EAL are consistent with the overall EAL scheme development guidance and with the plant-specific implementation strategies provided, and are therefore considered part of a standard EAL scheme.

The instrumentation and set points derived for this EAL are consistent with the overall EAL scheme development guidance, address the plant-specific implementation strategies provided, and are 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, 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 EAL CU5 [CU5]

This EAL is not part of an EAL set within the overall EAL scheme. The EAL's intent 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 for offsite response organizations including the NRC, are lost. The NRC staff has determined that no escalation path is necessary for this EAL.

The NRC staff has also determined that the numbering, sequencing, and format of this EAL are consistent with the overall EAL scheme development guidance and with the plant-specific implementation strategies provided, and are therefore considered part of a standard EAL scheme.

The communication methods derived for this EAL are consistent with the overall EAL scheme development guidance, address the plant-specific implementation strategies provided, and are 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, 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 EAL CA6 [CA6]

This EAL is not part of an EAL set within the overall EAL scheme. The EAL's intent is to ensure that an EAL is declared when hazardous events lead to potential damage to safety systems. The SAE and GE classification levels for this accident progression are bounded by indications available in EALs RS1, and RG1.

The NRC staff has determined that the numbering, sequencing, and format of this EAL are consistent with the overall EAL scheme development guidance and with 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, 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 Category 'E' – Independent Spent Fuel Storage Installation (ISFSI)

### 3.3.1 EAL EU1 [E-HU1]

This EAL is not part of an EAL set within the overall EAL scheme. The EAL's intent is limited to radiological events at the ISFSI. The NRC staff has determined that, while security-related events at the ISFSI are also of concern, they are bounded by the licensee's EAL HA1.

The NRC staff has also determined that the numbering, sequencing, and format of this EAL are consistent with the overall EAL scheme development guidance and with 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, 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 category is unique in the overall EAL scheme, as the thresholds are not intended to be stand-alone indicators of a particular event occurring at the plant. Rather, they are to be used as triggers within the particular logic configuration needed to reflect a loss or potential loss of a fission product barrier. The U.S. nuclear power plants 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 the Category 'R' and Category 'M' EAL sets, due to the importance for licensees to be able to recognize reactor and/or fission product barrier events as timely as possible using the best available indicators from several different perspectives.

The NRC staff verified that the logic used to determine the appropriate emergency classification is consistent with the generic EAL scheme development guidance.

The instrumentation and set points derived for this EAL category are consistent with the overall EAL scheme development guidance, address the plant-specific implementation strategies provided, and are consistent with a standard EAL scheme, as required by 10 CFR 50.47(b)(4).

The licensee chose to modify this EAL category by using a plant-specific implementation method that uses a modified numbering format and EAL sequence other than that provided in the generic EAL scheme development guidance. However, the NRC staff has determined that the numbering, sequencing, and format of this EAL category are consistent with the overall EAL scheme development guidance and with 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 category is in alignment with the key characteristics of an effective EAL scheme and, while different than that provided in the generic EAL development guidance, continues to meet 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 EAL Set HG1/HS1/HA1/HU1 [HG1/HS1/HA1/HU1]

This EAL set is based upon security-related events originally developed in accordance with the guidance from NRC Bulletin 2005-02 and RIS 2006-12 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 so as to eliminate any confusion without changing the intent of the EAL set as set forth in NRC Bulletin 2005-02 and RIS 2006-12.

The NRC staff has determined that the numbering, sequencing, and format of this EAL set are consistent with the overall EAL scheme development guidance and with the plant-specific implementation strategies provided, and are therefore considered part of a standard EAL scheme.

The NRC staff has also determined that this EAL set is consistent with the guidance provided in NRC Bulletin 2005-02 and RIS 2006-12, as further enhanced by the lessons learned from implementation and drills, and revised in NEI 99-01, Revision 6.

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, 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 EAL HU2 [HU2]

This EAL is not part of an EAL set within the overall EAL scheme. This EAL is based upon the effect that a seismic event may have on the facility. The Alert, SAE, and GE classification levels for this specific accident progression are bounded by indications available in the fission product barrier matrix, as well as in EALs RA1, RS1, RG1, CA6, and SA8.

The NRC staff has determined that the numbering, sequencing, and format of this EAL are consistent with the overall EAL scheme development guidance and with 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, and while different than that provided in the generic EAL development guidance, it continues to meet 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 EAL HU3 [HU3]

This EAL is not part of an EAL set within the overall EAL scheme. This EAL is based upon the effect that natural and destructive hazards may have on the facility. The Alert, SAE, and GE

classification levels for this specific accident progression are bounded by indications available in the fission product barrier matrix, as well as in EALs RA1, RS1, RG1, CA6, and SA8.

The NRC staff has determined that the numbering, sequencing, and format of this EAL are consistent with the overall EAL scheme development guidance and with the plant-specific implementation strategies provided, and are therefore considered part of a standard EAL scheme.

The instrumentation and set points derived for this EAL are consistent with the overall EAL scheme development guidance, address the plant-specific implementation strategies provided, and are 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 and, while different than that provided in the generic EAL development guidance, continues to meet 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 EAL HU4 [HU4]

This EAL is not part of an EAL set within the overall EAL scheme. This EAL is based upon the effect that fires may have on the facility. The Alert, SAE, and GE classification levels for this specific accident progression are bounded by indications available in the fission product barrier matrix, as well as in EALs RA1, RS1, RG1, CA6, and SA8.

The NRC staff has determined that the numbering, sequencing, and format of this EAL are consistent with the overall EAL scheme development guidance and with 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 and, while different than that provided in the generic EAL development guidance, continues to meet 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 EAL HA5 [HA5]

This EAL is not part of an EAL set within the overall EAL scheme. This EAL is based upon the effect that toxic, corrosive, asphyxiant, or flammable gases may have on the facility. The SAE and GE classification levels for this specific accident progression are bounded by indications available in the fission product barrier matrix, as well as in EALs RS1 and RG1.

The NRC staff has determined that the numbering, sequencing, and format of this EAL are consistent with the overall EAL scheme development guidance and with 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 and, while different than that provided in the generic EAL development guidance, continues to meet 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 EAL Set HS6/HA6 [HS6/HA6]

This EAL set is based upon control room evacuation and the inability to control critical plant systems remotely. The NRC staff has determined that the progression from Alert to SAE is appropriate and consistent with EAL scheme development guidance. The GE classification level for this specific accident progression is bounded by indications available in the fission product barrier matrix, as well as in EAL RG1.

The NRC staff has also determined that the numbering, sequencing, and format of this EAL set are consistent with the overall EAL scheme development guidance and with 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, 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 EAL Set HG7/HS7/HA7/HU7 [HG7/HS7/HA7/HU7]

This EAL set is based upon providing the decision-makers with EALs to consider when, in their judgment, an emergency classification is warranted.

The NRC staff has determined that the numbering, sequencing and format of this EAL set are consistent with the overall EAL scheme development guidance, are consistent with 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 and, while different than that provided in the generic EAL development guidance, continues to meet 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 EAL Set SG1/SS1/SA1/SU1 [SG1/SS1/SA1/SU1]

This EAL set is based upon a loss of available alternating current (ac) power sources to the emergency busses. The NRC staff has determined that the progression from UE to GE is appropriate and consistent with EAL scheme development guidance.

The licensee chose to modify this EAL set by using a site-specific implementation method that uses a modified numbering format and EAL sequence other than that provided in the generic EAL scheme development guidance. However, the NRC staff has determined that the numbering, sequencing, and format of this EAL set are consistent with the overall EAL scheme development guidance and with the site-specific implementation strategies provided, and are therefore considered part of a standard EAL scheme.

The instrumentation, values, and listing of applicable power sources derived for this EAL set are consistent with the overall EAL scheme development guidance, address the plant-specific implementation strategies provided, and are 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, 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 EAL Set SG1.2/SS2 [SG8/SS8]

This EAL set is based upon a loss of site AC and DC power sources. The EAL's intent 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 licensee chose to modify this EAL set by using a site-specific implementation method that uses a modified numbering format and EAL sequence other than that provided in the generic EAL scheme development guidance. However, the NRC staff has determined that the numbering, sequencing, and format of this EAL set are consistent with the overall EAL scheme development guidance and with the site-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, 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 EAL Set SA3/SU3 [SA2/SU2]

This EAL set is based upon the effect that a loss of available indicators in the control room has on the facility. The NRC staff has determined 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 indications available in the fission product barrier matrix, as well as in EALs RS1 and RG1.

The licensee chose to modify this EAL set by using a site-specific implementation method that uses a modified numbering format and EAL sequence other than that provided in the generic EAL scheme development guidance. However, the NRC staff has determined that the numbering, sequencing, and format of this EAL set are consistent with the overall EAL scheme development guidance and with the site-specific implementation strategies provided, and are therefore considered part of a standard EAL scheme.

The instrumentation and set points derived for this EAL set are consistent with the overall EAL scheme development guidance, address the plant-specific implementation strategies provided, and are 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, 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 EAL SU5 [SU4]

This EAL is not part of an EAL set within the overall EAL scheme. The EAL's intent 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 regardless of the particular EAL table a licensee may be referring to. EAL escalation is bounded by indications available in the fission product barrier matrix, as well as in EALs RA1, RS1, and RG1.

The licensee chose to modify this EAL set by using a site-specific implementation method that uses a modified numbering format and EAL sequence other than that provided in the generic EAL scheme development guidance. However, the NRC staff has determined that the numbering, sequencing, and format of this EAL set are consistent with the overall EAL scheme development guidance and with the site-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, 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 EAL Set SS6/SA6/SU6 [SS5/SA5/SU5]

This EAL set is based upon the effect that a failure of the reactor protection system may have on the plant. The NRC staff has determined 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 indications available in the fission product barrier matrix, as well as in EAL RG1.

The licensee chose to modify this EAL set by using a site-specific implementation method that uses a modified numbering format and EAL sequence other than that provided in the generic EAL scheme development guidance. However, the NRC staff has determined that the numbering, sequencing, and format of this EAL set are consistent with the overall EAL scheme development guidance and with the site-specific implementation strategies provided, and are therefore considered part of a standard EAL scheme.

The instrumentation and set points derived for this EAL set are consistent with the overall EAL scheme development guidance, address the plant-specific implementation strategies provided, and are 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 and, while different than that provided in the generic EAL development guidance, continues to meet 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]

This EAL is not part of an EAL set within the overall EAL scheme. The EAL's intent 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 for offsite response organizations including the NRC, are lost. The NRC staff has determined that no escalation path is necessary.

The licensee chose to modify this EAL set by using a site-specific implementation method that uses a modified numbering format and EAL sequence other than that provided in the generic EAL scheme development guidance. However, the NRC staff has determined that the numbering, sequencing, and format of this EAL set are consistent with the overall EAL scheme development guidance and with the site-specific implementation strategies provided, and are therefore considered part of a standard EAL scheme.

The communication methods derived for this EAL are consistent with the overall EAL scheme development guidance, address the plant-specific implementation strategies provided, and are 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, 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 SU4 [SU3]

This EAL is not part of an EAL set within the overall EAL scheme. The EAL's intent is to ensure that an EAL is declared when RCS activity is greater than Technical Specification allowable limits. The Alert, SAE, and GE classification levels for this specific accident progression are bounded by indications available in the fission product barrier matrix, as well as in EALs RA1, RS1, and RG1.

The licensee chose to modify this EAL set by using a site-specific implementation method that uses a modified numbering format and EAL sequence other than that provided in the generic EAL scheme development guidance. However, the NRC staff has determined that the numbering, sequencing, and format of this EAL set are consistent with the overall EAL scheme development guidance and with the site-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, 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]

This EAL is not part of an EAL set within the overall EAL. The EAL's intent is to ensure that an EAL is declared when hazardous events lead to potential damage to safety systems. The SAE and GE classification levels for this accident progression are bounded by indications available in the fission product barrier matrix, as well as in EALs RS1 and RG1.

The licensee chose to modify this EAL set by using a site-specific implementation method that uses a modified numbering format and EAL sequence other than that provided in the generic EAL scheme development guidance. However, the NRC staff has determined that the numbering, sequencing, and format of this EAL set are consistent with the overall EAL scheme development guidance and with the site-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, 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 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 determined that these modifications do not alter the intent of any specific EAL within a set, category, or within the entire EAL scheme described in NEI 99-01, Revision 6.

Based on its review, the NRC staff has determined 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 determined that the proposed EAL scheme is technically complete and consistent with EAL schemes implemented at similarly designed plants.

### 3.8 Conclusion

Based on the above, the NRC staff has determined 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). 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 Enclosure 3 of the letter dated November 23, 2015, is acceptable for implementation.

#### 4.0 STATE CONSULTATION

#### 5.0 ENVIRONMENTAL CONSIDERATION

#### 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

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