



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

July 18, 2011

Vice President, Operations
Entergy Operations, Inc.
Waterford Steam Electric Station, Unit 3
17265 River Road
Killona, LA 70057-3093

SUBJECT: WATERFORD STEAM ELECTRIC STATION, UNIT 3 – APPROVAL OF
CONVERSION OF THE EMERGENCY ACTION LEVEL SCHEME TO SCHEME
BASED ON NUCLEAR ENERGY INSTITUTE (NEI) 99-01, REVISION 5
(TAC NO. ME4726)

Dear Sir or Madam:

By letter dated September 16, 2010, as supplemented by letters dated March 28 and May 4, 2011, Entergy Operations, Inc. (Entergy or the licensee), requested prior U.S. Nuclear Regulatory Commission (NRC) approval for proposed changes to the emergency action level (EAL) scheme for the Waterford Steam Electric Station, Unit 3 (Waterford 3). The requested changes to the EAL scheme support a conversion from the current EAL scheme to a scheme based on Nuclear Energy Institute (NEI) 99-01, Revision 5, "Methodology for Development of Emergency Action Levels," February 2008.

The NRC staff performed a review of the proposed changes to the licensee's EAL scheme and supporting documentation in accordance with Appendix E, "Emergency Planning and Preparedness for Production and Utilization Facilities," to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, Section IV.B.(1). The NRC staff determined that incorporation of the proposed changes meets 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 NRC staff concludes that the licensee's proposed changes to the EAL scheme for Waterford 3, as outlined in the letters referenced above, are acceptable.

NRC expects Entergy to implement the EALs as approved in the enclosed safety evaluation, which includes the implementation of the EAL technical basis document within a period of 30 days from the date on this letter, as stated in your application dated September 16, 2010.

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If you have any questions, please contact Mr. Kaly Kalyanam, the NRC Project Manager for Waterford 3, at (301) 415-1480, or through e-mail to kaly.kalyanam@nrc.gov.

Sincerely,

A handwritten signature in black ink, appearing to read "William J. Ruland/for". The signature is written in a cursive style with a large, stylized "W" and "J".

Eric J. Leeds, Director
Office of Nuclear Reactor Regulation

Docket No. 50-382

Enclosure:
Safety Evaluation

cc: Listserv



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO PROPOSED UPGRADE TO EMERGENCY ACTION LEVEL SCHEME
USING NEI 99-01, REVISION 5 METHODOLOGY
ENTERGY OPERATIONS, INC.
WATERFORD STEAM ELECTRIC STATION, UNIT 3
DOCKET NO. 50-382

1.0 INTRODUCTION

By letter dated September 16, 2010, as supplemented by letters dated March 28 and May 4, 2011 (References 1, 2, and 3, respectively), Entergy Operations, Inc. (Entergy or the licensee), requested prior U.S. Nuclear Regulatory Commission (NRC) approval for proposed changes to the emergency action level (EAL) scheme for the Waterford Steam Electric Station, Unit 3 (Waterford 3). The requested changes to the EAL scheme support a conversion from the current EAL scheme to a scheme based on Nuclear Energy Institute (NEI) 99-01, Revision 5, "Methodology for Development of Emergency Action Levels," February 2008 (Reference 4). Waterford 3 currently utilizes an EAL scheme that is plant-specific yet developed in accordance with the guidance provided in NEI 99-01, Revision 4, "Methodology for Development of Emergency Action Levels," January 2003 (Reference 5).

2.0 REGULATORY EVALUATION

The NRC staff reviewed the proposed revision against the following regulations and guidance described below.

2.1 Regulations

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

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

Enclosure

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 the licensee can and will take adequate protective measures in the event of a radiological emergency. Planning standard (4) of 10 CFR 50.47(b) requires that a licensee's emergency response plan contain:

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

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. These initial emergency action levels shall be discussed and agreed on by the applicant or licensee and state and local governmental authorities, and approved by the NRC. Thereafter, emergency action levels shall be reviewed with the State and local governmental authorities on an annual basis. A revision to an emergency action level must be approved by the NRC before implementation if:

- (1) the licensee is changing from one emergency action level scheme to another emergency action level scheme (e.g., a change from an emergency action level scheme based on NUREG-0654 to a scheme based upon NUMARC/NESP-007 or NEI 99-01);
- (2) the licensee is proposing an alternate method for complying with the regulations; or
- (3) the emergency action level revision decreases the effectiveness of the emergency plan.

Section 50.47(b)(4) to 10 CFR specifies a standard emergency classification and action level scheme, and as such, the NRC staff will ensure 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.

The proposed changes were submitted to the NRC for a technical and regulatory review prior to implementation by the licensee, as required under Section IV.B of Appendix E to 10 CFR Part 50. This review is based upon a revision to the Waterford 3 EAL scheme provided in the licensee's application letter and supplemented by the licensee's responses to the NRC's request for additional information. Attachment 4 of the licensee's letter dated March 28, 2011 (Reference 2), contains the final version of the licensee's proposed plant-specific EAL scheme for Waterford 3 and is therefore, the final version reviewed by the NRC for acceptability.

2.2 Guidance

EAL development guidance was initially established via NRC Generic Letter (GL) 79-50 (Reference 6) and subsequently established in NUREG-0654/FEMA-REP-1, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants" (Reference 7), which was endorsed as an approach for the development of an EAL scheme via NRC Regulatory Guide (RG) 1.101, Revision 2, "Emergency Planning and Preparedness for Nuclear Power Reactors" (Reference 8). As industry and regulatory experience was gained with the implementation and use of the EAL scheme, the industry developed revised EAL scheme development guidance documents to gain the benefit of lessons-learned. To date, NUMARC/NESP-007, "Methodology for Development of Emergency Action Levels" (Reference 9), NEI 99-01, Revision 4 (Reference 5), and NEI 99-01, Revision 5 (Reference 4) were provided to the NRC for review and endorsement as generic (non plant-specific) EAL development guidance. RG 1.101, Revisions 3 and 4 (Reference 8), 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, as well as allowing licensees to develop plant-specific EALs based upon an alternative approach not endorsed by the NRC. NEI 99-01, Revision 5 was endorsed as generic (non plant-specific) EAL development guidance via NRC letter dated February 22, 2008 (Reference 10), and will be further endorsed in the next revision of RG 1.101.

GL 79-50, NUREG-0654/FEMA-REP-1, NUMARC/NESP-007, NEI 99-01, Revisions 4 and 5 are all considered generic EAL development guidance documents, 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 their plant-specific EAL schemes using the latest version of the endorsed EAL development guidance with appropriate plant-specific alterations, as applicable. Pursuant to 10 CFR 50, Appendix E, Section IV.B.1, a revision to an emergency action level must be approved by the NRC before implementation, if the licensee is changing from one emergency action level scheme to another action level scheme.

The NRC 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 NRC letter dated February 22, 2008:

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," November 1980;

NUMARC/NESP-007, Revision 2, "Methodology for Development of Emergency Action Levels," January 1992;

NEI 99-01, Revision 4, "Methodology for Development of Emergency Action Levels," January 2003; and

NEI 99-01, Revision 5, "Methodology for Development of Emergency Action Levels," February 2008.

NRC Regulatory Issue Summary (RIS) 2003-18, with Supplements 1 and 2, "Use of NEI 99-01, Methodology for Development of Emergency Action Levels" (Reference 11), also provide 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 will review the EAL scheme to ensure 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 and supplemental letters, the licensee submitted the proposed EAL scheme for Waterford 3, the technical basis, a comparison matrix, the EAL numbering scheme, and an explanation for any difference or deviation from NEI 99-01. The comparison matrix provided a cross reference relating the proposed EAL scheme to the EAL scheme in NEI 99-01, Revision 5.

Waterford 3 currently utilizes an EAL scheme based on the generic EAL scheme development guidance from NEI 99-01, Revision 4. The licensee is converting to an EAL scheme using the updated guidance from NEI 99-01, Revision 5, with plant-specific modifications due to design issues and/or licensee preference.

The proposed plant-specific EAL scheme is unique to Waterford 3; however, to ensure consistency and regulatory stability, the NRC staff reviewed the proposed plant-specific EAL scheme to ensure the following key characteristics of an effective EAL scheme are in place:

- consistency (i.e., the EALs would lead to similar decisions under similar circumstances at different plants), up to and including standardization in intent, if not in actual wording;
- human engineering and user friendliness;
- potential for classification upgrade only when there is an increasing threat to public health and safety;
- ease of upgrading and downgrading;
- thoroughness in addressing and disposing of the issues of completeness and accuracy raised regarding Appendix 1 to NUREG-0654;
- 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, for each category of EALs reviewed the following naming/numbering convention is used: the first letter signifies the category; the second letter signifies the classification level (G = General Emergency (GE), S = Site Area Emergency (SAE), A = Alert, U = Notification of Unusual Event (UE)); and the number is the applicable number from the plant-specific EAL scheme. For ease of use, this safety evaluation will use the numbering system from the plant-specific EAL scheme rather than from the generic EAL development guidance.

3.1 CATEGORY 'A' – ABNORMAL RADIOLOGICAL RELEASE/ RADIOLOGICAL EFFLUENT

3.1.1 EAL Set AG1/AS1/AA1/AU1

This EAL set is based upon plant-specific indications of a release of radioactivity (gaseous and/or liquid). 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 plant-specific implementation method that uses a modified numbering format and EAL sequence other than that provided in the generic EAL scheme development guidance. In addition, the licensee chose to use mathematical symbols instead of their noun equivalent where applicable. The numbering, sequencing, and format of this EAL set is consistent with the overall EAL scheme development guidance and with the plant-specific implementation strategies provided, and is 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 considered part of a standard EAL scheme.

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, 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, therefore, is acceptable.

3.1.2 EAL Set AA2/AU2

This EAL set is based upon plant-specific indications of unexpected water level drop in the reactor. 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 barrier matrix as well as EALs AS1 and AG1.

The licensee chose to modify this EAL set 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. In addition, the licensee chose to use mathematical symbols instead of their noun equivalent where applicable. The numbering, sequencing, and format of this EAL set is consistent with the overall EAL scheme development guidance and with the plant-specific implementation strategies provided, and is 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 considered part of a standard EAL scheme.

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, 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, therefore, is acceptable.

3.1.3 EAL Set AA3

This EAL set is based upon indications of a rise in plant radiation levels that impedes normal access to the Control Room (CR) and Central Alarm Station (CAS).

The Alert EAL is primarily intended to ensure the site emergency response organization is activated to support the CR in removing the impediment to normal access to the CR and CAS. Indications of increasing radiation levels in the plant are bounded by indication of fission barrier loss or potential loss, as well as AS1 and AG1.

The licensee chose to modify this EAL set 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. The numbering, sequencing, and format of this EAL set is

consistent with the overall EAL scheme development guidance and with the plant-specific implementation strategies provided, and is considered part of a standard EAL scheme.

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, therefore, is acceptable.

3.2 CATEGORY 'C' – COLD SHUTDOWN/REFUELING SYSTEM MALFUNCTION

3.2.1 EAL Set CA5/CU5

This EAL set is based upon a loss of available alternating current (AC) power sources to the emergency busses. 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 AS1 and AG1.

The licensee chose to modify this EAL set 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. In addition, the licensee chose to use mathematical symbols instead of their noun equivalent where applicable. The numbering, sequencing, and format of this EAL set is consistent with the overall EAL scheme development guidance and with the plant-specific implementation strategies provided, and is 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 considered part of a standard EAL scheme.

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, 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, therefore, is acceptable.

3.2.2 EAL Set CG1/CS1/CA1/CU1 and CU2

This EAL set is based upon a loss of reactor pressure vessel inventory and/or reactor coolant system (RCS) leakage. The progression from UE to GE is appropriate and consistent with EAL scheme development guidance. While CU2 seems to be a stand-alone EAL, it is actually similar in intent to EAL CU1 and is considered part of this EAL set. The only difference is the applicable operating mode between these two EALs and the relevant wording of the EAL.

The licensee chose to modify this EAL set 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. In addition, the licensee chose to use mathematical symbols instead of their noun equivalent where applicable. The numbering, sequencing, and format of this EAL set is consistent with the overall EAL scheme development guidance and

with the plant-specific implementation strategies provided, and is 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 considered part of a standard EAL scheme.

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, 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, therefore, is acceptable.

3.2.3 EAL Set CA3/CU3

This EAL set is based upon an inability to maintain control of decay heat removal. 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 AS1 and AG1.

The licensee chose to modify this EAL set 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. In addition, the licensee chose to use mathematical symbols instead of their noun equivalent where applicable. The numbering, sequencing, and format of this EAL set is consistent with the overall EAL scheme development guidance and with the plant-specific implementation strategies provided, and is 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 considered part of a standard EAL scheme.

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, 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, therefore, is acceptable.

3.2.4 EAL CU8

This EAL does not require an EAL set within the overall EAL scheme as the EAL's intent is to highlight the importance of emergency communications by ensuring an EAL is declared if normal communication methods for onsite and offsite personnel, or for offsite response organizations including the NRC, are lost.

The licensee chose to modify this EAL 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. 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 is 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 considered part of a standard EAL scheme.

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, therefore, is acceptable.

3.2.5 EAL CU7

This EAL does not require an EAL set within the overall EAL scheme as the EAL's intent is to highlight the significance of inadvertent criticality events by ensuring an EAL is declared if unplanned positive and sustained startup rate is observed on nuclear instrumentation.

The licensee chose to modify this EAL 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. 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 is considered part of a standard EAL scheme.

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, therefore, is acceptable.

3.2.6 EAL CU6

This EAL does not require an EAL set within the overall EAL scheme as the EAL's intent is to ensure an EAL is declared when a loss of direct current (DC) power event occurs as it compromises the ability of the licensee to monitor and control the removal of decay heat during Cold Shutdown or Refueling modes of operation.

The licensee chose to modify this EAL 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. 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 is considered part of a standard EAL scheme.

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, therefore, is acceptable.

3.3 CATEGORY 'E' – INDEPENDENT SPENT FUEL STORAGE INSTALLATION (ISFSI)

3.3.1 EAL E-HU1

This EAL does not require an EAL set within the overall EAL scheme as the EAL's intent is limited to radiological events at the ISFSI. While security-related events at the ISFSI are also of concern, they are bounded by the licensee's EAL HA4.

The licensee chose to modify this EAL 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. 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 is considered part of a standard EAL scheme.

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, therefore, is acceptable.

3.4 CATEGORY 'H' - HAZARDS

3.4.1 EAL Set HA6/HU6

This EAL set is based upon the effects natural and destructive hazards may have. 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 barrier matrix and EALs AS1 and AG1.

The licensee chose to modify this EAL set 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. In addition, the licensee chose to use mathematical symbols instead of their noun equivalent where applicable. The numbering, sequencing, and format of this EAL set is consistent with the overall EAL scheme development guidance and with the plant-specific implementation strategies provided, and is 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 considered part of a standard EAL scheme.

The method of determining seismic events is consistent with the development strategies stated in the generic EAL development guidance. Seismic event classification criteria, for both the UE and Alert classification levels, are appropriate, considered part of a standard EAL scheme, and meet the requirements of Section IV of Appendix E to 10 CFR Part 50 and 10 CFR 50.47(b)(4), and, therefore, are acceptable.

High wind and tornado events, as well as the development of plant-specific areas considered in these EALs, are consistent with the development strategies stated in the generic EAL development guidance. These EALs are considered part of a standard EAL scheme and meet the requirements of Section IV of Appendix E to 10 CFR Part 50 and 10 CFR 50.47(b)(4). Therefore, these EALs are acceptable.

Rotating equipment failures from the main turbine are appropriately developed using the generic EAL development guidance with plant-specific terminology and plant-specific areas of consideration determined for these EALs. These EALs are considered part of a standard EAL scheme and meet the requirements of Section IV of Appendix E to 10 CFR Part 50 and 10 CFR 50.47(b)(4). Therefore, these EALs are acceptable.

Internal flooding events are appropriately developed using the generic EAL development guidance with plant-specific terminology and plant-specific areas of consideration determined for these EALs. While consistent with the development strategies stated in the generic EAL development guidance, the actual wording used is different. However, these EALs are considered part of a standard EAL scheme and meet the requirements of Section IV of Appendix E to 10 CFR Part 50 and 10 CFR 50.47(b)(4). Therefore, these EALs are acceptable.

The licensee developed additional EALs related to hurricane force winds and high river water level for the UE classification level. The instrumentation and set points developed for these EALs are appropriate and applicable for this licensee. The generic EAL scheme development guidance, as well as NUREG-0654/FEMA-REP-1, had the licensee consider unique hazard events applicable to its specific site and to develop plant-specific EALs to address these hazards. These EALs are considered part of a standard EAL scheme and meet the requirements of Section IV of Appendix E to 10 CFR Part 50 and 10 CFR 50.47(b)(4). Therefore, these EALs are acceptable.

Events based upon vehicle crashes within the protected area or vital area has typically been difficult to differentiate between the UE and Alert classification levels. GL 79-50, NUREG-0654/FEMA-REP-1, and NUMARC/NESP-007 used language equating vehicles to aircraft, trains, and barges. NEI 99-01, Revision 4 used language clarifying vehicle hazards based on the size and potential to cause damage. With the issuance of NRC Bulletin 2005-02, "Emergency Preparedness and Response Actions for Security-Based Events" (Reference 12), the need for EALs related to airborne, waterborne, or land-based security events have been resolved with the development of security-specific EALs. In addition, the intended basis for a UE EAL is, among other considerations, the resultant degradation in the level of safety of the plant. Eliminating the UE EAL due to vehicle crashes is consistent with the intent of the UE classification and removes any misunderstanding with the remaining Alert classification. The Alert classification is based upon indications of degraded performance or visible damage to a specific list of areas considered applicable to this EAL. Removing the UE EAL based upon vehicle crashes, and revising the wording of the remaining Alert EAL, continues to be considered part of a standard EAL scheme and meets the requirements of Section IV of Appendix E to 10 CFR Part 50 and 10 CFR 50.47(b)(4). Therefore, these EALs are acceptable.

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, 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, therefore, is acceptable.

3.4.2 EAL Set HA4/HU4

This EAL set is based upon the effects that fires and explosions may have. 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 barrier matrix, EALs AS1 and AG1, or applicable EALs from the Systems Malfunction category.

The licensee chose to modify this EAL set 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. The numbering, sequencing, and format of this EAL set is consistent with the overall EAL scheme development guidance and with the plant-specific implementation strategies provided, and is considered part of a standard EAL scheme.

The development of plant-specific areas considered in these EALs is consistent with the development strategies stated in the generic EAL development guidance even though the actual wording used is different, and is considered part of a standard EAL scheme.

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, 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, therefore, is acceptable.

3.4.3 EAL Set HA5/HU5

This EAL set is based upon the effects toxic, corrosive, asphyxiant, or flammable gases may have. 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 barrier matrix, EALs AS1 and AG1, or applicable EALs from the Systems Malfunction category.

The licensee chose to modify this EAL set 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. The numbering, sequencing, and format of this EAL set is consistent with the overall EAL scheme development guidance and with the plant-specific implementation strategies provided, and is considered part of a standard EAL scheme.

The development of plant-specific areas considered in these EALs, is consistent with the development strategies stated in the generic EAL development guidance even though the actual wording used is different, and is considered part of a standard EAL scheme.

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, 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, therefore, is acceptable.

3.4.4 EAL Set HG1/HS1/HA1/HU1

This EAL set is based upon security-related events originally developed via the guidance from NRC Bulletin 2005-02 or NRC Regulatory Issue Summary (RIS) 2006-12, "Endorsement of Nuclear Energy Institute Guidance 'Enhancements to Emergency Preparedness Programs for Hostile Action'" (Reference 13), 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 implementation and use of this EAL set, particularly from when licensees performed 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 generated "Emergency Action Level Frequently Asked Question (EALFAQ) 2009-48" (Reference 14), to address the changes made to the generic EAL scheme development guidance document.

The licensee chose to modify this EAL set by using a plant-specific implementation method that uses a modified numbering format and EAL sequence than that provided in the generic EAL scheme development guidance. The numbering, sequencing, and format of this EAL set is consistent with the overall EAL scheme development guidance, is consistent with the plant-specific implementation strategies provided, and is considered part of a standard EAL scheme.

The development of 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 5, and evaluated in EALFAQ 2009-48.

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, 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, therefore, is acceptable.

3.4.5 EAL Set HS3/HA3

This EAL set is based upon CR evacuation. 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 barrier matrix or EAL AG1.

The licensee chose to modify this EAL set by using a plant-specific implementation method that uses a modified numbering format and EAL sequence than that provided in the generic EAL scheme development guidance. The numbering, sequencing, and format of this EAL set is consistent with the overall EAL scheme development guidance, is consistent with the

plant-specific implementation strategies provided, and is considered part of a standard EAL scheme.

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, 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, therefore, is acceptable.

3.4.6 EAL Set HG2/HS2/HA2/HU2

This EAL set is based upon providing the EAL decision-maker EALs to consider when his/her judgment deems an emergency classification is warranted.

The licensee chose to modify this EAL set by using a plant-specific implementation method that uses a modified numbering format and EAL sequence than that provided in the generic EAL scheme development guidance. The numbering, sequencing, and format of this EAL set is consistent with the overall EAL scheme development guidance, is consistent with the plant-specific implementation strategies provided, and is considered part of a standard EAL scheme.

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, 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, therefore, is acceptable.

3.5 CATEGORY 'S' – SYSTEM MALFUNCTION

3.5.1 EAL Set SG1/SS1/SA1/SU1

This EAL set is based upon a loss of available AC power sources to the emergency busses. 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 plant-specific implementation method that uses a modified numbering format and EAL sequence other than that provided in the generic EAL scheme development guidance. In addition, the licensee chose to use mathematical symbols instead of their noun equivalent where applicable. The numbering, sequencing, and format of this EAL set is consistent with the overall EAL scheme development guidance and with the plant-specific implementation strategies provided, and is 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 considered part of a standard EAL scheme.

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, 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, therefore, is acceptable.

3.5.2 EAL Set SG3/SS3/SA3

This EAL set is based upon the effect a failure of the reactor protection system may have on the plant, as well as inadvertent criticality for SU10. The progression from Alert to GE is appropriate and consistent with EAL scheme development guidance.

The licensee chose to modify this EAL set 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. In addition, the licensee chose to use mathematical symbols instead of their noun equivalent where applicable. The numbering, sequencing, and format of this EAL set is consistent with the overall EAL scheme development guidance and with the plant-specific implementation strategies provided, and is 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 considered part of a standard EAL scheme.

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, 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, therefore, is acceptable.

3.5.3 EAL SU11

This EAL does not require an EAL set within the overall EAL scheme as the EAL's intent is to ensure an EAL is declared when the plant is not brought into the required operating mode within the time allowed via its Technical Specifications Limiting Condition for Operation action statement completion time.

The licensee chose to modify this EAL by using a plant-specific implementation method that uses a modified numbering format other than that provided in the generic EAL scheme development guidance. The numbering and format of this EAL is consistent with the overall EAL scheme development guidance and with the plant-specific implementation strategies provided, and is considered part of a standard EAL scheme.

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, therefore, is acceptable.

3.5.4 EAL Set SS6/SA6/SU6

This EAL set is based upon the effect a loss of indication, control, and annunciation capabilities has on the plant. The progression from UE 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 barrier matrix or EAL AG1.

The licensee chose to modify this EAL by using a plant-specific implementation method that uses a modified numbering format other than that provided in the generic EAL scheme development guidance. In addition, the licensee chose to use mathematical symbols instead of their noun equivalent where applicable. The numbering, sequencing, and format of this EAL set is consistent with the overall EAL scheme development guidance and with the plant-specific implementation strategies provided, and is 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 considered part of a standard EAL scheme.

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, therefore, is acceptable.

3.5.5 EAL SU8

This EAL does not require an EAL set within the overall EAL scheme as the EAL's intent is to highlight the importance of emergency communications by ensuring an EAL is declared if normal communication methods for onsite and offsite personnel, or for offsite response organizations including the NRC, are lost. No escalation path is necessary for this event progression.

The licensee chose to modify this EAL 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. The numbering, sequencing, and format of this EAL is consistent with the overall EAL scheme development guidance, is consistent with the plant-specific implementation strategies provided, and is 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 considered part of a standard EAL scheme.

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, therefore, is acceptable.

3.5.6 EAL SU9

This EAL does not require an EAL set within the overall EAL scheme as the EAL's intent is to ensure an EAL is declared when the plant has indications of fuel clad degradation. By design, this EAL is redundant with corresponding indicators from a loss or potential loss of fission barriers, as well as radiation monitoring, to ensure reactor and/or fission barrier events are

recognized regardless of the particular EAL table to which a licensee may be referring. EAL escalation is bounded by fission barrier indicators and EALs AA1, AS1, and AG1.

The licensee chose to modify this EAL 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. The numbering, sequencing, and format of this EAL is consistent with the overall EAL scheme development guidance, is consistent with the plant-specific implementation strategies provided, and is considered part of a standard EAL scheme.

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, therefore, is acceptable.

3.5.7 EAL SU7

This EAL does not require an EAL set within the overall EAL scheme as the EAL's intent is to ensure 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 barriers, as well as radiation monitoring, to ensure reactor and/or fission barrier events are recognized regardless of the particular EAL table to which a licensee may be referring. EAL escalation is bounded by fission barrier indicators and EALs AA1, AS1, and AG1.

The licensee chose to modify this EAL 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. The numbering, sequencing, and format of this EAL is consistent with the overall EAL scheme development guidance, is consistent with the plant-specific implementation strategies provided, and is considered part of a standard EAL scheme.

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, therefore, is acceptable.

3.5.8 EAL SS4

This EAL does not require an EAL set within the overall EAL scheme as the EAL's intent is to ensure an EAL is declared when a loss of DC power event occurs as it compromises the ability of the licensee to monitor and control the removal of decay heat. The GE classification level for this event is bounded by fission barrier matrix indicators and EAL AG1.

The licensee chose to modify this EAL 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. The numbering, sequencing, and format of this EAL is consistent with the overall EAL scheme development guidance, is consistent with the plant-specific implementation strategies provided, and is considered part of a standard EAL scheme.

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, therefore, is acceptable.

3.5.9 EAL SU10

This EAL does not require an EAL set within the overall EAL scheme as the EAL's intent is to ensure an EAL is declared when an inadvertent criticality event occurs. The Alert, SAE, and GE classification levels for this event are bounded by fission barrier matrix indicators and EALs AG1, AS1, and AA1.

The licensee chose to modify this EAL 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. The numbering, sequencing, and format of this EAL is consistent with the overall EAL scheme development guidance, is consistent with the plant-specific implementation strategies provided, and is considered part of a standard EAL scheme.

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, therefore, is acceptable.

3.6 CATEGORY 'F' – FISSION 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 barrier. Each licensee has three fission 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 barrier barriers.

While there are only four EALs within this set (FG1/FS1/FA1/FU1), 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 'A' and Category 'S' EAL sets due to the importance of licensees being able to recognize reactor and/or fission 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. However, the staff discovered an error in the table layout during this review and informed the licensee of the discrepancy via electronic mail on February 10, 2011 (Reference 15). The discrepancy was that the table erroneously listed the emergency classification levels as GE, SAE, Alert, and GE. The actual emergency classification levels are GE, SAE, Alert, and UE. The licensee corrected the error via letter dated May 4, 2011 (Reference 3).

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 considered part of a standard EAL scheme.

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. The numbering, sequencing, and format of this EAL is consistent with the overall EAL scheme development guidance, is consistent with the plant-specific implementation strategies provided, and is considered part of a standard EAL scheme.

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, 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, therefore, is acceptable.

4.0 CONCLUSION

The NRC staff has reviewed the technical basis for the proposed EAL scheme, the modifications from NEI 99-01, and the licensee's evaluation of the proposed changes. The licensee chose to modify its EAL scheme from the generic EAL scheme development guidance provided in NEI 99-01, Revision 5, in order to adopt a format more in alignment with how the licensee currently implements its EALs, as well as alignment 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 an EAL set, EAL category, or within the entire EAL scheme as stated in NEI 99-01, Revision 5.

Based on its review, the NRC staff determined that the proposed EAL scheme uses objective and observable values, is worded in a manner that addresses human engineering and user friendliness concerns, follows logical progression 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 emergency classification are in the same range of relative risk. In addition, the NRC staff concluded that the proposed EAL scheme was consistent with EAL schemes implemented at similarly designed plants.

Based on the above, the NRC staff concludes that the proposed changes meet the guidance in NEI 99-01, Revision 5, the requirements of 10 CFR 50.47(b)(4), and the standards in Appendix E to 10 CFR Part 50. Therefore, the NRC staff concludes that the proposed EAL scheme, as stated in Attachment 4 of the licensee's letter dated March 28, 2011 (Reference 2), with the correction to the Fission Barrier Matrix table headings as provided in the licensee's letter dated May 4, 2011 (Reference 3), provides reasonable assurance that the licensee can and will take adequate protective measures in the event of a radiological emergency.

5.0 REFERENCES

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Date: July 18, 2011

If you have any questions, please contact Mr. Kaly Kalyanam, the NRC Project Manager for Waterford 3, at (301) 415-1480, or through e-mail to kaly.kalyanam@nrc.gov.

Sincerely,

/RA by William H. Ruland for/

Eric J. Leeds, Director
Office of Nuclear Reactor Regulation

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