



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

May 19, 2021

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

SUBJECT: WATERFORD STEAM ELECTRIC STATION, UNIT 3 - ISSUANCE OF AMENDMENT NO. 259 TO REVISE EMERGENCY ACTION LEVELS TO A SCHEME BASED ON NEI 99-01, REVISION 6, "DEVELOPMENT OF EMERGENCY ACTION LEVELS FOR NON-PASSIVE REACTORS" (EPID L-2020-LLA-0122)

Dear Sir or Madam:

The U.S. Nuclear Regulatory Commission (NRC, the Commission) has issued the enclosed Amendment No. 259 to Renewed Facility Operating License No. NPF-38 for the Waterford Steam Electric Station, Unit 3. This amendment consists of changes to the emergency action level scheme in response to your application dated June 1, 2020, as supplemented by letter dated December 15, 2020.

The amendment revises the current emergency action level scheme to one based on Nuclear Energy Institute (NEI) guidance in NEI 99-01, Revision 6, "Development of Emergency Action Levels for Non-Passive Reactors," dated November 2012, which was endorsed by the NRC in a letter dated March 26, 2013.

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

Sincerely,

/RA/

Perry H. Buckberg, Senior Project Manager
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-382

Enclosures:

1. Amendment No. 259 to NPF-38
2. Safety Evaluation

cc: Listserv



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

ENERGY OPERATIONS, INC.

DOCKET NO. 50-382

WATERFORD STEAM ELECTRIC STATION, UNIT 3

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 259
Renewed License No. NPF-38

1. The Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for amendment by Entergy Operations, Inc. (EOI), dated June 1, 2020, as supplemented by letter dated December 15, 2020, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;
 - B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;
 - C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;
 - D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and
 - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, by Amendment No. 259, Renewed Facility Operating License No. NPF-38 is hereby amended to authorize revision to the Emergency Action Level Technical Basis Document of the Waterford Steam Electric Station, Unit 3 Emergency Plan as set forth in the licensee's application dated June 1, 2020, as supplemented by letter dated December 15, 2020, and evaluated in the NRC staff's safety evaluation for this amendment.
3. This license amendment is effective as of its date of issuance and shall be implemented within 180 days from the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Andrea D. Veil, Director
Office of Nuclear Reactor Regulation

Date of Issuance: May 19, 2021



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 259 TO

RENEWED FACILITY OPERATING LICENSE NO. NPF-38

ENTERGY LOUISIANA, LLC

ENTERGY OPERATIONS, INC.

WATERFORD STEAM ELECTRIC STATION, UNIT 3

DOCKET NO. 50-382

1.0 INTRODUCTION

By application dated June 1, 2020 (Reference 1), as supplemented by letter dated December 15, 2020 (Reference 2), Entergy Operations, Inc. (Entergy, the licensee) submitted a license amendment request to the U.S. Nuclear Regulatory Commission (NRC or the Commission) for approval of changes to revise the emergency action level (EAL) scheme for Waterford Steam Electric Station, Unit 3 (Waterford 3).

The proposed changes would revise the current EAL scheme to one based on the Nuclear Energy Institute (NEI) document NEI 99-01, Revision 6, "Development of Emergency Action Levels for Non-Passive Reactors," dated November 21, 2012 (Reference 3).

The supplemental letter dated December 15, 2020, 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 proposed no significant hazards consideration determination as published in the *Federal Register* on September 22, 2020 (85 FR 59563).

2.0 REGULATORY EVALUATION

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 reactors. Section 50.47(b) of 10 CFR establishes the planning standards that the onsite and offsite emergency response plans must meet for the NRC staff to make a finding that there is reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency.

Planning Standard (4) of 10 CFR 50.47(b) 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 off-site response measures.

Section 50.47(b)(4) of 10 CFR requires the use of a standard emergency classification and action level scheme to ensure that implementation methods are relatively consistent throughout the industry for a given reactor and containment design while still permitting site-specific design considerations and preferences.

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

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

Section IV.B.2 of Appendix E to 10 CFR Part 50 states:

A licensee desiring to change its entire emergency action level scheme shall submit an application for an amendment to its license and receive NRC approval before implementing the change. Licensees shall follow the change process in § 50.54(q) for all other emergency action level changes.

2.2 Guidance

The EAL development guidance was initially established in Generic Letter 79-50, dated October 10, 1979 (Reference 4). This guidance was subsequently revised in NUREG-0654/FEMA-REP-1 (NUREG-0654), Revision 1, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants," dated November 1980 (Reference 5), which was endorsed by NRC Regulatory Guide (RG) 1.101, Revision 2, "Emergency Planning and Preparedness for Nuclear Power Reactors," dated October 1981 (Reference 6),¹ as an approach acceptable to the NRC for the development of an EAL scheme.

As industry and regulatory experience was gained with the implementation and use of EAL schemes, the industry issued revised EAL scheme development guidance to reflect lessons

¹ Subsequently issued as Revision 3 and Revision 4 in August 1992 and July 2003, respectively.

learned. Many of these industry guidance documents have been provided to the NRC for review and endorsement as generic (i.e., non-site-specific) EAL development guidance. Most recently, the industry developed NEI 99-01, Revision 6, which was endorsed by the NRC in a letter dated March 28, 2013, as acceptable generic EAL scheme development guidance (Reference 7).

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

NRC Regulatory Issue Summary (RIS) 2003-18, Revision 4, "Use of NEI 99-01, 'Methodology for Development of Emergency Action Levels,'" dated October 8, 2003, including Supplements 1 and 2 (Reference 8), also provides guidance for developing or changing a standard EAL scheme. In addition, this RIS and its supplements provide recommendations to assist licensees, consistent with Section IV.B.2 of Appendix E to 10 CFR Part 50, in determining whether to seek prior NRC approval of deviations from the guidance.

In summary, the NRC staff considers NEI 99-01, Revision 6, as an acceptable method to develop site-specific EALs that meet the requirements of Section IV.B of Appendix E to 10 CFR Part 50 and planning standard 10 CFR 50.47(b)(4), with the understanding that licensees may want to develop EALs that differ from the guidance document as allowed in RG 1.101.

3.0 TECHNICAL EVALUATION

In its application dated June 1, 2020, as supplemented by letter dated December 15, 2020, the licensee proposed to revise the EAL scheme for Waterford 3 based on NEI 99-01, Revision 6. The licensee submitted the proposed EAL scheme, the technical basis containing an evaluation and rationale for each proposed EAL change, and a comparison matrix providing a comparison of the proposed initiating conditions, mode applicability, and EAL wording to that found in NEI 99-01, Revision 6. The comparison matrix also included a description of global changes applicable to the EAL scheme and a justification for differences or deviations from NEI 99-01, Revision 6. The application stated that the licensee used the terms "difference" and "deviation" as defined in RIS 2003-18, as supplemented, when comparing its proposed site-specific EALs to the generic EALs in NEI 99-01, Revision 6.

The NRC staff reviewed the application, as supplemented, and verified that the EAL scheme is consistent with the guidance provided in NEI 99-01, Revision 6, to ensure that the proposed EAL scheme meets the requirements of Section IV.B of Appendix E to 10 CFR Part 50 and the planning standard in 10 CFR 50.47(b)(4). The NRC staff notes that both the current and proposed EALs have modifications from the NEI 99-01, Revision 6, guidance due to specific plant designs and licensee preference.

The NRC staff reviewed the application, as supplemented, and verified that the instrumentation and setpoints derived for this proposed EAL scheme are consistent with the overall EAL scheme development guidance, address the site-specific implementation strategies provided, and are consistent with a standard EAL scheme.

Although the EALs must be site-specific, the NRC staff reviewed the proposed EAL scheme to ensure consistency with the following key characteristics of an effective EAL scheme:

- 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 issues regarding completeness and accuracy raised in Appendix 1 to NUREG-0654 (i.e., the EALs are unambiguous and are based on site-specific indicators);
- Technical completeness for each classification level;
- Logical progression in classification for multiple events; and
- The use of objective and observable values.

To aid in understanding the nomenclature used in this safety evaluation, the following conventions are used (e.g., AU1 or AA1):

- The first letter signifies the EAL recognition category:
 - A or R – Abnormal Radiation Levels/Radiological Effluent,
 - C – Cold Shutdown/Refueling System Malfunction,
 - E – Independent Spent Fuel Storage Installation,
 - F – Fission Product Barrier,
 - H – Hazards and Other Conditions Affecting Plant Safety, and
 - S or M – System Malfunction.
- The second letter signifies the emergency classification level:
 - U = Notification of Unusual Event (UE),
 - A = Alert,
 - S = Site Area Emergency (SAE), and
 - G = General Emergency (GE).
- The number is the applicable number from the site-specific EAL scheme.

An EAL set refers to EALs within an EAL recognition category that include an escalation path for one or more emergency classification levels. Not all EAL recognition categories require an EAL set.

This safety evaluation uses the numbering system from the proposed site-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, where applicable.

3.1 Recognition Category 'A' – Abnormal Radiation Levels/Radiological Effluent

3.1.1 Waterford 3 EAL Set AU1/AA1/AS1/AG1 [AU1/AA1/AS1/AG1]

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

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

- AU1– This EAL addresses a potential reduction in the level of safety of the plant as indicated by a low-level radiological release that exceeds regulatory commitments for an extended period of time (e.g., an uncontrolled release).
- AA1 – This EAL addresses a release of gaseous or liquid radioactivity that results in projected or actual offsite doses greater than or equal to 1 percent of the U.S. Environmental Protection Agency (EPA) early phase protective action guides (PAGs) (Reference 9).
- AS1 – This EAL addresses a release of gaseous radioactivity that results in projected or actual offsite doses greater than or equal to 10 percent of the EPA early phase PAGs.
- AG1 – This EAL addresses a release of gaseous radioactivity that results in projected or actual offsite doses greater than or equal to the EPA early phase PAGs.

The NRC staff has reviewed the proposed removal of the condenser exhaust radiation monitors from the respective effluent monitor threshold tables. Considering that the main steam radiation monitors are not effluent monitors and that a steam generator tube leak would be bounded by the fission product barrier, and offsite dose assessment or field monitoring, the NRC staff finds this change to be acceptable.

The NRC staff verified that the numbering, sequencing, formatting, logical progression, ease of upgrading/downgrading, and instrumentation and setpoints for this EAL set are consistent with the overall EAL scheme development guidance provided by NEI 99-01, Revision 6, and address the site-specific implementation strategies provided, and are, therefore, consistent with a standard EAL scheme, as required by 10 CFR 50.47(b)(4). The NRC staff also verified that the

EAL set is worded in an unambiguous manner that addresses human factors engineering and user-friendliness concerns, is technically complete for each emergency classification level, addresses issues regarding completeness and accuracy raised in Appendix 1 to NUREG-0654, and uses objective and observable values based on site-specific indications.

Based on the above, the NRC staff concludes that the site-specific implementation method for this EAL set is consistent with the key characteristics of an effective EAL scheme and meets the requirements of 10 CFR 50.47(b)(4) and Section IV.B of Appendix E to 10 CFR Part 50. Therefore, the NRC staff finds this EAL set acceptable.

3.1.2 Waterford 3 EAL Set AU2/AA2/AS2/AG2 [AU2/AA2/AS2/AG2]

The intent of this EAL set is to ensure that an emergency classification level is declared upon site-specific indications of potential or actual damage to an irradiated fuel assembly or multiple assemblies. This EAL addresses a lowering of water level over irradiated fuel or fuel uncover (i.e., level below the top of the fuel), and a spectrum of fuel handling accidents that result in mechanical damage to irradiated fuel (e.g., a dropped fuel assembly). Some of these EALs rely on spent fuel pool (SFP) water level instrumentation required by NRC Order EA-12-051, "Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation," dated March 12, 2012 (Reference 10).

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

- AU2 – This EAL addresses a drop in water level above irradiated fuel that causes elevated radiation levels.
- AA2 – This EAL addresses events that have caused imminent or actual damage to an irradiated fuel assembly or a significant lowering of water level within the refueling pathway.
- AS2 – This EAL addresses a significant loss of SFP water inventory control and makeup capability leading to imminent fuel damage and addresses NRC Order EA-12-051.
- AG2 – This EAL addresses a significant loss of SFP inventory control and makeup capability leading to a prolonged uncover of spent fuel and addresses NRC Order EA-12-051.

In the application, as supplemented, the licensee includes the term IMMEDIATE in the threshold value for EAL AA2.1, which would modify AA2.1 to include imminent uncover of irradiated fuel. The guidance in Section 5.5, "Classification of Imminent Conditions," of NEI 99-01, Revision 6, refers to making an emergency classification when the Emergency Director determines that "conditions that could lead to meeting or exceeding an EAL within a short amount of time" exist. Because this Section 5.5 determination is consistent with the proposed use of IMMEDIATE in the threshold value for AU2.1, the NRC staff finds the addition of IMMEDIATE to AA2.1 acceptable.

The NRC staff verified that the numbering, sequencing, formatting, logical progression, ease of upgrading/downgrading, and instrumentation and setpoints for this EAL set are consistent with the overall EAL scheme development guidance provided by NEI 99-01, Revision 6, and address the site-specific implementation strategies provided, and are, therefore, consistent with a

standard EAL scheme, as required by 10 CFR 50.47(b)(4). The NRC staff also verified that the EAL set is worded in an unambiguous manner that addresses human factors engineering and user-friendliness concerns, is technically complete for each emergency classification level, addresses issues regarding completeness and accuracy raised in Appendix 1 to NUREG-0654, and uses objective and observable values based on site-specific indications.

Based on the above, the NRC staff concludes that the site-specific implementation method for this EAL set is consistent with the key characteristics of an effective EAL scheme and meets the requirements of 10 CFR 50.47(b)(4) and Section IV.B of Appendix E to 10 CFR Part 50. Therefore, the NRC staff finds this EAL set acceptable.

3.1.3 Waterford 3 EAL AA3 [AA3]

The intent of this EAL is to ensure that an emergency classification level is declared when elevated radiation levels in certain plant rooms and areas are enough to preclude or impede personnel from performing actions necessary to maintain normal plant operation or to perform a normal plant cooldown and shutdown. This includes equipment in the control room and the central alarm station. The Alert classification level is primarily intended to ensure that the licensee emergency response organization (ERO) is activated to support the control room in removing the impediment to normal access, as well as assisting in quantifying potential damage to the fuel. Escalation of an Alert classified under AA3 would be via Recognition Category 'A,' 'C,' or 'F' EALs.

The NRC staff verified that the numbering, sequencing, formatting, logical progression, and instrumentation and setpoints for this EAL are consistent with the overall EAL scheme development guidance provided by NEI 99-01, Revision 6, and address the site-specific implementation strategies provided, and are, therefore, consistent with a standard EAL scheme, as required by 10 CFR 50.47(b)(4). The NRC staff also verified that the EAL is worded in an unambiguous manner that addresses human factors engineering and user-friendliness concerns, is technically complete for this emergency classification level, addresses issues regarding completeness and accuracy raised in Appendix 1 to NUREG-0654, and uses objective and observable values based on site-specific indications.

Based on the above, the NRC staff concludes that the site-specific implementation method for this EAL is consistent with the key characteristics of an effective EAL scheme and meets the requirements of 10 CFR 50.47(b)(4) and Section IV.B of Appendix E to 10 CFR Part 50. Therefore, the NRC staff finds this EAL acceptable.

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

3.2.1 Waterford 3 EAL Set CU1/CA1/CS1/CG1 [CU1/CA1/CS1/CG1]

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

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

- CU1 – This EAL addresses the inability to restore and maintain water level to a required minimum level (or the lower limit of a level band) or a loss of the ability to monitor RCS level concurrent with indications of reactor coolant leakage.

- CA1 – This EAL addresses conditions that are precursors to a loss of the ability to adequately cool irradiated fuel (i.e., a precursor to a challenge to the fuel clad barrier).
- CS1 – This EAL addresses a significant and prolonged loss of RCS inventory control and makeup capability leading to imminent fuel damage.
- CG1 – This EAL addresses the inability to restore and maintain reactor vessel level above the top of active fuel with containment challenged.

The currently approved Waterford 3 EAL scheme utilizes core exit thermocouple (CET) indications of superheat as an indication that the core has been uncovered and would require an EAL declaration that would be consistent with reactor vessel level at, or below, the top of active fuel. In response to an NRC request for additional information, by letter dated December 15, 2020, the licensee stated that using superheat rather than an actual level indication is because Waterford 3 does not have the capability to monitor reactor vessel level at or below the top of active fuel and uses superheat indication on CETs for EALs CS1.2 and CG1.1. As level falls below the top of active fuel, CETs will begin to indicate superheat conditions. The NRC staff finds that the utilization of superheat to provide an indication that water is at, or below, the top of active fuel is acceptable.

The NRC staff verified that the numbering, sequencing, formatting, logical progression, ease of upgrading/downgrading, and instrumentation and setpoints for this EAL set are consistent with the overall EAL scheme development guidance provided by NEI 99-01, Revision 6, and address the site-specific implementation strategies provided, and are, therefore, consistent with a standard EAL scheme, as required by 10 CFR 50.47(b)(4). The NRC staff also verified that the EAL set is worded in an unambiguous manner that addresses human factors engineering and user-friendliness concerns, is technically complete for each emergency classification level, addresses issues regarding completeness and accuracy raised in Appendix 1 to NUREG-0654, and uses objective and observable values based on site-specific indications.

Based on the above, the NRC staff concludes that the site-specific implementation method for this EAL set is consistent with the key characteristics of an effective EAL scheme and meets the requirements of 10 CFR 50.47(b)(4) and Section IV.B of Appendix E to 10 CFR Part 50. Therefore, the NRC staff finds this EAL set acceptable.

3.2.2 Waterford 3 EAL Set CU2/CA2 [CU2/CA2]

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

The NRC staff verified that the progression from a UE to an Alert classification level is appropriate and consistent with EAL scheme development guidance. Escalation of an Alert classified under CA2 would be via EALs CS1 or AS1.

- CU2 – This EAL describes a significant degradation of offsite and onsite AC power sources such that any additional single failure would result in a loss of all AC power to safety systems.

- CA2 – This EAL addresses a total loss of all AC power that compromises the performance of all safety systems requiring electric power, including those necessary for emergency core cooling, containment heat removal/pressure control, spent fuel heat removal, and the ultimate heat sink.

The NRC staff verified that the numbering, sequencing, formatting, logical progression, and ease of upgrading/downgrading for this EAL set are consistent with the overall EAL scheme development guidance provided by NEI 99-01, Revision 6, and address the site-specific implementation strategies provided, and are, therefore, consistent with a standard EAL scheme, as required by 10 CFR 50.47(b)(4). The NRC staff also verified that the EAL set is worded in an unambiguous manner that addresses human factors engineering and user-friendliness concerns, is technically complete for each emergency classification level, addresses issues regarding completeness and accuracy raised in Appendix 1 to NUREG-0654, and uses objective and observable values based on site-specific indications.

Based on the above, the NRC staff concludes that the site-specific implementation method for this EAL set is consistent with the key characteristics of an effective EAL scheme and meets the requirements of 10 CFR 50.47(b)(4) and Section IV.B of Appendix E to 10 CFR Part 50. Therefore, the NRC staff finds this EAL set acceptable.

3.2.3 Waterford 3 EAL Set CU3/CA3 [CU3/CA3]

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

The NRC staff verified that the progression from a UE to an Alert classification level is appropriate and consistent with EAL scheme development guidance. Escalation of an Alert classified under CA3 would be via EALs CS1 or AS1.

- CU3 – This EAL addresses the inability to determine RCS temperature and level, and represents a potential degradation of the level of safety of the plant.
- CA3 – This EAL addresses conditions involving a loss of decay heat removal capability or an addition of heat to the RCS in excess of that which can currently be removed.

The NRC staff verified that the numbering, sequencing, formatting, logical progression, and ease of upgrading/downgrading for this EAL set are consistent with the overall EAL scheme development guidance provided by NEI 99-01, Revision 6, and address the site-specific implementation strategies provided, and are, therefore, consistent with a standard EAL scheme, as required by 10 CFR 50.47(b)(4). The NRC staff also verified that the EAL set is worded in an unambiguous manner that addresses human factors engineering and user-friendliness concerns, is technically complete for each emergency classification level, addresses issues regarding completeness and accuracy raised in Appendix 1 to NUREG-0654, and uses objective and observable values based on site-specific indications.

Based on the above, the NRC staff concludes that the site-specific implementation method for this EAL set is consistent with the key characteristics of an effective EAL scheme and meets the requirements of 10 CFR 50.47(b)(4) and Section IV.B of Appendix E to 10 CFR Part 50. Therefore, the NRC staff finds this EAL set acceptable.

3.2.4 Waterford 3 EAL CU4 [CU4]

The intent of this EAL is to ensure that an emergency classification level is declared upon a loss of vital direct current (DC) power that compromises the ability to monitor and control operable safety systems, when the plant is in the cold shutdown or refueling mode. This EAL is primarily intended to ensure that key licensee ERO members and offsite response organizations (OROs) are aware of the event, resources necessary to respond to the event are mobilized, and any necessary compensatory measures are promptly implemented. Escalation of an Alert classified under CU4 would be via EALs CA1 or CA3, or in Recognition Category 'A' of the proposed EAL scheme.

The NRC staff verified that the numbering, formatting, logical progression, and instrumentation and setpoints for this EAL are consistent with the overall EAL scheme development guidance provided by NEI 99-01, Revision 6, and address the site-specific implementation strategies provided, and are, therefore, consistent with a standard EAL scheme, as required by 10 CFR 50.47(b)(4). The NRC staff also verified that the EAL is worded in an unambiguous manner that addresses human factors engineering and user-friendliness concerns, is technically complete for this emergency classification level, addresses issues regarding completeness and accuracy raised in Appendix 1 to NUREG-0654, and uses objective and observable values based on site-specific indications.

Based on the above, the NRC staff concludes that the site-specific implementation method for this EAL is consistent with the key characteristics of an effective EAL scheme and meets the requirements of 10 CFR 50.47(b)(4) and Section IV.B of Appendix E to 10 CFR Part 50. Therefore, the NRC staff finds this EAL acceptable.

3.2.5 Waterford 3 EAL CU5 [CU5]

The intent of this EAL is to highlight the importance of emergency communications by ensuring that an emergency classification level is declared if normal communication methods for onsite and offsite personnel, or with OROs, including the NRC, are lost. This EAL is primarily intended to ensure that key licensee ERO members, and State and local agencies, and the NRC are aware of the loss of communications capabilities, the resources necessary to restore communications are mobilized, and compensatory measures are promptly implemented. Considering that a loss of emergency communications capability would not involve an actual or potential substantial degradation to the level of safety of the plant, no escalation path is necessary for this EAL.

The communication methods derived for this EAL are consistent with the overall EAL scheme development guidance provided by NEI 99-01, Revision 6.

The NRC staff verified that the numbering, sequencing, formatting, and logical progression for this EAL are consistent with the overall EAL scheme development guidance provided by NEI 99-01, Revision 6, and address the site-specific implementation strategies provided, and are, therefore, consistent with a standard EAL scheme, as required by 10 CFR 50.47(b)(4). The NRC staff also verified that the EAL is worded in an unambiguous manner that addresses human factors engineering and user-friendliness concerns, is technically complete for this emergency classification level, addresses issues regarding completeness and accuracy raised in Appendix 1 to NUREG-0654, and uses objective and observable values based on site-specific indications.

Based on the above, the NRC staff concludes that the site-specific implementation method for this EAL is consistent with the key characteristics of an effective EAL scheme and meets the requirements of 10 CFR 50.47(b)(4) and Section IV.B of Appendix E to 10 CFR Part 50. Therefore, the NRC staff finds this EAL acceptable.

3.2.6 Waterford 3 EAL CA6 [CA6]

The intent of this EAL is to ensure that an emergency classification level is declared when hazardous events lead to potential damage to safety systems for the current operating mode. The hazardous events of interest include, but are not limited to, an earthquake, flooding, high winds, tornado strike, explosion, fire, or any other hazard applicable for the site. This EAL is primarily intended to ensure that the licensee ERO is activated to support the control room in understanding the event impacts and restoring affected safety system equipment to service. Escalation of an Alert classified under CA6 would be via EALs CS1 or AS1.

As described in NEI 99-01, Revision 6, an Alert classification level exists when “[e]vents are in process or have occurred which involve an actual or potential substantial degradation of the level of safety of the plant Any releases are expected to be limited to small fractions of the EPA [early phase] PAG exposure levels.” The guidance in NEI 99-01, Revision 6, is intended to ensure that an Alert classification level should be declared only when an actual or potential substantial degradation of the level of safety of the plant has occurred because of a hazardous event.

The licensee proposed that an Alert classification level will be declared when a hazardous event results in indications of degraded performance to one train of a safety system with either indications of degraded performance on a second safety system train or visible damage to a second safety system train, such that the operability or reliability of the second safety system train is a concern. Although different from the guidance in NEI 99-01, Revision 6, this change is acceptable, considering that the guidance in NEI 99-01, Revision 6, is intended to ensure that an Alert classification level should be declared only when an actual or potential substantial degradation of the level of safety of the plant has occurred because of a hazardous event.

The NRC staff verified that the numbering, sequencing, formatting, and logical progression for this EAL are consistent with the overall EAL scheme development guidance provided by NEI 99-01, Revision 6, and address the site-specific implementation strategies provided, and are, therefore, consistent with a standard EAL scheme, as required by 10 CFR 50.47(b)(4). The NRC staff also verified that the EAL is worded in an unambiguous manner that addresses human factors engineering and user-friendliness concerns, is technically complete for this emergency classification level, addresses issues regarding completeness and accuracy raised in Appendix 1 to NUREG-0654, and uses objective and observable values based on site-specific indications.

Based on the above, the NRC staff concludes that the site-specific implementation method for this EAL is consistent with the key characteristics of an effective EAL scheme and meets the requirements of 10 CFR 50.47(b)(4) and Section IV.B of Appendix E to 10 CFR Part 50. Therefore, the NRC staff finds this EAL acceptable.

3.3 Recognition Category 'E' – Independent Spent Fuel Storage Installation

3.3.1 Waterford 3 EAL EU1 [E-HU1]

This EAL applies to an event that results in damage to the confinement boundary of a storage cask containing spent fuel. This EAL is primarily intended to ensure that key licensee ERO members and OROs are aware of the cask damage, resources necessary to respond to the event are mobilized, and protective measures, if warranted, are promptly implemented.

The NRC staff verified that the numbering, sequencing, formatting, and logical progression for this EAL are consistent with the overall EAL scheme development guidance provided by NEI 99-01, Revision 6, and address the site-specific implementation strategies provided, and are, therefore, consistent with a standard EAL scheme, as required by 10 CFR 50.47(b)(4). The NRC staff also verified that the EAL is worded in an unambiguous manner that addresses human factors engineering and user-friendliness concerns, is technically complete for this emergency classification level, addresses issues regarding completeness and accuracy raised in Appendix 1 to NUREG-0654, and uses objective and observable values based on site-specific indications.

Based on the above, the NRC staff concludes that the site-specific implementation method for this EAL is consistent with the key characteristics of an effective EAL scheme and meets the requirements of 10 CFR 50.47(b)(4) and Section IV.B of Appendix E to 10 CFR Part 50. Therefore, the NRC staff finds this EAL acceptable.

3.4 Recognition Category 'F' – Fission Product Barrier Matrix

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

The intent of this EAL set is to ensure that an emergency classification level is declared upon a loss or potential loss of one or more fission product barriers.

This EAL set uses plant condition-based thresholds as triggers within a particular logic configuration needed to reflect a loss or potential loss of a fission product barrier. Non-passive, large light-water reactors in the United States have three fission product barriers: fuel cladding, the RCS, and 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 emergency classification level based upon the number of loss and/or potential loss indicators that are met for each barrier.

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

- FA1 – This EAL addresses any loss or any potential loss of either the fuel clad or RCS barrier.
- FS1 – This EAL addresses loss or potential loss of any two barriers.

- FG1 – This EAL addresses loss of any two barriers and loss or potential loss of the third barrier.

The NRC staff verified that the numbering, sequencing, formatting, logical progression, ease of upgrading/downgrading, and instrumentation and setpoints for this EAL set are consistent with the overall EAL scheme development guidance provided by NEI 99-01, Revision 6, and address the site-specific implementation strategies provided, and are, therefore, consistent with a standard EAL scheme, as required by 10 CFR 50.47(b)(4). The NRC staff also verified that the EAL set is worded in an unambiguous manner that addresses human factors engineering and user-friendliness concerns, is technically complete for each emergency classification level, addresses issues regarding completeness and accuracy raised in Appendix 1 to NUREG-0654, and uses objective and observable values based on site-specific indications.

Based on the above, the NRC staff concludes that the site-specific implementation method for this EAL set is consistent with the key characteristics of an effective EAL scheme and meets the requirements of 10 CFR 50.47(b)(4) and Section IV.B of Appendix E to 10 CFR Part 50. Therefore, the NRC staff finds this EAL set acceptable.

3.5 Recognition Category 'H' – Hazards and Other Conditions Affecting Plant Safety

3.5.1 Waterford 3 EAL Set HU1/HA1/HS1 [HU1/HA1/HS1/HG1]

The intent of this EAL set is to ensure that an emergency classification level is declared based upon a security-related event. 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 licensee proposed to not develop EAL HG1, as provided in NEI 99-01, Revision 6.

EAL HG1 of NEI 99-01, Revision 6, addresses a hostile action that results in the loss of physical control of the facility. Such an action can reasonably be expected to exceed EPA early phase PAG exposure levels offsite for more than the immediate site area, which is the criteria for EAL HG7 in NEI 99-01, Revision 6. Therefore, in NEI 99-01, Revision 6, EAL HG1 is bounded by EAL HG7. Additionally, any event that could result in a radiological release in excess of EPA early phase PAGs would be bounded by EALs AG1 [AG1] or AG2 [AG2] in NEI 99-01, Revision 6. The NRC staff verified that the Waterford 3 EALs AG1, AG2, and HG7 bound the events addressed by EAL HG1 in NEI 99-01, Revision 6.

The NRC staff also verified that the progression from a UE to an SAE classification level is appropriate and consistent with EAL scheme development guidance.

- HU1 – This EAL addresses events that pose a threat to plant personnel or safety system equipment.
- HA1 – This EAL addresses the occurrence of a hostile action within the Security Owner Controlled Area or notification of an aircraft attack threat.
- HS1 – This EAL addresses the occurrence of a hostile action within the Protected Area.

The NRC staff verified that the numbering, sequencing, formatting, logical progression, and ease of upgrading/downgrading for this EAL set are consistent with the overall EAL scheme

development guidance provided by NEI 99-01, Revision 6, and address the site-specific implementation strategies provided, and are, therefore, consistent with a standard EAL scheme, as required by 10 CFR 50.47(b)(4). The NRC staff also verified that the EAL set is worded in an unambiguous manner that addresses human factors engineering and user-friendliness concerns, is technically complete for each emergency classification level, addresses issues regarding completeness and accuracy raised in Appendix 1 to NUREG-0654, and uses objective and observable values based on site-specific indications.

Based on the above, the NRC staff concludes that the site-specific implementation method for this EAL set is consistent with the key characteristics of an effective EAL scheme and meets the requirements of 10 CFR 50.47(b)(4) and Section IV.B of Appendix E to 10 CFR Part 50. Therefore, the NRC staff finds this EAL set acceptable.

3.5.2 Waterford 3 EAL HU2 [HU2]

The intent of this EAL is to ensure that an emergency classification level is declared based upon a seismic event that results in accelerations at the site greater than specified for an operating basis earthquake. This EAL is primarily intended to ensure that key licensee ERO members and OROs are aware of the earthquake magnitude at the site and that post-event damage assessments are promptly implemented. This EAL is considered part of an EAL set containing EALs CA6 and SA9. Depending on the operating mode applicable at the time of the event, escalation of a UE classified under HU2 would be via EALs CA6.1 or SA9.1 for seismic events that affect more than one safety system.

The NRC staff verified that the numbering, sequencing, formatting, logical progression, and instrumentation and setpoints for this EAL are consistent with the overall EAL scheme development guidance provided by NEI 99-01, Revision 6, and address the site-specific implementation strategies provided, and are, therefore, consistent with a standard EAL scheme, as required by 10 CFR 50.47(b)(4). The NRC staff also verified that the EAL is worded in an unambiguous manner that addresses human factors engineering and user-friendliness concerns, is technically complete for this emergency classification level, addresses issues regarding completeness and accuracy raised in Appendix 1 to NUREG-0654, and uses objective and observable values based on site-specific indications.

Based on the above, the NRC staff concludes that the site-specific implementation method for this EAL is consistent with the key characteristics of an effective EAL scheme and meets the requirements of 10 CFR 50.47(b)(4) and Section IV.B of Appendix E to 10 CFR Part 50. Therefore, the NRC staff finds this EAL acceptable.

3.5.3 Waterford 3 EAL HU3 [HU3]

The intent of this EAL is to ensure that an emergency classification level is declared based upon the effects that natural or technological hazard events may have on the facility that are considered to be precursors to a more significant event or condition or have potential impacts that warrant emergency notification to local, State, and Federal authorities. Specific hazards addressed include:

- Tornado striking within the protected area;
- Internal room or area flooding requiring the electrical isolation of a safety system component;

- Movement of personnel within the protected area that is impeded due to an offsite event involving hazardous materials;
- A hazardous event that results in onsite conditions that are sufficient to prohibit the plant staff from accessing the site via personal vehicles; and
- Other site-specific events.

This EAL is primarily intended to ensure that key licensee ERO members and OROs are aware of the hazardous event affecting the site, and post-event damage assessments are promptly implemented. In addition, other site-specific events that may impact the effective implementation of the site emergency plan are considered.

This EAL is considered part of an EAL set containing EALs CA6 and SA9. Depending on the operating mode applicable at the time of the event, escalation of a UE classified under HU3 would be via EALs CA6.1 or SA9.1 for natural or technological hazard events that affect more than one safety system.

The NRC staff verified that the numbering, sequencing, formatting, and logical progression for this EAL are consistent with the overall EAL scheme development guidance provided by NEI 99-01, Revision 6, and address the site-specific implementation strategies provided, and are, therefore, consistent with a standard EAL scheme, as required by 10 CFR 50.47(b)(4). The NRC staff also verified that the EAL is worded in an unambiguous manner that addresses human factors engineering and user-friendliness concerns, is technically complete for this emergency classification level, addresses issues regarding completeness and accuracy raised in Appendix 1 to NUREG-0654, and uses objective and observable values based on site-specific indications.

Based on the above, the NRC staff concludes that the site-specific implementation method for this EAL is consistent with the key characteristics of an effective EAL scheme and meets the requirements of 10 CFR 50.47(b)(4) and Section IV.B of Appendix E to 10 CFR Part 50. Therefore, the NRC staff finds this EAL acceptable.

3.5.4 Waterford 3 EAL HU4 [HU4]

The intent of this EAL is to ensure that an emergency classification level is declared based upon the effect that a fire may have on the facility, which would be indicative of a potential degradation of the level of safety of the plant. This EAL is primarily intended to ensure that key licensee ERO members and OROs are aware of the fire, and post-event damage assessments are promptly implemented.

This EAL is considered part of an EAL set containing EALs CA6 and SA9. Depending on the operating mode applicable at the time of the event, escalation of an Unusual Event classified under HU4 would be via EALs CA6.1 or SA9.1 for fires that affect more than one safety system.

The NRC staff verified that the numbering, sequencing, formatting, and logical progression for this EAL are consistent with the overall EAL scheme development guidance provided by NEI 99-01, Revision 6, and address the site-specific implementation strategies provided, and are, therefore, consistent with a standard EAL scheme, as required by 10 CFR 50.47(b)(4). The NRC staff also verified that the EAL is worded in an unambiguous manner that addresses

human factors engineering and user-friendliness concerns, is technically complete for this emergency classification level, addresses issues regarding completeness and accuracy raised in Appendix 1 to NUREG-0654, and uses objective and observable values based on site-specific indications.

Based on the above, the NRC staff concludes that the site-specific implementation method for this EAL is consistent with the key characteristics of an effective EAL scheme and meets the requirements of 10 CFR 50.47(b)(4) and Section IV.B of Appendix E to 10 CFR Part 50. Therefore, the NRC staff finds this EAL acceptable.

3.5.5 Waterford 3 EAL HA5 [HA5]

The intent of this EAL is to ensure that an emergency classification level is declared based upon the effect that toxic, corrosive, asphyxiating or flammable gases may have on the facility, which precludes or impedes access to equipment necessary to maintain normal plant operation or is required for a normal plant cooldown and shutdown. This EAL is primarily intended to ensure that the licensee ERO is activated to support the control room in removing the impediment to normal access to the affected area or room. Escalation of an Alert classified under HA5 would be via Recognition Category 'A,' 'C,' or 'F' EALs.

The NRC staff verified that the numbering, sequencing, and formatting for this EAL are consistent with the overall EAL scheme development guidance provided by NEI 99-01, Revision 6, and address the site-specific implementation strategies provided, and are, therefore, consistent with a standard EAL scheme, as required by 10 CFR 50.47(b)(4). The NRC staff also verified that the EAL is worded in an unambiguous manner that addresses human factors engineering and user-friendliness concerns, is technically complete for this emergency classification level, addresses issues regarding completeness and accuracy raised in Appendix 1 to NUREG-0654, and uses objective and observable values based on site-specific indications.

Based on the above, the NRC staff concludes that the site-specific implementation method for this EAL is consistent with the key characteristics of an effective EAL scheme and meets the requirements of 10 CFR 50.47(b)(4) and Section IV.B of Appendix E to 10 CFR Part 50. Therefore, the NRC staff finds this EAL acceptable.

3.5.6 Waterford 3 EAL Set HA6/HS6 [HA6/HS6]

The intent of this EAL set is to ensure that an emergency classification level is declared based upon a control room evacuation.

The NRC staff verified that the progression from an Alert to an SAE classification level is appropriate and consistent with EAL scheme development guidance. Escalation of a SAE classified under HS6 would be via EALs FG1 or CG1.

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

The NRC staff verified that the numbering, sequencing, formatting, and ease of upgrading/downgrading for this EAL set are consistent with the overall EAL scheme development guidance provided by NEI 99-01, Revision 6, and address the site-specific implementation strategies provided, and are, therefore, consistent with a standard EAL scheme, as required by 10 CFR 50.47(b)(4). The NRC staff also verified that the EAL set is worded in an unambiguous manner that addresses human factors engineering and user-friendliness concerns, is technically complete for each emergency classification level, addresses issues regarding completeness and accuracy raised in Appendix 1 to NUREG-0654, and uses objective and observable values based on site-specific indications.

Based on the above, the NRC staff concludes that the site-specific implementation method for this EAL set is consistent with the key characteristics of an effective EAL scheme and meets the requirements of 10 CFR 50.47(b)(4) and Section IV.B of Appendix E to 10 CFR Part 50. Therefore, the NRC staff finds this EAL set acceptable.

3.5.7 Waterford 3 EAL Set HU7/HA7/HS7/HG7 [HU7/HA7/HS7/HG7]

The intent of this EAL set is to provide decision-makers with an escalating emergency classification level path to consider when, in their judgment, entry into the site's emergency plan and mobilization of the licensee ERO and ORO is warranted.

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

- HU7 – This EAL addresses unanticipated conditions not addressed explicitly elsewhere but, in the judgment of the Emergency Director, warrant declaration of an emergency due to conditions existing that are believed to fall under the emergency classification level description for a UE.
- HA7 – This EAL addresses unanticipated conditions not addressed explicitly elsewhere but, in the judgment of the Emergency Director, warrant declaration of an emergency due to conditions existing that are believed to fall under the emergency classification level description for an Alert.
- HS7 – This EAL addresses unanticipated conditions not addressed explicitly elsewhere but, in the judgment of the Emergency Director, warrant declaration of an emergency due to conditions existing that are believed to fall under the emergency classification level description for an SAE.
- HG7 – This EAL addresses unanticipated conditions not addressed explicitly elsewhere but, in the judgment of the Emergency Director, warrant declaration of an emergency due to conditions existing that are believed to fall under the emergency classification level description for a GE.

The NRC staff verified that the numbering, sequencing, formatting, and ease of upgrading/downgrading for this EAL set are consistent with the overall EAL scheme development guidance provided by NEI 99-01, Revision 6, and address the site-specific implementation strategies provided, and are, therefore, consistent with a standard EAL scheme, as required by 10 CFR 50.47(b)(4). The NRC staff also verified that the EAL set is worded in an unambiguous manner that addresses human factors engineering and user-friendliness

concerns, is technically complete for each emergency classification level, addresses issues regarding completeness and accuracy raised in Appendix 1 to NUREG-0654, and uses objective and observable values based on site-specific indications.

Based on the above, the NRC staff concludes that the site-specific implementation method for this EAL set is consistent with the key characteristics of an effective EAL scheme and meets the requirements of 10 CFR 50.47(b)(4) and Section IV.B of Appendix E to 10 CFR Part 50. Therefore, the NRC staff finds this EAL set acceptable.

3.6 Recognition Category 'S' – System Malfunction

3.6.1 Waterford 3 EAL Set SU1/SA1/SS1/SG1 [SU1/SA1/SS1/SG1]

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

The NRC staff reviewed the licensee's evaluation and justification for site-specific changes associated with this EAL set and verified that the progression from a UE to a GE classification level is appropriate and consistent with EAL scheme development guidance.

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

The licensee proposed an alternate threshold value for EAL SG1 that was based on the capability to establish long-term RCS heat removal rather than basing a threshold value solely on a coping time that may no longer lead to the loss of one or more fission product barriers. Considering that the licensee currently has procedures and equipment to, "restore core cooling, containment, and spent fuel pool cooling capabilities indefinitely," the NRC staff concludes that the proposed threshold values for EAL SG1 are acceptable.

The NRC staff verified that the numbering, sequencing, formatting, logical progression, ease of upgrading/downgrading, and instrumentation and setpoints for this EAL set are consistent with the overall EAL scheme development guidance provided by NEI 99-01, Revision 6, and address the site-specific implementation strategies provided, and are, therefore, consistent with a standard EAL scheme, as required by 10 CFR 50.47(b)(4). The NRC staff also verified that the EAL set is worded in an unambiguous manner that addresses human factors engineering and user-friendliness concerns, is technically complete for each emergency classification level, addresses issues regarding completeness and accuracy raised in Appendix 1 to NUREG-0654, and uses objective and observable values based on site-specific indications.

Based on the above, the NRC staff concludes that the site-specific implementation method for this EAL set is consistent with the key characteristics of an effective EAL scheme and meets the requirements of 10 CFR 50.47(b)(4) and Section IV.B of Appendix E to 10 CFR Part 50. Therefore, the NRC staff finds this EAL set acceptable.

3.6.2 Waterford 3 EAL Set SU3/SA3 [SU2/SA2]

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

The NRC staff verified that the progression from a UE to an Alert classification level is appropriate and consistent with EAL scheme development guidance. Escalation of an Alert classified under SA3 would be via EALs FS1 or AS1.

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

The NRC staff verified that the numbering, sequencing, formatting, logical progression, ease of upgrading/downgrading, and instrumentation and setpoints for this EAL set are consistent with the overall EAL scheme development guidance provided by NEI 99-01, Revision 6, and address the site-specific implementation strategies provided, and are, therefore, consistent with a standard EAL scheme, as required by 10 CFR 50.47(b)(4). The NRC staff also verified that the EAL set is worded in an unambiguous manner that addresses human factors engineering and user-friendliness concerns, is technically complete for each emergency classification level, addresses issues regarding completeness and accuracy raised in Appendix 1 to NUREG-0654, and uses objective and observable values based on site-specific indications.

Based on the above, the NRC staff concludes that the site-specific implementation method for this EAL set is consistent with the key characteristics of an effective EAL scheme and meets the requirements of 10 CFR 50.47(b)(4) and Section IV.B of Appendix E to 10 CFR Part 50. Therefore, the NRC staff finds this EAL set acceptable.

3.6.3 Waterford 3 EAL SU4 [SU3]

The intent of this EAL is to ensure that an emergency classification level is declared when RCS activity is greater than technical specification allowable limits. This EAL is primarily intended to ensure that key licensee ERO members are aware of the elevated reactor coolant activity and support the control room in implementation of appropriate response measures. Escalation of a UE classified under SU4 would be via EAL FA1 or Recognition Category 'A' EALs.

The NRC staff verified that the numbering, sequencing, formatting, logical progression, and instrumentation and setpoints for this EAL are consistent with the overall EAL scheme development guidance provided by NEI 99-01, Revision 6, and address the site-specific implementation strategies provided, and are, therefore, consistent with a standard EAL scheme, as required by 10 CFR 50.47(b)(4). The NRC staff also verified that the EAL is worded in an unambiguous manner that addresses human factors engineering and user-friendliness

concerns, is technically complete for this emergency classification level, addresses issues regarding completeness and accuracy raised in Appendix 1 to NUREG-0654, and uses objective and observable values based on site-specific indications.

Based on the above, the NRC staff concludes that the site-specific implementation method for this EAL is consistent with the key characteristics of an effective EAL scheme and meets the requirements of 10 CFR 50.47(b)(4) and Section IV.B of Appendix E to 10 CFR Part 50. Therefore, the NRC staff finds this EAL acceptable.

3.6.4 Waterford 3 EAL SU5 [SU4]

The intent of this EAL is to ensure that an emergency classification level is declared when the plant has indications of RCS leakage. By design, the indications for this EAL are redundant to corresponding indicators for a loss or potential loss of fission product barriers, as well as radiation monitoring, to ensure reactor and/or fission product barrier events are recognized.

This EAL is primarily intended to ensure that key licensee ERO members are aware of the RCS leakage and support the control room in implementation of appropriate response measures. Escalation of a UE classified under EAL SU5 would be via Recognition Category 'A' or 'F' EALs.

The NRC staff verified that the numbering, sequencing, formatting, logical progression, and instrumentation and setpoints for this EAL are consistent with the overall EAL scheme development guidance provided by NEI 99-01, Revision 6, and address the site-specific implementation strategies provided, and are, therefore, consistent with a standard EAL scheme, as required by 10 CFR 50.47(b)(4). The NRC staff also verified that the EAL is worded in an unambiguous manner that addresses human factors engineering and user-friendliness concerns, is technically complete for this emergency classification level, addresses issues regarding completeness and accuracy raised in Appendix 1 to NUREG-0654, and uses objective and observable values based on site-specific indications.

Based on the above, the NRC staff concludes that the site-specific implementation method for this EAL is consistent with the key characteristics of an effective EAL scheme and meets the requirements of 10 CFR 50.47(b)(4) and Section IV.B of Appendix E to 10 CFR Part 50. Therefore, the NRC staff finds this EAL acceptable.

3.6.5 Waterford 3 EAL Set SU6/SA6/SS6 [SU5/SA5/SS5]

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

The NRC staff verified that the progression from a UE to an SAE classification level is appropriate and consistent with EAL scheme development guidance. Escalation of an SAE classified under EAL SS6 would be via EALs AG1 or FG1.

- SU6 – This EAL addresses a failure of the RPS to initiate or complete an automatic or manual reactor trip that results in a reactor shutdown, and either a subsequent operator manual action taken at the reactor control consoles or an automatic trip is successful in shutting down the reactor.
- SA6 – This EAL addresses a failure of the RPS to initiate or complete an automatic or manual reactor trip that results in a reactor shutdown, and subsequent operator manual

actions taken at the reactor control consoles to shut down the reactor are also unsuccessful.

- SS6 – This EAL addresses a failure of the RPS to initiate or complete an automatic or manual reactor trip that results in a reactor shutdown, all subsequent operator actions to manually shut down the reactor are unsuccessful, and continued power generation is challenging the capability to adequately remove heat from the core and/or the RCS.

For the Waterford 3 EAL scheme, the licensee chose to add “as indicated by reactor power > 5%” to the threshold values for EALs SU6, SA6, and SS6. Considering that the RPS is designed to place the reactor in a subcritical condition when certain setpoints are exceeded, a failure of the RPS would be indicated by reactor power rising subsequent to reaching or exceeding an RPS setpoint or condition that should have resulted in RPS placing the reactor in a subcritical condition. As such, the NRC staff concludes that the threshold values for this proposed EAL set should include all site-specific conditions that would be used to ensure the reactor is subcritical. These site-specific indications of a subcritical reactor, if not met, would require entry into the site-specific anticipated transient without scram procedure. Because Waterford 3 continues to use the subcategory of “RPS Failure” and both the Initiating Condition and threshold values include “Automatic or manual trip fails to shut down the reactor,” the NRC staff finds that adding the condition of reactor power being less than or equal to 5 percent to the condition of the reactor being shutdown acceptable.

The NRC staff verified that the numbering, sequencing, formatting, logical progression, ease of upgrading/downgrading, and instrumentation and setpoints for this EAL set are consistent with the overall EAL scheme development guidance provided by NEI 99-01, Revision 6, and address the site-specific implementation strategies provided, and are, therefore, consistent with a standard EAL scheme, as required by 10 CFR 50.47(b)(4). The NRC staff also verified that the EAL set is worded in an unambiguous manner that addresses human factors engineering and user-friendliness concerns, is technically complete for each emergency classification level, addresses issues regarding completeness and accuracy raised in Appendix 1 to NUREG-0654, and uses objective and observable values based on site-specific indications.

Based on the above, the NRC staff concludes that the site-specific implementation method for this EAL set is consistent with the key characteristics of an effective EAL scheme and meets the requirements of 10 CFR 50.47(b)(4) and Section IV.B of Appendix E to 10 CFR Part 50. Therefore, the NRC staff finds this EAL set acceptable.

3.6.6 Waterford 3 EAL SU7 [SU6]

The intent of this EAL is to highlight the importance of emergency communications by ensuring that an emergency classification level is declared if normal communication methods for onsite and offsite personnel, or with OROs, including the NRC, are lost. This EAL is primarily intended to ensure that key licensee ERO members, and State and local agencies, and the NRC are aware of the loss of communication capabilities, the resources necessary to restore communications are mobilized, and compensatory measures are promptly implemented. Considering that a loss of emergency communications capability would not involve an actual or potential substantial degradation to the level of safety of the plant, no escalation path is necessary for this EAL.

The communication methods derived for this EAL are consistent with the overall EAL scheme development guidance.

The NRC staff verified that the numbering, sequencing, formatting, and logical progression for this EAL are consistent with the overall EAL scheme development guidance provided by NEI 99-01, Revision 6, and address the site-specific implementation strategies provided, and are, therefore, consistent with a standard EAL scheme, as required by 10 CFR 50.47(b)(4). The NRC staff also verified that the EAL is worded in an unambiguous manner that addresses human factors engineering and user-friendliness concerns, is technically complete for this emergency classification level, addresses issues regarding completeness and accuracy raised in Appendix 1 to NUREG-0654, and uses objective and observable values based on site-specific indications.

Based on the above, the NRC staff concludes that the site-specific implementation method for this EAL is consistent with the key characteristics of an effective EAL scheme and meets the requirements of 10 CFR 50.47(b)(4) and Section IV.B of Appendix E to 10 CFR Part 50. Therefore, the NRC staff finds this EAL acceptable.

3.6.7 Waterford 3 EAL SU8 [SU7]

The intent of this EAL is to ensure that an emergency classification level is declared when the plant has indications of containment barrier degradation. It also addresses an event that results in high containment pressure with a concurrent failure of containment pressure control systems. The indications for this EAL are redundant to corresponding indicators from a loss or potential loss of fission product barriers, as well as radiation monitoring, to ensure reactor and/or fission product barrier events are recognized.

This EAL is primarily intended to ensure that key licensee ERO members, OROs, and the NRC are aware of significant challenges to containment integrity, and to ensure that compensatory measures are promptly implemented. Escalation is bounded by Recognition Category 'F', as well as EALs AA1, AS1 and AG1.

The NRC staff verified that the numbering, sequencing, formatting, logical progression, and instrumentation and setpoints for this EAL are consistent with the overall EAL scheme development guidance provided by NEI 99-01, Revision 6, and address the site-specific implementation strategies provided, and are, therefore, consistent with a standard EAL scheme, as required by 10 CFR 50.47(b)(4). The NRC staff also verified that the EAL is worded in an unambiguous manner that addresses human factors engineering and user-friendliness concerns, is technically complete for this emergency classification level, addresses issues regarding completeness and accuracy of Appendix 1 to NUREG-0654, and uses objective and observable values based on site-specific indications.

Based on the above, the NRC staff concludes that the site-specific implementation method for this EAL is consistent with the key characteristics of an effective EAL scheme and meets the requirements of 10 CFR 50.47(b)(4) and Section IV.B of Appendix E to 10 CFR Part 50. Therefore, the NRC staff finds this EAL acceptable.

3.6.8 Waterford 3 EAL Set SS2/SG1 [SS8/SG8]

The intent of this EAL set is to ensure that an emergency classification level is declared when a loss of DC power occurs, as this condition compromises the ability of the licensee to monitor and control safety systems.

The NRC staff verified that the progression from an SAE to a GE classification level is appropriate and consistent with EAL scheme development guidance.

- SS2 – This EAL addresses a loss of vital DC power which compromises the ability to monitor and control safety systems.
- SG1 – This EAL addresses a concurrent and prolonged loss of both AC and vital DC power.

The NRC staff verified that the numbering, sequencing, formatting, logical progression, ease of upgrading/downgrading, and instrumentation and setpoints for this EAL set are consistent with the overall EAL scheme development guidance provided by NEI 99-01, Revision 6, and address the site-specific implementation strategies provided, and are, therefore, consistent with a standard EAL scheme, as required by 10 CFR 50.47(b)(4). The NRC staff also verified that the EAL set is worded in an unambiguous manner that addresses human factors engineering and user-friendliness concerns, is technically complete for each emergency classification level, addresses issues regarding completeness and accuracy raised in Appendix 1 to NUREG-0654, and uses objective and observable values based on site-specific indications.

Based on the above, the NRC staff concludes that the site-specific implementation method for this EAL set is consistent with the key characteristics of an effective EAL scheme and meets the requirements of 10 CFR 50.47(b)(4) and Section IV.B of Appendix E to 10 CFR Part 50. Therefore, the NRC staff finds this EAL set acceptable.

3.6.9 Waterford 3 EAL SA9 [SA9]

The intent of this EAL is to ensure that an emergency classification level is declared when hazardous events cause damage to safety systems needed for the current operating mode. The hazardous events of interest include, but are not limited to, an earthquake, flooding, high winds, tornado strike, explosion, fire, or any other hazard applicable for Waterford 3. This EAL is primarily intended to ensure that the licensee ERO is activated to support the control room in understanding the event impacts and restoring affected safety system equipment to service. Indications of hazard-induced damage to components containing radioactive materials are bounded by Recognition Category 'F,' as well as EALs AS1 and AG1.

As described in NEI 99-01, Revision 6, an Alert classification level exists when “[e]vents are in process or have occurred which involve an actual or potential substantial degradation of the level of safety of the plant Any releases are expected to be limited to small fractions of the EPA [early phase] PAG exposure levels.” The guidance in NEI 99-01, Revision 6, is intended to ensure that an Alert classification level should be declared only when an actual or potential substantial degradation of the level of safety of the plant has occurred because of a hazardous event. However, there may be cases where a hazardous event only causes damage to a single safety system component or a single safety system train. Additionally, an Alert classification level should not be declared if the damage from the hazardous event is limited to a safety system component or a safety system train that was inoperable or out of service prior to the event occurring.

The licensee proposed that an Alert classification level be declared when a hazardous event results in indications of degraded performance to one train of a safety system with either indications of degraded performance on a second safety system train or visible damage to a second safety system train, such that the operability or reliability of the second safety system

train is a concern. Although different from the guidance in NEI 99-01, Revision 6, this change is acceptable, considering that the guidance in NEI 99-01, Revision 6, is intended to ensure that an Alert classification level should be declared only when an actual or potential substantial degradation of the level of safety of the plant has occurred because of a hazardous event.

The NRC staff verified that the numbering, sequencing, formatting, logical progression, and instrumentation and setpoints for this EAL are consistent with the overall EAL scheme development guidance provided by NEI 99-01, Revision 6, and address the site-specific implementation strategies provided, and are, therefore, consistent with a standard EAL scheme, as required by 10 CFR 50.47(b)(4). The NRC staff also verified that the EAL is worded in an unambiguous manner that addresses human factors engineering and user friendliness concerns, is technically complete for this emergency classification level, addresses issues regarding completeness and accuracy raised in Appendix 1 to NUREG 0654, and uses objective and observable values based on site-specific indications.

Based on the above, the NRC staff concludes that the site-specific implementation method for this EAL is consistent with the key characteristics of an effective EAL scheme and meets the requirements of 10 CFR 50.47(b)(4) and Section IV.B of Appendix E to 10 CFR Part 50. Therefore, the NRC staff finds this EAL acceptable.

3.7 Review Summary

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

The NRC staff 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 determined that the proposed EAL scheme is technically complete and consistent with EAL schemes implemented at similarly designed plants.

The NRC staff verified that the instrumentation and setpoints derived for this proposed EAL scheme are consistent with the overall EAL scheme development guidance provided by NEI 99-01, Revision 6, address the site-specific implementation strategies provided, and are consistent with a standard EAL scheme.

Based on its review, the NRC staff finds 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 NRC staff concludes that the licensee's proposed EAL scheme and site-specific EAL technical basis document provided

by letter dated June 1, 2020, as supplemented by letter dated December 15, 2020, are acceptable for implementation.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Louisiana State official was notified of the proposed issuance of the amendment on March 23, 2021. The State official had no comments.

5.0 ENVIRONMENTAL CONSIDERATION

The amendment changes requirements with respect to installation or use of facility components located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendment involves no significant hazards consideration, published in the *Federal Register* on September 22, 2020 (85 FR 59563), and there has been no public comment on such finding. Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

6.0 CONCLUSION

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

7.0 REFERENCES

- 1 Gaston, R., Entergy Operations, Inc., letter to U.S. Nuclear Regulatory Commission, "License Amendment Request Adoption of Emergency Action Level Schemes Pursuant to NEI 99-01, Revision 6," dated June 1, 2020 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML20153A457).
- 2 Gaston, R., Entergy Operations, Inc., letter to U.S. Nuclear Regulatory Commission, "Response to U.S. Nuclear Regulatory Commission Request for Additional Information Regarding License Amendment Request for Adoption of Emergency Action Level Schemes Pursuant to NEI 99-01, Revision 6," dated December 15, 2020 (ADAMS Accession No. ML20352A231).
- 3 Nuclear Energy Institute, "Development of Emergency Action Levels for Non-Passive Reactors," NEI 99-01, Revision 6, dated November 2012 (ADAMS Accession No. ML12326A805).
- 4 U.S. Nuclear Regulatory Commission, Generic Letter 79-50, "Emergency Plans Submittal Dates," dated October 10, 1979 (ADAMS Accession No. ML031320278).

- 5 U.S. Nuclear Regulatory Commission and Federal Emergency Management Agency (FEMA), "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants," NUREG-0654/FEMA-REP-1, Revision 1, dated November 1980 (ADAMS Accession No. ML040420012).
- 6 U.S. Nuclear Regulatory Commission, "Emergency Planning and Preparedness for Nuclear Power Reactors," Regulatory Guide 1.101, Revision 2, October 1981 (ADAMS Accession No. ML090440294); Revision 3, dated August 31, 1992 (ADAMS Accession No. ML003740302); and Revision 4, dated July 31, 2003 (ADAMS Accession No. ML032020276).
- 7 Thaggard, M., U.S. Nuclear Regulatory Commission, letter to Susan Perkins-Grew, Nuclear Energy Institute, "U.S. Nuclear Regulatory Commission Review and Endorsement of NEI 99-01, Revision 6, dated November 2012 (TAC No. D92368)," dated March 28, 2013 (ADAMS Accession No. ML12346A463).
- 8 U.S. Nuclear Regulatory Commission, Regulatory Issue Summary 2003-18, "Use of NEI-99-01, 'Methodology for Development of Emergency Action Levels,' Revision 4, dated January 2003," dated October 8, 2003, including Supplement 1, dated July 13, 2004, and Supplement 2 dated December 12, 2005 (ADAMS Accession Nos. ML032580518, ML041550395, and ML051450482, respectively).
- 9 U.S. Environmental Protection Agency, "PAG Manual: Protective Action Guides and Planning Guidance for Radiological Incidents," dated January 2017 (ADAMS Accession No. ML17044A073).
- 10 Leeds, E. and Johnson, M., NRC Order EA-12-051 to All Power Reactor Licensees and Holders of Construction Permits in Active or Deferred Status, "Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation (Effective Immediately)," dated March 12, 2012 (ADAMS Accession No. ML12056A044).

Principal Contributor: R. J. Hoffman

Date: May 19, 2021

SUBJECT: WATERFORD STEAM ELECTRIC STATION, UNIT 3 - ISSUANCE OF AMENDMENT NO. 259 TO REVISE EMERGENCY ACTION LEVELS TO A SCHEME BASED ON NEI 99-01, REVISION 6, "DEVELOPMENT OF EMERGENCY ACTION LEVELS FOR NON-PASSIVE REACTORS" (EPID L-2020-LLA-0122) DATED MAY 19, 2021

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 RHoffman, NSIR.

ADAMS Accession No.: ML21082A302 *via email **via memorandum **NRR-106**

OFFICE	NRR/DORL/LPL4/PM*	NRR/DORL/LPL4/LA*	NSIR/DPR/RLB/BC**	OGC*
NAME	MChawla for PBuckberg (concur)	PBlechman	JQuichocho	KGamin
DATE	4/7/2021	3/26/2021	2/24/2021	4/6/2021
OFFICE	NRR/DORL/LPL4/BC	NRR/DORL/D	NRR/D	NRR/DORL/LPL4/PM*
NAME	JDixon-Herrity	CErlanger	AVeil (MKing for)	PBuckberg (sign)
DATE	4/12/2021	4/20/2021	5 /19 /2021	5 /19 /2021

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