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10 CFR 50.90

W3F1-2020-0036

June 1, 2020

ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Subject: License Amendment Request
Adoption of Emergency Action Level Schemes Pursuant to NEI 99-01, Revision 6

Waterford Steam Electric Station, Unit 3
NRC Docket No. 50-382
Renewed Facility Operating License No. NPF-38

Reference: NRC letter "U.S. Nuclear Regulatory Commission Review and Endorsement of NEI 99-01, Revision 6, dated November, 2012 (TAC No. D92368)," (ADAMS Accession No. ML12346A463), dated March 28, 2013

As required by 10 CFR 50.90, Entergy Operations, Inc. (Entergy), hereby requests an amendment to the license for Waterford Steam Electric Station, Unit 3 (Waterford 3). Specifically, the proposed change involves revising the Emergency Plan for Waterford 3 to adopt the Nuclear Energy Institute's (NEI's) revised Emergency Action Level (EAL) scheme described in NEI 99-01, Revision 6, "Development of Emergency Action Levels for Non-Passive Reactors," which has been endorsed by the Nuclear Regulatory Commission (NRC) as documented in the referenced letter. Waterford 3 currently uses an EAL scheme based on NEI 99-01, Revision 5. The proposed amendment does not involve a significant hazards consideration under the standards set forth in 10 CFR 50.92(c), and no significant environmental impacts are associated with the proposed changes.

10 CFR Part 50, Appendix E, Section IV.B.2, stipulates that a licensee desiring to change its entire EAL scheme shall submit an application for an amendment to its license and receive NRC approval before implementing the change. In its endorsement of the guidance, the NRC notes that NEI 99-01, Revision 6, is considered a significant change to the EAL scheme development methodology, and licensees seeking to use this guidance in the development of EAL schemes must adhere to the requirements of 10 CFR Part 50, Appendix E, Section IV.B.2. Therefore,

pursuant to 10 CFR 50.90, Entergy requests NRC review and approval of a revision to the Emergency Plan EALs for Waterford 3.

The Enclosure provides an evaluation of the proposed changes. Attachment 1 provides the NEI 99-01, Revision 6, Waterford 3 Steam Electric Station EAL Technical Basis marked to illustrate the proposed changes. Attachment 2 provides the revised (clean) Waterford 3 Steam Electric Station EAL Technical Basis. Attachment 3 provides a deviation-difference document comparing NEI 99-01, Revision 6, with the proposed changes to the Waterford 3 EAL schemes. Attachment 4 includes an EAL wallchart (for information only), which is a quick-reference tool developed to support timely Emergency Response Organization personnel EAL determinations. Attachment 5 provides specific reference documents or excerpts which support related Waterford 3 Emergency Plan proposed changes.

Approval of the proposed amendment is requested by June 30, 2021. Once approved, the amendment shall be implemented by August 31, 2021.

This letter contains no new regulatory commitments.

The proposed Initiating Conditions and EALs have been reviewed by the Waterford 3 Onsite Safety Review Committee. In addition, the proposed changes associated with adoption of NEI 99-01, Revision 6, were distributed to representatives from the Louisiana Department of Health, St. Charles Parish and St. John Parish on April 29, 2020. In accordance with 10 CFR 50.91, "Notice for public comment; State consultation," paragraph (b), Entergy is notifying the State of Louisiana of this license amendment request by transmitting a copy of this letter and enclosure to the designated State Official.

Should you have any questions or require additional information, please contact Paul Wood, Regulatory Assurance Manager, at 504-464-3786.

I declare under penalty of perjury, that the foregoing is true and correct. Executed on June 1, 2020.

Respectfully,

Ron Gaston

RWG/mmz

Enclosure: Evaluation of the Proposed Change

Attachments to Enclosure:

1. Waterford 3 Steam Electric Station EAL Technical Basis (Markup)
2. Waterford 3 Steam Electric Station EAL Technical Basis (Clean)
3. Waterford 3 Steam Electric Station NEI 99-01 Revision 6 EAL Comparison Matrix
4. Waterford 3 EAL Wallchart (for information only)
5. Supporting Referenced Document Pages

cc: NRC Region IV Regional Administrator
NRC Senior Resident Inspector – Waterford 3
NRR Project Manager – Waterford 3
Louisiana Department of Environmental Quality, Office of Environmental Compliance

Enclosure

W3F1-2020-0036

Evaluation of the Proposed Change

EVALUATION OF THE PROPOSED CHANGE

1.0 SUMMARY DESCRIPTION

Entergy Operations, Inc. (Entergy) proposes to revise the Waterford Steam Electric Station, Unit 3 (Waterford 3) currently approved Emergency Plan (EP) Emergency Action Level (EAL) scheme, which is based on the Nuclear Energy Institute's (NEI's) guidance established in NEI 99-01, Revision 5, "Methodology for Development of Emergency Action Levels" (Reference 1). Entergy is proposing to adopt the EAL schemes based on the guidance provided in NEI 99-01, Revision 6, "Development of Emergency Action Levels for Non-Passive Reactors," which has been endorsed by the NRC (Reference 2).

2.0 DETAILED DESCRIPTION

The proposed changes involve revising Waterford 3's EAL scheme, which is currently based on NEI 99-01, Revision 5, to a scheme based on NEI 99-01, Revision 6. Enhancements provided by Revision 6 of the guidance include:

- Clarification of numerous EALs that have been typically misinterpreted by the industry in the development of their site-specific EAL scheme,
- Clarification of the intent of EALs that have been historically misclassified,
- Providing additional guidance for the development of EALs for current non-passive reactor designs as well as possible future reactor designs that are non-passive,
- Incorporating lessons learned from industry events (i.e., Fukushima and others) and NUREG/CR-7154, "Risk Informing Emergency Preparedness Oversight: Evaluation of Emergency Action Levels – A Pilot Study of Peach Bottom, Surry and Sequoyah," and
- A detailed review of the guidance to re-validate that the EALs are appropriate and are at the necessary emergency classification level based upon 32 years of industry and NRC experience with EAL scheme development and implementation.

2.1 Proposed Initiating Conditions (ICs) and EALs

Attachment 1, "Waterford 3 Steam Electric Station EAL Technical Basis (Markup)," provides a markup of the current Waterford 3 EAL scheme basis illustrating changes incorporating the guidance of NEI 99-01, Revision 6. Attachment 2 provides a clean copy of the proposed revision to the Waterford 3 Steam Electric Station EAL Technical Basis.

2.2 Deviations and Differences

Attachment 3 contains a matrix that provides a comparison of the ICs and EALs in NEI 99-01 to the ICs and EALs proposed for Waterford 3. The comparison evaluates differences and deviations consistent with the similar exercise performed during the Waterford 3 EP upgrade to NEI 99-01, Revision 5 (Reference 3). The NRC approved Waterford 3's EP upgrade to NEI 99-01, Revision 5, on July 18, 2011 (Reference 4).

A *difference* is an EAL change where the basis scheme guidance differs in wording, but agrees in meaning and intent, such that classification of an event would be the same, whether using the basis scheme guidance or the site-specific proposed EAL. Examples of differences include the use of site-specific terminology or administrative re-formatting of site-specific EALs.

A *deviation* is an EAL change where the basis scheme guidance differs in wording and is altered in meaning or intent, such that classification of the event could be different between the basis scheme guidance and the site-specific proposed EAL. Examples of deviations include the use of altered mode applicability, altering key words or time limits, or changing words of physical reference (protected area, safety-related equipment, etc.).

Some of the identified differences are the result of adding plant-specific information to the EALs. In these cases, Attachment 3 may refer the reader to an associated document in Attachment 5, "Supporting Referenced Document Pages," which provides the technical basis for plant-specific information.

2.3 Generic Differences

The differences below apply throughout the set of EALs and are not specifically identified in each instance in the comparison matrix as a difference.

NEI 99-01, Rev 6 EALs	Waterford 3 EALs
References BWRs	Deleted BWR references as appropriate
Uses E-HU for ISFSI ICs	Uses EU for ISFSI ICs
Designates ICs and EALs as Example: (IC)HU1 EAL 2	Designates ICs and EALs as Example: HU1.2
Emergency Classification ICs are presented together by Emergency Classification level (all NOUEs grouped together, then all Alerts, etc.) for each category (A, C, H, etc.), in ascending order (UE – GE)	Emergency Classification ICs are presented by Emergency Classification “family” (A…1, A…2, A…3, etc.) for each category, in ascending order (UE – GE)

2.4 Operational Modes

Mode applicability of the proposed ICs and EALs is consistent with the NEI 99-01, Revision 6. The following table provides the operating modes as defined by the Waterford 3 Technical Specifications.

OPERATIONAL MODE	REACTIVITY CONDITION, Keff	% OF RATED THERMAL POWER*	AVERAGE COOLANT TEMPERATURE
1. Power Operation	≥ 0.99	> 5%	≥ 350°F
2. Startup	≥ 0.99	≤ 5%	≥ 350°F
3. Hot Standby	< 0.99	0	≥ 350°F
4. Hot Shutdown	< 0.99	0	350°F > T_{avg} > 200°F
5. Cold Shutdown	< 0.99	0	≤ 200°F
6. Refueling**	≤ 0.95	0	≤ 140°F

* Excluding decay heat.
** Fuel in the reactor vessel with the vessel head closure bolts less than fully tensioned or with the head removed.

In addition to the TS defined operational modes, NEI 99-01, Revision 6, defines the following additional mode:

Defueled: All reactor fuel removed from the reactor vessel (i.e., full core off load during refueling or extended outage).

Waterford 3 procedures recognize and are consistent with the definition of a defueled condition.

2.5 Instrumentation Used for EALs

Waterford 3 has verified that the specified values used as EAL setpoints are within the calibrated range of the referenced instrumentation.

2.6 Background Technical Information

Attachment 1 provides the existing Waterford 3 Steam Electric Station EAL Technical Basis marked to illustrate the proposed changes. Attachment 2 provides the revised (clean) Waterford 3 Steam Electric Station EAL Technical Basis. Attachment 3 provides a deviation-difference document comparing NEI 99-01, Revision 6, with the proposed changes to the Waterford 3 EAL schemes. Attachment 4 provides the Waterford 3 EAL Wallchart (for information only), which is a quick-reference tool developed to support timely Emergency Response Organization personnel EAL determinations. Attachment 5 provides specific reference documents or excerpts which support related Waterford 3 Emergency Plan proposed changes.

3.0 TECHNICAL EVALUATION

Entergy has evaluated the proposed changes to determine whether applicable regulations and requirements have been met. NEI 99-01 guidance methodology includes many years of development, along with use and implementation. The guidance has been subject to NRC reviews and approval. The Waterford 3 EAL scheme currently in place is based on the methodology in NEI 99-01, Revision 5. NEI 99-01, Revision 6, is the latest version endorsed by the NRC and provides guidance to nuclear power plant operators for the development of a site-specific emergency action level scheme.

10 CFR 50.47(b)(4) requires that emergency plans include a standard emergency classification and action level scheme. This scheme is a fundamental component of an EP in that it provides the defined thresholds that will allow site personnel to rapidly implement a range of pre-planned emergency response measures. An emergency classification scheme also facilitates timely decision-making by an offsite response organization concerning the implementation of precautionary or protective actions for the public.

NEI 99-01, Revision 6, contains a generic set of ICs, EALs, and fission product barrier status thresholds. The guidance also includes supporting technical basis information, developer notes, and recommended classification instructions for users. The methodology described in this document is consistent with NRC requirements and guidance. In particular, this methodology was specifically endorsed by the NRC in a March 28, 2013, letter from NRC to NEI (Reference 2) and determined to provide an acceptable approach in meeting requirements of 10 CFR 50.47(b)(4), applicable requirements of 10 CFR Part 50, Appendix E, and the associated planning standard evaluation elements contained in NUREG-0654/FEMA-REP-1, Revision 1, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants," November 1980.

10 CFR Part 50, Appendix E, Section IV.B.2, requires that a licensee desiring to change its entire EAL scheme shall submit an application for an amendment to its license and receive NRC approval before implementing the change. The proposed change to the Waterford 3 EAL scheme from NEI 99-01, Revision 5, to NEI 99-01, Revision 6, guidance does not reduce the capability to meet the applicable emergency planning standards and requirements in 10 CFR 50.47(b) and 10 CFR Part 50, Appendix E. Accordingly, pursuant to the requirements of 10 CFR Part 50, Appendix E, Section IV.B.2, Entergy requests NRC review and approval of the proposed changes to the EAL scheme as a license amendment request in accordance with 10 CFR 50.90.

4.0 REGULATORY EVALUATION

4.1 Applicable Regulatory Requirements/Criteria

The regulations in 10 CFR 50.54(q) provide direction to licensees seeking to revise emergency plans. The requirements related to nuclear power plant emergency plans are contained in the standards in 10 CFR 50.47, “Emergency Plans,” and the requirements of Appendix E, "Emergency Planning and Preparedness for Production and Utilization Facilities."

Paragraph 10 CFR 50.47(a)(1) states that no operating license for a nuclear power reactor will be issued unless a finding is made by the NRC that there is reasonable assurance that

adequate protective measures can and will be taken in the event of a radiological emergency. Section 50.47(b) contains standards that onsite and offsite emergency response plans must meet for the NRC staff to make a positive finding that there is reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency. One of these standards, 10 CFR 50.47(b)(4), requires that emergency plans include a standard emergency classification and action level scheme.

10 CFR Part 50, Appendix E, Section IV.B, "Assessment Actions," requires that emergency plans include EALs that are to be used as criteria for determining the need for notification and participation of local and state agencies, and for determining when and what type of protective measures should be considered to protect the health and safety of individuals both onsite and offsite. EALs are to be based on plant conditions and instrumentation, as well as onsite and offsite radiological monitoring. Section IV.B provides that initial EALs shall be discussed and agreed on by the applicant and state and local authorities, be approved by the NRC, and reviewed annually thereafter with state and local authorities. Therefore, a revision to EALs will require NRC approval prior to implementation, if it involves (1) changing from one EAL scheme to another (e.g., NEI 99-01, Revision 4 to NEI 99-01, Revision 6), (2) proposing an alternate method to comply with the regulations, or (3) the EAL revision proposed by the licensee decreases the effectiveness of the emergency plan.

NRC Regulatory Issue Summary (RIS) 2005-02, Revision 1, "Clarifying the Process for Making Emergency Plan Changes," issued April 19, 2011, says that a change in an EAL scheme to incorporate the improvements provided in NUMARC/NESP-007 or NEI 99-01 would not decrease the overall effectiveness of the emergency plan, but due to the potential safety significance of the change, the change needs prior NRC review and approval.

The proposed change does not affect compliance with these regulations or guidance and will ensure that the lowest functional capabilities or performance levels of equipment required for safe operation are met.

4.2 Precedent

The following commercial nuclear power plants have received license amendments that approved EALs based on NEI 99-01, Revision 6:

Callaway - Amendment 212 (Reference 5)
Fermi 2 - Amendment 202 (Reference 6)
South Texas – Amendments 206 and 194 (Reference 7)
Summer 1 - Amendment 200 (Reference 8)
Seabrook – Amendment 152 (Reference 9)
ANO – Amendments 263 and 314 (Reference 10)
River Bend – Amendment 197 (Reference 11)
Grand Gulf – Amendment 216 (Reference 12)

4.3 No Significant Hazards Consideration Analysis

Entergy Operations, Inc. (Entergy) proposes to revise the currently approved Emergency Plan (EP) Emergency Action Level (EAL) scheme for Waterford Steam Electric Station, Unit 3 (Waterford 3), which is based on the Nuclear Energy Institute's (NEI's) guidance established in NEI 99-01, Revision 5, "Methodology for Development of Emergency Action Levels." Entergy is proposing to adopt the EAL schemes based on the guidance provided in NEI 99-01, Revision 6, "Development of Emergency Action Levels for Non-Passive Reactors," which has been endorsed by the NRC.

Entergy has evaluated whether or not a significant hazards consideration is involved with the proposed amendment by focusing on the three standards set forth in 10 CFR 50.92, "Issuance of Amendment." As required by 10 CFR 50.91(a), the Entergy analysis of the issue of no significant hazards consideration is presented below.

1. Does the proposed change involve a significant increase in the probability or consequences of an accident previously evaluated?

   Response: No

   The proposed changes to the Waterford 3 EALs do not involve any physical changes to plant equipment or systems and do not alter the assumptions of any accident analyses. The proposed changes do not adversely affect accident initiators or precursors and do not alter design assumptions, plant configuration, or the manner in which the plant is operated and maintained. The proposed changes do not adversely affect the ability of structures, systems or components (SSCs) to perform intended safety functions in mitigating the consequences of an initiating event within the assumed acceptance limits.

   Therefore, the changes do not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. Does the proposed change create the possibility of a new or different kind of accident from any accident previously evaluated?

   Response: No

   No new accident scenarios, failure mechanisms, or limiting single failures are introduced as a result of the proposed changes. The changes do not challenge the integrity or performance of any safety-related systems. No plant equipment is installed or removed, and the changes do not alter the design, physical configuration, or method of operation of any plant SSC. Because EALs are not accident initiators and no physical changes are made to the plant, no new causal mechanisms are introduced.

   Therefore, the changes do not create the possibility of a new or different kind of accident from an accident previously evaluated.

3. Does the proposed change involve a significant reduction in a margin of safety?

   Response: No

   Margin of safety is associated with the ability of the fission product barriers (i.e., fuel cladding, reactor coolant system pressure boundary, and containment structure) to limit the level of radiation dose to the public. The proposed changes do not impact operation of the plant and no accident analyses are affected by the proposed changes. The changes do not affect the Technical Specifications or the method of operating the plant. Additionally, the proposed changes will not relax any criteria used to establish safety limits and will not relax any safety system settings. The safety analysis acceptance criteria are not affected by these changes. The proposed changes will not result in plant operation in a configuration outside the design basis. The proposed changes do not adversely affect systems that respond to safely shut down the plant and to maintain the plant in a safe shutdown condition.

   Therefore, the changes do not involve a significant reduction in a margin of safety.

Based upon the reasoning presented above, Entergy concludes that the requested change involves no significant hazards consideration, as set forth in 10 CFR 50.92(c), "Issuance of Amendment."

4.4 Conclusions

In conclusion, based on the considerations discussed above, (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) 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.

5.0 ENVIRONMENTAL CONSIDERATION

The proposed changes are applicable to emergency planning requirements involving the proposed adoption of the NRC-endorsed EAL guidance as described in NEI 99-01, Revision 6, and do not reduce the capability to meet the emergency planning standards of 10 CFR 50.47(b) and the requirements of 10 CFR Part 50, Appendix E. The proposed changes do not involve (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amounts of any effluents that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed changes meet the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed changes.

6.0 REFERENCES

1. NEI 99-01, Revision 5, "Methodology for Development of Emergency Action Levels," (ADAMS Accession No. ML080450149), dated February 2008

2. NRC letter to Nuclear Energy Institute, "U.S. Nuclear Regulatory Commission Review and Endorsement of NEI 99-01, Revision 6, dated November, 2012 (TAC No. D92368)," (ADAMS Accession No. ML12346A463), dated March 28, 2013

3. Entergy letter to NRC, "Proposed Emergency Action Levels Using NEI 99-01, Revision 5 Scheme," (ADAMS Accession No. ML102630124), dated September 16, 2010

4. NRC letter to Entergy, "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), (ADAMS Accession No. ML111380558), dated July 18, 2011

5. NRC letter to Union Electric Company, "Callaway Plant, Unit 1 - Issuance of Amendment Re: Upgrade to Emergency Action Level Scheme (CAC No. MF4945)," (ADAMS Accession No. ML15251A493), dated October 7, 2015

6. NRC letter to DTE Electric Company, "Fermi 2 - Issuance of Amendment to Revise the Emergency Action Level Scheme for the Fermi 2 Emergency Plan (TAC No. MF5048)," (ADAMS Accession No. ML15233A084), dated September 29, 2015

7. NRC letter to STP Nuclear Operating Company, "South Texas Project, Units 1 and 2 - Re: Upgrade to Emergency Action Level Scheme (TAC Nos. MF4195 and MF4196)," (ADAMS Accession No. ML15201A195), dated August 20, 2015

8. NRC letter to South Carolina Electric & Gas Company, "Virgil C. Summer Nuclear Station, Unit 1 - Issuance of Amendment to Revise Emergency Action Levels to a Scheme Based on NEI 99-01, Revision 6 (TAC No. MF3927)," (ADAMS Accession No. ML15063A355), dated April 13, 2015

9. NRC letter to NextEra Energy, "Seabrook Station, Unit No. 1 - Issuance of Amendment Re: Adoption of Emergency Action Level Scheme Pursuant to NEI 99-01, Revision 6 (CAC No. MF7439)," (ADAMS Accession No. ML16358A411), dated February 10, 2017

10. NRC letter to Entergy, "Arkansas Nuclear One, Units 1 and 2 – Issuance of Amendments Re: Revision to the Emergency Action Level Scheme (EPID L-2018-LLA-0082)," (ADAMS Accession No. ML18337A247), dated January 17, 2019

11. NRC letter to Entergy, "River Bend Station, Unit 1 – Issuance of Amendment 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-2018-LLA-0130)," (ADAMS Accession No. ML19070A062), dated May 14, 2019

12. NRC letter to Entergy, "Grand Gulf Nuclear Station, Unit 1 – Issuance of Amendment 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-2018-LLA-0116)," (ADAMS Accession No. ML19025A023), dated March 12, 2019

ATTACHMENTS

1. Waterford 3 Steam Electric Station EAL Technical Basis (Markup)
2. Waterford 3 Steam Electric Station EAL Technical Basis (Clean)
3. Waterford 3 Steam Electric Station NEI 99-01 Revision 6 EAL Comparison Matrix
4. Waterford 3 EAL Wallchart (for information only)
5. Supporting Referenced Document Pages

Enclosure, Attachment 1

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Waterford 3 Steam Electric Station EAL Technical Basis (Markup)

Waterford 3 Steam Electric Station
EAL Technical Basis

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1.0 INTRODUCTION

This document provides an explanation and rationale for each Emergency Action Level (EAL) included in the EAL Upgrade Project for Waterford 3 Steam Electric Station (WF3). It should be used to facilitate review of the WF3 EALs and provide historical documentation for future reference. Decision-makers responsible for implementation of EP-001-001, “Recognition and Classification of Emergency Conditions”, may use this document as a technical reference in support of EAL interpretation. This information may assist the Emergency Director in making classifications, particularly those involving judgment or multiple events. The basis information may also be useful in training and for explaining event classifications to off-site officials.

The expectation is that emergency classifications are to be made as soon as conditions are present and recognizable for the classification, but within 15 minutes or less in all cases of conditions present. Use of this document for assistance is not intended to delay the emergency classification.

Because the information in a basis document can affect emergency classification decision-making (e.g., the Emergency Director refers to it during an event), the NRC staff expects that changes to the basis document will be evaluated in accordance with the provisions of 10 CFR 50.54(q).

2.0 DISCUSSION

2.1 Background

EALs are the plant-specific indications, conditions or instrument readings that are utilized to classify emergency conditions defined in the WF3 Emergency Plan.

In 1992, the NRC endorsed NUMARC/NESP-007 “Methodology for Development of Emergency Action Levels” as an alternative to NUREG-0654 EAL guidance.

NEI 99-01 (NUMARC/NESP-007) Revisions 4 and 5 were subsequently issued for industry implementation. Enhancements over earlier revisions included:

- Consolidating the system malfunction initiating conditions and example emergency action levels which address conditions that may be postulated to occur during plant shutdown conditions.
- Initiating conditions and example emergency action levels that fully address conditions that may be postulated to occur at permanently Defueled Stations and Independent Spent Fuel Storage Installations (ISFSIs).
- Simplifying the fission product barrier EAL threshold for a Site Area Emergency.

Subsequently, Revision 6 of NEI 99-01 has been issued which incorporates resolutions to numerous implementation issues including the NRC EAL Frequently Asked Questions (FAQs). Using NEI 99-01 Revision 6, "Methodology for the Development of Emergency Action Levels for Non-Passive Reactors,” November 2012 (ref. 4.1.1), WF3 conducted an EAL implementation upgrade project that produced the EALs discussed herein.

2.2 Fission Product Barriers

Fission product barrier thresholds represent threats to the defense in depth design concept that precludes the release of radioactive fission products to the environment. This concept relies on multiple physical barriers, any one of which, if maintained intact, precludes the release of significant amounts of radioactive fission products to the environment.

Many of the EALs derived from the NEI methodology are fission product barrier threshold based. That is, the conditions that define the EALs are based upon thresholds that represent the loss or potential loss of one or more of the three fission product barriers. “Loss” and “Potential Loss” signify the relative damage and threat of damage to the barrier. A “Loss” threshold means the barrier no longer assures containment of radioactive materials. A “Potential Loss” threshold implies a greater probability of barrier loss and reduced certainty of maintaining the barrier.

The primary fission product barriers are:

A. Fuel Clad Barrier (FCB): The Fuel Clad Barrier consists of the cladding material that contains the fuel pellets.

B. Reactor Coolant System Barrier (RCB): The Reactor Coolant System Barrier includes the RCS primary side and its connections up to and including the pressurizer safety and relief valves, and other connections up to and including the primary isolation valves.

C. Containment Barrier (CNB): The Containment Barrier includes the containment building and connections up to and including the outermost containment isolation valves. This barrier also includes the main steam, feedwater, and blowdown line extensions outside the containment building up to and including the outermost secondary side isolation valve. Containment Barrier thresholds are used as criteria for escalation of the Emergency Classification Level (ECL) from an Alert to a Site Area Emergency or a General Emergency.

2.3 Fission Product Barrier Classification Criteria

The following criteria are the bases for event classification related to fission product barrier loss or potential loss:

Alert:

Any loss or any potential loss of either Fuel Clad or RCS Barrier

Site Area Emergency:

Loss or potential loss of any two barriers

General Emergency:

Loss of any two barriers and loss or potential loss of the third barrier

2.4 EAL Organization

The WF3 EAL scheme includes the following features:

- Division of the EAL set into three broad groups:
  - EALs applicable under <u>any</u> plant operating modes – This group would be reviewed by the EAL-user any time emergency classification is considered.
  - EALs applicable only under <u>hot</u> operating modes – This group would only be reviewed by the EAL-user when the plant is in Hot Shutdown, Hot Standby, Startup, or Power Operation mode.
  - EALs applicable only under <u>cold</u> operating modes – This group would only be reviewed by the EAL-user when the plant is in Cold Shutdown, Refueling or Defueled mode.

  The purpose of the groups is to avoid review of hot condition EALs when the plant is in a cold condition and avoid review of cold condition EALs when the plant is in a hot condition. This approach significantly minimizes the total number of EALs that must be reviewed by the EAL-user for a given plant condition, reduces EAL-user reading burden and, thereby, speeds identification of the EAL that applies to the emergency.
- Within each group, assignment of EALs to categories and subcategories:

Category and subcategory titles are selected to represent conditions that are operationally significant to the EAL-user. The WF3 EAL categories are aligned to and represent the NEI 99-01 “Recognition Categories.” Subcategories are used in the WF3 scheme as necessary to further divide the EALs of a category into logical sets of possible emergency classification thresholds. The WF3 EAL categories and subcategories are listed below.

The primary tool for determining the emergency classification level is the EAL Classification Matrix. The user of the EAL Classification Matrix may (but is not required to) consult the EAL technical bases in order to obtain additional information concerning the EALs under classification consideration. The user should consult Section 3.0 and Attachment 1 of this document for such information.

EAL Groups, Categories and Subcategories

EAL Group/Category	EAL Subcategory
Any Operating Mode:	
A – **A**bnormal Rad Levels / Rad Effluent	1 – Radiological Effluent 2 – Irradiated Fuel Event 3 – Area Radiation Levels
H – **H**azards and Other Conditions Affecting Plant Safety	1 – Security 2 – Seismic Event 3 – Natural or Technological Hazard 4 – Fire 5 – Hazardous Gas 6 – Control Room Evacuation 7 – Emergency Director Judgment
E – Independent Spent Fuel Storage Installation (ISFSI)	1 – Confinement Boundary
Hot Conditions:	
S – **S**ystem Malfunction	1 – Loss of Safety Bus AC Power 2 – Loss of Vital DC Power 3 – Loss of Control Room Indications 4 – RCS Activity 5 – RCS Leakage 6 – RPS Failure 7 – Loss of Communications 8 – Containment Failure 9 – Hazardous Event Affecting Safety Systems
F – **F**ission Product Barrier Degradation	None
Cold Conditions:	
C – **C**old Shutdown / Refueling System Malfunction	1 – RCS Level 2 – Loss of Safety Bus AC Power 3 – RCS Temperature 4 – Loss of Vital DC Power 5 – Loss of Communications 6 – Hazardous Event Affecting Safety Systems

2.5 Technical Bases Information

EAL technical bases are provided in Attachment 1 for each EAL according to EAL group (Any, Hot, Cold), EAL category (A, C, E, F, H and S) and EAL subcategory. A summary explanation of each category and subcategory is given at the beginning of the technical bases discussions of the EALs included in the category. For each EAL, the following information is provided:

Category Letter & Title

Subcategory Number & Title

Initiating Condition (IC)

Site-specific description of the generic IC given in NEI 99-01 Rev. 6.

EAL Identifier (enclosed in rectangle)

Each EAL is assigned a unique identifier to support accurate communication of the emergency classification to onsite and offsite personnel. Four characters define each EAL identifier:

1. First character (letter): Corresponds to the EAL category as described above (A, C, E, F, H or S)
2. Second character (letter): The emergency classification (G, S, A or U)

   G = General Emergency
   S = Site Area Emergency
   A = Alert
   U = Unusual Event

3. Third character (number): Subcategory number within the given category. Subcategories are sequentially numbered beginning with the number one (1). If a category does not have a subcategory, this character is assigned the number one (1).
4. Fourth character (number): The numerical sequence of the EAL within the EAL subcategory. If the subcategory has only one EAL, it is given the number one (1).

Classification (enclosed in rectangle):

Unusual Event (U), Alert (A), Site Area Emergency (S) or General Emergency (G)

EAL (enclosed in rectangle)

Exact wording of the EAL as it appears in the EAL Classification Matrix.

Mode Applicability

One or more of the following plant operating conditions comprise the mode to which each EAL is applicable: 1 - Power Operation, 2 - Startup, 3 – Hot Standby, 4 - Hot Shutdown, 5 - Cold Shutdown, 6 - Refueling, DEF - Defueled, or Any. (See Section 2.6 for operating mode definitions)

Definitions:

If the EAL or Basis wording contains a defined term, the definition of the term is included in this section. These definitions can also be found in Section 5.1.

Basis:

An EAL basis section that provides WF3-relevant information concerning the EAL as well as a description of the rationale for the EAL as provided in NEI 99-01 Rev. 6.

Reference(s):

Source documentation from which the EAL is derived

2.6 Operating Mode Applicability

1 Power Operation
$K_{eff} \geq 0.99$, rated reactor thermal power > 5%

2 Startup
$K_{eff} \geq 0.99$, rated reactor thermal power ≤ 5%

3 Hot Standby
$K_{eff} < 0.99$, average reactor coolant temperature ≥ 350ºF

4 Hot Shutdown
$K_{eff} < 0.99$, average reactor coolant temperature 350ºF > T_{avg} > 200ºF

5 Cold Shutdown
$K_{eff} < 0.99$, average reactor coolant temperature ≤ 200ºF

6 Refueling
$K_{eff} < 0.95$, average reactor coolant temperature ≤ 140ºF
Fuel in the reactor vessel with the vessel head closure bolts less than fully tensioned or with the head removed

DEF Defueled
All reactor fuel removed from reactor vessel (full core off load during refueling or extended outage).

The plant operating mode that exists at the time that the event occurs (prior to any protective system or operator action being initiated in response to the condition) should be compared to the mode applicability of the EALs. If a lower or higher plant operating mode is reached before the emergency classification is made, the declaration shall be based on the mode that existed at the time the event occurred.

3.0 GUIDANCE ON MAKING EMERGENCY CLASSIFICATIONS

3.1 General Considerations

When making an emergency classification, the Emergency Director must consider all information having a bearing on the proper assessment of an Initiating Condition (IC). This includes the Emergency Action Level (EAL) plus the associated Operating Mode Applicability, Notes, and the informing basis information. In the Recognition Category F matrices, EALs are based on loss or potential loss of Fission Product Barrier Thresholds.

EAL matrices should be read from left to right, from General Emergency to Unusual Event, and top to bottom. Declaration decisions should be independently verified before declaration is made except when gaining this verification would exceed the 15 minute declaration requirement. Place keeping should be used on all EAL matrices.

3.1.1 Classification Timeliness

NRC regulations require the licensee to establish and maintain the capability to assess, classify, and declare an emergency condition within 15 minutes after the availability of indications to plant operators that an emergency action level has been exceeded and to promptly declare the emergency condition as soon as possible following identification of the appropriate emergency classification level. The NRC staff has provided guidance on implementing this requirement in NSIR/DPR-ISG-01, "Interim Staff Guidance, Emergency Planning for Nuclear Power Plants" (ref. 4.1.8).

For ICs and EALs that have a stipulated time duration (e.g., 15 minutes, 30 minutes, etc.), the Emergency Director is not allowed an additional 15 minutes to declare after the specified time limit is exceeded.

3.1.2 Valid Indications

All emergency classification assessments shall be based upon valid indications, reports or conditions. A valid indication, report, or condition~~,~~ is one that has been verified through appropriate means such that there is no doubt regarding the indicator's operability, the condition's existence, or the report's accuracy. For example, validation could be accomplished through an instrument channel check, response on related or redundant indicators, or direct observation by plant personnel.

An indication, report, or condition is considered to be valid when it is verified by (1) an instrument channel check, or (2) indications on related or redundant indicators, or (3) by direct observation by plant personnel, such that doubt related to indicator operability, condition existence, or report accuracy is removed. Implicit in this definition is the need for timely assessment.

3.1.3 Imminent Conditions

For ICs and EALs that have a stipulated time duration (e.g., 15 minutes, 30 minutes, etc.), the Emergency Director should not wait until the applicable time has elapsed~~,~~ but should declare the event as soon as it is determined that the condition has exceeded, or will likely exceed, the applicable time. If an ongoing radiological release is detected and the release start time is

unknown, it should be assumed that the release duration specified in the IC/EAL has been exceeded, absent data to the contrary.

3.1.4 Planned vs. Unplanned Events

A planned work activity that results in an expected event or condition which meets or exceeds an EAL does **not** warrant an emergency declaration provided that: 1) the activity proceeds as planned, and 2) the plant remains within the limits imposed by the operating license. Such activities include planned work to test, manipulate, repair, maintain or modify a system or component. In these cases, the controls associated with the planning, preparation and execution of the work will ensure that compliance is maintained with all aspects of the operating license provided that the activity proceeds and concludes as expected. Events or conditions of this type may be subject to the reporting requirements of 10 § CFR 50.72 (ref. 4.1.4).

3.1.5 Classification Based on Analysis

The assessment of some EALs is based on the results of analyses that are necessary to ascertain whether a specific EAL threshold has been exceeded (e.g., dose assessments, chemistry sampling, RCS leak rate calculation, etc.). For these EALs, the EAL wording or the associated basis discussion will identify the necessary analysis. In these cases, the 15-minute declaration period starts with the availability of the analysis results that show the threshold to be exceeded (i.e., this is the time that the EAL information is first available). The NRC expects licensees to establish the capability to initiate and complete EAL-related analyses within a reasonable period of time (e.g., maintain the necessary expertise on-shift).

3.1.6 Emergency Director Judgment

While the EALs have been developed to address a full spectrum of possible events and conditions which may warrant emergency classification, a provision for classification based on operator/management experience and judgment is still necessary. The NEI 99-01 EAL scheme provides the Emergency Director with the ability to classify events and conditions based upon judgment using EALs that are consistent with the Emergency Classification Level (ECL) definitions (refer to Category H). The Emergency Director will need to determine if the effects or consequences of the event or condition reasonably meet or exceed a particular ECL definition. A similar provision is incorporated in the Fission Product Barrier Tables; judgment may be used to determine the status of a fission product barrier.

3.2 Classification Methodology

To make an emergency classification, the user will compare an event or condition (i.e., the relevant plant indications and reports) to an EAL(s) and determine if the EAL has been met or exceeded. The evaluation of an EAL must be consistent with the related Operating Mode Applicability and Notes. If an EAL has been met or exceeded, the associated IC is likewise met, the emergency classification process “clock” starts, and the ECL must be declared in accordance with plant procedures no later than fifteen minutes after the process “clock” started.

When assessing an EAL that specifies a time duration for the off-normal condition, the "clock" for the EAL time duration runs concurrently with the emergency classification process "clock." For a full discussion of this timing requirement, refer to NSIR/DPR-ISG-01 (ref. 4.1.8).

3.2.1 Classification of Multiple Events and Conditions

When multiple emergency events or conditions are present, the user will identify all met or exceeded EALs. The highest applicable ECL identified during this review is declared. For example:

- If an Alert EAL and a Site Area Emergency EAL are met ~~, whether at one unit or at two different units,~~ a Site Area Emergency should be declared.

There is no "additive" effect from multiple EALs meeting the same ECL. For example:

- If two Alert EALs are met ~~, whether at one unit or at two different units,~~ an Alert should be declared.
- If a declaration has been made and conditions for another EAL of the equal significance occurs, another initial declaration should not be made.

~~Related guidance concerning classification of rapidly escalating events or conditions is provided in Regulatory Issue Summary (RIS) 2007-02, *Clarification of NRC Guidance for Emergency Notifications During Quickly Changing Events* (ref. 4.1.2).~~

3.2.2 Consideration of Mode Changes During Classification

The mode in effect at the time that an event or condition occurred, and prior to any plant or operator response, is the mode that determines whether or not an IC is applicable. If an event or condition occurs, and results in a mode change before the emergency is declared, the emergency classification level is still based on the mode that existed at the time that the event or condition was initiated (and not when it was declared). Once a different mode is reached, any new event or condition, not related to the original event or condition, requiring emergency classification should be evaluated against the ICs and EALs applicable to the operating mode at the time of the new event or condition.

For events that occur in Cold Shutdown or Refueling, escalation is via EALs that are applicable in the Cold Shutdown or Refueling modes, even if Hot Shutdown (or a higher mode) is entered during the subsequent plant response. In particular, the fission product barrier EALs are applicable only to events that initiate in the Hot Shutdown mode or higher.

3.2.3 Classification of Imminent Conditions

Although EALs provide specific thresholds, the Emergency Director must remain alert to events or conditions that could lead to meeting or exceeding an EAL within a relatively short period of time (i.e., a change in the ECL is IMMINENT). If, in the judgment of the Emergency Director, meeting an EAL is IMMINENT, the emergency classification should be made as if the EAL has been met. While applicable to all emergency classification levels, this approach is particularly important at the higher emergency classification levels since it provides additional time for implementation of protective measures.

3.2.4 Emergency Classification Level Upgrading and Termination

An ECL may be terminated when the event or condition that meets the classified IC and EAL no longer exists, and other site-specific termination requirements are met.

~~As noted above, guidance concerning classification of rapidly escalating events or conditions is provided in RIS 2007-02 (ref. 4.1.2).~~

3.2.5 Classification of Short-Lived Events

Event-based ICs and EALs define a variety of specific occurrences that have potential or actual safety significance. By their nature, some of these events may be short-lived and, thus, over before the emergency classification assessment can be completed. If an event occurs that meets or exceeds an EAL, the associated ECL must be declared regardless of its continued presence at the time of declaration. Examples of such events include an earthquake or a failure of the reactor protection system to automatically trip the reactor followed by a successful manual trip.

3.2.6 Classification of Transient Conditions

Many of the ICs and/or EALs employ time-based criteria. These criteria will require that the IC/EAL conditions be present for a defined period of time before an emergency declaration is warranted. In cases where no time-based criterion is specified, it is recognized that some transient conditions may cause an EAL to be met for a brief period of time (e.g., a few seconds to a few minutes). The following guidance should be applied to the classification of these conditions.

<u>EAL momentarily met during expected plant response</u> - In instances in which an EAL is briefly met during an expected (normal) plant response, an emergency declaration is **not** warranted provided that associated systems and components are operating as expected, and operator actions are performed in accordance with procedures.

<u>EAL momentarily met but the condition is corrected prior to an emergency declaration</u> – If an operator takes prompt manual action to address a condition, and the action is successful in correcting the condition prior to the emergency declaration, then the applicable EAL is not considered met and the associated emergency declaration is not required. For illustrative purposes, consider the following example:

> An ATWS occurs and the high pressure ECCS systems fail to automatically start. The plant enters an inadequate core cooling condition (a potential loss of both the Fuel Clad and RCS Barriers). If an operator manually starts a high pressure ECCS system in accordance with an EOP step and clears the inadequate core cooling condition prior to an emergency declaration, then the classification should be based on the ATWS only.

It is important to stress that the 15-minute emergency classification assessment period (process clock) is not a “grace period” during which a classification may be delayed to allow the performance of a corrective action that would obviate the need to classify the event. Emergency classification assessments must be deliberate and timely, with no undue delays. The provision discussed above addresses only those rapidly evolving situations when an operator is able to take a successful corrective action prior to the Emergency Director completing the review and steps necessary to make the emergency declaration. This provision is included to ensure that any public protective actions resulting from the emergency classification are truly warranted by the plant conditions.

3.2.7 After-the-Fact Discovery of an Emergency Event or Condition

In some cases, an EAL may be met but the emergency classification was not made at the time of the event or condition. This situation can occur when personnel discover that an event or condition existed which met an EAL, but no emergency was declared, and the event or condition no longer exists at the time of discovery. This may be due to the event or condition **not** being recognized at the time or an error that was made in the emergency classification process.

In these cases, no emergency declaration is warranted; however, the guidance contained in NUREG-1022 (ref. 4.1.3) is applicable. Specifically, the event should be reported to the NRC in accordance with 10 CFR § 50.72 (ref. 4.1.4) within one hour of the discovery of the undeclared event or condition. The licensee should also notify appropriate State and local agencies in accordance with the agreed upon arrangements.

3.2.8 Retraction of an Emergency Declaration

Guidance on the retraction of an emergency declaration reported to the NRC is discussed in NUREG-1022 (ref. 4.1.3).

4.0 REFERENCES

4.1 Developmental

4.1.1 NEI 99-01 Revision 6, Methodology for the Development of Emergency Action Levels for Non-Passive Reactors, ADAMS Accession Number ML12326A805

4.1.2 RIS 2007-02 Clarification of NRC Guidance for Emergency Notifications During Quickly Changing Events, February 2, 2007.

4.1.3 NUREG-1022 Event Reporting Guidelines: 10CFR50.72 and 50.73

4.1.4 10 § CFR 50.72 Immediate Notification Requirements for Operating Nuclear Power Reactors

4.1.5 10 § CFR 50.73 License Event Report System

4.1.6 Technical Specifications Table 1.2, Operational Modes

4.1.7 WF3 Offsite Dose Calculation Manual

4.1.8 NSIR/DPR-ISG-01 Interim Staff Guidance, Emergency Planning for Nuclear Power Plants

4.1.9 Waterford 3 SES Emergency Plan

4.1.10 UFSAR Section 9.1.5 Spent Fuel Dry Cask Storage

4.1.11 Technical Specifications section 3/4.9.4 Containment Building Penetrations

4.1.12 WF3 Safeguards Contingency Plan

4.2 Implementing

4.2.1 EP-001-001, Recognition and Classification of Emergency Conditions

4.2.2 NEI 99-01 Rev. 6 to WF3 EAL Comparison Matrix

4.2.3 WF3 EAL Matrix

5.0 DEFINITIONS, ACRONYMS & ABBREVIATIONS

5.1 Definitions (ref. 4.1.1 except as noted)

Selected terms used in the Initiating Condition statement, the Emergency Action Level statement, and EAL Bases are set in all capital letters (e.g., ALL CAPS). These words are defined terms that have specific meanings as used in this document. The definitions of these terms are provided below.

Alert

Events are in progress, or have occurred, which involve an actual or potential substantial degradation of the level of safety of the plant or a security event that involves probable life threatening risk to site personnel or damage to site equipment because of HOSTILE ACTION. **Any** releases are expected to be limited to small fractions of the EPA Protective Action Guideline exposure levels.

Confinement Boundary

The barrier(s) between spent fuel and the environment once the spent fuel is processed for dry storage. As related to the WF3 ISFSI, Confinement Boundary is considered the Multi-Purpose Canister (MPC) for the HI-STORM 100 dry storage system (ref. 4.1.10).

Containment Closure

The procedurally defined actions taken to secure containment and its associated structures, systems, and components as a functional barrier to fission product release under shutdown conditions. As applied to WF3, all Containment Penetrations are closed as described in the requirements of Technical Specifications section 3/4.9.4 Containment Building Penetrations (ref. 4.1.11) and OP-010-006, Outage Operations.

Emergency Action Level (EAL)

A pre-determined, site-specific, observable threshold for an INITIATING CONDITION that, when met or exceeded, places the plant in a given emergency classification level.

Emergency Classification Level (ECL)

One of a set of names or titles established by the US Nuclear Regulatory Commission (NRC) for grouping off-normal events or conditions according to (1) potential or actual effects or consequences, and (2) resulting onsite and offsite response actions. The emergency classification levels, in ascending order of severity, are:

- ~~Notification of~~ Unusual Event (~~NO~~UE)
- Alert
- Site Area Emergency (SAE)
- General Emergency (GE)

Explosion

A rapid, violent and catastrophic failure of a piece of equipment due to combustion, chemical reaction or overpressurization. A release of steam (from high energy lines or components) or an electrical component failure (caused by short circuits, grounding, arcing, etc.) should **not** automatically be considered an explosion. Such events require a post-event inspection to determine if the attributes of an explosion are present.

Faulted

The term applied to a steam generator that has a steam leak on the secondary side of sufficient size to cause an uncontrolled drop in steam generator pressure or the steam generator to become completely depressurized.

Fire

Combustion characterized by heat and light. Sources of smoke such as slipping drive belts or overheated electrical equipment do **not** constitute fires. Observation of flame is preferred but is **not** required if large quantities of smoke and heat are observed.

Fission Product Barrier Threshold

A pre-determined, site-specific, observable threshold indicating the loss or potential loss of a fission product barrier.

Flooding

A condition where water is entering a room or area faster than installed equipment is capable of removal, resulting in a rise of water level within the room or area.

General Emergency

Events are in progress or have occurred which involve actual or IMMINENT substantial core degradation or melting with potential for loss of containment integrity or HOSTILE ACTION~~s~~ that results in an actual loss of physical control of the facility. Releases can be reasonably expected to exceed EPA PAG exposure levels offsite for more than the immediate site area.

Hostage

A person(s) held as leverage against the station to ensure that demands will be met by the station.

Hostile Action

An act toward ~~a NPP~~ WF3 or its personnel that includes the use of violent force to destroy equipment, take HOSTAGES, and/or intimidate the licensee to achieve an end. This includes attack by air, land, or water using guns, explosives, PROJECTILEs, vehicles, or other devices used to deliver destructive force. Other acts that satisfy the overall intent may be included. Hostile action should **not** be construed to include acts of civil disobedience or felonious acts that are **not** part of a concerted attack on ~~the NPP~~ WF3. Non-terrorism-based EALs should be used to address such activities (i.e., this may include violent acts between individuals in the SECURITY OWNER CONTROLLED AREA (SOCA)).

Hostile Force

One or more individuals who are engaged in a determined assault, overtly or by stealth and deception, equipped with suitable weapons capable of killing, maiming, or causing destruction.

Imminent

The trajectory of events or conditions is such that an EAL will be met within a relatively short period of time regardless of mitigation or corrective actions.

Impede(d)

Personnel access to a room or area is hindered to an extent that extraordinary measures are necessary to facilitate entry of personnel into the affected room/area (e.g., requiring use of protective equipment, such as SCBAs, that is **not** routinely employed).

Independent Spent Fuel Storage Installation (ISFSI)

A complex that is designed and constructed for the interim storage of spent nuclear fuel and other radioactive materials associated with spent fuel storage.

Initiating Condition (IC)

An event or condition that aligns with the definition of one of the four emergency classification levels by virtue of the potential or actual effects or consequences.

~~**Normal Levels**~~

~~As applied to radiological IC/EALs, the highest reading in the past twenty-four hours excluding the current peak value.~~

~~**Owner Controlled Area (OCA)**~~

Projectile

An object directed toward a Nuclear Power Plant that could cause concern for its continued operability, reliability, or personnel safety.

Protected Area

The area encompassed by physical barriers (the security fence) and to which access is controlled into the vital areas of the plant (ref. 4.1.9).

RCS Intact

The RCS should be considered intact when the RCS pressure boundary is in its normal condition for the cold shutdown mode of operation (e.g., no freeze seals or nozzle dams).

Refueling Pathway

All the cavities, tubes, canals and pools through which irradiated fuel may be moved, but **not** including the reactor vessel.

Rupture(d)

The condition of a steam generator in which primary-to-secondary leakage is of sufficient magnitude to require a safety injection (automatic or manual).

Safety System

A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related (as defined in 10CFR50.2):

Those structures, systems and components that are relied upon to remain functional during and following design basis events to assure:

(1) The integrity of the reactor coolant pressure boundary;

(2) The capability to shut down the reactor and maintain it in a safe shutdown condition;

(3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures.

Security Condition

Any security event as listed in the approved security contingency plan that constitutes a threat/compromise to site security, threat/risk to site personnel, or a potential degradation to the level of safety of the plant. A security condition does **not** involve a HOSTILE ACTION.

Security Owner Controlled Area (SOCA)

The area inside the SOCA Vehicle Barrier System (VBS) up to the PROTECTED AREA fence line. Access to this area is controlled by the SOCA Personnel Access Control Point. The SOCA is part of but not equal to the Owner Controlled Area as described or defined in the Waterford 3 Emergency Plan.

Site Area Emergency

Events are in progress or have occurred which involve actual or likely major failures of plant functions needed for protection of the public or HOSTILE ACTION that results in intentional damage or malicious acts; (1) toward site personnel or equipment that could lead to the likely failure of or; (2) that prevent effective access to equipment needed for the protection of the public. **Any** releases are **not** expected to result in exposure levels which exceed EPA PAG exposure levels beyond the SITE BOUNDARY.

Site Boundary

The border of the Exclusion Area or an area corresponding to a distance of 914 meters from the Waterford 3 reactor. Also referred to as the Exclusion Area Boundary (ref. 4.1.9).

Unisolable

An open or breached system line that **cannot** be isolated, remotely or locally.

Unplanned

A parameter change or an event that is **not** 1) the result of an intended evolution or 2) an expected plant response to a transient. The cause of the parameter change or event may be known or unknown.

Unusual Event

Events are in progress or have occurred which indicate a potential degradation in the level of safety of the plant or indicate a security threat to facility protection has been initiated. No releases of radioactive material requiring offsite response or monitoring are expected unless further degradation of SAFETY SYSTEMS occurs.

Valid

An indication, report, or condition, is considered to be valid when it is verified by (1) an instrument channel check, or (2) indications on related or redundant indicators, or (3) by direct observation by plant personnel, such that doubt related to the indicator's operability, the condition's existence, or the report's accuracy is removed. Implicit in this definition is the need for timely assessment.

Visible Damage

Damage to a SAFETY SYSTEM train that is readily observable without measurements, testing, or analysis. The visual impact of the damage is sufficient to cause concern regarding the operability or reliability of the affected SAFETY SYSTEM train.

~~Damage to a component or structure that is readily observable without measurements, testing, or analysis. The visual impact of the damage is sufficient to cause concern regarding the operability or reliability of the affected component or structure.~~

5.2 Abbreviations/Acronyms

°F ..... Degrees Fahrenheit
° ..... Degrees
AC ..... Alternating Current
AFW ..... Auxiliary Feedwater
ARM ..... Area Radiation Monitor
ARP ..... Annunciator Response Procedure
ATWS ..... Anticipated Transient Without Scram
CAS ..... Central Alarm Station
CCW ..... Component Cooling Water
CDE ..... Committed Dose Equivalent
CE ..... Combustion Engineering
CEOG ..... Combustion Engineering Owners Group
CET ..... Core Exit Thermocouple
CFR ..... Code of Federal Regulations
CNB ..... Containment Barrier
CPM ..... Counts Per Minute
CR ..... Control Room
CTMT ..... Containment
DC ..... Direct Current
DEF ..... Defueled
DBA ..... Design Basis Accident
DC ..... Direct Current
D/G ..... Diesel Generator
DRT ..... Diversified Reactor Trip
EAL ..... Emergency Action Level
ECCS ..... Emergency Core Cooling System
ECL ..... Emergency Classification Level
ED ..... Emergency Director
EPIP ..... Emergency Plan Implementing Procedure
ele. ..... Elevation
EOF ..... Emergency Operations Facility
EOP ..... Emergency Operating Procedure
EPA ..... Environmental Protection Agency
EPM ..... Emergency Plant Manager
ERO ..... Emergency Response Organization
ESF ..... Engineered Safety Feature

FAA ..... Federal Aviation Administration
FBI ..... Federal Bureau of Investigation
FC ..... Fuel Clad Barrier
FEMA ..... Federal Emergency Management Agency
FHB ..... Fuel Handling Building
FSAR ..... Final Safety Analysis Report
ft. ..... Feet
FTS ..... Federal Telephone System
GE ..... General Emergency
HJTC ..... Heated Junction Thermocouple
HPSI ..... High Pressure Safety Injection
hr. ..... Hour
IC ..... Initiating Condition
in. ..... Inch
IPEEE ..... Individual Plant Examination of External Events (Generic Letter 88-20)
ISFSI ..... Independent Spent Fuel Storage Installation
K_{eff} ..... Effective Neutron Multiplication Factor
kV ..... Kilovolt
LCO ..... Limiting Condition of Operation
LER ..... Licensee Event Report
LOCA ..... Loss of Coolant Accident
LWR ..... Light Water Reactor
MPC ..... Maximum Permissible Concentration/Multi-Purpose Canister
mR, mRem, mrem, mREM ..... milli-Roentgen Equivalent Man
MSIV ..... Main Steam Isolation Valve
MSL ..... Main Steam Line / Mean Sea Level
MW ..... Megawatt
NEI ..... Nuclear Energy Institute
NEIC ..... National Earthquake Information Center
NESP ..... National Environmental Studies Project
NORAD ..... North American Aerospace Defense Command
(NO)UE ..... Notification of Unusual Event
NPP ..... Nuclear Power Plant
NRC ..... Nuclear Regulatory Commission
NSSS ..... Nuclear Steam Supply System
OBE ..... Operating Basis Earthquake
OCA ..... Owner Controlled Area

ODCM.....Off-site Dose Calculation Manual
OI.....Operating Instruction
OP .....Operating Procedure
ORO ..... Offsite Response Organization
OTCC ..... Once Through Core Cooling
PA..... Protected Area
PIG ..... Particulate, Iodine, Gas (monitor)
PAG ..... Protective Action Guideline
PRA/PSA ..... Probabilistic Risk Assessment / Probabilistic Safety Assessment
PWR ..... Pressurized Water Reactor
PSIA ..... Pounds per Square Inch Atmosphere
PTS..... Pressurized Thermal Shock
P/T ..... Pressure - Temperature
R..... Roentgen
RAB ..... Reactor Auxiliary Building
RCB ..... Reactor Coolant System Barrier
RCP .....Reactor Coolant Pump
RCS ..... Reactor Coolant System
Rem, rem, REM .....Roentgen Equivalent Man
RHR..... Residual Heat Removal
RMS..... Radiation Monitoring System
RPS ..... Reactor Protection System
RPV ..... Reactor Pressure Vessel
RVLMS .....Reactor Vessel Level Monitoring System
SAR .....Safety Analysis Report
SBO ..... Station Blackout
SCBA..... Self-Contained Breathing Apparatus
SFP..... Spent Fuel Pool
S/G .....Steam Generator
SI ..... Safety Injection
SOCA .....Security Owner Controlled Area
SRO.....Senior Reactor Operator
SSE ..... Safe Shutdown Earthquake
SWS .....Service Water System
TED .....Temporary Emergency Diesel
TEDE ..... Total Effective Dose Equivalent
TOAF ..... Top of Active Fuel

TSC ..... Technical Support Center
UFSAR .....Updated Final Safety Analysis Report
USGS ..... United States Geological Survey
UHS ..... Ultimate Heat Sink
USGS ..... United States Geological Survey
VBS .....Vehicle Barrier System
WF3 ..... Waterford 3 Steam Electric Station

6.0 WF3-TO-NEI 99-01 Rev. 6 EAL CROSS-REFERENCE

This cross-reference is provided to facilitate association and location of a WF3 EAL within the NEI 99-01 IC/EAL identification scheme. Further information regarding the development of the WF3 EALs based on the NEI guidance can be found in the EAL Comparison Matrix.

WF3	NEI 99-01 Rev. 6	
EAL	**IC**	**Example EAL**
AU1.1	AU1	1, 2
AU1.2	AU1	3
AU2.1	AU2	1
AA1.1	AA1	1
AA1.2	AA1	2
AA1.3	AA1	3
AA1.4	AA1	4
AA2.1	AA2	1
AA2.2	AA2	2
AA2.3	AA2	3
AA3.1	AA3	1
AA3.2	AA3	2
AS1.1	AS1	1
AS1.2	AS1	2
AS1.3	AS1	3
AS2.1	AS2	1
AG1.1	AG1	1
AG1.2	AG1	2
AG1.3	AG1	3

WF3	NEI 99-01 Rev. 6	
EAL	**IC**	**Example EAL**
AG2.1	AG2	1
CU1.1	CU1	1
CU1.2	CU1	2
CU2.1	CU2	1
CU3.1	CU3	1
CU3.2	CU3	2
CU4.1	CU4	1
CU5.1	CU5	1, 2, 3
CA1.1	CA1	1
CA1.2	CA1	2
CA2.1	CA2	1
CA3.1	CA3	1, 2
CA6.1	CA6	1
CS1.1	CS1	1
CS1.2	CS1	2
CS1.3	CS1	3
CG1.1	CG1	1
CG1.2	CG1	2
EU1.1	E-HU1	1
FA1.1	FA1	1
FS1.1	FS1	1
FG1.1	FG1	1
HU1.1	HU1	1, 2, 3

WF3	NEI 99-01 Rev. 6	
EAL	**IC**	**Example EAL**
HU2.1	HU2	1
HU3.1	HU3	1
HU3.2	HU3	2
HU3.3	HU3	3
HU3.4	HU3	4
HU4.1	HU4	1
HU4.2	HU4	2
HU4.3	HU4	3
HU4.4	HU4	4
HU7.1	HU7	1
HA1.1	HA1	1, 2
HA5.1	HA5	1
HA6.1	HA6	1
HA7.1	HA7	1
HS1.1	HS1	1
HS6.1	HS6	1
HS7.1	HS7	1
HG7.1	HG7	1
SU1.1	SU1	1
SU3.1	SU2	1
SU4.1	SU3	2
SU5.1	SU4	1, 2, 3
SU6.1	SU5	1

WF3	NEI 99-01 Rev. 6	
EAL	**IC**	**Example EAL**
SU6.2	SU5	2
SU7.1	SU6	1, 2, 3
SU8.1	SU7	1, 2
SA1.1	SA1	1
SA3.1	SA2	1
SA6.1	SA5	1
SA9.1	SA9	1
SS1.1	SS1	1
SS2.1	SS8	1
SS6.1	SS5	1
SG1.1	SG1	1
SG1.2	SG8	1

7.0 ATTACHMENTS

7.1 Attachment 1, Emergency Action Level Technical Bases

7.2 Attachment 2, Safe Operation & Shutdown Areas Tables A-3 & H-2 Bases

Category A – Abnormal Rad Levels / Rad Effluent

EAL Group: ANY (EALs in this category are applicable to any plant condition, hot or cold.)

Many EALs are based on actual or potential degradation of fission product barriers because of the elevated potential for offsite radioactivity release. Degradation of fission product barriers though is not always apparent via non-radiological symptoms. Therefore, direct indication of elevated radiological effluents or area radiation levels are appropriate symptoms for emergency classification.

At lower levels, abnormal radioactivity releases may be indicative of a failure of containment systems or precursors to more significant releases. At higher release rates, offsite radiological conditions may result which require offsite protective actions. Elevated area radiation levels in plant may also be indicative of the failure of containment systems or preclude access to plant vital equipment necessary to ensure plant safety.

Events of this category pertain to the following subcategories:

1. Radiological Effluent

   Direct indication of effluent radiation monitoring systems provides a rapid assessment mechanism to determine releases in excess of classifiable limits. Projected offsite doses, actual offsite field measurements or measured release rates via sampling indicate doses or dose rates above classifiable limits.

2. Irradiated Fuel Event

   Conditions indicative of a loss of adequate shielding or damage to irradiated fuel may preclude access to vital plant areas or result in radiological releases that warrant emergency classification.

3. Area Radiation Levels

   Sustained general area radiation levels which may preclude access to areas requiring continuous occupancy also warrant emergency classification.

Category: A – Abnormal Rad Levels / Rad Effluent

Subcategory: 1 – Radiological Effluent

Initiating Condition: Release of gaseous or liquid radioactivity greater than 2 times the ODCM limits for 60 minutes or longer

EAL:

AU1.1 Unusual Event

Reading on **any** Table A-1 effluent radiation monitor > column "UE" for ≥ 60 min. (Notes 1, 2, 3)

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Note 2: If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded the specified time limit.

Note 3: If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is **no** longer VALID for classification purposes.

Table A-1 Effluent Monitor Classification Thresholds

Release Point		Monitor	GE	SAE	Alert	UE
Gaseous	Plant Stack WRGM	PRM-IRE-0110-4	4.01 E+08 µCi/sec	4.01 E+07 µCi/sec	4.01 E+06 µCi/sec	2.27 E+05 µCi/sec
		PRM-IRE-0110-1 to 3	6.54 E+01 µCi/cc	6.54 E+00 µCi/cc	6.54 E-01 µCi/cc	5.81 E-03 µCi/cc
	Fuel Handling Bldg. Exhaust WRGM	PRM-IRE-3032-4	1.48 E+10 µCi/sec	1.48 E+09 µCi/sec	1.48 E+08 µCi/sec	2.27 E+05 µCi/sec
		PRM-IRE-3032-1 to 3	7.85 E+03 µCi/cc	7.85 E+02 µCi/cc	7.85 E+01 µCi/cc	1.60 E-02 µCi/cc
Liquid	Circulating Water Discharge Monitor	PRM-IRE-1900	N/A	N/A	N/A	7.27 E-04 µCi/ml
	Liquid Waste Management Discharge Monitor	PRM-IRE-0647	N/A	N/A	N/A	2.40 E-03 µCi/ml
	Boron Management Discharge Monitor	PRM-IRE-0627	N/A	N/A	N/A	2.40 E-03 µCi/ml

Mode Applicability:

All

Definition(s):

VALID - An indication, report, or condition, is considered to be valid when it is verified by (1) an instrument channel check, or (2) indications on related or redundant indicators, or (3) by direct observation by plant personnel, such that doubt related to the indicator's operability, the condition's existence, or the report's accuracy is removed. Implicit in this definition is the need for timely assessment.

Basis:

This IC addresses a potential ~~decrease~~ reduction in the level of safety of the plant as indicated by a low-level radiological release that exceeds regulatory commitments (ref. 1) for an extended period of time (e.g., an uncontrolled release). It includes any gaseous or liquid radiological release, monitored or un-monitored, including those for which a radioactivity discharge permit is normally prepared.

Nuclear power plants incorporate design features intended to control the release of radioactive effluents to the environment. Further, there are administrative controls established to prevent unintentional releases, and to control and monitor intentional releases. The occurrence of an extended, uncontrolled radioactive release to the environment is indicative of degradation in these features and/or controls.

Radiological effluent EALs are also included to provide a basis for classifying events and conditions that cannot be readily or appropriately classified on the basis of plant conditions alone. The inclusion of both plant condition and radiological effluent EALs more fully addresses the spectrum of possible accident events and conditions.

Classification based on effluent monitor readings assumes that a release path to the environment is established. If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is no longer VALID for classification purposes.

Releases should not be prorated or averaged. For example, a release exceeding 4 times release limits for 30 minutes does not meet the EAL.

~~EAL #1 -~~ This EAL addresses normally occurring continuous radioactivity releases from monitored gaseous or liquid effluent pathways~~.~~

~~EAL #2 - This EAL addresses~~as well as radioactivity releases that cause effluent radiation monitor readings to exceed 2 times the limit established by a radioactivity discharge permit. ~~This EAL will~~ Such releases are typically ~~be~~ associated with planned batch releases from non-continuous release pathways (e.g., radwaste, waste gas).

The values used on the Dry Cooling Tower and Turbine Building sump discharge are based on the release pathway being aligned to the Storm Water System or Discharge Canal vice the circulating water system and are not applicable if the pathway is aligned to the circulating water system.

~~EAL #3 - This EAL addresses uncontrolled gaseous or liquid releases that are detected by sample analyses or environmental surveys, particularly on unmonitored pathways (e.g., spills of radioactive liquids into storm drains, heat exchanger leakage in river water systems, etc.).~~

Escalation of the emergency classification level would be via IC AA1.

Reference(s):

1. UNT-005-014 Offsite Dose Calculation Manual
2. EC86890, EP-CALC-WF3-1701, Radiological Effluent EAL Values
3. NEI 99-01 AU1

Category: A – Abnormal Rad Levels / Rad Effluent

Subcategory: 1 – Radiological Effluent

Initiating Condition: Release of gaseous or liquid radioactivity greater than 2 times the ODCM limits for 60 minutes or longer.

EAL:

AU1.2 Unusual Event

Sample analysis for a gaseous or liquid release indicates a concentration or release rate > 2 x ODCM limits for ≥ 60 min. (Notes 1, 2)

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Note 2: If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded the specified time limit.

Mode Applicability:

All

Definition(s):

None

Basis:

This IC addresses a potential ~~decrease~~ 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). It includes any gaseous or liquid radiological release, monitored or un-monitored, including those for which a radioactivity discharge permit is normally prepared.

Nuclear power plants incorporate design features intended to control the release of radioactive effluents to the environment. Further, there are administrative controls established to prevent unintentional releases, and to control and monitor intentional releases. The occurrence of an extended, uncontrolled radioactive release to the environment is indicative of degradation in these features and/or controls.

Radiological effluent EALs are also included to provide a basis for classifying events and conditions that cannot be readily or appropriately classified on the basis of plant conditions alone. The inclusion of both plant condition and radiological effluent EALs more fully addresses the spectrum of possible accident events and conditions.

~~Classification based on effluent monitor readings assumes that a release path to the environment is established. If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is no longer valid for classification purposes.~~

Releases should not be prorated or averaged. For example, a release exceeding 4 times release limits for 30 minutes does not meet the EAL.

~~EAL #1 - This EAL addresses normally occurring continuous radioactivity releases from monitored gaseous or liquid effluent pathways.~~

~~EAL #2 - This EAL addresses radioactivity releases that cause effluent radiation monitor readings to exceed 2 times the limit established by a radioactivity discharge permit. This EAL will typically be associated with planned batch releases from non-continuous release pathways (e.g., radwaste, waste gas).~~

~~EAL #3 -~~ This EAL addresses uncontrolled gaseous or liquid releases that are detected by sample analyses or environmental surveys, particularly on unmonitored pathways (e.g., spills of radioactive liquids into storm drains, heat exchanger leakage in river water systems, etc.).

Escalation of the emergency classification level would be via IC AA1.

Reference(s):

1. UNT-005-014 Offsite Dose Calculation Manual
2. NEI 99-01 AU1

Category: A – Abnormal Rad Levels / Rad Effluent
Subcategory: 1 – Radiological Effluent

Initiating Condition: Release of gaseous or liquid radioactivity resulting in offsite dose greater than 10 mrem TEDE or 50 mrem thyroid CDE

EAL:

AA1.1 Alert

Reading on **any** Table A-1 effluent radiation monitor > column "ALERT" for ≥ 15 min. (Notes 1, 2, 3, 4)

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Note 2: If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded the specified time limit.

Note 3: If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is **no** longer VALID for classification purposes.

Note 4 The pre-calculated effluent monitor values presented in EALs AA1.1, AS1.1 and AG1.1 should be used for emergency classification assessments until the results from a dose assessment using actual meteorology are available.

Table A-1 Effluent Monitor Classification Thresholds

Release Point		Monitor	GE	SAE	Alert	UE
Gaseous	Plant Stack WRGM	PRM-IRE-0110-4	4.01 E+08 µCi/sec	4.01 E+07 µCi/sec	4.01 E+06 µCi/sec	2.27 E+05 µCi/sec
		PRM-IRE-0110-1 to 3	6.54 E+01 µCi/cc	6.54 E+00 µCi/cc	6.54 E-01 µCi/cc	5.81 E-03 µCi/cc
	Fuel Handling Bldg. Exhaust WRGM	PRM-IRE-3032-4	1.48 E+10 µCi/sec	1.48 E+09 µCi/sec	1.48 E+08 µCi/sec	2.27 E+05 µCi/sec
		PRM-IRE-3032-1 to 3	7.85 E+03 µCi/cc	7.85 E+02 µCi/cc	7.85 E+01 µCi/cc	1.60 E-02 µCi/cc
Liquid	Circulating Water Discharge Monitor	PRM-IRE-1900	N/A	N/A	N/A	7.27 E-04 µCi/ml
	Liquid Waste Management Discharge Monitor	PRM-IRE-0647	N/A	N/A	N/A	2.40 E-03 µCi/ml
	Boron Management Discharge Monitor	PRM-IRE-0627	N/A	N/A	N/A	2.40 E-03 µCi/ml

Mode Applicability:

All

Definition(s):

VALID - An indication, report, or condition, is considered to be valid when it is verified by (1) an instrument channel check, or (2) indications on related or redundant indicators, or (3) by direct observation by plant personnel, such that doubt related to the indicator's operability, the condition's existence, or the report's accuracy is removed. Implicit in this definition is the need for timely assessment.

Basis:

This IC addresses a release of gaseous or liquid radioactivity that results in projected or actual offsite doses greater than or equal to 1% of the EPA Protective Action Guides (PAGs). It includes both monitored and un-monitored releases. Releases of this magnitude represent an actual or potential substantial degradation of the level of safety of the plant as indicated by a radiological release that significantly exceeds regulatory limits (e.g., a significant uncontrolled release).

Radiological effluent EALs are also included to provide a basis for classifying events and conditions that cannot be readily or appropriately classified on the basis of plant conditions alone. The inclusion of both plant condition and radiological effluent EALs more fully addresses the spectrum of possible accident events and conditions.

The TEDE dose is set at 1% of the EPA PAG of 1,000 mrem while the 50 mrem thyroid CDE was established in consideration of the 1:5 ratio of the EPA PAG for TEDE and thyroid CDE.

Classification based on effluent monitor readings assumes that a release path to the environment is established. If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is no longer VALID for classification purposes.

Escalation of the emergency classification level would be via IC AS1.

Reference(s):

1. EC86890, EP-CALC-WF3-1701, Radiological Effluent EAL Values
2. NEI 99-01 AA1

Category: A – Abnormal Rad Levels / Rad Effluent

Subcategory: 1 – Radiological Effluent

Initiating Condition: Release of gaseous or liquid radioactivity resulting in offsite dose greater than 10 mrem TEDE or 50 mrem thyroid CDE

EAL:

AA1.2 Alert

Dose assessment using actual meteorology indicates doses > 10 mrem TEDE or 50 mrem thyroid CDE at or beyond the SITE BOUNDARY (Note 4)

Note 4: The pre-calculated effluent monitor values presented in EALs AA1.1, AS1.1 and AG1.1 should be used for emergency classification assessments until the results from a dose assessment using actual meteorology are available.

Mode Applicability:

All

Definition(s):

SITE BOUNDARY - The border of the Exclusion Area or an area corresponding to a distance of 914 meters from the Waterford 3 reactor. Also referred to as the Exclusion Area Boundary.

Basis:

This IC addresses a release of gaseous or liquid radioactivity that results in projected or actual offsite doses greater than or equal to 1% of the EPA Protective Action Guides (PAGs). It includes both monitored and un-monitored releases. Releases of this magnitude represent an actual or potential substantial degradation of the level of safety of the plant as indicated by a radiological release that significantly exceeds regulatory limits (e.g., a significant uncontrolled release).

Radiological effluent EALs are also included to provide a basis for classifying events and conditions that cannot be readily or appropriately classified on the basis of plant conditions alone. The inclusion of both plant condition and radiological effluent EALs more fully addresses the spectrum of possible accident events and conditions.

The TEDE dose is set at 1% of the EPA PAG of 1,000 mrem while the 50 mrem thyroid CDE was established in consideration of the 1:5 ratio of the EPA PAG for TEDE and thyroid CDE.

~~Classification based on effluent monitor readings assumes that a release path to the environment is established. If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is no longer valid for classification purposes.~~

Escalation of the emergency classification level would be via IC AS1.

Reference(s):

1. EP-002-050 Offsite Dose Assessment
2. NEI 99-01 AA1

Category: A – Abnormal Rad Levels / Rad Effluent

Subcategory: 1 – Radiological Effluent

Initiating Condition: Release of gaseous or liquid radioactivity resulting in offsite dose greater than 10 mrem TEDE or 50 mrem thyroid CDE

EAL:

AA1.3 Alert

Analysis of a liquid effluent sample indicates a concentration or release rate that would result in doses > 10 mrem TEDE or 50 mrem thyroid CDE at or beyond the SITE BOUNDARY for 60 min. of exposure (Notes 1, 2)

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Note 2: If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded the specified time limit.

Mode Applicability:

All

Definition(s):

SITE BOUNDARY - The border of the Exclusion Area or an area corresponding to a distance of 914 meters from the Waterford 3 reactor. Also referred to as the Exclusion Area Boundary.

Basis:

This IC addresses a release of gaseous or liquid radioactivity that results in projected or actual offsite doses greater than or equal to 1% of the EPA Protective Action Guides (PAGs). It includes both monitored and un-monitored releases. Releases of this magnitude represent an actual or potential substantial degradation of the level of safety of the plant as indicated by a radiological release that significantly exceeds regulatory limits (e.g., a significant uncontrolled release).

Radiological effluent EALs are also included to provide a basis for classifying events and conditions that cannot be readily or appropriately classified on the basis of plant conditions alone. The inclusion of both plant condition and radiological effluent EALs more fully addresses the spectrum of possible accident events and conditions.

The TEDE dose is set at 1% of the EPA PAG of 1,000 mrem while the 50 mrem thyroid CDE was established in consideration of the 1:5 ratio of the EPA PAG for TEDE and thyroid CDE.

~~Classification based on effluent monitor readings assumes that a release path to the environment is established. If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is no longer valid for classification purposes.~~

This EAL is assessed per the ODCM (ref. 1)

Escalation of the emergency classification level would be via IC AS1.

Reference(s):

1. UNT-005-014 Offsite Dose Calculation Manual
2. NEI 99-01 AA1

Category: A – Abnormal Rad Levels / Rad Effluent

Subcategory: 1 – Radiological Effluent

Initiating Condition: Release of gaseous or liquid radioactivity resulting in offsite dose greater than 10 mrem TEDE or 50 mrem thyroid CDE

EAL:

AA1.4 Alert

Field survey results indicate **EITHER** of the following at or beyond the SITE BOUNDARY:

- Closed window dose rates > 10 mR/hr expected to continue for ≥ 60 min.
- Analyses of field survey samples indicate thyroid CDE > 50 mrem for 60 min. of inhalation.

(Notes 1, 2)

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Note 2: If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded the specified time limit.

Mode Applicability:

All

Definition(s):

SITE BOUNDARY - The border of the Exclusion Area or an area corresponding to a distance of 914 meters from the Waterford 3 reactor. Also referred to as the Exclusion Area Boundary.

Basis:

This IC addresses a release of gaseous or liquid radioactivity that results in projected or actual offsite doses greater than or equal to 1% of the EPA Protective Action Guides (PAGs). It includes both monitored and un-monitored releases. Releases of this magnitude represent an actual or potential substantial degradation of the level of safety of the plant as indicated by a radiological release that significantly exceeds regulatory limits (e.g., a significant uncontrolled release).

Radiological effluent EALs are also included to provide a basis for classifying events and conditions that cannot be readily or appropriately classified on the basis of plant conditions alone. The inclusion of both plant condition and radiological effluent EALs more fully addresses the spectrum of possible accident events and conditions.

The TEDE dose is set at 1% of the EPA PAG of 1,000 mrem while the 50 mrem thyroid CDE was established in consideration of the 1:5 ratio of the EPA PAG for TEDE and thyroid CDE.

~~Classification based on effluent monitor readings assumes that a release path to the environment is established. If the effluent flow past an effluent monitor is known to have~~

~~stopped due to actions to isolate the release path, then the effluent monitor reading is no longer valid for classification purposes.~~

Escalation of the emergency classification level would be via IC AS1.

Reference(s):

1. EP-002-060 Radiological Field Monitoring
2. NEI 99-01 AA1

Category: A – Abnormal Rad Levels / Rad Effluent
Subcategory: 1 – Radiological Effluent
Initiating Condition: Release of gaseous radioactivity resulting in offsite dose greater than 100 mrem TEDE or 500 mrem thyroid CDE

EAL:

AS1.1 Site Area Emergency

Reading on **any** Table A-1 effluent radiation monitor > column "SAE" for ≥ 15 min. (Notes 1, 2, 3, 4)

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Note 2: If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded the specified time limit.

Note 3: If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is **no** longer VALID for classification purposes.

Note 4: The pre-calculated effluent monitor values presented in EALs AA1.1, AS1.1 and AG1.1 should be used for emergency classification assessments until the results from a dose assessment using actual meteorology are available

Table A-1 Effluent Monitor Classification Thresholds

Release Point		Monitor	GE	SAE	Alert	UE
Gaseous	Plant Stack WRGM	PRM-IRE-0110-4	4.01 E+08 µCi/sec	4.01 E+07 µCi/sec	4.01 E+06 µCi/sec	2.27 E+05 µCi/sec
		PRM-IRE-0110-1 to 3	6.54 E+01 µCi/cc	6.54 E+00 µCi/cc	6.54 E-01 µCi/cc	5.81 E-03 µCi/cc
	Fuel Handling Bldg. Exhaust WRGM	PRM-IRE-3032-4	1.48 E+10 µCi/sec	1.48 E+09 µCi/sec	1.48 E+08 µCi/sec	2.27 E+05 µCi/sec
		PRM-IRE-3032-1 to 3	7.85 E+03 µCi/cc	7.85 E+02 µCi/cc	7.85 E+01 µCi/cc	1.60 E-02 µCi/cc
Liquid	Circulating Water Discharge Monitor	PRM-IRE-1900	N/A	N/A	N/A	7.27 E-04 µCi/ml
	Liquid Waste Management Discharge Monitor	PRM-IRE-0647	N/A	N/A	N/A	2.40 E-03 µCi/ml
	Boron Management Discharge Monitor	PRM-IRE-0627	N/A	N/A	N/A	2.40 E-03 µCi/ml

Mode Applicability:

All

Definition(s):

VALID - An indication, report, or condition, is considered to be valid when it is verified by (1) an instrument channel check, or (2) indications on related or redundant indicators, or (3) by direct observation by plant personnel, such that doubt related to the indicator's operability, the condition's existence, or the report's accuracy is removed. Implicit in this definition is the need for timely assessment.

Basis:

This IC addresses a release of gaseous radioactivity that results in projected or actual offsite doses greater than or equal to 10% of the EPA Protective Action Guides (PAGs). It includes both monitored and un-monitored releases. Releases of this magnitude are associated with the failure of plant systems needed for the protection of the public.

Radiological effluent EALs are also included to provide a basis for classifying events and conditions that cannot be readily or appropriately classified on the basis of plant conditions alone. The inclusion of both plant condition and radiological effluent EALs more fully addresses the spectrum of possible accident events and conditions.

The TEDE dose is set at 10% of the EPA PAG of 1,000 mrem while the 500 mrem thyroid CDE was established in consideration of the 1:5 ratio of the EPA PAG for TEDE and thyroid CDE.

Classification based on effluent monitor readings assumes that a release path to the environment is established. If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is no longer VALID for classification purposes.

Escalation of the emergency classification level would be via IC AG1.

Reference(s):

1. EC86890, EP-CALC-WF3-1701, Radiological Effluent EAL Values
2. NEI 99-01 AS1

Category: A – Abnormal Rad Levels / Rad Effluent

Subcategory: 1 – Radiological Effluent

Initiating Condition: Release of gaseous radioactivity resulting in offsite dose greater than 100 mrem TEDE or 500 mrem thyroid CDE

EAL:

AS1.2 Site Area Emergency

Dose assessment using actual meteorology indicates doses > 100 mrem TEDE or 500 mrem thyroid CDE at or beyond the SITE BOUNDARY (Note 4)

Note 4: The pre-calculated effluent monitor values presented in EALs AA1.1, AS1.1 and AG1.1 should be used for emergency classification assessments until the results from a dose assessment using actual meteorology are available.

Mode Applicability:

All

Definition(s):

SITE BOUNDARY - The border of the Exclusion Area or an area corresponding to a distance of 914 meters from the Waterford 3 reactor. Also referred to as the Exclusion Area Boundary.

Basis:

This IC addresses a release of gaseous radioactivity that results in projected or actual offsite doses greater than or equal to 10% of the EPA Protective Action Guides (PAGs). It includes both monitored and un-monitored releases. Releases of this magnitude are associated with the failure of plant systems needed for the protection of the public.

Radiological effluent EALs are also included to provide a basis for classifying events and conditions that cannot be readily or appropriately classified on the basis of plant conditions alone. The inclusion of both plant condition and radiological effluent EALs more fully addresses the spectrum of possible accident events and conditions.

The TEDE dose is set at 10% of the EPA PAG of 1,000 mrem while the 500 mrem thyroid CDE was established in consideration of the 1:5 ratio of the EPA PAG for TEDE and thyroid CDE.

~~Classification based on effluent monitor readings assumes that a release path to the environment is established. If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is no longer valid for classification purposes.~~

Escalation of the emergency classification level would be via IC AG1.

Reference(s):

1. EP-002-050 Offsite Dose Assessment
2. NEI 99-01 AS1

Category: A – Abnormal Rad Levels / Rad Effluent

Subcategory: 1 – Radiological Effluent

Initiating Condition: Release of gaseous radioactivity resulting in offsite dose greater than 100 mrem TEDE or 500 mrem thyroid CDE

EAL:

AS1.3 Site Area Emergency

Field survey results indicate **EITHER** of the following at or beyond the SITE BOUNDARY:

- Closed window dose rates > 100 mR/hr expected to continue for ≥ 60 min.
- Analyses of field survey samples indicate thyroid CDE > 500 mrem for 60 min. of inhalation.

(Notes 1, 2)

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Note 2: If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded the specified time limit.

Mode Applicability:

All

Definition(s):

SITE BOUNDARY - The border of the Exclusion Area or an area corresponding to a distance of 914 meters from the Waterford 3 reactor. Also referred to as the Exclusion Area Boundary.

Basis:

This IC addresses a release of gaseous radioactivity that results in projected or actual offsite doses greater than or equal to 10% of the EPA Protective Action Guides (PAGs). It includes both monitored and un-monitored releases. Releases of this magnitude are associated with the failure of plant systems needed for the protection of the public.

Radiological effluent EALs are also included to provide a basis for classifying events and conditions that cannot be readily or appropriately classified on the basis of plant conditions alone. The inclusion of both plant condition and radiological effluent EALs more fully addresses the spectrum of possible accident events and conditions.

The TEDE dose is set at 10% of the EPA PAG of 1,000 mrem while the 500 mrem thyroid CDE was established in consideration of the 1:5 ratio of the EPA PAG for TEDE and thyroid CDE.

~~Classification based on effluent monitor readings assumes that a release path to the environment is established. If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is no longer valid for classification purposes.~~

Escalation of the emergency classification level would be via IC AG1.

Reference(s):

1. EP-002-060 Radiological Field Monitoring
2. NEI 99-01 AS1

Category: A – Abnormal Rad Levels / Rad Effluent

Subcategory: 1 – Radiological Effluent

Initiating Condition: Release of gaseous radioactivity resulting in offsite dose greater than 1,000 mrem TEDE or 5,000 mrem thyroid CDE

EAL:

AG1.1 General Emergency

Reading on **any** Table A-1 effluent radiation monitor > column "GE" for ≥ 15 min. (Notes 1, 2, 3, 4)

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Note 2: If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded the specified time limit.

Note 3: If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is **no** longer VALID for classification purposes.

Note 4: The pre-calculated effluent monitor values presented in EALs AA1.1, AS1.1 and AG1.1 should be used for emergency classification assessments until the results from a dose assessment using actual meteorology are available.

Table A-1 Effluent Monitor Classification Thresholds

Release Point		Monitor	GE	SAE	Alert	UE
Gaseous	Plant Stack WRGM	PRM-IRE-0110-4	4.01 E+08 μCi/sec	4.01 E+07 μCi/sec	4.01 E+06 μCi/sec	2.27 E+05 μCi/sec
		PRM-IRE-0110-1 to 3	6.54 E+01 μCi/cc	6.54 E+00 μCi/cc	6.54 E-01 μCi/cc	5.81 E-03 μCi/cc
	Fuel Handling Bldg. Exhaust WRGM	PRM-IRE-3032-4	1.48 E+10 μCi/sec	1.48 E+09 μCi/sec	1.48 E+08 μCi/sec	2.27 E+05 μCi/sec
		PRM-IRE-3032-1 to 3	7.85 E+03 μCi/cc	7.85 E+02 μCi/cc	7.85 E+01 μCi/cc	1.60 E-02 μCi/cc
Liquid	Circulating Water Discharge Monitor	PRM-IRE-1900	N/A	N/A	N/A	7.27 E-04 μCi/ml
	Liquid Waste Management Discharge Monitor	PRM-IRE-0647	N/A	N/A	N/A	2.40 E-03 μCi/ml
	Boron Management Discharge Monitor	PRM-IRE-0627	N/A	N/A	N/A	2.40 E-03 μCi/ml

Mode Applicability:

All

Definition(s):

VALID - An indication, report, or condition, is considered to be valid when it is verified by (1) an instrument channel check, or (2) indications on related or redundant indicators, or (3) by direct observation by plant personnel, such that doubt related to the indicator's operability, the condition's existence, or the report's accuracy is removed. Implicit in this definition is the need for timely assessment.

Basis:

This IC addresses a release of gaseous radioactivity that results in projected or actual offsite doses greater than or equal to the EPA Protective Action Guides (PAGs). It includes both monitored and un-monitored releases. Releases of this magnitude will require implementation of protective actions for the public.

Radiological effluent EALs are also included to provide a basis for classifying events and conditions that cannot be readily or appropriately classified on the basis of plant conditions alone. The inclusion of both plant condition and radiological effluent EALs more fully addresses the spectrum of possible accident events and conditions.

The TEDE dose is set at the EPA PAG of 1,000 mrem while the 5,000 mrem thyroid CDE was established in consideration of the 1:5 ratio of the EPA PAG for TEDE and thyroid CDE.

Classification based on effluent monitor readings assumes that a release path to the environment is established. If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is no longer VALID for classification purposes.

Reference(s):

1. EC86890, EP-CALC-WF3-1701, Radiological Effluent EAL Values
2. NEI 99-01 AG1

Category: A – Abnormal Rad Levels / Rad Effluent

Subcategory: 1 – Radiological Effluent

Initiating Condition: Release of gaseous radioactivity resulting in offsite dose greater than 1,000 mrem TEDE or 5,000 mrem thyroid CDE

EAL:

AG1.2 General Emergency

Dose assessment using actual meteorology indicates doses > 1,000 mrem TEDE or 5,000 mrem thyroid CDE at or beyond the SITE BOUNDARY (Note 4)

Note 4: The pre-calculated effluent monitor values presented in EALs AA1.1, AS1.1 and AG1.1 should be used for emergency classification assessments until the results from a dose assessment using actual meteorology are available.

Mode Applicability:

All

Definition(s):

SITE BOUNDARY - The border of the Exclusion Area or an area corresponding to a distance of 914 meters from the Waterford 3 reactor. Also referred to as the Exclusion Area Boundary.

Basis:

This IC addresses a release of gaseous radioactivity that results in projected or actual offsite doses greater than or equal to the EPA Protective Action Guides (PAGs). It includes both monitored and un-monitored releases. Releases of this magnitude will require implementation of protective actions for the public.

Radiological effluent EALs are also included to provide a basis for classifying events and conditions that cannot be readily or appropriately classified on the basis of plant conditions alone. The inclusion of both plant condition and radiological effluent EALs more fully addresses the spectrum of possible accident events and conditions.

The TEDE dose is set at the EPA PAG of 1,000 mrem while the 5,000 mrem thyroid CDE was established in consideration of the 1:5 ratio of the EPA PAG for TEDE and thyroid CDE.

~~Classification based on effluent monitor readings assumes that a release path to the environment is established. If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is no longer valid for classification purposes.~~

Reference(s):

1. EP-002-050 Offsite Dose Assessment
2. NEI 99-01 AG1

Category: A – Abnormal Rad Levels / Rad Effluent

Subcategory: 1 – Radiological Effluent

Initiating Condition: Release of gaseous radioactivity resulting in offsite dose greater than 1,000 mrem TEDE or 5,000 mrem thyroid CDE

EAL:

AG1.3 General Emergency

Field survey results indicate **EITHER** of the following at or beyond the SITE BOUNDARY:

- Closed window dose rates > 1,000 mR/hr expected to continue for ≥ 60 min.
- Analyses of field survey samples indicate thyroid CDE > 5,000 mrem for 60 min. of inhalation.

(Notes 1, 2)

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Note 2: If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded the specified time limit.

Mode Applicability:

All

Definition(s):

SITE BOUNDARY - The border of the Exclusion Area or an area corresponding to a distance of 914 meters from the Waterford 3 reactor. Also referred to as the Exclusion Area Boundary.

Basis:

This IC addresses a release of gaseous radioactivity that results in projected or actual offsite doses greater than or equal to the EPA Protective Action Guides (PAGs). It includes both monitored and un-monitored releases. Releases of this magnitude will require implementation of protective actions for the public.

Radiological effluent EALs are also included to provide a basis for classifying events and conditions that cannot be readily or appropriately classified on the basis of plant conditions alone. The inclusion of both plant condition and radiological effluent EALs more fully addresses the spectrum of possible accident events and conditions.

The TEDE dose is set at the EPA PAG of 1,000 mrem while the 5,000 mrem thyroid CDE was established in consideration of the 1:5 ratio of the EPA PAG for TEDE and thyroid CDE.

~~Classification based on effluent monitor readings assumes that a release path to the environment is established. If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is no longer valid for classification purposes.~~

Reference(s):

1. EP-002-060 Radiological Field Monitoring
2. NEI 99-01 AG1

Category: A – Abnormal Rad Levels / Rad Effluent

Subcategory: 2 – Irradiated Fuel Event

Initiating Condition: UNPLANNED loss of water level above irradiated fuel

EAL:

AU2.1 Unusual Event

UNPLANNED water level drop in the REFUELING PATHWAY as indicated by SFP low water level alarm or visual observation

AND

UNPLANNED rise in corresponding area radiation levels as indicated by **any** Table A-2 radiation monitor

Table A-2 Irradiated Fuel Radiation Monitors	
• ARM-IRE-5024 • ARM-IRE-5025 • ARM-IRE-5026 • ARM-IRE-5027	Containment Purge Isolation Monitors
• ARM-IRE-0300.1 • ARM-IRE-0300.2 • ARM-IRE-0300.3 • ARM-IRE-0300.4	FHB Area Radiation Monitors
• PRM-IRE-5107A or B	FHB PIG Gas Channel

Mode Applicability:

All

Definition(s):

UNPLANNED-. A parameter change or an event that is **not** 1) the result of an intended evolution or 2) an expected plant response to a transient. The cause of the parameter change or event may be known or unknown.

REFUELING PATHWAY- All the cavities, tubes, canals and pools through which irradiated fuel may be moved, but **not** including the reactor vessel.

Basis:

This IC addresses a ~~decrease~~ drop in water level above irradiated fuel sufficient to cause elevated radiation levels. This condition could be a precursor to a more serious event and is also indicative of a minor loss in the ability to control radiation levels within the plant. It is therefore a potential degradation in the level of safety of the plant.

A water level ~~decrease~~ drop will be primarily determined by indications from available level instrumentation. Other sources of level indications may include reports from plant personnel (e.g., from a refueling crew) or video camera observations (if available). A significant drop in the water level may also cause a~~n~~ ~~increase~~ rise in the radiation levels of adjacent areas that can be detected by monitors in those locations.

The effects of planned evolutions should be considered. For example, a refueling bridge area radiation monitor reading may ~~increase~~ rise due to planned evolutions such as lifting of the reactor vessel head or movement of a fuel assembly. Note that this EAL is applicable only in cases where the elevated reading is due to an UNPLANNED loss of water level.

A drop in water level above irradiated fuel within the reactor vessel may be classified in accordance Recognition Category C during the Cold Shutdown and Refueling modes.

Escalation of the emergency classification level would be via IC AA2.

Reference(s):

1. Technical Specifications 3/4.9.11 Water Level - Spent Fuel Pool
2. Technical Specifications 3/4.9.10 Water Level – Reactor Vessel
3. OP-500-008 Control Room Cabinet H Window L-2 FUEL POOL LEVEL LO
4. W3-DBD-32, Radiation Monitoring System Design Basis Document
5. NEI 99-01 AU2

Category: A – Abnormal Rad Levels / Rad Effluent

Subcategory: 2 – Irradiated Fuel Event

Initiating Condition: Significant lowering of water level above, or damage to, irradiated fuel

EAL:

AA2.1 Alert

IMMINENT uncovery of irradiated fuel in the REFUELING PATHWAY

Mode Applicability:

All

Definition(s):

CONFINEMENT BOUNDARY- The barrier(s) between spent fuel and the environment once the spent fuel is processed for dry storage. The cask confinement boundary is considered the Multi-Purpose Canister (MPC) for the HI-STORM 100 dry storage system.

IMMINENT - The trajectory of events or conditions is such that an EAL will be met within a relatively short period of time regardless of mitigation or corrective actions.

REFUELING PATHWAY- All the cavities, tubes, canals and pools through which irradiated fuel may be moved, but **not** including the reactor vessel.

Basis:

This IC addresses events that have caused IMMINENT or actual damage to an irradiated fuel assembly, or a significant lowering of water level within the ~~spent fuel pool~~REFUELING PATHWAY ~~*(see Developer Notes)*~~. These events present radiological safety challenges to plant personnel and are precursors to a release of radioactivity to the environment. As such, they represent an actual or potential substantial degradation of the level of safety of the plant. This IC applies to irradiated fuel that is licensed for dry storage up to the point that the loaded storage cask is sealed. Once sealed, damage to a loaded cask causing loss of the CONFINEMENT BOUNDARY is classified in accordance with IC E~~-H~~U1.

~~Escalation of the emergency would be based on either Recognition Category A or C ICs.~~

~~EAL #1~~

This EAL escalates from ~~AU2~~ AU2.1 in that the loss of level, in the affected portion of the REFUELING PATHWAY, is of sufficient magnitude to have resulted in uncovery of irradiated fuel. Indications of irradiated fuel uncovery may include direct or indirect visual observation (e.g., reports from personnel or camera images), as well as significant changes in water and radiation levels, or other plant parameters. Computational aids may also be used (e.g., a boil-off curve). Classification of an event using this EAL should be based on the totality of available indications, reports and observations.

While an area radiation monitor could detect a~~n~~ ~~increase~~ rise in a dose rate due to a lowering of water level in some portion of the REFUELING PATHWAY, the reading may not be a

reliable indication of whether or not the fuel is actually uncovered. To the degree possible, readings should be considered in combination with other available indications of inventory loss.

A drop in water level above irradiated fuel within the reactor vessel may be classified in accordance with Recognition Category C during the Cold Shutdown and Refueling modes.

~~EAL #2~~

~~This EAL addresses a release of radioactive material caused by mechanical damage to irradiated fuel. Damaging events may include the dropping, bumping or binding of an assembly, or dropping a heavy load onto an assembly. A rise in readings on radiation monitors should be considered in conjunction with in-plant reports or observations of a potential fuel damaging event (e.g., a fuel handling accident).~~

~~EAL #3~~

~~Spent fuel pool water level at this value is within the lower end of the level range necessary to prevent significant dose consequences from direct gamma radiation to personnel performing operations in the vicinity of the spent fuel pool. This condition reflects a significant loss of spent fuel pool water inventory and thus it is also a precursor to a loss of the ability to adequately cool the irradiated fuel assembles stored in the pool.~~

Escalation of the emergency classification level would be via IC~~s~~ ~~AS1~~ AS1~~or AS2 (*see AS2 Developer Notes*)~~.

Reference(s):

1. NEI 99-01 AA2

Category: A – Abnormal Rad Levels / Rad Effluent

Subcategory: 2 – Irradiated Fuel Event

Initiating Condition: Significant lowering of water level above, or damage to, irradiated fuel

EAL:

AA2.2 Alert

Damage to irradiated fuel resulting in a release of radioactivity

AND

High alarm on **any** Table A-2 radiation monitor

Table A-2 Irradiated Fuel Radiation Monitors	
• ARM-IRE-5024 • ARM-IRE-5025 • ARM-IRE-5026 • ARM-IRE-5027	Containment Purge Isolation Monitors
• ARM-IRE-0300.1 • ARM-IRE-0300.2 • ARM-IRE-0300.3 • ARM-IRE-0300.4	FHB Area Radiation Monitors
• PRM-IRE-5107A or B	FHB PIG Gas Channel

Mode Applicability:

All

Definition(s):

CONFINEMENT BOUNDARY- The barrier(s) between spent fuel and the environment once the spent fuel is processed for dry storage. The cask confinement boundary is considered the Multi-Purpose Canister (MPC) for the HI-STORM 100 dry storage system.

VALID - An indication, report, or condition, is considered to be valid when it is verified by (1) an instrument channel check, or (2) indications on related or redundant indicators, or (3) by direct observation by plant personnel, such that doubt related to the indicator's operability, the condition's existence, or the report's accuracy is removed. Implicit in this definition is the need for timely assessment.

Basis:

This ~~IC~~ EAL addresses events that have caused ~~imminent or~~ actual damage to an irradiated fuel assembly~~, or a significant lowering of water level within the spent fuel pool *(see Developer*~~

~~*Notes)*~~. These events present radiological safety challenges to plant personnel and are precursors to a release of radioactivity to the environment. As such, they represent an actual or potential substantial degradation of the level of safety of the plant.

This ~~IC~~ EAL applies to irradiated fuel that is licensed for dry storage up to the point that the loaded storage cask is sealed. Once sealed, damage to a loaded cask causing loss of the CONFINEMENT BOUNDARY is classified in accordance with IC E~~-H~~U1.

~~EAL #1~~

~~This EAL escalates from AU2 in that the loss of level, in the affected portion of the REFUELING PATHWAY, is of sufficient magnitude to have resulted in uncovery of irradiated fuel. Indications of irradiated fuel uncovery may include direct or indirect visual observation (e.g., reports from personnel or camera images), as well as significant changes in water and radiation levels, or other plant parameters. Computational aids may also be used (e.g., a boil-off curve). Classification of an event using this EAL should be based on the totality of available indications, reports and observations.~~

~~While an area radiation monitor could detect an increase in a dose rate due to a lowering of water level in some portion of the REFUELING PATHWAY, the reading may not be a reliable indication of whether or not the fuel is actually uncovered. To the degree possible, readings should be considered in combination with other available indications of inventory loss.~~

~~A drop in water level above irradiated fuel within the reactor vessel may be classified in accordance Recognition Category C during the Cold Shutdown and Refueling modes.~~

~~EAL #2~~

This EAL addresses a release of radioactive material caused by mechanical damage to irradiated fuel. Damaging events may include the dropping, bumping or binding of an assembly, or dropping a heavy load onto an assembly. A rise in readings on radiation monitors should be considered in conjunction with in-plant reports or observations of a potential fuel damaging event (e.g., a fuel handling accident).

~~EAL #3~~

~~Spent fuel pool water level at this value is within the lower end of the level range necessary to prevent significant dose consequences from direct gamma radiation to personnel performing operations in the vicinity of the spent fuel pool. This condition reflects a significant loss of spent fuel pool water inventory and thus it is also a precursor to a loss of the ability to adequately cool the irradiated fuel assembles stored in the pool.~~

Escalation of the emergency classification level would be via IC~~s~~ AS1~~ or AS2 (*see AS2 Developer Notes*)~~.

Reference(s):

1. W3-DBD-32, Radiation Monitoring System Design Basis Document
2. NEI 99-01 AA2

Category: A – Abnormal Rad Levels / Rad Effluent

Subcategory: 2 – Irradiated Fuel Event

Initiating Condition: Significant lowering of water level above, or damage to, irradiated fuel

EAL:

AA2.3	**Alert**
Lowering of spent fuel pool level to 11 ft. (Level 2) on FS-ILI-3000(3001)	

Mode Applicability:

All

Definition(s):

None

Basis:

FS-ILI-3000(3001) read Level 2 as 11ft. This corresponds to 31' MSL and 10 feet above level 3. The level as read on the instrument should be compared to the EAL criteria without adding any additional level.

This ~~IC~~ EAL addresses events that have caused ~~IMMINENT or actual damage to an irradiated fuel assembly, or~~ a significant lowering of water level within the spent fuel pool ~~*(see Developer Notes)*~~. These events present radiological safety challenges to plant personnel and are precursors to a release of radioactivity to the environment. As such, they represent an actual or potential substantial degradation of the level of safety of the plant.

~~This IC applies to irradiated fuel that is licensed for dry storage up to the point that the loaded storage cask is sealed. Once sealed, damage to a loaded cask causing loss of the CONFINEMENT BOUNDARY is classified in accordance with IC E-HU1.~~

~~Escalation of the emergency would be based on either Recognition Category A A or C ICs.~~EAL ~~#This EAL escalates from AU2 in that the loss of level, in the affected portion of the REFUELING PATHWAY, is of sufficient magnitude to have resulted in uncovery of irradiated fuel. Indications of irradiated fuel uncovery may include direct or indirect visual observation (e.g., reports from personnel or camera images), as well as significant changes in water and radiation levels, or other plant parameters. Computational aids may also be used (e.g., a boil-off curve). Classification of an event using this EAL should be based on the totality of available indications, reports and observations.~~

~~While an area radiation monitor could detect an increase in a dose rate due to a lowering of water level in some portion of the REFUELING PATHWAY, the reading may not be a reliable indication of whether or not the fuel is actually uncovered. To the degree possible, readings should be considered in combination with other available indications of inventory loss.~~

~~A drop in water level above irradiated fuel within the reactor vessel may be classified in accordance Recognition Category C during the Cold Shutdown and Refueling modes.~~

~~This EAL addresses a release of radioactive material caused by mechanical damage to~~

~~irradiated fuel. Damaging events may include the dropping, bumping or binding of an assembly, or dropping a heavy load onto an assembly. A rise in readings on radiation monitors should be considered in conjunction with in-plant reports or observations of a potential fuel damaging event (e.g., a fuel handling accident).~~

~~EAL #3~~Spent fuel pool water level at this value is within the lower end of the level range necessary to prevent significant dose consequences from direct gamma radiation to personnel performing operations in the vicinity of the spent fuel pool. This condition reflects a significant loss of spent fuel pool water inventory and thus it is also a precursor to a loss of the ability to adequately cool the irradiated fuel assembles stored in the pool.

Escalation of the emergency classification level would be via IC~~s~~ AS1 or AS2 ~~(*see AS2 Developer Notes*)~~.

Post-Fukushima order EA-12-051 required the installation of reliable SFP level indication capable of identifying normal level (Level 1), SFP level 10 ft. above the top of the fuel racks (Level 2) and SFP level at the top of the fuel racks (Level 3) (ref. 1, 2).

Spent Fuel Pool Level indicators FS-ILI-3000 and 3001 are read on the +21 Auxiliary Building just inside from the Q-deck.

Reference(s):

1. EC 48147 Attachment 10.002 SFPI Water Levels
2. OP-901-513 Spent Fuel Cooling Malfunction
3. OP-903-001 Technical Specification Surveillance Logs
4. NEI 99-01 AA2

Category: A – Abnormal Rad Levels / Rad Effluent

Subcategory: 2 – Irradiated Fuel Event

Initiating Condition: Spent fuel pool level at the top of the fuel racks

EAL:

AS2.1	**Site Area Emergency**
Lowering of spent fuel pool level to 1 ft. (Level 3) on FS-ILI-3000(3001)	

Mode Applicability:

All

Definition(s):

IMMINENT - The trajectory of events or conditions is such that an EAL will be met within a relatively short period of time regardless of mitigation or corrective actions.

Basis:

FS-ILI-3000(3001) read Level 1 as 1 ft. This corresponds to 21' MSL. The level as read on the instrument should be compared to the EAL criteria without adding any additional level.

This ~~IC~~ EAL addresses a significant loss of spent fuel pool inventory control and makeup capability leading to IMMINENT fuel damage. This condition entails major failures of plant functions needed for protection of the public and thus warrant a Site Area Emergency declaration.

It is recognized that this IC would likely not be met until well after another Site Area Emergency IC was met; however, it is included to provide classification diversity.

Escalation of the emergency classification level would be via IC AG1 or AG2.

Post-Fukushima order EA-12-051 required the installation of reliable SFP level indication capable of identifying normal level (Level 1), SFP level 10 ft. above the top of the fuel racks (Level 2) and SFP level at the top of the fuel racks (Level 3) (ref. 1, 2).

Spent Fuel Pool Level indicators FS-ILI-3000 and 3001 are read on the +21 Auxiliary Building just inside from the Q-deck.

Reference(s):

1. EC 48147 Attachment 10.002 SFPI Water Levels
2. OP-901-513 Spent Fuel Cooling Malfunction
3. OP-903-001 Technical Specification Surveillance Logs
4. NEI 99-01 AS2

Category: A – Abnormal Rad Levels / Rad Effluent

Subcategory: 2 – Irradiated Fuel Event

Initiating Condition: Spent fuel pool level **cannot** be restored to at least the top of the fuel racks for 60 minutes or longer

EAL:

AG2.1 General Emergency

Spent fuel pool level **cannot** be restored to at least 1 ft. (Level 3) on FS-ILI-3000(3001) for ≥ 60 min. (Note 1)

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded**.** The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Mode Applicability:

All

Definition(s):

None

Basis:

FS-ILI-3000(3001) read Level 1 as 1 ft. This corresponds to 21' MSL. The level as read on the instrument should be compared to the EAL criteria without adding any additional level.

This ~~IC~~ EAL addresses a significant loss of spent fuel pool inventory control and makeup capability leading to a prolonged uncovery of spent fuel. This condition will lead to fuel damage and a radiological release to the environment.

It is recognized that this IC would likely not be met until well after another General Emergency IC was met; however, it is included to provide classification diversity.

Post-Fukushima order EA-12-051 required the installation of reliable SFP level indication capable of identifying normal level (Level 1), SFP level 10 ft. above the top of the fuel racks (Level 2) and SFP level at the top of the fuel racks (Level 3) (ref. 1, 2).

Spent Fuel Pool Level indicators FS-ILI-3000 and 3001 are read on the +21 Auxiliary Building just inside from the Q-deck.

Reference(s):

1. EC 48147 Attachment 10.002 SFPI Water Levels
2. OP-901-513 Spent Fuel Cooling Malfunction
3. OP-903-001 Technical Specification Surveillance Logs
4. NEI 99-01 AG2

Category: A – Abnormal Rad Levels / Rad Effluent

Subcategory: 3 – Area Radiation Levels

Initiating Condition: Radiation levels that IMPEDE access to equipment necessary for normal plant operations, cooldown or shutdown

EAL:

AA3.1 Alert

Dose rate > 15 mR/hr in **EITHER** of the following areas:

- Control Room (ARM-IRE-5001)
- CAS (by survey)

Mode Applicability:

All

Definition(s):

IMPEDE(D) - Personnel access to a room or area is hindered to an extent that extraordinary measures are necessary to facilitate entry of personnel into the affected room/area (e.g., requiring use of protective equipment, such as SCBAs, that is **not** routinely employed).

Basis:

Areas that meet this threshold include the Control Room (CR) and the Central Alarm Station (CAS). The Control Room is monitored for excessive radiation by ARM-IRE-5001 (ref. 1). The CAS is included in this EAL because of its importance to permitting access to areas required to assure safe plant operations. There are no permanently installed area radiation monitors in CAS that may be used to assess this EAL threshold. Therefore, this threshold is evaluated using local radiation survey for this area.

This ~~IC~~ EAL addresses elevated radiation levels in certain plant rooms/areas sufficient to preclude or IMPEDE personnel from performing actions necessary to maintain normal plant operation, or to perform a normal plant cooldown and shutdown. As such, it represents an actual or potential substantial degradation of the level of safety of the plant. The Emergency Director should consider the cause of the ~~increased~~rise in radiation levels and determine if another IC may be applicable.~~For EAL #2, an Alert declaration is warranted if entry into the affected room/area is, or may be, procedurally required during the plant operating mode in effect at the time of the elevated radiation levels. The emergency classification is not contingent upon whether entry is actually necessary at the time of the increased radiation levels. Access should be considered as impeded if extraordinary measures are necessary to facilitate entry of personnel into the affected room/area (e.g., installing temporary shielding, requiring use of non-routine protective equipment, requesting an extension in dose limits beyond normal administrative limits).~~

~~An emergency declaration is not warranted if any of the following conditions apply.~~

- ~~The plant is in an operating mode different than the mode specified for the affected room/area (i.e., entry is not required during the operating mode in effect at the time of the elevated radiation levels). For example, the plant is in Mode 1 when the radiation increase occurs, and the procedures used for normal operation, cooldown and shutdown do not require entry into the affected room until Mode 4.~~
- ~~The increased radiation levels are a result of a planned activity that includes compensatory measures which address the temporary inaccessibility of a room or area (e.g., radiography, spent filter or resin transfer, etc.).~~
- ~~The action for which room/area entry is required is of an administrative or record keeping nature (e.g., normal rounds or routine inspections).~~
- ~~The access control measures are of a conservative or precautionary nature, and would not actually prevent or impede a required action.~~

Escalation of the emergency classification level would be via Recognition Category A, C or F ICs.

Reference(s):

1. W3-DBD-32, Radiation Monitoring System Design Basis Document
2. NEI 99-01 AA3

Category: A – Abnormal Rad Levels / Rad Effluent

Subcategory: 3 – Area Radiation Levels

Initiating Condition: Radiation levels that IMPEDE access to equipment necessary for normal plant operations, cooldown or shutdown

EAL:

AA3.2 Alert

An UNPLANNED event results in radiation levels that prohibit or IMPEDE access to **any** Table A-3 room or area (Note 5)

Note 5: If the equipment in the listed room or area was already inoperable or out-of-service before the event occurred, then **no** emergency classification is warranted.

Table A-3 Safe Operation & Shutdown Rooms/Areas

Room/Area	Mode
Turbine Building (all elevations and rooms)	1
Polisher Building (all elevations and rooms)	1
-4 RCA Letdown Valve Gallery	3
+21 RAB Switchgears A or B	3
-4 RCA Wing Area	4
-15 RCA Valve Gallery	4
-35 RCA Safeguard Rooms	4
+21 RAB Switchgears A or B	4

Mode Applicability:

1 – Power Operation, 3 – Hot Standby, 4 – Hot Shutdown

Definition(s):

IMPEDE(D) - Personnel access to a room or area is hindered to an extent that extraordinary measures are necessary to facilitate entry of personnel into the affected room/area (e.g., requiring use of protective equipment, such as SCBAs, that is **not** routinely employed).

UNPLANNED-. A parameter change or an event that is **not** 1) the result of an intended evolution or 2) an expected plant response to a transient. The cause of the parameter change or event may be known or unknown.

Basis:

This IC addresses elevated radiation levels in certain plant rooms/areas sufficient to preclude or IMPEDE personnel from performing actions necessary to maintain normal plant operation, or to perform a normal plant cooldown and shutdown. As such, it represents an actual or potential substantial degradation of the level of safety of the plant. The Emergency Director should consider the cause of the ~~increased~~rise in radiation levels and determine if another IC may be applicable.

For ~~EAL #2~~AA3.2, an Alert declaration is warranted if entry into the affected room/area is, or may be, procedurally required during the plant operating mode in effect at the time of the elevated radiation levels. The emergency classification is not contingent upon whether entry is actually necessary at the time of the ~~increased~~higher radiation levels. Access should be considered as IMPEDED if extraordinary measures are necessary to facilitate entry of personnel into the affected room/area (e.g., installing temporary shielding, requiring use of non-routine protective equipment, requesting an extension in dose limits beyond normal administrative limits).

An emergency declaration is **not** warranted if any of the following conditions apply:

- The plant is in an operating mode different than the mode specified for the affected room/area (i.e., entry is not required during the operating mode in effect at the time of the elevated radiation levels). For example, the plant is in Mode 1 when the radiation ~~increase~~ rise occurs, and the procedures used for normal operation, cooldown and shutdown do not require entry into the affected room until Mode 4.
- The ~~increased~~ higher radiation levels are a result of a planned activity that includes compensatory measures which address the temporary inaccessibility of a room or area (e.g., radiography, spent filter or resin transfer, etc.).
- ~~The action for which room/area entry is required is of an administrative or record keeping nature (e.g., normal rounds or routine inspections).~~
- The access control measures are of a conservative or precautionary nature, and would not actually prevent or IMPEDE a required action.

Escalation of the emergency classification level would be via Recognition Category A, C or F ICs.

If the equipment in the listed room or area was already inoperable, or out-of-service, before the event occurred, then no emergency should be declared since the event will have no adverse impact beyond that already allowed by Technical Specifications at the time of the event.

The list of plant rooms or areas with entry-related mode applicability identified specify those rooms or areas that contain equipment which require a manual/local action as specified in operating procedures used for normal plant operation, cooldown and shutdown. Rooms or areas in which actions of a contingent or emergency nature would be performed (e.g., an action to address an off-normal or emergency condition such as emergency repairs, corrective measures or emergency operations) are not included. In addition, the list specifies the plant mode(s) during which entry would be required for each room or area (ref. 1).

EAL AA3.2 mode applicability has been limited to the mode limitations of Table A-3.

Reference(s):

1. Attachment 3 Safe Operation & Shutdown Areas Tables A-3 & H-2 Bases
2. NEI 99-01 AA3

Category C – Cold Shutdown / Refueling System Malfunction

EAL Group: Cold Conditions (RCS temperature ≤ 200ºF); EALs in this category are applicable only in one or more cold operating modes.

Category C EALs are directly associated with cold shutdown or refueling system safety functions. Given the variability of plant configurations (e.g., systems out-of-service for maintenance, containment open, reduced AC power redundancy, time since shutdown) during these periods, the consequences of any given initiating event can vary greatly. For example, a loss of decay heat removal capability that occurs at the end of an extended outage has less significance than a similar loss occurring during the first week after shutdown. Compounding these events is the likelihood that instrumentation necessary for assessment may also be inoperable. The cold shutdown and refueling system malfunction EALs are based on performance capability to the extent possible with consideration given to RCS integrity, CONTAINMENT CLOSURE, and fuel clad integrity for the applicable operating modes (5 - Cold Shutdown, 6 - Refueling, DEF – Defueled).

The events of this category pertain to the following subcategories:

1. RCS Level

RCS water level is directly related to the status of adequate core cooling and, therefore, fuel clad integrity.

2. Loss of Safety Bus AC Power

Loss of plant electrical power can compromise plant SAFETY SYSTEM operability including decay heat removal and emergency core cooling systems which may be necessary to ensure fission product barrier integrity. This category includes loss of onsite and offsite power sources for 4160 VAC safety buses.

3. RCS Temperature

Uncontrolled or inadvertent temperature or pressure rises are indicative of a potential loss of safety functions.

4. Loss of Vital DC Power

Loss of emergency plant electrical power can compromise plant SAFETY SYSTEM operability including decay heat removal and emergency core cooling systems which may be necessary to ensure fission product barrier integrity. This category includes loss of power to or degraded voltage on the 125-Volt vital DC buses.

5. Loss of Communications

Certain events that degrade plant operator ability to effectively communicate with essential personnel within or external to the plant warrant emergency classification.

6. Hazardous Event Affecting SAFETY SYSTEMS

Certain hazardous natural and technological events may result in VISIBLE DAMAGE to or degraded performance of SAFETY SYSTEMS warranting classification.

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 1 – RCS Level

Initiating Condition: UNPLANNED loss of RCS inventory

EAL:

CU1.1 Unusual Event

UNPLANNED loss of reactor coolant results in RCS level less than a required lower limit for ≥ 15 min. (Note 1)

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Mode Applicability:

5 - Cold Shutdown, 6 - Refueling

Definition(s):

UNPLANNED-. A parameter change or an event that is **not** 1) the result of an intended evolution or 2) an expected plant response to a transient. The cause of the parameter change or event may be known or unknown.

Basis:

This ~~IC~~ EAL addresses the inability to restore and maintain water level to a required minimum level (or the lower limit of a level band), or a loss of the ability to monitor ~~(reactor vessel/~~RCS ~~[*PWR*] or RPV [*BWR*])~~ level concurrent with indications of coolant leakage. Either of these conditions is considered to be a potential degradation of the level of safety of the plant.

Refueling evolutions that ~~decrease~~ lower RCS water inventory are carefully planned and controlled. OP-001-003, Reactor Coolant System Drain Down, is used to capture required RCS water levels for plant conditions using RCS Level Control Requests sheets. An UNPLANNED event that results in water level ~~decreasing~~ lowering below a procedurally required limit warrants the declaration of an Unusual Event due to the reduced water inventory that is available to keep the core covered.

This EAL ~~#1~~ recognizes that the minimum required ~~(reactor vessel/~~RCS ~~[*PWR*] or RPV [*BWR*])~~ level can change several times during the course of a refueling outage as different plant configurations and system lineups are implemented. This EAL is met if the minimum level, specified for the current plant conditions, cannot be maintained for 15 minutes or longer. The minimum level is typically specified in the applicable operating procedure but may be specified in another controlling document.

The 15-minute threshold duration allows sufficient time for prompt operator actions to restore and maintain the expected water level. This criterion excludes transient conditions causing a brief lowering of water level.

~~EAL #2 addresses a condition where all means to determine (reactor vessel/RCS [*PWR*] or RPV [*BWR*]) level have been lost. In this condition, operators may determine that an inventory loss is occurring by observing changes in sump and/or tank levels. Sump and/or tank level changes must be evaluated against other potential sources of water flow to ensure they are indicative of leakage from the (reactor vessel/RCS [*PWR*] or RPV [*BWR*]).~~

Continued loss of RCS inventory may result in escalation to the Alert emergency classification level via either IC CA1 or CA3.

Reference(s):

1. OP-001-003 Reactor Coolant System Drain Down
2. OI-040-000 Reactor Coolant System Leakage Monitoring
3. OP-901-111 Reactor Coolant System Leak
4. NEI 99-01 CU1

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 1 – RCS Level

Initiating Condition: UNPLANNED loss of RCS inventory

EAL:

CU1.2 Unusual Event

RCS level **cannot** be monitored

AND EITHER

- UNPLANNED rise in Containment Sump or Reactor Drain Tank level due to loss of RCS inventory
- Visual observation of UNISOLABLE RCS leakage

Mode Applicability:

5 - Cold Shutdown, 6 – Refueling

Definition(s):

UNISOLABLE - An open or breached system line that **cannot** be isolated, remotely or locally.

UNPLANNED-. A parameter change or an event that is **not** 1) the result of an intended evolution or 2) an expected plant response to a transient. The cause of the parameter change or event may be known or unknown.

Basis:

This IC addresses the inability to restore and maintain water level to a required minimum level (or the lower limit of a level band), or a loss of the ability to monitor ~~(reactor vessel/~~RCS ~~[PWR] or RPV [BWR])~~ level concurrent with indications of coolant leakage. Either of these conditions is considered to be a potential degradation of the level of safety of the plant.

Refueling evolutions that ~~decrease~~ lower RCS water inventory are carefully planned and controlled. An UNPLANNED event that results in water level ~~decreasing~~ lowering below a procedurally required limit warrants the declaration of an Unusual Event due to the reduced water inventory that is available to keep the core covered.

~~EAL #1 recognizes that the minimum required (reactor vessel/RCS [*PWR*] or RPV [*BWR*]) level can change several times during the course of a refueling outage as different plant configurations and system lineups are implemented. This EAL is met if the minimum level, specified for the current plant conditions, cannot be maintained for 15 minutes or longer. The minimum level is typically specified in the applicable operating procedure but may be specified in another controlling document.~~

~~The 15-minute threshold duration allows sufficient time for prompt operator actions to restore and maintain the expected water level. This criterion excludes transient conditions causing a brief lowering of water level.~~

This EAL ~~#2~~ addresses a condition where all means to determine ~~(reactor vessel/~~RCS ~~[PWR] or RPV [BWR])~~ level have been lost. In this condition, operators may determine that an inventory loss is occurring by observing changes in sump and/or tank levels. Sump and/or tank level changes must be evaluated against other potential sources of water flow to ensure they are indicative of leakage from the ~~(reactor vessel/~~RCS (ref. 1, 2) ~~[PWR] or RPV [BWR])~~.

Continued loss of RCS inventory may result in escalation to the Alert emergency classification level via either IC CA1 or CA3.

Reference(s):

1. OI-040-000 Reactor Coolant System Leakage Monitoring
2. OP-901-111 Reactor Coolant System Leak
3. NEI 99-01 CU1

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 1 – RCS Level

Initiating Condition: Significant loss of RCS inventory

EAL:

CA1.1 Alert

Loss of RCS inventory as indicated by RCS level < 13.46 ft.

Mode Applicability:

5 - Cold Shutdown, 6 – Refueling

Definition(s):

None

Basis:

13.46 ft. RCS level is at the elevation of the hot leg centerline. This is the minimum level for operation of Shutdown Cooling (ref. 1).

This IC 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). This condition represents a potential substantial reduction in the level of plant safety.

For this EAL ~~#1~~, a lowering of RCS water level below ~~(site-specific level) ft.~~the specified level indicates that operator actions have not been successful in restoring and maintaining ~~RCS (~~reactor vessel/RCS ~~[PWR] or RPV [BWR])~~ water level. The heat-up rate of the coolant will ~~increase~~ rise as the available water inventory is reduced. A continuing ~~decrease~~ drop in water level will lead to core uncovery.

Although related, this EAL ~~#1~~ is concerned with the loss of RCS inventory and **not** the potential concurrent effects on systems needed for decay heat removal (e.g., loss of a Residual Heat Removal suction point). A~~n~~ ~~increase~~ rise in RCS temperature caused by a loss of decay heat removal capability is evaluated under IC CA3.

~~For EAL #2, the inability to monitor (reactor vessel/RCS [PWR] or RPV [BWR]) level may be caused by instrumentation and/or power failures, or water level dropping below the range of available instrumentation. If water level cannot be monitored, operators may determine that an inventory loss is occurring by observing changes in sump and/or tank levels. Sump and/or tank level changes must be evaluated against other potential sources of water flow to ensure they are indicative of leakage from the (reactor vessel/RCS [PWR] or RPV [BWR]).~~

~~The 15-minute duration for the loss of level indication was chosen because it is half of the EAL duration specified in IC CS1~~

If ~~the (reactor vessel/RCS [PWR] or RPV [BWR]) inventory~~water level continues to lower, then escalation to Site Area Emergency would be via IC CS1.

Reference(s):

1. OP-901-131 Shutdown Cooling Malfunction
2. NEI 99-01 CA1

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 1 – RCS Level

Initiating Condition: Significant loss of RCS inventory

EAL:

CA1.2 Alert

RCS level **cannot** be monitored for ≥ 15 min. (Note 1)

AND EITHER

- UNPLANNED rise in Containment Sump or Reactor Drain Tank level due to loss of RCS inventory
- Visual observation of UNISOLABLE RCS leakage

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Mode Applicability:

5 - Cold Shutdown, 6 – Refueling

Definition(s):

UNISOLABLE - An open or breached system line that **cannot** be isolated, remotely or locally.

UNPLANNED - A parameter change or an event that is **not** 1) the result of an intended evolution or 2) an expected plant response to a transient. The cause of the parameter change or event may be known or unknown.

Basis:

This IC 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). This condition represents a potential substantial reduction in the level of plant safety.

~~For EAL #1, a lowering of water level below (site-specific level) indicates that operator actions have not been successful in restoring and maintaining (reactor vessel/RCS [*PWR*] or RPV [*BWR*]) water level. The heat-up rate of the coolant will increase as the available water inventory is reduced. A continuing decrease in water level will lead to core uncovery.~~

~~Although related, EAL #1 is concerned with the loss of RCS inventory and not the potential concurrent effects on systems needed for decay heat removal (e.g., loss of a Residual Heat Removal suction point). An increase in RCS temperature caused by a loss of decay heat removal capability is evaluated under IC CA3.~~

For this EAL ~~#2~~, the inability to monitor ~~(reactor vessel/~~RCS ~~[PWR] or RPV [BWR])~~ level may be caused by instrumentation and/or power failures, or water level dropping below the range of available instrumentation. If water level cannot be monitored, operators may determine that an

inventory loss is occurring by observing changes in sump and/or tank levels. Sump and/or tank level changes must be evaluated against other potential sources of water flow to ensure they are indicative of leakage from the ~~(reactor vessel/~~RCS (ref. 1, 2) ~~[PWR] or RPV [BWR])~~.

The 15-minute duration for the loss of level indication was chosen because it is half of the EAL duration specified in IC CS1.

If the ~~(reactor vessel/~~RCS ~~[PWR] or RPV [BWR])~~ inventory level continues to lower, then escalation to Site Area Emergency would be via IC CS1.

Reference(s):

1. OI-040-000 Reactor Coolant System Leakage Monitoring
2. OP-901-111 Reactor Coolant System Leak
3. NEI 99-01 CA1

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 1 – RCS Level

Initiating Condition: Loss of RCS inventory affecting core decay heat removal capability

EAL:

CS1.1 Site Area Emergency

CONTAINMENT CLOSURE **not** established

AND

RVLMS upper plenum 0%

Mode Applicability:

5 – Cold Shutdown, 6 – Refueling

Definition(s):

CONTAINMENT CLOSURE - The procedurally defined actions taken to secure containment and its associated structures, systems, and components as a functional barrier to fission product release under shutdown conditions. As applied to WF3, all Containment Penetrations are closed as described in the requirements of Technical Specifications section 3/4.9.4 Containment Building Penetrations and OP-010-006, Outage Operations.

IMMINENT - The trajectory of events or conditions is such that an EAL will be met within a relatively short period of time regardless of mitigation or corrective actions.

Basis:

This IC addresses a significant and prolonged loss of ~~(reactor vessel/~~RCS ~~[PWR] or RPV [BWR])~~ inventory control and makeup capability leading to IMMINENT fuel damage. The lost inventory may be due to an RCS component failure, a loss of configuration control or prolonged boiling of reactor coolant. These conditions entail major failures of plant functions needed for protection of the public and thus warrant a Site Area Emergency declaration.

Following an extended loss of core decay heat removal and inventory makeup, decay heat will cause reactor coolant boiling and a further reduction in reactor vessel level. If RCS/reactor vessel level cannot be restored, fuel damage is probable.

Outage/shutdown contingency plans typically provide for re-establishing or verifying CONTAINMENT CLOSURE following a loss of heat removal or RCS inventory control functions. ~~The difference in the specified RCS/reactor vessel levels of EALs 1.b and 2.b reflect the fact that with CONTAINMENT CLOSURE established, there is a lower probability of a fission product release to the environment.~~

~~In EAL 3.a, the 30-minute criterion is tied to a readily recognizable event start time (i.e., the total loss of ability to monitor level), and allows sufficient time to monitor, assess and correlate reactor and plant conditions to determine if core uncovery has actually occurred (i.e., to account for various accident progression and instrumentation uncertainties). It also allows~~

~~sufficient time for performance of actions to terminate leakage, recover inventory control/makeup equipment and/or restore level monitoring.~~

~~The inability to monitor (reactor vessel/RCS [PWR] or RPV [BWR]) level may be caused by instrumentation and/or power failures, or water level dropping below the range of available instrumentation. If water level cannot be monitored, operators may determine that an inventory loss is occurring by observing changes in sump and/or tank levels. Sump and/or tank level changes must be evaluated against other potential sources of water flow to ensure they are indicative of leakage from the (reactor vessel/RCS [PWR] or RPV [BWR]).~~

This~~ese~~ EAL~~s~~ addresses concerns raised by Generic Letter 88-17, *Loss of Decay Heat Removal*; SECY 91-283, *Evaluation of Shutdown and Low Power Risk Issues*; NUREG-1449, *Shutdown and Low-Power Operation at Commercial Nuclear Power Plants in the United States*; and NUMARC 91-06, *Guidelines for Industry Actions to Assess Shutdown Management*.

Escalation of the emergency classification level would be via IC CG1 or AG1.

Reference(s):

1. UFSAR Section 1.9A Inadequate Core Cooling Instrumentation
2. NEI 99-01 CS1

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 1 – RCS Level

Initiating Condition: Loss of RCS inventory affecting core decay heat removal capability

EAL:

CS1.2 Site Area Emergency

CONTAINMENT CLOSURE established

AND

Representative CETs indicate superheat

Mode Applicability:

5 – Cold Shutdown, 6 – Refueling

Definition(s):

CONTAINMENT CLOSURE - The procedurally defined actions taken to secure containment and its associated structures, systems, and components as a functional barrier to fission product release under shutdown conditions. As applied to WF3, all Containment Penetrations are closed as described in the requirements of Technical Specifications section 3/4.9.4 Containment Building Penetrations and OP-010-006, Outage Operations.

IMMINENT - The trajectory of events or conditions is such that an EAL will be met within a relatively short period of time regardless of mitigation or corrective actions.

Basis:

This IC addresses a significant and prolonged loss of ~~reactor vessel/~~RCS inventory control and makeup capability leading to IMMINENT fuel damage. The lost inventory may be due to an RCS component failure, a loss of configuration control or prolonged boiling of reactor coolant. These conditions entail major failures of plant functions needed for protection of the public and thus warrant a Site Area Emergency declaration.

Following an extended loss of core decay heat removal and inventory makeup, decay heat will cause reactor coolant boiling and a further reduction in reactor vessel level. If RCS/reactor vessel level cannot be restored, fuel damage is probable.

Outage/shutdown contingency plans typically provide for re-establishing or verifying CONTAINMENT CLOSURE following a loss of heat removal or RCS inventory control functions. The difference in the specified RCS~~/reactor vessel levels~~ parameters of EALs ~~1.b~~ CS1.1 and ~~2.b~~ CS1.2 reflect the fact that with CONTAINMENT CLOSURE established, there is a lower probability of a fission product release to the environment.

This~~ese~~ EAL~~s~~ addresses concerns raised by Generic Letter 88-17, *Loss of Decay Heat Removal*; SECY 91-283, *Evaluation of Shutdown and Low Power Risk Issues*; NUREG-1449, *Shutdown and Low-Power Operation at Commercial Nuclear Power Plants in the United*

States; and NUMARC 91-06, *Guidelines for Industry Actions to Assess Shutdown Management*.

Escalation of the emergency classification level would be via IC CG1 or AG1.

Superheated conditions in the core can only occur with core uncovery. Therefore superheated conditions, as indicated on representative CETs, is used as an indicator of reactor vessel level below the top of active fuel (ref. 1, 2).

Reference(s):

1. UFSAR Section 1.9A Inadequate Core Cooling Instrumentation
2. TG-OP-902-002 Technical Guide for Loss of Coolant Accident Recovery Procedure.
3. NEI 99-01 CS1

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 1 – RCS Level

Initiating Condition: Loss of RCS inventory affecting core decay heat removal capability

EAL:

CS1.3 Site Area Emergency

RCS level **cannot** be monitored for ≥ 30 min. (Note 1)

AND

Core uncovery is indicated by **any** of the following:

- UNPLANNED rise in Containment Sump or Reactor Drain Tank level of sufficient magnitude to indicate core uncovery
- Visual observation of UNISOLABLE RCS leakage of sufficient magnitude to indicate core uncovery
- Containment High Range Radiation Monitor (ARM-IRE-5400AS or BS) > 10 R/hr
- Erratic Source Range Monitor indication

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Mode Applicability:

5 – Cold Shutdown, 6 – Refueling

Definition(s):

IMMINENT - The trajectory of events or conditions is such that an EAL will be met within a relatively short period of time regardless of mitigation or corrective actions.

UNISOLABLE - An open or breached system line that **cannot** be isolated, remotely or locally.

UNPLANNED - A parameter change or an event that is **not** 1) the result of an intended evolution or 2) an expected plant response to a transient. The cause of the parameter change or event may be known or unknown.

Basis:

This IC addresses a significant and prolonged loss of ~~(reactor vessel/~~RCS ~~[PWR] or RPV [BWR])~~ inventory control and makeup capability leading to IMMINENT fuel damage. The lost inventory may be due to an RCS component failure, a loss of configuration control or prolonged boiling of reactor coolant. These conditions entail major failures of plant functions needed for protection of the public and thus warrant a Site Area Emergency declaration.

Following an extended loss of core decay heat removal and inventory makeup, decay heat will cause reactor coolant boiling and a further reduction in reactor vessel level. If RCS/reactor vessel level cannot be restored, fuel damage is probable.

~~Outage/shutdown contingency plans typically provide for re-establishing or verifying CONTAINMENT CLOSURE following a loss of heat removal or RCS inventory control functions. The difference in the specified RCS/reactor vessel levels of EALs 1.b and 2.b reflect the fact that with CONTAINMENT CLOSURE established, there is a lower probability of a fission product release to the environment.~~

~~In EAL 3.a, t~~The 30-minute criterion is tied to a readily recognizable event start time (i.e., the total loss of ability to monitor level), and allows sufficient time to monitor, assess and correlate reactor and plant conditions to determine if core uncovery has actually occurred (i.e., to account for various accident progression and instrumentation uncertainties). It also allows sufficient time for performance of actions to terminate leakage, recover inventory control/makeup equipment and/or restore level monitoring.

The inability to monitor ~~(reactor vessel/~~RCS ~~[PWR] or RPV [BWR])~~ level may be caused by instrumentation and/or power failures, or water level dropping below the range of available instrumentation. If water level cannot be monitored, operators may determine that an inventory loss is occurring by observing changes in sump and/or tank levels. Sump and/or tank level changes must be evaluated against other potential sources of water flow to ensure they are indicative of leakage from the ~~(reactor vessel/~~RCS ~~[PWR] or RPV [BWR])~~.

~~These~~ This EAL~~s~~ addresses concerns raised by Generic Letter 88-17, *Loss of Decay Heat Removal*; SECY 91-283, *Evaluation of Shutdown and Low Power Risk Issues*; NUREG-1449, *Shutdown and Low-Power Operation at Commercial Nuclear Power Plants in the United States*; and NUMARC 91-06, *Guidelines for Industry Actions to Assess Shutdown Management*.

Containment High Range Radiation Monitors ARM-IRE-5400AS and BS are the site-specific radiation monitors that would be indicative of possible core uncovery in the Refueling mode. The dose rate due to core shine when the top of the core becomes uncovered should result in dose rates > 10 R/hr.

Escalation of the emergency classification level would be via IC CG1 or AG1

Reference(s):

1. OI-040-000 Reactor Coolant System Leakage Monitoring
2. OP-901-111 Reactor Coolant System Leak
3. W3-DBD-32, Radiation Monitoring System Design Basis Document
4. NEI 99-01 CS1

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 1 – RCS Level

Initiating Condition: Loss of RCS inventory affecting fuel clad integrity with containment challenged

EAL:

CG1.1 General Emergency

Representative CETs indicate superheat for ≥ 30 min. (Note 1)

AND

Any Containment Challenge indication, Table C-1

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Note 6: If CONTAINMENT CLOSURE is re-established prior to exceeding the 30-minute time limit, declaration of a General Emergency is **not** required.

Table C-1 Containment Challenge Indications
• CONTAINMENT CLOSURE **not** established (Note 6) • Containment hydrogen concentration > 4% • UNPLANNED rise in containment pressure

Mode Applicability:

5 - Cold Shutdown, 6 – Refueling

Definition(s):

CONTAINMENT CLOSURE - The procedurally defined actions taken to secure containment and its associated structures, systems, and components as a functional barrier to fission product release under shutdown conditions. As applied to WF3, all Containment Penetrations are closed as described in the requirements of Technical Specifications section 3/4.9.4 Containment Building Penetrations and OP-010-006, Outage Operations.

IMMINENT - The trajectory of events or conditions is such that an EAL will be met within a relatively short period of time regardless of mitigation or corrective actions.

UNPLANNED - A parameter change or an event that is **not** 1) the result of an intended evolution or 2) an expected plant response to a transient. The cause of the parameter change or event may be known or unknown.

Basis:

This IC addresses the inability to restore and maintain reactor vessel level above the top of active fuel with containment challenged. This condition represents actual or IMMINENT substantial core degradation or melting with potential for loss of containment integrity. Releases can be reasonably expected to exceed EPA PAG exposure levels offsite for more than the immediate site area.

Following an extended loss of core decay heat removal and inventory makeup, decay heat will cause reactor coolant boiling and a further reduction in reactor vessel level. If RCS~~/reactor vessel~~ level cannot be restored, fuel damage is probable.

With CONTAINMENT CLOSURE not established, there is a high potential for a direct and unmonitored release of radioactivity to the environment. If CONTAINMENT CLOSURE is re-established prior to exceeding the 30-minute time limit, then declaration of a General Emergency is not required.

The existence of an explosive mixture means, at a minimum, that the containment atmospheric hydrogen concentration is sufficient to support a hydrogen burn (i.e., at the lower deflagration limit). A hydrogen burn will raise containment pressure and could result in collateral equipment damage leading to a loss of containment integrity. It therefore represents a challenge to Containment integrity.

In the early stages of a core uncovery event, it is unlikely that hydrogen buildup due to ~~a~~ core uncovery could result in an explosive gas mixture in containment. If all installed hydrogen gas monitors are out-of-service during an event leading to fuel cladding damage, it may **not** be possible to obtain a containment hydrogen gas concentration reading as ambient conditions within the containment will preclude personnel access. During periods when installed containment hydrogen gas monitors are out-of-service, operators may use the other listed indications to assess whether or **not** containment is challenged.

~~In EAL 2.b, the 30-minute criterion is tied to a readily recognizable event start time (i.e., the total loss of ability to monitor level), and allows sufficient time to monitor, assess and correlate reactor and plant conditions to determine if core uncovery has actually occurred (i.e., to account for various accident progression and instrumentation uncertainties). It also allows sufficient time for performance of actions to terminate leakage, recover inventory control/makeup equipment and/or restore level monitoring.~~

~~The inability to monitor (reactor vessel/RCS [PWR] or RPV [BWR]) level may be caused by instrumentation and/or power failures, or water level dropping below the range of available instrumentation. If water level cannot be monitored, operators may determine that an inventory loss is occurring by observing changes in sump and/or tank levels. Sump and/or tank level changes must be evaluated against other potential sources of water flow to ensure they are indicative of leakage from the (reactor vessel/RCS [PWR] or RPV [BWR]).~~

This~~ese~~ EAL~~s~~ addresses concerns raised by Generic Letter 88-17, *Loss of Decay Heat Removal*; SECY 91-283, *Evaluation of Shutdown and Low Power Risk Issues*; NUREG-1449, *Shutdown and Low-Power Operation at Commercial Nuclear Power Plants in the United*

States; and NUMARC 91-06, *Guidelines for Industry Actions to Assess Shutdown Management*.

Superheated conditions in the core can only occur with core uncovery. Therefore superheated conditions, as indicated on representative CETs, is used as an indicator of reactor vessel level below the top of active fuel (ref. 1).

Reference(s):

1. TG-OP-902-002 Technical Guide for Loss of Coolant Accident Recovery Procedure.
2. Technical Specifications section 3/4.9.4 Containment Building Penetrations
3. UFSAR Section 6.2.5.5 Instrumentation Requirements
4. NEI 99-01 CG1

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 1 – RCS Level

Initiating Condition: Loss of RCS inventory affecting fuel clad integrity with containment challenged

EAL:

CG1.2 General Emergency

RCS level **cannot** be monitored for ≥ 30 min. (Note 1)

AND

Core uncovery is indicated by **any** of the following:

- UNPLANNED rise in Containment Sump or Reactor Drain Tank level of sufficient magnitude to indicate core uncovery
- Visual observation of UNISOLABLE RCS leakage of sufficient magnitude to indicate core uncovery
- Containment High Range Radiation Monitor (ARM-IRE-5400AS or BS) > 10 R/hr
- Erratic Source Range Monitor indication

AND

Any Containment Challenge indication, Table C-1

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Note 6: If CONTAINMENT CLOSURE is re-established prior to exceeding the 30-minute time limit, declaration of a General Emergency is **not** required.

Table C-1 Containment Challenge Indications
• CONTAINMENT CLOSURE **not** established (Note 6) • Containment hydrogen concentration > 4% • UNPLANNED rise in containment pressure

Mode Applicability:

5 - Cold Shutdown, 6 – Refueling

Definition(s):

CONTAINMENT CLOSURE - The procedurally defined actions taken to secure containment and its associated structures, systems, and components as a functional barrier to fission product release under shutdown conditions. As applied to WF3, all Containment Penetrations

are closed as described in the requirements of Technical Specifications section 3/4.9.4 Containment Building Penetrations and OP-010-006, Outage Operations.

IMMINENT - The trajectory of events or conditions is such that an EAL will be met within a relatively short period of time regardless of mitigation or corrective actions.

UNISOLABLE - An open or breached system line that **cannot** be isolated, remotely or locally.

UNPLANNED - A parameter change or an event that is **not** 1) the result of an intended evolution or 2) an expected plant response to a transient. The cause of the parameter change or event may be known or unknown.

Basis:

This IC addresses the inability to restore and maintain reactor vessel level above the top of active fuel with containment challenged. This condition represents actual or IMMINENT substantial core degradation or melting with potential for loss of containment integrity. Releases can be reasonably expected to exceed EPA PAG exposure levels offsite for more than the immediate site area.

Following an extended loss of core decay heat removal and inventory makeup, decay heat will cause reactor coolant boiling and a further reduction in reactor vessel level. If RCS~~/reactor vessel~~ level cannot be restored, fuel damage is probable.

With CONTAINMENT CLOSURE not established, there is a high potential for a direct and unmonitored release of radioactivity to the environment. If CONTAINMENT CLOSURE is re-established prior to exceeding the 30-minute time limit, then declaration of a General Emergency is not required.

The existence of an explosive mixture means, at a minimum, that the containment atmospheric hydrogen concentration is sufficient to support a hydrogen burn (i.e., at the lower deflagration limit). A hydrogen burn will raise containment pressure and could result in collateral equipment damage leading to a loss of containment integrity. It therefore represents a challenge to Containment integrity.

In the early stages of a core uncovery event, it is unlikely that hydrogen buildup due to ~~a~~ core uncovery could result in an explosive gas mixture in containment. If all installed hydrogen gas monitors are out-of-service during an event leading to fuel cladding damage, it may not be possible to obtain a containment hydrogen gas concentration reading as ambient conditions within the containment will preclude personnel access. During periods when installed containment hydrogen gas monitors are out-of-service, operators may use the other listed indications to assess whether or not containment is challenged.

~~In EAL 2.b, t~~The 30-minute criterion is tied to a readily recognizable event start time (i.e., the total loss of ability to monitor level), and allows sufficient time to monitor, assess and correlate reactor and plant conditions to determine if core uncovery has actually occurred (i.e., to account for various accident progression and instrumentation uncertainties). It also allows sufficient time for performance of actions to terminate leakage, recover inventory control/makeup equipment and/or restore level monitoring.

The inability to monitor ~~(reactor vessel/~~RCS ~~[*PWR*] or RPV RCS [*BWR*])~~ level may be caused by instrumentation and/or power failures, or water level dropping below the range of available instrumentation. If water level cannot be monitored, operators may determine that an inventory loss is occurring by observing changes in sump and/or tank levels. Sump and/or tank level changes must be evaluated against other potential sources of water flow to ensure they are indicative of leakage from the ~~(reactor vessel/~~RCS ~~[*PWR*] or RPV [*BWR*])~~.

Containment High Range Radiation Monitors ARM-IRE-5400AS and BS are the site-specific radiation monitors that would be indicative of possible core uncovery in the Refueling mode. The dose rate due to core shine when the top of the core becomes uncovered should result in dose rates > 10 R/hr.

This~~ese~~ EAL~~s~~ addresses concerns raised by Generic Letter 88-17, *Loss of Decay Heat Removal*; SECY 91-283, *Evaluation of Shutdown and Low Power Risk Issues*; NUREG-1449, *Shutdown and Low-Power Operation at Commercial Nuclear Power Plants in the United States*; and NUMARC 91-06, *Guidelines for Industry Actions to Assess Shutdown Management*.

Reference(s):

1. OI-040-000 Reactor Coolant System Leakage Monitoring
2. OP-901-111 Reactor Coolant System Leak
3. W3-DBD-32, Radiation Monitoring System Design Basis Document
4. Technical Specifications section 3/4.9.4 Containment Building Penetrations
5. UFSAR Section 6.2.5.5 Instrumentation Requirements
6. NEI 99-01 CG1

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 2 – Loss of Safety Bus AC Power

Initiating Condition: Loss of **all but one** AC power source to safety buses for 15 minutes or longer

EAL:

CU2.1 Unusual Event

AC power capability, Table C-2, to 4160 VAC safety buses 3A and 3B reduced to a single power source for ≥ 15 min. (Note 1)

AND

Any additional single power source failure will result in loss of **all** AC power to SAFETY SYSTEMS

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Table C-2 AC Power Sources	
Onsite	• Emergency Diesel Generator A • Emergency Diesel Generator B • Temporary Emergency Diesels (TEDs) (if already aligned)
Offsite	• Startup Transformer 3A • Startup Transformer 3B • Unit Auxiliary Transformer 3A (when back-fed from offsite) • Unit Auxiliary Transformer 3B (when back-fed from offsite)

Mode Applicability:

5 - Cold Shutdown, 6 – Refueling, DEF - Defueled

Definition(s):

SAFETY SYSTEM - A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related (as defined in 10CFR50.2):

Those structures, systems and components that are relied upon to remain functional during and following design basis events to assure:

(1) The integrity of the reactor coolant pressure boundary;

(2) The capability to shut down the reactor and maintain it in a safe shutdown condition;

(3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures.

Basis:

This IC 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. In this condition, the sole AC power source may be powering one, or more than one, train of safety-related equipment.

When in the cold shutdown, refueling, or defueled mode, this condition is not classified as an Alert because of the ~~increased~~greater time available to restore another power source to service. Additional time is available due to the reduced core decay heat load, and the lower temperatures and pressures in various plant systems. Thus, when in these modes, this condition is considered to be a potential degradation of the level of safety of the plant.

An "AC power source" is a source recognized in AOPs and EOPs, and capable of supplying required power to a safety bus. Some examples of this condition are presented below.

- A loss of all offsite power with a concurrent failure of ~~all but~~ one emergency power source (e.g., an onsite diesel generator).
- A loss of all offsite power and loss of all emergency power sources (e.g., onsite diesel generators) with a single train of ~~emergency~~ safety buses being ~~back~~-fed from ~~the unit main generator~~TEDs.
- A loss of emergency power sources (e.g., onsite diesel generators) with a ~~single~~ train of ~~emergency~~ safety buses being ~~back~~-fed from ~~an~~ a single offsite power source (Startup Transformer).

Fifteen minutes was selected as a threshold to exclude transient or momentary losses of power.

The subsequent loss of the remaining single power source would escalate the event to an Alert in accordance with IC CA2.

Temporary Emergency Diesels (TEDs) can be credited if already installed in accordance with site procedures (ref. 5, 6).

This EAL is the cold condition equivalent of the hot condition EAL SA1.1.

Reference(s):

1. UFSAR Section 8.1, Onsite Power System
2. UFSAR Section 8.2, Offsite Power System
3. OP-901-310 Loss of Train A Safety Bus
4. OP-901-311 Loss of Train B Safety Bus
5. Technical Specifications 3/4.8.1 A.C. Sources
6. ME-001-012 Temporary Power from Temporary Diesel for 3A2 and 3B2 4KV Buses (Modes 1-6).

7. NEI 99-01 CU2

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 2 – Loss of Safety Bus AC Power

Initiating Condition: Loss of **all** offsite and **all** onsite AC power to safety buses for 15 minutes or longer

EAL:

CA2.1	**Alert**
Loss of **all** offsite and **all** onsite AC power to 4160 VAC safety buses 3A and 3B for ≥ 15 min. (Note 1)	

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Mode Applicability:

5 - Cold Shutdown, 6 - Refueling, DEF - Defueled

Definition(s):

SAFETY SYSTEM - A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related (as defined in 10CFR50.2):

Those structures, systems and components that are relied upon to remain functional during and following design basis events to assure:

(1) The integrity of the reactor coolant pressure boundary;

(2) The capability to shut down the reactor and maintain it in a safe shutdown condition;

(3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures.

Basis:

This IC addresses a total loss of AC power that compromises the performance of all SAFETY SYSTEMS requiring electric power including those necessary for emergency core cooling, containment heat removal/pressure control, spent fuel heat removal and the ultimate heat sink. Mitigative strategies using non-safety related power sources (FLEX generators, etc.) may be effective in supplying power to these buses. These power sources must be controlled in accordance with abnormal or emergency operating procedures, or beyond design basis accident response guidelines (e.g., FLEX support guidelines) and must be capable (alone or in combination) of supplying power for long term decay heat removal systems.

When in the cold shutdown, refueling, or defueled mode, this condition is not classified as a Site Area Emergency because of the ~~increased~~ greater time available to restore a safety~~n~~ ~~emergency~~ bus to service. Additional time is available due to the reduced core decay heat load, and the lower temperatures and pressures in various plant systems. Thus, when in these

modes, this condition represents an actual or potential substantial degradation of the level of safety of the plant.

Fifteen minutes was selected as a threshold to exclude transient or momentary power losses.

Escalation of the emergency classification level would be via IC CS1 or AS1.

Temporary Emergency Diesels (TEDs) can be credited if already installed in accordance with site procedures (ref. 5, 6).

This EAL is the cold condition equivalent of the hot condition EAL SS1.1.

Reference(s):

1. UFSAR Section 8.1, Onsite Power System
2. UFSAR Section 8.2, Offsite Power System
3. OP-901-310 Loss of Train A Safety Bus
4. OP-901-311 Loss of Train B Safety Bus
5. Technical Specifications 3/4.8.1 A.C. Sources
6. ME-001-012, Temporary Power from Temporary Diesel for 3A2 and 3B2 4KV Buses (Modes 1-6)
7. NEI 99-01 CU2

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 3 – RCS Temperature

Initiating Condition: UNPLANNED rise in RCS temperature

EAL:

CU3.1	**Unusual Event**
UNPLANNED rise in RCS temperature to > 200°F	

Mode Applicability:

5 - Cold Shutdown, 6 - Refueling

Definition(s):

CONTAINMENT CLOSURE - The procedurally defined actions taken to secure containment and its associated structures, systems, and components as a functional barrier to fission product release under shutdown conditions. As applied to WF3, all Containment Penetrations are closed as described in the requirements of Technical Specifications section 3/4.9.4 Containment Building Penetrations and OP-010-006, Outage Operations.

UNPLANNED - A parameter change or an event that is **not** 1) the result of an intended evolution or 2) an expected plant response to a transient. The cause of the parameter change or event may be known or unknown.

Basis:

This IC addresses an UNPLANNED ~~increase~~ rise in RCS temperature above the Technical Specification cold shutdown temperature limit ~~, or the inability to determine RCS temperature and level,~~and represents a potential degradation of the level of safety of the plant. If the RCS is not intact and CONTAINMENT CLOSURE is not established during this event, the Emergency Director should also refer to ~~IC~~ EAL CA3.1.

A momentary UNPLANNED excursion above the Technical Specification cold shutdown temperature limit when the heat removal function is available does not warrant a classification.

~~EAL #1~~This EAL involves a loss of decay heat removal capability, or an addition of heat to the RCS in excess of that which can currently be removed, such that reactor coolant temperature cannot be maintained below the cold shutdown temperature limit specified in Technical Specifications. During this condition, there is no immediate threat of fuel damage because the core decay heat load has been reduced since the cessation of power operation.

During an outage, the level in the reactor vessel will normally be maintained at or above the reactor vessel flange. Refueling evolutions that lower water level below the reactor vessel flange are carefully planned and controlled. A loss of forced decay heat removal at ~~reduced~~ lowered inventory may result in a rapid ~~increase~~ rise in reactor coolant temperature depending on the time after shutdown.

~~EAL #2 reflects a condition where there has been a significant loss of instrumentation capability necessary to monitor RCS conditions and operators would be unable to monitor key~~

~~parameters necessary to assure core decay heat removal. During this condition, there is no immediate threat of fuel damage because the core decay heat load has been reduced since the cessation of power operation.~~

~~Fifteen minutes was selected as a threshold to exclude transient or momentary losses of indication.~~

Escalation to Alert would be via IC CA1 based on an inventory loss or IC CA3 based on exceeding plant configuration-specific time criteria.

Reference(s):

1. Technical Specifications Table 1.2
2. OP-901-131 Shutdown Cooling Malfunction
3. NEI 99-01 CU3

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 3 – RCS Temperature

Initiating Condition: UNPLANNED rise in RCS temperature

EAL:

CU3.2 Unusual Event

Loss of **all** RCS temperature and RCS level indication for ≥ 15 min. (Note 1)

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Mode Applicability:

5 - Cold Shutdown, 6- Refueling

Definition(s):

CONTAINMENT CLOSURE - The procedurally defined actions taken to secure containment and its associated structures, systems, and components as a functional barrier to fission product release under shutdown conditions. As applied to WF3, all Containment Penetrations are closed as described in the requirements of Technical Specifications section 3/4.9.4 Containment Building Penetrations and OP-010-006, Outage Operations.

Basis:

This ~~IC~~ EAL addresses ~~an UNPLANNED increase in RCS temperature above the Technical Specification cold shutdown temperature limit, or~~ the inability to determine RCS temperature and level, and represents a potential degradation of the level of safety of the plant. If the RCS is not intact and CONTAINMENT CLOSURE is not established during this event, the Emergency Director should also refer to ~~IC~~ EAL CA3.1.

~~A momentary UNPLANNED excursion above the Technical Specification cold shutdown temperature limit when the heat removal function is available does not warrant a classification.~~

~~EAL #1 involves a loss of decay heat removal capability, or an addition of heat to the RCS in excess of that which can currently be removed, such that reactor coolant temperature cannot be maintained below the cold shutdown temperature limit specified in Technical Specifications. During this condition, there is no immediate threat of fuel damage because the core decay heat load has been reduced since the cessation of power operation.~~

~~During an outage, the level in the reactor vessel will normally be maintained above the reactor vessel flange. Refueling evolutions that lower water level below the reactor vessel flange are carefully planned and controlled. A loss of forced decay heat removal at reduced inventory may result in a rapid increase in reactor coolant temperature depending on the time after shutdown.~~

~~EAL #2~~This EAL reflects a condition where there has been a significant loss of instrumentation capability necessary to monitor RCS conditions and operators would be unable to monitor key parameters necessary to assure core decay heat removal. During this condition, there is no immediate threat of fuel damage because the core decay heat load has been reduced since the cessation of power operation.

Fifteen minutes was selected as a threshold to exclude transient or momentary losses of indication.

Escalation to Alert would be via IC CA1 based on an inventory loss or IC CA3 based on exceeding plant configuration-specific time criteria.

Reference(s):

1. Technical Specifications Table 1.2
2. OP-901-131 Shutdown Cooling Malfunction
3. OP-001-005 RCS Drain and Fill Below RCS Hot Leg Centerline
4. NEI 99-01 CU3

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 3 – RCS Temperature

Initiating Condition: Inability to maintain plant in cold shutdown

EAL:

CA3.1 Alert

UNPLANNED rise in RCS temperature to > 200°F for > Table C-3 duration (Note 1)

OR

UNPLANNED RCS pressure rise > 10 psia (this EAL does **not** apply during water-solid plant conditions)

Note 1: The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Table C-3 RCS Heat-up Duration Thresholds

RCS Status	CONTAINMENT CLOSURE Status	Heat-up Duration
Intact (but **not** lowered inventory) (< 20 ft MSL)	N/A	60 min.*
Not intact **OR** lowered inventory (< 20 ft MSL)	established	20 min.*
	not established	0 min.

* If an RCS heat removal system is in operation within this time frame and RCS temperature is being reduced, the EAL is **not** applicable.

Mode Applicability:

5 - Cold Shutdown, 6 – Refueling

Definition(s):

CONTAINMENT CLOSURE - The procedurally defined actions taken to secure containment and its associated structures, systems, and components as a functional barrier to fission product release under shutdown conditions. As applied to WF3, all Containment Penetrations are closed as described in the requirements of Technical Specifications section 3/4.9.4 Containment Building Penetrations and OP-010-006, Outage Operations.

UNPLANNED-. A parameter change or an event that is **not** 1) the result of an intended evolution or 2) an expected plant response to a transient. The cause of the parameter change or event may be known or unknown.

Basis:

In the absence of reliable RCS temperature indication, classification should be based on the RCS pressure rise criteria when the RCS is intact in Mode 5 or based on time to boil data when in Mode 6 or the RCS is not intact in Mode 5 (ref. 2).

This ~~IC~~ 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. Either condition represents an actual or potential substantial degradation of the level of safety of the plant.

A momentary UNPLANNED excursion above the Technical Specification cold shutdown temperature limit when the heat removal function is available does not warrant a classification.

The RCS Heat-up Duration Thresholds table addresses a~~n~~ ~~increase~~ rise in RCS temperature when CONTAINMENT CLOSURE is established but the RCS is not intact, or RCS inventory is reduced (e.g., ~~mid-loop operation~~lowered inventory ~~in PWRs~~). The 20-minute criterion was included to allow time for operator action to address the temperature ~~increase~~rise.

The RCS Heat-up Duration Thresholds table also addresses a~~n~~ ~~increase~~ rise in RCS temperature with the RCS intact. The status of CONTAINMENT CLOSURE is not crucial in this condition since the intact RCS is providing a high pressure barrier to a fission product release. The 60-minute time frame should allow sufficient time to address the temperature ~~increase~~ rise without a substantial degradation in plant safety.

Finally, in the case where there is a~~n~~ ~~increase~~ rise in RCS temperature, the RCS is not intact or is at ~~reduced~~ lowered inventory ~~[*PWR*]~~, and CONTAINMENT CLOSURE is not established, no heat-up duration is allowed (i.e., 0 minutes). This is because 1) the evaporated reactor coolant may be released directly into the containment atmosphere and subsequently to the environment, and 2) there is reduced reactor coolant inventory above the top of irradiated fuel.

~~EAL #2~~The RCS pressure rise threshold provides a pressure-based indication of RCS heat-up in the absence of RCS temperature monitoring capability.

Escalation of the emergency classification level would be via IC CS1 or AS1.

Reference(s):

1. Technical Specifications Table 1.2
2. OP-901-131 Shutdown Cooling Malfunction
3. OP-001-003 Reactor Coolant System Drain Down
4. NEI 99-01 CA3

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 4 – Loss of Vital DC Power

Initiating Condition: Loss of Vital DC power for 15 minutes or longer

EAL:

CU4.1	**Unusual Event**
Indicated voltage is < 108 VDC on required vital DC buses for ≥ 15 min. (Note 1)	

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Mode Applicability:

5 - Cold Shutdown, 6 - Refueling

Definition(s):

SAFETY SYSTEM - A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related (as defined in 10CFR50.2):

Those structures, systems and components that are relied upon to remain functional during and following design basis events to assure:

(1) The integrity of the reactor coolant pressure boundary;

(2) The capability to shut down the reactor and maintain it in a safe shutdown condition;

(3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures.

Basis

This IC addresses a loss of vital DC power which compromises the ability to monitor and control operable SAFETY SYSTEMS when the plant is in the cold shutdown or refueling mode. In these modes, the core decay heat load has been significantly reduced, and coolant system temperatures and pressures are lower; these conditions ~~increase~~ raise the time available to restore a vital DC bus to service. Thus, this condition is considered to be a potential degradation of the level of safety of the plant.

As used in this EAL, “required” means the 3A-DC, 3B-DC or 3AB-DC buses~~vital DC buses~~ necessary to support operation of the in-service, or operable, train or trains of SAFETY SYSTEM equipment. For example, if Train A is out-of-service (inoperable) for scheduled outage maintenance work and Train B is in-service (operable), then a loss of vital DC power affecting Train B would require the declaration of an Unusual Event. A loss of vital DC power to Train A would not warrant an emergency classification.

Fifteen minutes was selected as a threshold to exclude transient or momentary power losses.

Depending upon the event, escalation of the emergency classification level would be via IC CA1 or CA3, or an IC in Recognition Category A.

Less than 108 VDC bus voltage is based on the minimum bus voltage necessary for the operation of safety related equipment (ref. 1, 2, 3). Technical Specifications section 3/4.8.2.2 D.C. Sources - Shutdown, specifies “required” DC buses (associated station batteries and battery chargers) while in cold conditions (ref. 4).

This EAL is the cold condition equivalent of the hot condition EAL SS2.1.

Reference(s):

1. ECE91-058 Battery 3A-S “A” Train Calculation for Station Blackout
2. ECE91-059 Battery 3B-S “B” Train Calculation for Station Blackout
3. ECE91-060 Battery 3AB-S Calculation for Station Blackout
4. Technical Specifications section 3/4.8.2.2 D.C. Sources - Shutdown
5. NEI 99-01 CU4

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 5 – Loss of Communications

Initiating Condition: Loss of **all** onsite or offsite communications capabilities

EAL:

CU5.1 Unusual Event

Loss of **all** Table C-4 onsite communication methods

OR

Loss of **all** Table C-4 State and local agency communication methods

OR

Loss of **all** Table C-4 NRC communication methods

Table C-4 Communication Methods

System	Onsite	State/ Local	NRC
Telephone System	X	X	X
Operational Hotline		X	
Plant Radio System (O&M)	X		
Plant Paging System	X		
Sound Powered Phone System	X		
Civil Defense Radio System		X	
Satellite Phones		X	X
Emergency Notification System (ENS)			X

Mode Applicability:

5 - Cold Shutdown, 6 - Refueling, DEF – Defueled

Definition(s):

None

Basis:

This IC addresses a significant loss of on-site or offsite communications capabilities. While not a direct challenge to plant or personnel safety, this event warrants prompt notifications to ~~OROs~~ State and local agencies and the NRC.

This IC should be assessed only when extraordinary means are being utilized to make communications possible (e.g., use of non-plant, privately owned equipment, relaying of on-site information via individuals or multiple radio transmission points, individuals being sent to offsite locations, etc.).

~~EAL #1~~The first EAL condition addresses a total loss of the communications methods used in support of routine plant operations.

~~EAL #2~~The second EAL condition addresses a total loss of the communications methods used to notify all ~~OROs~~ State and local agencies of an emergency declaration. The State and local agencies referred to here are the St. Charles Parish Department of Homeland Security and Emergency Preparedness, St. Charles Parish Sheriff's Department 911 Center, St. John the Baptist Parish Office of Emergency Preparedness, St. John the Baptist Parish Sheriff's Department 911 Center, Louisiana Department of Environmental Quality and the Louisiana Governor's Office of Homeland Security and Emergency Preparedness. ~~The OROs referred to here are the State and Parish OROs (see Developer Notes).~~

~~EAL #3~~The third EAL condition addresses a total loss of the communications methods used to notify the NRC of an emergency declaration.

This EAL is the cold condition equivalent of the hot condition EAL SU7.1.

Reference(s):

1. EP-003-070 Emergency Communications Systems
2. Waterford 3 SES Emergency Plan Section 7.5 Communications Systems
3. NEI 99-01 CU5

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 6 – Hazardous Event Affecting Safety Systems

Initiating Condition: Hazardous event affecting SAFETY SYSTEMS needed for the current operating mode

EAL:

CA6.1 Alert

The occurrence of **any** Table C-5 hazardous event

AND

Event damage has caused indications of degraded performance on one train of a SAFETY SYSTEM needed for the current operating mode

AND EITHER:

- Event damage has caused indications of degraded performance to the second train of the SAFETY SYSTEM needed for the current operating mode
- Event damage has resulted in VISIBLE DAMAGE to the second train of the SAFETY SYSTEM needed for the current operating mode

(Notes 10, 11)

Note 10: If the affected SAFETY SYSTEM train was already inoperable or out of service before the hazardous event occurred, then emergency classification is **not** warranted.

Note 11: If the hazardous event **only** resulted in VISIBLE DAMAGE, with **no** indications of degraded performance to at least one train of a SAFETY SYSTEM, then this emergency classification is **not** warranted.

Table C-5 Hazardous Events
• Seismic event (earthquake) • Internal or external FLOODING event • High winds or tornado strike • FIRE • EXPLOSION • Other events with similar hazard characteristics as determined by the Shift Manager

Mode Applicability:

5 - Cold Shutdown, 6 - Refueling

Definition(s):

EXPLOSION - A rapid, violent and catastrophic failure of a piece of equipment due to combustion, chemical reaction or overpressurization. A release of steam (from high energy lines or components) or an electrical component failure (caused by short circuits, grounding, arcing, etc.) should **not** automatically be considered an explosion. Such events require a post-event inspection to determine if the attributes of an explosion are present.

FIRE - Combustion characterized by heat and light. Sources of smoke such as slipping drive belts or overheated electrical equipment do **not** constitute fires. Observation of flame is preferred but is **not** required if large quantities of smoke and heat are observed.

FLOODING - A condition where water is entering a room or area faster than installed equipment is capable of removal, resulting in a rise of water level within the room or area.

SAFETY SYSTEM - A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related (as defined in 10CFR50.2):

Those structures, systems and components that are relied upon to remain functional during and following design basis events to assure:

(1) The integrity of the reactor coolant pressure boundary;

(2) The capability to shut down the reactor and maintain it in a safe shutdown condition;

(3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures.

VISIBLE DAMAGE - Damage to a SAFETY SYSTEM train that is readily observable without measurements, testing, or analysis. The visual impact of the damage is sufficient to cause concern regarding the operability or reliability of the affected SAFETY SYSTEM train.

Basis:

This IC addresses a hazardous event that causes damage to SAFETY SYSTEMS needed for the current operating mode. In order to provide the appropriate context for consideration of an ALERT classification, the hazardous event must have caused indications of degraded SAFETY SYSTEM performance in one train, and there must be either indications of performance issues with the second SAFETY SYSTEM train or VISIBLE DAMAGE to the second train such that the potential exists for this second SAFETY SYSTEM train to have performance issues. In other words, in order for this EAL to be classified, the hazardous event must occur, at least one SAFETY SYSTEM train must have indications of degraded performance, and the second SAFETY SYSTEM train must have indications of degraded performance or VISIBLE DAMAGE such that the potential exists for performance issues. Note that this second SAFETY SYSTEM train is from the same SAFETY SYSTEM that has indications of degraded performance; commercial nuclear power plants are designed to be able to support single system issues without compromising public health and safety from radiological events.

Indications of degraded performance addresses damage to a SAFETY SYSTEM train that is in service/operation since indications for it will be readily available. The indications of degraded performance should be significant enough to cause concern regarding the operability or reliability of the SAFETY SYSTEM train.

VISIBLE DAMAGE addresses damage to a SAFETY SYSTEM train that is not in service/operation and that potentially could cause performance issues. Operators will make this determination based on the totality of available event and damage report information. This is intended to be a brief assessment not requiring lengthy analysis or quantification of the damage. This VISIBLE DAMAGE should be significant enough to cause concern regarding the operability or reliability of the SAFETY SYSTEM train.

~~This IC addresses a hazardous event that causes damage to a SAFETY SYSTEM, or a structure containing SAFETY SYSTEM components, needed for the current operating mode. This condition significantly reduces the margin to a loss or potential loss of a fission product barrier, and therefore represents an actual or potential substantial degradation of the level of safety of the plant.~~

~~EAL 1.b.1 addresses damage to a SAFETY SYSTEM train that is in service/operation since indications for it will be readily available. The indications of degraded performance should be significant enough to cause concern regarding the operability or reliability of the SAFETY SYSTEM train.~~

~~EAL 1.b.2 addresses damage to a SAFETY SYSTEM component that is not in service/operation or readily apparent through indications alone, or to a structure containing SAFETY SYSTEM components. Operators will make this determination based on the totality of available event and damage report information. This is intended to be a brief assessment not requiring lengthy analysis or quantification of the damage.~~

Escalation of the emergency classification level would be via IC CS1 or AS1.

This EAL is the cold condition equivalent of the hot condition EAL SA9.1.

Reference(s):

1. EP FAQ 2016-002
2. NEI 99-01 CA6

Category E – Independent Spent Fuel Storage Installation (ISFSI)

EAL Group: ANY (EALs in this category are applicable to any plant condition, hot or cold.)

An independent spent fuel storage installation (ISFSI) is a complex that is designed and constructed for the interim storage of spent nuclear fuel and other radioactive materials associated with spent fuel storage. A significant amount of the radioactive material contained within a canister must escape its packaging and enter the biosphere for there to be a significant environmental effect resulting from an accident involving the dry storage of spent nuclear fuel.

An Unusual Event is declared on the basis of the occurrence of an event of sufficient magnitude that a loaded cask CONFINEMENT BOUNDARY is damaged or violated.

The WF3 ISFSI is located wholly within the plant PROTECTED AREA. Therefore any security event related to the ISFSI is classified under Category H1 security event related EALs.

Category: E - ISFSI

Subcategory: ISFSI

Initiating Condition: Damage to a loaded cask CONFINEMENT BOUNDARY

EAL:

EU1.1 Unusual Event

Damage to a loaded cask CONFINEMENT BOUNDARY as indicated by an on-contact radiation reading on the surface of a loaded spent fuel cask > **any** Table E-1 dose rate limit.

Table E-1 ISFSI Dose Rate Limits
HI-STORM (Note E)
126 mrem/hr Total Dose Rate Point A
338 mrem/hr Total Dose Rate Point B
326 mrem/hr Total Dose Rate Point C
60 mrem/hr Total Dose Rate Point D
60 mrem/hr Total Dose Rate Point E
374 mrem/hr Total Dose Rate Point F
136 mrem/hr Total Dose Rate Point G

NOTE E: Survey points are described in DFS-007-003, Radiation Monitoring Requirements for Loading and Storage HI-STORM.

Mode Applicability:

All

Definition(s):

CONFINEMENT BOUNDARY- The barrier(s) between spent fuel and the environment once the spent fuel is processed for dry storage. The cask confinement boundary is considered the Multi-Purpose Canister (MPC) for the HI-STORM 100 dry storage system.

INDEPENDENT SPENT FUEL STORAGE INSTALLATION (ISFSI): A complex that is designed and constructed for the interim storage of spent nuclear fuel and other radioactive materials associated with spent fuel storage.

Basis:

This IC addresses an event that results in damage to the CONFINEMENT BOUNDARY of a storage cask containing spent fuel. It applies to irradiated fuel that is licensed for dry storage beginning at the point that the loaded storage cask is sealed. The issues of concern are the creation of a potential or actual release path to the environment, degradation of one or more fuel assemblies due to environmental factors, and configuration changes which could cause challenges in removing the cask or fuel from storage.

The existence of "damage" is determined by radiological survey. The specified EAL threshold values correspond to 2 times the cask technical specification values (ref. 1, 2). The technical specification (licensing bases document) multiple of "2 times", which is also used in Recognition Category A IC AU1, is used here to distinguish between non-emergency and emergency conditions. The emphasis for this classification is the degradation in the level of safety of the spent fuel cask and not the magnitude of the associated dose or dose rate. It is recognized that in the case of extreme damage to a loaded cask, the fact that the "on-contact" dose rate limit is exceeded may be determined based on measurement of a dose rate at some distance from the cask.

Security-related events for ISFSIs are covered under ICs HU1 and HA1.

Reference(s):

1. UFSAR Section 9.1.5 Spent Fuel Dry Cask Storage
2. Holtec International Final Safety Analysis Report for the HI-STORM 100 Cask System – Holtec Report No.: HI-2002444
3. DFS-007-003 Radiation Monitoring Requirements for Loading and Storage HI-STORM
4. NEI 99-01 E-HU1

Category F – Fission Product Barrier Degradation

EAL Group: Hot Conditions (RCS temperature > 200ºF); EALs in this category are applicable only in one or more hot operating modes.

EALs in this category represent threats to the defense in depth design concept that precludes the release of highly radioactive fission products to the environment. This concept relies on multiple physical barriers any one of which, if maintained intact, precludes the release of significant amounts of radioactive fission products to the environment. The primary fission product barriers are:

A. Fuel Clad Barrier (FCB): The Fuel Clad Barrier consists of the cladding material that contains the fuel pellets.

B. Reactor Coolant System Barrier (RCB): The RCS Barrier includes the RCS primary side and its connections up to and including the pressurizer safety and relief valves, and other connections up to and including the primary isolation valves.

C. Containment Barrier (CNB): The Containment Barrier includes the containment building and connections up to and including the outermost containment isolation valves. This barrier also includes the main steam, feedwater, and blowdown line extensions outside the containment building up to and including the outermost secondary side isolation valve. Containment Barrier thresholds are used as criteria for escalation of the Emergency Classification Level (ECL) from an Alert to a Site Area Emergency or a General Emergency.

The EALs in this category require evaluation of the loss and potential loss thresholds listed in the fission product barrier matrix of Table F-1. “Loss” and “Potential Loss” signify the relative damage and threat of damage to the barrier. “Loss” means the barrier no longer assures containment of radioactive materials. “Potential Loss” means integrity of the barrier is threatened and could be lost if conditions continue to degrade. The number of barriers that are lost or potentially lost and the following criteria determine the appropriate emergency classification level:

Alert:
Any loss or any potential loss of either Fuel Clad or RCS Barrier

Site Area Emergency:
Loss or potential loss of any two barriers

General Emergency:
Loss of any two barriers and loss or potential loss of third barrier

The logic used for emergency classification based on fission product barrier monitoring should reflect the following considerations:

- The Fuel Clad Barrier and the RCS Barrier are weighted more heavily than the Containment Barrier.

- Unusual Event ICs associated with RCS and Fuel Clad Barriers are addressed under System Malfunction ICs.
- For accident conditions involving a radiological release, evaluation of the fission product barrier thresholds will need to be performed in conjunction with dose assessments to ensure correct and timely escalation of the emergency classification. For example, an evaluation of the fission product barrier thresholds may result in a Site Area Emergency classification while a dose assessment may indicate that an EAL for General Emergency IC AG1 has been exceeded.
- The fission product barrier thresholds specified within a scheme reflect plant-specific WF3 design and operating characteristics.
- As used in this category, the term RCS leakage encompasses not just those types defined in Technical Specifications but also includes the loss of RCS mass to any location– inside the containment, an interfacing system, or outside of the containment. The release of liquid or steam mass from the RCS due to the as-designed/expected operation of a relief valve is not considered to be RCS leakage.
- At the Site Area Emergency level, EAL users should maintain cognizance of how far present conditions are from meeting a threshold that would require a General Emergency declaration. For example, if the Fuel Clad and RCS fission product barriers were both lost, then there should be frequent assessments of containment radioactive inventory and integrity. Alternatively, if both the Fuel Clad and RCS fission product barriers were potentially lost, the Emergency Director would have more assurance that there was no immediate need to escalate to a General Emergency.

Category: F - Fission Product Barrier Degradation

Subcategory: N/A

Initiating Condition: **Any** loss or **any** potential loss of either Fuel Clad or RCS barrier

EAL:

FA1.1	**Alert**
Any loss or **any** potential loss of either Fuel Clad or RCS barrier (Table F-1)	

Mode Applicability:

1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 - Hot Shutdown

Definition(s):

None

Basis:

Fuel Clad, RCS and Containment comprise the fission product barriers. Table F-1 lists the fission product barrier thresholds, bases and references.

At the Alert classification level, Fuel Clad and RCS barriers are weighted more heavily than the Containment barrier. Unlike the Containment barrier, loss or potential loss of either the Fuel Clad or RCS barrier may result in the relocation of radioactive materials or degradation of core cooling capability. Note that the loss or potential loss of Containment barrier in combination with loss or potential loss of either Fuel Clad or RCS barrier results in declaration of a Site Area Emergency under EAL FS1.1

Reference(s):

1. NEI 99-01 FA1

Category: F - Fission Product Barrier Degradation

Subcategory: N/A

Initiating Condition: Loss or potential loss of **any** two barriers

EAL:

FS1.1	**Site Area Emergency**
Loss or potential loss of **any** two barriers (Table F-1)	

Mode Applicability:

1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 - Hot Shutdown

Definition(s):

IMMINENT - The trajectory of events or conditions is such that an EAL will be met within a relatively short period of time regardless of mitigation or corrective actions.

Basis:

Fuel Clad, RCS and Containment comprise the fission product barriers. Table F-1 lists the fission product barrier thresholds, bases and references.

At the Site Area Emergency classification level, each barrier is weighted equally. A Site Area Emergency is therefore appropriate for any combination of the following conditions:

- One barrier loss and a second barrier loss (i.e., loss - loss)
- One barrier loss and a second barrier potential loss (i.e., loss - potential loss)
- One barrier potential loss and a second barrier potential loss (i.e., potential loss - potential loss)

At the Site Area Emergency classification level, the ability to dynamically assess the proximity of present conditions with respect to the threshold for a General Emergency is important. For example, the existence of Fuel Clad and RCS Barrier loss thresholds in addition to offsite dose assessments would require continual assessments of radioactive inventory and Containment integrity in anticipation of reaching a General Emergency classification. Alternatively, if both Fuel Clad and RCS Potential Loss thresholds existed (vice Loss), the Emergency Director would have greater assurance that escalation to a General Emergency is less IMMINENT.

Reference(s):

1. NEI 99-01 FS1

Category: F - Fission Product Barrier Degradation

Subcategory: N/A

Initiating Condition: Loss of **any** two barriers and loss or potential loss of the third barrier

EAL:

FG1.1 General Emergency

Loss of **any** two barriers

AND

Loss or potential loss of the third barrier (Table F-1)

Mode Applicability:

1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 - Hot Shutdown

Definition(s):

None

Basis:

Fuel Clad, RCS and Containment comprise the fission product barriers. Table F-1 lists the fission product barrier thresholds, bases and references.

At the General Emergency classification level each barrier is weighted equally. A General Emergency is therefore appropriate for any combination of the following conditions:

- Loss of Fuel Clad, RCS and Containment Barriers
- Loss of Fuel Clad and RCS Barriers with potential loss of Containment Barrier
- Loss of RCS and Containment Barriers with potential loss of Fuel Clad Barrier
- Loss of Fuel Clad and Containment Barriers with potential loss of RCS Barrier

Reference(s):

1. NEI 99-01 FG1

Table F-1 Fission Product Barrier Threshold Matrix & Bases

Table F-1 lists the threshold conditions that define the Loss and Potential Loss of the three fission product barriers (Fuel Clad, Reactor Coolant System, and Containment). The table is structured so that each of the three barriers occupies adjacent columns. Each fission product barrier column is further divided into two columns; one for Loss thresholds and one for Potential Loss thresholds.

The first column of the table (to the left of the Fuel Clad Loss column) lists the categories (types) of fission product barrier thresholds. The fission product barrier categories are:

A. RCS or S/G Tube Leakage
B. Inadequate Heat removal
C. Containment Radiation / RCS Activity
D. Containment Integrity or Bypass
E. Emergency Director Judgment

Each category occupies a row in Table F-1 thus forming a matrix defined by the categories. The intersection of each row with each Loss/Potential Loss column forms a cell in which one or more fission product barrier thresholds appear. If NEI 99-01 does not define a threshold for a barrier Loss/Potential Loss, the word “None” is entered in the cell.

Thresholds are assigned sequential numbers within each barrier column beginning with number one (ex., FCB1, FCB2…FCB9).

If a cell in Table F-1 contains more than one numbered threshold, each of the numbered thresholds, if exceeded, signifies a Loss or Potential Loss of the barrier. It is not necessary to exceed all of the thresholds in a category before declaring a barrier Loss/Potential Loss.

Subdivision of Table F-1 by category facilitates association of plant conditions to the applicable fission product barrier Loss and Potential Loss thresholds. This structure promotes a systematic approach to assessing the classification status of the fission product barriers.

When equipped with knowledge of plant conditions related to the fission product barriers, the EAL-user first scans down the category column of Table F-1, locates the likely category and then reads across the fission product barrier Loss and Potential Loss thresholds in that category to determine if a threshold has been exceeded. If a threshold has not been exceeded, the EAL-user proceeds to the next likely category and continues review of the thresholds in the new category

If the EAL-user determines that any threshold has been exceeded, by definition, the barrier is lost or potentially lost – even if multiple thresholds in the same barrier column are exceeded, only that one barrier is lost or potentially lost. The EAL-user must examine each of the three fission product barriers to determine if other barrier thresholds in the category are lost or potentially lost. For example, if containment radiation is sufficiently high, a Loss of the Fuel Clad and RCS Barriers and a Potential Loss of the Containment Barrier can occur. Barrier Losses and Potential Losses are then applied to the algorithms given in EALs FG1.1, FS1.1, and FA1.1 to determine the appropriate emergency classification.

In the remainder of this Attachment, the Fuel Clad Barrier threshold bases appear first, followed by the RCS Barrier and finally the Containment Barrier threshold bases. In each barrier, the bases are given according category Loss followed by category Potential Loss beginning with Category A, then B,…, E.

Table F-1 Fission Product Barrier Threshold Matrix

	Fuel Clad Barrier (FCB)		Reactor Coolant System Barrier (RCB)		Containment Barrier (CNB)	
Category	**Loss**	**Potential Loss**	**Loss**	**Potential Loss**	**Loss**	**Potential Loss**
A **RCS or S/G Tube Leakage**	None	FCB1 RVLMS upper plenum level 0%	RCB1 An automatic or manual ECCS (SIAS) actuation required by **EITHER:** • UNISOLABLE RCS leakage • S/G tube RUPTURE	RCB2 UNISOLABLE RCS leakage or S/G tube leakage > 44 gpm excluding normal reductions in RCS inventory (e.g., letdown, RCP seal leakoff) RCB3 RCS cooldown rate > 100°F/hr **AND** Pressurizer pressure > maximum limits of the RCS Pressure and Temperature Limits (OP-902-009 Attachments 2-A thru D)	CNB1 S/G tube leakage > 44 gpm (excluding normal reductions in RCS inventory) or that is RUPTURED is also FAULTED outside of containment	None
B **Inadequate Heat Removal**	FCB2 Representative CET readings > 1,200°F	FCB3 Representative CET readings > 700°F FCB4 **Any** OP-902-008 Functional Recovery RCS/Core Heat Removal safety function criterion is **not** met for ≥ 15 min. (Note 1)	None	RCB4 **Any** OP-902-008 Functional Recovery RCS/Core Heat Removal safety function criterion is **not** met for ≥ 15 min. (Note 1)	None	CNB2 Representative CET readings > 1,200°F **AND** Restoration procedures **not** effective within 15 min. (Note 1)
C **CTMT Radiation / RCS Activity**	FCB5 Containment High Range Radiation Monitor (ARM-IRE-5400AS or ARM-IRE-5400BS) > 900 R/hr. (Note 14) FCB6 Reactor coolant activity > 300 µCi/gm dose equivalent I-131 as indicated by Chemistry sample	None	RCB5 Containment High Range Radiation Monitor (ARM-IRE-5400AS or ARM-IRE-5400BS) > 60 R/hr. (Note 14)	None	None	CNB3 Containment High Range Radiation Monitor (ARM-IRE-5400AS or ARM-IRE-5400BS) > 15,000 R/hr. (Note 14)
D **CTMT Integrity or Bypass**	None	None	None	None	CNB4 Containment isolation is required **AND EITHER:** • Containment integrity has been lost based on Emergency Director judgment • UNISOLABLE pathway from Containment to the environment exists CNB5 Indications of RCS leakage outside of Containment	CNB6 Containment pressure > 50 psia CNB7 Containment hydrogen concentration > 4% CNB8 Containment pressure > 17.7 psia with < one full train of containment heat removal systems operating per design for ≥ 15 min. (Notes 1, 9)
E **Emergency Director Judgment**	FCB7 **Any** condition in the opinion of the Emergency Director that indicates loss of the Fuel Clad barrier	FCB8 **Any** condition in the opinion of the Emergency Director that indicates potential loss of the Fuel Clad barrier	RCB6 **Any** condition in the opinion of the Emergency Director that indicates loss of the RCS barrier	RCB7 **Any** condition in the opinion of the Emergency Director that indicates potential loss of the RCS barrier	CNB9 **Any** condition in the opinion of the Emergency Director that indicates loss of the Containment barrier	CNB10 **Any** condition in the opinion of the Emergency Director that indicates potential loss of the Containment barrier

Barrier: Fuel Clad

Category: A. RCS or S/G Tube Leakage

Degradation Threat: Loss

Threshold:

None

Barrier: Fuel Clad

Category: A. RCS or S/G Tube Leakage

Degradation Threat: Potential Loss

Threshold:

FCB1
RVLMS upper plenum level 0%

Definition(s):

None

Basis:

This reading indicates a reduction in reactor vessel water level sufficient to allow the onset of heat-induced cladding damage.

The closest indication of level near top of active fuel is provided by the RVLMS 0% sensor (#8), ~12.6 in. above the fuel alignment plate (ref. 1).

RVLMS Sensor #8 (RVLMS upper plenum level 0%) may briefly indicate voided during a normal response to a loss of inventory. Existing guidance for classifying transient events such as this addresses the period of time of event recognition and classification (15 minutes). However, in cases when EAL declaration criteria may be met momentarily during the normal expected response of the plant, declaration requirements should **not** be considered to be met when the conditions are a part of the designed plant response, or result from appropriate operator actions (ref. 2, 3).

There is no Fuel Clad barrier Loss threshold associated with RCS or S/G Tube Leakage.

Reference(s):

1. UFSAR Section 1.9A Inadequate Core Cooling Instrumentation
2. SAMG-03A Severe Accident Management Guidelines Candidate High Level Action Implementation and Assessment Waterford Unit 3
3. CEOG Generic Accident Management Guidelines - Phase 1, “Initial Diagnosis”
4. NEI 99-01 RCS or S/G Tube Leakage Potential Loss 1.A

Barrier: Fuel Clad

Category: B. Inadequate Heat Removal

Degradation Threat: Loss

Threshold:

FCB2

Representative CET readings > 1,200°F

Definition(s):

None

Basis:

This reading indicates temperatures within the core are sufficient to cause significant superheating of reactor coolant.

Reference(s):

1. CEOG Generic Accident Management Guidelines
2. UFSAR Section 1.9A Inadequate Core Cooling Instrumentation
3. NEI 99-01 Inadequate Heat Removal Loss 2.A

Barrier: Fuel Clad

Category: B. Inadequate Heat Removal

Degradation Threat: Potential Loss

Threshold:

FCB3

Representative CET readings > 700°F

Definition(s):

None

Basis:

This reading indicates a reduction in reactor vessel water level sufficient to allow the onset of heat-induced cladding damage.

Reference(s):

1. CEOG Generic Accident Management Guidelines
2. UFSAR Section 1.9A Inadequate Core Cooling Instrumentation
3. NEI 99-01 Inadequate Heat Removal Potential Loss 2.A

Barrier: Fuel Clad

Category: B. Inadequate Heat Removal

Degradation Threat: Potential Loss

Threshold:

FCB4

Any OP-902-008 Functional Recovery RCS/Core Heat Removal safety function criterion is **not** met for ≥ 15 min. (Note 1)

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Definition(s):

None

Basis:

This condition indicates an extreme challenge to the ability to remove RCS heat using the steam generators (i.e., loss of an effective secondary-side heat sink). This condition represents a potential loss of the Fuel Clad Barrier. In accordance with EOPs, there may be unusual accident conditions during which operators intentionally reduce the heat removal capability of the steam generators; during these conditions, classification using this threshold is not warranted.

In combination with Potential Loss threshold RCB4, meeting this threshold results in a Site Area Emergency.

Inability to remove heat from the RCS to the ultimate heat sink is a loss of function required for hot shutdown with the reactor at pressure and temperature and thus represents potential loss of the Fuel Clad and RCS barriers. The RCS/Core Heat Removal safety function criteria from OP-902-008, Functional Recovery is used for this determination (ref. 1, 2).

The process of checking the safety functions in EOPs is periodic and continuous as long as the procedure is in use. The fifteen minute interval (subject to Note 1) provides a suitable opportunity to assess plant conditions with respect to the threshold criteria.

Reference(s):

1. OP-902-008 Functional Recovery
2. TG-OP-902-008 Technical Guide for Functional Recovery
3. NEI 99-01 Inadequate Heat Removal Potential Loss 2.B

Barrier: Fuel Clad

Category: C. CTMT Radiation / RCS Activity

Degradation Threat: Loss

Threshold:

FCB5

Containment High Range Radiation Monitor (ARM-IRE-5400AS or ARM-IRE-5400BS) > 900 R/hr (Note 14).

Note 14: Evaluate Containment High Range Radiation Monitor readings for potential erratic indications as a result of thermally induced currents.

Definition(s):

None

Basis:

NRC Information Notice 97-045 Supplement 1 identifies the potential for erratic indications from the Containment High Range Radiation Monitors (CHRRMs) as a result of Thermally Induced Currents (TIC) which may cause the CHRRM to read falsely high on a rapid temperature rise, and fail low intermittently on a rapid temperature fall. The TICs induced in the Waterford CHRRM signal cable are anticipated to be negligible within 5 minutes. Because of this phenomenon, any trends or alarms on the CHRRM's should be validated by comparison to the containment low range/area radiation monitors and Air Monitoring Systems trends before actions are taken.

The containment radiation monitor reading (943 R/hr rounded to 900 R/hr for readability) corresponds to an instantaneous release of all reactor coolant mass into the containment, assuming that reactor coolant activity equals 300 µCi/gm dose equivalent I-131. Reactor coolant activity above this level is greater than that expected for iodine spikes and corresponds to ~~an~~ approximately ~~range of 2~~1% ~~to 5%~~ fuel clad damage. Since this condition indicates that a significant amount of fuel clad damage has occurred, it represents a loss of the Fuel Clad Barrier.

The radiation monitor reading in this threshold is higher than that specified for RCS Barrier Loss threshold ~~C.1~~ RCB5 since it indicates a loss of both the Fuel Clad Barrier and the RCS Barrier. Note that a combination of the two monitor readings appropriately escalates the ECL to a Site Area Emergency.

There is no Fuel Clad barrier Potential Loss threshold associated with CTMT Radiation/RCS Activity ~~/ Containment Radiation~~.

Reference(s):

1. EC86890, EP-CALC-WF3-1702, Cont. High Range Radiation EAL Threshold Values
2. NRC Information Notice 97-045 Supplement 1
3. NEI 99-01 CTMT Radiation / RCS Activity FC Loss 3.A

Barrier: Fuel Clad

Category: C. CTMT Radiation / RCS Activity

Degradation Threat: Loss

Threshold:

FCB6

Reactor coolant activity > 300 µCi/gm dose equivalent I-131 as indicated by Chemistry sample

Definition(s):

None

Basis:

This threshold indicates that RCS radioactivity concentration is greater than 300 µCi/gm dose equivalent I-131. Reactor coolant activity above this level is greater than that expected for iodine spikes and corresponds to ~~an~~ approximately~~e~~ ~~range of~~ 1~~2% to 5~~% fuel clad damage. Since this condition indicates that a significant amount of fuel clad damage has occurred, it represents a loss of the Fuel Clad Barrier.

It is recognized that sample collection and analysis of reactor coolant with highly elevated activity levels could require several hours to complete. Nonetheless, a sample-related threshold is included as a backup to other indications.

There is no Fuel Clad barrier Potential Loss threshold associated with CTMT Radiation/RCS Activity ~~/ Containment Radiation~~.

Reference(s):

1. NEI 99-01 CTMT Radiation / RCS Activity Fuel Clad Loss 3.B

Barrier: Fuel Clad

Category: C. CTMT Radiation / RCS Activity

Degradation Threat: Potential Loss

Threshold:

None

Barrier: Fuel Clad

Category: D. CTMT Integrity or Bypass

Degradation Threat: Loss

Threshold:

None

Barrier: Fuel Clad

Category: D. CTMT Integrity or Bypass

Degradation Threat: Potential Loss

Threshold:

None

Barrier: Fuel Clad

Category: E. Emergency Director Judgment

Degradation Threat: Loss

Threshold:

FCB7

Any condition in the opinion of the Emergency Director that indicates loss of the Fuel Clad barrier

Definition(s):

None

Basis:

This threshold addresses any other factors that are to be used by the Emergency Director in determining whether the Fuel Clad barrier is lost.

Reference(s):

1. NEI 99-01 Emergency Director Judgment Fuel Clad Loss 6.A

Barrier: Fuel Clad

Category: E. Emergency Director Judgment

Degradation Threat: Potential Loss

Threshold:

FCB8

Any condition in the opinion of the Emergency Director that indicates potential loss of the Fuel Clad barrier

Definition(s):

None

Basis:

This threshold addresses any other factors that are to be used by the Emergency Director in determining whether the Fuel Clad barrier is potentially lost. The Emergency Director should also consider whether or not to declare the barrier potentially lost in the event that barrier status cannot be monitored.

Reference(s):

1. NEI 99-01 Emergency Director Judgment Potential Fuel Clad Loss 6.A

Barrier: Reactor Coolant System

Category: A. RCS or S/G Tube Leakage

Degradation Threat: Loss

Threshold:

RCB1

An automatic or manual ECCS (SIAS) actuation required by **EITHER:**

- UNISOLABLE RCS leakage
- S/G tube RUPTURE

Definition(s):

FAULTED - The term applied to a steam generator that has a steam leak on the secondary side of sufficient size to cause an uncontrolled drop in steam generator pressure or the steam generator to become completely depressurized.

RUPTURE(D) - The condition of a steam generator in which primary-to-secondary leakage is of sufficient magnitude to require a safety injection (automatic or manual).

UNISOLABLE - An open or breached system line that **cannot** be isolated, remotely or locally.

Basis:

Failure to isolate the leak (from the Control Room or locally), within 15 minutes or if known that the leak cannot be isolated within 15 minutes, from the start of the leak requires immediate classification.

This threshold is based on an UNISOLABLE RCS leak of sufficient size to require an automatic or manual actuation of the Emergency Core Cooling System (ECCS). This condition clearly represents a loss of the RCS Barrier.

This threshold is applicable to unidentified and pressure boundary leakage, as well as identified leakage. It is also applicable to UNISOLABLE RCS leakage through an interfacing system. The mass loss may be into any location – inside containment, to the secondary-side (i.e., steam generator tube leakage) or outside of containment.

A steam generator with primary-to-secondary leakage of sufficient magnitude to require a safety injection is considered to be RUPTURED. If a RUPTURED steam generator is also FAULTED outside of containment, the declaration escalates to a Site Area Emergency since the Containment Barrier Loss threshold ~~1.A~~CNB1 will also be met.

Reference(s):

1. NEI 99-01 RCS or SG Tube Leakage Reactor Coolant System Loss 1.A

Barrier: Reactor Coolant System

Category: A. RCS or S/G Tube Leakage

Degradation Threat: Potential Loss

Threshold:

RCB2

UNISOLABLE RCS leakage or S/G tube leakage > 44 gpm excluding normal reductions in RCS inventory (e.g., letdown, RCP seal leakoff)

Definition(s):

FAULTED - The term applied to a steam generator that has a steam leak on the secondary side of sufficient size to cause an uncontrolled drop in steam generator pressure or the steam generator to become completely depressurized.

UNISOLABLE - An open or breached system line that **cannot** be isolated, remotely or locally.

Basis:

Failure to isolate the leak (from the Control Room or locally), within 15 minutes or if known that the leak cannot be isolated within 15 minutes, from the start of the leak requires immediate classification.

This threshold is based on an UNISOLABLE RCS leak that results in the inability to maintain pressurizer level within specified limits by operation of a normally used charging ~~) (makeup)~~ pump, but an ECCS (SIAS) actuation has not occurred. ~~The threshold is met when an operating procedure, or operating crew supervision, directs that a standby charging (makeup) pump be placed in service to restore and maintain pressurizer level~~

Isolating letdown is a standard abnormal operating procedure action and may prevent unnecessary classifications when a non-RCS leakage path such as a CVCS leak exists. The intent of this condition is met if attempts to isolate Letdown are NOT successful. Additional charging pumps being required is indicative of a substantial RCS leak.

This threshold is applicable to unidentified and pressure boundary leakage, as well as identified leakage. It is also applicable to UNISOLABLE RCS leakage through an interfacing system. The mass loss may be into any location – inside containment, to the secondary-side (i.e., steam generator tube leakage) or outside of containment.

If a leaking steam generator is also FAULTED outside of containment, the declaration escalates to a Site Area Emergency since the Containment Barrier Loss threshold ~~1.A~~CNB1 will also be met.

Reference(s):

1. OP-901-111 Reactor Coolant System Leak
2. UFSAR Table 9.3-9 Design Parameters
3. NEI 99-01 RCS or SG Tube Leakage Reactor Coolant System Potential Loss 1.A

Barrier: Reactor Coolant System

Category: A. RCS or S/G Tube Leakage

Degradation Threat: Potential Loss

Threshold:

RCB3

RCS cooldown rate > 100°F/hr

AND

Pressurizer pressure > maximum limits of the RCS Pressure and Temperature Limits (OP-902-009 Attachments 2-A thru D)

Definition(s):

None

Basis:

This condition indicates an extreme challenge to the integrity of the RCS pressure boundary due to pressurized thermal shock – a transient that causes rapid RCS cooldown of greater than 100° F in less than 1 hour while the RCS is in Mode 3 or higher (i.e., hot and pressurized).

Reference(s):

1. TG-OP-902-004 Technical Guide for Excess Steam Demand Recovery Procedure
2. Technical Specifications 3.4.8 Pressure/Temperature Limits
3. OP-902-008 Functional Recovery
4. OP-902-009 Standard Appendices, Attachments 2-A thru D RCS Pressure and Temperature Limits
5. NEI 99-01 RCS or SG Tube Leakage Reactor Coolant System Potential Loss 1.B

Barrier: Reactor Coolant System

Category: B. Inadequate Heat Removal

Degradation Threat: Loss

Threshold:

None

Barrier: Reactor Coolant System

Category: B. Inadequate Heat Removal

Degradation Threat: Potential Loss

Threshold:

RCB4

Any OP-902-008 Functional Recovery RCS/Core Heat Removal safety function criterion is **not** met for ≥ 15 min. (Note 1)

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Definition(s):

None

Basis:

This condition indicates an extreme challenge to the ability to remove RCS heat using the steam generators (i.e., loss of an effective secondary-side heat sink). This condition represents a potential loss of the RCS Barrier. In accordance with EOPs, there may be unusual accident conditions during which operators intentionally reduce the heat removal capability of the steam generators; during these conditions, classification using this threshold is not warranted.

In combination with Potential Loss threshold FCB4, meeting this threshold results in a Site Area Emergency.

~~Meeting this threshold results in a Site Area Emergency because this threshold is identical to Fuel Clad Barrier Potential Loss threshold 2.B; both will be met.~~ This condition warrants a Site Area Emergency declaration because inadequate RCS heat removal may result in fuel heat-up sufficient to damage the cladding and ~~increase~~ raise RCS pressure to the point where mass will be lost from the system.

Inability to remove heat from the RCS to the ultimate heat sink is a loss of function required for hot shutdown with the reactor at pressure and temperature and thus represents potential loss of the Fuel Clad and RCS barriers. The RCS/Core Heat Removal safety function criteria from OP-902-008, Functional Recovery is used for this determination (ref. 1, 2).

The process of checking the safety functions in EOPs is periodic and continuous as long as the procedure is in use. The fifteen minute interval (subject to Note 1) provides a suitable opportunity to assess plant conditions with respect to the threshold criteria.

There is no RCS barrier Loss threshold associated with Inadequate Heat Removal.

Reference(s):

1. OP-902-008 Functional Recovery
2. TG-OP-902-008 Technical Guide for Functional Recovery
3. NEI 99-01 Inadequate Heat Removal RCS Potential Loss 2.B

Barrier: Reactor Coolant System

Category: C. CTMT Radiation/ RCS Activity

Degradation Threat: Loss

Threshold:

RCB5

Containment High Range Radiation Monitor (ARM-IRE-5400AS or ARM-IRE-5400BS) > 60 R/hr (Note 14).

Note 14: Evaluate Containment High Range Radiation Monitor readings for potential erratic indications as a result of thermally induced currents.

Definition(s):

N/A

Basis:

NRC Information Notice 97-045 Supplement 1 identifies the potential for erratic indications from the Containment High Range Radiation Monitors (CHRRMs) as a result of Thermally Induced Currents (TIC) which may cause the CHRRM to read falsely high on a rapid temperature rise, and fail low intermittently on a rapid temperature fall. The TICs induced in the Waterford CHRRM signal cable are anticipated to be negligible within 5 minutes. Because of this phenomenon, any trends or alarms on the CHRRM's should be validated by comparison to the containment low range/area radiation monitors and Air Monitoring Systems trends before actions are taken.

The containment radiation monitor reading (61.9 R/hr rounded to 60 R/hr for readability) corresponds to an instantaneous release of all reactor coolant mass into the containment, assuming that reactor coolant activity equals Technical Specification allowable limits (ref. 1). This value is lower than that specified for Fuel Clad Barrier Loss threshold ~~3.A~~FCB5 since it indicates a loss of the RCS Barrier only.

There is no RCS barrier Potential Loss threshold associated with CTMT ~~RCS Activity / Containment~~ Radiation/RCS Activity.

Reference(s):

1. EC86890, EP-CALC-WF3-1702, Cont~~ainment~~. High Range Radiation EAL Threshold Values
2. NRC Information Notice 97-045 Supplement 1
3. NEI 99-01 CTMT Radiation / RCS Activity RCS Loss 3.A

Barrier: Reactor Coolant System

Category: B. CTMT Radiation/ RCS Activity

Degradation Threat: Potential Loss

Threshold:

None

Barrier: Reactor Coolant System

Category: D. CTMT Integrity or Bypass

Degradation Threat: Loss

Threshold:

None

Barrier: Reactor Coolant System

Category: D. CTMT Integrity or Bypass

Degradation Threat: Potential Loss

Threshold:

None

Barrier: Reactor Coolant System

Category: E. Emergency Director Judgment

Degradation Threat: Loss

Threshold:

RCB6

Any condition in the opinion of the Emergency Director that indicates loss of the RCS barrier

Definition(s):

None

Basis:

This threshold addresses any other factors that may be used by the Emergency Director in determining whether the RCS Barrier is lost.

Reference(s):

1. NEI 99-01 Emergency Director Judgment RCS Loss 6.A

Barrier: Reactor Coolant System

Category: E. Emergency Director Judgment

Degradation Threat: Potential Loss

Threshold:

RCB7

Any condition in the opinion of the Emergency Director that indicates potential loss of the RCS barrier

Definition(s):

None

Basis:

This threshold addresses any other factors that may be used by the Emergency Director in determining whether the RCS Barrier is potentially lost. The Emergency Director should also consider whether or not to declare the barrier potentially lost in the event that barrier status cannot be monitored.

Reference(s):

1. NEI 99-01 Emergency Director Judgment RCS Potential Loss 6.A

Barrier: Containment

Category: A. RCS or S/G Tube Leakage

Degradation Threat: Loss

Threshold:

CNB1

S/G tube leakage > 44 gpm (excluding normal reductions in RCS inventory) or that is RUPTURED is also FAULTED outside of containment

Definition(s):

FAULTED - The term applied to a steam generator that has a steam leak on the secondary side of sufficient size to cause an uncontrolled drop in steam generator pressure or the steam generator to become completely depressurized.

RUPTURED - The condition of a steam generator in which primary-to-secondary leakage is of sufficient magnitude to require a safety injection (automatic or manual).

Basis:

This threshold addresses a leaking or RUPTURED Steam Generator (S/G) that is also FAULTED outside of containment. The condition of the SG, whether leaking or RUPTURED, is determined in accordance with the thresholds for RCS Barrier Potential Loss ~~1.A~~ RCB2 and Loss ~~1.A~~RCB1, respectively. This condition represents a bypass of the containment barrier.

FAULTED is a defined term within the NEI 99-01 methodology; this determination is not necessarily dependent upon entry into, or diagnostic steps within, an EOP. For example, if the pressure in a steam generator is ~~decreasing~~ dropping uncontrollably (~~[~~part of the FAULTED definition)~~]~~ and the FAULTED steam generator isolation procedure is not entered because EOP user rules are dictating implementation of another procedure to address a higher priority condition, the steam generator is still considered FAULTED for emergency classification purposes.

The FAULTED criterion establishes an appropriate lower bound on the size of a steam release that may require an emergency classification. Steam releases of this size are readily observable with normal Control Room indications. The lower bound for this aspect of the containment barrier is analogous to the lower bound criteria specified in IC SU4 for the fuel clad barrier (i.e., RCS activity values) and IC SU5 for the RCS barrier (i.e., RCS leak rate values).

This threshold also applies to prolonged steam releases necessitated by operational considerations such as the forced steaming of a leaking or RUPTURED steam generator directly to atmosphere to cooldown the plant, or to drive ~~an auxiliary (emergency) feed water pump~~Emergency Feedwater Pump AB. These conditions may exist when one steam

generator is leaking or ruptured and the opposite steam generator is also faulted. These types of conditions will result in a significant and sustained release of radioactive steam to the environment (and are thus similar to a FAULTED condition). The inability to isolate the steam flow without an adverse effect on plant cooldown meets the intent of a loss of containment.

Execution of a rapid RCS cooldown to less than 520°F Hot Leg temperature using both Atmospheric Dump valves, as directed by emergency operating procedures, does not meet this intent, provided the affected steam generator Atmospheric Dump valve can be closed when isolation of the RUPTURED steam generator is directed at less than 520°F. Steaming of Emergency Feedwater Pump AB prior to isolation of the RUPTURED steam generator does not meet this intent, provided MS-401 A(B) is closed when isolation of the RUPTURED steam generator is directed at less than 520°F. These short term radiological releases should be evaluated using Category A ICs.

Steam releases associated with the expected operation of a S/G Atmospheric Dump ~~power operated relief valve or safety relief~~ valve do not meet the intent of this threshold. Such releases may occur intermittently for a short period of time following a reactor trip as operators process through emergency operating procedures to bring the plant to a stable condition and prepare to initiate a plant cooldown. Steam releases associated with the unexpected operation of a valve (e.g., a stuck-open safety valve) do meet this threshold.

Following a~~n~~ S/G tube leak or RUPTURE, there may be minor radiological releases through a secondary-side system component (e.g., air ejectors, glad seal exhausters, valve packing, etc.). These types of releases do not constitute a loss or potential loss of containment but should be evaluated using the Recognition Category A ICs.

The ~~emergency classification level~~ECLs resulting from primary-to-secondary leakage, with or without a steam release from the FAULTED S/G, are summarized below.

	Affected S/G is FAULTED Outside of Containment?	
P-to-S Leak Rate	**Yes**	**No**
Less than or equal to 25 gpm	No classification	No classification
Greater than 25 gpm	Unusual Event per ~~SU4~~SU5.1	Unusual Event per ~~SU4~~SU5.1
~~Requires operation of a standby charging (makeup) pump~~Greater than 44 gpm (*RCS Barrier Potential Loss*)	Site Area Emergency per FS1.1	Alert per FA1.1
Requires an automatic or manual ECCS (SIAS) actuation (*RCS Barrier Loss*)	Site Area Emergency per FS1.1	Alert per FA1.1

There is no Containment barrier Potential Loss threshold associated with RCS or S/G Tube Leakage.

Reference(s):

1. NEI 99-01 RCS or SG Tube Leakage Containment Loss 1.A

Barrier: Containment

Category: A. RCS or S/G Tube Leakage

Degradation Threat: Potential Loss

Threshold:

None

Barrier: Containment

Category: B. Inadequate Heat Removal

Degradation Threat: Loss

Threshold:

None

Barrier: Containment

Category: B. Inadequate Heat Removal

Degradation Threat: Potential Loss

Threshold:

CNB2

Representative CET readings > 1,200°F

AND

Restoration procedures **not** effective within 15 min. (Note 1)

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Definition(s):

IMMINENT - The trajectory of events or conditions is such that an EAL will be met within a relatively short period of time regardless of mitigation or corrective actions.

Basis:

The restoration procedure is considered "effective" if core exit thermocouple readings are ~~decreasing~~ dropping and/or if reactor vessel level is ~~increasing~~rising. Whether or not the procedure(s) will be effective should be apparent within 15 minutes of CET readings exceeding 1,200°F. The Emergency Director should escalate the emergency classification level as soon as it is determined that the procedure(s) will not be effective.

This condition represents an IMMINENT core melt sequence which, if not corrected, could lead to vessel failure and a~~n~~ ~~increased~~ greater potential for containment failure. For this condition to occur, there must already have been a loss of the RCS Barrier and the Fuel Clad Barrier. If implementation of a procedure(s) to restore adequate core cooling is not effective (successful) within 15 minutes, it is assumed that the event trajectory will likely lead to core melting and a subsequent challenge of the Containment Barrier.

Severe accident analyses (e.g., NUREG-1150) have concluded that function restoration procedures can arrest core degradation in a significant fraction of core damage scenarios, and that the likelihood of containment failure is very small in these events. Given this, it is appropriate to provide 15 minutes beyond the required entry point to determine if procedural actions can reverse the core melt sequence.

There is no Containment barrier Loss threshold associated with Inadequate Heat Removal.

Reference(s):

1. CEOG Generic Accident Management Guidelines
2. UFSAR Section 1.9A Inadequate Core Cooling Instrumentation
3. NEI 99-01 Inadequate Heat Removal Containment Potential Loss 2.A

Barrier: Containment

Category: C. CTMT Radiation/RCS Activity

Degradation Threat: Loss

Threshold:

None

Barrier: Containment

Category: C. CTMT Radiation/RCS Activity

Degradation Threat: Potential Loss

Threshold:

CNB3

Containment High Range Radiation Monitor (ARM-IRE-5400AS or ARM-IRE-5400BS) > 15,000 R/hr (Note 14).

Note 14: Evaluate Containment High Range Radiation Monitor readings for potential erratic indications as a result of thermally induced currents.

Definition(s):

None

Basis:

NRC Information Notice 97-045 Supplement 1 identifies the potential for erratic indications from the Containment High Range Radiation Monitors (CHRRMs) as a result of Thermally Induced Currents (TIC) which may cause the CHRRM to read falsely high on a rapid temperature rise, and fail low intermittently on a rapid temperature fall. The TICs induced in the Waterford CHRRM signal cable are anticipated to be negligible within 5 minutes. Because of this phenomenon, any trends or alarms on the CHRRM's should be validated by comparison to the containment low range/area radiation monitors and Air Monitoring Systems trends before actions are taken.

The containment radiation monitor reading corresponds to an instantaneous release of all reactor coolant mass into the containment, assuming that 20% of the fuel cladding has failed (ref. 1). This level of fuel clad failure is well above that used to determine the analogous Fuel Clad Barrier Loss and RCS Barrier Loss thresholds.

NUREG-1228, Source Estimations During Incident Response to Severe Nuclear Power Plant Accidents, indicates the fuel clad failure must be greater than approximately 20% in order for there to be a major release of radioactivity requiring offsite protective actions. For this condition to exist, there must already have been a loss of the RCS Barrier and the Fuel Clad Barrier. It is therefore prudent to treat this condition as a potential loss of containment which would then escalate the ~~emergency classification level~~ECL to a General Emergency.

There is no Loss threshold associated with ~~RCS Activity/Containment~~CTMT Radiation/RCS Activity.

Reference(s):

1. EC86890, EP-CALC-WF3-1702, Cont. High Range Radiation EAL Threshold Values
2. NRC Information Notice 97-045 Supplement 1
3. NEI 99-01 CTMT Radiation / RCS Activity Containment Potential Loss 3.A

Barrier: Containment

Category: D. CTMT Integrity or Bypass

Degradation Threat: Loss

Threshold:

CNB4

Containment isolation is required

AND EITHER:

- Containment integrity has been lost based on Emergency Director judgment
- UNISOLABLE pathway from Containment to the environment exists

Definition(s):

FAULTED - The term applied to a steam generator that has a steam leak on the secondary side of sufficient size to cause an uncontrolled drop in steam generator pressure or the steam generator to become completely depressurized.

UNISOLABLE - An open or breached system line that **cannot** be isolated, remotely or locally.

Basis:

Failure to isolate the leak (from the Control Room or locally), within 15 minutes or if known that the leak cannot be isolated within 15 minutes, from the start of the leak requires immediate classification.

The status of the containment barrier during an event involving steam generator tube leakage is assessed using Loss Threshold ~~1.A~~CNB1.

These thresholds address a situation where containment isolation is required and one of two conditions exists as discussed below. Users are reminded that there may be accident and release conditions that simultaneously meet both bulleted thresholds ~~4.A.1 and 4.A.2~~.

~~4.A.1~~First Threshold – Containment integrity has been lost, i.e., the actual containment atmospheric leak rate likely exceeds that associated with allowable leakage (or sometimes referred to as design leakage). Following the release of RCS mass into containment, containment pressure will fluctuate based on a variety of factors; a loss of containment integrity condition may (or may not) be accompanied by a noticeable drop in containment pressure. Recognizing the inherent difficulties in determining a containment leak rate during accident conditions, it is expected that the Emergency Director will assess this threshold using judgment, and with due consideration given to current plant conditions, and available operational and radiological data (e.g., containment pressure, readings on radiation monitors outside containment, operating status of containment pressure control equipment, etc.).

Refer to the middle piping run of Figure ~~9-F-4~~1. Two simplified examples are provided. One is leakage from a penetration and the other is leakage from an in-service system valve.

Depending upon radiation monitor locations and sensitivities, the leakage could be detected by any of the four monitors depicted in the figure.

Another example would be a loss or potential loss of the RCS barrier, and the simultaneous occurrence of two FAULTED locations on a steam generator where one fault is located inside containment (e.g., on a steam or feedwater line) and the other outside of containment. In this case, the associated steam line provides a pathway for the containment atmosphere to escape to an area outside the containment.

Following the leakage of RCS mass into containment and a rise in containment pressure, there may be minor radiological releases associated with allowable (design) containment leakage through various penetrations or system components. These releases do not constitute a loss or potential loss of containment but should be evaluated using the Recognition Category A ICs.

~~4.A.2~~Second Threshold – Conditions are such that there is an UNISOLABLE pathway for the migration of radioactive material from the containment atmosphere to the environment. As used here, the term “environment” includes the atmosphere of a room or area, outside the containment, that may, in turn, communicate with the outside-the-plant atmosphere (e.g., through discharge of a ventilation system or atmospheric leakage). Depending upon a variety of factors, this condition may or may not be accompanied by a noticeable drop in containment pressure.

A failure of a containment penetration will raise pressure in the Annulus. This condition will be indicated by more frequent cycling of the Shield Building Ventilation System to Exhaust Mode combined with rising radiation levels on the Plant Stack radiation monitors.

Refer to the top piping run of Figure ~~9-F-4~~1. In this simplified example, the inboard and outboard isolation valves remained open after a containment isolation was required (i.e., containment isolation was not successful). There is now an UNISOLABLE pathway from the containment to the environment.

The existence of a filter is not considered in the threshold assessment. Filters do not remove fission product noble gases. In addition, a filter could become ineffective due to iodine and/or particulate loading beyond design limits (i.e., retention ability has been exceeded) or water saturation from steam/high humidity in the release stream.

Leakage between two interfacing liquid systems, by itself, does not meet this threshold.

Refer to the bottom piping run of Figure ~~9-F-4~~1. In this simplified example, leakage in an RCP seal cooler is allowing radioactive material to enter the Auxiliary Building. The radioactivity would be detected by the Process Monitor. If there is no leakage from the closed water cooling system to the Auxiliary Building, then no threshold has been met. If the pump developed a leak that allowed steam/water to enter the Auxiliary Building, then the second threshold ~~4.B~~ would be met. Depending upon radiation monitor locations and sensitivities, this leakage could be detected by any of the four monitors depicted in the figure and cause the first threshold ~~4.A.1~~ to be met as well.

Following the leakage of RCS mass into containment and a rise in containment pressure, there may be minor radiological releases associated with allowable containment leakage

through various penetrations or system components. Minor releases may also occur if a containment isolation valve(s) fails to close but the containment atmosphere escapes to an enclosed system. These releases do not constitute a loss or potential loss of containment but should be evaluated using the Recognition Category A ICs.

Reference(s):

1. NEI 99-01 CTMT Integrity or Bypass Containment Loss 4.A

Barrier: Containment

Category: D. CTMT Integrity or Bypass

Degradation Threat: Loss

Threshold:

CNB5

Indications of RCS leakage outside of Containment

Definition(s):

None

Basis:

The status of the containment barrier during an event involving steam generator tube leakage is assessed using Loss Threshold CNB1.

To ensure proper escalation of the emergency classification, the RCS leakage outside of containment must be related to the mass loss that is causing the RCS Loss RCB1 and/or Potential Loss RCB2 threshold ~~1.A~~to be met.

Containment sump, temperature, pressure and/or radiation levels will ~~increase~~ rise if reactor coolant mass is leaking into the containment. If these parameters have not ~~increased~~risen, then the reactor coolant mass may be leaking outside of containment (i.e., a containment bypass sequence). ~~Increases~~ Rises in sump, temperature, pressure, flow and/or radiation level readings outside of the containment may indicate that the RCS mass is being lost outside of containment.

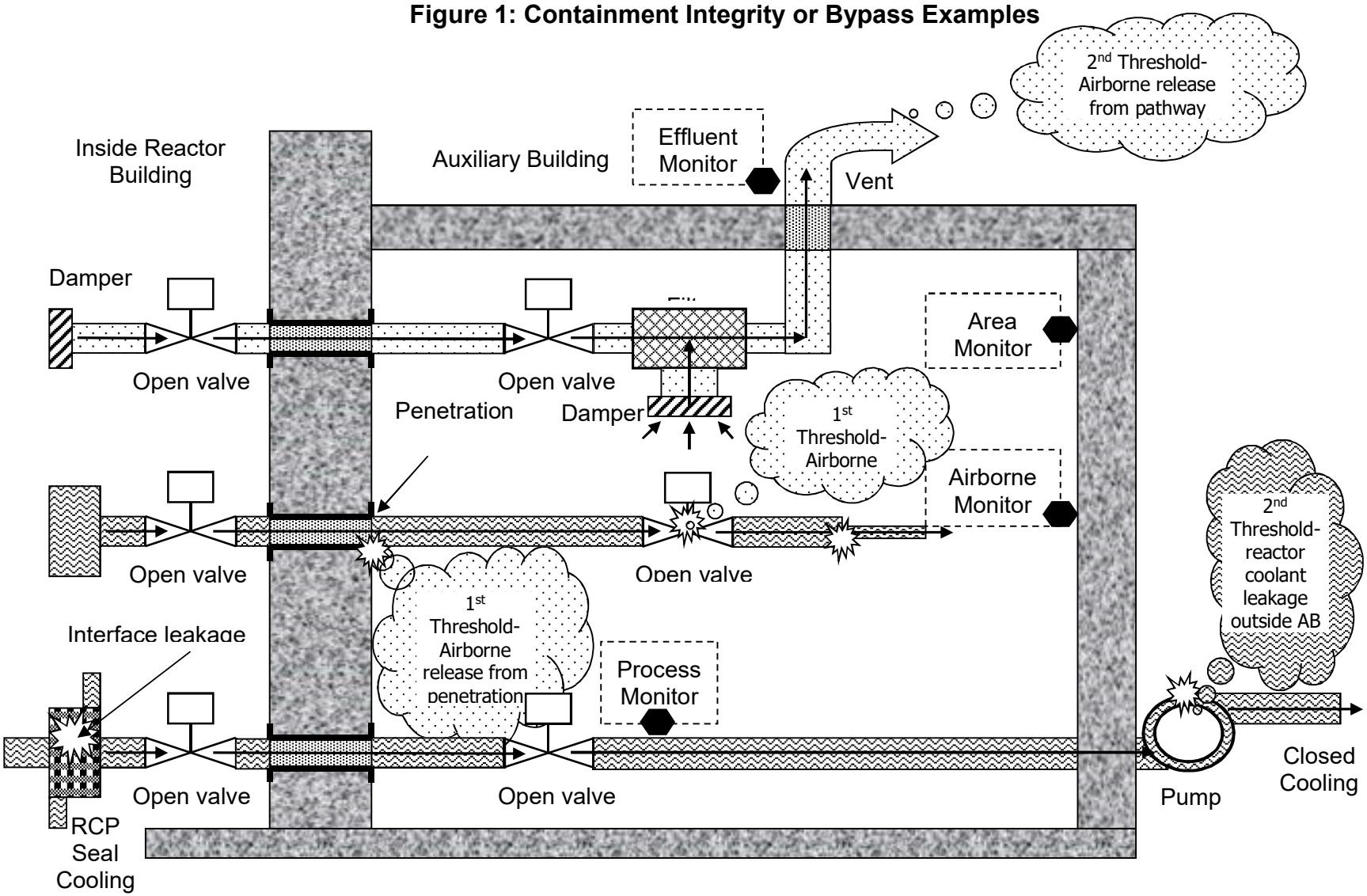
Unexpected elevated readings and alarms on radiation monitors with detectors outside containment should be corroborated with other available indications to confirm that the source is a loss of RCS mass outside of containment. If the fuel clad barrier has not been lost, radiation monitor readings outside of containment may not ~~increase~~ rise significantly; however, other unexpected changes in sump levels, area temperatures or pressures, flow rates, etc. should be sufficient to determine if RCS mass is being lost outside of the containment.

Refer to the middle piping run of Figure ~~9-F-4~~1. In this simplified example, a leak has occurred at a reducer on a pipe carrying reactor coolant in the Auxiliary Building. Depending upon radiation monitor locations and sensitivities, the leakage could be detected by any of the four monitors depicted in the figure and cause threshold ~~4.A.1~~CNB4 to be met as well.

Reference(s):

1. NEI 99-01 CTMT Integrity or Bypass Containment Loss 4.

Figure 1: Containment Integrity or Bypass Examples



Barrier: Containment

Category: D. CTMT Integrity or Bypass

Degradation Threat: Potential Loss

Threshold:

CNB6

Containment pressure > 50 psia

Definition(s):

None

Basis:

If containment pressure exceeds the design pressure, there exists a potential to lose the Containment Barrier. To reach this level, there must be an inadequate core cooling condition for an extended period of time; therefore, the RCS and Fuel Clad barriers would already be lost. Thus, this threshold is a discriminator between a Site Area Emergency and General Emergency since there is now a potential to lose the third barrier.

Reference(s):

1. Calculation ECS98-001 EOP Action value Basis Document
2. NEI 99-01 CTMT Integrity or Bypass Containment Potential Loss 4.A

Barrier: Containment

Category: D. CTMT Integrity or Bypass

Degradation Threat: Potential Loss

Threshold:

CNB7

Containment hydrogen concentration > 4%

Definition(s):

None

Basis:

The existence of an explosive mixture means, at a minimum, that the containment atmospheric hydrogen concentration is sufficient to support a hydrogen burn (i.e., at the lower deflagration limit). The 4% hydrogen concentration is generally considered the lower limit for hydrogen deflagrations. A hydrogen burn will raise containment pressure and could result in collateral equipment damage leading to a loss of containment integrity. It therefore represents a potential loss of the Containment Barrier.

Reference(s):

1. UFSAR Section 6.2.5.5 Instrumentation Requirements
2. NEI 99-01 CTMT Integrity or Bypass Containment Potential Loss 4.B

Barrier: Containment

Category: D. CTMT Integrity or Bypass

Degradation Threat: Potential Loss

Threshold:

CNB8

Containment pressure > 17.7 psia with < one full train of containment heat removal systems operating per design for ≥ 15 min. (Notes 1, 9)

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Note 9: One full train of containment heat removal systems consists of either:

- One train of the Containment Spray System (operating with ≥1750 gpm flow) **AND** One train of the Containment Cooling System (one fan cooler required)

OR

- Two trains of the Containment Spray System (operating with ≥1750 gpm flow each).

Definition(s):

None

Basis:

This threshold describes a condition where containment pressure is greater than the setpoint at which containment energy (heat) removal systems are designed to automatically actuate, and less than one full train of equipment is capable of operating per design. The 15-minute criterion is included to allow operators time to manually start equipment that may not have automatically started, if possible. This threshold represents a potential loss of containment in that containment heat removal/depressurization systems (e.g., containment sprays~~, ice condenser fans, etc.,~~ but not including containment venting strategies) are either lost or performing in a degraded manner.

Reference(s):

1. OP-902-002 Loss of Coolant Accident Recovery
2. UFSAR Section 6.2.2 Containment Heat Removal Systems
3. Technical Specification 3.6.2 Containment Systems – Depressurization and Cooling Systems
4. NEI 99-01 CTMT Integrity or Bypass Containment Potential Loss 4.C

Barrier: Containment

Category: E. Emergency Director Judgment

Degradation Threat: Loss

Threshold:

CNB9

Any condition in the opinion of the Emergency Director that indicates loss of the Containment barrier

Definition(s):

None

Basis:

This threshold addresses any other factors that may be used by the Emergency Director in determining whether the Containment Barrier is lost.

Reference(s):

1. NEI 99-01 Emergency Director Judgment Containment Loss 6.A

Barrier: Containment

Category: E. Emergency Director Judgment

Degradation Threat: Potential Loss

Threshold:

CNB10

Any condition in the opinion of the Emergency Director that indicates potential loss of the Containment barrier

Definition(s):

None

Basis:

This threshold addresses any other factors that may be used by the Emergency Director in determining whether the Containment Barrier is potentially lost. The Emergency Director should also consider whether or not to declare the barrier potentially lost in the event that barrier status cannot be monitored.

Reference(s):

1. NEI 99-01 Emergency Director Judgment Containment Potential Loss 6.A

Category H – Hazards and Other Conditions Affecting Plant Safety

EAL Group: ANY (EALs in this category are applicable to any plant condition, hot or cold.)

Hazards are non-plant, system-related events that can directly or indirectly affect plant operation, reactor plant safety or personnel safety.

1. Security

Unauthorized entry attempts into the PROTECTED AREA, bomb threats, sabotage attempts, and actual security compromises threatening loss of physical control of the plant.

2. Seismic Event

Natural events such as earthquakes have potential to cause plant structure or equipment damage of sufficient magnitude to threaten personnel or plant safety.

3. Natural or Technological Hazard

Other natural and non-naturally occurring events that can cause damage to plant facilities include tornados, FLOODING, hazardous material releases and events restricting site access warranting classification.

4. Fire

FIRES can pose significant hazards to personnel and reactor safety. Appropriate for classification are FIRES within the plant PROTECTED AREA or which may affect operability of equipment needed for safe shutdown

5. Hazardous Gas

Toxic, corrosive, asphyxiant or flammable gas leaks can affect normal plant operations or preclude access to plant areas required to safely shutdown the plant.

6. Control Room Evacuation

Events that are indicative of loss of Control Room habitability. If the Control Room must be evacuated, additional support for monitoring and controlling plant functions is necessary through the emergency response facilities.

7. Emergency Director Judgment

The EALs defined in other categories specify the predetermined symptoms or events that are indicative of emergency or potential emergency conditions and thus warrant classification. While these EALs have been developed to address the full spectrum of possible emergency conditions which may warrant classification and subsequent implementation of the Emergency Plan, a provision for classification of emergencies based on operator/management experience and judgment is still necessary. The EALs of this category provide the Emergency Director the latitude to classify emergency conditions consistent with the established classification criteria based upon Emergency Director judgment.

Category: H – Hazards

Subcategory: 1 – Security

Initiating Condition: Confirmed SECURITY CONDITION or threat

EAL:

HU1.1 Unusual Event

A SECURITY CONDITION that does **not** involve a HOSTILE ACTION as reported by Security Shift Supervisor

OR

Notification of a credible security threat directed at the site

OR

A validated notification from the NRC providing information of an aircraft threat

Mode Applicability:

All

Definition(s):

HOSTAGE - A person(s) held as leverage against the station to ensure that demands will be met by the station.

HOSTILE ACTION - An act toward WF3 or its personnel that includes the use of violent force to destroy equipment, take HOSTAGES, and/or intimidate the licensee to achieve an end. This includes attack by air, land, or water using guns, explosives, PROJECTILES, vehicles, or other devices used to deliver destructive force. Other acts that satisfy the overall intent may be included. Hostile action should **not** be construed to include acts of civil disobedience or felonious acts that are **not** part of a concerted attack on WF3. Non-terrorism-based EALs should be used to address such activities (i.e., this may include violent acts between individuals in the SECURITY OWNER CONTROLLED AREA (SOCA)).

PROJECTILE - An object directed toward a Nuclear Power Plant that could cause concern for its continued operability, reliability, or personnel safety.

PROTECTED AREA - The area encompassed by physical barriers (the security fence) and to which access is controlled into the vital areas of the plant.

SAFETY SYSTEM - A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related (as defined in 10CFR50.2):

Those structures, systems and components that are relied upon to remain functional during and following design basis events to assure:

(1) The integrity of the reactor coolant pressure boundary;

(2) The capability to shut down the reactor and maintain it in a safe shutdown condition;

(3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures.

SECURITY CONDITION - **Any** security event as listed in the approved security contingency plan that constitutes a threat/compromise to site security, threat/risk to site personnel, or a potential degradation to the level of safety of the plant. A security condition does **not** involve a HOSTILE ACTION.

SECURITY OWNER CONTROLLED AREA (SOCA) - The area inside the SOCA Vehicle Barrier System (VBS) up to the PROTECTED AREA fence line. Access to this area is controlled by the SOCA Personnel Access Control Point. The SOCA is part of but not equal to the Owner Controlled Area as described or defined in the Waterford 3 Emergency Plan.

Basis:

This IC addresses events that pose a threat to plant personnel or SAFETY SYSTEM equipment, and thus represent a potential degradation in the level of plant safety. Security events which do not meet one of these EALs are adequately addressed by the requirements of 10 CFR § 73.71 or 10 CFR § 50.72. Security events assessed as HOSTILE ACTIONS are classifiable under ICs HA1~~,~~ and HS1~~ and HG1~~.

Timely and accurate communications between Security Shift Supervision and the Control Room is essential for proper classification of a security-related event. Classification of these events will initiate appropriate threat-related notifications to plant personnel and Offsite Response Organizations.

Security plans and terminology are based on the guidance provided by NEI 03-12, *Template for the Security Plan, Training and Qualification Plan, Safeguards Contingency Plan [and Independent Spent Fuel Storage Installation Security Program]*.

~~EAL #1~~The first threshold references ~~(site-specific~~ the ~~security shift supervision)~~Security Shift Supervisor because ~~these are~~this is the individual~~s~~ trained to confirm that a security event is occurring or has occurred. Training on security event confirmation and classification is controlled due to the nature of Safeguards and 10 CFR § 2.39 information.

~~EAL #2~~The second threshold addresses the receipt of a credible security threat. The credibility of the threat is assessed in accordance with ~~(site-specific procedure)~~the WF3 Safeguards Contingency Plan (ref. 1).

~~EAL #3~~The third threshold addresses the threat from the impact of an aircraft on the plant. The NRC Headquarters Operations Officer (HOO) will communicate to the licensee if the threat involves an aircraft. The status and size of the plane may also be provided by NORAD through the NRC. Validation of the threat is performed in accordance with the WF3 Safeguards Contingency Plan (ref.1)~~(site-specific procedure)~~.

Emergency plans and implementing procedures are public documents; therefore, EALs should not incorporate Security-sensitive information. This includes information that may be advantageous to a potential adversary, such as the particulars concerning a specific threat or threat location. Security-sensitive information should be contained in non-public documents such as the ~~Security~~Safeguards Contingency Plan for WF3 (ref. 1).

Escalation of the emergency classification level would be via IC HA1.

Reference(s):

1. WF3 Safeguards Contingency Plan
2. NEI 99-01 HU1

Category: H – Hazards

Subcategory: 1 – Security

Initiating Condition: HOSTILE ACTION within the SECURITY OWNER CONTROLLED AREA or airborne attack threat within 30 minutes

EAL:

HA1.1 Alert

A HOSTILE ACTION is occurring or has occurred within the SECURITY OWNER CONTROLLED AREA as reported by Security Shift Supervisor

OR

A validated notification from NRC of an aircraft attack threat within 30 min. of the site

Mode Applicability:

All

Definition(s):

HOSTAGE - A person(s) held as leverage against the station to ensure that demands will be met by the station.

HOSTILE ACTION - An act toward WF3 or its personnel that includes the use of violent force to destroy equipment, take HOSTAGES, and/or intimidate the licensee to achieve an end. This includes attack by air, land, or water using guns, explosives, PROJECTILES, vehicles, or other devices used to deliver destructive force. Other acts that satisfy the overall intent may be included. Hostile action should **not** be construed to include acts of civil disobedience or felonious acts that are **not** part of a concerted attack on WF3. Non-terrorism-based EALs should be used to address such activities (i.e., this may include violent acts between individuals in the SECURITY OWNER CONTROLLED AREA (SOCA)).

HOSTILE FORCE - One or more individuals who are engaged in a determined assault, overtly or by stealth and deception, equipped with suitable weapons capable of killing, maiming, or causing destruction.

PROJECTILE - An object directed toward a Nuclear Power Plant that could cause concern for its continued operability, reliability, or personnel safety.

PROTECTED AREA - The area encompassed by physical barriers (the security fence) and to which access is controlled into the vital areas of the plant.

SECURITY OWNER CONTROLLED AREA (SOCA) - The area inside the SOCA Vehicle Barrier System (VBS) up to the PROTECTED AREA fence line. Access to this area is controlled by the SOCA Personnel Access Control Point. The SOCA is part of but not equal to the Owner Controlled Area as described or defined in the Waterford 3 Emergency Plan.

Basis:

This IC addresses the occurrence of a HOSTILE ACTION within the SECURITY OWNER CONTROLLED AREA or notification of an aircraft attack threat. This event will require rapid response and assistance due to the possibility of the attack progressing to the PROTECTED AREA, or the need to prepare the plant and staff for a potential aircraft impact.

Timely and accurate communications between Security Shift Supervision and the Control Room is essential for proper classification of a security-related event.

Security plans and terminology are based on the guidance provided by NEI 03-12, *Template for the Security Plan, Training and Qualification Plan, Safeguards Contingency Plan [and Independent Spent Fuel Storage Installation Security Program]*.

As time and conditions allow, these events require a heightened state of readiness by the plant staff and implementation of onsite protective measures (e.g., evacuation, dispersal or sheltering). The Alert declaration will also heighten the awareness of Offsite Response Organizations (OROs), allowing them to be better prepared should it be necessary to consider further actions.

This ~~IC~~ EAL does not apply to incidents that are accidental events, acts of civil disobedience, or otherwise are not a HOSTILE ACTION perpetrated by a HOSTILE FORCE. Examples include the crash of a small aircraft, shots from hunters, physical disputes between employees, etc. Reporting of these types of events is adequately addressed by other EALs, or the requirements of 10 CFR § 73.71 or 10 CFR § 50.72.

~~EAL #1~~The first threshold is applicable for any HOSTILE ACTION occurring, or that has occurred, in the SECURITY OWNER CONTROLLED AREA. ~~This includes any action directed against an ISFSI that is located outside the plant PROTECTED AREA.~~

~~EAL #2~~The second threshold addresses the threat from the impact of an aircraft on the plant, and the anticipated arrival time is within 30 minutes. The intent of this EAL is to ensure that threat-related notifications are made in a timely manner so that plant personnel and OROs are in a heightened state of readiness. This EAL is met when the threat-related information has been validated in accordance with the WF3 Safeguards Contingency Plan (ref.1)~~(site-specific procedure)~~.

The NRC Headquarters Operations Officer (HOO) will communicate to the licensee if the threat involves an aircraft. The status and size of the plane may be provided by NORAD through the NRC.

In some cases, it may not be readily apparent if an aircraft impact within the SECURITY OWNER CONTROLLED AREA was intentional (i.e., a HOSTILE ACTION). It is expected, although not certain, that notification by an appropriate Federal agency to the site would clarify this point. In this case, the appropriate federal agency is intended to be NORAD, FBI, FAA or NRC. The emergency declaration, including one based on other ICs/EALs, should not be unduly delayed while awaiting notification by a Federal agency.

Emergency plans and implementing procedures are public documents; therefore, EALs should not incorporate Security-sensitive information. This includes information that may be advantageous to a potential adversary, such as the particulars concerning a specific threat or

threat location. Security-sensitive information should be contained in non-public documents such as the ~~Security~~ Safeguards Contingency Plan for WF3 (ref. 1).

Escalation of the emergency classification level would be via IC HS1.

Reference(s):

1. WF3 Safeguards Contingency Plan
2. NEI 99-01 HA1

Category: H – Hazards

Subcategory: 1 – Security

Initiating Condition: HOSTILE ACTION within the PROTECTED AREA

EAL:

HS1.1 Site Area Emergency

A HOSTILE ACTION is occurring or has occurred within the PROTECTED AREA as reported by Security Shift Supervisor

Mode Applicability:

All

Definition(s):

HOSTAGE - A person(s) held as leverage against the station to ensure that demands will be met by the station.

HOSTILE ACTION - An act toward WF3 or its personnel that includes the use of violent force to destroy equipment, take HOSTAGES, and/or intimidate the licensee to achieve an end. This includes attack by air, land, or water using guns, explosives, PROJECTILES, vehicles, or other devices used to deliver destructive force. Other acts that satisfy the overall intent may be included. Hostile action should **not** be construed to include acts of civil disobedience or felonious acts that are **not** part of a concerted attack on WF3. Non-terrorism-based EALs should be used to address such activities (i.e., this may include violent acts between individuals in the SECURITY OWNER CONTROLLED AREA (SOCA)).

HOSTILE FORCE - One or more individuals who are engaged in a determined assault, overtly or by stealth and deception, equipped with suitable weapons capable of killing, maiming, or causing destruction.

PROJECTILE - An object directed toward a Nuclear Power Plant that could cause concern for its continued operability, reliability, or personnel safety.

PROTECTED AREA - The area encompassed by physical barriers (the security fence) and to which access is controlled into the vital areas of the plant.

SECURITY OWNER CONTROLLED AREA (SOCA) - The area inside the SOCA Vehicle Barrier System (VBS) up to the PROTECTED AREA fence line. Access to this area is controlled by the SOCA Personnel Access Control Point. The SOCA is part of but not equal to the Owner Controlled Area as described or defined in the Waterford 3 Emergency Plan.

Basis:

This IC addresses the occurrence of a HOSTILE ACTION within the PROTECTED AREA. This event will require rapid response and assistance due to the possibility for damage to plant equipment.

Timely and accurate communications between Security Shift Supervision and the Control Room is essential for proper classification of a security-related event.

Security plans and terminology are based on the guidance provided by NEI 03-12, *Template for the Security Plan, Training and Qualification Plan, Safeguards Contingency Plan [and Independent Spent Fuel Storage Installation Security Program]*.

As time and conditions allow, these events require a heightened state of readiness by the plant staff and implementation of onsite protective measures (e.g., evacuation, dispersal or sheltering). The Site Area Emergency declaration will mobilize Offsite Response Organization (ORO) resources and have them available to develop and implement public protective actions in the unlikely event that the attack is successful in impairing multiple safety functions.

This ~~IC~~ EAL does not apply to ~~a HOSTILE ACTION directed at an ISFSI Protected Area located outside the PROTECTED AREA; such an attack should be assessed using IC HA1. It also does not apply to~~ incidents that are accidental events, acts of civil disobedience, or otherwise are not a HOSTILE ACTION perpetrated by a HOSTILE FORCE. Examples include the crash of a small aircraft, shots from hunters, physical disputes between employees, etc. Reporting of these types of events is adequately addressed by other EALs, or the requirements of 10 CFR § 73.71 or 10 CFR § 50.72.

Emergency plans and implementing procedures are public documents; therefore, EALs should not incorporate Security-sensitive information. This includes information that may be advantageous to a potential adversary, such as the particulars concerning a specific threat or threat location. Security-sensitive information should be contained in non-public documents such as the ~~Security~~ Safeguards Contingency Plan for WF3 (ref. 1).

~~Escalation of the emergency classification level would be via IC HG1.~~

Reference(s):

1. WF3 Safeguards Contingency Plan
2. NEI 99-01 HS1

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 2 – Seismic Event

Initiating Condition: Seismic event greater than OBE levels

EAL:

HU2.1 Unusual Event

Seismic event > OBE as indicated by RED light on the seismic monitor panel

Mode Applicability:

All

Definition(s):

None

Basis:

A RED LIGHT on the Seismic Monitoring Panel indicates that the design limit for the Operating Basis Earthquake (OBE) (0.05g horizontal or 0.033g vertical) has been exceeded.

This IC addresses a seismic event that results in accelerations at the plant site greater than those specified for an Operating Basis Earthquake (OBE). An earthquake greater than an OBE but less than a Safe Shutdown Earthquake (SSE) should have no significant impact on safety-related systems, structures and components; however, some time may be required for the plant staff to ascertain the actual post-event condition of the plant (e.g., performs walk-downs and post-event inspections). Given the time necessary to perform walk-downs and inspections, and fully understand any impacts, this event represents a potential degradation of the level of safety of the plant.

Event verification with external sources should not be necessary during or following an OBE. Earthquakes of this magnitude should be readily felt by on-site personnel and recognized as a seismic event (e.g., lateral accelerations in excess of 0.~~08g~~05g). The Shift Manager or Emergency Director may seek external verification if deemed appropriate (e.g., a call to the U.S. Geological Survey (USGS), check internet news sources, etc.); however, the verification action must not preclude a timely emergency declaration.

Depending upon the plant mode at the time of the event, escalation of the emergency classification level would be via IC CA6 or SA9.

To avoid inappropriate emergency classification resulting from spurious actuation of the seismic instrumentation or felt motion not attributable to seismic activity, an offsite agency can confirm that an earthquake has occurred in the area of the plant. Such confirmation should not, however, preclude a timely emergency declaration based on receipt of the OBE alarm. If requested, provide the analyst with the following WF3 coordinates: **29º 59' 42" north latitude, 90º 28' 16" west longitude** (ref. 3). Seismic activity information can be accessed via the contact information in the Emergency Management Resources Book, Section IV, Offsite Support Organizations.

Reference(s):

1. UFSAR Section 3.7.4 Seismic Instrumentation
2. OP-901-522 Seismic Event
3. UFSAR Section 1.2.1.1 Location and Population
4. NEI 99-01 HU2

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 3 – Natural or Technological Hazard

Initiating Condition: Hazardous event

EAL:

HU3.1 Unusual Event

A tornado strike within the PROTECTED AREA

Mode Applicability:

All

Definition(s):

PROTECTED AREA - The area encompassed by physical barriers (the security fence) and to which access is controlled into the vital areas of the plant.

Basis:

This IC addresses hazardous events that are considered to represent a potential degradation of the level of safety of the plant.

~~EAL #1~~This EAL addresses a tornado striking (touching down) within the PROTECTED AREA.

~~EAL #2 addresses flooding of a building room or area that results in operators isolating power to a SAFETY SYSTEM component due to water level or other wetting concerns. Classification is also required if the water level or related wetting causes an automatic isolation of a SAFETY SYSTEM component from its power source (e.g., a breaker or relay trip). To warrant classification, operability of the affected component must be required by Technical Specifications for the current operating mode.~~

~~EAL #3 addresses a hazardous materials event originating at an offsite location and of sufficient magnitude to impede the movement of personnel within the PROTECTED AREA.~~

~~EAL #4 addresses a hazardous event that causes an on-site impediment to vehicle movement and significant enough to prohibit the plant staff from accessing the site using personal vehicles. Examples of such an event include site flooding caused by a hurricane, heavy rains, up-river water releases, dam failure, etc., or an on-site train derailment blocking the access road.~~

~~This EAL is not intended apply to routine impediments such as fog, snow, ice, or vehicle breakdowns or accidents, but rather to more significant conditions such as the Hurricane Andrew strike on Turkey Point in 1992, the flooding around the Cooper Station during the Midwest floods of 1993, or the flooding around Ft. Calhoun Station in 2011.~~

~~EAL #5 addresses (site-specific description).~~

Escalation of the emergency classification level would be based on ICs in Recognition Categories A, F, S or C.

If damage is confirmed visually or by other in-plant indications, the event may be escalated to an Alert under EAL CA6.1 or SA9.1.

A tornado striking (touching down) within the PROTECTED AREA warrants declaration of an Unusual Event regardless of the measured wind speed at the meteorological tower. A tornado is defined as a violently rotating column of air in contact with the ground and extending from the base of a thunderstorm.

Reference(s):

1. OP-901-521 Severe Weather and Flooding
2. NEI 99-01 HU3

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 3 – Natural or Technological Hazard

Initiating Condition: Hazardous event

EAL:

HU3.2 Unusual Event

Internal room or area FLOODING of a magnitude sufficient to require manual or automatic electrical isolation of a SAFETY SYSTEM component required by Technical Specifications for the current operating mode

Mode Applicability:

All

Definition(s):

FLOODING - A condition where water is entering a room or area faster than installed equipment is capable of removal, resulting in a rise of water level within the room or area.

SAFETY SYSTEM - A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related (as defined in 10CFR50.2):

Those structures, systems and components that are relied upon to remain functional during and following design basis events to assure:

(1) The integrity of the reactor coolant pressure boundary;

(2) The capability to shut down the reactor and maintain it in a safe shutdown condition;

(3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures.

Basis:

This IC addresses hazardous events that are considered to represent a potential degradation of the level of safety of the plant.

~~EAL #1 addresses a tornado striking (touching down) within the PROTECTED AREA.~~

This EAL ~~EAL #2~~ addresses FLOODING of a building room or area that results in operators isolating power to a SAFETY SYSTEM component due to water level or other wetting concerns. Classification is also required if the water level or related wetting causes an automatic isolation of a SAFETY SYSTEM component from its power source (e.g., a breaker or relay trip). To warrant classification, operability of the affected component must be required by Technical Specifications for the current operating mode.

~~EAL #3 addresses a hazardous materials event originating at an offsite location and of sufficient magnitude to impede the movement of personnel within the PROTECTED AREA.~~

~~EAL #4 addresses a hazardous event that causes an on-site impediment to vehicle movement and significant enough to prohibit the plant staff from accessing the site using personal~~

~~vehicles. Examples of such an event include site flooding caused by a hurricane, heavy rains, up-river water releases, dam failure, etc., or an on-site train derailment blocking the access road.~~

~~This EAL is not intended apply to routine impediments such as fog, snow, ice, or vehicle breakdowns or accidents, but rather to more significant conditions such as the Hurricane Andrew strike on Turkey Point in 1992, the flooding around the Cooper Station during the Midwest floods of 1993, or the flooding around Ft. Calhoun Station in 2011.~~

~~EAL #5 addresses (site-specific description).~~

Escalation of the emergency classification level would be based on ICs in Recognition Categories A, F, S or C.

Refer to EAL CA6.1 or SA9.1 for internal FLOODING affecting more than one SAFETY SYSTEM train.

Reference(s):

1. UFSAR Section 3.6A.6 Flooding Analysis
2. NEI 99-01 HU3

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 3 – Natural or Technological Hazard

Initiating Condition: Hazardous event

EAL:

HU3.3 Unusual Event

Movement of personnel within the PROTECTED AREA is IMPEDED due to an event external to the PROTECTED AREA involving hazardous materials (e.g., an offsite chemical spill or toxic gas release)

Mode Applicability:

All

Definition(s):

IMPEDE(D) - Personnel access to a room or area is hindered to an extent that extraordinary measures are necessary to facilitate entry of personnel into the affected room/area (e.g., requiring use of protective equipment, such as SCBAs, that is **not** routinely employed).

PROTECTED AREA - The area encompassed by physical barriers (the security fence) and to which access is controlled into the vital areas of the plant.

Basis:

This IC addresses hazardous events that are considered to represent a potential degradation of the level of safety of the plant.

~~EAL #1 addresses a tornado striking (touching down) within the PROTECTED AREA.~~

~~This EAL addresses flooding of a building room or area that results in operators isolating power to a SAFETY SYSTEM component due to water level or other wetting concerns. Classification is also required if the water level or related wetting causes an automatic isolation of a SAFETY SYSTEM component from its power source (e.g., a breaker or relay trip). To warrant classification, operability of the affected component must be required by Technical Specifications for the current operating mode.~~

~~EAL #3~~This EAL addresses a hazardous materials event originating at a~~n~~ ~~offsite~~ location outside the PROTECTED AREA and of sufficient magnitude to IMPEDE the movement of personnel within the PROTECTED AREA.

~~EAL #4 addresses a hazardous event that causes an on-site impediment to vehicle movement and significant enough to prohibit the plant staff from accessing the site using personal vehicles. Examples of such an event include site flooding caused by a hurricane, heavy rains, up-river water releases, dam failure, etc., or an on-site train derailment blocking the access road.~~

~~This EAL is not intended apply to routine impediments such as fog, snow, ice, or vehicle breakdowns or accidents, but rather to more significant conditions such as the Hurricane~~

~~Andrew strike on Turkey Point in 1992, the flooding around the Cooper Station during the Midwest floods of 1993, or the flooding around Ft. Calhoun Station in 2011.~~

~~EAL #5 addresses (site-specific description).~~

Escalation of the emergency classification level would be based on ICs in Recognition Categories A, F, S or C.

Reference(s):

1. NEI 99-01 HU3

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 3 – Natural or Technological Hazard

Initiating Condition: Hazardous event

EAL:

HU3.4 Unusual Event

A hazardous event that results in on-site conditions sufficient to prohibit the plant staff from accessing the site via personal vehicles (Note 7)

Note 7: This EAL does **not** apply to routine traffic impediments such as fog, snow, ice, or vehicle breakdowns or accidents.

Mode Applicability:

All

Definition(s):

FLOODING - A condition where water is entering a room or area faster than installed equipment is capable of removal, resulting in a rise of water level within the room or area.

Basis:

This IC addresses hazardous events that are considered to represent a potential degradation of the level of safety of the plant.~~EAL #1 addresses a tornado striking (touching down) within the PROTECTED AREA.~~

~~This EAL addresses flooding of a building room or area that results in operators isolating power to a SAFETY SYSTEM component due to water level or other wetting concerns. Classification is also required if the water level or related wetting causes an automatic isolation of a SAFETY SYSTEM component from its power source (e.g., a breaker or relay trip). To warrant classification, operability of the affected component must be required by Technical Specifications for the current operating mode.~~

~~EAL #3 addresses a hazardous materials event originating at an offsite location and of sufficient magnitude to impede the movement of personnel within the PROTECTED AREA.~~

~~EAL #4~~This EAL addresses a hazardous event that causes an on-site impediment to vehicle movement and significant enough to prohibit the plant staff from accessing the site using personal vehicles. Examples of such an event include site FLOODING caused by a hurricane, heavy rains, up-river water releases, dam failure, etc., or an on-site train derailment blocking the access road.

This EAL is not intended to apply to routine impediments such as fog, snow, ice, or vehicle breakdowns or accidents, but rather to more significant conditions such as the Hurricane Andrew strike on Turkey Point in 1992, the FLOODING around the Cooper Station during the Midwest floods of 1993, or the FLOODING around Ft. Calhoun Station in 2011.

~~EAL #5 addresses (site-specific description).~~ Escalation of the emergency classification level would be based on ICs in Recognition Categories A, F, S or C.

Reference(s):

1. NEI 99-01 HU3

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 4 – Fire

Initiating Condition: FIRE potentially degrading the level of safety of the plant

EAL:

HU4.1 Unusual Event

A FIRE is **not** extinguished within 15 min. of **any** of the following FIRE detection indications (Note 1):

- Report from the field (i.e., visual observation)
- Receipt of multiple (more than 1) fire alarms or indications (Note 12)
- Field verification of a single fire alarm

AND

The FIRE is located within **any** Table H-1 area

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Note 12: Bullet 2 of this EAL (multiple fire alarm indications) is **not** applicable when diagnosed into a LOCA or Excess Steam Demand event in Containment.

Table H-1 Fire Areas
• Containment • Cooling Tower Areas • Fuel Handling Building • Reactor Auxiliary Building

Mode Applicability:

All

Definition(s):

FIRE - Combustion characterized by heat and light. Sources of smoke such as slipping drive belts or overheated electrical equipment do **not** constitute fires. Observation of flame is preferred but is **not** required if large quantities of smoke and heat are observed.

VALID - An indication, report, or condition, is considered to be valid when it is verified by (1) an instrument channel check, or (2) indications on related or redundant indicators, or (3) by direct observation by plant personnel, such that doubt related to the indicator's operability, the

condition's existence, or the report's accuracy is removed. Implicit in this definition is the need for timely assessment.

Basis:

This IC addresses the magnitude and extent of FIRES that may be indicative of a potential degradation of the level of safety of the plant.

~~EAL #1~~

The intent of the 15-minute duration is to size the FIRE and to discriminate against small FIRES that are readily extinguished (e.g., smoldering waste paper basket). In addition to alarms, other indications of a FIRE could be a drop in fire main pressure, automatic activation of a suppression system, etc.

Upon receipt, operators will take prompt actions to confirm the validity of an initial fire alarm, indication, or report. For EAL assessment purposes, the emergency declaration clock starts at the time that the initial alarm, indication, or report was received, and not the time that a subsequent verification action was performed. Similarly, the fire duration clock also starts at the time of receipt of the initial alarm, indication or report.

Depending upon the plant mode at the time of the event, escalation of the emergency classification level would be via EAL CA6.1 or SA9.1.

~~This EAL addresses receipt of a single fire alarm, and the existence of a FIRE is not verified (i.e., proved or disproved) within 30-minutes of the alarm. Upon receipt, operators will take prompt actions to confirm the validity of a single fire alarm. For EAL assessment purposes, the 30-minute clock starts at the time that the initial alarm was received, and not the time that a subsequent verification action was performed.~~

~~A single fire alarm, absent other indication(s) of a FIRE, may be indicative of equipment failure or a spurious activation, and not an actual FIRE. For this reason, additional time is allowed to verify the validity of the alarm. The 30-minute period is a reasonable amount of time to determine if an actual FIRE exists; however, after that time, and absent information to the contrary, it is assumed that an actual FIRE is in progress.~~

~~If an actual FIRE is verified by a report from the field, then EAL #1 is immediately applicable, and the emergency must be declared if the FIRE is not extinguished within 15-minutes of the report. If the alarm is verified to be due to an equipment failure or a spurious activation, and this verification occurs within 30-minutes of the receipt of the alarm, then this EAL is not applicable and no emergency declaration is warranted.~~

~~EAL #3~~

~~In addition to a FIRE addressed by EAL #1 or EAL #2, a FIRE within the plant PROTECTED AREA not extinguished within 60-minutes may also potentially degrade the level of plant safety. This basis extends to a FIRE occurring within the PROTECTED AREA of an ISFSI located outside the plant PROTECTED AREA. [Sentence for plants with an ISFSI outside the plant Protected Area]~~

~~EAL #4~~

~~If a FIRE within the plant or ISFSI [for plants with an ISFSI outside the plant Protected Area] PROTECTED AREA is of sufficient size to require a response by an offsite firefighting agency (e.g., a local town Fire Department), then the level of plant safety is potentially degraded. The dispatch of an offsite firefighting agency to the site requires an emergency declaration only if it is needed to actively support firefighting efforts because the fire is beyond the capability of the Fire Brigade to extinguish. Declaration is not necessary if the agency resources are placed on stand-by, or supporting post-extinguishment recovery or investigation actions.~~

~~Basis-Related Requirements from Appendix R~~

~~Appendix R to 10 CFR 50, states in part:~~

~~Criterion 3 of Appendix A to this part specifies that "Structures, systems, and components important to safety shall be designed and located to minimize, consistent with other safety requirements, the probability and effect of fires and explosions."~~

~~When considering the effects of fire, those systems associated with achieving and maintaining safe shutdown conditions assume major importance to safety because damage to them can lead to core damage resulting from loss of coolant through boil-off.~~

~~Because fire may affect safe shutdown systems and because the loss of function of systems used to mitigate the consequences of design basis accidents under post-fire conditions does not per se impact public safety, the need to limit fire damage to systems required to achieve and maintain safe shutdown conditions is greater than the need to limit fire damage to those systems required to mitigate the consequences of design basis accidents.~~

~~In addition, Appendix R to 10 CFR 50, requires, among other considerations, the use of 1-hour fire barriers for the enclosure of cable and equipment and associated non-safety circuits of one redundant train (G.2.c). As used in EAL #2, the 30-minutes to verify a single alarm is well within this worst-case 1-hour time period.~~

~~Depending upon the plant mode at the time of the event, escalation of the emergency classification level would be via IC EAL CA6.1 or SA9.1.~~

~~The 15 minute requirement begins with a credible notification that a FIRE is occurring, or receipt of multiple VALID fire detection system alarms or field validation of a single fire alarm. The alarm is to be validated using available Control Room indications or alarms to prove that it is not spurious, or by reports from the field.~~

Table H-1 Fire Areas are those areas that contain equipment necessary for safe operation and shutdown of the plant (ref. 1).

Reference(s):

1. UFSAR Section 9.5.1.3.2 Fire Area-By-Fire Area Analysis
2. NEI 99-01 HU4

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 4 – Fire

Initiating Condition: FIRE potentially degrading the level of safety of the plant

EAL:

HU4.2 Unusual Event

Receipt of a single fire alarm (i.e., **no** other indications of a FIRE) (Note 13)

AND

The fire alarm is indicating a FIRE within **any** Table H-1 area

AND

The existence of a FIRE is **not** verified (i.e., proved or disproved) within 30 min. of alarm receipt (Note 1)

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Note 13: During Modes 1 and 2, HU4.2 is **not** applicable to a single fire alarm in containment. A fire in containment in these modes should be assessed under EAL HU4.1.

Table H-1 Fire Areas
• Containment • Cooling Tower Areas • Fuel Handling Building • Reactor Auxiliary Building

Mode Applicability:

All

Definition(s):

FIRE - Combustion characterized by heat and light. Sources of smoke such as slipping drive belts or overheated electrical equipment do **not** constitute fires. Observation of flame is preferred but is **not** required if large quantities of smoke and heat are observed.

VALID - An indication, report, or condition, is considered to be valid when it is verified by (1) an instrument channel check, or (2) indications on related or redundant indicators, or (3) by direct observation by plant personnel, such that doubt related to the indicator's operability, the

condition's existence, or the report's accuracy is removed. Implicit in this definition is the need for timely assessment.

Basis:

This IC addresses the magnitude and extent of FIRES that may be indicative of a potential degradation of the level of safety of the plant.

~~EAL #1~~

~~The intent of the 15-minute duration is to size the FIRE and to discriminate against small FIRES that are readily extinguished (e.g., smoldering waste paper basket). In addition to alarms, other indications of a FIRE could be a drop in fire main pressure, automatic activation of a suppression system, etc.~~

~~Upon receipt, operators will take prompt actions to confirm the validity of an initial fire alarm, indication, or report. For EAL assessment purposes, the emergency declaration clock starts at the time that the initial alarm, indication, or report was received, and not the time that a subsequent verification action was performed. Similarly, the fire duration clock also starts at the time of receipt of the initial alarm, indication or report.~~

~~EAL #2~~

This EAL addresses receipt of a single fire alarm, and the existence of a FIRE is not verified (i.e., proved or disproved) within 30-minutes of the alarm. Upon receipt, operators will take prompt actions to confirm the validity of a single fire alarm. For EAL assessment purposes, the 30-minute clock starts at the time that the initial alarm was received, and not the time that a subsequent verification action was performed.

A single fire alarm, absent other indication(s) of a FIRE, may be indicative of equipment failure or a spurious activation, and not an actual FIRE. For this reason, additional time is allowed to verify the validity of the alarm. The 30-minute period is a reasonable amount of time to determine if an actual FIRE exists; however, after that time, and absent information to the contrary, it is assumed that an actual FIRE is in progress.

This EAL is not applicable for containment in Modes 1 and 2. The containment air flow design and Technical Specification requirements for operation of Containment Fan Coolers are such that multiple smoke detectors would be expected to alarm for a fire in containment. A fire in containment in these modes would therefore be classified under EAL HU4.1.

If an actual FIRE is verified by a report from the field, then ~~EAL #1~~HU4.1 is immediately applicable, and the emergency must be declared if the FIRE is not extinguished within 15-minutes of the report. If the alarm is verified to be due to an equipment failure or a spurious activation, and this verification occurs within 30-minutes of the receipt of the alarm, then this EAL is not applicable and no emergency declaration is warranted.~~EAL #3~~

~~In addition to a FIRE addressed by EAL #1 or EAL #2, a FIRE within the plant PROTECTED AREA not extinguished within 60-minutes may also potentially degrade the level of plant safety. *This basis extends to a FIRE occurring within the PROTECTED AREA of an ISFSI located outside the plant PROTECTED AREA.* [*Sentence for plants with an ISFSI outside the plant Protected Area*]~~

~~EAL #4~~

Basis-Related Fire Protection Requirements ~~from Appendix R~~

~~Appendix R to 10 CFR 50, states in part:~~

Criterion 3 of 10CFR50, Appendix A, states in part:

~~to this part specifies that~~ "Structures, systems, and components important to safety shall be designed and located to minimize, consistent with other safety requirements, the probability and effect of fires and explosions."

~~When considering the effects of fire, those systems associated with achieving and maintaining safe shutdown conditions assume major importance to safety because damage to them can lead to core damage resulting from loss of coolant through boil-off.~~

~~Because fire may affect safe shutdown systems and because the loss of function of systems used to mitigate the consequences of design basis accidents under post-fire conditions does not per se impact public safety, the need to limit fire damage to systems required to achieve and maintain safe shutdown conditions is greater than the need to limit fire damage to those systems required to mitigate the consequences of design basis accidents.~~

In this respect, noncombustible and heat resistant materials are used wherever practical throughout the unit, particularly in locations such as the containment and Control Room. Fire detection and fighting systems of appropriate capacity and capability are provided and designed to minimize the adverse effects of fires on SSCs important to safety. Firefighting systems are designed to assure that the rupture or inadvertent operation of a fire system does not significantly impair the safety capability of these structures, systems, and components.

In addition, ~~Appendix R to 10 CFR 50, requires, among other considerations,~~ the use of 1-hour fire barriers for the enclosure of cable and equipment and associated non-safety circuits of one redundant train is employed ~~(G.2.c)~~. As used in ~~EAL #2~~HU4.2, the 30-minutes to verify a single alarm is well within this worst-case 1-hour time period.

Depending upon the plant mode at the time of the event, escalation of the emergency classification level would be via ~~IC~~ EAL CA6.1 or SA9.1.

The 30 minute requirement begins upon receipt of a single VALID fire detection system alarm. The alarm is to be validated using available Control Room indications or alarms to prove that it is not spurious, or by reports from the field. Actual field reports must be made within the 30-minute time limit or a classification must be made. If a fire is verified to be occurring by field report, classification shall be made based on EAL HU4.1, with the 15-minute requirement beginning with the verification of the fire by field report.

Table H-1 Fire Areas are those areas that contain equipment necessary for safe operation and shutdown of the plant (ref. 1).

Reference(s):

1. OP-901-524 Fire in Areas Affecting Safe Shutdown
2. EP FAQ 2018-003
3. NEI 99-01 HU4

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 4 – Fire

Initiating Condition: FIRE potentially degrading the level of safety of the plant

EAL:

HU4.3 Unusual Event

A FIRE within the PROTECTED AREA **not** extinguished within 60 min. of the initial report, alarm or indication (Note 1)

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Mode Applicability:

All

Definition(s):

FIRE - Combustion characterized by heat and light. Sources of smoke such as slipping drive belts or overheated electrical equipment do **not** constitute fires. Observation of flame is preferred but is **not** required if large quantities of smoke and heat are observed.

PROTECTED AREA - The area encompassed by physical barriers (the security fence) and to which access is controlled into the vital areas of the plant.

Basis:

This IC addresses the magnitude and extent of FIRES that may be indicative of a potential degradation of the level of safety of the plant.

~~EAL #1~~

~~The intent of the 15-minute duration is to size the FIRE and to discriminate against small FIRES that are readily extinguished (e.g., smoldering waste paper basket). In addition to alarms, other indications of a FIRE could be a drop in fire main pressure, automatic activation of a suppression system, etc.~~

~~Upon receipt, operators will take prompt actions to confirm the validity of an initial fire alarm, indication, or report. For EAL assessment purposes, the emergency declaration clock starts at the time that the initial alarm, indication, or report was received, and not the time that a subsequent verification action was performed. Similarly, the fire duration clock also starts at the time of receipt of the initial alarm, indication or report.~~

~~EAL #2~~

~~This EAL addresses receipt of a single fire alarm, and the existence of a FIRE is not verified (i.e., proved or disproved) within 30-minutes of the alarm. Upon receipt, operators will take prompt actions to confirm the validity of a single fire alarm. For EAL assessment purposes, the 30-minute clock starts at the time that the initial alarm was received, and not the time that a subsequent verification action was performed.~~

~~A single fire alarm, absent other indication(s) of a FIRE, may be indicative of equipment failure or a spurious activation, and not an actual FIRE. For this reason, additional time is allowed to verify the validity of the alarm. The 30-minute period is a reasonable amount of time to determine if an actual FIRE exists; however, after that time, and absent information to the contrary, it is assumed that an actual FIRE is in progress.~~

~~If an actual FIRE is verified by a report from the field, then EAL #1 is immediately applicable, and the emergency must be declared if the FIRE is not extinguished within 15-minutes of the report. If the alarm is verified to be due to an equipment failure or a spurious activation, and this verification occurs within 30-minutes of the receipt of the alarm, then this EAL is not applicable and no emergency declaration is warranted.~~

~~EAL #3~~

In addition to a FIRE addressed by EAL ~~#1~~HU4.1 or ~~EAL #2~~HU4.2, a FIRE within the plant PROTECTED AREA not extinguished within 60-minutes may also potentially degrade the level of plant safety. ~~This basis extends to a FIRE occurring within the Protected Area of an ISFSI located outside the plant PROTECTED AREA. [*Sentence for plants with an ISFSI outside the plant Protected Area*]EAL #4~~
~~If a FIRE within the plant *or ISFSI* [*for plants with an ISFSI outside the plant Protected Area*] PROTECTED AREA is of sufficient size to require a response by an offsite firefighting agency (e.g., a local town Fire Department), then the level of plant safety is potentially degraded. The dispatch of an offsite firefighting agency to the site requires an emergency declaration only if it is needed to actively support firefighting efforts because the fire is beyond the capability of the Fire Brigade to extinguish. Declaration is not necessary if the agency resources are placed on stand-by, or supporting post-extinguishment recovery or investigation actions.~~

~~Basis-Related Requirements from Appendix R~~

~~Appendix R to 10 CFR 50, states in part:~~

> ~~Criterion 3 of Appendix A to this part specifies that "Structures, systems, and components important to safety shall be designed and located to minimize, consistent with other safety requirements, the probability and effect of fires and explosions."~~
>
> ~~When considering the effects of fire, those systems associated with achieving and maintaining safe shutdown conditions assume major importance to safety because damage to them can lead to core damage resulting from loss of coolant through boil-off.~~
>
> ~~Because fire may affect safe shutdown systems and because the loss of function of systems used to mitigate the consequences of design basis accidents under post-fire conditions does not per se impact public safety, the need to limit fire damage to systems required to achieve and maintain safe shutdown conditions is greater than the need to limit fire damage to those systems required to mitigate the consequences of design basis accidents.~~

~~In addition, Appendix R to 10 CFR 50, requires, among other considerations, the use of 1-hour fire barriers for the enclosure of cable and equipment and associated non-safety circuits of one redundant train (G.2.c). As used in EAL #2, the 30-minutes to verify a single alarm is well within this worst-case 1-hour time period.~~

Depending upon the plant mode at the time of the event, escalation of the emergency classification level would be via ~~IC~~ EAL CA6.1 or SA9.1.

Reference(s):

1. NEI 99-01 HU4

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 4 – Fire

Initiating Condition: FIRE potentially degrading the level of safety of the plant

EAL:

HU4.4 Unusual Event

A FIRE within the PROTECTED AREA that requires firefighting support by an offsite fire response agency to extinguish

Mode Applicability:

All

Definition(s):

FIRE - Combustion characterized by heat and light. Sources of smoke such as slipping drive belts or overheated electrical equipment do **not** constitute fires. Observation of flame is preferred but is **not** required if large quantities of smoke and heat are observed.

PROTECTED AREA - The area encompassed by physical barriers (the security fence) and to which access is controlled into the vital areas of the plant.

Basis:

This IC addresses the magnitude and extent of FIRES that may be indicative of a potential degradation of the level of safety of the plant.

~~EAL #1~~

~~The intent of the 15-minute duration is to size the FIRE and to discriminate against small FIRES that are readily extinguished (e.g., smoldering waste paper basket). In addition to alarms, other indications of a FIRE could be a drop in fire main pressure, automatic activation of a suppression system, etc.~~

~~Upon receipt, operators will take prompt actions to confirm the validity of an initial fire alarm, indication, or report. For EAL assessment purposes, the emergency declaration clock starts at the time that the initial alarm, indication, or report was received, and not the time that a subsequent verification action was performed. Similarly, the fire duration clock also starts at the time of receipt of the initial alarm, indication or report.~~

~~EAL #2~~

~~This EAL addresses receipt of a single fire alarm, and the existence of a FIRE is not verified (i.e., proved or disproved) within 30-minutes of the alarm. Upon receipt, operators will take prompt actions to confirm the validity of a single fire alarm. For EAL assessment purposes, the 30-minute clock starts at the time that the initial alarm was received, and not the time that a subsequent verification action was performed.~~

~~A single fire alarm, absent other indication(s) of a FIRE, may be indicative of equipment failure or a spurious activation, and not an actual FIRE. For this reason, additional time is allowed to verify the validity of the alarm. The 30-minute period is a reasonable amount of time to~~

~~determine if an actual FIRE exists; however, after that time, and absent information to the contrary, it is assumed that an actual FIRE is in progress.~~

~~If an actual FIRE is verified by a report from the field, then EAL #1 is immediately applicable, and the emergency must be declared if the FIRE is not extinguished within 15-minutes of the report. If the alarm is verified to be due to an equipment failure or a spurious activation, and this verification occurs within 30-minutes of the receipt of the alarm, then this EAL is not applicable and no emergency declaration is warranted.~~

~~EAL #3~~

~~In addition to a FIRE addressed by EAL #1 or EAL #2, a FIRE within the plant PROTECTED AREA not extinguished within 60-minutes may also potentially degrade the level of plant safety. *This basis extends to a FIRE occurring within the PROTECTED AREA of an ISFSI located outside the plant PROTECTED AREA.* [*Sentence for plants with an ISFSI outside the plant Protected Area*]~~

~~EAL #4~~

If a FIRE within the plant ~~*or ISFSI [for plants with an ISFSI outside the plant Protected Area]*~~ PROTECTED AREA is of sufficient size to require a response by an offsite firefighting agency (e.g., a local town Fire Department), then the level of plant safety is potentially degraded. The dispatch of an offsite firefighting agency to the site requires an emergency declaration only if it is needed to actively support firefighting efforts because the fire is beyond the capability of the Fire Brigade to extinguish. Declaration is not necessary if the agency resources are placed on stand-by, or supporting post-extinguishment recovery or investigation actions.

~~Basis-Related Requirements from Appendix R~~

~~Appendix R to 10 CFR 50, states in part:~~

> ~~Criterion 3 of Appendix A to this part specifies that "Structures, systems, and components important to safety shall be designed and located to minimize, consistent with other safety requirements, the probability and effect of fires and explosions."~~
>
> ~~When considering the effects of fire, those systems associated with achieving and maintaining safe shutdown conditions assume major importance to safety because damage to them can lead to core damage resulting from loss of coolant through boil-off.~~
>
> ~~Because fire may affect safe shutdown systems and because the loss of function of systems used to mitigate the consequences of design basis accidents under post-fire conditions does not per se impact public safety, the need to limit fire damage to systems required to achieve and maintain safe shutdown conditions is greater than the need to limit fire damage to those systems required to mitigate the consequences of design basis accidents.~~

~~In addition, Appendix R to 10 CFR 50, requires, among other considerations, the use of 1-hour fire barriers for the enclosure of cable and equipment and associated non-safety circuits~~

~~of one redundant train (G.2.c). As used in EAL #2, the 30-minutes to verify a single alarm is well within this worst-case 1-hour time period.~~

Depending upon the plant mode at the time of the event, escalation of the emergency classification level would be via ~~IC~~ EAL CA6.1 or SA9.1.

Reference(s):

1. NEI 99-01 HU4

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 5 – Hazardous Gas

Initiating Condition: Gaseous release IMPEDING access to equipment necessary for normal plant operations, cooldown or shutdown

EAL:

HA5.1 Alert

Release of a toxic, corrosive, asphyxiant or flammable gas into **any** Table H-2 room or area

AND

Entry into the room or area is prohibited or IMPEDED (Note 5)

Note 5: If the equipment in the listed room or area was already inoperable or out-of-service before the event occurred, then **no** emergency classification is warranted.

Table H-2 Safe Operation & Shutdown Rooms/Areas

Room/Area	Mode
Turbine Building (all elevations and rooms)	1
Polisher Building (all elevations and rooms)	1
-4 RCA Letdown Valve Gallery	3
+21 RAB Switchgears A or B	3
-4 RCA Wing Area	4
-15 RCA Valve Gallery	4
-35 RCA Safeguard Rooms	4
+21 RAB Switchgears A or B	4

Mode Applicability:

1 – Power Operation, 3 – Hot Standby, 4 – Hot Shutdown

Definition(s):

IMPEDE(D) - Personnel access to a room or area is hindered to an extent that extraordinary measures are necessary to facilitate entry of personnel into the affected room/area (e.g., requiring use of protective equipment, such as SCBAs, that is **not** routinely employed).

Basis:

This IC addresses an event involving a release of a hazardous gas that precludes or IMPEDES access to equipment necessary to maintain normal plant operation, or required for a normal plant cooldown and shutdown. This condition represents an actual or potential substantial degradation of the level of safety of the plant. This gas release could originate either on site or off site.

An Alert declaration is warranted if entry into the affected room/area is, or may be, procedurally required during the plant operating mode in effect at the time of the gaseous release. The emergency classification is not contingent upon whether entry is actually necessary at the time of the release.

Evaluation of the IC and EAL do not require atmospheric sampling; it only requires the Emergency Director's judgment that the gas concentration in the affected room/area is sufficient to preclude or significantly IMPEDE procedurally required access. This judgment may be based on a variety of factors including an existing job hazard analysis, report of ill effects on personnel, advice from a subject matter expert or operating experience with the same or similar hazards. Access should be considered as IMPEDED if extraordinary measures are necessary to facilitate entry of personnel into the affected room/area (e.g., requiring use of protective equipment, such as SCBAs, that is not routinely employed).

An emergency declaration is **not** warranted if any of the following conditions apply:

- The plant is in an operating mode different than the mode specified for the affected room/area (i.e., entry is not required during the operating mode in effect at the time of the gaseous release). For example, the plant is in Mode 1 when the gaseous release occurs, and the procedures used for normal operation, cooldown and shutdown do not require entry into the affected room until Mode 4.
- The gas release is a planned activity that includes compensatory measures which address the temporary inaccessibility of a room or area (e.g., fire suppression system testing).
- ~~The action for which room/area entry is required is of an administrative or record keeping nature (e.g., normal rounds or routine inspections).~~
- The access control measures are of a conservative or precautionary nature, and would not actually prevent or IMPEDE a required action.
- If the equipment in the listed room or area was already inoperable, or out-of-service, before the event occurred, then no emergency should be declared since the event will have no adverse impact beyond that already allowed by Technical Specifications at the time of the event.

An asphyxiant is a gas capable of reducing the level of oxygen in the body to dangerous levels. Most commonly, asphyxiants work by merely displacing air in an enclosed environment. This reduces the concentration of oxygen below the normal level of around 19%, which can lead to breathing difficulties, unconsciousness or even death.

This EAL does not apply to firefighting activities that generate smoke and that automatically or manually activate a fire suppression system in an area.~~, or to intentional inerting of containment. (BWR only).~~

The list of plant rooms or areas with entry-related mode applicability identified specify those rooms or areas that contain equipment which require a manual/local action as specified in operating procedures used for normal plant operation, cooldown and shutdown. Rooms or areas in which actions of a contingent or emergency nature would be performed (e.g., an action to address an off-normal or emergency condition such as emergency repairs, corrective measures or emergency operations) are not included. In addition, the list specifies the plant mode(s) during which entry would be required for each room or area (ref. 1).

Escalation of the emergency classification level would be via Recognition Category A, C or F ICs.

EAL HA5.1 mode applicability has been limited to the mode limitations of Table H-2 (Modes 1, 3 and 4 **only**).

Reference(s):

1. Attachment 2 Safe Operation & Shutdown Areas Tables A-3 & H-2 Bases
2. NEI 99-01 HA5

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 6 – Control Room Evacuation

Initiating Condition: Control Room evacuation resulting in transfer of plant control to alternate locations

EAL:

HA6.1 Alert

An event has resulted in plant control being transferred from the Control Room to the Remote Shutdown Panel (LCP-43)

Mode Applicability:

All

Definition(s):

None

Basis:

This IC addresses an evacuation of the Control Room that results in transfer of plant control to alternate locations outside the Control Room. The loss of the ability to control the plant from the Control Room is considered to be a potential substantial degradation in the level of plant safety.

Following a Control Room evacuation, control of the plant will be transferred to alternate shutdown locations. The necessity to control a plant shutdown from outside the Control Room, in addition to responding to the event that required the evacuation of the Control Room, will present challenges to plant operators and other on-shift personnel. Activation of the ERO and emergency response facilities will assist in responding to these challenges.

Transfer of plant control begins when the last licensed operator leaves the Control Room.

Escalation of the emergency classification level would be via IC HS6.

Reference(s):

1. OP-901-502 Evacuation of Control Room and Subsequent Plant Shutdown
2. NEI 99-01 HA6

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 6 – Control Room Evacuation

Initiating Condition: Inability to control a key safety function from outside the Control Room

EAL:

HS6.1 Site Area Emergency

An event has resulted in plant control being transferred from the Control Room to the Remote Shutdown Panel (LCP-43)

AND

Control of **any** of the following key safety functions is **not** re-established within 15 min. (Note 1):

- Reactivity Control (Modes 1, 2 and 3 **only**)
- Core Heat Removal
- RCS Heat Removal

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Mode Applicability:

1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 – Hot Shutdown, 5 - Cold Shutdown, 6 - Refueling

Definition(s):

None

Basis:

This IC 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 failure to gain control of a key safety function following a transfer of plant control to alternate locations is a precursor to a challenge to one or more fission product barriers within a relatively short period of time.

The determination of whether or not “control” is established at the remote safe shutdown location(s) is based on Emergency Director judgment. The Emergency Director is expected to make a reasonable, informed judgment within ~~(the site-specific time for transfer)~~15 minutes whether or not the operating staff has control of key safety functions from the remote safe shutdown location(s).

Transfer of plant control and the time period to establish control begins when the last licensed operator leaves the Control Room.

OP-901-502 Evacuation of Control Room and Subsequent Plant Shutdown provides specific instructions for evacuating the Control Room and establishing plant control at the local control

panel LCP-43. The 15 minute limit is established to ensure control is established at LCP-43 in sufficient time to allow completion of the remaining time critical actions in OP-901-502 (ref. 1).

Escalation of the emergency classification level would be via IC FG1 or CG1

Reference(s):

1. OP-901-502 Evacuation of Control Room and Subsequent Plant Shutdown
2. EP FAQ 2015-014
3. NEI 99-01 HS6

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 7 – Emergency Director Judgment

Initiating Condition: Other conditions exist that in the judgment of the Emergency Director warrant declaration of a UE

EAL:

HU7.1 Unusual Event

Other conditions exist which in the judgment of the Emergency Director indicate that events are in progress or have occurred which indicate a potential degradation of the level of safety of the plant or indicate a security threat to facility protection has been initiated. **No** releases of radioactive material requiring offsite response or monitoring are expected unless further degradation of SAFETY SYSTEMS occurs.

Mode Applicability:

All

Definition(s):

SAFETY SYSTEM - A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related (as defined in 10CFR50.2):

Those structures, systems and components that are relied upon to remain functional during and following design basis events to assure:

(1) The integrity of the reactor coolant pressure boundary;

(2) The capability to shut down the reactor and maintain it in a safe shutdown condition;

(3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures.

Basis:

This IC addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist which are believed by the Emergency Director to fall under the emergency classification level description for an ~~NOUE~~UNUSUAL EVENT.

Reference(s):

1. NEI 99-01 HU7

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 7 – Emergency Director Judgment

Initiating Condition: Other conditions exist that in the judgment of the Emergency Director warrant declaration of an ALERT

EAL:

HA7.1 Alert

Other conditions exist which in the judgment of the Emergency Director indicate that events are in progress or have occurred which involve an actual or potential substantial degradation of the level of safety of the plant or a security event that involves probable life threatening risk to site personnel or damage to site equipment because of HOSTILE ACTION. **Any** releases are expected to be limited to small fractions of the EPA Protective Action Guideline exposure levels.

Mode Applicability:

All

Definition(s):

HOSTAGE - A person(s) held as leverage against the station to ensure that demands will be met by the station.

HOSTILE ACTION - An act toward WF3 or its personnel that includes the use of violent force to destroy equipment, take HOSTAGES, and/or intimidate the licensee to achieve an end. This includes attack by air, land, or water using guns, explosives, PROJECTILES, vehicles, or other devices used to deliver destructive force. Other acts that satisfy the overall intent may be included. Hostile action should **not** be construed to include acts of civil disobedience or felonious acts that are **not** part of a concerted attack on WF3. Non-terrorism-based EALs should be used to address such activities (i.e., this may include violent acts between individuals in the SECURITY OWNER CONTROLLED AREA (SOCA)).

PROJECTILE - An object directed toward a Nuclear Power Plant that could cause concern for its continued operability, reliability, or personnel safety.

PROTECTED AREA - The area encompassed by physical barriers (the security fence) and to which access is controlled into the vital areas of the plant.

SECURITY OWNR CONTROLLED AREA (SOCA) - The area inside the SOCA Vehicle Barrier System (VBS) up to the PROTECTED AREA fence line. Access to this area is controlled by the SOCA Personnel Access Control Point. The SOCA is part of but not equal to the Owner Controlled Area as described or defined in the Waterford 3 Emergency Plan.

Basis:

This IC addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist which are believed by the Emergency Director to fall under the emergency classification level description for an ALERT.

Reference(s):

1. NEI 99-01 HA7

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 7 – Emergency Director Judgment

Initiating Condition: Other conditions exist that in the judgment of the Emergency Director warrant declaration of a SITE AREA EMERGENCY

EAL:

HS7.1 Site Area Emergency

Other conditions exist which in the judgment of the Emergency Director indicate that events are in progress or have occurred which involve actual or likely major failures of plant functions needed for protection of the public or HOSTILE ACTION that results in intentional damage or malicious acts, (1) toward site personnel or equipment that could lead to the likely failure of or, (2) that prevent effective access to equipment needed for the protection of the public. **Any** releases are **not** expected to result in exposure levels which exceed EPA Protective Action Guideline exposure levels beyond the SITE BOUNDARY

Mode Applicability:

All

Definition(s):

HOSTAGE - A person(s) held as leverage against the station to ensure that demands will be met by the station.

HOSTILE ACTION - An act toward WF3 or its personnel that includes the use of violent force to destroy equipment, take HOSTAGES, and/or intimidate the licensee to achieve an end. This includes attack by air, land, or water using guns, explosives, PROJECTILES, vehicles, or other devices used to deliver destructive force. Other acts that satisfy the overall intent may be included. Hostile action should **not** be construed to include acts of civil disobedience or felonious acts that are **not** part of a concerted attack on WF3. Non-terrorism-based EALs should be used to address such activities (i.e., this may include violent acts between individuals in the SECUFRITY OWNER CONTROLLED AREA (SOCA)).

PROJECTILE - An object directed toward a Nuclear Power Plant that could cause concern for its continued operability, reliability, or personnel safety.

PROTECTED AREA - The area encompassed by physical barriers (the security fence) and to which access is controlled into the vital areas of the plant.

SECURITY OWNR CONTROLLED AREA (SOCA) - The area inside the SOCA Vehicle Barrier System (VBS) up to the PROTECTED AREA fence line. Access to this area is controlled by the SOCA Personnel Access Control Point. The SOCA is part of but not equal to the Owner Controlled Area as described or defined in the Waterford 3 Emergency Plan.

SITE BOUNDARY - The border of the Exclusion Area or an area corresponding to a distance of 914 meters from the Waterford 3 reactor. Also referred to as the Exclusion Area Boundary.

Basis:

This IC addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist which are believed by the Emergency Director to fall under the emergency classification level description for a SITE AREA EMERGENCY.

Reference(s):

1. NEI 99-01 HS7

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 7 – Emergency Director Judgment

Initiating Condition: Other conditions exist that in the judgment of the Emergency Director warrant declaration of a GENERAL EMERGENCY

EAL:

HG7.1 General Emergency

Other conditions exist which in the judgment of the Emergency Director indicate that events are in progress or have occurred which involve actual or IMMINENT substantial core degradation or melting with potential for loss of containment integrity or HOSTILE ACTION that results in an actual loss of physical control of the facility. Releases can be reasonably expected to exceed EPA Protective Action Guideline exposure levels offsite for more than the immediate site area

Mode Applicability:

All

Definition(s):

HOSTAGE - A person(s) held as leverage against the station to ensure that demands will be met by the station.

HOSTILE ACTION - An act toward WF3 or its personnel that includes the use of violent force to destroy equipment, take HOSTAGES, and/or intimidate the licensee to achieve an end. This includes attack by air, land, or water using guns, explosives, PROJECTILES, vehicles, or other devices used to deliver destructive force. Other acts that satisfy the overall intent may be included. Hostile action should **not** be construed to include acts of civil disobedience or felonious acts that are **not** part of a concerted attack on WF3. Non-terrorism-based EALs should be used to address such activities (i.e., this may include violent acts between individuals in the SECURITY OWNER CONTROLLED AREA (SOCA)).

IMMINENT - The trajectory of events or conditions is such that an EAL will be met within a relatively short period of time regardless of mitigation or corrective actions.

PROJECTILE - An object directed toward a Nuclear Power Plant that could cause concern for its continued operability, reliability, or personnel safety.

PROTECTED AREA - The area encompassed by physical barriers (the security fence) and to which access is controlled into the vital areas of the plant.

SECURITY OWNR CONTROLLED AREA (SOCA) - The area inside the SOCA Vehicle Barrier System (VBS) up to the PROTECTED AREA fence line. Access to this area is controlled by the SOCA Personnel Access Control Point. The SOCA is part of but not equal to the Owner Controlled Area as described or defined in the Waterford 3 Emergency Plan.

Basis:

This IC addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist which are believed by the Emergency Director to fall under the emergency classification level description for a GENERAL EMERGENCY.

Reference(s):

1. NEI 99-01 HG7

Category S – System Malfunction

EAL Group: Hot Conditions (RCS temperature > 200ºF); EALs in this category are applicable only in one or more hot operating modes.

Numerous system-related equipment failure events that warrant emergency classification have been identified in this category. They may pose actual or potential threats to plant safety.

The events of this category pertain to the following subcategories:

1. Loss of Safety Bus AC Power

Loss of emergency electrical power can compromise plant SAFETY SYSTEM operability including decay heat removal and emergency core cooling systems which may be necessary to ensure fission product barrier integrity. This category includes loss of onsite and offsite sources for 4160 VAC safety buses.

2. Loss of Vital DC Power

Loss of emergency electrical power can compromise plant SAFETY SYSTEM operability including decay heat removal and emergency core cooling systems which may be necessary to ensure fission product barrier integrity. This category includes loss of vital plant 125V DC power sources.

3. Loss of Control Room Indications

Certain events that degrade plant operator ability to effectively assess plant conditions within the plant warrant emergency classification. Losses of indicators are in this subcategory.

4. RCS Activity

During normal operation, reactor coolant fission product activity is very low. Small concentrations of fission products in the coolant are primarily from the fission of tramp uranium in the fuel clad or minor perforations in the clad itself. Any significant ~~increase~~ rise from these base-line levels (2% - 5% clad failures) is indicative of fuel failures and is covered under the Fission Product Barrier Degradation category. However, lesser amounts of clad damage may result in coolant activity exceeding Technical Specification limits. These fission products will be circulated with the reactor coolant and can be detected by coolant sampling.

5. RCS Leakage

The reactor vessel provides a volume for the coolant that covers the reactor core. The reactor pressure vessel and associated pressure piping (reactor coolant system) together provide a barrier to limit the release of radioactive material should the reactor fuel clad integrity fail. Excessive RCS leakage greater than Technical Specification limits indicates potential pipe cracks that may propagate to an extent threatening fuel clad, RCS and containment integrity.

6. RPS Failure

This subcategory includes events related to failure of the Reactor Protection System (RPS) to initiate and complete reactor trips. In the plant licensing basis, postulated failures of the RPS to complete a reactor trip comprise a specific set of analyzed events referred to as Anticipated Transient Without Scram (ATWS) events. For EAL classification, however, ATWS is intended to mean any trip failure event that does not achieve reactor shutdown. If RPS actuation fails to assure reactor shutdown, positive control of reactivity is at risk and could cause a threat to fuel clad, RCS and containment integrity.

7. Loss of Communications

Certain events that degrade plant operator ability to effectively communicate with essential personnel within or external to the plant warrant emergency classification.

8. Containment Failure

Failure of containment isolation capability (under conditions in which the containment is not currently challenged) warrants emergency classification. Failure of containment pressure control capability also warrants emergency classification.

9. Hazardous Event Affecting SAFETY SYSTEMS

Various natural and technological events that result in degraded plant SAFETY SYSTEM performance or significant VISIBLE DAMAGE warrant emergency classification under this subcategory.

Category: S – System Malfunction

Subcategory: 1 – Loss of Safety Bus AC Power

Initiating Condition: Loss of **all** offsite AC power capability to safety buses for 15 minutes or longer

EAL:

SU1.1 Unusual Event

Loss of **all** offsite AC power capability, Table S-1, to 4160 VAC safety buses 3A and 3B for ≥ 15 min. (Note 1)

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Table S-1 AC Power Sources	
Onsite	• Emergency Diesel Generator A • Emergency Diesel Generator B • Temporary Emergency Diesels (TEDs) (if already aligned) • Unit Auxiliary Transformer 3A • Unit Auxiliary Transformer 3B
Offsite	• Startup Transformer 3A • Startup Transformer 3B • Unit Auxiliary Transformer 3A (when back-fed from offsite) • Unit Auxiliary Transformer 3B (when back-fed from offsite)

Mode Applicability:

1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 – Hot Shutdown

Definition(s):

None

Basis:

This IC addresses a prolonged loss of offsite power. The loss of offsite power sources renders the plant more vulnerable to a complete loss of power to AC ~~emergency~~ safety buses. This condition represents a potential reduction in the level of safety of the plant.

For emergency classification purposes, “capability” means that an offsite AC power source(s) is available to the ~~emergency~~ safety buses, whether or not the buses are powered from it.

Fifteen minutes was selected as a threshold to exclude transient or momentary losses of offsite power.

Escalation of the emergency classification level would be via IC SA1.

Reference(s):

1. UFSAR Section 8.2, Offsite Power System
2. NEI 99-01 SU1

Category: S – System Malfunction

Subcategory: 1 – Loss of Safety Bus AC Power

Initiating Condition: Loss of **all but one** AC power source to safety buses for 15 minutes or longer

EAL:

SA1.1 Alert

AC power capability, Table S-1, to 4160 VAC safety buses 3A and 3B reduced to a single power source for ≥ 15 min. (Note 1)

AND

Any additional single power source failure will result in loss of **all** AC power to SAFETY SYSTEMS

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Table S-1 AC Power Sources	
Onsite	• Emergency Diesel Generator A • Emergency Diesel Generator B • Temporary Emergency Diesels (TEDs) (if already aligned) • Unit Auxiliary Transformer 3A • Unit Auxiliary Transformer 3B
Offsite	• Startup Transformer 3A • Startup Transformer 3B • Unit Auxiliary Transformer 3A (when back-fed from offsite) • Unit Auxiliary Transformer 3B (when back-fed from offsite)

Mode Applicability:

1 - Power Operation, 2 - Startup, 3 - Hot Standby, 3 - Hot Shutdown

Definition(s):

SAFETY SYSTEM - A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related (as defined in 10CFR50.2):

Those structures, systems and components that are relied upon to remain functional during and following design basis events to assure:

(1) The integrity of the reactor coolant pressure boundary;

(2) The capability to shut down the reactor and maintain it in a safe shutdown condition;

(3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures.

Basis:

This IC 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. In this condition, the sole AC power source may be powering one, or more than one, train of safety-related equipment. This IC provides an escalation path from IC SU1.

An "AC power source" is a source recognized in AOPs and EOPs, and capable of supplying required power to a ~~n emergency~~safety bus. Some examples of this condition are presented below.

- A loss of all offsite power with a concurrent failure of all but one emergency power source (e.g., an onsite diesel generator).
- A loss of all offsite power and loss of all emergency power sources (e.g., onsite diesel generators) with a single train of ~~emergency~~ safety buses being back-fed from the unit main generator via a Unit Auxiliary Transformer.
- A loss of emergency power sources (e.g., onsite diesel generators) with a single train of ~~emergency~~ safety buses being ~~back~~ fed from an offsite power source (Startup Transformer).

Fifteen minutes was selected as a threshold to exclude transient or momentary losses of power.

Escalation of the emergency classification level would be via IC SS1.

Temporary Emergency Diesels (TEDs) can be credited if already installed in accordance with site procedures (ref. 5, 6).

This EAL is the hot condition equivalent of the cold condition EAL CU2.1.

Reference(s):

1. UFSAR Section 8.1, Onsite Power System
2. UFSAR Section 8.2, Offsite Power System
3. OP-901-310 Loss of Train A Safety Bus
4. OP-901-311 Loss of Train B Safety Bus
5. Technical Specifications 3/4.8.1 A.C. Sources
6. ME-001-012, Temporary Power from Temporary Diesel for 3A2 and 3B2 4KV Buses (Modes 1-6)
7. NEI 99-01 SA1

Category: S – System Malfunction

Subcategory: 1 – Loss of Safety Bus AC Power

Initiating Condition: Loss of **all** offsite power and **all** onsite AC power to safety buses for 15 minutes or longer

EAL:

SS1.1 Site Area Emergency

Loss of **all** offsite and **all** onsite AC power to 4160 VAC safety buses 3A and 3B for ≥ 15 min. (Note 1)

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Mode Applicability:

1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 - Hot Shutdown

Definition(s):

SAFETY SYSTEM - A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related (as defined in 10CFR50.2):

Those structures, systems and components that are relied upon to remain functional during and following design basis events to assure:

(1) The integrity of the reactor coolant pressure boundary;

(2) The capability to shut down the reactor and maintain it in a safe shutdown condition;

(3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures.

Basis:

This IC addresses a total loss of AC power that compromises the performance of all SAFETY SYSTEMS requiring electric power including those necessary for emergency core cooling, containment heat removal/pressure control, spent fuel heat removal and the ultimate heat sink. Mitigative strategies using non-safety related power sources (FLEX generators, etc.) may be effective in supplying power to these buses. These power sources must be controlled in accordance with abnormal or emergency operating procedures, or beyond design basis accident response guidelines (e.g., FLEX support guidelines) and must be capable (alone or in combination) of supplying power for long term decay heat removal systems. In addition, fission product barrier monitoring capabilities may be degraded under these conditions. This IC represents a condition that involves actual or likely major failures of plant functions needed for the protection of the public.

Fifteen minutes was selected as a threshold to exclude transient or momentary power losses.

Escalation of the emergency classification level would be via IC~~s~~ AG1, FG1 or SG1.

Temporary Emergency Diesels (TEDs) can be credited if already installed in accordance with site procedures (ref. 4, 5).

This EAL is the hot condition equivalent of the cold condition EAL CA2.1.

Reference(s):

1. UFSAR Section 8.1, Onsite Power System
2. UFSAR Section 8.2, Offsite Power System
3. OP-902-005 Station Blackout Recovery
4. Technical Specifications 3/4.8.1 A.C. Sources
5. ME-001-012, Temporary Power from Temporary Diesel for 3A2 and 3B2 4KV Buses (Modes 1-6)
6. NEI 99-01 SS1

Category: S –System Malfunction

Subcategory: 1 – Loss of Safety Bus AC Power

Initiating Condition: Prolonged loss of **all** offsite and **all** onsite AC power to safety buses

EAL:

SG1.1 General Emergency

Loss of **all** offsite and **all** onsite AC power to 4160 VAC safety buses 3A and 3B

AND EITHER:

- Restoration of at least one 4160 VAC safety bus in < 4 hours is **not** likely (Note 1)
- Representative CETs reading > 1,200ºF

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Mode Applicability:

1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 - Hot Shutdown

Definition(s):

SAFETY SYSTEM - A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related (as defined in 10CFR50.2):

Those structures, systems and components that are relied upon to remain functional during and following design basis events to assure:

(1) The integrity of the reactor coolant pressure boundary;

(2) The capability to shut down the reactor and maintain it in a safe shutdown condition;

(3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures.

Basis:

This IC addresses a prolonged loss of all power sources to AC ~~emergency~~ safety buses. A loss of all AC power 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. Mitigative strategies using non-safety related power sources (FLEX generators, etc.) may be effective in supplying power to these buses. These power sources must be controlled in accordance with abnormal or emergency operating procedures, or beyond design basis accident response guidelines (e.g., FLEX support guidelines) and must be capable (alone or in combination) of supplying power for long term decay heat removal systems. A prolonged loss of these buses will lead to a loss of one or more fission product barriers. In addition, fission product barrier monitoring capabilities may be degraded under these conditions.

The EAL should require declaration of a General Emergency prior to meeting the thresholds for IC FG1. This will allow additional time for implementation of offsite protective actions.

Escalation of the emergency classification from Site Area Emergency will occur if it is projected that power cannot be restored to at least one AC ~~emergency~~ safety bus by the end of the analyzed station blackout coping period. Beyond this time, plant responses and event trajectory are subject to greater uncertainty, and there is a~~n increased~~ greater likelihood of challenges to multiple fission product barriers.

The 4 hours to restore AC power is based on the site blackout coping analysis performed in conformance with 10 CFR 50.63 (ref. 6).

The estimate for restoring at least one ~~emergency~~ safety bus should be based on a realistic appraisal of the situation. Mitigation actions with a low probability of success should not be used as a basis for delaying a classification upgrade. The goal is to maximize the time available to prepare for, and implement, protective actions for the public.

The EAL will also require a General Emergency declaration if the loss of AC power results in parameters that indicate an inability to adequately remove decay heat from the core.

Temporary Emergency Diesels (TEDs) can be credited if already installed in accordance with site procedures (ref. 4, 5).

Reference(s):

1. UFSAR Section 8.1, Onsite Power System
2. UFSAR Section 8.2, Offsite Power System
3. OP-902-005 Station Blackout Recovery
4. Technical Specifications 3/4.8.1 A.C. Sources
5. ME-001-012, Temporary Power from Temporary Diesel for 3A2 and 3B2 4KV Buses (Modes 1-6)
6. UFSAR Appendix 8.1A Station Blackout (SBO) Evaluation
7. UFSAR Section 1.9A Inadequate Core Cooling Instrumentation
8. CEOG Generic Accident Management Guidelines - Phase 1, “Initial Diagnosis”
9. NEI 99-01 SG1

Category: S –System Malfunction

Subcategory: 1 – Loss of Safety Bus AC Power

Initiating Condition: Loss of **all** safety bus AC and vital DC power sources for 15 minutes or longer

EAL:

SG1.2 General Emergency

Loss of **all** offsite and **all** onsite AC power to 4160 VAC safety buses 3A and 3B for ≥ 15 min. (Note 1)

AND

Indicated voltage is < 108 VDC on **all** vital DC buses for ≥ 15 min. (Note 1)

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Mode Applicability:

1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 - Hot Shutdown

Definition(s):

SAFETY SYSTEM - A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related (as defined in 10CFR50.2):

Those structures, systems and components that are relied upon to remain functional during and following design basis events to assure:

(1) The integrity of the reactor coolant pressure boundary;

(2) The capability to shut down the reactor and maintain it in a safe shutdown condition;

(3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures.

Basis:

This IC addresses a concurrent and prolonged loss of both safety bus AC and vital DC power. A loss of all safety bus AC power 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. A loss of vital DC power compromises the ability to monitor and control SAFETY SYSTEMS. A sustained loss of both safety bus AC and vital DC power will lead to multiple challenges to fission product barriers.

Fifteen minutes was selected as a threshold to exclude transient or momentary power losses. The 15-minute emergency declaration clock begins at the point when both EAL thresholds are met.

Temporary Emergency Diesels (TEDs) can be credited if already installed in accordance with site procedures (ref. 4, 5).

This IC refers to loss of vital DC power from the 3A-DC, 3B-DC, and 3AB-DC buses. Less than 108 VDC bus voltage is based on the minimum bus voltage necessary for the operation of safety related equipment (ref. 5, 6, 7).

Reference(s):

1. UFSAR Section 8.1, Onsite Power System
2. UFSAR Section 8.2, Offsite Power System
3. OP-902-005 Station Blackout Recovery
4. Technical Specifications 3/4.8.1 A.C. Sources
5. ME-001-012, Temporary Power from Temporary Diesel for 3A2 and 3B2 4KV Buses (Modes 1-6)
6. ECE91-058 Battery 3A-S “A” Train Calculation for Station Blackout
7. ECE91-059 Battery 3B-S “B” Train Calculation for Station Blackout
8. ECE91-060 Battery 3AB-S Calculation for Station Blackout
9. NEI 99-01 SG8

Category: S – System Malfunction

Subcategory: 2 – Loss of Vital DC Power

Initiating Condition: Loss of **all** vital DC power for 15 minutes or longer

EAL:

SS2.1	**Site Area Emergency**
Indicated voltage is < 108 VDC on **all** vital DC buses for ≥ 15 min. (Note 1)	

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Mode Applicability:

1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 - Hot Shutdown

Definition(s):

SAFETY SYSTEM - A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related (as defined in 10CFR50.2):

Those structures, systems and components that are relied upon to remain functional during and following design basis events to assure:

(1) The integrity of the reactor coolant pressure boundary;

(2) The capability to shut down the reactor and maintain it in a safe shutdown condition;

(3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures.

Basis:

This IC addresses a loss of vital DC power which compromises the ability to monitor and control SAFETY SYSTEMS. In modes above Cold Shutdown, this condition involves a major failure of plant functions needed for the protection of the public.

This IC refers to loss of vital DC power from the 3A-DC, 3B-DC, and 3AB-DC buses.

Fifteen minutes was selected as a threshold to exclude transient or momentary power losses.

Escalation of the emergency classification level would be via IC~~s~~ AG1, FG1 or ~~SG8~~SG1.

Less than 108 VDC bus voltage is based on the minimum bus voltage necessary for the operation of safety related equipment (ref. 1, 2, 3).

This EAL is the hot condition equivalent of the cold condition EAL CU4.1.

Reference(s):

1. ECE91-058 Battery 3A-S “A” Train Calculation for Station Blackout
2. ECE91-059 Battery 3B-S “B” Train Calculation for Station Blackout
3. ECE91-060 Battery 3AB-S Calculation for Station Blackout
4. Technical Specifications section 3/4.8.2.2 D.C. Sources - Shutdown
5. NEI 99-01 SS8

Category: S – System Malfunction

Subcategory: 3 – Loss of Control Room Indications

Initiating Condition: UNPLANNED loss of Control Room indications for 15 minutes or longer

EAL:

SU3.1 Unusual Event

An UNPLANNED event results in the inability to monitor one or more Table S-2 parameters from within the Control Room for ≥ 15 min. (Note 1)

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Table S-2 Safety System Parameters
• Reactor power • RCS level • RCS pressure • Core exit temperature • Level in at least one S/G • S/G emergency feed water flow to at least one S/G

Mode Applicability:

1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 - Hot Shutdown

Definition(s):

SAFETY SYSTEM - A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related (as defined in 10CFR50.2):

Those structures, systems and components that are relied upon to remain functional during and following design basis events to assure:

(1) The integrity of the reactor coolant pressure boundary;

(2) The capability to shut down the reactor and maintain it in a safe shutdown condition;

(3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures.

UNPLANNED - A parameter change or an event that is **not** 1) the result of an intended evolution or 2) an expected plant response to a transient. The cause of the parameter change or event may be known or unknown.

Basis:

This IC addresses the difficulty associated with monitoring normal plant conditions without the ability to obtain SAFETY SYSTEM parameters from within the Control Room. This condition is a precursor to a more significant event and represents a potential degradation in the level of safety of the plant.

As used in this EAL, an "inability to monitor" means that values for one or more of the listed parameters cannot be determined from within the Control Room. This situation would require a loss of all of the Control Room sources for the given parameter(s). For example, the reactor power level cannot be determined from any analog, digital and recorder source within the Control Room.

An event involving a loss of plant indications, annunciators and/or display systems is evaluated in accordance with 10 CFR 50.72 (and associated guidance in NUREG-1022) to determine if an NRC event report is required. The event would be reported if it significantly impaired the capability to perform emergency assessments. In particular, emergency assessments necessary to implement abnormal operating procedures, emergency operating procedures, and emergency plan implementing procedures addressing emergency classification, accident assessment, or protective action decision-making.

This EAL is focused on a selected subset of plant parameters associated with the key safety functions of reactivity control, core cooling ~~[*PWR*] / RPV level [*BWR*]~~ and RCS heat removal. The loss of the ability to determine one or more of these parameters from within the Control Room is considered to be more significant than simply a reportable condition. In addition, if all indication sources for one or more of the listed parameters are lost, then the ability to determine the values of other SAFETY SYSTEM parameters may be impacted as well. For example, if the value for ~~reactor vessel~~RCS level ~~[PWR] / RPV water level [BWR]~~ cannot be determined from the indications and recorders on a main control board, the SPDS or the plant computer, the availability of other parameter values may be compromised as well.

Fifteen minutes was selected as a threshold to exclude transient or momentary losses of indication.

Escalation of the emergency classification level would be via ~~IC SA2~~EAL SA3.1.

Reference(s):

1. NEI 99-01 SU2

Category: S – System Malfunction

Subcategory: 3 – Loss of Control Room Indications

Initiating Condition: UNPLANNED loss of Control Room indications for 15 minutes or longer with a significant transient in progress

EAL:

SA3.1 Alert

An UNPLANNED event results in the inability to monitor **one or more** Table S-2 parameters from within the Control Room for ≥ 15 min. (Note 1)

AND

Any significant transient is in progress, Table S-3

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Table S-2 Safety System Parameters
• Reactor power • RCS level • RCS pressure • Core exit temperature • Level in at least one S/G • S/G emergency feed water flow to at least one S/G

Table S-3 Significant Transients
• Turbine runback > 25% reactor power • Electrical load rejection > 25% full electrical load (300 MWE) • Reactor trip • ECCS (SI) activation

Mode Applicability:

1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 - Hot Shutdown

Definition(s):

SAFETY SYSTEM - A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related (as defined in 10CFR50.2):

Those structures, systems and components that are relied upon to remain functional during and following design basis events to assure:

(1) The integrity of the reactor coolant pressure boundary;

(2) The capability to shut down the reactor and maintain it in a safe shutdown condition;

(3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures.

UNPLANNED - A parameter change or an event that is **not** 1) the result of an intended evolution or 2) an expected plant response to a transient. The cause of the parameter change or event may be known or unknown.

Basis:

This IC 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. During this condition, the margin to a potential fission product barrier challenge is reduced. It thus represents a potential substantial degradation in the level of safety of the plant.

As used in this EAL, an “inability to monitor” means that values for one or more of the listed parameters cannot be determined from within the Control Room. This situation would require a loss of all of the Control Room sources for the given parameter(s). For example, the reactor power level cannot be determined from any analog, digital and recorder source within the Control Room.

An event involving a loss of plant indications, annunciators and/or display systems is evaluated in accordance with 10 CFR 50.72 (and associated guidance in NUREG-1022) to determine if an NRC event report is required. The event would be reported if it significantly impaired the capability to perform emergency assessments. In particular, emergency assessments necessary to implement abnormal operating procedures, emergency operating procedures, and emergency plan implementing procedures addressing emergency classification, accident assessment, or protective action decision-making.

This EAL is focused on a selected subset of plant parameters associated with the key safety functions of reactivity control, core cooling ~~[*PWR*] / RPV level [*BWR*]~~ and RCS heat removal. The loss of the ability to determine one or more of these parameters from within the Control Room is considered to be more significant than simply a reportable condition. In addition, if all indication sources for one or more of the listed parameters are lost, then the ability to determine the values of other SAFETY SYSTEM parameters may be impacted as well. For example, if the value for ~~reactor vessel~~RCS level ~~[*PWR*] / RPV water level [*BWR*]~~ cannot be determined from the indications and recorders on a main control board, the SPDS or the plant computer, the availability of other parameter values may be compromised as well.

Fifteen minutes was selected as a threshold to exclude transient or momentary losses of indication.

Escalation of the emergency classification level would be via IC~~s~~ FS1 or ~~IC~~ AS1

Reference(s):

1. NEI 99-01 SA2

Category: S – System Malfunction

Subcategory: 4 – RCS Activity

Initiating Condition: Reactor coolant activity greater than Technical Specification allowable limits

EAL:

SU4.1 Unusual Event

RCS sample activity > 60 µCi/gm dose equivalent I-131

OR

RCS sample activity > 1.0 µCi/gm dose equivalent I-131 for > 48 hours during one continuous time interval (Note 1)

OR

RCS sample activity >100/Ē µCi/gm

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Mode Applicability:

1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 – Hot Shutdown

Definition(s):

None

Basis:

This IC addresses a reactor coolant activity value that exceeds an allowable limit specified in Technical Specifications. This condition is a precursor to a more significant event and represents a potential degradation of the level of safety of the plant.

Escalation of the emergency classification level would be via IC FA1 or the Recognition Category A ICs.

Reference(s):

1. Technical Specification 3.4.7 Reactor Coolant System - Specific Activity
2. NEI 99-01 SU3

Category: S – System Malfunction

Subcategory: 5 – RCS Leakage

Initiating Condition: RCS leakage for 15 minutes or longer

EAL:

SU5.1 Unusual Event

RCS unidentified or pressure boundary leakage > 10 gpm for ≥ 15 min. (Note 1)

OR

RCS identified leakage > 25 gpm for ≥ 15 min. (Note 1)

OR

Reactor coolant leakage to a location outside containment > 25 gpm for ≥ 15 min. (Note 1)

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Mode Applicability:

1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 - Hot Shutdown

Definition(s):

UNISOLABLE - An open or breached system line that **cannot** be isolated, remotely or locally.

Basis:

Failure to isolate the leak (from the Control Room or locally), within 15 minutes or if known that the leak cannot be isolated within 15 minutes, from the start of the leak requires immediate classification.

Steam generator tube leakage is identified RCS leakage.

This IC addresses RCS leakage which may be a precursor to a more significant event. In this case, RCS leakage has been detected and operators, following applicable procedures, have been unable to promptly isolate the leak. This condition is considered to be a potential degradation of the level of safety of the plant.

~~EAL #1 and EAL #2~~The first and second EAL conditions are focused on a loss of mass from the RCS due to “unidentified leakage", "pressure boundary leakage" or "identified leakage” (as these leakage types are defined in the plant Technical Specifications). ~~EAL #3~~The third condition addresses an RCS mass loss caused by an UNISOLABLE leak through an interfacing system. These ~~EALs~~ conditions thus apply to leakage into the containment, a secondary-side system (e.g., steam generator tube leakage ~~in a PWR~~) or a location outside of containment (ref. 1).

The leak rate values for each ~~EAL~~ condition were selected because they are usually observable with normal Control Room indications. Lesser values typically require time-consuming calculations to determine (e.g., a mass balance calculation). ~~EAL #1~~ The first

condition uses a lower value that reflects the greater significance of unidentified or pressure boundary leakage (ref. 2).

The release of mass from the RCS due to the as-designed/expected operation of a relief valve does not warrant an emergency classification. ~~For PWRs, a~~An emergency classification would be required if a mass loss is caused by a relief valve that is not functioning as designed/expected (e.g., a relief valve sticks open and the line flow cannot be isolated). ~~For BWRs, a stuck-open Safety Relief Valve (SRV) or SRV leakage is not considered either identified or unidentified leakage by Technical Specifications and, therefore, is not applicable to this EAL.~~

The 15-minute threshold duration allows sufficient time for prompt operator actions to isolate the leakage, if possible.

Escalation of the emergency classification level would be via ICs of Recognition Category A or F.

Reference(s):

1. Technical Specifications 3.4.5 Reactor Coolant Leakage
2. OP-901-111 Reactor Coolant System Leakage
3. NEI 99-01 SU4

Category: S – System Malfunction

Subcategory: 6 – RPS Failure

Initiating Condition: Automatic or manual trip fails to shut down the reactor

EAL:

SU6.1 Unusual Event

An automatic trip did **not** shut down the reactor as indicated by reactor power > 5% after **any** RPS setpoint is exceeded

AND

A subsequent automatic trip or manual trip action taken at the reactor control console (manual reactor trip push buttons or DRT) is successful in shutting down the reactor as indicated by reactor power ≤ 5% (Note 8)

Note 8: A manual action is **any** operator action, or set of actions, which causes the control rods to be rapidly inserted into the core, and does **not** include manually driving in control rods or implementation of boron injection strategies.

Mode Applicability:

1 - Power Operation

Definition(s):

IMMINENT - The trajectory of events or conditions is such that an EAL will be met within a relatively short period of time regardless of mitigation or corrective actions.

Basis:

After a successful reactor trip neutron power should immediately drop to approximately 6% due to prompt drop. Therefore, for the purpose of emergency classification, reactor power less than or equal to 5% is used to identify a successful reactor trip (ref. 2).

This IC addresses a failure of the RPS to initiate or complete an automatic or manual reactor ~~(~~trip ~~[*PWR*] / scram [*BWR*])~~ that results in a reactor shutdown, and either a subsequent operator manual action taken at the reactor control consoles or an automatic ~~(~~trip ~~[*PWR*] / scram [*BWR*])~~is successful in shutting down the reactor. This event is a precursor to a more significant condition and thus represents a potential degradation of the level of safety of the plant.

In the event that the operator identifies a reactor trip is IMMINENT and initiates a successful manual reactor trip before the automatic trip setpoint is reached, no declaration is required. The successful manual trip of the reactor before it reaches its automatic trip setpoint or reactor trip signals caused by instrumentation channel failures do not lead to a potential fission product barrier loss.

Following the failure of~~n~~ an automatic reactor ~~(~~trip~~[*PWR*] / scram [*BWR*])~~, operators will promptly initiate manual actions at the reactor control consoles to shutdown the reactor (e.g., initiate a manual reactor ~~(~~trip~~[*PWR*] / scram [*BWR*])~~). If these manual actions are successful in shutting down the reactor, core heat generation will quickly fall to a level within the

capabilities of the plant's decay heat removal systems.

If an initial manual reactor ~~(~~trip ~~[*PWR*] / scram [*BWR*])~~is unsuccessful, operators will promptly take manual action at another location(s) on the reactor control consoles to shutdown the reactor (e.g., initiate a manual reactor ~~(~~trip~~[*PWR*] / scram [*BWR*])~~) using a different switch). Depending upon several factors, the initial or subsequent effort to manually ~~(~~trip ~~[*PWR*] / scram [*BWR*])~~ the reactor, or a concurrent plant condition, may lead to the generation of an automatic reactor ~~(~~trip ~~[*PWR*] / scram [*BWR*])~~ signal. If a subsequent manual or automatic ~~(~~trip ~~[*PWR*] / scram [*BWR*])~~ is successful in shutting down the reactor, core heat generation will quickly fall to a level within the capabilities of the plant's decay heat removal systems.

A manual action at the reactor control consoles is any operator action, or set of actions, which causes the control rods to be rapidly inserted into the core (e.g., initiating a manual reactor ~~(~~trip~~[*PWR*] / scram [*BWR*])~~). Use of the Reactor Trip Pushbuttons at either CP-2 or CP-8 or the Diverse Reactor Trip Pushbuttons at CP-2 satisfy this requirement. This action does not include manually driving in control rods or implementation of boron injection strategies. Actions taken at back-panels or other locations (opening A32 and B32 Bus Feeders) within the Control Room, or any location outside the Control Room, are not considered to be "at the reactor control consoles" (ref. 1).~~Taking the Reactor Mode Switch to SHUTDOWN is considered to be a manual scram action. [*BWR*]~~

The plant response to the failure of an automatic or manual reactor ~~(~~trip ~~[PWR] / scram [BWR])~~will vary based upon several factors including the reactor power level prior to the event, availability of the condenser, performance of mitigation equipment and actions, other concurrent plant conditions, etc. If subsequent operator manual actions taken at the reactor control consoles are also unsuccessful in shutting down the reactor, then the emergency classification level will escalate to an Alert via IC ~~SA5~~SA6. Depending upon the plant response, escalation is also possible via IC FA1. Absent the plant conditions needed to meet either IC ~~SA5~~ SA6 or FA1, an Unusual Event declaration is appropriate for this event.

~~A reactor shutdown is determined in accordance with applicable Emergency Operating Procedure criteria.~~

Should a reactor ~~(~~trip ~~[PWR] / scram [BWR])~~signal be generated as a result of plant work (e.g., RPS setpoint testing), the following classification guidance should be applied.

- If the signal generated as a result of plant work causes a plant transient that results in a condition that should have included an automatic reactor ~~(~~trip ~~[PWR] / scram [BWR])~~ and the RPS fails to automatically shutdown the reactor, then this IC and ~~the~~ associated EALs are applicable, and should be evaluated.
- If the signal generated as a result of plant work does not cause a plant transient and the ~~(~~trip~~[PWR] / scram [BWR])~~ failure is determined through other means (e.g., assessment of test results), then this IC and ~~the~~ associated EALs are not applicable and no classification is warranted.

Reference(s):

1. OP-902-000 Standard Post Trip Actions
2. Calculation No. EC-S98-001 EOP Value Basis Document Application X.01
3. NEI 99-01 SU5

Category: S – System Malfunction

Subcategory: 6 – RPS Failure

Initiating Condition: Automatic or manual trip fails to shut down the reactor

EAL:

SU6.2 Unusual Event

A manual trip did **not** shut down the reactor as indicated by reactor power > 5% after **any** manual trip action was initiated

AND

A subsequent automatic trip or manual trip action taken at the reactor control console (manual reactor trip push buttons or DRT) is successful in shutting down the reactor as indicated by reactor power ≤ 5% (Note 8)

Note 8: A manual action is **any** operator action, or set of actions, which causes the control rods to be rapidly inserted into the core, and does **not** include manually driving in control rods or implementation of boron injection strategies.

Mode Applicability:

1 - Power Operation

Definition(s):

None

Basis:

After a successful reactor trip neutron power should immediately drop to approximately 6% due to prompt drop. Therefore, for the purpose of emergency classification, reactor power less than or equal to 5% is used to identify a successful reactor trip (ref. 2).

This IC addresses a failure of the RPS to initiate or complete an automatic or manual reactor ~~(~~trip ~~[*PWR*] / scram [*BWR*])~~ that results in a reactor shutdown, and either a subsequent operator manual action taken at the reactor control consoles or an automatic ~~(~~trip ~~[*PWR*] / scram [*BWR*])~~is successful in shutting down the reactor. This event is a precursor to a more significant condition and thus represents a potential degradation of the level of safety of the plant.

This EAL addresses a failure of a manually initiated trip in the absence of having exceeded an automatic RPS trip setpoint and a subsequent automatic or manual trip is successful in shutting down the reactor.

Following the failure on an automatic reactor ~~(~~trip~~[*PWR*] / scram [*BWR*])~~, operators will promptly initiate manual actions at the reactor control consoles to shutdown the reactor (e.g., initiate a manual reactor ~~(~~trip~~[*PWR*] / scram [*BWR*])~~). If these manual actions are successful in shutting down the reactor, core heat generation will quickly fall to a level within the capabilities of the plant's decay heat removal systems.

If an initial manual reactor ~~(~~trip ~~[*PWR*] / scram [*BWR*])~~is unsuccessful, operators will promptly take manual action at another location(s) on the reactor control consoles to shutdown the reactor (e.g., initiate a manual reactor ~~(~~trip~~[*PWR*] / scram [*BWR*])~~) using a different switch). Depending upon several factors, the initial or subsequent effort to manually ~~(~~trip ~~[*PWR*] / scr[*BWR*])~~the reactor, or a concurrent plant condition, may lead to the generation of an automatic reactor ~~(~~trip ~~[*PWR*] / scram [*BWR*])~~signal. If a subsequent manual or automatic ~~(~~trip ~~[*PWR*] / scram [*BWR*])~~is successful in shutting down the reactor, core heat generation will quickly fall to a level within the capabilities of the plant's decay heat removal systems.

A manual action at the reactor control consoles is any operator action, or set of actions, which causes the control rods to be rapidly inserted into the core (e.g., initiating a manual reactor ~~(~~trip~~[*PWR*] / scram [*BWR*])~~). Use of the Reactor Trip Pushbuttons at either CP-2 or CP-8 or the Diverse Reactor Trip Pushbuttons at CP-2 satisfy this requirement. This action does not include manually driving in control rods or implementation of boron injection strategies. Actions taken at back-panels or other locations (opening A32 and B32 Bus Feeders) within the Control Room, or any location outside the Control Room, are not considered to be "at the reactor control consoles" (ref. 1).~~Taking the Reactor Mode Switch to SHUTDOWN is considered to be a manual scram action. [*BWR*]~~

~~Taking the Reactor Mode Switch to SHUTDOWN is considered to be a manual scram action. [*BWR*]~~

The plant response to the failure of an automatic or manual reactor ~~(~~trip ~~[PWR] / scram [BWR])~~will vary based upon several factors including the reactor power level prior to the event, availability of the condenser, performance of mitigation equipment and actions, other concurrent plant conditions, etc. If subsequent operator manual actions taken at the reactor control consoles are also unsuccessful in shutting down the reactor, then the emergency classification level will escalate to an Alert via IC ~~SA5~~SA6. Depending upon the plant response, escalation is also possible via IC FA1. Absent the plant conditions needed to meet either IC ~~SA5~~ SA6 or FA1, an Unusual Event declaration is appropriate for this event.

~~A reactor shutdown is determined in accordance with applicable Emergency Operating Procedure criteria.~~

Should a reactor ~~(~~trip ~~[PWR] / scram [BWR])~~signal be generated as a result of plant work (e.g., RPS setpoint testing), the following classification guidance should be applied.

- If the signal generated as a result of plant work causes a plant transient that results in a condition that should have included an automatic reactor ~~(~~trip ~~[PWR] / scram [BWR])~~ and the RPS fails to automatically shutdown the reactor, then this IC and ~~the~~ associated EALs are applicable, and should be evaluated.
- If the signal generated as a result of plant work does not cause a plant transient and the ~~(~~trip ~~[PWR] / scram [BWR])~~failure is determined through other means (e.g., assessment of test results), then this IC and ~~the~~ associated EALs are not applicable and no classification is warranted.

Reference(s):

1. OP-902-000 Standard Post Trip Actions

2. Calculation No. EC-S98-001 EOP Value Basis Document Application X.01
3. NEI 99-01 SU5

Category: S – System Malfunction

Subcategory: 6– RPS Failure

Initiating Condition: Automatic or manual trip fails to shut down the reactor and subsequent manual actions taken at the reactor control consoles are **not** successful in shutting down the reactor

EAL:

SA6.1 Alert

An automatic or manual trip fails to shut down the reactor as indicated by reactor power > 5%

AND

Manual trip actions taken at the reactor control console (manual reactor trip push buttons and DRT) are **not** successful in shutting down the reactor as indicated by reactor power > 5% (Note 8)

Note 8: A manual action is **any** operator action, or set of actions, which causes the control rods to be rapidly inserted into the core, and does **not** include manually driving in control rods or implementation of boron injection strategies.

Mode Applicability:

1 - Power Operation

Definition(s):

None

Basis:

After a successful reactor trip neutron power should immediately drop to approximately 6% due to prompt drop. Therefore, for the purpose of emergency classification, reactor power less than or equal to 5% is used to identify a successful reactor trip (ref. 2).

This IC addresses a failure of the RPS to initiate or complete an automatic or manual reactor ~~(~~trip ~~[*PWR*] / scram [*BWR*])~~ that results in a reactor shutdown, and subsequent operator manual actions taken at the reactor control consoles to shutdown the reactor are also unsuccessful. This condition represents an actual or potential substantial degradation of the level of safety of the plant. An emergency declaration is required even if the reactor is subsequently shutdown by an action taken away from the reactor control consoles since this event entails a significant failure of the RPS.

A manual action at the reactor control console is any operator action, or set of actions, which causes the control rods to be rapidly inserted into the core (e.g., initiating a manual reactor ~~(~~trip~~[*PWR*] / scram [*BWR*])~~). Use of the Reactor Trip Pushbuttons at either CP-2 or CP-8 or the Diverse Reactor Trip Pushbuttons at CP-2 satisfy this requirement. This action does not include manually driving in control rods or implementation of boron injection strategies. If this action(s) is unsuccessful, operators would immediately pursue additional manual actions at

locations away from the reactor control console~~s~~ (e.g., locally opening breakers). Actions taken at back panels or other locations within the Control Room (opening A32 and B32 Bus Feeders), or any location outside the Control Room, are not considered to be "at the reactor control console~~s~~".

~~Taking the Reactor Mode Switch to SHUTDOWN is considered to be a manual scram action. [*BWR*]~~

The plant response to the failure of an automatic or manual reactor ~~(~~trip ~~[*PWR*] / scram [*BWR*])~~ will vary based upon several factors including the reactor power level prior to the event, availability of the condenser, performance of mitigation equipment and actions, other concurrent plant conditions, etc. If the failure to shut down the reactor is prolonged enough to cause a challenge to the core cooling ~~[PWR] / RPV water level [BWR]~~ or RCS heat removal safety functions, the emergency classification level will escalate to a Site Area Emergency via IC SS6~~5~~. Depending upon plant responses and symptoms, escalation is also possible via IC FS1. Absent the plant conditions needed to meet either IC SS6~~5~~ or FS1, an Alert declaration is appropriate for this event.

It is recognized that plant responses or symptoms may also require an Alert declaration in accordance with the Recognition Category F ICs; however, this IC and EAL are included to ensure a timely emergency declaration.

~~A reactor shutdown is determined in accordance with applicable Emergency Operating Procedure criteria.~~

Reference(s):

1. OP-902-000 Standard Post Trip Actions
2. Calculation No. EC-S98-001 EOP Value Basis Document Application X.01
3. NEI 99-01 SA5

Category: S – System Malfunction

Subcategory: 6 – RPS Failure

Initiating Condition: Inability to shut down the reactor causing a challenge to core cooling or RCS heat removal

EAL:

SS6.1 Site Area Emergency

An automatic or manual trip fails to shut down the reactor as indicated by reactor power > 5%

AND

All actions to shut down the reactor are **not** successful as indicated by reactor power > 5%

AND EITHER:

- Representative CET readings > 1,200ºF
- **Any** OP-902-008 Functional Recovery RCS/Core Heat Removal safety function criterion is **not** met for ≥ 15 min. (Note 1)

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Mode Applicability:

1 - Power Operation

Definition(s):

None

Basis:

After a successful reactor trip neutron power should immediately drop to approximately 6% due to prompt drop. Therefore, for the purpose of emergency classification, reactor power less than or equal to 5% is used to identify a successful reactor trip (ref. 2).

This IC addresses a failure of the RPS to initiate or complete an automatic or manual reactor ~~(~~trip ~~[*PWR*] / scram [*BWR*])~~ that results in a reactor shutdown, all subsequent operator actions to manually shutdown the reactor are unsuccessful, and continued power generation is challenging the capability to adequately remove heat from the core and/or the RCS. This condition will lead to fuel damage if additional mitigation actions are unsuccessful and thus warrants the declaration of a Site Area Emergency.

In some instances, the emergency classification resulting from this IC/EAL may be higher than that resulting from an assessment of the plant responses and symptoms against the Recognition Category F ICs/EALs. This is appropriate in that the Recognition Category F ICs/EALs do not address the additional threat posed by a failure to shutdown the reactor. The

inclusion of this IC and EAL ensures the timely declaration of a Site Area Emergency in response to prolonged failure to shutdown the reactor.

~~A reactor shutdown is determined in accordance with applicable Emergency Operating Procedure criteria.~~

The process of checking the safety functions in EOPs is periodic and continuous as long as the procedure is in use. The fifteen minute interval (subject to Note 1) provides a suitable opportunity to assess plant conditions with respect to the threshold criteria.

Escalation of the emergency classification level would be via IC AG1 or FG1.

Reference(s):

1. OP-902-000 Standard Post Trip Actions
2. Calculation No. EC-S98-001 EOP Value Basis Document Application X.01
3. OP-902-008 Functional Recovery
4. UFSAR Section 1.9A Inadequate Core Cooling Instrumentation
5. CEOG Generic Accident Management Guidelines - Phase 1, “Initial Diagnosis”
6. TG-OP-902-008 Technical Guide for Functional Recovery
7. NEI 99-01 SS5

Category: S – System Malfunction

Subcategory: 7 – Loss of Communications

Initiating Condition: Loss of **all** onsite or offsite communications capabilities

EAL:

SU7.1 Unusual Event

Loss of **all** Table S-4 onsite communication methods
OR
Loss of **all** Table S-4 State and local agency communication methods
OR
Loss of **all** Table S-4 NRC communication methods

Table S-4 Communication Methods

System	Onsite	State/ Local	NRC
Telephone System	X	X	X
Operational Hotline		X	
Plant Radio System (O&M)	X		
Plant Paging System	X		
Sound Powered Phone System	X		
Civil Defense Radio System		X	
Satellite Phones		X	X
Emergency Notification System (ENS)			X

Mode Applicability:

1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 - Hot Shutdown

Definition(s):

None

Basis:

This IC addresses a significant loss of on-site or offsite communications capabilities. While not a direct challenge to plant or personnel safety, this event warrants prompt notifications to ~~OROs~~ State and local agencies and the NRC.

This IC should be assessed only when extraordinary means are being utilized to make communications possible (e.g., use of non-plant, privately owned equipment, relaying of on-site information via individuals or multiple radio transmission points, individuals being sent to offsite locations, etc.).

~~EAL #1~~The first EAL condition addresses a total loss of the communications methods used in support of routine plant operations.

~~EAL #2~~The second EAL condition addresses a total loss of the communications methods used to notify all ~~OROs~~ State and local agencies of an emergency declaration. The State and local agencies referred to here are the St. Charles Parish Department of Homeland Security and Emergency Preparedness, St. Charles Parish Sherriff's Department 911 Center, St. John the Baptist Parish Office of Emergency Preparedness, St. John the Baptist Parish Sherriff's Department 911 Center, Louisiana Department of Environmental Quality and the Louisiana Governor's Office of Homeland Security and Emergency Preparedness. ~~The OROs referred to here are the State and Parish OROs (see Developer Notes).~~

~~EAL #3~~The third EAL condition addresses a total loss of the communications methods used to notify the NRC of an emergency declaration.

This EAL is the hot condition equivalent of the cold condition EAL CU5.1.

Reference(s):

1. EP-003-070 Emergency Communications Systems
2. Waterford 3 SES Emergency Plan Section 7.5 Communications Systems
3. NEI 99-01 SU6

Category: S – System Malfunction

Subcategory: 8 – Containment Failure

Initiating Condition: Failure to isolate containment or loss of containment pressure control

EAL:

SU8.1 Unusual Event

Any penetration is **not** closed within 15 min. of a required actuation signal

OR

Containment pressure > 17.7 psia with < one full train of containment heat removal systems (Note 9) operating per design for ≥ 15 min. (Note 1)

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Note 9: One full train of containment heat removal systems consists of either:

- One train of the Containment Spray System (operating with ≥1750 gpm flow) **AND** One train of the Containment Cooling System (one fan cooler required)

OR

- Two trains of the Containment Spray System (operating with ≥1750 gpm flow each).

Mode Applicability:

1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 - Hot Shutdown

Definition(s):

None

Basis:

This ~~IC~~ EAL addresses a failure of one or more containment penetrations to automatically isolate (close) when required by an actuation signal. It also addresses an event that results in high containment pressure with a concurrent failure of containment pressure control systems. Absent challenges to another fission product barrier, either condition represents potential degradation of the level of safety of the plant.

For ~~EAL #1~~the first condition, the containment isolation signal must be generated as the result on an off-normal/accident condition (e.g., a safety injection or high containment pressure); a failure resulting from testing or maintenance does not warrant classification. The determination of containment and penetration status – isolated or not isolated – should be made in accordance with the appropriate criteria contained in the plant AOPs and EOPs. The 15-minute criterion is included to allow operators time to manually isolate the required penetrations, if possible.

~~EAL #2~~The second condition addresses a condition where containment pressure is greater than the setpoint at which containment energy (heat) removal systems are designed to automatically actuate, and less than one full train of equipment is capable of operating per

design. The 15-minute criterion is included to allow operators time to manually start equipment that may not have automatically started, if possible. The inability to start the required equipment indicates that containment heat removal/depressurization systems (e.g., containment sprays ~~or ice condenser fans~~) are either lost or performing in a degraded manner.

This event would escalate to a Site Area Emergency in accordance with IC FS1 if there were a concurrent loss or potential loss of either the Fuel Clad or RCS fission product barriers.

Reference(s):

1. OP-902-002 Loss of Coolant Accident Recovery
2. UFSAR Section 6.2.2 Containment Heat Removal Systems
3. Technical Specification 3.6.2 Containment Systems – Depressurization and Cooling Systems
4. NEI 99-01 SU7

Category: S – System Malfunction

Subcategory: 9 – Hazardous Event Affecting Safety Systems

Initiating Condition: Hazardous event affecting SAFETY SYSTEMS needed for the current operating mode

EAL:

SA9.1 Alert

The occurrence of **any** Table S-5 hazardous event

AND

Event damage has caused indications of degraded performance on one train of a SAFETY SYSTEM needed for the current operating mode

AND EITHER:

- Event damage has caused indications of degraded performance to the second train of the SAFETY SYSTEM needed for the current operating mode
- Event damage has resulted in VISIBLE DAMAGE to the second train of the SAFETY SYSTEM needed for the current operating mode

(Notes 10, 11)

Note 10: If the affected SAFETY SYSTEM train was already inoperable or out of service before the hazardous event occurred, then emergency classification is **not** warranted.

Note 11: If the hazardous event **only** resulted in VISIBLE DAMAGE, with **no** indications of degraded performance to at least one train of a SAFETY SYSTEM, then this emergency classification is **not** warranted.

Table S-5 Hazardous Events
• Seismic event (earthquake) • Internal or external FLOODING event • High winds or tornado strike • FIRE • EXPLOSION • Other events with similar hazard characteristics as determined by the Shift Manager

Mode Applicability:

1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 - Hot Shutdown

Definition(s):

EXPLOSION - A rapid, violent and catastrophic failure of a piece of equipment due to combustion, chemical reaction or overpressurization. A release of steam (from high energy lines or components) or an electrical component failure (caused by short circuits, grounding, arcing, etc.) should **not** automatically be considered an explosion. Such events require a post-event inspection to determine if the attributes of an explosion are present.

FIRE - Combustion characterized by heat and light. Sources of smoke such as slipping drive belts or overheated electrical equipment do **not** constitute fires. Observation of flame is preferred but is **not** required if large quantities of smoke and heat are observed.

FLOODING - A condition where water is entering a room or area faster than installed equipment is capable of removal, resulting in a rise of water level within the room or area.

SAFETY SYSTEM - A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related (as defined in 10CFR50.2):

> Those structures, systems and components that are relied upon to remain functional during and following design basis events to assure:
>
> (1) The integrity of the reactor coolant pressure boundary;
>
> (2) The capability to shut down the reactor and maintain it in a safe shutdown condition;
>
> (3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures.

VISIBLE DAMAGE - Damage to a SAFETY SYSTEM train that is readily observable without measurements, testing, or analysis. The visual impact of the damage is sufficient to cause concern regarding the operability or reliability of the affected SAFETY SYSTEM train.

Basis:

This IC addresses a hazardous event that causes damage to SAFETY SYSTEMS needed for the current operating mode. In order to provide the appropriate context for consideration of an ALERT classification, the hazardous event must have caused indications of degraded SAFETY SYSTEM performance in one train, and there must be either indications of performance issues with the second SAFETY SYSTEM train or VISIBLE DAMAGE to the second train such that the potential exists for this second SAFETY SYSTEM train to have performance issues. In other words, in order for this EAL to be classified, the hazardous event must occur, at least one SAFETY SYSTEM train must have indications of degraded performance, and the second SAFETY SYSTEM train must have indications of degraded performance or VISIBLE DAMAGE such that the potential exists for performance issues.

Note that this second SAFETY SYSTEM train is from the same SAFETY SYSTEM that has indications of degraded performance; commercial nuclear power plants are designed to be able to support single system issues without compromising public health and safety from radiological events.

Indications of degraded performance addresses damage to a SAFETY SYSTEM train that is in service/operation since indications for it will be readily available. The indications of degraded performance should be significant enough to cause concern regarding the operability or reliability of the SAFETY SYSTEM train.

VISIBLE DAMAGE addresses damage to a SAFETY SYSTEM train that is not in service/operation and that potentially could cause performance issues. Operators will make a determination of VISIBLE DAMAGE based on the totality of available event and damage report information. This is intended to be a brief assessment not requiring lengthy analysis or quantification of the damage. This VISIBLE DAMAGE should be significant enough to cause concern regarding the operability or reliability of the SAFETY SYSTEM train.

~~This IC addresses a hazardous event that causes damage to a SAFETY SYSTEM, or a structure containing SAFETY SYSTEM components, needed for the current operating mode. This condition significantly reduces the margin to a loss or potential loss of a fission product barrier, and therefore represents an actual or potential substantial degradation of the level of safety of the plant.~~

~~EAL 1.b.1 addresses damage to a SAFETY SYSTEM train that is in service/operation since indications for it will be readily available. The indications of degraded performance should be significant enough to cause concern regarding the operability or reliability of the SAFETY SYSTEM train.~~

~~EAL 1.b.2 addresses damage to a SAFETY SYSTEM component that is not in service/operation or readily apparent through indications alone, or to a structure containing SAFETY SYSTEM components. Operators will make this determination based on the totality of available event and damage report information. This is intended to be a brief assessment not requiring lengthy analysis or quantification of the damage.~~

Escalation of the emergency classification level would be via IC FS1 or AS1.

This EAL is the hot condition equivalent of the cold condition EAL CA6.1.

Reference(s):

1. EP FAQ 2016-002
2. NEI 99-01 SA9

Enclosure, Attachment 2

W3F1-2020-0036

Waterford 3 Steam Electric Station EAL Technical Basis (Clean)

Waterford 3 Steam Electric Station
EAL Technical Basis

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1.0 INTRODUCTION

This document provides an explanation and rationale for each Emergency Action Level (EAL) included in the EAL Upgrade Project for Waterford 3 Steam Electric Station (WF3). It should be used to facilitate review of the WF3 EALs and provide historical documentation for future reference. Decision-makers responsible for implementation of EP-001-001, “Recognition and Classification of Emergency Conditions”, may use this document as a technical reference in support of EAL interpretation. This information may assist the Emergency Director in making classifications, particularly those involving judgment or multiple events. The basis information may also be useful in training and for explaining event classifications to off-site officials.

The expectation is that emergency classifications are to be made as soon as conditions are present and recognizable for the classification, but within 15 minutes or less in all cases of conditions present. Use of this document for assistance is not intended to delay the emergency classification.

Because the information in a basis document can affect emergency classification decision-making (e.g., the Emergency Director refers to it during an event), the NRC staff expects that changes to the basis document will be evaluated in accordance with the provisions of 10 CFR 50.54(q).

2.0 DISCUSSION

2.1 Background

EALs are the plant-specific indications, conditions or instrument readings that are utilized to classify emergency conditions defined in the WF3 Emergency Plan.

In 1992, the NRC endorsed NUMARC/NESP-007 “Methodology for Development of Emergency Action Levels” as an alternative to NUREG-0654 EAL guidance.

NEI 99-01 (NUMARC/NESP-007) Revisions 4 and 5 were subsequently issued for industry implementation. Enhancements over earlier revisions included:

- Consolidating the system malfunction initiating conditions and example emergency action levels which address conditions that may be postulated to occur during plant shutdown conditions.
- Initiating conditions and example emergency action levels that fully address conditions that may be postulated to occur at permanently Defueled Stations and Independent Spent Fuel Storage Installations (ISFSIs).
- Simplifying the fission product barrier EAL threshold for a Site Area Emergency.

Subsequently, Revision 6 of NEI 99-01 has been issued which incorporates resolutions to numerous implementation issues including the NRC EAL Frequently Asked Questions (FAQs). Using NEI 99-01 Revision 6, "Methodology for the Development of Emergency Action Levels for Non-Passive Reactors,” November 2012 (ref. 4.1.1), WF3 conducted an EAL implementation upgrade project that produced the EALs discussed herein.

2.2 Fission Product Barriers

Fission product barrier thresholds represent threats to the defense in depth design concept that precludes the release of radioactive fission products to the environment. This concept relies on multiple physical barriers, any one of which, if maintained intact, precludes the release of significant amounts of radioactive fission products to the environment.

Many of the EALs derived from the NEI methodology are fission product barrier threshold based. That is, the conditions that define the EALs are based upon thresholds that represent the loss or potential loss of one or more of the three fission product barriers. “Loss” and “Potential Loss” signify the relative damage and threat of damage to the barrier. A “Loss” threshold means the barrier no longer assures containment of radioactive materials. A “Potential Loss” threshold implies a greater probability of barrier loss and reduced certainty of maintaining the barrier.

The primary fission product barriers are:

A. Fuel Clad Barrier (FCB): The Fuel Clad Barrier consists of the cladding material that contains the fuel pellets.

B. Reactor Coolant System Barrier (RCB): The Reactor Coolant System Barrier includes the RCS primary side and its connections up to and including the pressurizer safety and relief valves, and other connections up to and including the primary isolation valves.

C. Containment Barrier (CNB): The Containment Barrier includes the containment building and connections up to and including the outermost containment isolation valves. This barrier also includes the main steam, feedwater, and blowdown line extensions outside the containment building up to and including the outermost secondary side isolation valve. Containment Barrier thresholds are used as criteria for escalation of the Emergency Classification Level (ECL) from an Alert to a Site Area Emergency or a General Emergency.

2.3 Fission Product Barrier Classification Criteria

The following criteria are the bases for event classification related to fission product barrier loss or potential loss:

Alert:

Any loss or any potential loss of either Fuel Clad or RCS Barrier

Site Area Emergency:

Loss or potential loss of any two barriers

General Emergency:

Loss of any two barriers and loss or potential loss of the third barrier

2.4 EAL Organization

The WF3 EAL scheme includes the following features:

- Division of the EAL set into three broad groups:
  - EALs applicable under <u>any</u> plant operating modes – This group would be reviewed by the EAL-user any time emergency classification is considered.
  - EALs applicable only under <u>hot</u> operating modes – This group would only be reviewed by the EAL-user when the plant is in Hot Shutdown, Hot Standby, Startup, or Power Operation mode.
  - EALs applicable only under <u>cold</u> operating modes – This group would only be reviewed by the EAL-user when the plant is in Cold Shutdown, Refueling or Defueled mode.

  The purpose of the groups is to avoid review of hot condition EALs when the plant is in a cold condition and avoid review of cold condition EALs when the plant is in a hot condition. This approach significantly minimizes the total number of EALs that must be reviewed by the EAL-user for a given plant condition, reduces EAL-user reading burden and, thereby, speeds identification of the EAL that applies to the emergency.
- Within each group, assignment of EALs to categories and subcategories:

Category and subcategory titles are selected to represent conditions that are operationally significant to the EAL-user. The WF3 EAL categories are aligned to and represent the NEI 99-01 “Recognition Categories.” Subcategories are used in the WF3 scheme as necessary to further divide the EALs of a category into logical sets of possible emergency classification thresholds. The WF3 EAL categories and subcategories are listed below.

The primary tool for determining the emergency classification level is the EAL Classification Matrix. The user of the EAL Classification Matrix may (but is not required to) consult the EAL technical bases in order to obtain additional information concerning the EALs under classification consideration. The user should consult Section 3.0 and Attachment 1 of this document for such information.

EAL Groups, Categories and Subcategories

EAL Group/Category	EAL Subcategory
Any Operating Mode:	
A – **A**bnormal Rad Levels / Rad Effluent	1 – Radiological Effluent 2 – Irradiated Fuel Event 3 – Area Radiation Levels
H – **H**azards and Other Conditions Affecting Plant Safety	1 – Security 2 – Seismic Event 3 – Natural or Technological Hazard 4 – Fire 5 – Hazardous Gas 6 – Control Room Evacuation 7 – Emergency Director Judgment
E – Independent Spent Fuel Storage Installation (ISFSI)	1 – Confinement Boundary
Hot Conditions:	
S – **S**ystem Malfunction	1 – Loss of Safety Bus AC Power 2 – Loss of Vital DC Power 3 – Loss of Control Room Indications 4 – RCS Activity 5 – RCS Leakage 6 – RPS Failure 7 – Loss of Communications 8 – Containment Failure 9 – Hazardous Event Affecting Safety Systems
F – **F**ission Product Barrier Degradation	None
Cold Conditions:	
C – **C**old Shutdown / Refueling System Malfunction	1 – RCS Level 2 – Loss of Safety Bus AC Power 3 – RCS Temperature 4 – Loss of Vital DC Power 5 – Loss of Communications 6 – Hazardous Event Affecting Safety Systems

2.5 Technical Bases Information

EAL technical bases are provided in Attachment 1 for each EAL according to EAL group (Any, Hot, Cold), EAL category (A, C, E, F, H and S) and EAL subcategory. A summary explanation of each category and subcategory is given at the beginning of the technical bases discussions of the EALs included in the category. For each EAL, the following information is provided:

Category Letter & Title

Subcategory Number & Title

Initiating Condition (IC)

Site-specific description of the generic IC given in NEI 99-01 Rev. 6.

EAL Identifier (enclosed in rectangle)

Each EAL is assigned a unique identifier to support accurate communication of the emergency classification to onsite and offsite personnel. Four characters define each EAL identifier:

1. First character (letter): Corresponds to the EAL category as described above (A, C, E, F, H or S)
2. Second character (letter): The emergency classification (G, S, A or U)

   G = General Emergency
   S = Site Area Emergency
   A = Alert
   U = Unusual Event

3. Third character (number): Subcategory number within the given category. Subcategories are sequentially numbered beginning with the number one (1). If a category does not have a subcategory, this character is assigned the number one (1).
4. Fourth character (number): The numerical sequence of the EAL within the EAL subcategory. If the subcategory has only one EAL, it is given the number one (1).

Classification (enclosed in rectangle):

Unusual Event (U), Alert (A), Site Area Emergency (S) or General Emergency (G)

EAL (enclosed in rectangle)

Exact wording of the EAL as it appears in the EAL Classification Matrix.

Mode Applicability

One or more of the following plant operating conditions comprise the mode to which each EAL is applicable: 1 - Power Operation, 2 - Startup, 3 – Hot Standby, 4 - Hot Shutdown, 5 - Cold Shutdown, 6 - Refueling, DEF - Defueled, or Any. (See Section 2.6 for operating mode definitions)

Definitions:

If the EAL or Basis wording contains a defined term, the definition of the term is included in this section. These definitions can also be found in Section 5.1.

Basis:

An EAL basis section that provides WF3-relevant information concerning the EAL as well as a description of the rationale for the EAL as provided in NEI 99-01 Rev. 6.

Reference(s):

Source documentation from which the EAL is derived

2.6 Operating Mode Applicability

1 Power Operation
$K_{eff} \geq 0.99$, rated reactor thermal power > 5%

2 Startup
$K_{eff} \geq 0.99$, rated reactor thermal power ≤ 5%

3 Hot Standby
$K_{eff} < 0.99$, average reactor coolant temperature ≥ 350ºF

4 Hot Shutdown
$K_{eff} < 0.99$, average reactor coolant temperature 350ºF > T_{avg} > 200ºF

5 Cold Shutdown
$K_{eff} < 0.99$, average reactor coolant temperature ≤ 200ºF

6 Refueling
$K_{eff} < 0.95$, average reactor coolant temperature ≤ 140ºF
Fuel in the reactor vessel with the vessel head closure bolts less than fully tensioned or with the head removed

DEF Defueled
All reactor fuel removed from reactor vessel (full core off load during refueling or extended outage).

The plant operating mode that exists at the time that the event occurs (prior to any protective system or operator action being initiated in response to the condition) should be compared to the mode applicability of the EALs. If a lower or higher plant operating mode is reached before the emergency classification is made, the declaration shall be based on the mode that existed at the time the event occurred.

3.0 GUIDANCE ON MAKING EMERGENCY CLASSIFICATIONS

3.1 General Considerations

When making an emergency classification, the Emergency Director must consider all information having a bearing on the proper assessment of an Initiating Condition (IC). This includes the Emergency Action Level (EAL) plus the associated Operating Mode Applicability, Notes, and the informing basis information. In the Recognition Category F matrices, EALs are based on loss or potential loss of Fission Product Barrier Thresholds.

EAL matrices should be read from left to right, from General Emergency to Unusual Event, and top to bottom. Declaration decisions should be independently verified before declaration is made except when gaining this verification would exceed the 15 minute declaration requirement. Place keeping should be used on all EAL matrices.

3.1.1 Classification Timeliness

NRC regulations require the licensee to establish and maintain the capability to assess, classify, and declare an emergency condition within 15 minutes after the availability of indications to plant operators that an emergency action level has been exceeded and to promptly declare the emergency condition as soon as possible following identification of the appropriate emergency classification level. The NRC staff has provided guidance on implementing this requirement in NSIR/DPR-ISG-01, "Interim Staff Guidance, Emergency Planning for Nuclear Power Plants" (ref. 4.1.8).

For ICs and EALs that have a stipulated time duration (e.g., 15 minutes, 30 minutes, etc.), the Emergency Director is not allowed an additional 15 minutes to declare after the specified time limit is exceeded.

3.1.2 Valid Indications

All emergency classification assessments shall be based upon valid indications, reports or conditions. A valid indication, report, or condition is one that has been verified through appropriate means such that there is no doubt regarding the indicator's operability, the condition's existence, or the report's accuracy. For example, validation could be accomplished through an instrument channel check, response on related or redundant indicators, or direct observation by plant personnel.

An indication, report, or condition is considered to be valid when it is verified by (1) an instrument channel check, or (2) indications on related or redundant indicators, or (3) by direct observation by plant personnel, such that doubt related to indicator operability, condition existence, or report accuracy is removed. Implicit in this definition is the need for timely assessment.

3.1.3 Imminent Conditions

For ICs and EALs that have a stipulated time duration (e.g., 15 minutes, 30 minutes, etc.), the Emergency Director should not wait until the applicable time has elapsed but should declare the event as soon as it is determined that the condition has exceeded, or will likely exceed, the applicable time. If an ongoing radiological release is detected and the release start time is unknown, it should be assumed that the release duration specified in the IC/EAL has been exceeded, absent data to the contrary.

3.1.4 Planned vs. Unplanned Events

A planned work activity that results in an expected event or condition which meets or exceeds an EAL does **not** warrant an emergency declaration provided that: 1) the activity proceeds as planned, and 2) the plant remains within the limits imposed by the operating license. Such activities include planned work to test, manipulate, repair, maintain or modify a system or component. In these cases, the controls associated with the planning, preparation and execution of the work will ensure that compliance is maintained with all aspects of the operating license provided that the activity proceeds and concludes as expected. Events or conditions of this type may be subject to the reporting requirements of 10 CFR 50.72 (ref. 4.1.4).

3.1.5 Classification Based on Analysis

The assessment of some EALs is based on the results of analyses that are necessary to ascertain whether a specific EAL threshold has been exceeded (e.g., dose assessments, chemistry sampling, RCS leak rate calculation, etc.). For these EALs, the EAL wording or the associated basis discussion will identify the necessary analysis. In these cases, the 15-minute declaration period starts with the availability of the analysis results that show the threshold to be exceeded (i.e., this is the time that the EAL information is first available). The NRC expects licensees to establish the capability to initiate and complete EAL-related analyses within a reasonable period of time (e.g., maintain the necessary expertise on-shift).

3.1.6 Emergency Director Judgment

While the EALs have been developed to address a full spectrum of possible events and conditions which may warrant emergency classification, a provision for classification based on operator/management experience and judgment is still necessary. The NEI 99-01 EAL scheme provides the Emergency Director with the ability to classify events and conditions based upon judgment using EALs that are consistent with the Emergency Classification Level (ECL) definitions (refer to Category H). The Emergency Director will need to determine if the effects or consequences of the event or condition reasonably meet or exceed a particular ECL definition. A similar provision is incorporated in the Fission Product Barrier Tables; judgment may be used to determine the status of a fission product barrier.

3.2 Classification Methodology

To make an emergency classification, the user will compare an event or condition (i.e., the relevant plant indications and reports) to an EAL(s) and determine if the EAL has been met or exceeded. The evaluation of an EAL must be consistent with the related Operating Mode Applicability and Notes. If an EAL has been met or exceeded, the associated IC is likewise met, the emergency classification process “clock” starts, and the ECL must be declared in accordance with plant procedures no later than fifteen minutes after the process “clock” started.

When assessing an EAL that specifies a time duration for the off-normal condition, the “clock” for the EAL time duration runs concurrently with the emergency classification process “clock.” For a full discussion of this timing requirement, refer to NSIR/DPR-ISG-01 (ref. 4.1.8).

3.2.1 Classification of Multiple Events and Conditions

When multiple emergency events or conditions are present, the user will identify all met or exceeded EALs. The highest applicable ECL identified during this review is declared. For example:

- If an Alert EAL and a Site Area Emergency EAL are met a Site Area Emergency should be declared.

There is no “additive” effect from multiple EALs meeting the same ECL. For example:

- If two Alert EALs are met an Alert should be declared.

If a declaration has been made and conditions for another EAL of the equal significance occurs, another initial declaration should not be made.

3.2.2 Consideration of Mode Changes During Classification

The mode in effect at the time that an event or condition occurred, and prior to any plant or operator response, is the mode that determines whether or not an IC is applicable. If an event or condition occurs, and results in a mode change before the emergency is declared, the emergency classification level is still based on the mode that existed at the time that the event or condition was initiated (and not when it was declared). Once a different mode is reached, any new event or condition, not related to the original event or condition, requiring emergency classification should be evaluated against the ICs and EALs applicable to the operating mode at the time of the new event or condition.

For events that occur in Cold Shutdown or Refueling, escalation is via EALs that are applicable in the Cold Shutdown or Refueling modes, even if Hot Shutdown (or a higher mode) is entered during the subsequent plant response. In particular, the fission product barrier EALs are applicable only to events that initiate in the Hot Shutdown mode or higher.

3.2.3 Classification of Imminent Conditions

Although EALs provide specific thresholds, the Emergency Director must remain alert to events or conditions that could lead to meeting or exceeding an EAL within a relatively short period of time (i.e., a change in the ECL is IMMINENT). If, in the judgment of the Emergency Director, meeting an EAL is IMMINENT, the emergency classification should be made as if the EAL has been met. While applicable to all emergency classification levels, this approach is particularly important at the higher emergency classification levels since it provides additional time for implementation of protective measures.

3.2.4 Emergency Classification Level Upgrading and Termination

An ECL may be terminated when the event or condition that meets the classified IC and EAL no longer exists, and other site-specific termination requirements are met.

3.2.5 Classification of Short-Lived Events

Event-based ICs and EALs define a variety of specific occurrences that have potential or actual safety significance. By their nature, some of these events may be short-lived and, thus, over before the emergency classification assessment can be completed. If an event occurs that meets or exceeds an EAL, the associated ECL must be declared regardless of its continued presence at the time of declaration. Examples of such events include an earthquake or a failure of the reactor protection system to automatically trip the reactor followed by a successful manual trip.

3.2.6 Classification of Transient Conditions

Many of the ICs and/or EALs employ time-based criteria. These criteria will require that the IC/EAL conditions be present for a defined period of time before an emergency declaration is warranted. In cases where no time-based criterion is specified, it is recognized that some transient conditions may cause an EAL to be met for a brief period of time (e.g., a few seconds to a few minutes). The following guidance should be applied to the classification of these conditions.

<u>EAL momentarily met during expected plant response</u> - In instances in which an EAL is briefly met during an expected (normal) plant response, an emergency declaration is **not** warranted provided that associated systems and components are operating as expected, and operator actions are performed in accordance with procedures.

<u>EAL momentarily met but the condition is corrected prior to an emergency declaration</u> – If an operator takes prompt manual action to address a condition, and the action is successful in correcting the condition prior to the emergency declaration, then the applicable EAL is not considered met and the associated emergency declaration is not required. For illustrative purposes, consider the following example:

> An ATWS occurs and the high pressure ECCS systems fail to automatically start. The plant enters an inadequate core cooling condition (a potential loss of both the Fuel Clad and RCS Barriers). If an operator manually starts a high pressure ECCS system in accordance with an EOP step and clears the inadequate core cooling condition prior to an emergency declaration, then the classification should be based on the ATWS only.

It is important to stress that the 15-minute emergency classification assessment period (process clock) is not a “grace period” during which a classification may be delayed to allow the performance of a corrective action that would obviate the need to classify the event. Emergency classification assessments must be deliberate and timely, with no undue delays. The provision discussed above addresses only those rapidly evolving situations when an operator is able to take a successful corrective action prior to the Emergency Director completing the review and steps necessary to make the emergency declaration. This provision is included to ensure that any public protective actions resulting from the emergency classification are truly warranted by the plant conditions.

3.2.7 After-the-Fact Discovery of an Emergency Event or Condition

In some cases, an EAL may be met but the emergency classification was not made at the time of the event or condition. This situation can occur when personnel discover that an event or condition existed which met an EAL, but no emergency was declared, and the event or condition no longer exists at the time of discovery. This may be due to the event or condition **not** being recognized at the time or an error that was made in the emergency classification process.

In these cases, no emergency declaration is warranted; however, the guidance contained in NUREG-1022 (ref. 4.1.3) is applicable. Specifically, the event should be reported to the NRC in accordance with 10 CFR 50.72 (ref. 4.1.4) within one hour of the discovery of the undeclared event or condition. The licensee should also notify appropriate State and local agencies in accordance with the agreed upon arrangements.

3.2.8 Retraction of an Emergency Declaration

Guidance on the retraction of an emergency declaration reported to the NRC is discussed in NUREG-1022 (ref. 4.1.3).

4.0 REFERENCES

4.1 Developmental

4.1.1 NEI 99-01 Revision 6, Methodology for the Development of Emergency Action Levels for Non-Passive Reactors, ADAMS Accession Number ML12326A805

4.1.2 RIS 2007-02 Clarification of NRC Guidance for Emergency Notifications During Quickly Changing Events, February 2, 2007.

4.1.3 NUREG-1022 Event Reporting Guidelines: 10 CFR 50.72 and 50.73

4.1.4 10 CFR 50.72 Immediate Notification Requirements for Operating Nuclear Power Reactors

4.1.5 10 CFR 50.73 License Event Report System

4.1.6 Technical Specifications Table 1.2, Operational Modes

4.1.7 WF3 Offsite Dose Calculation Manual

4.1.8 NSIR/DPR-ISG-01 Interim Staff Guidance, Emergency Planning for Nuclear Power Plants

4.1.9 Waterford 3 SES Emergency Plan

4.1.10 UFSAR Section 9.1.5 Spent Fuel Dry Cask Storage

4.1.11 Technical Specifications section 3/4.9.4 Containment Building Penetrations

4.1.12 WF3 Safeguards Contingency Plan

4.2 Implementing

4.2.1 EP-001-001, Recognition and Classification of Emergency Conditions

4.2.2 NEI 99-01 Rev. 6 to WF3 EAL Comparison Matrix

4.2.3 WF3 EAL Matrix

5.0 DEFINITIONS, ACRONYMS & ABBREVIATIONS

5.1 Definitions (ref. 4.1.1 except as noted)

Selected terms used in the Initiating Condition statement, the Emergency Action Level statement, and EAL Bases are set in all capital letters (e.g., ALL CAPS). These words are defined terms that have specific meanings as used in this document. The definitions of these terms are provided below.

Alert

Events are in progress, or have occurred, which involve an actual or potential substantial degradation of the level of safety of the plant or a security event that involves probable life threatening risk to site personnel or damage to site equipment because of HOSTILE ACTION. **Any** releases are expected to be limited to small fractions of the EPA Protective Action Guideline exposure levels.

Confinement Boundary

The barrier(s) between spent fuel and the environment once the spent fuel is processed for dry storage. As related to the WF3 ISFSI, Confinement Boundary is considered the Multi-Purpose Canister (MPC) for the HI-STORM 100 dry storage system (ref. 4.1.10).

Containment Closure

The procedurally defined actions taken to secure containment and its associated structures, systems, and components as a functional barrier to fission product release under shutdown conditions. As applied to WF3, all Containment Penetrations are closed as described in the requirements of Technical Specifications section 3/4.9.4 Containment Building Penetrations (ref. 4.1.11) and OP-010-006, Outage Operations.

Emergency Action Level (EAL)

A pre-determined, site-specific, observable threshold for an INITIATING CONDITION that, when met or exceeded, places the plant in a given emergency classification level.

Emergency Classification Level (ECL)

One of a set of names or titles established by the US Nuclear Regulatory Commission (NRC) for grouping off-normal events or conditions according to (1) potential or actual effects or consequences, and (2) resulting onsite and offsite response actions. The emergency classification levels, in ascending order of severity, are:

- Unusual Event (UE)
- Alert
- Site Area Emergency (SAE)
- General Emergency (GE)

Explosion

A rapid, violent and catastrophic failure of a piece of equipment due to combustion, chemical reaction or overpressurization. A release of steam (from high energy lines or components) or an electrical component failure (caused by short circuits, grounding, arcing, etc.) should **not** automatically be considered an explosion. Such events require a post-event inspection to determine if the attributes of an explosion are present.

Faulted

The term applied to a steam generator that has a steam leak on the secondary side of sufficient size to cause an uncontrolled drop in steam generator pressure or the steam generator to become completely depressurized.

Fire

Combustion characterized by heat and light. Sources of smoke such as slipping drive belts or overheated electrical equipment do **not** constitute fires. Observation of flame is preferred but is **not** required if large quantities of smoke and heat are observed.

Fission Product Barrier Threshold

A pre-determined, site-specific, observable threshold indicating the loss or potential loss of a fission product barrier.

Flooding

A condition where water is entering a room or area faster than installed equipment is capable of removal, resulting in a rise of water level within the room or area.

General Emergency

Events are in progress or have occurred which involve actual or IMMINENT substantial core degradation or melting with potential for loss of containment integrity or HOSTILE ACTION that results in an actual loss of physical control of the facility. Releases can be reasonably expected to exceed EPA PAG exposure levels offsite for more than the immediate site area.

Hostage

A person(s) held as leverage against the station to ensure that demands will be met by the station.

Hostile Action

An act toward WF3 or its personnel that includes the use of violent force to destroy equipment, take HOSTAGES, and/or intimidate the licensee to achieve an end. This includes attack by air, land, or water using guns, explosives, PROJECTILEs, vehicles, or other devices used to deliver destructive force. Other acts that satisfy the overall intent may be included. Hostile action should **not** be construed to include acts of civil disobedience or felonious acts that are **not** part of a concerted attack on WF3. Non-terrorism-based EALs should be used to address such activities (i.e., this may include violent acts between individuals in the SECURITY OWNER CONTROLLED AREA (SOCA)).

Hostile Force

One or more individuals who are engaged in a determined assault, overtly or by stealth and deception, equipped with suitable weapons capable of killing, maiming, or causing destruction.

Imminent

The trajectory of events or conditions is such that an EAL will be met within a relatively short period of time regardless of mitigation or corrective actions.

Impede(d)

Personnel access to a room or area is hindered to an extent that extraordinary measures are necessary to facilitate entry of personnel into the affected room/area (e.g., requiring use of protective equipment, such as SCBAs, that is **not** routinely employed).

Independent Spent Fuel Storage Installation (ISFSI)

A complex that is designed and constructed for the interim storage of spent nuclear fuel and other radioactive materials associated with spent fuel storage.

Initiating Condition (IC)

An event or condition that aligns with the definition of one of the four emergency classification levels by virtue of the potential or actual effects or consequences.

Projectile

An object directed toward a Nuclear Power Plant that could cause concern for its continued operability, reliability, or personnel safety.

Protected Area

The area encompassed by physical barriers (the security fence) and to which access is controlled into the vital areas of the plant (ref. 4.1.9).

RCS Intact

The RCS should be considered intact when the RCS pressure boundary is in its normal condition for the cold shutdown mode of operation (e.g., no freeze seals or nozzle dams).

Refueling Pathway

All the cavities, tubes, canals and pools through which irradiated fuel may be moved, but **not** including the reactor vessel.

Rupture(d)

The condition of a steam generator in which primary-to-secondary leakage is of sufficient magnitude to require a safety injection (automatic or manual).

Safety System

A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related (as defined in 10 CFR 50.2):

Those structures, systems and components that are relied upon to remain functional during and following design basis events to assure:

(1) The integrity of the reactor coolant pressure boundary;

(2) The capability to shut down the reactor and maintain it in a safe shutdown condition;

(3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures.

Security Condition

Any security event as listed in the approved security contingency plan that constitutes a threat/compromise to site security, threat/risk to site personnel, or a potential degradation to the level of safety of the plant. A security condition does **not** involve a HOSTILE ACTION.

Security Owner Controlled Area (SOCA)

The area inside the SOCA Vehicle Barrier System (VBS) up to the PROTECTED AREA fence line. Access to this area is controlled by the SOCA Personnel Access Control Point. The SOCA is part of but not equal to the Owner Controlled Area as described or defined in the Waterford 3 Emergency Plan.

Site Area Emergency

Events are in progress or have occurred which involve actual or likely major failures of plant functions needed for protection of the public or HOSTILE ACTION that results in intentional damage or malicious acts; (1) toward site personnel or equipment that could lead to the likely failure of or; (2) that prevent effective access to equipment needed for the protection of the public. **Any** releases are **not** expected to result in exposure levels which exceed EPA PAG exposure levels beyond the SITE BOUNDARY.

Site Boundary

The border of the Exclusion Area or an area corresponding to a distance of 914 meters from the Waterford 3 reactor. Also referred to as the Exclusion Area Boundary (ref. 4.1.9).

Unisolable

An open or breached system line that **cannot** be isolated, remotely or locally.

Unplanned

A parameter change or an event that is **not** 1) the result of an intended evolution or 2) an expected plant response to a transient. The cause of the parameter change or event may be known or unknown.

Unusual Event

Events are in progress or have occurred which indicate a potential degradation in the level of safety of the plant or indicate a security threat to facility protection has been initiated. No releases of radioactive material requiring offsite response or monitoring are expected unless further degradation of SAFETY SYSTEMS occurs.

Valid

An indication, report, or condition, is considered to be valid when it is verified by (1) an instrument channel check, or (2) indications on related or redundant indicators, or (3) by direct observation by plant personnel, such that doubt related to the indicator's operability, the condition's existence, or the report's accuracy is removed. Implicit in this definition is the need for timely assessment.

Visible Damage

Damage to a SAFETY SYSTEM train that is readily observable without measurements, testing, or analysis. The visual impact of the damage is sufficient to cause concern regarding the operability or reliability of the affected SAFETY SYSTEM train.

5.2 Abbreviations/Acronyms

°F ..... Degrees Fahrenheit
° ..... Degrees
AC ..... Alternating Current
AFW ..... Auxiliary Feedwater
ARM ..... Area Radiation Monitor
ARP ..... Annunciator Response Procedure
ATWS ..... Anticipated Transient Without Scram
CAS ..... Central Alarm Station
CCW ..... Component Cooling Water
CDE ..... Committed Dose Equivalent
CE ..... Combustion Engineering
CEOG ..... Combustion Engineering Owners Group
CET ..... Core Exit Thermocouple
CFR ..... Code of Federal Regulations
CNB ..... Containment Barrier
CPM ..... Counts Per Minute
CR ..... Control Room
CTMT ..... Containment
DC ..... Direct Current
DEF ..... Defueled
DBA ..... Design Basis Accident
DC ..... Direct Current
D/G ..... Diesel Generator
DRT ..... Diversified Reactor Trip
EAL ..... Emergency Action Level
ECCS ..... Emergency Core Cooling System
ECL ..... Emergency Classification Level
ED ..... Emergency Director
EPIP ..... Emergency Plan Implementing Procedure
ele ..... Elevation
EOF ..... Emergency Operations Facility
EOP ..... Emergency Operating Procedure
EPA ..... Environmental Protection Agency
EPM ..... Emergency Plant Manager
ERO ..... Emergency Response Organization

ESF ..... Engineered Safety Feature
FAA ..... Federal Aviation Administration
FBI ..... Federal Bureau of Investigation
FC ..... Fuel Clad Barrier
FEMA ..... Federal Emergency Management Agency
FHB ..... Fuel Handling Building
FSAR ..... Final Safety Analysis Report
ft. ..... Feet
FTS ..... Federal Telephone System
GE ..... General Emergency
HJTC ..... Heated Junction Thermocouple
HPSI ..... High Pressure Safety Injection
hr. ..... Hour
IC ..... Initiating Condition
in. ..... Inch
IPEEE ..... Individual Plant Examination of External Events (Generic Letter 88-20)
ISFSI ..... Independent Spent Fuel Storage Installation
K_{eff} ..... Effective Neutron Multiplication Factor
kV ..... Kilovolt
LCO ..... Limiting Condition of Operation
LER ..... Licensee Event Report
LOCA ..... Loss of Coolant Accident
LWR ..... Light Water Reactor
MPC ..... Maximum Permissible Concentration/Multi-Purpose Canister
mR, mRem, mrem, mREM ..... milli-Roentgen Equivalent Man
MSIV ..... Main Steam Isolation Valve
MSL ..... Main Steam Line / Mean Sea Level
MW ..... Megawatt
NEI ..... Nuclear Energy Institute
NEIC ..... National Earthquake Information Center
NESP ..... National Environmental Studies Project
NORAD ..... North American Aerospace Defense Command
(NO)UE ..... Notification of Unusual Event
NPP ..... Nuclear Power Plant
NRC ..... Nuclear Regulatory Commission
NSSS ..... Nuclear Steam Supply System

OBE ..... Operating Basis Earthquake
OCA ..... Owner Controlled Area
ODCM ..... Off-site Dose Calculation Manual
OI ..... Operating Instruction
OP ..... Operating Procedure
ORO ..... Offsite Response Organization
OTCC ..... Once Through Core Cooling
PA ..... Protected Area
PIG ..... Particulate, Iodine, Gas (monitor)
PAG ..... Protective Action Guideline
PRA/PSA ..... Probabilistic Risk Assessment / Probabilistic Safety Assessment
PWR ..... Pressurized Water Reactor
PSIA ..... Pounds per Square Inch Atmosphere
PTS ..... Pressurized Thermal Shock
P/T ..... Pressure - Temperature
R ..... Roentgen
RAB ..... Reactor Auxiliary Building
RCB ..... Reactor Coolant System Barrier
RCP ..... Reactor Coolant Pump
RCS ..... Reactor Coolant System
Rem, rem, REM ..... Roentgen Equivalent Man
RHR ..... Residual Heat Removal
RMS ..... Radiation Monitoring System
RPS ..... Reactor Protection System
RPV ..... Reactor Pressure Vessel
RVLMS ..... Reactor Vessel Level Monitoring System
SAR ..... Safety Analysis Report
SBO ..... Station Blackout
SCBA ..... Self-Contained Breathing Apparatus
SFP ..... Spent Fuel Pool
S/G ..... Steam Generator
SI ..... Safety Injection
SOCA ..... Security Owner Controlled Area
SRO ..... Senior Reactor Operator
SSE ..... Safe Shutdown Earthquake
SWS ..... Service Water System

TED .....Temporary Emergency Diesel
TEDE ..... Total Effective Dose Equivalent
TOAF ..... Top of Active Fuel
TSC ..... Technical Support Center
UFSAR .....Updated Final Safety Analysis Report
USGS ..... United States Geological Survey
UHS ..... Ultimate Heat Sink
USGS ..... United States Geological Survey
VBS .....Vehicle Barrier System
WF3 ..... Waterford 3 Steam Electric Station

6.0 WF3-TO-NEI 99-01 Rev. 6 EAL CROSS-REFERENCE

This cross-reference is provided to facilitate association and location of a WF3 EAL within the NEI 99-01 IC/EAL identification scheme. Further information regarding the development of the WF3 EALs based on the NEI guidance can be found in the EAL Comparison Matrix.

WF3	NEI 99-01 Rev. 6	
EAL	**IC**	**Example EAL**
AU1.1	AU1	1, 2
AU1.2	AU1	3
AU2.1	AU2	1
AA1.1	AA1	1
AA1.2	AA1	2
AA1.3	AA1	3
AA1.4	AA1	4
AA2.1	AA2	1
AA2.2	AA2	2
AA2.3	AA2	3
AA3.1	AA3	1
AA3.2	AA3	2
AS1.1	AS1	1
AS1.2	AS1	2
AS1.3	AS1	3
AS2.1	AS2	1
AG1.1	AG1	1
AG1.2	AG1	2
AG1.3	AG1	3

WF3	NEI 99-01 Rev. 6	
EAL	**IC**	**Example EAL**
AG2.1	AG2	1
CU1.1	CU1	1
CU1.2	CU1	2
CU2.1	CU2	1
CU3.1	CU3	1
CU3.2	CU3	2
CU4.1	CU4	1
CU5.1	CU5	1, 2, 3
CA1.1	CA1	1
CA1.2	CA1	2
CA2.1	CA2	1
CA3.1	CA3	1, 2
CA6.1	CA6	1
CS1.1	CS1	1
CS1.2	CS1	2
CS1.3	CS1	3
CG1.1	CG1	1
CG1.2	CG1	2
EU1.1	E-HU1	1
FA1.1	FA1	1
FS1.1	FS1	1
FG1.1	FG1	1
HU1.1	HU1	1, 2, 3

WF3	NEI 99-01 Rev. 6	
EAL	**IC**	**Example EAL**
HU2.1	HU2	1
HU3.1	HU3	1
HU3.2	HU3	2
HU3.3	HU3	3
HU3.4	HU3	4
HU4.1	HU4	1
HU4.2	HU4	2
HU4.3	HU4	3
HU4.4	HU4	4
HU7.1	HU7	1
HA1.1	HA1	1, 2
HA5.1	HA5	1
HA6.1	HA6	1
HA7.1	HA7	1
HS1.1	HS1	1
HS6.1	HS6	1
HS7.1	HS7	1
HG7.1	HG7	1
SU1.1	SU1	1
SU3.1	SU2	1
SU4.1	SU3	2
SU5.1	SU4	1, 2, 3
SU6.1	SU5	1

WF3	NEI 99-01 Rev. 6	
EAL	**IC**	**Example EAL**
SU6.2	SU5	2
SU7.1	SU6	1, 2, 3
SU8.1	SU7	1, 2
SA1.1	SA1	1
SA3.1	SA2	1
SA6.1	SA5	1
SA9.1	SA9	1
SS1.1	SS1	1
SS2.1	SS8	1
SS6.1	SS5	1
SG1.1	SG1	1
SG1.2	SG8	1

7.0 ATTACHMENTS

7.1 Attachment 1, Emergency Action Level Technical Bases

7.2 Attachment 2, Safe Operation & Shutdown Areas Tables A-3 & H-2 Bases

Category A – Abnormal Rad Levels / Rad Effluent

EAL Group: ANY (EALs in this category are applicable to any plant condition, hot or cold.)

Many EALs are based on actual or potential degradation of fission product barriers because of the elevated potential for offsite radioactivity release. Degradation of fission product barriers though is not always apparent via non-radiological symptoms. Therefore, direct indication of elevated radiological effluents or area radiation levels are appropriate symptoms for emergency classification.

At lower levels, abnormal radioactivity releases may be indicative of a failure of containment systems or precursors to more significant releases. At higher release rates, offsite radiological conditions may result which require offsite protective actions. Elevated area radiation levels in plant may also be indicative of the failure of containment systems or preclude access to plant vital equipment necessary to ensure plant safety.

Events of this category pertain to the following subcategories:

1. Radiological Effluent

   Direct indication of effluent radiation monitoring systems provides a rapid assessment mechanism to determine releases in excess of classifiable limits. Projected offsite doses, actual offsite field measurements or measured release rates via sampling indicate doses or dose rates above classifiable limits.

2. Irradiated Fuel Event

   Conditions indicative of a loss of adequate shielding or damage to irradiated fuel may preclude access to vital plant areas or result in radiological releases that warrant emergency classification.

3. Area Radiation Levels

   Sustained general area radiation levels which may preclude access to areas requiring continuous occupancy also warrant emergency classification.

Category: A – Abnormal Rad Levels / Rad Effluent

Subcategory: 1 – Radiological Effluent

Initiating Condition: Release of gaseous or liquid radioactivity greater than 2 times the ODCM limits for 60 minutes or longer

EAL:

AU1.1 Unusual Event

Reading on **any** Table A-1 effluent radiation monitor > column "UE" for ≥ 60 min. (Notes 1, 2, 3)

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Note 2: If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded the specified time limit.

Note 3: If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is **no** longer VALID for classification purposes.

Table A-1 Effluent Monitor Classification Thresholds

Release Point		Monitor	GE	SAE	Alert	UE
Gaseous	Plant Stack WRGM	PRM-IRE-0110-4	4.01 E+08 µCi/sec	4.01 E+07 µCi/sec	4.01 E+06 µCi/sec	2.27 E+05 µCi/sec
		PRM-IRE-0110-1 to 3	6.54 E+01 µCi/cc	6.54 E+00 µCi/cc	6.54 E-01 µCi/cc	5.81 E-03 µCi/cc
	Fuel Handling Bldg. Exhaust WRGM	PRM-IRE-3032-4	1.48 E+10 µCi/sec	1.48 E+09 µCi/sec	1.48 E+08 µCi/sec	2.27 E+05 µCi/sec
		PRM-IRE-3032-1 to 3	7.85 E+03 µCi/cc	7.85 E+02 µCi/cc	7.85 E+01 µCi/cc	1.60 E-02 µCi/cc
Liquid	Circulating Water Discharge Monitor	PRM-IRE-1900	N/A	N/A	N/A	7.27 E-04 µCi/ml
	Liquid Waste Management Discharge Monitor	PRM-IRE-0647	N/A	N/A	N/A	2.40 E-03 µCi/ml
	Boron Management Discharge Monitor	PRM-IRE-0627	N/A	N/A	N/A	2.40 E-03 µCi/ml

Mode Applicability:

All

Definition(s):

VALID - An indication, report, or condition, is considered to be valid when it is verified by (1) an instrument channel check, or (2) indications on related or redundant indicators, or (3) by direct observation by plant personnel, such that doubt related to the indicator's operability, the condition's existence, or the report's accuracy is removed. Implicit in this definition is the need for timely assessment.

Basis:

This IC addresses a potential reduction in the level of safety of the plant as indicated by a low-level radiological release that exceeds regulatory commitments (ref. 1) for an extended period of time (e.g., an uncontrolled release). It includes any gaseous or liquid radiological release, monitored or un-monitored, including those for which a radioactivity discharge permit is normally prepared.

Nuclear power plants incorporate design features intended to control the release of radioactive effluents to the environment. Further, there are administrative controls established to prevent unintentional releases, and to control and monitor intentional releases. The occurrence of an extended, uncontrolled radioactive release to the environment is indicative of degradation in these features and/or controls.

Radiological effluent EALs are also included to provide a basis for classifying events and conditions that cannot be readily or appropriately classified on the basis of plant conditions alone. The inclusion of both plant condition and radiological effluent EALs more fully addresses the spectrum of possible accident events and conditions.

Classification based on effluent monitor readings assumes that a release path to the environment is established. If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is no longer VALID for classification purposes.

Releases should not be prorated or averaged. For example, a release exceeding 4 times release limits for 30 minutes does not meet the EAL.

This EAL addresses normally occurring continuous radioactivity releases from monitored gaseous or liquid effluent pathways as well as radioactivity releases that cause effluent radiation monitor readings to exceed 2 times the limit established by a radioactivity discharge permit. Such releases are typically associated with planned batch releases from non-continuous release pathways (e.g., radwaste, waste gas).

The values used on the Dry Cooling Tower and Turbine Building sump discharge are based on the release pathway being aligned to the Storm Water System or Discharge Canal vice the circulating water system and are not applicable if the pathway is aligned to the circulating water system.

Escalation of the emergency classification level would be via IC AA1.

Reference(s):

1. UNT-005-014 Offsite Dose Calculation Manual
2. EC86890, EP-CALC-WF3-1701, Radiological Effluent EAL Values
3. NEI 99-01 AU1

Category: A – Abnormal Rad Levels / Rad Effluent

Subcategory: 1 – Radiological Effluent

Initiating Condition: Release of gaseous or liquid radioactivity greater than 2 times the ODCM limits for 60 minutes or longer.

EAL:

AU1.2 Unusual Event

Sample analysis for a gaseous or liquid release indicates a concentration or release rate > 2 x ODCM limits for ≥ 60 min. (Notes 1, 2)

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Note 2: If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded the specified time limit.

Mode Applicability:

All

Definition(s):

None

Basis:

This IC 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). It includes any gaseous or liquid radiological release, monitored or un-monitored, including those for which a radioactivity discharge permit is normally prepared.

Nuclear power plants incorporate design features intended to control the release of radioactive effluents to the environment. Further, there are administrative controls established to prevent unintentional releases, and to control and monitor intentional releases. The occurrence of an extended, uncontrolled radioactive release to the environment is indicative of degradation in these features and/or controls.

Radiological effluent EALs are also included to provide a basis for classifying events and conditions that cannot be readily or appropriately classified on the basis of plant conditions alone. The inclusion of both plant condition and radiological effluent EALs more fully addresses the spectrum of possible accident events and conditions.

Releases should not be prorated or averaged. For example, a release exceeding 4 times release limits for 30 minutes does not meet the EAL.

This EAL addresses uncontrolled gaseous or liquid releases that are detected by sample analyses or environmental surveys, particularly on unmonitored pathways (e.g., spills of radioactive liquids into storm drains, heat exchanger leakage in river water systems, etc.).

Escalation of the emergency classification level would be via IC AA1.

Reference(s):

1. UNT-005-014 Offsite Dose Calculation Manual
2. NEI 99-01 AU1

Category: A – Abnormal Rad Levels / Rad Effluent
Subcategory: 1 – Radiological Effluent

Initiating Condition: Release of gaseous or liquid radioactivity resulting in offsite dose greater than 10 mrem TEDE or 50 mrem thyroid CDE

EAL:

AA1.1 Alert

Reading on **any** Table A-1 effluent radiation monitor > column "ALERT" for ≥ 15 min. (Notes 1, 2, 3, 4)

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Note 2: If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded the specified time limit.

Note 3: If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is **no** longer VALID for classification purposes.

Note 4 The pre-calculated effluent monitor values presented in EALs AA1.1, AS1.1 and AG1.1 should be used for emergency classification assessments until the results from a dose assessment using actual meteorology are available.

Table A-1 Effluent Monitor Classification Thresholds

Release Point		Monitor	GE	SAE	Alert	UE
Gaseous	Plant Stack WRGM	PRM-IRE-0110-4	4.01 E+08 µCi/sec	4.01 E+07 µCi/sec	4.01 E+06 µCi/sec	2.27 E+05 µCi/sec
		PRM-IRE-0110-1 to 3	6.54 E+01 µCi/cc	6.54 E+00 µCi/cc	6.54 E-01 µCi/cc	5.81 E-03 µCi/cc
	Fuel Handling Bldg. Exhaust WRGM	PRM-IRE-3032-4	1.48 E+10 µCi/sec	1.48 E+09 µCi/sec	1.48 E+08 µCi/sec	2.27 E+05 µCi/sec
		PRM-IRE-3032-1 to 3	7.85 E+03 µCi/cc	7.85 E+02 µCi/cc	7.85 E+01 µCi/cc	1.60 E-02 µCi/cc
Liquid	Circulating Water Discharge Monitor	PRM-IRE-1900	N/A	N/A	N/A	7.27 E-04 µCi/ml
	Liquid Waste Management Discharge Monitor	PRM-IRE-0647	N/A	N/A	N/A	2.40 E-03 µCi/ml
	Boron Management Discharge Monitor	PRM-IRE-0627	N/A	N/A	N/A	2.40 E-03 µCi/ml

Mode Applicability:

All

Definition(s):

VALID - An indication, report, or condition, is considered to be valid when it is verified by (1) an instrument channel check, or (2) indications on related or redundant indicators, or (3) by direct observation by plant personnel, such that doubt related to the indicator's operability, the condition's existence, or the report's accuracy is removed. Implicit in this definition is the need for timely assessment.

Basis:

This IC addresses a release of gaseous or liquid radioactivity that results in projected or actual offsite doses greater than or equal to 1% of the EPA Protective Action Guides (PAGs). It includes both monitored and un-monitored releases. Releases of this magnitude represent an actual or potential substantial degradation of the level of safety of the plant as indicated by a radiological release that significantly exceeds regulatory limits (e.g., a significant uncontrolled release).

Radiological effluent EALs are also included to provide a basis for classifying events and conditions that cannot be readily or appropriately classified on the basis of plant conditions alone. The inclusion of both plant condition and radiological effluent EALs more fully addresses the spectrum of possible accident events and conditions.

The TEDE dose is set at 1% of the EPA PAG of 1,000 mrem while the 50 mrem thyroid CDE was established in consideration of the 1:5 ratio of the EPA PAG for TEDE and thyroid CDE.

Classification based on effluent monitor readings assumes that a release path to the environment is established. If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is no longer VALID for classification purposes.

Escalation of the emergency classification level would be via IC AS1.

Reference(s):

1. EC86890, EP-CALC-WF3-1701, Radiological Effluent EAL Values
2. NEI 99-01 AA1

Category: A – Abnormal Rad Levels / Rad Effluent

Subcategory: 1 – Radiological Effluent

Initiating Condition: Release of gaseous or liquid radioactivity resulting in offsite dose greater than 10 mrem TEDE or 50 mrem thyroid CDE

EAL:

AA1.2 Alert

Dose assessment using actual meteorology indicates doses > 10 mrem TEDE or 50 mrem thyroid CDE at or beyond the SITE BOUNDARY (Note 4)

Note 4: The pre-calculated effluent monitor values presented in EALs AA1.1, AS1.1 and AG1.1 should be used for emergency classification assessments until the results from a dose assessment using actual meteorology are available.

Mode Applicability:

All

Definition(s):

SITE BOUNDARY - The border of the Exclusion Area or an area corresponding to a distance of 914 meters from the Waterford 3 reactor. Also referred to as the Exclusion Area Boundary.

Basis:

This IC addresses a release of gaseous or liquid radioactivity that results in projected or actual offsite doses greater than or equal to 1% of the EPA Protective Action Guides (PAGs). It includes both monitored and un-monitored releases. Releases of this magnitude represent an actual or potential substantial degradation of the level of safety of the plant as indicated by a radiological release that significantly exceeds regulatory limits (e.g., a significant uncontrolled release).

Radiological effluent EALs are also included to provide a basis for classifying events and conditions that cannot be readily or appropriately classified on the basis of plant conditions alone. The inclusion of both plant condition and radiological effluent EALs more fully addresses the spectrum of possible accident events and conditions.

The TEDE dose is set at 1% of the EPA PAG of 1,000 mrem while the 50 mrem thyroid CDE was established in consideration of the 1:5 ratio of the EPA PAG for TEDE and thyroid CDE.

Escalation of the emergency classification level would be via IC AS1.

Reference(s):

1. EP-002-050 Offsite Dose Assessment
2. NEI 99-01 AA1

Category: A – Abnormal Rad Levels / Rad Effluent

Subcategory: 1 – Radiological Effluent

Initiating Condition: Release of gaseous or liquid radioactivity resulting in offsite dose greater than 10 mrem TEDE or 50 mrem thyroid CDE

EAL:

AA1.3 Alert

Analysis of a liquid effluent sample indicates a concentration or release rate that would result in doses > 10 mrem TEDE or 50 mrem thyroid CDE at or beyond the SITE BOUNDARY for 60 min. of exposure (Notes 1, 2)

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Note 2: If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded the specified time limit.

Mode Applicability:

All

Definition(s):

SITE BOUNDARY - The border of the Exclusion Area or an area corresponding to a distance of 914 meters from the Waterford 3 reactor. Also referred to as the Exclusion Area Boundary.

Basis:

This IC addresses a release of gaseous or liquid radioactivity that results in projected or actual offsite doses greater than or equal to 1% of the EPA Protective Action Guides (PAGs). It includes both monitored and un-monitored releases. Releases of this magnitude represent an actual or potential substantial degradation of the level of safety of the plant as indicated by a radiological release that significantly exceeds regulatory limits (e.g., a significant uncontrolled release).

Radiological effluent EALs are also included to provide a basis for classifying events and conditions that cannot be readily or appropriately classified on the basis of plant conditions alone. The inclusion of both plant condition and radiological effluent EALs more fully addresses the spectrum of possible accident events and conditions.

The TEDE dose is set at 1% of the EPA PAG of 1,000 mrem while the 50 mrem thyroid CDE was established in consideration of the 1:5 ratio of the EPA PAG for TEDE and thyroid CDE.

This EAL is assessed per the ODCM (ref. 1)

Escalation of the emergency classification level would be via IC AS1.

Reference(s):

1. UNT-005-014 Offsite Dose Calculation Manual
2. NEI 99-01 AA1

Category: A – Abnormal Rad Levels / Rad Effluent

Subcategory: 1 – Radiological Effluent

Initiating Condition: Release of gaseous or liquid radioactivity resulting in offsite dose greater than 10 mrem TEDE or 50 mrem thyroid CDE

EAL:

AA1.4 Alert

Field survey results indicate **EITHER** of the following at or beyond the SITE BOUNDARY:

- Closed window dose rates > 10 mR/hr expected to continue for ≥ 60 min.
- Analyses of field survey samples indicate thyroid CDE > 50 mrem for 60 min. of inhalation.

(Notes 1, 2)

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Note 2: If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded the specified time limit.

Mode Applicability:

All

Definition(s):

SITE BOUNDARY - The border of the Exclusion Area or an area corresponding to a distance of 914 meters from the Waterford 3 reactor. Also referred to as the Exclusion Area Boundary.

Basis:

This IC addresses a release of gaseous or liquid radioactivity that results in projected or actual offsite doses greater than or equal to 1% of the EPA Protective Action Guides (PAGs). It includes both monitored and un-monitored releases. Releases of this magnitude represent an actual or potential substantial degradation of the level of safety of the plant as indicated by a radiological release that significantly exceeds regulatory limits (e.g., a significant uncontrolled release).

Radiological effluent EALs are also included to provide a basis for classifying events and conditions that cannot be readily or appropriately classified on the basis of plant conditions alone. The inclusion of both plant condition and radiological effluent EALs more fully addresses the spectrum of possible accident events and conditions.

The TEDE dose is set at 1% of the EPA PAG of 1,000 mrem while the 50 mrem thyroid CDE was established in consideration of the 1:5 ratio of the EPA PAG for TEDE and thyroid CDE.

Escalation of the emergency classification level would be via IC AS1.

Reference(s):

1. EP-002-060 Radiological Field Monitoring
2. NEI 99-01 AA1

Category: A – Abnormal Rad Levels / Rad Effluent
Subcategory: 1 – Radiological Effluent
Initiating Condition: Release of gaseous radioactivity resulting in offsite dose greater than 100 mrem TEDE or 500 mrem thyroid CDE

EAL:

AS1.1 Site Area Emergency

Reading on **any** Table A-1 effluent radiation monitor > column "SAE" for ≥ 15 min. (Notes 1, 2, 3, 4)

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Note 2: If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded the specified time limit.

Note 3: If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is **no** longer VALID for classification purposes.

Note 4: The pre-calculated effluent monitor values presented in EALs AA1.1, AS1.1 and AG1.1 should be used for emergency classification assessments until the results from a dose assessment using actual meteorology are available

Table A-1 Effluent Monitor Classification Thresholds

Release Point		Monitor	GE	SAE	Alert	UE
Gaseous	Plant Stack WRGM	PRM-IRE-0110-4	4.01 E+08 µCi/sec	4.01 E+07 µCi/sec	4.01 E+06 µCi/sec	2.27 E+05 µCi/sec
		PRM-IRE-0110-1 to 3	6.54 E+01 µCi/cc	6.54 E+00 µCi/cc	6.54 E-01 µCi/cc	5.81 E-03 µCi/cc
	Fuel Handling Bldg. Exhaust WRGM	PRM-IRE-3032-4	1.48 E+10 µCi/sec	1.48 E+09 µCi/sec	1.48 E+08 µCi/sec	2.27 E+05 µCi/sec
		PRM-IRE-3032-1 to 3	7.85 E+03 µCi/cc	7.85 E+02 µCi/cc	7.85 E+01 µCi/cc	1.60 E-02 µCi/cc
Liquid	Circulating Water Discharge Monitor	PRM-IRE-1900	N/A	N/A	N/A	7.27 E-04 µCi/ml
	Liquid Waste Management Discharge Monitor	PRM-IRE-0647	N/A	N/A	N/A	2.40 E-03 µCi/ml
	Boron Management Discharge Monitor	PRM-IRE-0627	N/A	N/A	N/A	2.40 E-03 µCi/ml

Mode Applicability:
All

Definition(s):

VALID - An indication, report, or condition, is considered to be valid when it is verified by (1) an instrument channel check, or (2) indications on related or redundant indicators, or (3) by direct observation by plant personnel, such that doubt related to the indicator's operability, the condition's existence, or the report's accuracy is removed. Implicit in this definition is the need for timely assessment.

Basis:

This IC addresses a release of gaseous radioactivity that results in projected or actual offsite doses greater than or equal to 10% of the EPA Protective Action Guides (PAGs). It includes both monitored and un-monitored releases. Releases of this magnitude are associated with the failure of plant systems needed for the protection of the public.

Radiological effluent EALs are also included to provide a basis for classifying events and conditions that cannot be readily or appropriately classified on the basis of plant conditions alone. The inclusion of both plant condition and radiological effluent EALs more fully addresses the spectrum of possible accident events and conditions.

The TEDE dose is set at 10% of the EPA PAG of 1,000 mrem while the 500 mrem thyroid CDE was established in consideration of the 1:5 ratio of the EPA PAG for TEDE and thyroid CDE.

Classification based on effluent monitor readings assumes that a release path to the environment is established. If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is no longer VALID for classification purposes.

Escalation of the emergency classification level would be via IC AG1.

Reference(s):

1. EC86890, EP-CALC-WF3-1701, Radiological Effluent EAL Values
2. NEI 99-01 AS1

Category: A – Abnormal Rad Levels / Rad Effluent

Subcategory: 1 – Radiological Effluent

Initiating Condition: Release of gaseous radioactivity resulting in offsite dose greater than 100 mrem TEDE or 500 mrem thyroid CDE

EAL:

AS1.2 Site Area Emergency

Dose assessment using actual meteorology indicates doses > 100 mrem TEDE or 500 mrem thyroid CDE at or beyond the SITE BOUNDARY (Note 4)

Note 4: The pre-calculated effluent monitor values presented in EALs AA1.1, AS1.1 and AG1.1 should be used for emergency classification assessments until the results from a dose assessment using actual meteorology are available.

Mode Applicability:

All

Definition(s):

SITE BOUNDARY - The border of the Exclusion Area or an area corresponding to a distance of 914 meters from the Waterford 3 reactor. Also referred to as the Exclusion Area Boundary.

Basis:

This IC addresses a release of gaseous radioactivity that results in projected or actual offsite doses greater than or equal to 10% of the EPA Protective Action Guides (PAGs). It includes both monitored and un-monitored releases. Releases of this magnitude are associated with the failure of plant systems needed for the protection of the public.

Radiological effluent EALs are also included to provide a basis for classifying events and conditions that cannot be readily or appropriately classified on the basis of plant conditions alone. The inclusion of both plant condition and radiological effluent EALs more fully addresses the spectrum of possible accident events and conditions.

The TEDE dose is set at 10% of the EPA PAG of 1,000 mrem while the 500 mrem thyroid CDE was established in consideration of the 1:5 ratio of the EPA PAG for TEDE and thyroid CDE.

Escalation of the emergency classification level would be via IC AG1.

Reference(s):

1. EP-002-050 Offsite Dose Assessment
2. NEI 99-01 AS1

Category: A – Abnormal Rad Levels / Rad Effluent

Subcategory: 1 – Radiological Effluent

Initiating Condition: Release of gaseous radioactivity resulting in offsite dose greater than 100 mrem TEDE or 500 mrem thyroid CDE

EAL:

AS1.3 Site Area Emergency

Field survey results indicate **EITHER** of the following at or beyond the SITE BOUNDARY:

- Closed window dose rates > 100 mR/hr expected to continue for ≥ 60 min.
- Analyses of field survey samples indicate thyroid CDE > 500 mrem for 60 min. of inhalation.

(Notes 1, 2)

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Note 2: If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded the specified time limit.

Mode Applicability:

All

Definition(s):

SITE BOUNDARY - The border of the Exclusion Area or an area corresponding to a distance of 914 meters from the Waterford 3 reactor. Also referred to as the Exclusion Area Boundary.

Basis:

This IC addresses a release of gaseous radioactivity that results in projected or actual offsite doses greater than or equal to 10% of the EPA Protective Action Guides (PAGs). It includes both monitored and un-monitored releases. Releases of this magnitude are associated with the failure of plant systems needed for the protection of the public.

Radiological effluent EALs are also included to provide a basis for classifying events and conditions that cannot be readily or appropriately classified on the basis of plant conditions alone. The inclusion of both plant condition and radiological effluent EALs more fully addresses the spectrum of possible accident events and conditions.

The TEDE dose is set at 10% of the EPA PAG of 1,000 mrem while the 500 mrem thyroid CDE was established in consideration of the 1:5 ratio of the EPA PAG for TEDE and thyroid CDE.

Escalation of the emergency classification level would be via IC AG1.

Reference(s):

1. EP-002-060 Radiological Field Monitoring
2. NEI 99-01 AS1

Category: A – Abnormal Rad Levels / Rad Effluent

Subcategory: 1 – Radiological Effluent

Initiating Condition: Release of gaseous radioactivity resulting in offsite dose greater than 1,000 mrem TEDE or 5,000 mrem thyroid CDE

EAL:

AG1.1 General Emergency

Reading on **any** Table A-1 effluent radiation monitor > column "GE" for ≥ 15 min. (Notes 1, 2, 3, 4)

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Note 2: If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded the specified time limit.

Note 3: If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is **no** longer VALID for classification purposes.

Note 4: The pre-calculated effluent monitor values presented in EALs AA1.1, AS1.1 and AG1.1 should be used for emergency classification assessments until the results from a dose assessment using actual meteorology are available.

Table A-1 Effluent Monitor Classification Thresholds

Release Point		Monitor	GE	SAE	Alert	UE
Gaseous	Plant Stack WRGM	PRM-IRE-0110-4	4.01 E+08 µCi/sec	4.01 E+07 µCi/sec	4.01 E+06 µCi/sec	2.27 E+05 µCi/sec
		PRM-IRE-0110-1 to 3	6.54 E+01 µCi/cc	6.54 E+00 µCi/cc	6.54 E-01 µCi/cc	5.81 E-03 µCi/cc
	Fuel Handling Bldg. Exhaust WRGM	PRM-IRE-3032-4	1.48 E+10 µCi/sec	1.48 E+09 µCi/sec	1.48 E+08 µCi/sec	2.27 E+05 µCi/sec
		PRM-IRE-3032-1 to 3	7.85 E+03 µCi/cc	7.85 E+02 µCi/cc	7.85 E+01 µCi/cc	1.60 E-02 µCi/cc
Liquid	Circulating Water Discharge Monitor	PRM-IRE-1900	N/A	N/A	N/A	7.27 E-04 µCi/ml
	Liquid Waste Management Discharge Monitor	PRM-IRE-0647	N/A	N/A	N/A	2.40 E-03 µCi/ml
	Boron Management Discharge Monitor	PRM-IRE-0627	N/A	N/A	N/A	2.40 E-03 µCi/ml

Mode Applicability:

All

Definition(s):

VALID - An indication, report, or condition, is considered to be valid when it is verified by (1) an instrument channel check, or (2) indications on related or redundant indicators, or (3) by direct observation by plant personnel, such that doubt related to the indicator's operability, the condition's existence, or the report's accuracy is removed. Implicit in this definition is the need for timely assessment.

Basis:

This IC addresses a release of gaseous radioactivity that results in projected or actual offsite doses greater than or equal to the EPA Protective Action Guides (PAGs). It includes both monitored and un-monitored releases. Releases of this magnitude will require implementation of protective actions for the public.

Radiological effluent EALs are also included to provide a basis for classifying events and conditions that cannot be readily or appropriately classified on the basis of plant conditions alone. The inclusion of both plant condition and radiological effluent EALs more fully addresses the spectrum of possible accident events and conditions.

The TEDE dose is set at the EPA PAG of 1,000 mrem while the 5,000 mrem thyroid CDE was established in consideration of the 1:5 ratio of the EPA PAG for TEDE and thyroid CDE.

Classification based on effluent monitor readings assumes that a release path to the environment is established. If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is no longer VALID for classification purposes.

Reference(s):

1. EC86890, EP-CALC-WF3-1701, Radiological Effluent EAL Values
2. NEI 99-01 AG1

Category: A – Abnormal Rad Levels / Rad Effluent

Subcategory: 1 – Radiological Effluent

Initiating Condition: Release of gaseous radioactivity resulting in offsite dose greater than 1,000 mrem TEDE or 5,000 mrem thyroid CDE

EAL:

AG1.2 General Emergency

Dose assessment using actual meteorology indicates doses > 1,000 mrem TEDE or 5,000 mrem thyroid CDE at or beyond the SITE BOUNDARY (Note 4)

Note 4: The pre-calculated effluent monitor values presented in EALs AA1.1, AS1.1 and AG1.1 should be used for emergency classification assessments until the results from a dose assessment using actual meteorology are available.

Mode Applicability:

All

Definition(s):

SITE BOUNDARY - The border of the Exclusion Area or an area corresponding to a distance of 914 meters from the Waterford 3 reactor. Also referred to as the Exclusion Area Boundary.

Basis:

This IC addresses a release of gaseous radioactivity that results in projected or actual offsite doses greater than or equal to the EPA Protective Action Guides (PAGs). It includes both monitored and un-monitored releases. Releases of this magnitude will require implementation of protective actions for the public.

Radiological effluent EALs are also included to provide a basis for classifying events and conditions that cannot be readily or appropriately classified on the basis of plant conditions alone. The inclusion of both plant condition and radiological effluent EALs more fully addresses the spectrum of possible accident events and conditions.

The TEDE dose is set at the EPA PAG of 1,000 mrem while the 5,000 mrem thyroid CDE was established in consideration of the 1:5 ratio of the EPA PAG for TEDE and thyroid CDE.

Reference(s):

1. EP-002-050 Offsite Dose Assessment
2. NEI 99-01 AG1

Category: A – Abnormal Rad Levels / Rad Effluent

Subcategory: 1 – Radiological Effluent

Initiating Condition: Release of gaseous radioactivity resulting in offsite dose greater than 1,000 mrem TEDE or 5,000 mrem thyroid CDE

EAL:

AG1.3 General Emergency

Field survey results indicate **EITHER** of the following at or beyond the SITE BOUNDARY:

- Closed window dose rates > 1,000 mR/hr expected to continue for ≥ 60 min.
- Analyses of field survey samples indicate thyroid CDE > 5,000 mrem for 60 min. of inhalation.

(Notes 1, 2)

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Note 2: If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded the specified time limit.

Mode Applicability:

All

Definition(s):

SITE BOUNDARY - The border of the Exclusion Area or an area corresponding to a distance of 914 meters from the Waterford 3 reactor. Also referred to as the Exclusion Area Boundary.

Basis:

This IC addresses a release of gaseous radioactivity that results in projected or actual offsite doses greater than or equal to the EPA Protective Action Guides (PAGs). It includes both monitored and un-monitored releases. Releases of this magnitude will require implementation of protective actions for the public.

Radiological effluent EALs are also included to provide a basis for classifying events and conditions that cannot be readily or appropriately classified on the basis of plant conditions alone. The inclusion of both plant condition and radiological effluent EALs more fully addresses the spectrum of possible accident events and conditions.

The TEDE dose is set at the EPA PAG of 1,000 mrem while the 5,000 mrem thyroid CDE was established in consideration of the 1:5 ratio of the EPA PAG for TEDE and thyroid CDE.

Reference(s):

1. EP-002-060 Radiological Field Monitoring
2. NEI 99-01 AG1

Category: A – Abnormal Rad Levels / Rad Effluent

Subcategory: 2 – Irradiated Fuel Event

Initiating Condition: UNPLANNED loss of water level above irradiated fuel

EAL:

AU2.1 Unusual Event

UNPLANNED water level drop in the REFUELING PATHWAY as indicated by SFP low water level alarm or visual observation

AND

UNPLANNED rise in corresponding area radiation levels as indicated by **any** Table A-2 radiation monitor

Table A-2 Irradiated Fuel Radiation Monitors	
• ARM-IRE-5024 • ARM-IRE-5025 • ARM-IRE-5026 • ARM-IRE-5027	Containment Purge Isolation Monitors
• ARM-IRE-0300.1 • ARM-IRE-0300.2 • ARM-IRE-0300.3 • ARM-IRE-0300.4	FHB Area Radiation Monitors
• PRM-IRE-5107A or B	FHB PIG Gas Channel

Mode Applicability:

All

Definition(s):

UNPLANNED-. A parameter change or an event that is **not** 1) the result of an intended evolution or 2) an expected plant response to a transient. The cause of the parameter change or event may be known or unknown.

REFUELING PATHWAY- All the cavities, tubes, canals and pools through which irradiated fuel may be moved, but **not** including the reactor vessel.

Basis:

This IC addresses a drop in water level above irradiated fuel sufficient to cause elevated radiation levels. This condition could be a precursor to a more serious event and is also indicative of a minor loss in the ability to control radiation levels within the plant. It is therefore a potential degradation in the level of safety of the plant.

A water level drop will be primarily determined by indications from available level instrumentation. Other sources of level indications may include reports from plant personnel (e.g., from a refueling crew) or video camera observations (if available). A significant drop in the water level may also cause a rise in the radiation levels of adjacent areas that can be detected by monitors in those locations.

The effects of planned evolutions should be considered. For example, a refueling bridge area radiation monitor reading may rise due to planned evolutions such as lifting of the reactor vessel head or movement of a fuel assembly. Note that this EAL is applicable only in cases where the elevated reading is due to an UNPLANNED loss of water level.

A drop in water level above irradiated fuel within the reactor vessel may be classified in accordance Recognition Category C during the Cold Shutdown and Refueling modes.

Escalation of the emergency classification level would be via IC AA2.

Reference(s):

1. Technical Specifications 3/4.9.11 Water Level - Spent Fuel Pool
2. Technical Specifications 3/4.9.10 Water Level – Reactor Vessel
3. OP-500-008 Control Room Cabinet H Window L-2 FUEL POOL LEVEL LO
4. W3-DBD-32, Radiation Monitoring System Design Basis Document
5. NEI 99-01 AU2

Category: A – Abnormal Rad Levels / Rad Effluent

Subcategory: 2 – Irradiated Fuel Event

Initiating Condition: Significant lowering of water level above, or damage to, irradiated fuel

EAL:

AA2.1 Alert

IMMINENT uncovery of irradiated fuel in the REFUELING PATHWAY

Mode Applicability:

All

Definition(s):

CONFINEMENT BOUNDARY- The barrier(s) between spent fuel and the environment once the spent fuel is processed for dry storage. The cask confinement boundary is considered the Multi-Purpose Canister (MPC) for the HI-STORM 100 dry storage system.

IMMINENT - The trajectory of events or conditions is such that an EAL will be met within a relatively short period of time regardless of mitigation or corrective actions.

REFUELING PATHWAY- All the cavities, tubes, canals and pools through which irradiated fuel may be moved, but **not** including the reactor vessel.

Basis:

This IC 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. These events present radiological safety challenges to plant personnel and are precursors to a release of radioactivity to the environment. As such, they represent an actual or potential substantial degradation of the level of safety of the plant. This IC applies to irradiated fuel that is licensed for dry storage up to the point that the loaded storage cask is sealed. Once sealed, damage to a loaded cask causing loss of the CONFINEMENT BOUNDARY is classified in accordance with IC EU1.

This EAL escalates from AU2.1 in that the loss of level, in the affected portion of the REFUELING PATHWAY, is of sufficient magnitude to have resulted in uncovery of irradiated fuel. Indications of irradiated fuel uncovery may include direct or indirect visual observation (e.g., reports from personnel or camera images), as well as significant changes in water and radiation levels, or other plant parameters. Computational aids may also be used (e.g., a boil-off curve). Classification of an event using this EAL should be based on the totality of available indications, reports and observations.

While an area radiation monitor could detect a rise in a dose rate due to a lowering of water level in some portion of the REFUELING PATHWAY, the reading may not be a reliable indication of whether or not the fuel is actually uncovered. To the degree possible, readings should be considered in combination with other available indications of inventory loss.

A drop in water level above irradiated fuel within the reactor vessel may be classified in accordance with Recognition Category C during the Cold Shutdown and Refueling modes.

Escalation of the emergency classification level would be via IC AS1.

Reference(s):

1. NEI 99-01 AA2

Category: A – Abnormal Rad Levels / Rad Effluent

Subcategory: 2 – Irradiated Fuel Event

Initiating Condition: Significant lowering of water level above, or damage to, irradiated fuel

EAL:

AA2.2 Alert

Damage to irradiated fuel resulting in a release of radioactivity

AND

High alarm on **any** Table A-2 radiation monitor

Table A-2 Irradiated Fuel Radiation Monitors	
• ARM-IRE-5024 • ARM-IRE-5025 • ARM-IRE-5026 • ARM-IRE-5027	Containment Purge Isolation Monitors
• ARM-IRE-0300.1 • ARM-IRE-0300.2 • ARM-IRE-0300.3 • ARM-IRE-0300.4	FHB Area Radiation Monitors
• PRM-IRE-5107A or B	FHB PIG Gas Channel

Mode Applicability:

All

Definition(s):

CONFINEMENT BOUNDARY- The barrier(s) between spent fuel and the environment once the spent fuel is processed for dry storage. The cask confinement boundary is considered the Multi-Purpose Canister (MPC) for the HI-STORM 100 dry storage system.

VALID - An indication, report, or condition, is considered to be valid when it is verified by (1) an instrument channel check, or (2) indications on related or redundant indicators, or (3) by direct observation by plant personnel, such that doubt related to the indicator's operability, the condition's existence, or the report's accuracy is removed. Implicit in this definition is the need for timely assessment.

Basis:

This EAL addresses events that have caused actual damage to an irradiated fuel assembly. These events present radiological safety challenges to plant personnel and are precursors to a release of radioactivity to the environment. As such, they represent an actual or potential substantial degradation of the level of safety of the plant.

This EAL applies to irradiated fuel that is licensed for dry storage up to the point that the loaded storage cask is sealed. Once sealed, damage to a loaded cask causing loss of the CONFINEMENT BOUNDARY is classified in accordance with IC EU1.

This EAL addresses a release of radioactive material caused by mechanical damage to irradiated fuel. Damaging events may include the dropping, bumping or binding of an assembly, or dropping a heavy load onto an assembly. A rise in readings on radiation monitors should be considered in conjunction with in-plant reports or observations of a potential fuel damaging event (e.g., a fuel handling accident).

Escalation of the emergency classification level would be via IC AS1.

Reference(s):

1. W3-DBD-32, Radiation Monitoring System Design Basis Document
2. NEI 99-01 AA2

Category: A – Abnormal Rad Levels / Rad Effluent

Subcategory: 2 – Irradiated Fuel Event

Initiating Condition: Significant lowering of water level above, or damage to, irradiated fuel

EAL:

AA2.3 Alert

Lowering of spent fuel pool level to 11 ft. (Level 2) on FS-ILI-3000(3001)

Mode Applicability:

All

Definition(s):

None

Basis:

FS-ILI-3000(3001) read Level 2 as 11ft. This corresponds to 31' MSL and 10 feet above level 3. The level as read on the instrument should be compared to the EAL criteria without adding any additional level.

This EAL addresses events that have caused a significant lowering of water level within the spent fuel pool. These events present radiological safety challenges to plant personnel and are precursors to a release of radioactivity to the environment. As such, they represent an actual or potential substantial degradation of the level of safety of the plant.

Spent fuel pool water level at this value is within the lower end of the level range necessary to prevent significant dose consequences from direct gamma radiation to personnel performing operations in the vicinity of the spent fuel pool. This condition reflects a significant loss of spent fuel pool water inventory and thus it is also a precursor to a loss of the ability to adequately cool the irradiated fuel assembles stored in the pool.

Escalation of the emergency classification level would be via IC AS1 or AS2.

Post-Fukushima order EA-12-051 required the installation of reliable SFP level indication capable of identifying normal level (Level 1), SFP level 10 ft. above the top of the fuel racks (Level 2) and SFP level at the top of the fuel racks (Level 3) (ref. 1, 2).

Spent Fuel Pool Level indicators FS-ILI-3000 and 3001 are read on the +21 Auxiliary Building just inside from the Q-deck.

Reference(s):

1. EC 48147 Attachment 10.002 SFPI Water Levels
2. OP-901-513 Spent Fuel Cooling Malfunction
3. OP-903-001 Technical Specification Surveillance Logs
4. NEI 99-01 AA2

Category: A – Abnormal Rad Levels / Rad Effluent

Subcategory: 2 – Irradiated Fuel Event

Initiating Condition: Spent fuel pool level at the top of the fuel racks

EAL:

AS2.1	**Site Area Emergency**
Lowering of spent fuel pool level to 1 ft. (Level 3) on FS-ILI-3000(3001)	

Mode Applicability:

All

Definition(s):

IMMINENT - The trajectory of events or conditions is such that an EAL will be met within a relatively short period of time regardless of mitigation or corrective actions.

Basis:

FS-ILI-3000(3001) read Level 1 as 1 ft. This corresponds to 21' MSL. The level as read on the instrument should be compared to the EAL criteria without adding any additional level.

This EAL addresses a significant loss of spent fuel pool inventory control and makeup capability leading to IMMINENT fuel damage. This condition entails major failures of plant functions needed for protection of the public and thus warrant a Site Area Emergency declaration.

It is recognized that this IC would likely not be met until well after another Site Area Emergency IC was met; however, it is included to provide classification diversity.
Escalation of the emergency classification level would be via IC AG1 or AG2.

Post-Fukushima order EA-12-051 required the installation of reliable SFP level indication capable of identifying normal level (Level 1), SFP level 10 ft. above the top of the fuel racks (Level 2) and SFP level at the top of the fuel racks (Level 3) (ref. 1, 2).

Spent Fuel Pool Level indicators FS-ILI-3000 and 3001 are read on the +21 Auxiliary Building just inside from the Q-deck.

Reference(s):

1. EC 48147 Attachment 10.002 SFPI Water Levels
2. OP-901-513 Spent Fuel Cooling Malfunction
3. OP-903-001 Technical Specification Surveillance Logs
4. NEI 99-01 AS2

Category: A – Abnormal Rad Levels / Rad Effluent

Subcategory: 2 – Irradiated Fuel Event

Initiating Condition: Spent fuel pool level **cannot** be restored to at least the top of the fuel racks for 60 minutes or longer

EAL:

AG2.1 General Emergency

Spent fuel pool level **cannot** be restored to at least 1 ft. (Level 3) on FS-ILI-3000(3001) for ≥ 60 min. (Note 1)

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded**.** The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Mode Applicability:

All

Definition(s):

None

Basis:

FS-ILI-3000(3001) read Level 1 as 1 ft. This corresponds to 21' MSL. The level as read on the instrument should be compared to the EAL criteria without adding any additional level.

This EAL addresses a significant loss of spent fuel pool inventory control and makeup capability leading to a prolonged uncovery of spent fuel. This condition will lead to fuel damage and a radiological release to the environment.

It is recognized that this IC would likely not be met until well after another General Emergency IC was met; however, it is included to provide classification diversity.

Post-Fukushima order EA-12-051 required the installation of reliable SFP level indication capable of identifying normal level (Level 1), SFP level 10 ft. above the top of the fuel racks (Level 2) and SFP level at the top of the fuel racks (Level 3) (ref. 1, 2).

Spent Fuel Pool Level indicators FS-ILI-3000 and 3001 are read on the +21 Auxiliary Building just inside from the Q-deck.

Reference(s):

1. EC 48147 Attachment 10.002 SFPI Water Levels
2. OP-901-513 Spent Fuel Cooling Malfunction
3. OP-903-001 Technical Specification Surveillance Logs
4. NEI 99-01 AG2

Category: A – Abnormal Rad Levels / Rad Effluent

Subcategory: 3 – Area Radiation Levels

Initiating Condition: Radiation levels that IMPEDE access to equipment necessary for normal plant operations, cooldown or shutdown

EAL:

AA3.1 Alert

Dose rate > 15 mR/hr in **EITHER** of the following areas:

- Control Room (ARM-IRE-5001)
- CAS (by survey)

Mode Applicability:

All

Definition(s):

IMPEDE(D) - Personnel access to a room or area is hindered to an extent that extraordinary measures are necessary to facilitate entry of personnel into the affected room/area (e.g., requiring use of protective equipment, such as SCBAs, that is **not** routinely employed).

Basis:

Areas that meet this threshold include the Control Room (CR) and the Central Alarm Station (CAS). The Control Room is monitored for excessive radiation by ARM-IRE-5001 (ref. 1). The CAS is included in this EAL because of its importance to permitting access to areas required to assure safe plant operations. There are no permanently installed area radiation monitors in CAS that may be used to assess this EAL threshold. Therefore, this threshold is evaluated using local radiation survey for this area.

This EAL addresses elevated radiation levels in certain plant rooms/areas sufficient to preclude or IMPEDE personnel from performing actions necessary to maintain normal plant operation, or to perform a normal plant cooldown and shutdown. As such, it represents an actual or potential substantial degradation of the level of safety of the plant. The Emergency Director should consider the cause of the rise in radiation levels and determine if another IC may be applicable.

Escalation of the emergency classification level would be via Recognition Category A, C or F ICs.

Reference(s):

1. W3-DBD-32, Radiation Monitoring System Design Basis Document
2. NEI 99-01 AA3

Category: A – Abnormal Rad Levels / Rad Effluent

Subcategory: 3 – Area Radiation Levels

Initiating Condition: Radiation levels that IMPEDE access to equipment necessary for normal plant operations, cooldown or shutdown

EAL:

AA3.2 Alert

An UNPLANNED event results in radiation levels that prohibit or IMPEDE access to **any** Table A-3 room or area (Note 5)

Note 5: If the equipment in the listed room or area was already inoperable or out-of-service before the event occurred, then **no** emergency classification is warranted.

Table A-3 Safe Operation & Shutdown Rooms/Areas

Room/Area	Mode
Turbine Building (all elevations and rooms)	1
Polisher Building (all elevations and rooms)	1
-4 RCA Letdown Valve Gallery	3
+21 RAB Switchgears A or B	3
-4 RCA Wing Area	4
-15 RCA Valve Gallery	4
-35 RCA Safeguard Rooms	4
+21 RAB Switchgears A or B	4

Mode Applicability:

1 – Power Operation, 3 – Hot Standby, 4 – Hot Shutdown

Definition(s):

IMPEDE(D) - Personnel access to a room or area is hindered to an extent that extraordinary measures are necessary to facilitate entry of personnel into the affected room/area (e.g., requiring use of protective equipment, such as SCBAs, that is **not** routinely employed).

UNPLANNED-. A parameter change or an event that is **not** 1) the result of an intended evolution or 2) an expected plant response to a transient. The cause of the parameter change or event may be known or unknown.

Basis:

This IC addresses elevated radiation levels in certain plant rooms/areas sufficient to preclude or IMPEDE personnel from performing actions necessary to maintain normal plant operation, or to perform a normal plant cooldown and shutdown. As such, it represents an actual or potential substantial degradation of the level of safety of the plant. The Emergency Director should consider the cause of the rise in radiation levels and determine if another IC may be applicable.

For AA3.2, an Alert declaration is warranted if entry into the affected room/area is, or may be, procedurally required during the plant operating mode in effect at the time of the elevated radiation levels. The emergency classification is not contingent upon whether entry is actually necessary at the time of the higher radiation levels. Access should be considered as IMPEDED if extraordinary measures are necessary to facilitate entry of personnel into the affected room/area (e.g., installing temporary shielding, requiring use of non-routine protective equipment, requesting an extension in dose limits beyond normal administrative limits).

An emergency declaration is **not** warranted if any of the following conditions apply:

- The plant is in an operating mode different than the mode specified for the affected room/area (i.e., entry is not required during the operating mode in effect at the time of the elevated radiation levels). For example, the plant is in Mode 1 when the radiation rise occurs, and the procedures used for normal operation, cooldown and shutdown do not require entry into the affected room until Mode 4.
- The higher radiation levels are a result of a planned activity that includes compensatory measures which address the temporary inaccessibility of a room or area (e.g., radiography, spent filter or resin transfer, etc.).
- The access control measures are of a conservative or precautionary nature, and would not actually prevent or IMPEDE a required action.

Escalation of the emergency classification level would be via Recognition Category A, C or F ICs.

If the equipment in the listed room or area was already inoperable, or out-of-service, before the event occurred, then no emergency should be declared since the event will have no adverse impact beyond that already allowed by Technical Specifications at the time of the event.

The list of plant rooms or areas with entry-related mode applicability identified specify those rooms or areas that contain equipment which require a manual/local action as specified in operating procedures used for normal plant operation, cooldown and shutdown. Rooms or areas in which actions of a contingent or emergency nature would be performed (e.g., an action to address an off-normal or emergency condition such as emergency repairs, corrective measures or emergency operations) are not included. In addition, the list specifies the plant mode(s) during which entry would be required for each room or area (ref. 1).

EAL AA3.2 mode applicability has been limited to the mode limitations of Table A-3.

Reference(s):

1. Attachment 3 Safe Operation & Shutdown Areas Tables A-3 & H-2 Bases
2. NEI 99-01 AA3

Category C – Cold Shutdown / Refueling System Malfunction

EAL Group: Cold Conditions (RCS temperature ≤ 200ºF); EALs in this category are applicable only in one or more cold operating modes.

Category C EALs are directly associated with cold shutdown or refueling system safety functions. Given the variability of plant configurations (e.g., systems out-of-service for maintenance, containment open, reduced AC power redundancy, time since shutdown) during these periods, the consequences of any given initiating event can vary greatly. For example, a loss of decay heat removal capability that occurs at the end of an extended outage has less significance than a similar loss occurring during the first week after shutdown. Compounding these events is the likelihood that instrumentation necessary for assessment may also be inoperable. The cold shutdown and refueling system malfunction EALs are based on performance capability to the extent possible with consideration given to RCS integrity, CONTAINMENT CLOSURE, and fuel clad integrity for the applicable operating modes (5 - Cold Shutdown, 6 - Refueling, DEF – Defueled).

The events of this category pertain to the following subcategories:

1. RCS Level

RCS water level is directly related to the status of adequate core cooling and, therefore, fuel clad integrity.

2. Loss of Safety Bus AC Power

Loss of plant electrical power can compromise plant SAFETY SYSTEM operability including decay heat removal and emergency core cooling systems which may be necessary to ensure fission product barrier integrity. This category includes loss of onsite and offsite power sources for 4160 VAC safety buses.

3. RCS Temperature

Uncontrolled or inadvertent temperature or pressure rises are indicative of a potential loss of safety functions.

4. Loss of Vital DC Power

Loss of emergency plant electrical power can compromise plant SAFETY SYSTEM operability including decay heat removal and emergency core cooling systems which may be necessary to ensure fission product barrier integrity. This category includes loss of power to or degraded voltage on the 125-Volt vital DC buses.

5. Loss of Communications

Certain events that degrade plant operator ability to effectively communicate with essential personnel within or external to the plant warrant emergency classification.

6. Hazardous Event Affecting SAFETY SYSTEMS

Certain hazardous natural and technological events may result in VISIBLE DAMAGE to or degraded performance of SAFETY SYSTEMS warranting classification.

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 1 – RCS Level

Initiating Condition: UNPLANNED loss of RCS inventory

EAL:

CU1.1 Unusual Event

UNPLANNED loss of reactor coolant results in RCS level less than a required lower limit for ≥ 15 min. (Note 1)

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Mode Applicability:

5 - Cold Shutdown, 6 - Refueling

Definition(s):

UNPLANNED-. A parameter change or an event that is **not** 1) the result of an intended evolution or 2) an expected plant response to a transient. The cause of the parameter change or event may be known or unknown.

Basis:

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 coolant leakage. Either of these conditions is considered to be a potential degradation of the level of safety of the plant.

Refueling evolutions that lower RCS water inventory are carefully planned and controlled. OP-001-003, Reactor Coolant System Drain Down, is used to capture required RCS water levels for plant conditions using RCS Level Control Requests sheets. An UNPLANNED event that results in water level lowering below a procedurally required limit warrants the declaration of an Unusual Event due to the reduced water inventory that is available to keep the core covered.

This EAL recognizes that the minimum required RCS level can change several times during the course of a refueling outage as different plant configurations and system lineups are implemented. This EAL is met if the minimum level, specified for the current plant conditions, cannot be maintained for 15 minutes or longer. The minimum level is typically specified in the applicable operating procedure but may be specified in another controlling document.

The 15-minute threshold duration allows sufficient time for prompt operator actions to restore and maintain the expected water level. This criterion excludes transient conditions causing a brief lowering of water level.

Continued loss of RCS inventory may result in escalation to the Alert emergency classification level via either IC CA1 or CA3.

Reference(s):

1. OP-001-003 Reactor Coolant System Drain Down
2. OI-040-000 Reactor Coolant System Leakage Monitoring
3. OP-901-111 Reactor Coolant System Leak
4. NEI 99-01 CU1

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 1 – RCS Level

Initiating Condition: UNPLANNED loss of RCS inventory

EAL:

CU1.2 Unusual Event

RCS level **cannot** be monitored

AND EITHER

- UNPLANNED rise in Containment Sump or Reactor Drain Tank level due to loss of RCS inventory
- Visual observation of UNISOLABLE RCS leakage

Mode Applicability:

5 - Cold Shutdown, 6 – Refueling

Definition(s):

UNISOLABLE - An open or breached system line that **cannot** be isolated, remotely or locally.

UNPLANNED-. A parameter change or an event that is **not** 1) the result of an intended evolution or 2) an expected plant response to a transient. The cause of the parameter change or event may be known or unknown.

Basis:

This IC 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 coolant leakage. Either of these conditions is considered to be a potential degradation of the level of safety of the plant.

Refueling evolutions that lower RCS water inventory are carefully planned and controlled. An UNPLANNED event that results in water level lowering below a procedurally required limit warrants the declaration of an Unusual Event due to the reduced water inventory that is available to keep the core covered.

This EAL addresses a condition where all means to determine RCS level have been lost. In this condition, operators may determine that an inventory loss is occurring by observing changes in sump and/or tank levels. Sump and/or tank level changes must be evaluated against other potential sources of water flow to ensure they are indicative of leakage from the RCS (ref. 1, 2).

Continued loss of RCS inventory may result in escalation to the Alert emergency classification level via either IC CA1 or CA3.

Reference(s):

1. OI-040-000 Reactor Coolant System Leakage Monitoring
2. OP-901-111 Reactor Coolant System Leak
3. NEI 99-01 CU1

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 1 – RCS Level

Initiating Condition: Significant loss of RCS inventory

EAL:

CA1.1 Alert

Loss of RCS inventory as indicated by RCS level < 13.46 ft.

Mode Applicability:

5 - Cold Shutdown, 6 – Refueling

Definition(s):

None

Basis:

13.46 ft. RCS level is at the elevation of the hot leg centerline. This is the minimum level for operation of Shutdown Cooling (ref. 1).

This IC 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). This condition represents a potential substantial reduction in the level of plant safety.

For this EAL, a lowering of RCS water level below the specified level indicates that operator actions have not been successful in restoring and maintaining reactor vessel/RCS water level. The heat-up rate of the coolant will rise as the available water inventory is reduced. A continuing drop in water level will lead to core uncovery.

Although related, this EAL is concerned with the loss of RCS inventory and **not** the potential concurrent effects on systems needed for decay heat removal (e.g., loss of a Residual Heat Removal suction point). A rise in RCS temperature caused by a loss of decay heat removal capability is evaluated under IC CA3.

If water level continues to lower, then escalation to Site Area Emergency would be via IC CS1.

Reference(s):

1. OP-901-131 Shutdown Cooling Malfunction
2. NEI 99-01 CA1

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 1 – RCS Level

Initiating Condition: Significant loss of RCS inventory

EAL:

CA1.2 Alert

RCS level **cannot** be monitored for ≥ 15 min. (Note 1)

AND EITHER

- UNPLANNED rise in Containment Sump or Reactor Drain Tank level due to loss of RCS inventory
- Visual observation of UNISOLABLE RCS leakage

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Mode Applicability:

5 - Cold Shutdown, 6 – Refueling

Definition(s):

UNISOLABLE - An open or breached system line that **cannot** be isolated, remotely or locally.

UNPLANNED - A parameter change or an event that is **not** 1) the result of an intended evolution or 2) an expected plant response to a transient. The cause of the parameter change or event may be known or unknown.

Basis:

This IC 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). This condition represents a potential substantial reduction in the level of plant safety.

For this EAL, the inability to monitor RCS level may be caused by instrumentation and/or power failures, or water level dropping below the range of available instrumentation. If water level cannot be monitored, operators may determine that an inventory loss is occurring by observing changes in sump and/or tank levels. Sump and/or tank level changes must be evaluated against other potential sources of water flow to ensure they are indicative of leakage from the RCS (ref. 1, 2).

The 15-minute duration for the loss of level indication was chosen because it is half of the EAL duration specified in IC CS1.

If the RCS inventory level continues to lower, then escalation to Site Area Emergency would be via IC CS1.

Reference(s):

1. OI-040-000 Reactor Coolant System Leakage Monitoring
2. OP-901-111 Reactor Coolant System Leak
3. NEI 99-01 CA1

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 1 – RCS Level

Initiating Condition: Loss of RCS inventory affecting core decay heat removal capability

EAL:

CS1.1 Site Area Emergency

CONTAINMENT CLOSURE **not** established

AND

RVLMS upper plenum 0%

Mode Applicability:

5 – Cold Shutdown, 6 – Refueling

Definition(s):

CONTAINMENT CLOSURE - The procedurally defined actions taken to secure containment and its associated structures, systems, and components as a functional barrier to fission product release under shutdown conditions. As applied to WF3, all Containment Penetrations are closed as described in the requirements of Technical Specifications section 3/4.9.4 Containment Building Penetrations and OP-010-006, Outage Operations.

IMMINENT - The trajectory of events or conditions is such that an EAL will be met within a relatively short period of time regardless of mitigation or corrective actions.

Basis:

This IC addresses a significant and prolonged loss of RCS inventory control and makeup capability leading to IMMINENT fuel damage. The lost inventory may be due to an RCS component failure, a loss of configuration control or prolonged boiling of reactor coolant. These conditions entail major failures of plant functions needed for protection of the public and thus warrant a Site Area Emergency declaration.

Following an extended loss of core decay heat removal and inventory makeup, decay heat will cause reactor coolant boiling and a further reduction in reactor vessel level. If RCS/reactor vessel level cannot be restored, fuel damage is probable.

Outage/shutdown contingency plans typically provide for re-establishing or verifying CONTAINMENT CLOSURE following a loss of heat removal or RCS inventory control functions.

This EAL addresses concerns raised by Generic Letter 88-17, *Loss of Decay Heat Removal*; SECY 91-283, *Evaluation of Shutdown and Low Power Risk Issues*; NUREG-1449, *Shutdown and Low-Power Operation at Commercial Nuclear Power Plants in the United States*; and NUMARC 91-06, *Guidelines for Industry Actions to Assess Shutdown Management*.

Escalation of the emergency classification level would be via IC CG1 or AG1.

Reference(s):

1. UFSAR Section 1.9A Inadequate Core Cooling Instrumentation
2. NEI 99-01 CS1

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 1 – RCS Level

Initiating Condition: Loss of RCS inventory affecting core decay heat removal capability

EAL:

CS1.2 Site Area Emergency

CONTAINMENT CLOSURE established

AND

Representative CETs indicate superheat

Mode Applicability:

5 – Cold Shutdown, 6 – Refueling

Definition(s):

CONTAINMENT CLOSURE - The procedurally defined actions taken to secure containment and its associated structures, systems, and components as a functional barrier to fission product release under shutdown conditions. As applied to WF3, all Containment Penetrations are closed as described in the requirements of Technical Specifications section 3/4.9.4 Containment Building Penetrations and OP-010-006, Outage Operations.

IMMINENT - The trajectory of events or conditions is such that an EAL will be met within a relatively short period of time regardless of mitigation or corrective actions.

Basis:

This IC addresses a significant and prolonged loss of RCS inventory control and makeup capability leading to IMMINENT fuel damage. The lost inventory may be due to an RCS component failure, a loss of configuration control or prolonged boiling of reactor coolant. These conditions entail major failures of plant functions needed for protection of the public and thus warrant a Site Area Emergency declaration.

Following an extended loss of core decay heat removal and inventory makeup, decay heat will cause reactor coolant boiling and a further reduction in reactor vessel level. If RCS/reactor vessel level cannot be restored, fuel damage is probable.

Outage/shutdown contingency plans typically provide for re-establishing or verifying CONTAINMENT CLOSURE following a loss of heat removal or RCS inventory control functions. The difference in the specified RCS parameters of EALs CS1.1 and CS1.2 reflect the fact that with CONTAINMENT CLOSURE established, there is a lower probability of a fission product release to the environment.

This EAL addresses concerns raised by Generic Letter 88-17, *Loss of Decay Heat Removal*; SECY 91-283, *Evaluation of Shutdown and Low Power Risk Issues*; NUREG-1449, *Shutdown and Low-Power Operation at Commercial Nuclear Power Plants in the United States*; and NUMARC 91-06, *Guidelines for Industry Actions to Assess Shutdown Management*.

Escalation of the emergency classification level would be via IC CG1 or AG1.

Superheated conditions in the core can only occur with core uncovery. Therefore superheated conditions, as indicated on representative CETs, is used as an indicator of reactor vessel level below the top of active fuel (ref. 1, 2).

Reference(s):

1. UFSAR Section 1.9A Inadequate Core Cooling Instrumentation
2. TG-OP-902-002 Technical Guide for Loss of Coolant Accident Recovery Procedure.
3. NEI 99-01 CS1

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 1 – RCS Level

Initiating Condition: Loss of RCS inventory affecting core decay heat removal capability

EAL:

CS1.3 Site Area Emergency

RCS level **cannot** be monitored for ≥ 30 min. (Note 1)

AND

Core uncovery is indicated by **any** of the following:

- UNPLANNED rise in Containment Sump or Reactor Drain Tank level of sufficient magnitude to indicate core uncovery
- Visual observation of UNISOLABLE RCS leakage of sufficient magnitude to indicate core uncovery
- Containment High Range Radiation Monitor (ARM-IRE-5400AS or BS) > 10 R/hr
- Erratic Source Range Monitor indication

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Mode Applicability:

5 – Cold Shutdown, 6 – Refueling

Definition(s):

IMMINENT - The trajectory of events or conditions is such that an EAL will be met within a relatively short period of time regardless of mitigation or corrective actions.

UNISOLABLE - An open or breached system line that **cannot** be isolated, remotely or locally.

UNPLANNED - A parameter change or an event that is **not** 1) the result of an intended evolution or 2) an expected plant response to a transient. The cause of the parameter change or event may be known or unknown.

Basis:

This IC addresses a significant and prolonged loss of RCS inventory control and makeup capability leading to IMMINENT fuel damage. The lost inventory may be due to an RCS component failure, a loss of configuration control or prolonged boiling of reactor coolant. These conditions entail major failures of plant functions needed for protection of the public and thus warrant a Site Area Emergency declaration.

Following an extended loss of core decay heat removal and inventory makeup, decay heat will cause reactor coolant boiling and a further reduction in reactor vessel level. If RCS/reactor vessel level cannot be restored, fuel damage is probable.

The 30-minute criterion is tied to a readily recognizable event start time (i.e., the total loss of ability to monitor level), and allows sufficient time to monitor, assess and correlate reactor and plant conditions to determine if core uncovery has actually occurred (i.e., to account for various accident progression and instrumentation uncertainties). It also allows sufficient time for performance of actions to terminate leakage, recover inventory control/makeup equipment and/or restore level monitoring.

The inability to monitor RCS level may be caused by instrumentation and/or power failures, or water level dropping below the range of available instrumentation. If water level cannot be monitored, operators may determine that an inventory loss is occurring by observing changes in sump and/or tank levels. Sump and/or tank level changes must be evaluated against other potential sources of water flow to ensure they are indicative of leakage from the RCS.

This EAL addresses concerns raised by Generic Letter 88-17, *Loss of Decay Heat Removal*; SECY 91-283, *Evaluation of Shutdown and Low Power Risk Issues*; NUREG-1449, *Shutdown and Low-Power Operation at Commercial Nuclear Power Plants in the United States*; and NUMARC 91-06, *Guidelines for Industry Actions to Assess Shutdown Management*.

Containment High Range Radiation Monitors ARM-IRE-5400AS and BS are the site-specific radiation monitors that would be indicative of possible core uncovery in the Refueling mode. The dose rate due to core shine when the top of the core becomes uncovered should result in dose rates > 10 R/hr.

Escalation of the emergency classification level would be via IC CG1 or AG1

Reference(s):

1. OI-040-000 Reactor Coolant System Leakage Monitoring
2. OP-901-111 Reactor Coolant System Leak
3. W3-DBD-32, Radiation Monitoring System Design Basis Document
4. NEI 99-01 CS1

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 1 – RCS Level

Initiating Condition: Loss of RCS inventory affecting fuel clad integrity with containment challenged

EAL:

CG1.1 General Emergency

Representative CETs indicate superheat for ≥ 30 min. (Note 1)

AND

Any Containment Challenge indication, Table C-1

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Note 6: If CONTAINMENT CLOSURE is re-established prior to exceeding the 30-minute time limit, declaration of a General Emergency is **not** required.

Table C-1 Containment Challenge Indications
• CONTAINMENT CLOSURE **not** established (Note 6) • Containment hydrogen concentration > 4% • UNPLANNED rise in containment pressure

Mode Applicability:

5 - Cold Shutdown, 6 – Refueling

Definition(s):

CONTAINMENT CLOSURE - The procedurally defined actions taken to secure containment and its associated structures, systems, and components as a functional barrier to fission product release under shutdown conditions. As applied to WF3, all Containment Penetrations are closed as described in the requirements of Technical Specifications section 3/4.9.4 Containment Building Penetrations and OP-010-006, Outage Operations.

IMMINENT - The trajectory of events or conditions is such that an EAL will be met within a relatively short period of time regardless of mitigation or corrective actions.

UNPLANNED - A parameter change or an event that is **not** 1) the result of an intended evolution or 2) an expected plant response to a transient. The cause of the parameter change or event may be known or unknown.

Basis:

This IC addresses the inability to restore and maintain reactor vessel level above the top of active fuel with containment challenged. This condition represents actual or IMMINENT substantial core degradation or melting with potential for loss of containment integrity. Releases can be reasonably expected to exceed EPA PAG exposure levels offsite for more than the immediate site area.

Following an extended loss of core decay heat removal and inventory makeup, decay heat will cause reactor coolant boiling and a further reduction in reactor vessel level. If RCS level cannot be restored, fuel damage is probable.

With CONTAINMENT CLOSURE not established, there is a high potential for a direct and unmonitored release of radioactivity to the environment. If CONTAINMENT CLOSURE is re-established prior to exceeding the 30-minute time limit, then declaration of a General Emergency is not required.

The existence of an explosive mixture means, at a minimum, that the containment atmospheric hydrogen concentration is sufficient to support a hydrogen burn (i.e., at the lower deflagration limit). A hydrogen burn will raise containment pressure and could result in collateral equipment damage leading to a loss of containment integrity. It therefore represents a challenge to Containment integrity.

In the early stages of a core uncovery event, it is unlikely that hydrogen buildup due to core uncovery could result in an explosive gas mixture in containment. If all installed hydrogen gas monitors are out-of-service during an event leading to fuel cladding damage, it may **not** be possible to obtain a containment hydrogen gas concentration reading as ambient conditions within the containment will preclude personnel access. During periods when installed containment hydrogen gas monitors are out-of-service, operators may use the other listed indications to assess whether or **not** containment is challenged.

This EAL addresses concerns raised by Generic Letter 88-17, *Loss of Decay Heat Removal*; SECY 91-283, *Evaluation of Shutdown and Low Power Risk Issues*; NUREG-1449, *Shutdown and Low-Power Operation at Commercial Nuclear Power Plants in the United States*; and NUMARC 91-06, *Guidelines for Industry Actions to Assess Shutdown Management*.

Superheated conditions in the core can only occur with core uncovery. Therefore superheated conditions, as indicated on representative CETs, is used as an indicator of reactor vessel level below the top of active fuel (ref. 1).

Reference(s):

1. TG-OP-902-002 Technical Guide for Loss of Coolant Accident Recovery Procedure.
2. Technical Specifications section 3/4.9.4 Containment Building Penetrations
3. UFSAR Section 6.2.5.5 Instrumentation Requirements
4. NEI 99-01 CG1

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 1 – RCS Level

Initiating Condition: Loss of RCS inventory affecting fuel clad integrity with containment challenged

EAL:

CG1.2 General Emergency

RCS level **cannot** be monitored for ≥ 30 min. (Note 1)

AND

Core uncovery is indicated by **any** of the following:

- UNPLANNED rise in Containment Sump or Reactor Drain Tank level of sufficient magnitude to indicate core uncovery
- Visual observation of UNISOLABLE RCS leakage of sufficient magnitude to indicate core uncovery
- Containment High Range Radiation Monitor (ARM-IRE-5400AS or BS) > 10 R/hr
- Erratic Source Range Monitor indication

AND

Any Containment Challenge indication, Table C-1

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Note 6: If CONTAINMENT CLOSURE is re-established prior to exceeding the 30-minute time limit, declaration of a General Emergency is **not** required.

Table C-1 Containment Challenge Indications
• CONTAINMENT CLOSURE **not** established (Note 6) • Containment hydrogen concentration > 4% • UNPLANNED rise in containment pressure

Mode Applicability:

5 - Cold Shutdown, 6 – Refueling

Definition(s):

CONTAINMENT CLOSURE - The procedurally defined actions taken to secure containment and its associated structures, systems, and components as a functional barrier to fission product release under shutdown conditions. As applied to WF3, all Containment Penetrations are closed as described in the requirements of Technical Specifications section 3/4.9.4 Containment Building Penetrations and OP-010-006, Outage Operations.

IMMINENT - The trajectory of events or conditions is such that an EAL will be met within a relatively short period of time regardless of mitigation or corrective actions.

UNISOLABLE - An open or breached system line that **cannot** be isolated, remotely or locally.

UNPLANNED - A parameter change or an event that is **not** 1) the result of an intended evolution or 2) an expected plant response to a transient. The cause of the parameter change or event may be known or unknown.

Basis:

This IC addresses the inability to restore and maintain reactor vessel level above the top of active fuel with containment challenged. This condition represents actual or IMMINENT substantial core degradation or melting with potential for loss of containment integrity. Releases can be reasonably expected to exceed EPA PAG exposure levels offsite for more than the immediate site area.

Following an extended loss of core decay heat removal and inventory makeup, decay heat will cause reactor coolant boiling and a further reduction in reactor vessel level. If RCS level cannot be restored, fuel damage is probable.

With CONTAINMENT CLOSURE not established, there is a high potential for a direct and unmonitored release of radioactivity to the environment. If CONTAINMENT CLOSURE is re-established prior to exceeding the 30-minute time limit, then declaration of a General Emergency is not required.

The existence of an explosive mixture means, at a minimum, that the containment atmospheric hydrogen concentration is sufficient to support a hydrogen burn (i.e., at the lower deflagration limit). A hydrogen burn will raise containment pressure and could result in collateral equipment damage leading to a loss of containment integrity. It therefore represents a challenge to Containment integrity.

In the early stages of a core uncovery event, it is unlikely that hydrogen buildup due to core uncovery could result in an explosive gas mixture in containment. If all installed hydrogen gas monitors are out-of-service during an event leading to fuel cladding damage, it may not be possible to obtain a containment hydrogen gas concentration reading as ambient conditions within the containment will preclude personnel access. During periods when installed containment hydrogen gas monitors are out-of-service, operators may use the other listed indications to assess whether or not containment is challenged.

The 30-minute criterion is tied to a readily recognizable event start time (i.e., the total loss of ability to monitor level), and allows sufficient time to monitor, assess and correlate reactor and plant conditions to determine if core uncovery has actually occurred (i.e., to account for various accident progression and instrumentation uncertainties). It also allows sufficient time for performance of actions to terminate leakage, recover inventory control/makeup equipment and/or restore level monitoring.

The inability to monitor RCS level may be caused by instrumentation and/or power failures, or water level dropping below the range of available instrumentation. If water level cannot be monitored, operators may determine that an inventory loss is occurring by observing changes in sump and/or tank levels. Sump and/or tank level changes must be evaluated against other potential sources of water flow to ensure they are indicative of leakage from the RCS.

Containment High Range Radiation Monitors ARM-IRE-5400AS and BS are the site-specific radiation monitors that would be indicative of possible core uncovery in the Refueling mode. The dose rate due to core shine when the top of the core becomes uncovered should result in dose rates > 10 R/hr.

This EAL addresses concerns raised by Generic Letter 88-17, *Loss of Decay Heat Removal*; SECY 91-283, *Evaluation of Shutdown and Low Power Risk Issues*; NUREG-1449, *Shutdown and Low-Power Operation at Commercial Nuclear Power Plants in the United States*; and NUMARC 91-06, *Guidelines for Industry Actions to Assess Shutdown Management*.

Reference(s):

1. OI-040-000 Reactor Coolant System Leakage Monitoring
2. OP-901-111 Reactor Coolant System Leak
3. W3-DBD-32, Radiation Monitoring System Design Basis Document
4. Technical Specifications section 3/4.9.4 Containment Building Penetrations
5. UFSAR Section 6.2.5.5 Instrumentation Requirements
6. NEI 99-01 CG1

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 2 – Loss of Safety Bus AC Power

Initiating Condition: Loss of **all but one** AC power source to safety buses for 15 minutes or longer

EAL:

CU2.1 Unusual Event

AC power capability, Table C-2, to 4160 VAC safety buses 3A and 3B reduced to a single power source for ≥ 15 min. (Note 1)

AND

Any additional single power source failure will result in loss of **all** AC power to SAFETY SYSTEMS

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Table C-2 AC Power Sources	
Onsite	• Emergency Diesel Generator A • Emergency Diesel Generator B • Temporary Emergency Diesels (TEDs) (if already aligned)
Offsite	• Startup Transformer 3A • Startup Transformer 3B • Unit Auxiliary Transformer 3A (when back-fed from offsite) • Unit Auxiliary Transformer 3B (when back-fed from offsite)

Mode Applicability:

5 - Cold Shutdown, 6 – Refueling, DEF - Defueled

Definition(s):

SAFETY SYSTEM - A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related (as defined in 10 CFR 50.2):

Those structures, systems and components that are relied upon to remain functional during and following design basis events to assure:

(1) The integrity of the reactor coolant pressure boundary;

(2) The capability to shut down the reactor and maintain it in a safe shutdown condition;

(3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures.

Basis:

This IC 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. In this condition, the sole AC power source may be powering one, or more than one, train of safety-related equipment.

When in the cold shutdown, refueling, or defueled mode, this condition is not classified as an Alert because of the greater time available to restore another power source to service. Additional time is available due to the reduced core decay heat load, and the lower temperatures and pressures in various plant systems. Thus, when in these modes, this condition is considered to be a potential degradation of the level of safety of the plant.

An “AC power source” is a source recognized in AOPs and EOPs, and capable of supplying required power to a safety bus. Some examples of this condition are presented below.

- A loss of all offsite power with a concurrent failure of one emergency power source (e.g., an onsite diesel generator).
- A loss of all offsite power and loss of all emergency power sources (e.g., onsite diesel generators) with a single train of safety buses being fed from TEDs.
- A loss of emergency power sources (e.g., onsite diesel generators) with a train of safety buses being fed from a single offsite power source (Startup Transformer).

Fifteen minutes was selected as a threshold to exclude transient or momentary losses of power.

The subsequent loss of the remaining single power source would escalate the event to an Alert in accordance with IC CA2.

Temporary Emergency Diesels (TEDs) can be credited if already installed in accordance with site procedures (ref. 5, 6).

This EAL is the cold condition equivalent of the hot condition EAL SA1.1.

Reference(s):

1. UFSAR Section 8.1, Onsite Power System
2. UFSAR Section 8.2, Offsite Power System
3. OP-901-310 Loss of Train A Safety Bus
4. OP-901-311 Loss of Train B Safety Bus
5. Technical Specifications 3/4.8.1 A.C. Sources
6. ME-001-012 Temporary Power from Temporary Diesel for 3A2 and 3B2 4KV Buses (Modes 1-6).
7. NEI 99-01 CU2

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 2 – Loss of Safety Bus AC Power

Initiating Condition: Loss of **all** offsite and **all** onsite AC power to safety buses for 15 minutes or longer

EAL:

CA2.1 Alert

Loss of **all** offsite and **all** onsite AC power to 4160 VAC safety buses 3A and 3B for ≥ 15 min. (Note 1)

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Mode Applicability:

5 - Cold Shutdown, 6 - Refueling, DEF - Defueled

Definition(s):

SAFETY SYSTEM - A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related (as defined in 10 CFR 50.2):

Those structures, systems and components that are relied upon to remain functional during and following design basis events to assure:

(1) The integrity of the reactor coolant pressure boundary;

(2) The capability to shut down the reactor and maintain it in a safe shutdown condition;

(3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures.

Basis:

This IC addresses a total loss of AC power that compromises the performance of all SAFETY SYSTEMS requiring electric power including those necessary for emergency core cooling, containment heat removal/pressure control, spent fuel heat removal and the ultimate heat sink. Mitigative strategies using non-safety related power sources (FLEX generators, etc.) may be effective in supplying power to these buses. These power sources must be controlled in accordance with abnormal or emergency operating procedures, or beyond design basis accident response guidelines (e.g., FLEX support guidelines) and must be capable (alone or in combination) of supplying power for long term decay heat removal systems.

When in the cold shutdown, refueling, or defueled mode, this condition is not classified as a Site Area Emergency because of the greater time available to restore a safety bus to service. Additional time is available due to the reduced core decay heat load, and the lower temperatures and pressures in various plant systems. Thus, when in these modes, this condition represents an actual or potential substantial degradation of the level of safety of the plant.

Fifteen minutes was selected as a threshold to exclude transient or momentary power losses.

Escalation of the emergency classification level would be via IC CS1 or AS1.

Temporary Emergency Diesels (TEDs) can be credited if already installed in accordance with site procedures (ref. 5, 6).

This EAL is the cold condition equivalent of the hot condition EAL SS1.1.

Reference(s):

1. UFSAR Section 8.1, Onsite Power System
2. UFSAR Section 8.2, Offsite Power System
3. OP-901-310 Loss of Train A Safety Bus
4. OP-901-311 Loss of Train B Safety Bus
5. Technical Specifications 3/4.8.1 A.C. Sources
6. ME-001-012, Temporary Power from Temporary Diesel for 3A2 and 3B2 4KV Buses (Modes 1-6)
7. NEI 99-01 CU2

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 3 – RCS Temperature

Initiating Condition: UNPLANNED rise in RCS temperature

EAL:

CU3.1	**Unusual Event**
UNPLANNED rise in RCS temperature to > 200°F	

Mode Applicability:

5 - Cold Shutdown, 6 - Refueling

Definition(s):

CONTAINMENT CLOSURE - The procedurally defined actions taken to secure containment and its associated structures, systems, and components as a functional barrier to fission product release under shutdown conditions. As applied to WF3, all Containment Penetrations are closed as described in the requirements of Technical Specifications section 3/4.9.4 Containment Building Penetrations and OP-010-006, Outage Operations.

UNPLANNED - A parameter change or an event that is **not** 1) the result of an intended evolution or 2) an expected plant response to a transient. The cause of the parameter change or event may be known or unknown.

Basis:

This IC addresses an UNPLANNED rise in RCS temperature above the Technical Specification cold shutdown temperature limit and represents a potential degradation of the level of safety of the plant. If the RCS is not intact and CONTAINMENT CLOSURE is not established during this event, the Emergency Director should also refer to EAL CA3.1.

A momentary UNPLANNED excursion above the Technical Specification cold shutdown temperature limit when the heat removal function is available does not warrant a classification.

This EAL involves a loss of decay heat removal capability, or an addition of heat to the RCS in excess of that which can currently be removed, such that reactor coolant temperature cannot be maintained below the cold shutdown temperature limit specified in Technical Specifications. During this condition, there is no immediate threat of fuel damage because the core decay heat load has been reduced since the cessation of power operation.

During an outage, the level in the reactor vessel will normally be maintained at or above the reactor vessel flange. Refueling evolutions that lower water level below the reactor vessel flange are carefully planned and controlled. A loss of forced decay heat removal at lowered inventory may result in a rapid rise in reactor coolant temperature depending on the time after shutdown.

Escalation to Alert would be via IC CA1 based on an inventory loss or IC CA3 based on exceeding plant configuration-specific time criteria.

Reference(s):

1. Technical Specifications Table 1.2
2. OP-901-131 Shutdown Cooling Malfunction
3. NEI 99-01 CU3

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 3 – RCS Temperature

Initiating Condition: UNPLANNED rise in RCS temperature

EAL:

CU3.2 Unusual Event

Loss of **all** RCS temperature and RCS level indication for ≥ 15 min. (Note 1)

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Mode Applicability:

5 - Cold Shutdown, 6- Refueling

Definition(s):

CONTAINMENT CLOSURE - The procedurally defined actions taken to secure containment and its associated structures, systems, and components as a functional barrier to fission product release under shutdown conditions. As applied to WF3, all Containment Penetrations are closed as described in the requirements of Technical Specifications section 3/4.9.4 Containment Building Penetrations and OP-010-006, Outage Operations.

Basis:

This EAL addresses the inability to determine RCS temperature and level, and represents a potential degradation of the level of safety of the plant. If the RCS is not intact and CONTAINMENT CLOSURE is not established during this event, the Emergency Director should also refer to EAL CA3.1.

This EAL reflects a condition where there has been a significant loss of instrumentation capability necessary to monitor RCS conditions and operators would be unable to monitor key parameters necessary to assure core decay heat removal. During this condition, there is no immediate threat of fuel damage because the core decay heat load has been reduced since the cessation of power operation.

Fifteen minutes was selected as a threshold to exclude transient or momentary losses of indication.

Escalation to Alert would be via IC CA1 based on an inventory loss or IC CA3 based on exceeding plant configuration-specific time criteria.

Reference(s):

1. Technical Specifications Table 1.2
2. OP-901-131 Shutdown Cooling Malfunction
3. OP-001-005 RCS Drain and Fill Below RCS Hot Leg Centerline
4. NEI 99-01 CU3

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 3 – RCS Temperature

Initiating Condition: Inability to maintain plant in cold shutdown

EAL:

CA3.1 Alert

UNPLANNED rise in RCS temperature to > 200°F for > Table C-3 duration (Note 1)

OR

UNPLANNED RCS pressure rise > 10 psia (this EAL does **not** apply during water-solid plant conditions)

Note 1: The Emergency Director should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Table C-3 RCS Heat-up Duration Thresholds

RCS Status	CONTAINMENT CLOSURE Status	Heat-up Duration
Intact (but **not** lowered inventory) (< 20 ft MSL)	N/A	60 min.*
Not intact **OR** lowered inventory (< 20 ft MSL)	established	20 min.*
	not established	0 min.

* If an RCS heat removal system is in operation within this time frame and RCS temperature is being reduced, the EAL is **not** applicable.

Mode Applicability:

5 - Cold Shutdown, 6 – Refueling

Definition(s):

CONTAINMENT CLOSURE - The procedurally defined actions taken to secure containment and its associated structures, systems, and components as a functional barrier to fission product release under shutdown conditions. As applied to WF3, all Containment Penetrations are closed as described in the requirements of Technical Specifications section 3/4.9.4 Containment Building Penetrations and OP-010-006, Outage Operations.

UNPLANNED-. A parameter change or an event that is **not** 1) the result of an intended evolution or 2) an expected plant response to a transient. The cause of the parameter change or event may be known or unknown.

Basis:

In the absence of reliable RCS temperature indication, classification should be based on the RCS pressure rise criteria when the RCS is intact in Mode 5 or based on time to boil data when in Mode 6 or the RCS is not intact in Mode 5 (ref. 2).

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. Either condition represents an actual or potential substantial degradation of the level of safety of the plant.

A momentary UNPLANNED excursion above the Technical Specification cold shutdown temperature limit when the heat removal function is available does not warrant a classification.

The RCS Heat-up Duration Thresholds table addresses a rise in RCS temperature when CONTAINMENT CLOSURE is established but the RCS is not intact, or RCS inventory is reduced (e.g., lowered inventory). The 20-minute criterion was included to allow time for operator action to address the temperature rise.

The RCS Heat-up Duration Thresholds table also addresses a rise in RCS temperature with the RCS intact. The status of CONTAINMENT CLOSURE is not crucial in this condition since the intact RCS is providing a high pressure barrier to a fission product release. The 60-minute time frame should allow sufficient time to address the temperature rise without a substantial degradation in plant safety.

Finally, in the case where there is a rise in RCS temperature, the RCS is not intact or is at lowered inventory, and CONTAINMENT CLOSURE is not established, no heat-up duration is allowed (i.e., 0 minutes). This is because 1) the evaporated reactor coolant may be released directly into the containment atmosphere and subsequently to the environment, and 2) there is reduced reactor coolant inventory above the top of irradiated fuel.

The RCS pressure rise threshold provides a pressure-based indication of RCS heat-up in the absence of RCS temperature monitoring capability.

Escalation of the emergency classification level would be via IC CS1 or AS1.

Reference(s):

1. Technical Specifications Table 1.2
2. OP-901-131 Shutdown Cooling Malfunction
3. OP-001-003 Reactor Coolant System Drain Down
4. NEI 99-01 CA3

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 4 – Loss of Vital DC Power

Initiating Condition: Loss of Vital DC power for 15 minutes or longer

EAL:

CU4.1	**Unusual Event**
Indicated voltage is < 108 VDC on required vital DC buses for ≥ 15 min. (Note 1)	

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Mode Applicability:

5 - Cold Shutdown, 6 - Refueling

Definition(s):

SAFETY SYSTEM - A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related (as defined in 10 CFR 50.2):

Those structures, systems and components that are relied upon to remain functional during and following design basis events to assure:

(1) The integrity of the reactor coolant pressure boundary;

(2) The capability to shut down the reactor and maintain it in a safe shutdown condition;

(3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures.

Basis

This IC addresses a loss of vital DC power which compromises the ability to monitor and control operable SAFETY SYSTEMS when the plant is in the cold shutdown or refueling mode. In these modes, the core decay heat load has been significantly reduced, and coolant system temperatures and pressures are lower; these conditions raise the time available to restore a vital DC bus to service. Thus, this condition is considered to be a potential degradation of the level of safety of the plant.

As used in this EAL, “required” means the 3A-DC, 3B-DC or 3AB-DC buses necessary to support operation of the in-service, or operable, train or trains of SAFETY SYSTEM equipment. For example, if Train A is out-of-service (inoperable) for scheduled outage maintenance work and Train B is in-service (operable), then a loss of vital DC power affecting Train B would require the declaration of an Unusual Event. A loss of vital DC power to Train A would not warrant an emergency classification.

Fifteen minutes was selected as a threshold to exclude transient or momentary power losses.

Depending upon the event, escalation of the emergency classification level would be via IC CA1 or CA3, or an IC in Recognition Category A.

Less than 108 VDC bus voltage is based on the minimum bus voltage necessary for the operation of safety related equipment (ref. 1, 2, 3). Technical Specifications section 3/4.8.2.2 D.C. Sources - Shutdown, specifies “required” DC buses (associated station batteries and battery chargers) while in cold conditions (ref. 4).

This EAL is the cold condition equivalent of the hot condition EAL SS2.1.

Reference(s):

1. ECE91-058 Battery 3A-S “A” Train Calculation for Station Blackout
2. ECE91-059 Battery 3B-S “B” Train Calculation for Station Blackout
3. ECE91-060 Battery 3AB-S Calculation for Station Blackout
4. Technical Specifications section 3/4.8.2.2 D.C. Sources - Shutdown
5. NEI 99-01 CU4

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 5 – Loss of Communications

Initiating Condition: Loss of **all** onsite or offsite communications capabilities

EAL:

CU5.1 Unusual Event

Loss of **all** Table C-4 onsite communication methods

OR

Loss of **all** Table C-4 State and local agency communication methods

OR

Loss of **all** Table C-4 NRC communication methods

Table C-4 Communication Methods

System	Onsite	State/ Local	NRC
Telephone System	X	X	X
Operational Hotline		X	
Plant Radio System (O&M)	X		
Plant Paging System	X		
Sound Powered Phone System	X		
Civil Defense Radio System		X	
Satellite Phones		X	X
Emergency Notification System (ENS)			X

Mode Applicability:

5 - Cold Shutdown, 6 - Refueling, DEF – Defueled

Definition(s):

None

Basis:

This IC addresses a significant loss of on-site or offsite communications capabilities. While not a direct challenge to plant or personnel safety, this event warrants prompt notifications to State and local agencies and the NRC.

This IC should be assessed only when extraordinary means are being utilized to make communications possible (e.g., use of non-plant, privately owned equipment, relaying of on-site information via individuals or multiple radio transmission points, individuals being sent to offsite locations, etc.).

The first EAL condition addresses a total loss of the communications methods used in support of routine plant operations.

The second EAL condition addresses a total loss of the communications methods used to notify all State and local agencies of an emergency declaration. The State and local agencies referred to here are the St. Charles Parish Department of Homeland Security and Emergency Preparedness, St. Charles Parish Sheriff's Department 911 Center, St. John the Baptist Parish Office of Emergency Preparedness, St. John the Baptist Parish Sheriff's Department 911 Center, Louisiana Department of Environmental Quality and the Louisiana Governor's Office of Homeland Security and Emergency Preparedness. The third EAL condition addresses a total loss of the communications methods used to notify the NRC of an emergency declaration.

This EAL is the cold condition equivalent of the hot condition EAL SU7.1.

Reference(s):

1. EP-003-070 Emergency Communications Systems
2. Waterford 3 SES Emergency Plan Section 7.5 Communications Systems
3. NEI 99-01 CU5

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 6 – Hazardous Event Affecting Safety Systems

Initiating Condition: Hazardous event affecting SAFETY SYSTEMS needed for the current operating mode

EAL:

CA6.1 Alert

The occurrence of **any** Table C-5 hazardous event

AND

Event damage has caused indications of degraded performance on one train of a SAFETY SYSTEM needed for the current operating mode

AND EITHER:

- Event damage has caused indications of degraded performance to the second train of the SAFETY SYSTEM needed for the current operating mode
- Event damage has resulted in VISIBLE DAMAGE to the second train of the SAFETY SYSTEM needed for the current operating mode

(Notes 10, 11)

Note 10: If the affected SAFETY SYSTEM train was already inoperable or out of service before the hazardous event occurred, then emergency classification is **not** warranted.

Note 11: If the hazardous event **only** resulted in VISIBLE DAMAGE, with **no** indications of degraded performance to at least one train of a SAFETY SYSTEM, then this emergency classification is **not** warranted.

Table C-5 Hazardous Events
• Seismic event (earthquake) • Internal or external FLOODING event • High winds or tornado strike • FIRE • EXPLOSION • Other events with similar hazard characteristics as determined by the Shift Manager

Mode Applicability:

5 - Cold Shutdown, 6 - Refueling

Definition(s):

EXPLOSION - A rapid, violent and catastrophic failure of a piece of equipment due to combustion, chemical reaction or overpressurization. A release of steam (from high energy lines or components) or an electrical component failure (caused by short circuits, grounding, arcing, etc.) should **not** automatically be considered an explosion. Such events require a post-event inspection to determine if the attributes of an explosion are present.

FIRE - Combustion characterized by heat and light. Sources of smoke such as slipping drive belts or overheated electrical equipment do **not** constitute fires. Observation of flame is preferred but is **not** required if large quantities of smoke and heat are observed.

FLOODING - A condition where water is entering a room or area faster than installed equipment is capable of removal, resulting in a rise of water level within the room or area.

SAFETY SYSTEM - A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related (as defined in 10 CFR 50.2):

Those structures, systems and components that are relied upon to remain functional during and following design basis events to assure:

(1) The integrity of the reactor coolant pressure boundary;

(2) The capability to shut down the reactor and maintain it in a safe shutdown condition;

(3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures.

VISIBLE DAMAGE - Damage to a SAFETY SYSTEM train that is readily observable without measurements, testing, or analysis. The visual impact of the damage is sufficient to cause concern regarding the operability or reliability of the affected SAFETY SYSTEM train.

Basis:

This IC addresses a hazardous event that causes damage to SAFETY SYSTEMS needed for the current operating mode. In order to provide the appropriate context for consideration of an ALERT classification, the hazardous event must have caused indications of degraded SAFETY SYSTEM performance in one train, and there must be either indications of performance issues with the second SAFETY SYSTEM train or VISIBLE DAMAGE to the second train such that the potential exists for this second SAFETY SYSTEM train to have performance issues. In other words, in order for this EAL to be classified, the hazardous event must occur, at least one SAFETY SYSTEM train must have indications of degraded performance, and the second SAFETY SYSTEM train must have indications of degraded performance or VISIBLE DAMAGE such that the potential exists for performance issues. Note that this second SAFETY SYSTEM train is from the same SAFETY SYSTEM that has indications of degraded performance; commercial nuclear power plants are designed to be able to support single system issues without compromising public health and safety from radiological events.

Indications of degraded performance addresses damage to a SAFETY SYSTEM train that is in service/operation since indications for it will be readily available. The indications of degraded performance should be significant enough to cause concern regarding the operability or reliability of the SAFETY SYSTEM train.

VISIBLE DAMAGE addresses damage to a SAFETY SYSTEM train that is not in service/operation and that potentially could cause performance issues. Operators will make this determination based on the totality of available event and damage report information. This is intended to be a brief assessment not requiring lengthy analysis or quantification of the damage. This VISIBLE DAMAGE should be significant enough to cause concern regarding the operability or reliability of the SAFETY SYSTEM train.

Escalation of the emergency classification level would be via IC CS1 or AS1.

This EAL is the cold condition equivalent of the hot condition EAL SA9.1.

Reference(s):

1. EP FAQ 2016-002
2. NEI 99-01 CA6

Category E – Independent Spent Fuel Storage Installation (ISFSI)

EAL Group: ANY (EALs in this category are applicable to any plant condition, hot or cold.)

An independent spent fuel storage installation (ISFSI) is a complex that is designed and constructed for the interim storage of spent nuclear fuel and other radioactive materials associated with spent fuel storage. A significant amount of the radioactive material contained within a canister must escape its packaging and enter the biosphere for there to be a significant environmental effect resulting from an accident involving the dry storage of spent nuclear fuel.

An Unusual Event is declared on the basis of the occurrence of an event of sufficient magnitude that a loaded cask CONFINEMENT BOUNDARY is damaged or violated.

The WF3 ISFSI is located wholly within the plant PROTECTED AREA. Therefore any security event related to the ISFSI is classified under Category H1 security event related EALs.

Category: E - ISFSI

Subcategory: ISFSI

Initiating Condition: Damage to a loaded cask CONFINEMENT BOUNDARY

EAL:

EU1.1 Unusual Event

Damage to a loaded cask CONFINEMENT BOUNDARY as indicated by an on-contact radiation reading on the surface of a loaded spent fuel cask > **any** Table E-1 dose rate limit.

Table E-1 ISFSI Dose Rate Limits
HI-STORM (Note E)
126 mrem/hr Total Dose Rate Point A
338 mrem/hr Total Dose Rate Point B
326 mrem/hr Total Dose Rate Point C
60 mrem/hr Total Dose Rate Point D
60 mrem/hr Total Dose Rate Point E
374 mrem/hr Total Dose Rate Point F
136 mrem/hr Total Dose Rate Point G

NOTE E: Survey points are described in DFS-007-003, Radiation Monitoring Requirements for Loading and Storage HI-STORM.

Mode Applicability:

All

Definition(s):

CONFINEMENT BOUNDARY- The barrier(s) between spent fuel and the environment once the spent fuel is processed for dry storage. The cask confinement boundary is considered the Multi-Purpose Canister (MPC) for the HI-STORM 100 dry storage system.

INDEPENDENT SPENT FUEL STORAGE INSTALLATION (ISFSI): A complex that is designed and constructed for the interim storage of spent nuclear fuel and other radioactive materials associated with spent fuel storage.

Basis:

This IC addresses an event that results in damage to the CONFINEMENT BOUNDARY of a storage cask containing spent fuel. It applies to irradiated fuel that is licensed for dry storage beginning at the point that the loaded storage cask is sealed. The issues of concern are the creation of a potential or actual release path to the environment, degradation of one or more fuel assemblies due to environmental factors, and configuration changes which could cause challenges in removing the cask or fuel from storage.

The existence of "damage" is determined by radiological survey. The specified EAL threshold values correspond to 2 times the cask technical specification values (ref. 1, 2). The technical specification (licensing bases document) multiple of "2 times", which is also used in Recognition Category A IC AU1, is used here to distinguish between non-emergency and emergency conditions. The emphasis for this classification is the degradation in the level of safety of the spent fuel cask and not the magnitude of the associated dose or dose rate. It is recognized that in the case of extreme damage to a loaded cask, the fact that the "on-contact" dose rate limit is exceeded may be determined based on measurement of a dose rate at some distance from the cask.

Security-related events for ISFSIs are covered under ICs HU1 and HA1.

Reference(s):

1. UFSAR Section 9.1.5 Spent Fuel Dry Cask Storage
2. Holtec International Final Safety Analysis Report for the HI-STORM 100 Cask System – Holtec Report No.: HI-2002444
3. DFS-007-003 Radiation Monitoring Requirements for Loading and Storage HI-STORM
4. NEI 99-01 E-HU1

Category F – Fission Product Barrier Degradation

EAL Group: Hot Conditions (RCS temperature > 200ºF); EALs in this category are applicable only in one or more hot operating modes.

EALs in this category represent threats to the defense in depth design concept that precludes the release of highly radioactive fission products to the environment. This concept relies on multiple physical barriers any one of which, if maintained intact, precludes the release of significant amounts of radioactive fission products to the environment. The primary fission product barriers are:

A. Fuel Clad Barrier (FCB): The Fuel Clad Barrier consists of the cladding material that contains the fuel pellets.

B. Reactor Coolant System Barrier (RCB): The RCS Barrier includes the RCS primary side and its connections up to and including the pressurizer safety and relief valves, and other connections up to and including the primary isolation valves.

C. Containment Barrier (CNB): The Containment Barrier includes the containment building and connections up to and including the outermost containment isolation valves. This barrier also includes the main steam, feedwater, and blowdown line extensions outside the containment building up to and including the outermost secondary side isolation valve. Containment Barrier thresholds are used as criteria for escalation of the Emergency Classification Level (ECL) from an Alert to a Site Area Emergency or a General Emergency.

The EALs in this category require evaluation of the loss and potential loss thresholds listed in the fission product barrier matrix of Table F-1. “Loss” and “Potential Loss” signify the relative damage and threat of damage to the barrier. “Loss” means the barrier no longer assures containment of radioactive materials. “Potential Loss” means integrity of the barrier is threatened and could be lost if conditions continue to degrade. The number of barriers that are lost or potentially lost and the following criteria determine the appropriate emergency classification level:

Alert:
Any loss or any potential loss of either Fuel Clad or RCS Barrier

Site Area Emergency:
Loss or potential loss of any two barriers

General Emergency:
Loss of any two barriers and loss or potential loss of third barrier

The logic used for emergency classification based on fission product barrier monitoring should reflect the following considerations:

- The Fuel Clad Barrier and the RCS Barrier are weighted more heavily than the Containment Barrier.
- Unusual Event ICs associated with RCS and Fuel Clad Barriers are addressed under System Malfunction ICs.
- For accident conditions involving a radiological release, evaluation of the fission product barrier thresholds will need to be performed in conjunction with dose assessments to ensure correct and timely escalation of the emergency classification. For example, an evaluation of the fission product barrier thresholds may result in a Site Area Emergency classification while a dose assessment may indicate that an EAL for General Emergency IC AG1 has been exceeded.
- The fission product barrier thresholds specified within a scheme reflect plant-specific WF3 design and operating characteristics.
- As used in this category, the term RCS leakage encompasses not just those types defined in Technical Specifications but also includes the loss of RCS mass to any location– inside the containment, an interfacing system, or outside of the containment. The release of liquid or steam mass from the RCS due to the as-designed/expected operation of a relief valve is not considered to be RCS leakage.
- At the Site Area Emergency level, EAL users should maintain cognizance of how far present conditions are from meeting a threshold that would require a General Emergency declaration. For example, if the Fuel Clad and RCS fission product barriers were both lost, then there should be frequent assessments of containment radioactive inventory and integrity. Alternatively, if both the Fuel Clad and RCS fission product barriers were potentially lost, the Emergency Director would have more assurance that there was no immediate need to escalate to a General Emergency.

Category: F - Fission Product Barrier Degradation

Subcategory: N/A

Initiating Condition: **Any** loss or **any** potential loss of either Fuel Clad or RCS barrier

EAL:

FA1.1 Alert

Any loss or **any** potential loss of either Fuel Clad or RCS barrier (Table F-1)

Mode Applicability:

1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 - Hot Shutdown

Definition(s):

None

Basis:

Fuel Clad, RCS and Containment comprise the fission product barriers. Table F-1 lists the fission product barrier thresholds, bases and references.

At the Alert classification level, Fuel Clad and RCS barriers are weighted more heavily than the Containment barrier. Unlike the Containment barrier, loss or potential loss of either the Fuel Clad or RCS barrier may result in the relocation of radioactive materials or degradation of core cooling capability. Note that the loss or potential loss of Containment barrier in combination with loss or potential loss of either Fuel Clad or RCS barrier results in declaration of a Site Area Emergency under EAL FS1.1

Reference(s):

1. NEI 99-01 FA1

Category: F - Fission Product Barrier Degradation

Subcategory: N/A

Initiating Condition: Loss or potential loss of **any** two barriers

EAL:

FS1.1	**Site Area Emergency**
Loss or potential loss of **any** two barriers (Table F-1)	

Mode Applicability:

1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 - Hot Shutdown

Definition(s):

IMMINENT - The trajectory of events or conditions is such that an EAL will be met within a relatively short period of time regardless of mitigation or corrective actions.

Basis:

Fuel Clad, RCS and Containment comprise the fission product barriers. Table F-1 lists the fission product barrier thresholds, bases and references.

At the Site Area Emergency classification level, each barrier is weighted equally. A Site Area Emergency is therefore appropriate for any combination of the following conditions:

- One barrier loss and a second barrier loss (i.e., loss - loss)
- One barrier loss and a second barrier potential loss (i.e., loss - potential loss)
- One barrier potential loss and a second barrier potential loss (i.e., potential loss - potential loss)

At the Site Area Emergency classification level, the ability to dynamically assess the proximity of present conditions with respect to the threshold for a General Emergency is important. For example, the existence of Fuel Clad and RCS Barrier loss thresholds in addition to offsite dose assessments would require continual assessments of radioactive inventory and Containment integrity in anticipation of reaching a General Emergency classification. Alternatively, if both Fuel Clad and RCS Potential Loss thresholds existed (vice Loss), the Emergency Director would have greater assurance that escalation to a General Emergency is less IMMINENT.

Reference(s):

1. NEI 99-01 FS1

Category: F - Fission Product Barrier Degradation

Subcategory: N/A

Initiating Condition: Loss of **any** two barriers and loss or potential loss of the third barrier

EAL:

FG1.1 General Emergency

Loss of **any** two barriers

AND

Loss or potential loss of the third barrier (Table F-1)

Mode Applicability:

1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 - Hot Shutdown

Definition(s):

None

Basis:

Fuel Clad, RCS and Containment comprise the fission product barriers. Table F-1 lists the fission product barrier thresholds, bases and references.

At the General Emergency classification level each barrier is weighted equally. A General Emergency is therefore appropriate for any combination of the following conditions:

- Loss of Fuel Clad, RCS and Containment Barriers
- Loss of Fuel Clad and RCS Barriers with potential loss of Containment Barrier
- Loss of RCS and Containment Barriers with potential loss of Fuel Clad Barrier
- Loss of Fuel Clad and Containment Barriers with potential loss of RCS Barrier

Reference(s):

1. NEI 99-01 FG1

Table F-1 Fission Product Barrier Threshold Matrix & Bases

Table F-1 lists the threshold conditions that define the Loss and Potential Loss of the three fission product barriers (Fuel Clad, Reactor Coolant System, and Containment). The table is structured so that each of the three barriers occupies adjacent columns. Each fission product barrier column is further divided into two columns; one for Loss thresholds and one for Potential Loss thresholds.

The first column of the table (to the left of the Fuel Clad Loss column) lists the categories (types) of fission product barrier thresholds. The fission product barrier categories are:

A. RCS or S/G Tube Leakage

B. Inadequate Heat removal

C. Containment Radiation / RCS Activity

D. Containment Integrity or Bypass

E. Emergency Director Judgment

Each category occupies a row in Table F-1 thus forming a matrix defined by the categories. The intersection of each row with each Loss/Potential Loss column forms a cell in which one or more fission product barrier thresholds appear. If NEI 99-01 does not define a threshold for a barrier Loss/Potential Loss, the word “None” is entered in the cell.

Thresholds are assigned sequential numbers within each barrier column beginning with number one (ex., FCB1, FCB2…FCB9).

If a cell in Table F-1 contains more than one numbered threshold, each of the numbered thresholds, if exceeded, signifies a Loss or Potential Loss of the barrier. It is not necessary to exceed all of the thresholds in a category before declaring a barrier Loss/Potential Loss.

Subdivision of Table F-1 by category facilitates association of plant conditions to the applicable fission product barrier Loss and Potential Loss thresholds. This structure promotes a systematic approach to assessing the classification status of the fission product barriers.

When equipped with knowledge of plant conditions related to the fission product barriers, the EAL-user first scans down the category column of Table F-1, locates the likely category and then reads across the fission product barrier Loss and Potential Loss thresholds in that category to determine if a threshold has been exceeded. If a threshold has not been exceeded, the EAL-user proceeds to the next likely category and continues review of the thresholds in the new category

If the EAL-user determines that any threshold has been exceeded, by definition, the barrier is lost or potentially lost – even if multiple thresholds in the same barrier column are exceeded, only that one barrier is lost or potentially lost. The EAL-user must examine each of the three fission product barriers to determine if other barrier thresholds in the category are lost or potentially lost. For example, if containment radiation is sufficiently high, a Loss of the Fuel Clad and RCS Barriers and a Potential Loss of the Containment Barrier can occur. Barrier Losses and Potential Losses are then applied to the algorithms given in EALs FG1.1, FS1.1, and FA1.1 to determine the appropriate emergency classification.

In the remainder of this Attachment, the Fuel Clad Barrier threshold bases appear first, followed by the RCS Barrier and finally the Containment Barrier threshold bases. In each barrier, the bases are given according category Loss followed by category Potential Loss beginning with Category A, then B,…, E.

Table F-1 Fission Product Barrier Threshold Matrix

	Fuel Clad Barrier (FCB)		Reactor Coolant System Barrier (RCB)		Containment Barrier (CNB)	
Category	**Loss**	**Potential Loss**	**Loss**	**Potential Loss**	**Loss**	**Potential Loss**
A **RCS or S/G Tube Leakage**	None	FCB1 RVLMS upper plenum level 0%	RCB1 An automatic or manual ECCS (SIAS) actuation required by **EITHER:** • UNISOLABLE RCS leakage • S/G tube RUPTURE	RCB2 UNISOLABLE RCS leakage or S/G tube leakage > 44 gpm excluding normal reductions in RCS inventory (e.g., letdown, RCP seal leakoff) RCB3 RCS cooldown rate > 100°F/hr **AND** Pressurizer pressure > maximum limits of the RCS Pressure and Temperature Limits (OP-902-009 Attachments 2-A thru D)	CNB1 S/G tube leakage > 44 gpm (excluding normal reductions in RCS inventory) or that is RUPTURED is also FAULTED outside of containment	None
B **Inadequate Heat Removal**	FCB2 Representative CET readings > 1,200°F	FCB3 Representative CET readings > 700°F FCB4 **Any** OP-902-008 Functional Recovery RCS/Core Heat Removal safety function criterion is **not** met for ≥ 15 min. (Note 1)	None	RCB4 **Any** OP-902-008 Functional Recovery RCS/Core Heat Removal safety function criterion is **not** met for ≥ 15 min. (Note 1)	None	CNB2 Representative CET readings > 1,200°F **AND** Restoration procedures **not** effective within 15 min. (Note 1)
C **CTMT Radiation / RCS Activity**	FCB5 Containment High Range Radiation Monitor (ARM-IRE-5400AS or ARM-IRE-5400BS) > 900 R/hr. (Note 14) FCB6 Reactor coolant activity > 300 µCi/gm dose equivalent I-131 as indicated by Chemistry sample	None	RCB5 Containment High Range Radiation Monitor (ARM-IRE-5400AS or ARM-IRE-5400BS) > 60 R/hr. (Note 14)	None	None	CNB3 Containment High Range Radiation Monitor (ARM-IRE-5400AS or ARM-IRE-5400BS) > 15,000 R/hr. (Note 14)
D **CTMT Integrity or Bypass**	None	None	None	None	CNB4 Containment isolation is required **AND EITHER:** • Containment integrity has been lost based on Emergency Director judgment • UNISOLABLE pathway from Containment to the environment exists CNB5 Indications of RCS leakage outside of Containment	CNB6 Containment pressure > 50 psia CNB7 Containment hydrogen concentration > 4% CNB8 Containment pressure > 17.7 psia with < one full train of containment heat removal systems operating per design for ≥ 15 min. (Notes 1, 9)
E **Emergency Director Judgment**	FCB7 **Any** condition in the opinion of the Emergency Director that indicates loss of the Fuel Clad barrier	FCB8 **Any** condition in the opinion of the Emergency Director that indicates potential loss of the Fuel Clad barrier	RCB6 **Any** condition in the opinion of the Emergency Director that indicates loss of the RCS barrier	RCB7 **Any** condition in the opinion of the Emergency Director that indicates potential loss of the RCS barrier	CNB9 **Any** condition in the opinion of the Emergency Director that indicates loss of the Containment barrier	CNB10 **Any** condition in the opinion of the Emergency Director that indicates potential loss of the Containment barrier

Barrier: Fuel Clad

Category: A. RCS or S/G Tube Leakage

Degradation Threat: Loss

Threshold:

None

Barrier: Fuel Clad

Category: A. RCS or S/G Tube Leakage

Degradation Threat: Potential Loss

Threshold:

FCB1
RVLMS upper plenum level 0%

Definition(s):

None

Basis:

This reading indicates a reduction in reactor vessel water level sufficient to allow the onset of heat-induced cladding damage.

The closest indication of level near top of active fuel is provided by the RVLMS 0% sensor (#8), ~12.6 in. above the fuel alignment plate (ref. 1).

RVLMS Sensor #8 (RVLMS upper plenum level 0%) may briefly indicate voided during a normal response to a loss of inventory. Existing guidance for classifying transient events such as this addresses the period of time of event recognition and classification (15 minutes). However, in cases when EAL declaration criteria may be met momentarily during the normal expected response of the plant, declaration requirements should **not** be considered to be met when the conditions are a part of the designed plant response, or result from appropriate operator actions (ref. 2, 3).

There is no Fuel Clad barrier Loss threshold associated with RCS or S/G Tube Leakage.

Reference(s):

1. UFSAR Section 1.9A Inadequate Core Cooling Instrumentation
2. SAMG-03A Severe Accident Management Guidelines Candidate High Level Action Implementation and Assessment Waterford Unit 3
3. CEOG Generic Accident Management Guidelines - Phase 1, “Initial Diagnosis”
4. NEI 99-01 RCS or S/G Tube Leakage Potential Loss 1.A

Barrier: Fuel Clad

Category: B. Inadequate Heat Removal

Degradation Threat: Loss

Threshold:

FCB2

Representative CET readings > 1,200°F

Definition(s):

None

Basis:

This reading indicates temperatures within the core are sufficient to cause significant superheating of reactor coolant.

Reference(s):

1. CEOG Generic Accident Management Guidelines
2. UFSAR Section 1.9A Inadequate Core Cooling Instrumentation
3. NEI 99-01 Inadequate Heat Removal Loss 2.A

Barrier: Fuel Clad

Category: B. Inadequate Heat Removal

Degradation Threat: Potential Loss

Threshold:

FCB3

Representative CET readings > 700°F

Definition(s):

None

Basis:

This reading indicates a reduction in reactor vessel water level sufficient to allow the onset of heat-induced cladding damage.

Reference(s):

1. CEOG Generic Accident Management Guidelines
2. UFSAR Section 1.9A Inadequate Core Cooling Instrumentation
3. NEI 99-01 Inadequate Heat Removal Potential Loss 2.A

Barrier: Fuel Clad

Category: B. Inadequate Heat Removal

Degradation Threat: Potential Loss

Threshold:

FCB4

Any OP-902-008 Functional Recovery RCS/Core Heat Removal safety function criterion is **not** met for ≥ 15 min. (Note 1)

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Definition(s):

None

Basis:

This condition indicates an extreme challenge to the ability to remove RCS heat using the steam generators (i.e., loss of an effective secondary-side heat sink). This condition represents a potential loss of the Fuel Clad Barrier. In accordance with EOPs, there may be unusual accident conditions during which operators intentionally reduce the heat removal capability of the steam generators; during these conditions, classification using this threshold is not warranted.

In combination with Potential Loss threshold RCB4, meeting this threshold results in a Site Area Emergency.

Inability to remove heat from the RCS to the ultimate heat sink is a loss of function required for hot shutdown with the reactor at pressure and temperature and thus represents potential loss of the Fuel Clad and RCS barriers. The RCS/Core Heat Removal safety function criteria from OP-902-008, Functional Recovery is used for this determination (ref. 1, 2).

The process of checking the safety functions in EOPs is periodic and continuous as long as the procedure is in use. The fifteen minute interval (subject to Note 1) provides a suitable opportunity to assess plant conditions with respect to the threshold criteria.

Reference(s):

1. OP-902-008 Functional Recovery
2. TG-OP-902-008 Technical Guide for Functional Recovery
3. NEI 99-01 Inadequate Heat Removal Potential Loss 2.B

Barrier: Fuel Clad

Category: C. CTMT Radiation / RCS Activity

Degradation Threat: Loss

Threshold:

FCB5

Containment High Range Radiation Monitor (ARM-IRE-5400AS or ARM-IRE-5400BS) > 900 R/hr (Note 14).

Note 14: Evaluate Containment High Range Radiation Monitor readings for potential erratic indications as a result of thermally induced currents.

Definition(s):

None

Basis:

NRC Information Notice 97-045 Supplement 1 identifies the potential for erratic indications from the Containment High Range Radiation Monitors (CHRRMs) as a result of Thermally Induced Currents (TIC) which may cause the CHRRM to read falsely high on a rapid temperature rise, and fail low intermittently on a rapid temperature fall. The TICs induced in the Waterford CHRRM signal cable are anticipated to be negligible within 5 minutes. Because of this phenomenon, any trends or alarms on the CHRRM's should be validated by comparison to the containment low range/area radiation monitors and Air Monitoring Systems trends before actions are taken.

The containment radiation monitor reading (943 R/hr rounded to 900 R/hr for readability) corresponds to an instantaneous release of all reactor coolant mass into the containment, assuming that reactor coolant activity equals 300 µCi/gm dose equivalent I-131. Reactor coolant activity above this level is greater than that expected for iodine spikes and corresponds to approximately 1% fuel clad damage. Since this condition indicates that a significant amount of fuel clad damage has occurred, it represents a loss of the Fuel Clad Barrier.

The radiation monitor reading in this threshold is higher than that specified for RCS Barrier Loss threshold RCB5 since it indicates a loss of both the Fuel Clad Barrier and the RCS Barrier. Note that a combination of the two monitor readings appropriately escalates the ECL to a Site Area Emergency.

There is no Fuel Clad barrier Potential Loss threshold associated with CTMT Radiation/RCS Activity.

Reference(s):

1. EC86890, EP-CALC-WF3-1702, Cont. High Range Radiation EAL Threshold Values
2. NRC Information Notice 97-045 Supplement 1
3. NEI 99-01 CTMT Radiation / RCS Activity FC Loss 3.A

Barrier: Fuel Clad

Category: C. CTMT Radiation / RCS Activity

Degradation Threat: Loss

Threshold:

FCB6

Reactor coolant activity > 300 µCi/gm dose equivalent I-131 as indicated by Chemistry sample

Definition(s):

None

Basis:

This threshold indicates that RCS radioactivity concentration is greater than 300 µCi/gm dose equivalent I-131. Reactor coolant activity above this level is greater than that expected for iodine spikes and corresponds to approximately 1% fuel clad damage. Since this condition indicates that a significant amount of fuel clad damage has occurred, it represents a loss of the Fuel Clad Barrier.

It is recognized that sample collection and analysis of reactor coolant with highly elevated activity levels could require several hours to complete. Nonetheless, a sample-related threshold is included as a backup to other indications.

There is no Fuel Clad barrier Potential Loss threshold associated with CTMT Radiation/RCS Activity.

Reference(s):

1. NEI 99-01 CTMT Radiation / RCS Activity Fuel Clad Loss 3.B

Barrier: Fuel Clad

Category: C. CTMT Radiation / RCS Activity

Degradation Threat: Potential Loss

Threshold:

None

Barrier: Fuel Clad

Category: D. CTMT Integrity or Bypass

Degradation Threat: Loss

Threshold:

None

Barrier: Fuel Clad

Category: D. CTMT Integrity or Bypass

Degradation Threat: Potential Loss

Threshold:

None

Barrier: Fuel Clad

Category: E. Emergency Director Judgment

Degradation Threat: Loss

Threshold:

FCB7

Any condition in the opinion of the Emergency Director that indicates loss of the Fuel Clad barrier

Definition(s):

None

Basis:

This threshold addresses any other factors that are to be used by the Emergency Director in determining whether the Fuel Clad barrier is lost.

Reference(s):

1. NEI 99-01 Emergency Director Judgment Fuel Clad Loss 6.A

Barrier: Fuel Clad

Category: E. Emergency Director Judgment

Degradation Threat: Potential Loss

Threshold:

FCB8

Any condition in the opinion of the Emergency Director that indicates potential loss of the Fuel Clad barrier

Definition(s):

None

Basis:

This threshold addresses any other factors that are to be used by the Emergency Director in determining whether the Fuel Clad barrier is potentially lost. The Emergency Director should also consider whether or not to declare the barrier potentially lost in the event that barrier status cannot be monitored.

Reference(s):

1. NEI 99-01 Emergency Director Judgment Potential Fuel Clad Loss 6.A

Barrier: Reactor Coolant System

Category: A. RCS or S/G Tube Leakage

Degradation Threat: Loss

Threshold:

RCB1

An automatic or manual ECCS (SIAS) actuation required by **EITHER:**

- UNISOLABLE RCS leakage
- S/G tube RUPTURE

Definition(s):

FAULTED - The term applied to a steam generator that has a steam leak on the secondary side of sufficient size to cause an uncontrolled drop in steam generator pressure or the steam generator to become completely depressurized.

RUPTURE(D) - The condition of a steam generator in which primary-to-secondary leakage is of sufficient magnitude to require a safety injection (automatic or manual).

UNISOLABLE - An open or breached system line that **cannot** be isolated, remotely or locally.

Basis:

Failure to isolate the leak (from the Control Room or locally), within 15 minutes or if known that the leak cannot be isolated within 15 minutes, from the start of the leak requires immediate classification.

This threshold is based on an UNISOLABLE RCS leak of sufficient size to require an automatic or manual actuation of the Emergency Core Cooling System (ECCS). This condition clearly represents a loss of the RCS Barrier.

This threshold is applicable to unidentified and pressure boundary leakage, as well as identified leakage. It is also applicable to UNISOLABLE RCS leakage through an interfacing system. The mass loss may be into any location – inside containment, to the secondary-side (i.e., steam generator tube leakage) or outside of containment.

A steam generator with primary-to-secondary leakage of sufficient magnitude to require a safety injection is considered to be RUPTURED. If a RUPTURED steam generator is also FAULTED outside of containment, the declaration escalates to a Site Area Emergency since the Containment Barrier Loss threshold CNB1 will also be met.

Reference(s):

1. NEI 99-01 RCS or SG Tube Leakage Reactor Coolant System Loss 1.A

Barrier: Reactor Coolant System

Category: A. RCS or S/G Tube Leakage

Degradation Threat: Potential Loss

Threshold:

RCB2

UNISOLABLE RCS leakage or S/G tube leakage > 44 gpm excluding normal reductions in RCS inventory (e.g., letdown, RCP seal leakoff)

Definition(s):

FAULTED - The term applied to a steam generator that has a steam leak on the secondary side of sufficient size to cause an uncontrolled drop in steam generator pressure or the steam generator to become completely depressurized.

UNISOLABLE - An open or breached system line that **cannot** be isolated, remotely or locally.

Basis:

Failure to isolate the leak (from the Control Room or locally), within 15 minutes or if known that the leak cannot be isolated within 15 minutes, from the start of the leak requires immediate classification.

This threshold is based on an UNISOLABLE RCS leak that results in the inability to maintain pressurizer level within specified limits by operation of a normally used charging pump, but an ECCS (SIAS) actuation has not occurred.

Isolating letdown is a standard abnormal operating procedure action and may prevent unnecessary classifications when a non-RCS leakage path such as a CVCS leak exists. The intent of this condition is met if attempts to isolate Letdown are NOT successful. Additional charging pumps being required is indicative of a substantial RCS leak.

This threshold is applicable to unidentified and pressure boundary leakage, as well as identified leakage. It is also applicable to UNISOLABLE RCS leakage through an interfacing system. The mass loss may be into any location – inside containment, to the secondary-side (i.e., steam generator tube leakage) or outside of containment.

If a leaking steam generator is also FAULTED outside of containment, the declaration escalates to a Site Area Emergency since the Containment Barrier Loss threshold CNB1 will also be met.

Reference(s):

1. OP-901-111 Reactor Coolant System Leak
2. UFSAR Table 9.3-9 Design Parameters
3. NEI 99-01 RCS or SG Tube Leakage Reactor Coolant System Potential Loss 1.A

Barrier: Reactor Coolant System

Category: A. RCS or S/G Tube Leakage

Degradation Threat: Potential Loss

Threshold:

RCB3

RCS cooldown rate > 100°F/hr

AND

Pressurizer pressure > maximum limits of the RCS Pressure and Temperature Limits (OP-902-009 Attachments 2-A thru D)

Definition(s):

None

Basis:

This condition indicates an extreme challenge to the integrity of the RCS pressure boundary due to pressurized thermal shock – a transient that causes rapid RCS cooldown of greater than 100° F in less than 1 hour while the RCS is in Mode 3 or higher (i.e., hot and pressurized).

Reference(s):

1. TG-OP-902-004 Technical Guide for Excess Steam Demand Recovery Procedure
2. Technical Specifications 3.4.8 Pressure/Temperature Limits
3. OP-902-008 Functional Recovery
4. OP-902-009 Standard Appendices, Attachments 2-A thru D RCS Pressure and Temperature Limits
5. NEI 99-01 RCS or SG Tube Leakage Reactor Coolant System Potential Loss 1.B

Barrier: Reactor Coolant System

Category: B. Inadequate Heat Removal

Degradation Threat: Loss

Threshold:

None

Barrier: Reactor Coolant System

Category: B. Inadequate Heat Removal

Degradation Threat: Potential Loss

Threshold:

RCB4

Any OP-902-008 Functional Recovery RCS/Core Heat Removal safety function criterion is **not** met for ≥ 15 min. (Note 1)

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Definition(s):

None

Basis:

This condition indicates an extreme challenge to the ability to remove RCS heat using the steam generators (i.e., loss of an effective secondary-side heat sink). This condition represents a potential loss of the RCS Barrier. In accordance with EOPs, there may be unusual accident conditions during which operators intentionally reduce the heat removal capability of the steam generators; during these conditions, classification using this threshold is not warranted.

In combination with Potential Loss threshold FCB4, meeting this threshold results in a Site Area Emergency.

This condition warrants a Site Area Emergency declaration because inadequate RCS heat removal may result in fuel heat-up sufficient to damage the cladding and raise RCS pressure to the point where mass will be lost from the system.

Inability to remove heat from the RCS to the ultimate heat sink is a loss of function required for hot shutdown with the reactor at pressure and temperature and thus represents potential loss of the Fuel Clad and RCS barriers. The RCS/Core Heat Removal safety function criteria from OP-902-008, Functional Recovery is used for this determination (ref. 1, 2).

The process of checking the safety functions in EOPs is periodic and continuous as long as the procedure is in use. The fifteen minute interval (subject to Note 1) provides a suitable opportunity to assess plant conditions with respect to the threshold criteria.

There is no RCS barrier Loss threshold associated with Inadequate Heat Removal.

Reference(s):

1. OP-902-008 Functional Recovery
2. TG-OP-902-008 Technical Guide for Functional Recovery
3. NEI 99-01 Inadequate Heat Removal RCS Potential Loss 2.B

Barrier: Reactor Coolant System

Category: C. CTMT Radiation/ RCS Activity

Degradation Threat: Loss

Threshold:

RCB5

Containment High Range Radiation Monitor (ARM-IRE-5400AS or ARM-IRE-5400BS) > 60 R/hr (Note 14).

Note 14: Evaluate Containment High Range Radiation Monitor readings for potential erratic indications as a result of thermally induced currents.

Definition(s):

N/A

Basis:

NRC Information Notice 97-045 Supplement 1 identifies the potential for erratic indications from the Containment High Range Radiation Monitors (CHRRMs) as a result of Thermally Induced Currents (TIC) which may cause the CHRRM to read falsely high on a rapid temperature rise, and fail low intermittently on a rapid temperature fall. The TICs induced in the Waterford CHRRM signal cable are anticipated to be negligible within 5 minutes. Because of this phenomenon, any trends or alarms on the CHRRM's should be validated by comparison to the containment low range/area radiation monitors and Air Monitoring Systems trends before actions are taken.

The containment radiation monitor reading (61.9 R/hr rounded to 60 R/hr for readability) corresponds to an instantaneous release of all reactor coolant mass into the containment, assuming that reactor coolant activity equals Technical Specification allowable limits (ref. 1). This value is lower than that specified for Fuel Clad Barrier Loss threshold FCB5 since it indicates a loss of the RCS Barrier only.

There is no RCS barrier Potential Loss threshold associated with CTMT Radiation/RCS Activity.

Reference(s):

1. EC86890, EP-CALC-WF3-1702, Cont. High Range Radiation EAL Threshold Values
2. NRC Information Notice 97-045 Supplement 1
3. NEI 99-01 CTMT Radiation / RCS Activity RCS Loss 3.A

Barrier: Reactor Coolant System

Category: B. CTMT Radiation/ RCS Activity

Degradation Threat: Potential Loss

Threshold:

None

Barrier: Reactor Coolant System

Category: D. CTMT Integrity or Bypass

Degradation Threat: Loss

Threshold:

None

Barrier: Reactor Coolant System

Category: D. CTMT Integrity or Bypass

Degradation Threat: Potential Loss

Threshold:

None

Barrier: Reactor Coolant System

Category: E. Emergency Director Judgment

Degradation Threat: Loss

Threshold:

RCB6

Any condition in the opinion of the Emergency Director that indicates loss of the RCS barrier

Definition(s):

None

Basis:

This threshold addresses any other factors that may be used by the Emergency Director in determining whether the RCS Barrier is lost.

Reference(s):

1. NEI 99-01 Emergency Director Judgment RCS Loss 6.A

Barrier: Reactor Coolant System

Category: E. Emergency Director Judgment

Degradation Threat: Potential Loss

Threshold:

RCB7

Any condition in the opinion of the Emergency Director that indicates potential loss of the RCS barrier

Definition(s):

None

Basis:

This threshold addresses any other factors that may be used by the Emergency Director in determining whether the RCS Barrier is potentially lost. The Emergency Director should also consider whether or not to declare the barrier potentially lost in the event that barrier status cannot be monitored.

Reference(s):

1. NEI 99-01 Emergency Director Judgment RCS Potential Loss 6.A

Barrier: Containment

Category: A. RCS or S/G Tube Leakage

Degradation Threat: Loss

Threshold:

CNB1

S/G tube leakage > 44 gpm (excluding normal reductions in RCS inventory) or that is RUPTURED is also FAULTED outside of containment

Definition(s):

FAULTED - The term applied to a steam generator that has a steam leak on the secondary side of sufficient size to cause an uncontrolled drop in steam generator pressure or the steam generator to become completely depressurized.

RUPTURED - The condition of a steam generator in which primary-to-secondary leakage is of sufficient magnitude to require a safety injection (automatic or manual).

Basis:

This threshold addresses a leaking or RUPTURED Steam Generator (S/G) that is also FAULTED outside of containment. The condition of the SG, whether leaking or RUPTURED, is determined in accordance with the thresholds for RCS Barrier Potential Loss RCB2 and Loss RCB1, respectively. This condition represents a bypass of the containment barrier.

FAULTED is a defined term within the NEI 99-01 methodology; this determination is not necessarily dependent upon entry into, or diagnostic steps within, an EOP. For example, if the pressure in a steam generator is dropping uncontrollably (part of the FAULTED definition) and the FAULTED steam generator isolation procedure is not entered because EOP user rules are dictating implementation of another procedure to address a higher priority condition, the steam generator is still considered FAULTED for emergency classification purposes.

The FAULTED criterion establishes an appropriate lower bound on the size of a steam release that may require an emergency classification. Steam releases of this size are readily observable with normal Control Room indications. The lower bound for this aspect of the containment barrier is analogous to the lower bound criteria specified in IC SU4 for the fuel clad barrier (i.e., RCS activity values) and IC SU5 for the RCS barrier (i.e., RCS leak rate values).

This threshold also applies to prolonged steam releases necessitated by operational considerations such as the forced steaming of a leaking or RUPTURED steam generator directly to atmosphere to cooldown the plant, or to drive Emergency Feedwater Pump AB. These conditions may exist when one steam generator is leaking or ruptured and the opposite steam generator is also faulted. These types of conditions will result in a significant and

sustained release of radioactive steam to the environment (and are thus similar to a FAULTED condition). The inability to isolate the steam flow without an adverse effect on plant cooldown meets the intent of a loss of containment.

Execution of a rapid RCS cooldown to less than 520°F Hot Leg temperature using both Atmospheric Dump valves, as directed by emergency operating procedures, does not meet this intent, provided the affected steam generator Atmospheric Dump valve can be closed when isolation of the RUPTURED steam generator is directed at less than 520°F. Steaming of Emergency Feedwater Pump AB prior to isolation of the RUPTURED steam generator does not meet this intent, provided MS-401 A(B) is closed when isolation of the RUPTURED steam generator is directed at less than 520°F. These short term radiological releases should be evaluated using Category A ICs.

Steam releases associated with the expected operation of a S/G Atmospheric Dump valve do not meet the intent of this threshold. Such releases may occur intermittently for a short period of time following a reactor trip as operators process through emergency operating procedures to bring the plant to a stable condition and prepare to initiate a plant cooldown. Steam releases associated with the unexpected operation of a valve (e.g., a stuck-open safety valve) do meet this threshold.

Following a S/G tube leak or RUPTURE, there may be minor radiological releases through a secondary-side system component (e.g., air ejectors, glad seal exhausters, valve packing, etc.). These types of releases do not constitute a loss or potential loss of containment but should be evaluated using the Recognition Category A ICs.

The ECLs resulting from primary-to-secondary leakage, with or without a steam release from the FAULTED S/G, are summarized below.

	Affected S/G is FAULTED Outside of Containment?	
P-to-S Leak Rate	**Yes**	**No**
Less than or equal to 25 gpm	No classification	No classification
Greater than 25 gpm	Unusual Event per SU5.1	Unusual Event per SU5.1
Greater than 44 gpm (*RCS Barrier Potential Loss*)	Site Area Emergency per FS1.1	Alert per FA1.1
Requires an automatic or manual ECCS (SIAS) actuation (*RCS Barrier Loss*)	Site Area Emergency per FS1.1	Alert per FA1.1

There is no Containment barrier Potential Loss threshold associated with RCS or S/G Tube Leakage.

Reference(s):

1. NEI 99-01 RCS or SG Tube Leakage Containment Loss 1.A

Barrier: Containment

Category: A. RCS or S/G Tube Leakage

Degradation Threat: Potential Loss

Threshold:

None

Barrier: Containment

Category: B. Inadequate Heat Removal

Degradation Threat: Loss

Threshold:

None

Barrier: Containment

Category: B. Inadequate Heat Removal

Degradation Threat: Potential Loss

Threshold:

CNB2

Representative CET readings > 1,200°F

AND

Restoration procedures **not** effective within 15 min. (Note 1)

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Definition(s):

IMMINENT - The trajectory of events or conditions is such that an EAL will be met within a relatively short period of time regardless of mitigation or corrective actions.

Basis:

The restoration procedure is considered "effective" if core exit thermocouple readings are dropping and/or if reactor vessel level is rising. Whether or not the procedure(s) will be effective should be apparent within 15 minutes of CET readings exceeding 1,200°F. The Emergency Director should escalate the emergency classification level as soon as it is determined that the procedure(s) will not be effective.

This condition represents an IMMINENT core melt sequence which, if not corrected, could lead to vessel failure and a greater potential for containment failure. For this condition to occur, there must already have been a loss of the RCS Barrier and the Fuel Clad Barrier. If implementation of a procedure(s) to restore adequate core cooling is not effective (successful) within 15 minutes, it is assumed that the event trajectory will likely lead to core melting and a subsequent challenge of the Containment Barrier.

Severe accident analyses (e.g., NUREG-1150) have concluded that function restoration procedures can arrest core degradation in a significant fraction of core damage scenarios, and that the likelihood of containment failure is very small in these events. Given this, it is appropriate to provide 15 minutes beyond the required entry point to determine if procedural actions can reverse the core melt sequence.

There is no Containment barrier Loss threshold associated with Inadequate Heat Removal.

Reference(s):

1. CEOG Generic Accident Management Guidelines
2. UFSAR Section 1.9A Inadequate Core Cooling Instrumentation
3. NEI 99-01 Inadequate Heat Removal Containment Potential Loss 2.A

Barrier: Containment

Category: C. CTMT Radiation/RCS Activity

Degradation Threat: Loss

Threshold:

None

Barrier: Containment

Category: C. CTMT Radiation/RCS Activity

Degradation Threat: Potential Loss

Threshold:

CNB3

Containment High Range Radiation Monitor (ARM-IRE-5400AS or ARM-IRE-5400BS) > 15,000 R/hr (Note 14).

Note 14: Evaluate Containment High Range Radiation Monitor readings for potential erratic indications as a result of thermally induced currents.

Definition(s):

None

Basis:

NRC Information Notice 97-045 Supplement 1 identifies the potential for erratic indications from the Containment High Range Radiation Monitors (CHRRMs) as a result of Thermally Induced Currents (TIC) which may cause the CHRRM to read falsely high on a rapid temperature rise, and fail low intermittently on a rapid temperature fall. The TICs induced in the Waterford CHRRM signal cable are anticipated to be negligible within 5 minutes. Because of this phenomenon, any trends or alarms on the CHRRM's should be validated by comparison to the containment low range/area radiation monitors and Air Monitoring Systems trends before actions are taken.

The containment radiation monitor reading corresponds to an instantaneous release of all reactor coolant mass into the containment, assuming that 20% of the fuel cladding has failed (ref. 1). This level of fuel clad failure is well above that used to determine the analogous Fuel Clad Barrier Loss and RCS Barrier Loss thresholds.

NUREG-1228, Source Estimations During Incident Response to Severe Nuclear Power Plant Accidents, indicates the fuel clad failure must be greater than approximately 20% in order for there to be a major release of radioactivity requiring offsite protective actions. For this condition to exist, there must already have been a loss of the RCS Barrier and the Fuel Clad Barrier. It is therefore prudent to treat this condition as a potential loss of containment which would then escalate the ECL to a General Emergency.

There is no Loss threshold associated with CTMT Radiation/RCS Activity.

Reference(s):

1. EC86890, EP-CALC-WF3-1702, Cont. High Range Radiation EAL Threshold Values
2. NRC Information Notice 97-045 Supplement 1
3. NEI 99-01 CTMT Radiation / RCS Activity Containment Potential Loss 3.A

Barrier: Containment

Category: D. CTMT Integrity or Bypass

Degradation Threat: Loss

Threshold:

CNB4

Containment isolation is required

AND EITHER:

- Containment integrity has been lost based on Emergency Director judgment
- UNISOLABLE pathway from Containment to the environment exists

Definition(s):

FAULTED - The term applied to a steam generator that has a steam leak on the secondary side of sufficient size to cause an uncontrolled drop in steam generator pressure or the steam generator to become completely depressurized.

UNISOLABLE - An open or breached system line that **cannot** be isolated, remotely or locally.

Basis:

Failure to isolate the leak (from the Control Room or locally), within 15 minutes or if known that the leak cannot be isolated within 15 minutes, from the start of the leak requires immediate classification.

The status of the containment barrier during an event involving steam generator tube leakage is assessed using Loss Threshold CNB1.

These thresholds address a situation where containment isolation is required and one of two conditions exists as discussed below. Users are reminded that there may be accident and release conditions that simultaneously meet both bulleted thresholds.

First Threshold – Containment integrity has been lost, i.e., the actual containment atmospheric leak rate likely exceeds that associated with allowable leakage (or sometimes referred to as design leakage). Following the release of RCS mass into containment, containment pressure will fluctuate based on a variety of factors; a loss of containment integrity condition may (or may not) be accompanied by a noticeable drop in containment pressure. Recognizing the inherent difficulties in determining a containment leak rate during accident conditions, it is expected that the Emergency Director will assess this threshold using judgment, and with due consideration given to current plant conditions, and available operational and radiological data (e.g., containment pressure, readings on radiation monitors outside containment, operating status of containment pressure control equipment, etc.).

Refer to the middle piping run of Figure 1. Two simplified examples are provided. One is leakage from a penetration and the other is leakage from an in-service system valve.

Depending upon radiation monitor locations and sensitivities, the leakage could be detected by any of the four monitors depicted in the figure.

Another example would be a loss or potential loss of the RCS barrier, and the simultaneous occurrence of two FAULTED locations on a steam generator where one fault is located inside containment (e.g., on a steam or feedwater line) and the other outside of containment. In this case, the associated steam line provides a pathway for the containment atmosphere to escape to an area outside the containment.

Following the leakage of RCS mass into containment and a rise in containment pressure, there may be minor radiological releases associated with allowable (design) containment leakage through various penetrations or system components. These releases do not constitute a loss or potential loss of containment but should be evaluated using the Recognition Category A ICs.

Second Threshold – Conditions are such that there is an UNISOLABLE pathway for the migration of radioactive material from the containment atmosphere to the environment. As used here, the term “environment” includes the atmosphere of a room or area, outside the containment, that may, in turn, communicate with the outside-the-plant atmosphere (e.g., through discharge of a ventilation system or atmospheric leakage). Depending upon a variety of factors, this condition may or may not be accompanied by a noticeable drop in containment pressure.

A failure of a containment penetration will raise pressure in the Annulus. This condition will be indicated by more frequent cycling of the Shield Building Ventilation System to Exhaust Mode combined with rising radiation levels on the Plant Stack radiation monitors.

Refer to the top piping run of Figure 1. In this simplified example, the inboard and outboard isolation valves remained open after a containment isolation was required (i.e., containment isolation was not successful). There is now an UNISOLABLE pathway from the containment to the environment.

The existence of a filter is not considered in the threshold assessment. Filters do not remove fission product noble gases. In addition, a filter could become ineffective due to iodine and/or particulate loading beyond design limits (i.e., retention ability has been exceeded) or water saturation from steam/high humidity in the release stream.

Leakage between two interfacing liquid systems, by itself, does not meet this threshold.

Refer to the bottom piping run of Figure 1. In this simplified example, leakage in an RCP seal cooler is allowing radioactive material to enter the Auxiliary Building. The radioactivity would be detected by the Process Monitor. If there is no leakage from the closed water cooling system to the Auxiliary Building, then no threshold has been met. If the pump developed a leak that allowed steam/water to enter the Auxiliary Building, then the second threshold would be met. Depending upon radiation monitor locations and sensitivities, this leakage could be detected by any of the four monitors depicted in the figure and cause the first threshold to be met as well.

Following the leakage of RCS mass into containment and a rise in containment pressure, there may be minor radiological releases associated with allowable containment leakage

through various penetrations or system components. Minor releases may also occur if a containment isolation valve(s) fails to close but the containment atmosphere escapes to an enclosed system. These releases do not constitute a loss or potential loss of containment but should be evaluated using the Recognition Category A ICs.

Reference(s):

1. NEI 99-01 CTMT Integrity or Bypass Containment Loss 4.A

Barrier: Containment

Category: D. CTMT Integrity or Bypass

Degradation Threat: Loss

Threshold:

CNB5

Indications of RCS leakage outside of Containment

Definition(s):

None

Basis:

The status of the containment barrier during an event involving steam generator tube leakage is assessed using Loss Threshold CNB1.

To ensure proper escalation of the emergency classification, the RCS leakage outside of containment must be related to the mass loss that is causing the RCS Loss RCB1 and/or Potential Loss RCB2 threshold to be met.

Containment sump, temperature, pressure and/or radiation levels will rise if reactor coolant mass is leaking into the containment. If these parameters have not risen, then the reactor coolant mass may be leaking outside of containment (i.e., a containment bypass sequence). Rises in sump, temperature, pressure, flow and/or radiation level readings outside of the containment may indicate that the RCS mass is being lost outside of containment.

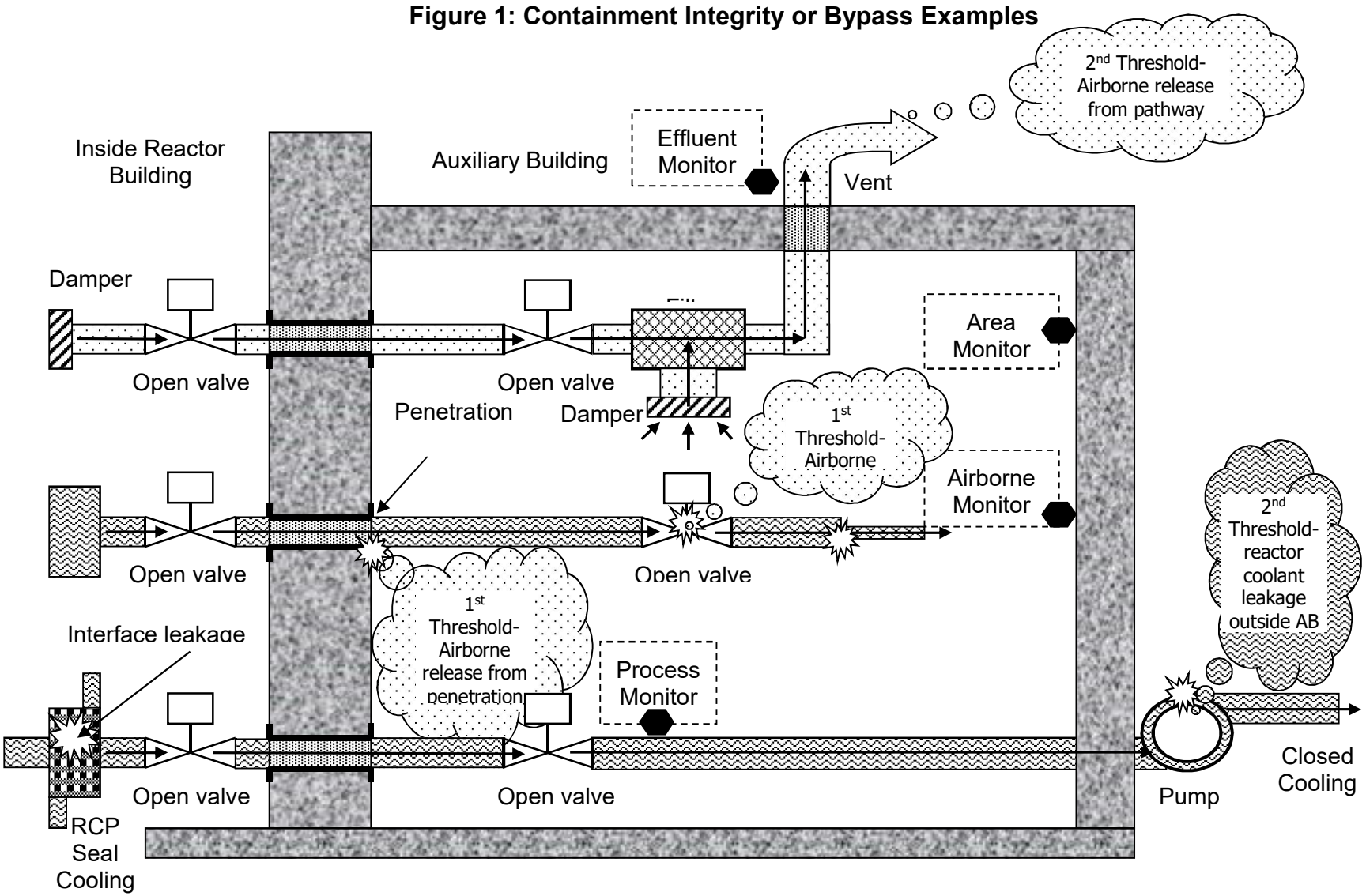
Unexpected elevated readings and alarms on radiation monitors with detectors outside containment should be corroborated with other available indications to confirm that the source is a loss of RCS mass outside of containment. If the fuel clad barrier has not been lost, radiation monitor readings outside of containment may not rise significantly; however, other unexpected changes in sump levels, area temperatures or pressures, flow rates, etc. should be sufficient to determine if RCS mass is being lost outside of the containment.

Refer to the middle piping run of Figure 1. In this simplified example, a leak has occurred at a reducer on a pipe carrying reactor coolant in the Auxiliary Building. Depending upon radiation monitor locations and sensitivities, the leakage could be detected by any of the four monitors depicted in the figure and cause threshold CNB4 to be met as well.

Reference(s):

1. NEI 99-01 CTMT Integrity or Bypass Containment Loss 4.

Figure 1: Containment Integrity or Bypass Examples



Barrier: Containment

Category: D. CTMT Integrity or Bypass

Degradation Threat: Potential Loss

Threshold:

CNB6

Containment pressure > 50 psia

Definition(s):

None

Basis:

If containment pressure exceeds the design pressure, there exists a potential to lose the Containment Barrier. To reach this level, there must be an inadequate core cooling condition for an extended period of time; therefore, the RCS and Fuel Clad barriers would already be lost. Thus, this threshold is a discriminator between a Site Area Emergency and General Emergency since there is now a potential to lose the third barrier.

Reference(s):

1. Calculation ECS98-001 EOP Action value Basis Document
2. NEI 99-01 CTMT Integrity or Bypass Containment Potential Loss 4.A

Barrier: Containment

Category: D. CTMT Integrity or Bypass

Degradation Threat: Potential Loss

Threshold:

CNB7

Containment hydrogen concentration > 4%

Definition(s):

None

Basis:

The existence of an explosive mixture means, at a minimum, that the containment atmospheric hydrogen concentration is sufficient to support a hydrogen burn (i.e., at the lower deflagration limit). The 4% hydrogen concentration is generally considered the lower limit for hydrogen deflagrations. A hydrogen burn will raise containment pressure and could result in collateral equipment damage leading to a loss of containment integrity. It therefore represents a potential loss of the Containment Barrier.

Reference(s):

1. UFSAR Section 6.2.5.5 Instrumentation Requirements
2. NEI 99-01 CTMT Integrity or Bypass Containment Potential Loss 4.B

Barrier: Containment

Category: D. CTMT Integrity or Bypass

Degradation Threat: Potential Loss

Threshold:

CNB8

Containment pressure > 17.7 psia with < one full train of containment heat removal systems operating per design for ≥ 15 min. (Notes 1, 9)

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Note 9: One full train of containment heat removal systems consists of either:

- One train of the Containment Spray System (operating with ≥1750 gpm flow) **AND** One train of the Containment Cooling System (one fan cooler required)

OR

- Two trains of the Containment Spray System (operating with ≥1750 gpm flow each).

Definition(s):

None

Basis:

This threshold describes a condition where containment pressure is greater than the setpoint at which containment energy (heat) removal systems are designed to automatically actuate, and less than one full train of equipment is capable of operating per design. The 15-minute criterion is included to allow operators time to manually start equipment that may not have automatically started, if possible. This threshold represents a potential loss of containment in that containment heat removal/depressurization systems (e.g., containment sprays but not including containment venting strategies) are either lost or performing in a degraded manner.

Reference(s):

1. OP-902-002 Loss of Coolant Accident Recovery
2. UFSAR Section 6.2.2 Containment Heat Removal Systems
3. Technical Specification 3.6.2 Containment Systems – Depressurization and Cooling Systems
4. NEI 99-01 CTMT Integrity or Bypass Containment Potential Loss 4.C

Barrier: Containment

Category: E. Emergency Director Judgment

Degradation Threat: Loss

Threshold:

CNB9

Any condition in the opinion of the Emergency Director that indicates loss of the Containment barrier

Definition(s):

None

Basis:

This threshold addresses any other factors that may be used by the Emergency Director in determining whether the Containment Barrier is lost.

Reference(s):

1. NEI 99-01 Emergency Director Judgment Containment Loss 6.A

Barrier: Containment

Category: E. Emergency Director Judgment

Degradation Threat: Potential Loss

Threshold:

CNB10

Any condition in the opinion of the Emergency Director that indicates potential loss of the Containment barrier

Definition(s):

None

Basis:

This threshold addresses any other factors that may be used by the Emergency Director in determining whether the Containment Barrier is potentially lost. The Emergency Director should also consider whether or not to declare the barrier potentially lost in the event that barrier status cannot be monitored.

Reference(s):

1. NEI 99-01 Emergency Director Judgment Containment Potential Loss 6.A

Category H – Hazards and Other Conditions Affecting Plant Safety

EAL Group: ANY (EALs in this category are applicable to any plant condition, hot or cold.)

Hazards are non-plant, system-related events that can directly or indirectly affect plant operation, reactor plant safety or personnel safety.

1. Security

Unauthorized entry attempts into the PROTECTED AREA, bomb threats, sabotage attempts, and actual security compromises threatening loss of physical control of the plant.

2. Seismic Event

Natural events such as earthquakes have potential to cause plant structure or equipment damage of sufficient magnitude to threaten personnel or plant safety.

3. Natural or Technological Hazard

Other natural and non-naturally occurring events that can cause damage to plant facilities include tornados, FLOODING, hazardous material releases and events restricting site access warranting classification.

4. Fire

FIRES can pose significant hazards to personnel and reactor safety. Appropriate for classification are FIRES within the plant PROTECTED AREA or which may affect operability of equipment needed for safe shutdown

5. Hazardous Gas

Toxic, corrosive, asphyxiant or flammable gas leaks can affect normal plant operations or preclude access to plant areas required to safely shutdown the plant.

6. Control Room Evacuation

Events that are indicative of loss of Control Room habitability. If the Control Room must be evacuated, additional support for monitoring and controlling plant functions is necessary through the emergency response facilities.

7. Emergency Director Judgment

The EALs defined in other categories specify the predetermined symptoms or events that are indicative of emergency or potential emergency conditions and thus warrant classification. While these EALs have been developed to address the full spectrum of possible emergency conditions which may warrant classification and subsequent implementation of the Emergency Plan, a provision for classification of emergencies based on operator/management experience and judgment is still necessary. The EALs of this category provide the Emergency Director the latitude to classify emergency conditions consistent with the established classification criteria based upon Emergency Director judgment.

Category: H – Hazards

Subcategory: 1 – Security

Initiating Condition: Confirmed SECURITY CONDITION or threat

EAL:

HU1.1 Unusual Event

A SECURITY CONDITION that does **not** involve a HOSTILE ACTION as reported by Security Shift Supervisor

OR

Notification of a credible security threat directed at the site

OR

A validated notification from the NRC providing information of an aircraft threat

Mode Applicability:

All

Definition(s):

HOSTAGE - A person(s) held as leverage against the station to ensure that demands will be met by the station.

HOSTILE ACTION - An act toward WF3 or its personnel that includes the use of violent force to destroy equipment, take HOSTAGES, and/or intimidate the licensee to achieve an end. This includes attack by air, land, or water using guns, explosives, PROJECTILES, vehicles, or other devices used to deliver destructive force. Other acts that satisfy the overall intent may be included. Hostile action should **not** be construed to include acts of civil disobedience or felonious acts that are **not** part of a concerted attack on WF3. Non-terrorism-based EALs should be used to address such activities (i.e., this may include violent acts between individuals in the SECURITY OWNER CONTROLLED AREA (SOCA)).

PROJECTILE - An object directed toward a Nuclear Power Plant that could cause concern for its continued operability, reliability, or personnel safety.

PROTECTED AREA - The area encompassed by physical barriers (the security fence) and to which access is controlled into the vital areas of the plant.

SAFETY SYSTEM - A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related (as defined in 10 CFR 50.2):

Those structures, systems and components that are relied upon to remain functional during and following design basis events to assure:

(1) The integrity of the reactor coolant pressure boundary;

(2) The capability to shut down the reactor and maintain it in a safe shutdown condition;

(3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures.

SECURITY CONDITION - **Any** security event as listed in the approved security contingency plan that constitutes a threat/compromise to site security, threat/risk to site personnel, or a potential degradation to the level of safety of the plant. A security condition does **not** involve a HOSTILE ACTION.

SECURITY OWNER CONTROLLED AREA (SOCA) - The area inside the SOCA Vehicle Barrier System (VBS) up to the PROTECTED AREA fence line. Access to this area is controlled by the SOCA Personnel Access Control Point. The SOCA is part of but not equal to the Owner Controlled Area as described or defined in the Waterford 3 Emergency Plan.

Basis:

This IC addresses events that pose a threat to plant personnel or SAFETY SYSTEM equipment, and thus represent a potential degradation in the level of plant safety. Security events which do not meet one of these EALs are adequately addressed by the requirements of 10 CFR 73.71 or 10 CFR 50.72. Security events assessed as HOSTILE ACTIONS are classifiable under ICs HA1 and HS1.

Timely and accurate communications between Security Shift Supervision and the Control Room is essential for proper classification of a security-related event. Classification of these events will initiate appropriate threat-related notifications to plant personnel and Offsite Response Organizations.

Security plans and terminology are based on the guidance provided by NEI 03-12, *Template for the Security Plan, Training and Qualification Plan, Safeguards Contingency Plan [and Independent Spent Fuel Storage Installation Security Program]*.

The first threshold references the Security Shift Supervisor because this is the individual trained to confirm that a security event is occurring or has occurred. Training on security event confirmation and classification is controlled due to the nature of Safeguards and 10 CFR 2.39 information.

The second threshold addresses the receipt of a credible security threat. The credibility of the threat is assessed in accordance with the WF3 Safeguards Contingency Plan (ref. 1).

The third threshold addresses the threat from the impact of an aircraft on the plant. The NRC Headquarters Operations Officer (HOO) will communicate to the licensee if the threat involves an aircraft. The status and size of the plane may also be provided by NORAD through the NRC. Validation of the threat is performed in accordance with the WF3 Safeguards Contingency Plan (ref.1).

Emergency plans and implementing procedures are public documents; therefore, EALs should not incorporate Security-sensitive information. This includes information that may be advantageous to a potential adversary, such as the particulars concerning a specific threat or threat location. Security-sensitive information should be contained in non-public documents such as the Safeguards Contingency Plan for WF3 (ref. 1).

Escalation of the emergency classification level would be via IC HA1.

Reference(s):

1. WF3 Safeguards Contingency Plan
2. NEI 99-01 HU1

Category: H – Hazards

Subcategory: 1 – Security

Initiating Condition: HOSTILE ACTION within the SECURITY OWNER CONTROLLED AREA or airborne attack threat within 30 minutes

EAL:

HA1.1 Alert

A HOSTILE ACTION is occurring or has occurred within the SECURITY OWNER CONTROLLED AREA as reported by Security Shift Supervisor

OR

A validated notification from NRC of an aircraft attack threat within 30 min. of the site

Mode Applicability:

All

Definition(s):

HOSTAGE - A person(s) held as leverage against the station to ensure that demands will be met by the station.

HOSTILE ACTION - An act toward WF3 or its personnel that includes the use of violent force to destroy equipment, take HOSTAGES, and/or intimidate the licensee to achieve an end. This includes attack by air, land, or water using guns, explosives, PROJECTILES, vehicles, or other devices used to deliver destructive force. Other acts that satisfy the overall intent may be included. Hostile action should **not** be construed to include acts of civil disobedience or felonious acts that are **not** part of a concerted attack on WF3. Non-terrorism-based EALs should be used to address such activities (i.e., this may include violent acts between individuals in the SECURITY OWNER CONTROLLED AREA (SOCA)).

HOSTILE FORCE - One or more individuals who are engaged in a determined assault, overtly or by stealth and deception, equipped with suitable weapons capable of killing, maiming, or causing destruction.

PROJECTILE - An object directed toward a Nuclear Power Plant that could cause concern for its continued operability, reliability, or personnel safety.

PROTECTED AREA - The area encompassed by physical barriers (the security fence) and to which access is controlled into the vital areas of the plant.

SECURITY OWNER CONTROLLED AREA (SOCA) - The area inside the SOCA Vehicle Barrier System (VBS) up to the PROTECTED AREA fence line. Access to this area is controlled by the SOCA Personnel Access Control Point. The SOCA is part of but not equal to the Owner Controlled Area as described or defined in the Waterford 3 Emergency Plan.

Basis:

This IC addresses the occurrence of a HOSTILE ACTION within the SECURITY OWNER CONTROLLED AREA or notification of an aircraft attack threat. This event will require rapid response and assistance due to the possibility of the attack progressing to the PROTECTED AREA, or the need to prepare the plant and staff for a potential aircraft impact.

Timely and accurate communications between Security Shift Supervision and the Control Room is essential for proper classification of a security-related event.

Security plans and terminology are based on the guidance provided by NEI 03-12, *Template for the Security Plan, Training and Qualification Plan, Safeguards Contingency Plan [and Independent Spent Fuel Storage Installation Security Program]*.

As time and conditions allow, these events require a heightened state of readiness by the plant staff and implementation of onsite protective measures (e.g., evacuation, dispersal or sheltering). The Alert declaration will also heighten the awareness of Offsite Response Organizations (OROs), allowing them to be better prepared should it be necessary to consider further actions.

This EAL does not apply to incidents that are accidental events, acts of civil disobedience, or otherwise are not a HOSTILE ACTION perpetrated by a HOSTILE FORCE. Examples include the crash of a small aircraft, shots from hunters, physical disputes between employees, etc. Reporting of these types of events is adequately addressed by other EALs, or the requirements of 10 CFR 73.71 or 10 CFR 50.72.

The first threshold is applicable for any HOSTILE ACTION occurring, or that has occurred, in the SECURITY OWNER CONTROLLED AREA.

The second threshold addresses the threat from the impact of an aircraft on the plant, and the anticipated arrival time is within 30 minutes. The intent of this EAL is to ensure that threat-related notifications are made in a timely manner so that plant personnel and OROs are in a heightened state of readiness. This EAL is met when the threat-related information has been validated in accordance with the WF3 Safeguards Contingency Plan (ref.1).

The NRC Headquarters Operations Officer (HOO) will communicate to the licensee if the threat involves an aircraft. The status and size of the plane may be provided by NORAD through the NRC.

In some cases, it may not be readily apparent if an aircraft impact within the SECURITY OWNER CONTROLLED AREA was intentional (i.e., a HOSTILE ACTION). It is expected, although not certain, that notification by an appropriate Federal agency to the site would clarify this point. In this case, the appropriate federal agency is intended to be NORAD, FBI, FAA or NRC. The emergency declaration, including one based on other ICs/EALs, should not be unduly delayed while awaiting notification by a Federal agency.

Emergency plans and implementing procedures are public documents; therefore, EALs should not incorporate Security-sensitive information. This includes information that may be advantageous to a potential adversary, such as the particulars concerning a specific threat or threat location. Security-sensitive information should be contained in non-public documents such as the Safeguards Contingency Plan for WF3 (ref. 1).

Escalation of the emergency classification level would be via IC HS1.

Reference(s):

1. WF3 Safeguards Contingency Plan
2. NEI 99-01 HA1

Category: H – Hazards

Subcategory: 1 – Security

Initiating Condition: HOSTILE ACTION within the PROTECTED AREA

EAL:

HS1.1 Site Area Emergency

A HOSTILE ACTION is occurring or has occurred within the PROTECTED AREA as reported by Security Shift Supervisor

Mode Applicability:

All

Definition(s):

HOSTAGE - A person(s) held as leverage against the station to ensure that demands will be met by the station.

HOSTILE ACTION - An act toward WF3 or its personnel that includes the use of violent force to destroy equipment, take HOSTAGES, and/or intimidate the licensee to achieve an end. This includes attack by air, land, or water using guns, explosives, PROJECTILES, vehicles, or other devices used to deliver destructive force. Other acts that satisfy the overall intent may be included. Hostile action should **not** be construed to include acts of civil disobedience or felonious acts that are **not** part of a concerted attack on WF3. Non-terrorism-based EALs should be used to address such activities (i.e., this may include violent acts between individuals in the SECURITY OWNER CONTROLLED AREA (SOCA)).

HOSTILE FORCE - One or more individuals who are engaged in a determined assault, overtly or by stealth and deception, equipped with suitable weapons capable of killing, maiming, or causing destruction.

PROJECTILE - An object directed toward a Nuclear Power Plant that could cause concern for its continued operability, reliability, or personnel safety.

PROTECTED AREA - The area encompassed by physical barriers (the security fence) and to which access is controlled into the vital areas of the plant.

SECURITY OWNER CONTROLLED AREA (SOCA) - The area inside the SOCA Vehicle Barrier System (VBS) up to the PROTECTED AREA fence line. Access to this area is controlled by the SOCA Personnel Access Control Point. The SOCA is part of but not equal to the Owner Controlled Area as described or defined in the Waterford 3 Emergency Plan.

Basis:

This IC addresses the occurrence of a HOSTILE ACTION within the PROTECTED AREA. This event will require rapid response and assistance due to the possibility for damage to plant equipment.

Timely and accurate communications between Security Shift Supervision and the Control Room is essential for proper classification of a security-related event.

Security plans and terminology are based on the guidance provided by NEI 03-12, *Template for the Security Plan, Training and Qualification Plan, Safeguards Contingency Plan [and Independent Spent Fuel Storage Installation Security Program]*.

As time and conditions allow, these events require a heightened state of readiness by the plant staff and implementation of onsite protective measures (e.g., evacuation, dispersal or sheltering). The Site Area Emergency declaration will mobilize Offsite Response Organization (ORO) resources and have them available to develop and implement public protective actions in the unlikely event that the attack is successful in impairing multiple safety functions.

This EAL does not apply to incidents that are accidental events, acts of civil disobedience, or otherwise are not a HOSTILE ACTION perpetrated by a HOSTILE FORCE. Examples include the crash of a small aircraft, shots from hunters, physical disputes between employees, etc. Reporting of these types of events is adequately addressed by other EALs, or the requirements of 10 CFR 73.71 or 10 CFR 50.72.

Emergency plans and implementing procedures are public documents; therefore, EALs should not incorporate Security-sensitive information. This includes information that may be advantageous to a potential adversary, such as the particulars concerning a specific threat or threat location. Security-sensitive information should be contained in non-public documents such as the Safeguards Contingency Plan for WF3 (ref. 1).

Reference(s):

1. WF3 Safeguards Contingency Plan
2. NEI 99-01 HS1

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 2 – Seismic Event

Initiating Condition: Seismic event greater than OBE levels

EAL:

HU2.1 Unusual Event

Seismic event > OBE as indicated by RED light on the seismic monitor panel

Mode Applicability:

All

Definition(s):

None

Basis:

A RED LIGHT on the Seismic Monitoring Panel indicates that the design limit for the Operating Basis Earthquake (OBE) (0.05g horizontal or 0.033g vertical) has been exceeded.

This IC addresses a seismic event that results in accelerations at the plant site greater than those specified for an Operating Basis Earthquake (OBE). An earthquake greater than an OBE but less than a Safe Shutdown Earthquake (SSE) should have no significant impact on safety-related systems, structures and components; however, some time may be required for the plant staff to ascertain the actual post-event condition of the plant (e.g., performs walk-downs and post-event inspections). Given the time necessary to perform walk-downs and inspections, and fully understand any impacts, this event represents a potential degradation of the level of safety of the plant.

Event verification with external sources should not be necessary during or following an OBE. Earthquakes of this magnitude should be readily felt by on-site personnel and recognized as a seismic event (e.g., lateral accelerations in excess of 0.05g). The Shift Manager or Emergency Director may seek external verification if deemed appropriate (e.g., a call to the U.S. Geological Survey (USGS), check internet news sources, etc.); however, the verification action must not preclude a timely emergency declaration.

Depending upon the plant mode at the time of the event, escalation of the emergency classification level would be via IC CA6 or SA9.

To avoid inappropriate emergency classification resulting from spurious actuation of the seismic instrumentation or felt motion not attributable to seismic activity, an offsite agency can confirm that an earthquake has occurred in the area of the plant. Such confirmation should not, however, preclude a timely emergency declaration based on receipt of the OBE alarm. If requested, provide the analyst with the following WF3 coordinates: **29º 59' 42" north latitude, 90º 28' 16" west longitude** (ref. 3). Seismic activity information can be accessed via the contact information in the Emergency Management Resources Book, Section IV, Offsite Support Organizations.

Reference(s):

1. UFSAR Section 3.7.4 Seismic Instrumentation
2. OP-901-522 Seismic Event
3. UFSAR Section 1.2.1.1 Location and Population
4. NEI 99-01 HU2

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 3 – Natural or Technological Hazard

Initiating Condition: Hazardous event

EAL:

HU3.1 Unusual Event

A tornado strike within the PROTECTED AREA

Mode Applicability:

All

Definition(s):

PROTECTED AREA - The area encompassed by physical barriers (the security fence) and to which access is controlled into the vital areas of the plant.

Basis:

This IC addresses hazardous events that are considered to represent a potential degradation of the level of safety of the plant.

This EAL addresses a tornado striking (touching down) within the PROTECTED AREA.

Escalation of the emergency classification level would be based on ICs in Recognition Categories A, F, S or C.

If damage is confirmed visually or by other in-plant indications, the event may be escalated to an Alert under EAL CA6.1 or SA9.1.

A tornado striking (touching down) within the PROTECTED AREA warrants declaration of an Unusual Event regardless of the measured wind speed at the meteorological tower. A tornado is defined as a violently rotating column of air in contact with the ground and extending from the base of a thunderstorm.

Reference(s):

1. OP-901-521 Severe Weather and Flooding
2. NEI 99-01 HU3

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 3 – Natural or Technological Hazard

Initiating Condition: Hazardous event

EAL:

HU3.2 Unusual Event

Internal room or area FLOODING of a magnitude sufficient to require manual or automatic electrical isolation of a SAFETY SYSTEM component required by Technical Specifications for the current operating mode

Mode Applicability:

All

Definition(s):

FLOODING - A condition where water is entering a room or area faster than installed equipment is capable of removal, resulting in a rise of water level within the room or area.

SAFETY SYSTEM - A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related (as defined in 10 CFR 50.2):

Those structures, systems and components that are relied upon to remain functional during and following design basis events to assure:

(1) The integrity of the reactor coolant pressure boundary;

(2) The capability to shut down the reactor and maintain it in a safe shutdown condition;

(3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures.

Basis:

This IC addresses hazardous events that are considered to represent a potential degradation of the level of safety of the plant.

This EAL addresses FLOODING of a building room or area that results in operators isolating power to a SAFETY SYSTEM component due to water level or other wetting concerns. Classification is also required if the water level or related wetting causes an automatic isolation of a SAFETY SYSTEM component from its power source (e.g., a breaker or relay trip). To warrant classification, operability of the affected component must be required by Technical Specifications for the current operating mode.

Escalation of the emergency classification level would be based on ICs in Recognition Categories A, F, S or C.

Refer to EAL CA6.1 or SA9.1 for internal FLOODING affecting more than one SAFETY SYSTEM train.

Reference(s):

1. UFSAR Section 3.6A.6 Flooding Analysis
2. NEI 99-01 HU3

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 3 – Natural or Technological Hazard

Initiating Condition: Hazardous event

EAL:

HU3.3 Unusual Event

Movement of personnel within the PROTECTED AREA is IMPEDED due to an event external to the PROTECTED AREA involving hazardous materials (e.g., an offsite chemical spill or toxic gas release)

Mode Applicability:

All

Definition(s):

IMPEDE(D) - Personnel access to a room or area is hindered to an extent that extraordinary measures are necessary to facilitate entry of personnel into the affected room/area (e.g., requiring use of protective equipment, such as SCBAs, that is **not** routinely employed).

PROTECTED AREA - The area encompassed by physical barriers (the security fence) and to which access is controlled into the vital areas of the plant.

Basis:

This IC addresses hazardous events that are considered to represent a potential degradation of the level of safety of the plant.

This EAL addresses a hazardous materials event originating at a location outside the PROTECTED AREA and of sufficient magnitude to IMPEDE the movement of personnel within the PROTECTED AREA.

Escalation of the emergency classification level would be based on ICs in Recognition Categories A, F, S or C.

Reference(s):

1. NEI 99-01 HU3

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 3 – Natural or Technological Hazard

Initiating Condition: Hazardous event

EAL:

HU3.4 Unusual Event

A hazardous event that results in on-site conditions sufficient to prohibit the plant staff from accessing the site via personal vehicles (Note 7)

Note 7: This EAL does **not** apply to routine traffic impediments such as fog, snow, ice, or vehicle breakdowns or accidents.

Mode Applicability:

All

Definition(s):

FLOODING - A condition where water is entering a room or area faster than installed equipment is capable of removal, resulting in a rise of water level within the room or area.

Basis:

This IC addresses hazardous events that are considered to represent a potential degradation of the level of safety of the plant.

This EAL addresses a hazardous event that causes an on-site impediment to vehicle movement and significant enough to prohibit the plant staff from accessing the site using personal vehicles. Examples of such an event include site FLOODING caused by a hurricane, heavy rains, up-river water releases, dam failure, etc., or an on-site train derailment blocking the access road.

This EAL is not intended to apply to routine impediments such as fog, snow, ice, or vehicle breakdowns or accidents, but rather to more significant conditions such as the Hurricane Andrew strike on Turkey Point in 1992, the FLOODING around the Cooper Station during the Midwest floods of 1993, or the FLOODING around Ft. Calhoun Station in 2011.

Escalation of the emergency classification level would be based on ICs in Recognition Categories A, F, S or C.

Reference(s):

1. NEI 99-01 HU3

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 4 – Fire

Initiating Condition: FIRE potentially degrading the level of safety of the plant

EAL:

HU4.1 Unusual Event

A FIRE is **not** extinguished within 15 min. of **any** of the following FIRE detection indications (Note 1):

- Report from the field (i.e., visual observation)
- Receipt of multiple (more than 1) fire alarms or indications (Note 12)
- Field verification of a single fire alarm

AND

The FIRE is located within **any** Table H-1 area

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Note 12: Bullet 2 of this EAL (multiple fire alarm indications) is **not** applicable when diagnosed into a LOCA or Excess Steam Demand event in Containment.

Table H-1 Fire Areas
• Containment • Cooling Tower Areas • Fuel Handling Building • Reactor Auxiliary Building

Mode Applicability:

All

Definition(s):

FIRE - Combustion characterized by heat and light. Sources of smoke such as slipping drive belts or overheated electrical equipment do **not** constitute fires. Observation of flame is preferred but is **not** required if large quantities of smoke and heat are observed.

VALID - An indication, report, or condition, is considered to be valid when it is verified by (1) an instrument channel check, or (2) indications on related or redundant indicators, or (3) by direct observation by plant personnel, such that doubt related to the indicator's operability, the condition's existence, or the report's accuracy is removed. Implicit in this definition is the need for timely assessment.

Basis:

This IC addresses the magnitude and extent of FIRES that may be indicative of a potential degradation of the level of safety of the plant.

The intent of the 15-minute duration is to size the FIRE and to discriminate against small FIRES that are readily extinguished (e.g., smoldering waste paper basket). In addition to alarms, other indications of a FIRE could be a drop in fire main pressure, automatic activation of a suppression system, etc.

Upon receipt, operators will take prompt actions to confirm the validity of an initial fire alarm, indication, or report. For EAL assessment purposes, the emergency declaration clock starts at the time that the initial alarm, indication, or report was received, and not the time that a subsequent verification action was performed. Similarly, the fire duration clock also starts at the time of receipt of the initial alarm, indication or report.

Depending upon the plant mode at the time of the event, escalation of the emergency classification level would be via EAL CA6.1 or SA9.1.

Table H-1 Fire Areas are those areas that contain equipment necessary for safe operation and shutdown of the plant (ref. 1).

Reference(s):

1. UFSAR Section 9.5.1.3.2 Fire Area-By-Fire Area Analysis
2. NEI 99-01 HU4

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 4 – Fire

Initiating Condition: FIRE potentially degrading the level of safety of the plant

EAL:

HU4.2 Unusual Event

Receipt of a single fire alarm (i.e., **no** other indications of a FIRE) (Note 13)

AND

The fire alarm is indicating a FIRE within **any** Table H-1 area

AND

The existence of a FIRE is **not** verified (i.e., proved or disproved) within 30 min. of alarm receipt (Note 1)

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Note 13: During Modes 1 and 2, HU4.2 is **not** applicable to a single fire alarm in containment. A fire in containment in these modes should be assessed under EAL HU4.1.

Table H-1 Fire Areas
• Containment • Cooling Tower Areas • Fuel Handling Building • Reactor Auxiliary Building

Mode Applicability:

All

Definition(s):

FIRE - Combustion characterized by heat and light. Sources of smoke such as slipping drive belts or overheated electrical equipment do **not** constitute fires. Observation of flame is preferred but is **not** required if large quantities of smoke and heat are observed.

VALID - An indication, report, or condition, is considered to be valid when it is verified by (1) an instrument channel check, or (2) indications on related or redundant indicators, or (3) by direct observation by plant personnel, such that doubt related to the indicator's operability, the condition's existence, or the report's accuracy is removed. Implicit in this definition is the need for timely assessment.

Basis:

This IC addresses the magnitude and extent of FIRES that may be indicative of a potential degradation of the level of safety of the plant.

This EAL addresses receipt of a single fire alarm, and the existence of a FIRE is not verified (i.e., proved or disproved) within 30-minutes of the alarm. Upon receipt, operators will take prompt actions to confirm the validity of a single fire alarm. For EAL assessment purposes, the 30-minute clock starts at the time that the initial alarm was received, and not the time that a subsequent verification action was performed.

A single fire alarm, absent other indication(s) of a FIRE, may be indicative of equipment failure or a spurious activation, and not an actual FIRE. For this reason, additional time is allowed to verify the validity of the alarm. The 30-minute period is a reasonable amount of time to determine if an actual FIRE exists; however, after that time, and absent information to the contrary, it is assumed that an actual FIRE is in progress.

This EAL is not applicable for containment in Modes 1 and 2. The containment air flow design and Technical Specification requirements for operation of Containment Fan Coolers are such that multiple smoke detectors would be expected to alarm for a fire in containment. A fire in containment in these modes would therefore be classified under EAL HU4.1.

If an actual FIRE is verified by a report from the field, then HU4.1 is immediately applicable, and the emergency must be declared if the FIRE is not extinguished within 15-minutes of the report. If the alarm is verified to be due to an equipment failure or a spurious activation, and this verification occurs within 30-minutes of the receipt of the alarm, then this EAL is not applicable and no emergency declaration is warranted.

<u>Basis-Related Fire Protection Requirements</u>

> Criterion 3 of 10 CFR 50, Appendix A, states in part:
>
> "Structures, systems, and components important to safety shall be designed and located to minimize, consistent with other safety requirements, the probability and effect of fires and explosions."

In this respect, noncombustible and heat resistant materials are used wherever practical throughout the unit, particularly in locations such as the containment and Control Room. Fire detection and fighting systems of appropriate capacity and capability are provided and designed to minimize the adverse effects of fires on SSCs important to safety. Firefighting systems are designed to assure that the rupture or inadvertent operation of a fire system does not significantly impair the safety capability of these structures, systems, and components.

In addition, the use of 1-hour fire barriers for the enclosure of cable and equipment and associated non-safety circuits of one redundant train is employed. As used in HU4.2, the 30-minutes to verify a single alarm is well within this worst-case 1-hour time period.

Depending upon the plant mode at the time of the event, escalation of the emergency classification level would be via EAL CA6.1 or SA9.1.

The 30 minute requirement begins upon receipt of a single valid fire detection system alarm. The alarm is to be validated using available Control Room indications or alarms to prove that it is not spurious, or by reports from the field. Actual field reports must be made within the 30-minute time limit or a classification must be made. If a fire is verified to be occurring by field report, classification shall be made based on EAL HU4.1, with the 15-minute requirement beginning with the verification of the fire by field report.

Table H-1 Fire Areas are those areas that contain equipment necessary for safe operation and shutdown of the plant (ref. 1).

Reference(s):

1. OP-901-524 Fire in Areas Affecting Safe Shutdown
2. EP FAQ 2018-003
3. NEI 99-01 HU4

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 4 – Fire

Initiating Condition: FIRE potentially degrading the level of safety of the plant

EAL:

HU4.3 Unusual Event

A FIRE within the PROTECTED AREA **not** extinguished within 60 min. of the initial report, alarm or indication (Note 1)

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Mode Applicability:

All

Definition(s):

FIRE - Combustion characterized by heat and light. Sources of smoke such as slipping drive belts or overheated electrical equipment do **not** constitute fires. Observation of flame is preferred but is **not** required if large quantities of smoke and heat are observed.

PROTECTED AREA - The area encompassed by physical barriers (the security fence) and to which access is controlled into the vital areas of the plant.

Basis:

This IC addresses the magnitude and extent of FIRES that may be indicative of a potential degradation of the level of safety of the plant.

In addition to a FIRE addressed by EAL HU4.1 or HU4.2, a FIRE within the plant PROTECTED AREA not extinguished within 60-minutes may also potentially degrade the level of plant safety.
Depending upon the plant mode at the time of the event, escalation of the emergency classification level would be via EAL CA6.1 or SA9.1.

Reference(s):

1. NEI 99-01 HU4

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 4 – Fire

Initiating Condition: FIRE potentially degrading the level of safety of the plant

EAL:

HU4.4 Unusual Event

A FIRE within the PROTECTED AREA that requires firefighting support by an offsite fire response agency to extinguish

Mode Applicability:

All

Definition(s):

FIRE - Combustion characterized by heat and light. Sources of smoke such as slipping drive belts or overheated electrical equipment do **not** constitute fires. Observation of flame is preferred but is **not** required if large quantities of smoke and heat are observed.

PROTECTED AREA - The area encompassed by physical barriers (the security fence) and to which access is controlled into the vital areas of the plant.

Basis:

This IC addresses the magnitude and extent of FIRES that may be indicative of a potential degradation of the level of safety of the plant.

If a FIRE within the plant PROTECTED AREA is of sufficient size to require a response by an offsite firefighting agency (e.g., a local town Fire Department), then the level of plant safety is potentially degraded. The dispatch of an offsite firefighting agency to the site requires an emergency declaration only if it is needed to actively support firefighting efforts because the fire is beyond the capability of the Fire Brigade to extinguish. Declaration is not necessary if the agency resources are placed on stand-by, or supporting post-extinguishment recovery or investigation actions.

Depending upon the plant mode at the time of the event, escalation of the emergency classification level would be via EAL CA6.1 or SA9.1.

Reference(s):

1. NEI 99-01 HU4

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 5 – Hazardous Gas

Initiating Condition: Gaseous release IMPEDING access to equipment necessary for normal plant operations, cooldown or shutdown

EAL:

HA5.1 Alert

Release of a toxic, corrosive, asphyxiant or flammable gas into **any** Table H-2 room or area

AND

Entry into the room or area is prohibited or IMPEDED (Note 5)

Note 5: If the equipment in the listed room or area was already inoperable or out-of-service before the event occurred, then **no** emergency classification is warranted.

Table H-2 Safe Operation & Shutdown Rooms/Areas

Room/Area	Mode
Turbine Building (all elevations and rooms)	1
Polisher Building (all elevations and rooms)	1
-4 RCA Letdown Valve Gallery	3
+21 RAB Switchgears A or B	3
-4 RCA Wing Area	4
-15 RCA Valve Gallery	4
-35 RCA Safeguard Rooms	4
+21 RAB Switchgears A or B	4

Mode Applicability:

1 – Power Operation, 3 – Hot Standby, 4 – Hot Shutdown

Definition(s):

IMPEDE(D) - Personnel access to a room or area is hindered to an extent that extraordinary measures are necessary to facilitate entry of personnel into the affected room/area (e.g., requiring use of protective equipment, such as SCBAs, that is **not** routinely employed).

Basis:

This IC addresses an event involving a release of a hazardous gas that precludes or IMPEDES access to equipment necessary to maintain normal plant operation, or required for a normal plant cooldown and shutdown. This condition represents an actual or potential substantial degradation of the level of safety of the plant. This gas release could originate either on site or off site.

An Alert declaration is warranted if entry into the affected room/area is, or may be, procedurally required during the plant operating mode in effect at the time of the gaseous release. The emergency classification is not contingent upon whether entry is actually necessary at the time of the release.

Evaluation of the IC and EAL do not require atmospheric sampling; it only requires the Emergency Director's judgment that the gas concentration in the affected room/area is sufficient to preclude or significantly IMPEDE procedurally required access. This judgment may be based on a variety of factors including an existing job hazard analysis, report of ill effects on personnel, advice from a subject matter expert or operating experience with the same or similar hazards. Access should be considered as IMPEDED if extraordinary measures are necessary to facilitate entry of personnel into the affected room/area (e.g., requiring use of protective equipment, such as SCBAs, that is not routinely employed).

An emergency declaration is **not** warranted if any of the following conditions apply:

- The plant is in an operating mode different than the mode specified for the affected room/area (i.e., entry is not required during the operating mode in effect at the time of the gaseous release). For example, the plant is in Mode 1 when the gaseous release occurs, and the procedures used for normal operation, cooldown and shutdown do not require entry into the affected room until Mode 4.
- The gas release is a planned activity that includes compensatory measures which address the temporary inaccessibility of a room or area (e.g., fire suppression system testing).
- The access control measures are of a conservative or precautionary nature, and would not actually prevent or IMPEDE a required action.
- If the equipment in the listed room or area was already inoperable, or out-of-service, before the event occurred, then no emergency should be declared since the event will have no adverse impact beyond that already allowed by Technical Specifications at the time of the event.

An asphyxiant is a gas capable of reducing the level of oxygen in the body to dangerous levels. Most commonly, asphyxiants work by merely displacing air in an enclosed environment. This reduces the concentration of oxygen below the normal level of around 19%, which can lead to breathing difficulties, unconsciousness or even death.

This EAL does not apply to firefighting activities that generate smoke and that automatically or manually activate a fire suppression system in an area.

The list of plant rooms or areas with entry-related mode applicability identified specify those rooms or areas that contain equipment which require a manual/local action as specified in operating procedures used for normal plant operation, cooldown and shutdown. Rooms or areas in which actions of a contingent or emergency nature would be performed (e.g., an action to address an off-normal or emergency condition such as emergency repairs, corrective measures or emergency operations) are not included. In addition, the list specifies the plant mode(s) during which entry would be required for each room or area (ref. 1).

Escalation of the emergency classification level would be via Recognition Category A, C or F ICs.

EAL HA5.1 mode applicability has been limited to the mode limitations of Table H-2 (Modes 1, 3 and 4 **only**).

Reference(s):

1. Attachment 2 Safe Operation & Shutdown Areas Tables A-3 & H-2 Bases
2. NEI 99-01 HA5

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 6 – Control Room Evacuation

Initiating Condition: Control Room evacuation resulting in transfer of plant control to alternate locations

EAL:

HA6.1 Alert

An event has resulted in plant control being transferred from the Control Room to the Remote Shutdown Panel (LCP-43)

Mode Applicability:

All

Definition(s):

None

Basis:

This IC addresses an evacuation of the Control Room that results in transfer of plant control to alternate locations outside the Control Room. The loss of the ability to control the plant from the Control Room is considered to be a potential substantial degradation in the level of plant safety.

Following a Control Room evacuation, control of the plant will be transferred to alternate shutdown locations. The necessity to control a plant shutdown from outside the Control Room, in addition to responding to the event that required the evacuation of the Control Room, will present challenges to plant operators and other on-shift personnel. Activation of the ERO and emergency response facilities will assist in responding to these challenges.

Transfer of plant control begins when the last licensed operator leaves the Control Room.

Escalation of the emergency classification level would be via IC HS6.

Reference(s):

1. OP-901-502 Evacuation of Control Room and Subsequent Plant Shutdown
2. NEI 99-01 HA6

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 6 – Control Room Evacuation

Initiating Condition: Inability to control a key safety function from outside the Control Room

EAL:

HS6.1 Site Area Emergency

An event has resulted in plant control being transferred from the Control Room to the Remote Shutdown Panel (LCP-43)

AND

Control of **any** of the following key safety functions is **not** re-established within 15 min. (Note 1):

- Reactivity Control (Modes 1, 2 and 3 **only**)
- Core Heat Removal
- RCS Heat Removal

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Mode Applicability:

1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 – Hot Shutdown, 5 - Cold Shutdown, 6 - Refueling

Definition(s):

None

Basis:

This IC 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 failure to gain control of a key safety function following a transfer of plant control to alternate locations is a precursor to a challenge to one or more fission product barriers within a relatively short period of time.

The determination of whether or not “control” is established at the remote safe shutdown location(s) is based on Emergency Director judgment. The Emergency Director is expected to make a reasonable, informed judgment within 15 minutes whether or not the operating staff has control of key safety functions from the remote safe shutdown location(s).

Transfer of plant control and the time period to establish control begins when the last licensed operator leaves the Control Room.

OP-901-502 Evacuation of Control Room and Subsequent Plant Shutdown provides specific instructions for evacuating the Control Room and establishing plant control at the local control panel LCP-43. The 15 minute limit is established to ensure control is established at LCP-43 in sufficient time to allow completion of the remaining time critical actions in OP-901-502 (ref. 1).

Escalation of the emergency classification level would be via IC FG1 or CG1

Reference(s):

1. OP-901-502 Evacuation of Control Room and Subsequent Plant Shutdown
2. EP FAQ 2015-014
3. NEI 99-01 HS6

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 7 – Emergency Director Judgment

Initiating Condition: Other conditions exist that in the judgment of the Emergency Director warrant declaration of a UE

EAL:

HU7.1 Unusual Event

Other conditions exist which in the judgment of the Emergency Director indicate that events are in progress or have occurred which indicate a potential degradation of the level of safety of the plant or indicate a security threat to facility protection has been initiated. **No** releases of radioactive material requiring offsite response or monitoring are expected unless further degradation of SAFETY SYSTEMS occurs.

Mode Applicability:

All

Definition(s):

SAFETY SYSTEM - A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related (as defined in 10 CFR 50.2):

Those structures, systems and components that are relied upon to remain functional during and following design basis events to assure:

(1) The integrity of the reactor coolant pressure boundary;

(2) The capability to shut down the reactor and maintain it in a safe shutdown condition;

(3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures.

Basis:

This IC addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist which are believed by the Emergency Director to fall under the emergency classification level description for an UNUSUAL EVENT.

Reference(s):

1. NEI 99-01 HU7

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 7 – Emergency Director Judgment

Initiating Condition: Other conditions exist that in the judgment of the Emergency Director warrant declaration of an ALERT

EAL:

HA7.1 Alert

Other conditions exist which in the judgment of the Emergency Director indicate that events are in progress or have occurred which involve an actual or potential substantial degradation of the level of safety of the plant or a security event that involves probable life threatening risk to site personnel or damage to site equipment because of HOSTILE ACTION. **Any** releases are expected to be limited to small fractions of the EPA Protective Action Guideline exposure levels.

Mode Applicability:

All

Definition(s):

HOSTAGE - A person(s) held as leverage against the station to ensure that demands will be met by the station.

HOSTILE ACTION - An act toward WF3 or its personnel that includes the use of violent force to destroy equipment, take HOSTAGES, and/or intimidate the licensee to achieve an end. This includes attack by air, land, or water using guns, explosives, PROJECTILES, vehicles, or other devices used to deliver destructive force. Other acts that satisfy the overall intent may be included. Hostile action should **not** be construed to include acts of civil disobedience or felonious acts that are **not** part of a concerted attack on WF3. Non-terrorism-based EALs should be used to address such activities (i.e., this may include violent acts between individuals in the SECURITY OWNER CONTROLLED AREA (SOCA)).

PROJECTILE - An object directed toward a Nuclear Power Plant that could cause concern for its continued operability, reliability, or personnel safety.

PROTECTED AREA - The area encompassed by physical barriers (the security fence) and to which access is controlled into the vital areas of the plant.

SECURITY OWNR CONTROLLED AREA (SOCA) - The area inside the SOCA Vehicle Barrier System (VBS) up to the PROTECTED AREA fence line. Access to this area is controlled by the SOCA Personnel Access Control Point. The SOCA is part of but not equal to the Owner Controlled Area as described or defined in the Waterford 3 Emergency Plan.

Basis:

This IC addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist which are believed by the Emergency Director to fall under the emergency classification level description for an ALERT.

Reference(s):

1. NEI 99-01 HA7

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 7 – Emergency Director Judgment

Initiating Condition: Other conditions exist that in the judgment of the Emergency Director warrant declaration of a SITE AREA EMERGENCY

EAL:

HS7.1 Site Area Emergency

Other conditions exist which in the judgment of the Emergency Director indicate that events are in progress or have occurred which involve actual or likely major failures of plant functions needed for protection of the public or HOSTILE ACTION that results in intentional damage or malicious acts, (1) toward site personnel or equipment that could lead to the likely failure of or, (2) that prevent effective access to equipment needed for the protection of the public. **Any** releases are **not** expected to result in exposure levels which exceed EPA Protective Action Guideline exposure levels beyond the SITE BOUNDARY

Mode Applicability:

All

Definition(s):

HOSTAGE - A person(s) held as leverage against the station to ensure that demands will be met by the station.

HOSTILE ACTION - An act toward WF3 or its personnel that includes the use of violent force to destroy equipment, take HOSTAGES, and/or intimidate the licensee to achieve an end. This includes attack by air, land, or water using guns, explosives, PROJECTILES, vehicles, or other devices used to deliver destructive force. Other acts that satisfy the overall intent may be included. Hostile action should **not** be construed to include acts of civil disobedience or felonious acts that are **not** part of a concerted attack on WF3. Non-terrorism-based EALs should be used to address such activities (i.e., this may include violent acts between individuals in the SECUFRITY OWNER CONTROLLED AREA (SOCA)).

PROJECTILE - An object directed toward a Nuclear Power Plant that could cause concern for its continued operability, reliability, or personnel safety.

PROTECTED AREA - The area encompassed by physical barriers (the security fence) and to which access is controlled into the vital areas of the plant.

SECURITY OWNR CONTROLLED AREA (SOCA) - The area inside the SOCA Vehicle Barrier System (VBS) up to the PROTECTED AREA fence line. Access to this area is controlled by the SOCA Personnel Access Control Point. The SOCA is part of but not equal to the Owner Controlled Area as described or defined in the Waterford 3 Emergency Plan.

SITE BOUNDARY - The border of the Exclusion Area or an area corresponding to a distance of 914 meters from the Waterford 3 reactor. Also referred to as the Exclusion Area Boundary.

Basis:

This IC addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist which are believed by the Emergency Director to fall under the emergency classification level description for a SITE AREA EMERGENCY.

Reference(s):

1. NEI 99-01 HS7

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 7 – Emergency Director Judgment

Initiating Condition: Other conditions exist that in the judgment of the Emergency Director warrant declaration of a GENERAL EMERGENCY

EAL:

HG7.1 General Emergency

Other conditions exist which in the judgment of the Emergency Director indicate that events are in progress or have occurred which involve actual or IMMINENT substantial core degradation or melting with potential for loss of containment integrity or HOSTILE ACTION that results in an actual loss of physical control of the facility. Releases can be reasonably expected to exceed EPA Protective Action Guideline exposure levels offsite for more than the immediate site area

Mode Applicability:

All

Definition(s):

HOSTAGE - A person(s) held as leverage against the station to ensure that demands will be met by the station.

HOSTILE ACTION - An act toward WF3 or its personnel that includes the use of violent force to destroy equipment, take HOSTAGES, and/or intimidate the licensee to achieve an end. This includes attack by air, land, or water using guns, explosives, PROJECTILES, vehicles, or other devices used to deliver destructive force. Other acts that satisfy the overall intent may be included. Hostile action should **not** be construed to include acts of civil disobedience or felonious acts that are **not** part of a concerted attack on WF3. Non-terrorism-based EALs should be used to address such activities (i.e., this may include violent acts between individuals in the SECURITY OWNER CONTROLLED AREA (SOCA)).

IMMINENT - The trajectory of events or conditions is such that an EAL will be met within a relatively short period of time regardless of mitigation or corrective actions.

PROJECTILE - An object directed toward a Nuclear Power Plant that could cause concern for its continued operability, reliability, or personnel safety.

PROTECTED AREA - The area encompassed by physical barriers (the security fence) and to which access is controlled into the vital areas of the plant.

SECURITY OWNR CONTROLLED AREA (SOCA) - The area inside the SOCA Vehicle Barrier System (VBS) up to the PROTECTED AREA fence line. Access to this area is controlled by the SOCA Personnel Access Control Point. The SOCA is part of but not equal to the Owner Controlled Area as described or defined in the Waterford 3 Emergency Plan.

Basis:

This IC addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist which are believed by the Emergency Director to fall under the emergency classification level description for a GENERAL EMERGENCY.

Reference(s):

1. NEI 99-01 HG7

Category S – System Malfunction

EAL Group: Hot Conditions (RCS temperature > 200ºF); EALs in this category are applicable only in one or more hot operating modes.

Numerous system-related equipment failure events that warrant emergency classification have been identified in this category. They may pose actual or potential threats to plant safety.

The events of this category pertain to the following subcategories:

1. Loss of Safety Bus AC Power

Loss of emergency electrical power can compromise plant SAFETY SYSTEM operability including decay heat removal and emergency core cooling systems which may be necessary to ensure fission product barrier integrity. This category includes loss of onsite and offsite sources for 4160 VAC safety buses.

2. Loss of Vital DC Power

Loss of emergency electrical power can compromise plant SAFETY SYSTEM operability including decay heat removal and emergency core cooling systems which may be necessary to ensure fission product barrier integrity. This category includes loss of vital plant 125V DC power sources.

3. Loss of Control Room Indications

Certain events that degrade plant operator ability to effectively assess plant conditions within the plant warrant emergency classification. Losses of indicators are in this subcategory.

4. RCS Activity

During normal operation, reactor coolant fission product activity is very low. Small concentrations of fission products in the coolant are primarily from the fission of tramp uranium in the fuel clad or minor perforations in the clad itself. Any significant rise from these base-line levels (2% - 5% clad failures) is indicative of fuel failures and is covered under the Fission Product Barrier Degradation category. However, lesser amounts of clad damage may result in coolant activity exceeding Technical Specification limits. These fission products will be circulated with the reactor coolant and can be detected by coolant sampling.

5. RCS Leakage

The reactor vessel provides a volume for the coolant that covers the reactor core. The reactor pressure vessel and associated pressure piping (reactor coolant system) together provide a barrier to limit the release of radioactive material should the reactor fuel clad integrity fail. Excessive RCS leakage greater than Technical Specification limits indicates potential pipe cracks that may propagate to an extent threatening fuel clad, RCS and containment integrity.

6. RPS Failure

This subcategory includes events related to failure of the Reactor Protection System (RPS) to initiate and complete reactor trips. In the plant licensing basis, postulated failures of the RPS to complete a reactor trip comprise a specific set of analyzed events referred to as Anticipated Transient Without Scram (ATWS) events. For EAL classification, however, ATWS is intended to mean any trip failure event that does not achieve reactor shutdown. If RPS actuation fails to assure reactor shutdown, positive control of reactivity is at risk and could cause a threat to fuel clad, RCS and containment integrity.

7. Loss of Communications

Certain events that degrade plant operator ability to effectively communicate with essential personnel within or external to the plant warrant emergency classification.

8. Containment Failure

Failure of containment isolation capability (under conditions in which the containment is not currently challenged) warrants emergency classification. Failure of containment pressure control capability also warrants emergency classification.

9. Hazardous Event Affecting SAFETY SYSTEMS

Various natural and technological events that result in degraded plant SAFETY SYSTEM performance or significant VISIBLE DAMAGE warrant emergency classification under this subcategory.

Category: S – System Malfunction

Subcategory: 1 – Loss of Safety Bus AC Power

Initiating Condition: Loss of **all** offsite AC power capability to safety buses for 15 minutes or longer

EAL:

SU1.1 Unusual Event

Loss of **all** offsite AC power capability, Table S-1, to 4160 VAC safety buses 3A and 3B for ≥ 15 min. (Note 1)

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Table S-1 AC Power Sources	
Onsite	• Emergency Diesel Generator A • Emergency Diesel Generator B • Temporary Emergency Diesels (TEDs) (if already aligned) • Unit Auxiliary Transformer 3A • Unit Auxiliary Transformer 3B
Offsite	• Startup Transformer 3A • Startup Transformer 3B • Unit Auxiliary Transformer 3A (when back-fed from offsite) • Unit Auxiliary Transformer 3B (when back-fed from offsite)

Mode Applicability:

1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 – Hot Shutdown

Definition(s):

None

Basis:

This IC addresses a prolonged loss of offsite power. The loss of offsite power sources renders the plant more vulnerable to a complete loss of power to AC safety buses. This condition represents a potential reduction in the level of safety of the plant.

For emergency classification purposes, “capability” means that an offsite AC power source(s) is available to the safety buses, whether or not the buses are powered from it.

Fifteen minutes was selected as a threshold to exclude transient or momentary losses of offsite power.

Escalation of the emergency classification level would be via IC SA1.

Reference(s):

1. UFSAR Section 8.2, Offsite Power System
2. NEI 99-01 SU1

Category: S – System Malfunction

Subcategory: 1 – Loss of Safety Bus AC Power

Initiating Condition: Loss of **all but one** AC power source to safety buses for 15 minutes or longer

EAL:

SA1.1 Alert

AC power capability, Table S-1, to 4160 VAC safety buses 3A and 3B reduced to a single power source for ≥ 15 min. (Note 1)

AND

Any additional single power source failure will result in loss of **all** AC power to SAFETY SYSTEMS

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Table S-1 AC Power Sources	
Onsite	• Emergency Diesel Generator A • Emergency Diesel Generator B • Temporary Emergency Diesels (TEDs) (if already aligned) • Unit Auxiliary Transformer 3A • Unit Auxiliary Transformer 3B
Offsite	• Startup Transformer 3A • Startup Transformer 3B • Unit Auxiliary Transformer 3A (when back-fed from offsite) • Unit Auxiliary Transformer 3B (when back-fed from offsite)

Mode Applicability:

1 - Power Operation, 2 - Startup, 3 - Hot Standby, 3 - Hot Shutdown

Definition(s):

SAFETY SYSTEM - A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related (as defined in 10 CFR 50.2):

Those structures, systems and components that are relied upon to remain functional during and following design basis events to assure:

(1) The integrity of the reactor coolant pressure boundary;

(2) The capability to shut down the reactor and maintain it in a safe shutdown condition;

(3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures.

Basis:

This IC 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. In this condition, the sole AC power source may be powering one, or more than one, train of safety-related equipment. This IC provides an escalation path from IC SU1.

An "AC power source" is a source recognized in AOPs and EOPs, and capable of supplying required power to a safety bus. Some examples of this condition are presented below.

- A loss of all offsite power with a concurrent failure of all but one emergency power source (e.g., an onsite diesel generator).
- A loss of all offsite power and loss of all emergency power sources (e.g., onsite diesel generators) with a single train of safety buses being back-fed from the unit main generator via a Unit Auxiliary Transformer.
- A loss of emergency power sources (e.g., onsite diesel generators) with a single train of safety buses being fed from an offsite power source (Startup Transformer).

Fifteen minutes was selected as a threshold to exclude transient or momentary losses of power.

Escalation of the emergency classification level would be via IC SS1.

Temporary Emergency Diesels (TEDs) can be credited if already installed in accordance with site procedures (ref. 5, 6).

This EAL is the hot condition equivalent of the cold condition EAL CU2.1.

Reference(s):

1. UFSAR Section 8.1, Onsite Power System
2. UFSAR Section 8.2, Offsite Power System
3. OP-901-310 Loss of Train A Safety Bus
4. OP-901-311 Loss of Train B Safety Bus
5. Technical Specifications 3/4.8.1 A.C. Sources
6. ME-001-012, Temporary Power from Temporary Diesel for 3A2 and 3B2 4KV Buses (Modes 1-6)
7. NEI 99-01 SA1

Category: S – System Malfunction

Subcategory: 1 – Loss of Safety Bus AC Power

Initiating Condition: Loss of **all** offsite power and **all** onsite AC power to safety buses for 15 minutes or longer

EAL:

SS1.1 Site Area Emergency

Loss of **all** offsite and **all** onsite AC power to 4160 VAC safety buses 3A and 3B for ≥ 15 min. (Note 1)

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Mode Applicability:

1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 - Hot Shutdown

Definition(s):

SAFETY SYSTEM - A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related (as defined in 10 CFR 50.2):

Those structures, systems and components that are relied upon to remain functional during and following design basis events to assure:

(1) The integrity of the reactor coolant pressure boundary;

(2) The capability to shut down the reactor and maintain it in a safe shutdown condition;

(3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures.

Basis:

This IC addresses a total loss of AC power that compromises the performance of all SAFETY SYSTEMS requiring electric power including those necessary for emergency core cooling, containment heat removal/pressure control, spent fuel heat removal and the ultimate heat sink. Mitigative strategies using non-safety related power sources (FLEX generators, etc.) may be effective in supplying power to these buses. These power sources must be controlled in accordance with abnormal or emergency operating procedures, or beyond design basis accident response guidelines (e.g., FLEX support guidelines) and must be capable (alone or in combination) of supplying power for long term decay heat removal systems. In addition, fission product barrier monitoring capabilities may be degraded under these conditions. This IC represents a condition that involves actual or likely major failures of plant functions needed for the protection of the public.

Fifteen minutes was selected as a threshold to exclude transient or momentary power losses.

Escalation of the emergency classification level would be via IC AG1, FG1 or SG1.

Temporary Emergency Diesels (TEDs) can be credited if already installed in accordance with site procedures (ref. 4, 5).

This EAL is the hot condition equivalent of the cold condition EAL CA2.1.

Reference(s):

1. UFSAR Section 8.1, Onsite Power System
2. UFSAR Section 8.2, Offsite Power System
3. OP-902-005 Station Blackout Recovery
4. Technical Specifications 3/4.8.1 A.C. Sources
5. ME-001-012, Temporary Power from Temporary Diesel for 3A2 and 3B2 4KV Buses (Modes 1-6)
6. NEI 99-01 SS1

Category: S –System Malfunction

Subcategory: 1 – Loss of Safety Bus AC Power

Initiating Condition: Prolonged loss of **all** offsite and **all** onsite AC power to safety buses

EAL:

SG1.1 General Emergency

Loss of **all** offsite and **all** onsite AC power to 4160 VAC safety buses 3A and 3B

AND EITHER:

- Restoration of at least one 4160 VAC safety bus in < 4 hours is **not** likely (Note 1)
- Representative CETs reading > 1,200ºF

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Mode Applicability:

1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 - Hot Shutdown

Definition(s):

SAFETY SYSTEM - A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related (as defined in 10 CFR 50.2):

Those structures, systems and components that are relied upon to remain functional during and following design basis events to assure:

(1) The integrity of the reactor coolant pressure boundary;

(2) The capability to shut down the reactor and maintain it in a safe shutdown condition;

(3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures.

Basis:

This IC addresses a prolonged loss of all power sources to AC safety buses. A loss of all AC power 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. Mitigative strategies using non-safety related power sources (FLEX generators, etc.) may be effective in supplying power to these buses. These power sources must be controlled in accordance with abnormal or emergency operating procedures, or beyond design basis accident response guidelines (e.g., FLEX support guidelines) and must be capable (alone or in combination) of supplying power for long term decay heat removal systems. A prolonged loss of these buses will lead to a loss of one or more fission product barriers. In addition, fission product barrier monitoring capabilities may be degraded under these conditions.

The EAL should require declaration of a General Emergency prior to meeting the thresholds for IC FG1. This will allow additional time for implementation of offsite protective actions.

Escalation of the emergency classification from Site Area Emergency will occur if it is projected that power cannot be restored to at least one AC safety bus by the end of the analyzed station blackout coping period. Beyond this time, plant responses and event trajectory are subject to greater uncertainty, and there is a greater likelihood of challenges to multiple fission product barriers.

The 4 hours to restore AC power is based on the site blackout coping analysis performed in conformance with 10 CFR 50.63 (ref. 6).

The estimate for restoring at least one safety bus should be based on a realistic appraisal of the situation. Mitigation actions with a low probability of success should not be used as a basis for delaying a classification upgrade. The goal is to maximize the time available to prepare for, and implement, protective actions for the public.

The EAL will also require a General Emergency declaration if the loss of AC power results in parameters that indicate an inability to adequately remove decay heat from the core.

Temporary Emergency Diesels (TEDs) can be credited if already installed in accordance with site procedures (ref. 4, 5).

Reference(s):

1. UFSAR Section 8.1, Onsite Power System
2. UFSAR Section 8.2, Offsite Power System
3. OP-902-005 Station Blackout Recovery
4. Technical Specifications 3/4.8.1 A.C. Sources
5. ME-001-012, Temporary Power from Temporary Diesel for 3A2 and 3B2 4KV Buses (Modes 1-6)
6. UFSAR Appendix 8.1A Station Blackout (SBO) Evaluation
7. UFSAR Section 1.9A Inadequate Core Cooling Instrumentation
8. CEOG Generic Accident Management Guidelines - Phase 1, “Initial Diagnosis”
9. NEI 99-01 SG1

Category: S –System Malfunction

Subcategory: 1 – Loss of Safety Bus AC Power

Initiating Condition: Loss of **all** safety bus AC and vital DC power sources for 15 minutes or longer

EAL:

SG1.2 General Emergency

Loss of **all** offsite and **all** onsite AC power to 4160 VAC safety buses 3A and 3B for ≥ 15 min. (Note 1)

AND

Indicated voltage is < 108 VDC on **all** vital DC buses for ≥ 15 min. (Note 1)

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Mode Applicability:

1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 - Hot Shutdown

Definition(s):

SAFETY SYSTEM - A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related (as defined in 10 CFR 50.2):

Those structures, systems and components that are relied upon to remain functional during and following design basis events to assure:

(1) The integrity of the reactor coolant pressure boundary;

(2) The capability to shut down the reactor and maintain it in a safe shutdown condition;

(3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures.

Basis:

This IC addresses a concurrent and prolonged loss of both safety bus AC and vital DC power. A loss of all safety bus AC power 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. A loss of vital DC power compromises the ability to monitor and control SAFETY SYSTEMS. A sustained loss of both safety bus AC and vital DC power will lead to multiple challenges to fission product barriers.

Fifteen minutes was selected as a threshold to exclude transient or momentary power losses. The 15-minute emergency declaration clock begins at the point when both EAL thresholds are met.

Temporary Emergency Diesels (TEDs) can be credited if already installed in accordance with site procedures (ref. 4, 5).

This IC refers to loss of vital DC power from the 3A-DC, 3B-DC, and 3AB-DC buses. Less than 108 VDC bus voltage is based on the minimum bus voltage necessary for the operation of safety related equipment (ref. 5, 6, 7).

Reference(s):

1. UFSAR Section 8.1, Onsite Power System
2. UFSAR Section 8.2, Offsite Power System
3. OP-902-005 Station Blackout Recovery
4. Technical Specifications 3/4.8.1 A.C. Sources
5. ME-001-012, Temporary Power from Temporary Diesel for 3A2 and 3B2 4KV Buses (Modes 1-6)
6. ECE91-058 Battery 3A-S “A” Train Calculation for Station Blackout
7. ECE91-059 Battery 3B-S “B” Train Calculation for Station Blackout
8. ECE91-060 Battery 3AB-S Calculation for Station Blackout
9. NEI 99-01 SG8

Category: S – System Malfunction

Subcategory: 2 – Loss of Vital DC Power

Initiating Condition: Loss of **all** vital DC power for 15 minutes or longer

EAL:

SS2.1	**Site Area Emergency**
Indicated voltage is < 108 VDC on **all** vital DC buses for ≥ 15 min. (Note 1)	

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Mode Applicability:

1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 - Hot Shutdown

Definition(s):

SAFETY SYSTEM - A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related (as defined in 10 CFR 50.2):

Those structures, systems and components that are relied upon to remain functional during and following design basis events to assure:

(1) The integrity of the reactor coolant pressure boundary;

(2) The capability to shut down the reactor and maintain it in a safe shutdown condition;

(3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures.

Basis:

This IC addresses a loss of vital DC power which compromises the ability to monitor and control SAFETY SYSTEMS. In modes above Cold Shutdown, this condition involves a major failure of plant functions needed for the protection of the public.

This IC refers to loss of vital DC power from the 3A-DC, 3B-DC, and 3AB-DC buses.

Fifteen minutes was selected as a threshold to exclude transient or momentary power losses.

Escalation of the emergency classification level would be via IC AG1, FG1 or SG1.

Less than 108 VDC bus voltage is based on the minimum bus voltage necessary for the operation of safety related equipment (ref. 1, 2, 3).

This EAL is the hot condition equivalent of the cold condition EAL CU4.1.

Reference(s):

1. ECE91-058 Battery 3A-S “A” Train Calculation for Station Blackout
2. ECE91-059 Battery 3B-S “B” Train Calculation for Station Blackout
3. ECE91-060 Battery 3AB-S Calculation for Station Blackout
4. Technical Specifications section 3/4.8.2.2 D.C. Sources - Shutdown
5. NEI 99-01 SS8

Category: S – System Malfunction

Subcategory: 3 – Loss of Control Room Indications

Initiating Condition: UNPLANNED loss of Control Room indications for 15 minutes or longer

EAL:

SU3.1 Unusual Event

An UNPLANNED event results in the inability to monitor one or more Table S-2 parameters from within the Control Room for ≥ 15 min. (Note 1)

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Table S-2 Safety System Parameters
• Reactor power • RCS level • RCS pressure • Core exit temperature • Level in at least one S/G • S/G emergency feed water flow to at least one S/G

Mode Applicability:

1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 - Hot Shutdown

Definition(s):

SAFETY SYSTEM - A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related (as defined in 10 CFR 50.2):

Those structures, systems and components that are relied upon to remain functional during and following design basis events to assure:

(1) The integrity of the reactor coolant pressure boundary;

(2) The capability to shut down the reactor and maintain it in a safe shutdown condition;

(3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures.

UNPLANNED - A parameter change or an event that is **not** 1) the result of an intended evolution or 2) an expected plant response to a transient. The cause of the parameter change or event may be known or unknown.

Basis:

This IC addresses the difficulty associated with monitoring normal plant conditions without the ability to obtain SAFETY SYSTEM parameters from within the Control Room. This condition is a precursor to a more significant event and represents a potential degradation in the level of safety of the plant.

As used in this EAL, an “inability to monitor” means that values for one or more of the listed parameters cannot be determined from within the Control Room. This situation would require a loss of all of the Control Room sources for the given parameter(s). For example, the reactor power level cannot be determined from any analog, digital and recorder source within the Control Room.

An event involving a loss of plant indications, annunciators and/or display systems is evaluated in accordance with 10 CFR 50.72 (and associated guidance in NUREG-1022) to determine if an NRC event report is required. The event would be reported if it significantly impaired the capability to perform emergency assessments. In particular, emergency assessments necessary to implement abnormal operating procedures, emergency operating procedures, and emergency plan implementing procedures addressing emergency classification, accident assessment, or protective action decision-making.

This EAL is focused on a selected subset of plant parameters associated with the key safety functions of reactivity control, core cooling and RCS heat removal. The loss of the ability to determine one or more of these parameters from within the Control Room is considered to be more significant than simply a reportable condition. In addition, if all indication sources for one or more of the listed parameters are lost, then the ability to determine the values of other SAFETY SYSTEM parameters may be impacted as well. For example, if the value for RCS level cannot be determined from the indications and recorders on a main control board, the SPDS or the plant computer, the availability of other parameter values may be compromised as well.

Fifteen minutes was selected as a threshold to exclude transient or momentary losses of indication.

Escalation of the emergency classification level would be via EAL SA3.1.

Reference(s):

1. NEI 99-01 SU2

Category: S – System Malfunction

Subcategory: 3 – Loss of Control Room Indications

Initiating Condition: UNPLANNED loss of Control Room indications for 15 minutes or longer with a significant transient in progress

EAL:

SA3.1 Alert

An UNPLANNED event results in the inability to monitor **one or more** Table S-2 parameters from within the Control Room for ≥ 15 min. (Note 1)

AND

Any significant transient is in progress, Table S-3

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Table S-2 Safety System Parameters
• Reactor power • RCS level • RCS pressure • Core exit temperature • Level in at least one S/G • S/G emergency feed water flow to at least one S/G

Table S-3 Significant Transients
• Turbine runback > 25% reactor power • Electrical load rejection > 25% full electrical load (300 MWE) • Reactor trip • ECCS (SI) activation

Mode Applicability:

1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 - Hot Shutdown

Definition(s):

SAFETY SYSTEM - A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related (as defined in 10 CFR 50.2):

Those structures, systems and components that are relied upon to remain functional during and following design basis events to assure:

(1) The integrity of the reactor coolant pressure boundary;

(2) The capability to shut down the reactor and maintain it in a safe shutdown condition;

(3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures.

UNPLANNED - A parameter change or an event that is **not** 1) the result of an intended evolution or 2) an expected plant response to a transient. The cause of the parameter change or event may be known or unknown.

Basis:

This IC 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. During this condition, the margin to a potential fission product barrier challenge is reduced. It thus represents a potential substantial degradation in the level of safety of the plant.

As used in this EAL, an “inability to monitor” means that values for one or more of the listed parameters cannot be determined from within the Control Room. This situation would require a loss of all of the Control Room sources for the given parameter(s). For example, the reactor power level cannot be determined from any analog, digital and recorder source within the Control Room.

An event involving a loss of plant indications, annunciators and/or display systems is evaluated in accordance with 10 CFR 50.72 (and associated guidance in NUREG-1022) to determine if an NRC event report is required. The event would be reported if it significantly impaired the capability to perform emergency assessments. In particular, emergency assessments necessary to implement abnormal operating procedures, emergency operating procedures, and emergency plan implementing procedures addressing emergency classification, accident assessment, or protective action decision-making.

This EAL is focused on a selected subset of plant parameters associated with the key safety functions of reactivity control, core cooling and RCS heat removal. The loss of the ability to determine one or more of these parameters from within the Control Room is considered to be more significant than simply a reportable condition. In addition, if all indication sources for one or more of the listed parameters are lost, then the ability to determine the values of other SAFETY SYSTEM parameters may be impacted as well. For example, if the value for RCS level cannot be determined from the indications and recorders on a main control board, the SPDS or the plant computer, the availability of other parameter values may be compromised as well.

Fifteen minutes was selected as a threshold to exclude transient or momentary losses of indication.

Escalation of the emergency classification level would be via IC FS1 or AS1

Reference(s):

1. NEI 99-01 SA2

Category: S – System Malfunction

Subcategory: 4 – RCS Activity

Initiating Condition: Reactor coolant activity greater than Technical Specification allowable limits

EAL:

SU4.1 Unusual Event

RCS sample activity > 60 µCi/gm dose equivalent I-131

OR

RCS sample activity > 1.0 µCi/gm dose equivalent I-131 for > 48 hours during one continuous time interval (Note 1)

OR

RCS sample activity >100/Ē µCi/gm

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Mode Applicability:

1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 – Hot Shutdown

Definition(s):

None

Basis:

This IC addresses a reactor coolant activity value that exceeds an allowable limit specified in Technical Specifications. This condition is a precursor to a more significant event and represents a potential degradation of the level of safety of the plant.

Escalation of the emergency classification level would be via IC FA1 or the Recognition Category A ICs.

Reference(s):

1. Technical Specification 3.4.7 Reactor Coolant System - Specific Activity
2. NEI 99-01 SU3

Category: S – System Malfunction

Subcategory: 5 – RCS Leakage

Initiating Condition: RCS leakage for 15 minutes or longer

EAL:

SU5.1 Unusual Event

RCS unidentified or pressure boundary leakage > 10 gpm for ≥ 15 min. (Note 1)

OR

RCS identified leakage > 25 gpm for ≥ 15 min. (Note 1)

OR

Reactor coolant leakage to a location outside containment > 25 gpm for ≥ 15 min. (Note 1)

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Mode Applicability:

1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 - Hot Shutdown

Definition(s):

UNISOLABLE - An open or breached system line that **cannot** be isolated, remotely or locally.

Basis:

Failure to isolate the leak (from the Control Room or locally), within 15 minutes or if known that the leak cannot be isolated within 15 minutes, from the start of the leak requires immediate classification.

Steam generator tube leakage is identified RCS leakage.

This IC addresses RCS leakage which may be a precursor to a more significant event. In this case, RCS leakage has been detected and operators, following applicable procedures, have been unable to promptly isolate the leak. This condition is considered to be a potential degradation of the level of safety of the plant.

The first and second EAL conditions are focused on a loss of mass from the RCS due to “unidentified leakage", "pressure boundary leakage" or "identified leakage” (as these leakage types are defined in the plant Technical Specifications). The third condition addresses an RCS mass loss caused by an UNISOLABLE leak through an interfacing system. These conditions thus apply to leakage into the containment, a secondary-side system (e.g., steam generator tube leakage) or a location outside of containment (ref. 1).

The leak rate values for each condition were selected because they are usually observable with normal Control Room indications. Lesser values typically require time-consuming calculations to determine (e.g., a mass balance calculation). The first condition uses a lower value that reflects the greater significance of unidentified or pressure boundary leakage (ref. 2).

The release of mass from the RCS due to the as-designed/expected operation of a relief valve does not warrant an emergency classification. An emergency classification would be required if a mass loss is caused by a relief valve that is not functioning as designed/expected (e.g., a relief valve sticks open and the line flow cannot be isolated).

The 15-minute threshold duration allows sufficient time for prompt operator actions to isolate the leakage, if possible.

Escalation of the emergency classification level would be via ICs of Recognition Category A or F.

Reference(s):

1. Technical Specifications 3.4.5 Reactor Coolant Leakage
2. OP-901-111 Reactor Coolant System Leakage
3. NEI 99-01 SU4

Category: S – System Malfunction

Subcategory: 6 – RPS Failure

Initiating Condition: Automatic or manual trip fails to shut down the reactor

EAL:

SU6.1 Unusual Event

An automatic trip did **not** shut down the reactor as indicated by reactor power > 5% after **any** RPS setpoint is exceeded

AND

A subsequent automatic trip or manual trip action taken at the reactor control console (manual reactor trip push buttons or DRT) is successful in shutting down the reactor as indicated by reactor power ≤ 5% (Note 8)

Note 8: A manual action is **any** operator action, or set of actions, which causes the control rods to be rapidly inserted into the core, and does **not** include manually driving in control rods or implementation of boron injection strategies.

Mode Applicability:

1 - Power Operation

Definition(s):

IMMINENT - The trajectory of events or conditions is such that an EAL will be met within a relatively short period of time regardless of mitigation or corrective actions.

Basis:

After a successful reactor trip neutron power should immediately drop to approximately 6% due to prompt drop. Therefore, for the purpose of emergency classification, reactor power less than or equal to 5% is used to identify a successful reactor trip (ref. 2).

This IC 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. This event is a precursor to a more significant condition and thus represents a potential degradation of the level of safety of the plant.

In the event that the operator identifies a reactor trip is IMMINENT and initiates a successful manual reactor trip before the automatic trip setpoint is reached, no declaration is required. The successful manual trip of the reactor before it reaches its automatic trip setpoint or reactor trip signals caused by instrumentation channel failures do not lead to a potential fission product barrier loss.

Following the failure of an automatic reactor trip, operators will promptly initiate manual actions at the reactor control consoles to shutdown the reactor (e.g., initiate a manual reactor trip). If these manual actions are successful in shutting down the reactor, core heat generation will quickly fall to a level within the capabilities of the plant's decay heat removal systems.

If an initial manual reactor trip is unsuccessful, operators will promptly take manual action at another location(s) on the reactor control consoles to shutdown the reactor (e.g., initiate a manual reactor trip) using a different switch). Depending upon several factors, the initial or subsequent effort to manually trip the reactor, or a concurrent plant condition, may lead to the generation of an automatic reactor trip signal. If a subsequent manual or automatic trip is successful in shutting down the reactor, core heat generation will quickly fall to a level within the capabilities of the plant's decay heat removal systems.

A manual action at the reactor control consoles is any operator action, or set of actions, which causes the control rods to be rapidly inserted into the core (e.g., initiating a manual reactor trip). Use of the Reactor Trip Pushbuttons at either CP-2 or CP-8 <u>or</u> the Diverse Reactor Trip Pushbuttons at CP-2 satisfy this requirement. This action does not include manually driving in control rods or implementation of boron injection strategies. Actions taken at back-panels or other locations (opening A32 and B32 Bus Feeders) within the Control Room, or any location outside the Control Room, are not considered to be "at the reactor control consoles" (ref. 1).

The plant response to the failure of an automatic or manual reactor trip will vary based upon several factors including the reactor power level prior to the event, availability of the condenser, performance of mitigation equipment and actions, other concurrent plant conditions, etc. If subsequent operator manual actions taken at the reactor control consoles are also unsuccessful in shutting down the reactor, then the emergency classification level will escalate to an Alert via IC SA6. Depending upon the plant response, escalation is also possible via IC FA1. Absent the plant conditions needed to meet either IC SA6 or FA1, an Unusual Event declaration is appropriate for this event.

Should a reactor trip signal be generated as a result of plant work (e.g., RPS setpoint testing), the following classification guidance should be applied.

- If the signal generated as a result of plant work causes a plant transient that results in a condition that should have included an automatic reactor trip and the RPS fails to automatically shutdown the reactor, then this IC and associated EALs are applicable, and should be evaluated.
- If the signal generated as a result of plant work does not cause a plant transient and the trip failure is determined through other means (e.g., assessment of test results), then this IC and associated EALs are not applicable and no classification is warranted.

Reference(s):

1. OP-902-000 Standard Post Trip Actions
2. Calculation No. EC-S98-001 EOP Value Basis Document Application X.01
3. NEI 99-01 SU5

Category: S – System Malfunction

Subcategory: 6 – RPS Failure

Initiating Condition: Automatic or manual trip fails to shut down the reactor

EAL:

SU6.2 Unusual Event

A manual trip did **not** shut down the reactor as indicated by reactor power > 5% after **any** manual trip action was initiated

AND

A subsequent automatic trip or manual trip action taken at the reactor control console (manual reactor trip push buttons or DRT) is successful in shutting down the reactor as indicated by reactor power ≤ 5% (Note 8)

Note 8: A manual action is **any** operator action, or set of actions, which causes the control rods to be rapidly inserted into the core, and does **not** include manually driving in control rods or implementation of boron injection strategies.

Mode Applicability:

1 - Power Operation

Definition(s):

None

Basis:

After a successful reactor trip neutron power should immediately drop to approximately 6% due to prompt drop. Therefore, for the purpose of emergency classification, reactor power less than or equal to 5% is used to identify a successful reactor trip (ref. 2).

This IC 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. This event is a precursor to a more significant condition and thus represents a potential degradation of the level of safety of the plant.

This EAL addresses a failure of a manually initiated trip in the absence of having exceeded an automatic RPS trip setpoint and a subsequent automatic or manual trip is successful in shutting down the reactor.

Following the failure on an automatic reactor trip, operators will promptly initiate manual actions at the reactor control consoles to shutdown the reactor (e.g., initiate a manual reactor trip). If these manual actions are successful in shutting down the reactor, core heat generation will quickly fall to a level within the capabilities of the plant's decay heat removal systems.

If an initial manual reactor trip is unsuccessful, operators will promptly take manual action at another location(s) on the reactor control consoles to shutdown the reactor (e.g., initiate a manual reactor trip) using a different switch). Depending upon several factors, the initial or subsequent effort to manually trip the reactor, or a concurrent plant condition, may lead to the generation of an automatic reactor trip signal. If a subsequent manual or automatic trip is successful in shutting down the reactor, core heat generation will quickly fall to a level within the capabilities of the plant's decay heat removal systems.

A manual action at the reactor control consoles is any operator action, or set of actions, which causes the control rods to be rapidly inserted into the core (e.g., initiating a manual reactor trip). Use of the Reactor Trip Pushbuttons at either CP-2 or CP-8 <u>or</u> the Diverse Reactor Trip Pushbuttons at CP-2 satisfy this requirement. This action does not include manually driving in control rods or implementation of boron injection strategies. Actions taken at back-panels or other locations (opening A32 and B32 Bus Feeders) within the Control Room, or any location outside the Control Room, are not considered to be "at the reactor control consoles" (ref. 1).

The plant response to the failure of an automatic or manual reactor trip will vary based upon several factors including the reactor power level prior to the event, availability of the condenser, performance of mitigation equipment and actions, other concurrent plant conditions, etc. If subsequent operator manual actions taken at the reactor control consoles are also unsuccessful in shutting down the reactor, then the emergency classification level will escalate to an Alert via IC SA6. Depending upon the plant response, escalation is also possible via IC FA1. Absent the plant conditions needed to meet either IC SA6 or FA1, an Unusual Event declaration is appropriate for this event.

Should a reactor trip signal be generated as a result of plant work (e.g., RPS setpoint testing), the following classification guidance should be applied.

- If the signal generated as a result of plant work causes a plant transient that results in a condition that should have included an automatic reactor trip and the RPS fails to automatically shutdown the reactor, then this IC and associated EALs are applicable, and should be evaluated.
- If the signal generated as a result of plant work does not cause a plant transient and the trip failure is determined through other means (e.g., assessment of test results), then this IC and associated EALs are not applicable and no classification is warranted.

Reference(s):

1. OP-902-000 Standard Post Trip Actions
2. Calculation No. EC-S98-001 EOP Value Basis Document Application X.01
3. NEI 99-01 SU5

Category: S – System Malfunction

Subcategory: 6– RPS Failure

Initiating Condition: Automatic or manual trip fails to shut down the reactor and subsequent manual actions taken at the reactor control consoles are **not** successful in shutting down the reactor

EAL:

SA6.1 Alert

An automatic or manual trip fails to shut down the reactor as indicated by reactor power > 5%

AND

Manual trip actions taken at the reactor control console (manual reactor trip push buttons and DRT) are **not** successful in shutting down the reactor as indicated by reactor power > 5% (Note 8)

Note 8: A manual action is **any** operator action, or set of actions, which causes the control rods to be rapidly inserted into the core, and does **not** include manually driving in control rods or implementation of boron injection strategies.

Mode Applicability:

1 - Power Operation

Definition(s):

None

Basis:

After a successful reactor trip neutron power should immediately drop to approximately 6% due to prompt drop. Therefore, for the purpose of emergency classification, reactor power less than or equal to 5% is used to identify a successful reactor trip (ref. 2).

This IC 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 shutdown the reactor are also unsuccessful. This condition represents an actual or potential substantial degradation of the level of safety of the plant. An emergency declaration is required even if the reactor is subsequently shutdown by an action taken away from the reactor control consoles since this event entails a significant failure of the RPS.

A manual action at the reactor control console is any operator action, or set of actions, which causes the control rods to be rapidly inserted into the core (e.g., initiating a manual reactor trip). Use of the Reactor Trip Pushbuttons at either CP-2 or CP-8 or the Diverse Reactor Trip Pushbuttons at CP-2 satisfy this requirement. This action does not include manually driving in control rods or implementation of boron injection strategies. If this action(s) is unsuccessful, operators would immediately pursue additional manual actions at locations away from the

reactor control console (e.g., locally opening breakers). Actions taken at back panels or other locations within the Control Room (opening A32 and B32 Bus Feeders), or any location outside the Control Room, are not considered to be “at the reactor control console”.

The plant response to the failure of an automatic or manual reactor trip will vary based upon several factors including the reactor power level prior to the event, availability of the condenser, performance of mitigation equipment and actions, other concurrent plant conditions, etc. If the failure to shut down the reactor is prolonged enough to cause a challenge to the core cooling or RCS heat removal safety functions, the emergency classification level will escalate to a Site Area Emergency via IC SS6. Depending upon plant responses and symptoms, escalation is also possible via IC FS1. Absent the plant conditions needed to meet either IC SS6 or FS1, an Alert declaration is appropriate for this event.

It is recognized that plant responses or symptoms may also require an Alert declaration in accordance with the Recognition Category F ICs; however, this IC and EAL are included to ensure a timely emergency declaration.

Reference(s):

1. OP-902-000 Standard Post Trip Actions
2. Calculation No. EC-S98-001 EOP Value Basis Document Application X.01
3. NEI 99-01 SA5

Category: S – System Malfunction

Subcategory: 6 – RPS Failure

Initiating Condition: Inability to shut down the reactor causing a challenge to core cooling or RCS heat removal

EAL:

SS6.1 Site Area Emergency

An automatic or manual trip fails to shut down the reactor as indicated by reactor power > 5%

AND

All actions to shut down the reactor are **not** successful as indicated by reactor power > 5%

AND EITHER:

- Representative CET readings > 1,200ºF
- **Any** OP-902-008 Functional Recovery RCS/Core Heat Removal safety function criterion is **not** met for ≥ 15 min. (Note 1)

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Mode Applicability:

1 - Power Operation

Definition(s):

None

Basis:

After a successful reactor trip neutron power should immediately drop to approximately 6% due to prompt drop. Therefore, for the purpose of emergency classification, reactor power less than or equal to 5% is used to identify a successful reactor trip (ref. 2).

This IC 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 shutdown the reactor are unsuccessful, and continued power generation is challenging the capability to adequately remove heat from the core and/or the RCS. This condition will lead to fuel damage if additional mitigation actions are unsuccessful and thus warrants the declaration of a Site Area Emergency.

In some instances, the emergency classification resulting from this IC/EAL may be higher than that resulting from an assessment of the plant responses and symptoms against the Recognition Category F ICs/EALs. This is appropriate in that the Recognition Category F ICs/EALs do not address the additional threat posed by a failure to shutdown the reactor. The inclusion of this IC and EAL ensures the timely declaration of a Site Area Emergency in response to prolonged failure to shutdown the reactor.

The process of checking the safety functions in EOPs is periodic and continuous as long as the procedure is in use. The fifteen minute interval (subject to Note 1) provides a suitable opportunity to assess plant conditions with respect to the threshold criteria.

Escalation of the emergency classification level would be via IC AG1 or FG1.

Reference(s):

1. OP-902-000 Standard Post Trip Actions
2. Calculation No. EC-S98-001 EOP Value Basis Document Application X.01
3. OP-902-008 Functional Recovery
4. UFSAR Section 1.9A Inadequate Core Cooling Instrumentation
5. CEOG Generic Accident Management Guidelines - Phase 1, “Initial Diagnosis”
6. TG-OP-902-008 Technical Guide for Functional Recovery
7. NEI 99-01 SS5

Category: S – System Malfunction

Subcategory: 7 – Loss of Communications

Initiating Condition: Loss of **all** onsite or offsite communications capabilities

EAL:

SU7.1 Unusual Event

Loss of **all** Table S-4 onsite communication methods
OR
Loss of **all** Table S-4 State and local agency communication methods
OR
Loss of **all** Table S-4 NRC communication methods

Table S-4 Communication Methods

System	Onsite	State/ Local	NRC
Telephone System	X	X	X
Operational Hotline		X	
Plant Radio System (O&M)	X		
Plant Paging System	X		
Sound Powered Phone System	X		
Civil Defense Radio System		X	
Satellite Phones		X	X
Emergency Notification System (ENS)			X

Mode Applicability:

1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 - Hot Shutdown

Definition(s):

None

Basis:

This IC addresses a significant loss of on-site or offsite communications capabilities. While not a direct challenge to plant or personnel safety, this event warrants prompt notifications to State and local agencies and the NRC.

This IC should be assessed only when extraordinary means are being utilized to make communications possible (e.g., use of non-plant, privately owned equipment, relaying of on-site information via individuals or multiple radio transmission points, individuals being sent to offsite locations, etc.).

The first EAL condition addresses a total loss of the communications methods used in support of routine plant operations.

The second EAL condition addresses a total loss of the communications methods used to notify all State and local agencies of an emergency declaration. The State and local agencies referred to here are the St. Charles Parish Department of Homeland Security and Emergency Preparedness, St. Charles Parish Sherriff's Department 911 Center, St. John the Baptist Parish Office of Emergency Preparedness, St. John the Baptist Parish Sherriff's Department 911 Center, Louisiana Department of Environmental Quality and the Louisiana Governor's Office of Homeland Security and Emergency Preparedness. The third EAL condition addresses a total loss of the communications methods used to notify the NRC of an emergency declaration.

This EAL is the hot condition equivalent of the cold condition EAL CU5.1.

Reference(s):

1. EP-003-070 Emergency Communications Systems
2. Waterford 3 SES Emergency Plan Section 7.5 Communications Systems
3. NEI 99-01 SU6

Category: S – System Malfunction

Subcategory: 8 – Containment Failure

Initiating Condition: Failure to isolate containment or loss of containment pressure control

EAL:

SU8.1 Unusual Event

Any penetration is **not** closed within 15 min. of a required actuation signal

OR

Containment pressure > 17.7 psia with < one full train of containment heat removal systems (Note 9) operating per design for ≥ 15 min. (Note 1)

Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Note 9: One full train of containment heat removal systems consists of either:

- One train of the Containment Spray System (operating with ≥1750 gpm flow) **AND** One train of the Containment Cooling System (one fan cooler required)

OR

- Two trains of the Containment Spray System (operating with ≥1750 gpm flow each).

Mode Applicability:

1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 - Hot Shutdown

Definition(s):

None

Basis:

This EAL addresses a failure of one or more containment penetrations to automatically isolate (close) when required by an actuation signal. It also addresses an event that results in high containment pressure with a concurrent failure of containment pressure control systems. Absent challenges to another fission product barrier, either condition represents potential degradation of the level of safety of the plant.

For the first condition, the containment isolation signal must be generated as the result on an off-normal/accident condition (e.g., a safety injection or high containment pressure); a failure resulting from testing or maintenance does not warrant classification. The determination of containment and penetration status – isolated or not isolated – should be made in accordance with the appropriate criteria contained in the plant AOPs and EOPs. The 15-minute criterion is included to allow operators time to manually isolate the required penetrations, if possible.

The second condition addresses a condition where containment pressure is greater than the setpoint at which containment energy (heat) removal systems are designed to automatically actuate, and less than one full train of equipment is capable of operating per design.

The 15-minute criterion is included to allow operators time to manually start equipment that may not have automatically started, if possible. The inability to start the required equipment indicates that containment heat removal/depressurization systems (e.g., containment sprays) are either lost or performing in a degraded manner.

This event would escalate to a Site Area Emergency in accordance with IC FS1 if there were a concurrent loss or potential loss of either the Fuel Clad or RCS fission product barriers.

Reference(s):

1. OP-902-002 Loss of Coolant Accident Recovery
2. UFSAR Section 6.2.2 Containment Heat Removal Systems
3. Technical Specification 3.6.2 Containment Systems – Depressurization and Cooling Systems
4. NEI 99-01 SU7

Category: S – System Malfunction

Subcategory: 9 – Hazardous Event Affecting Safety Systems

Initiating Condition: Hazardous event affecting SAFETY SYSTEMS needed for the current operating mode

EAL:

SA9.1 Alert

The occurrence of **any** Table S-5 hazardous event

AND

Event damage has caused indications of degraded performance on one train of a SAFETY SYSTEM needed for the current operating mode

AND EITHER:

- Event damage has caused indications of degraded performance to the second train of the SAFETY SYSTEM needed for the current operating mode
- Event damage has resulted in VISIBLE DAMAGE to the second train of the SAFETY SYSTEM needed for the current operating mode

(Notes 10, 11)

Note 10: If the affected SAFETY SYSTEM train was already inoperable or out of service before the hazardous event occurred, then emergency classification is **not** warranted.

Note 11: If the hazardous event **only** resulted in VISIBLE DAMAGE, with **no** indications of degraded performance to at least one train of a SAFETY SYSTEM, then this emergency classification is **not** warranted.

Table S-5 Hazardous Events
• Seismic event (earthquake) • Internal or external FLOODING event • High winds or tornado strike • FIRE • EXPLOSION • Other events with similar hazard characteristics as determined by the Shift Manager

Mode Applicability:

1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 - Hot Shutdown

Definition(s):

EXPLOSION - A rapid, violent and catastrophic failure of a piece of equipment due to combustion, chemical reaction or overpressurization. A release of steam (from high energy lines or components) or an electrical component failure (caused by short circuits, grounding, arcing, etc.) should **not** automatically be considered an explosion. Such events require a post-event inspection to determine if the attributes of an explosion are present.

FIRE - Combustion characterized by heat and light. Sources of smoke such as slipping drive belts or overheated electrical equipment do **not** constitute fires. Observation of flame is preferred but is **not** required if large quantities of smoke and heat are observed.

FLOODING - A condition where water is entering a room or area faster than installed equipment is capable of removal, resulting in a rise of water level within the room or area.

SAFETY SYSTEM - A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related (as defined in 10 CFR 50.2):

> Those structures, systems and components that are relied upon to remain functional during and following design basis events to assure:
>
> (1) The integrity of the reactor coolant pressure boundary;
>
> (2) The capability to shut down the reactor and maintain it in a safe shutdown condition;
>
> (3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures.

VISIBLE DAMAGE - Damage to a SAFETY SYSTEM train that is readily observable without measurements, testing, or analysis. The visual impact of the damage is sufficient to cause concern regarding the operability or reliability of the affected SAFETY SYSTEM train.

Basis:

This IC addresses a hazardous event that causes damage to SAFETY SYSTEMS needed for the current operating mode. In order to provide the appropriate context for consideration of an ALERT classification, the hazardous event must have caused indications of degraded SAFETY SYSTEM performance in one train, and there must be either indications of performance issues with the second SAFETY SYSTEM train or VISIBLE DAMAGE to the second train such that the potential exists for this second SAFETY SYSTEM train to have performance issues. In other words, in order for this EAL to be classified, the hazardous event must occur, at least one SAFETY SYSTEM train must have indications of degraded performance, and the second SAFETY SYSTEM train must have indications of degraded performance or VISIBLE DAMAGE such that the potential exists for performance issues.

Note that this second SAFETY SYSTEM train is from the same SAFETY SYSTEM that has indications of degraded performance; commercial nuclear power plants are designed to be able to support single system issues without compromising public health and safety from radiological events.

Indications of degraded performance addresses damage to a SAFETY SYSTEM train that is in service/operation since indications for it will be readily available. The indications of degraded performance should be significant enough to cause concern regarding the operability or reliability of the SAFETY SYSTEM train.

VISIBLE DAMAGE addresses damage to a SAFETY SYSTEM train that is not in service/operation and that potentially could cause performance issues. Operators will make a determination of VISIBLE DAMAGE based on the totality of available event and damage report information. This is intended to be a brief assessment not requiring lengthy analysis or quantification of the damage. This VISIBLE DAMAGE should be significant enough to cause concern regarding the operability or reliability of the SAFETY SYSTEM train.

Escalation of the emergency classification level would be via IC FS1 or AS1.

This EAL is the hot condition equivalent of the cold condition EAL CA6.1.

Reference(s):

1. EP FAQ 2016-002
2. NEI 99-01 SA9

Enclosure, Attachment 3

W3F1-2020-0036

Waterford 3 Steam Electric Station NEI 99-01 Revision 6 EAL Comparison Matrix

Waterford 3 Steam Electric Station
NEI 99-01 Revision 6
EAL Comparison Matrix

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Introduction

This document provides a line-by-line comparison of the Initiating Conditions (ICs), Mode Applicability and Emergency Action Levels (EALs) in NEI 99-01 Rev. 6 Final, Development of Emergency Action Levels for Non-Passive Reactors, ADAMS Accession Number ML12326A805, and Waterford 3 Steam Electric Station (WF3) ICs, Mode Applicability and EALs. This document provides a means of assessing WF3 differences and deviations from the NRC endorsed guidance given in NEI 99-01. Discussion of WF3 EAL bases and lists of source document references are given in the EAL Technical Bases Document. It is, therefore, advisable to reference the EAL Technical Bases Document for background information while using this document.

Comparison Matrix Format

The ICs and EALs discussed in this document are grouped according to NEI 99-01 Recognition Categories. Within each Recognition Category, the ICs and EALs are listed in tabular format according to the order in which they are given in NEI 99-01. Generally, each row of the comparison matrix provides the following information:

- NEI EAL/IC identifier
- NEI EAL/IC wording
- WF3 EAL/IC identifier
- WF3 EAL/IC wording
- Description of any differences or deviations

EAL Wording

In Section 4.1, NEI recommends the following: “The guidance in NEI 99-01 is not intended to be applied to plants “as-is”; however, developers should attempt to keep their site-specific schemes as close to the generic guidance as possible. The goal is to meet the intent of the generic Initiating Conditions (ICs) and Emergency Action Levels (EALs) within the context of site-specific characteristics – locale, plant design, operating features, terminology, etc. Meeting this goal will result in a shorter and less cumbersome NRC review and approval process, closer alignment with the schemes of other nuclear power plant sites and better positioning to adopt future industry-wide scheme enhancements”

To assist the Emergency Director (ED), the WF3 EALs have been written in a clear and concise style (to the extent that the differences from the NEI EAL wording could be reasonably documented and justified). This supports timely and accurate classification in the tense atmosphere of an emergency event. The EAL differences introduced to reduce reading burden comprise almost all of the differences justified in this document.

EAL Emphasis Techniques

Due to the width of the table columns and table formatting constraints in this document, line breaks and indentation may differ slightly from the appearance of comparable wording in the source documents. NEI 99-01 is the source document for the NEI EALs; the WF3 EAL Technical Bases Document for the WF3 EALs.

Development of the WF3 IC/EAL wording has attempted to minimize inconsistencies and apply sound human factors principles. As a result, differences occur between NEI and WF3 ICs/EALs for these reasons alone. When such difference may infer a technical difference in the associated NEI IC/EAL, the difference is identified and a justification provided.

The print and paragraph formatting conventions summarized below guide presentation of the WF3 EALs in accordance with the EAL writing criteria. Space restrictions in the EAL table of this document sometimes override this criteria in cases when following the criteria would introduce undesirable complications in the EAL layout.

- Upper case-bold print is used for the logic terms **AND**, **OR** and **EITHER**.
- Bold font is used for certain logic terms, negative terms (**not**, **cannot**, etc.), **any**, **all**.
- Upper case print is reserved for defined terms, acronyms, system abbreviations, logic terms (and, or, etc. when not used as a conjunction), annunciator window engravings.
- Three or more items in a list are normally introduced with “**Any** of the following...” or “**All** of the following...” Items of the list begin with bullets when a priority or sequence is not inferred.

- The use of **AND**/**OR** logic within the same EAL has been avoided when possible. When such logic cannot be avoided, indentation and separation of subordinate contingent phrases is employed.

Global Differences

The differences listed below generally apply throughout the set of EALs and are not repeated in the Justification sections of this document. The global differences do not decrease the effectiveness of the intent of NEI 99-01.

1. The NEI phrase “Notification of Unusual Event” has been changed to “Unusual Event” or abbreviated "UE" to reduce EAL-user reading burden.
2. NEI 99-01 IC Example EALs are implemented in separate plant EALs to improve clarity and readability. For example, NEI lists all IC HU3 Example EALs under one IC. The corresponding WF3 EALs appear as unique EALs (e.g., HU3.1 through HU3.4).
3. Mode applicability identifiers (numbers/letter) modify the NEI 99-01 mode applicability names as follows: 1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 - Hot Shutdown, 5 - Cold Shutdown, 6 - Refueling, DEF – Defueled. NEI 99-01defines Defueled as follows: “Reactor Vessel contains no irradiated fuel (full core off-load during refueling or extended outage).”
4. NEI 99-01 uses the terms greater than, less than, greater than or equal to, etc. in the wording of some example EALs. For consistency and to reduce EAL-user reading burden, WF3 has adopted use of Boolean symbols in place of the NEI 99-01 text modifiers within the EAL wording.
5. “min.” is the standard abbreviation for “minutes” and is used to reduce EAL user reading burden.
6. Wherever the generic bracketed PWR term “reactor vessel/RCS” is provided, WF3 uses the term “RCS” as the site-specific nomenclature.
7. IC/EAL identification:
   - NEI 99-01 defines the thresholds requiring emergency classification (example EALs) and assigns them to ICs which, in turn, are grouped in “Recognition Categories.” WF3 endeavors to optimize the NEI EAL organization and identification scheme to enhance usability of the plant-specific EAL set. To this end, the WF3 IC/EAL scheme includes the following features:

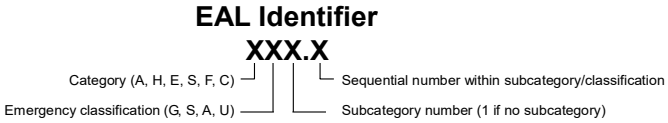
     a. Division of the NEI EAL set into three groups:
        - EALs applicable under <u>all</u> plant operating modes – This group would be reviewed by the EAL-user any time emergency classification is considered.
        - EALs applicable only under <u>hot</u> operating modes – This group would only be reviewed by the EAL-user when the plant is in Hot Shutdown, Hot Standby, Startup or Power Operation mode.
        - EALs applicable only under <u>cold</u> operating modes – This group would only be reviewed by the EAL-user when the plant is in Cold Shutdown, Refueling or Defueled mode.

        The purpose of the groups is to avoid review of hot condition EALs when the plant is in a cold condition and avoid review of cold condition EALs when the plant is in a hot condition. This approach significantly minimizes the total number of EALs that must be reviewed by the EAL-user for a given plant condition, reduces EAL-user reading burden and, thereby, speeds identification of the EAL that applies to the emergency.

     b. Within each of the above three groups, EALs are assigned to categories and subcategories. Category and subcategory titles are selected to represent conditions that are operationally significant to the EAL-user. Subcategories are used as necessary to further divide the EALs of a category into logical sets of possible emergency classification thresholds. The WF3 EAL categories/subcategories and their relationship to NEI Recognition Categories are listed in Table 1.

c. Unique identification of each EAL – Four characters comprise the EAL identifier as illustrated in Figure 1.

Figure 1 – EAL Identifier



The first character is a letter associated with the category in which the EAL is located. The second character is a letter associated with the emergency classification level (G for General Emergency, S for Site Area Emergency, A for Alert, and U for Notification of Unusual Event). The third character is a number associated with one or more subcategories within a given category. Subcategories are sequentially numbered beginning with the number “1”. If a category does not have a subcategory, this character is assigned the number “1”. The fourth character is a number preceded by a period for each EAL within a subcategory. EALs are sequentially numbered within the emergency classification level of a subcategory beginning with the number “1”.

The EAL identifier is designed to fulfill the following objectives:

- Uniqueness – The EAL identifier ensures that there can be no confusion over which EAL is driving the need for emergency classification.
- Speed in locating the EAL of concern – When the EALs are displayed in a matrix format, knowledge of the EAL identifier alone can lead the EAL-user to the location of the EAL within the classification matrix. The identifier conveys the category, subcategory and classification level. This assists Emergency Response Organization (ERO) responders (who may not be in the same facility as the ED) to find the EAL of concern in a timely manner without the need for a word description of the classification threshold.
- Possible classification upgrade – The category/subcategory/identifier scheme helps the EAL-user find higher emergency classification EALs that may become active if plant conditions worsen.

Table 2 lists the WF3 ICs and EALs that correspond to the NEI ICs/Example EALs when the above EAL/IC organization and identification scheme is implemented.

Differences and Deviations

In accordance NRC Regulatory Issue Summary (RIS) 2003-18 “Use of Nuclear Energy Institute (NEI) 99-01, Methodology for Development of Emergency Action Levels” Supplements 1 and 2, a difference is an EAL change in which the basis scheme guidance differs in wording but agrees in meaning and intent, such that classification of an event would be the same, whether using the basis scheme guidance or the WF3 EAL. A deviation is an EAL change in which the basis scheme guidance differs in wording and is altered in meaning or intent, such that classification of the event could be different between the basis scheme guidance and the WF3 proposed EAL.

Administrative changes that do not actually change the textual content are neither differences nor deviations. Likewise, any format change that does not alter the wording of the IC or EAL is considered neither a difference nor a deviation.

The following are examples of differences:

- Choosing the applicable EAL based upon plant type (i.e., BWR vs. PWR).
- Using a numbering scheme other than that provided in NEI 99-01 that does not change the intent of the overall scheme.
- Where the NEI 99-01 guidance specifically provides an option to not include an EAL if equipment for the EAL does not exist at WF3 (e.g., automatic real-time dose assessment capability).
- Pulling information from the bases section up to the actual EAL that does not change the intent of the EAL.

- Choosing to state ALL Operating Modes are applicable instead of stating N/A, or listing each mode individually under the Abnormal Rad Level/Radiological Effluent and Hazard and Other Conditions Affecting Plant Safety sections.
- Using synonymous wording (e.g., greater than or equal to vs. at or above, less than or equal vs. at or below, greater than or less than vs. above or below, etc.)
- Adding WF3 equipment/instrument identification and/or noun names to EALs.
- Combining like ICs that are exactly the same but have different operating modes as long as the intent of each IC is maintained and the overall progression of the EAL scheme is not affected.
- Any change to the IC and/or EAL, and/or basis wording, as stated in NEI 99-01, that does not alter the intent of the IC and/or EAL, i.e., the IC and/or EAL continues to:
    - Classify at the correct classification level.
    - Logically integrate with other EALs in the EAL scheme.
    - Ensure that the resulting EAL scheme is complete (i.e., classifies all potential emergency conditions).

The following are examples of deviations:

- Use of altered mode applicability.
- Altering key words or time limits.
- Changing words of physical reference (protected area, safety-related equipment, etc.).
- Eliminating an IC. This includes the removal of an IC from the Fission Product Barrier Degradation category as this impacts the logic of Fission Product Barrier ICs.
- Changing a Fission Product Barrier from a Loss to a Potential Loss or vice-versa.
- Not using NEI 99-01definitions as the intent is for all NEI 99-01 users to have a standard set of defined terms as defined in NEI 99-01. Differences due to plant types are permissible (BWR or PWR). Verbatim compliance to the wording in NEI 99-01 is not necessary as long as the intent of the defined word is maintained. Use of the wording provided in NEI 99-01 is encouraged since the intent is for all users to have a standard set of defined terms as defined in NEI 99-01.
- Any change to the IC and/or EAL, and/or basis wording as stated in NEI 99-01 that does alter the intent of the IC and/or EAL, i.e., the IC and/or EAL:
    - Does not classify at the classification level consistent with NEI 99-01.
    - Is not logically integrated with other EALs in the EAL scheme.
    - Results in an incomplete EAL scheme (i.e., does not classify all potential emergency conditions).

The “Difference/Deviation Justification” columns in the remaining sections of this document identify each difference between the NEI 99-01 IC/EAL wording and the WF3 IC/EAL wording. An explanation that justifies the reason for each difference is then provided. If the difference is determined to be a deviation, a statement is made to that affect and explanation is given that states why classification may be different from the NEI 99-01 IC/EAL and the reason for its acceptability. In all cases, however, the differences and deviations do not decrease the effectiveness of the intent of NEI 99-01. A summary list of WF3 EAL deviations from NEI 99-01 is given in Table 3.

Table 1 – WF3 EAL Categories/Subcategories

WF3 EALs		NEI Recognition Category
Category	**Subcategory**	
Group: Any Operating Mode:		
A – Abnormal Rad Levels/Rad Effluent	1 – Radiological Effluent 2 – Irradiated Fuel Event 3 – Area Radiation Levels	**A**bnormal Rad Levels/Radiological Effluent ICs/EALs
H – Hazards and Other Conditions Affecting Plant Safety	1 – Security 2 – Seismic Event 3 – Natural or Technological Hazard 4 – Fire 5 – Hazardous Gas 6 – Control Room Evacuation 7 – Emergency Director Judgment	**H**azards and Other Conditions Affecting Plant Safety ICs/EALs
E - ISFSI	1 – Confinement Boundary	ISFSI ICs/EALs
Group: Hot Conditions:		
S – System Malfunction	1 – Loss of Safety Bus AC Power 2 – Loss of Vital DC Power 3 – Loss of Control Room Indications 4 – RCS Activity 5 – RCS Leakage 6 – RPS Failure 7 – Loss of Communications 8 – Containment Failure 9 – Hazardous Event Affecting Safety Systems	**S**ystem Malfunction ICs/EALs
F – Fission Product Barrier	None	**F**ission Product Barrier ICs/EALs
Group: Cold Conditions:		
C – Cold Shutdown/Refueling System Malfunction	1 – RCS Level 2 – Loss of Safety Bus AC Power 3 – RCS Temperature 4 – Loss of Vital DC Power 5 – Loss of Communications 6 - Hazardous Event Affecting Safety Systems	**C**old Shutdown./ Refueling System Malfunction ICs/EALs

Table 2 – NEI / WF3 EAL Identification Cross-Reference

NEI		WF3	
IC	**Example EAL**	**Category and Subcategory**	**EAL**
AU1	1	A – Abnormal Rad Levels / Rad Effluent, 1 – Radiological Effluent	AU1.1
AU1	2	A – Abnormal Rad Levels / Rad Effluent, 1 – Radiological Effluent	AU1.1
AU1	3	A – Abnormal Rad Levels / Rad Effluent, 1 – Radiological Effluent	AU1.2
AU2	1	A – Abnormal Rad Levels / Rad Effluent, 2 – Irradiated Fuel Event	AU2.1
AA1	1	A – Abnormal Rad Levels / Rad Effluent, 1 – Radiological Effluent	AA1.1
AA1	2	A – Abnormal Rad Levels / Rad Effluent, 1 – Radiological Effluent	AA1.2
AA1	3	A – Abnormal Rad Levels / Rad Effluent, 1 – Radiological Effluent	AA1.3
AA1	4	A – Abnormal Rad Levels / Rad Effluent, 1 – Radiological Effluent	AA1.4
AA2	1	A – Abnormal Rad Levels / Rad Effluent, 2 – Irradiated Fuel Event	AA2.1
AA2	2	A – Abnormal Rad Levels / Rad Effluent, 2 – Irradiated Fuel Event	AA2.2
AA2	3	A – Abnormal Rad Levels / Rad Effluent, 2 – Irradiated Fuel Event	AA2.3
AA3	1	A – Abnormal Rad Levels / Rad Effluent, 3 – Area Radiation Levels	AA3.1
AA3	2	A – Abnormal Rad Levels / Rad Effluent, 3 – Area Radiation Levels	AA3.2
AS1	1	A – Abnormal Rad Levels / Rad Effluent, 1 – Radiological Effluent	AS1.1
AS1	2	A – Abnormal Rad Levels / Rad Effluent, 1 – Radiological Effluent	AS1.2
AS1	3	A – Abnormal Rad Levels / Rad Effluent, 1 – Radiological Effluent	AS1.3

NEI		WF3	
IC	**Example EAL**	**Category and Subcategory**	**EAL**
AS2	1	A – Abnormal Rad Levels / Rad Effluent, 2 – Irradiated Fuel Event	AS2.1
AG1	1	A – Abnormal Rad Levels / Rad Effluent, 1 – Radiological Effluent	AG1.1
AG1	2	A – Abnormal Rad Levels / Rad Effluent, 1 – Radiological Effluent	AG1.2
AG1	3	A – Abnormal Rad Levels / Rad Effluent, 1 – Radiological Effluent	AG1.3
AG2	1	A – Abnormal Rad Levels / Rad Effluent, 2 – Irradiated Fuel Event	AG2.1
CU1	1	C – Cold SD/ Refueling System Malfunction, 1 – RCS Level	CU1.1
CU1	2	C – Cold SD/ Refueling System Malfunction, 1 – RCS Level	CU1.2
CU2	1	C – Cold SD/ Refueling System Malfunction, 2 – Loss of Vital AC Power	CU2.1
CU3	1	C – Cold SD/ Refueling System Malfunction, 3 – RCS Temperature	CU3.1
CU3	2	C – Cold SD/ Refueling System Malfunction, 3 – RCS Temperature	CU3.2
CU4	1	C – Cold SD/ Refueling System Malfunction, 4 – Loss of Vital DC Power	CU4.1
CU5	1, 2, 3	C – Cold SD/ Refueling System Malfunction, 5 – Loss of Communications	CU5.1
CA1	1	C – Cold SD/ Refueling System Malfunction, 1 – RCS Level	CA1.1
CA1	2	C – Cold SD/ Refueling System Malfunction, 1 – RCS Level	CA1.2
CA2	1	C – Cold SD/ Refueling System Malfunction, 1 – Loss of Vital AC Power	CA2.1
CA3	1, 2	C – Cold SD/ Refueling System Malfunction, 3 – RCS Temperature	CA3.1
CA6	1	C – Cold SD/ Refueling System Malfunction, 6 – Hazardous Event Affecting Safety Systems	CA6.1
CS1	1	C – Cold SD/ Refueling System Malfunction, 1 – RCS Level	CS1.1

NEI		WF3	
IC	**Example EAL**	**Category and Subcategory**	**EAL**
CS1	2	C – Cold SD/ Refueling System Malfunction, 1 – RCS Level	CS1.2
CS1	3	C – Cold SD/ Refueling System Malfunction, 1 – RCS Level	CS1.3
CG1	1	C – Cold SD/ Refueling System Malfunction, 1 – RCS Level	CG1.1
CG1	2	C – Cold SD/ Refueling System Malfunction, 1 – RCS Level	CG1.2
E-HU1	1	E - ISFSI	EU1.1
FA1	1	F – Fission Product Barrier Degradation	FA1.1
FS1	1	F – Fission Product Barrier Degradation	FS1.1
FG1	1	F – Fission Product Barrier Degradation	FG1.1
HU1	1, 2, 3	H – Hazards and Other Conditions Affecting Plant Safety, 1 – Security	HU1.1
HU2	1	H – Hazards and Other Conditions Affecting Plant Safety, 2 – Seismic Event	HU2.1
HU3	1	H – Hazards and Other Conditions Affecting Plant Safety, 3 – Natural or Technological Hazard	HU3.1
HU3	2	H – Hazards and Other Conditions Affecting Plant Safety, 3 – Natural or Technological Hazard	HU3.2
HU3	3	H – Hazards and Other Conditions Affecting Plant Safety, 3 – Natural or Technological Hazard	HU3.3
HU3	4	H – Hazards and Other Conditions Affecting Plant Safety, 3 – Natural or Technological Hazard	HU3.4
HU3	5	H – Hazards and Other Conditions Affecting Plant Safety, 3 – Natural or Technological Hazard	N/A
HU4	1	H – Hazards and Other Conditions Affecting Plant Safety, 4 – Fire or Explosion	HU4.1
HU4	2	H – Hazards and Other Conditions Affecting Plant Safety, 4 – Fire or Explosion	HU4.2
HU4	3	H – Hazards and Other Conditions Affecting Plant Safety, 4 – Fire or Explosion	HU4.3

NEI		WF3	
IC	**Example EAL**	**Category and Subcategory**	**EAL**
HU4	4	H – Hazards and Other Conditions Affecting Plant Safety, 4 – Fire or Explosion	HU4.4
HU7	1	H – Hazards and Other Conditions Affecting Plant Safety, 7 – Judgment	HU7.1
HA1	1, 2	H – Hazards and Other Conditions Affecting Plant Safety, 1 – Security	HA1.1
HA5	1	H – Hazards and Other Conditions Affecting Plant Safety, 5 – Hazardous Gases	HA5.1
HA6	1	H – Hazards and Other Conditions Affecting Plant Safety, 6 – Control Room Evacuation	HA6.1
HA7	1	H – Hazards and Other Conditions Affecting Plant Safety, 7 – Judgment	HA7.1
HS1	1	H – Hazards and Other Conditions Affecting Plant Safety, 1 – Security	HS1.1
HS6	1	H – Hazards and Other Conditions Affecting Plant Safety, 6 – Control Room Evacuation	HS6.1
HS7	1	H – Hazards and Other Conditions Affecting Plant Safety, 7 – Judgment	HS7.1
HG1	1	N/A	N/A
HG7	1	H – Hazards and Other Conditions Affecting Plant Safety, 7 – Judgment	HG7.1
SU1	1	S – System Malfunction, 1 – Loss of Emergency AC Power	SU1.1
SU2	1	S – System Malfunction, 3 – Loss of Control Room Indications	SU3.1
SU3	1	S – System Malfunction, 4 – RCS Activity	N/A
SU3	2	S – System Malfunction, 4 – RCS Activity	SU4.1
SU4	1, 2, 3	S – System Malfunction, 5 – RCS Leakage	SU5.1
SU5	1	S – System Malfunction, 6 – RPS Failure	SU6.1
SU5	2	S – System Malfunction, 6 – RPS Failure	SU6.2

NEI		WF3	
IC	**Example EAL**	**Category and Subcategory**	**EAL**
SU6	1, 2, 3	S – System Malfunction, 7 –Loss of Communications	SU7.1
SU7	1, 2	S – System Malfunction, 8 –Containment Failure	SU8.1
SA1	1	S – System Malfunction, 1 – Loss of Emergency AC Power	SA1.1
SA2	1	S – System Malfunction, 3 – Loss of Control Room Indications	SA3.1
SA5	1	S – System Malfunction, 6 – RPS Failure	SA6.1
SA9	1	S – Hazardous Event Affecting Safety Systems	SA9.1
SS1	1	S – System Malfunction, 1 – Loss of Emergency AC Power	SS1.1
SS5	1	S – System Malfunction, 6 – RPS Failure	SS6.1
SS8	1	S – System Malfunction, 2 – Loss of Vital DC Power	SS2.1
SG1	1	S – System Malfunction, 1 – Loss of Emergency AC Power	SG1.1
SG8	1	S – System Malfunction, 1 – Loss of Emergency AC Power	SG1.2

Table 3 – Summary of Deviations

NEI		WF3 EAL	Description
IC	Example EAL		
HG1	1	N/A	IC HG1 and associated example EAL are not implemented in the WF3 scheme. There are several other ICs that are redundant with this IC, and are better suited to ensure timely and effective emergency declarations. In addition, the development of new spent fuel pool level EALs, as a result of NRC Order EA-12-051, clarified the intended emergency classification level for spent fuel pool level events. This deviation is justified because: 1. Hostile Action in the Protected Area is bounded by ICs HS1 and HS7. Hostile Action resulting in a loss of physical control is bound by EAL HG7, as well as any event that may lead to radiological releases to the public in excess of Environmental Protection Agency (EPA) Protective Action Guides (PAGs). a. If, for whatever reason, the Control Room must be evacuated, and control of safety functions (e.g., reactivity control, core cooling, and RCS heat removal) cannot be reestablished, then IC HS6 would apply, as well as IC HS7 if desired by the EAL decision-maker. b. Also, as stated above, any event (including Hostile Action) that could reasonably be expected to have a release exceeding EPA PAGs would be bound by IC HG7. c. From a Hostile Action perspective, ICs HS1, HS7 and HG7 are appropriate, and therefore, make this part of HG1 redundant and unnecessary. d. From a loss of physical control perspective, ICs HS6, HS7 and HG7 are appropriate, and therefore, make this part of HG1 redundant and unnecessary. 2. Any event which causes a loss of spent fuel pool level will be bounded by ICs AA2, AS2 and AG2, regardless of whether it was based upon a Hostile Action or not, thus making this part of HG1 redundant and unnecessary. a. An event that leads to a radiological release will be bounded by ICs AU1, AA1, AS1 and AG1. Events that lead to radiological releases in excess of

NEI		WF3 EAL	Description
IC	Example EAL		
			EPA PAGs will be bounded by EALs AG1 and HG7, thus making this part of HG1 redundant and unnecessary. ICs AA2, AS2, AG2, AS1, AG1, HS1, HS6, HS7 and HG7 have been implemented consistent with NEI 99-01 Revision 6 and thus HG1 is adequately bounded as described above. **Therefore, this is an acceptable deviation from the generic NEI 99-01 Revision 6 guidance and is consistent with NRC-approved EP FAQ 2015-013.**
HU4	1	HU4.1	Waterford 3 EAL HU4.1 addresses the condition where a fire is reported and verified in a listed Fire Area. This verification could be from a report in the field or because multiple fire detection device alarms are received. This EAL includes a table that lists fire areas of concern, including Containment. To avoid unnecessary declarations of EAL HU4.1, Note 12 is proposed to be added to HU4.1: Bullet 2 of this EAL (multiple fire alarm indications) is **not** applicable when diagnosed into a LOCA or Excess Steam Demand event in Containment. Steam releases are known to trigger fire detectors in the vicinity of the leak. Because other EALs address LOCAs and ESDs, Entergy believes declaring HU4.1 during such an event would suggest to non-Entergy agencies (local/state government, NRC, etc.) that a fire is also occurring at the site. While it may be possible to experience a fire inside containment coincident with a LOCA or Excess Steam Demand, such is unlikely, especially given the steam/water atmosphere created by the LOCA / ESD. Therefore, the aforementioned note is added with the following language also added to the HU4.1 basis that would eliminate this potential communication with offsite agencies when multiple fire detectors actuate inside containment coincident with a LOCA or Excess Steam Demand inside containment. Because steam release due to a LOCA or ESD inside containment can result in invalid fire detector actuations in containment, Note 12 eliminates the potential for EAL HU4.1 declaration due to such invalid alarms. This is reasonable based on the low probability of a fire occurring inside containment coincident with a LOCA

NEI		WF3 EAL	Description
IC	Example EAL		
			or ESD inside containment, and due to the low probability of a significant fire existing in a steam/water atmospheric environment. **Therefore, this is an acceptable deviation from the generic NEI 99-01 Revision 6 guidance. In addition, this treatment of NEI 99-01 Revision 6 HU4 EAL 1 is consistent with that provided in the NRC-approved Arkansas Nuclear One NEI 99-01 Revision 6 EAL scheme (ML18337A247).**
HU4	2	HU4.2	Waterford 3 EAL HU4.2 addresses receipt of a single fire detector without a corresponding verification. Entergy makes an exception in EAL HU4.2 to exclude containment in Modes 1 and 2. Personnel safety concerns preclude entry into certain areas of containment during these modes. In addition, there are areas within containment where fire detectors are located that would be inaccessible during these modes due to elevated radiation levels. Industry experience has demonstrated that including containment in Modes 1 and 2 in EAL HU4.2 can lead to unusual event emergency classifications based on a single spurious fire alarm, requiring subsequent emergency declaration retractions. With regard to containment fire alarms, it can reasonably be expected that a fire that burns for 15 minutes would produce sufficient products of combustion to cause multiple fire detection devices to alarm. This is due to the products of combustion being transported to other areas inside containment due to the forced flow ventilation system in operation. Receipt of a single fire alarm would likely be due to a spurious detector actuation. There are four Containment Fan Cooler (CFC) units located in the Waterford 3 containment building. Each CFC fan delivers approximately 75,000 CFM in normal mode and 37,800 CFM in accident mode. The four CFC units operate in accident mode when there is a Safety Injection Signal present. Two or three of the four CFCs are operating in normal mode at any given time to cool the Containment in modes 1 or 2. The CFC units draw return air from the containment atmosphere and discharge into a common header which discharges to multiple areas inside containment. This constant flow of air would draw any smoke towards the cooling units past the installed detectors, thus initiating multiple smoke detector alarms. Actuation of more than one smoke detector is the most reliable indication of an actual fire because of high volumetric air flow throughout the containment building. Due to construction of the intermediate floors and multiple openings in the floors, it can

NEI		WF3 EAL	Description
IC	Example EAL		
			be expected that smoke would migrate throughout containment in a very short period and that 2 or more smoke detectors would alarm. Basing emergency classifications on receiving more than one smoke detector actuation is therefore the most reliable indication of a valid alarm and accurately meets the Initiating Condition of HU4, "FIRE potentially degrading the level of safety of the plant." Note 13 is added to the Waterford 3 EALs that reads “During Modes 1 and 2, HU4.2 is **not** applicable to a single fire alarm in containment. A fire in containment in these modes should be assessed under EAL HU4.1.” Information is added to the basis for HU4.2 that reads: “This EAL is not applicable for containment in Modes 1 and 2. The containment air flow design and Technical Specification requirements for operation of Containment Fan Coolers are such that multiple smoke detectors would be expected to alarm for a fire in containment. A fire in containment in these modes would therefore be classified under EAL HU4.1.” Verification of a single containment fire alarm that is likely to be spurious does not warrant the potential elevated exposure risks and industrial safety risks associated with an emergency entry of containment in modes 1 and 2. Therefore, Waterford 3 has made EAL HU4.2 applicable to a single fire alarm in containment in Modes 3, 4, 5 and 6. The structure of the HU4 IC/EAL is modelled after Seabrook Station's adoption of NEI 99-01 Revision 6 EALs containing a similar exception, which was approved by the NRC with Amendment 152 to the Seabrook Station Facility Operating License No. NPF-86 on February 10, 2017 (ADAMS Accession No. ML16358A411). **Based on the information above, this is an acceptable deviation from the generic NEI 99-01 Revision 6 guidance. This deviation is consistent with NRC-approved EP FAQ 2018-003.**
HS6	1	HS6.1	Deleted defueled mode applicability. Control of the cited safety functions is not critical for a defueled reactor as there is no energy source in the reactor vessel or RCS. The Mode applicability for the reactivity control safety function has been limited to Modes 1, 2, and 3 (hot operating conditions). In the cold operating modes adequate shutdown margin exists under all conditions.

NEI		WF3 EAL	Description
IC	Example EAL		
			Therefore, This is an acceptable deviation from the generic NEI 99-01, Revision 6 guidance and is consistent with NRC-approved EP FAQ 2015-014.
CA6 SA9	1 1	CA6.1 SA9.1	The proposed WF3 CA6.1 and SA9.1 wording is intended to ensure that an Alert should be declared only when actual or potential performance issues with SAFETY SYSTEMS have occurred as a result of a hazardous event. The occurrence of a hazardous event will result in an Unusual Event classification at a minimum. In order to warrant escalation to the Alert classification, the hazardous event should cause indications of degraded performance to one train of a SAFETY SYSTEM with either indications of degraded performance on the second SAFETY SYSTEM train or VISIBLE DAMAGE to the second SAFETY SYSTEM train, such that the operability or reliability of the second train is a concern. In addition, escalation to the Alert classification should not occur if the damage from the hazardous event is limited to a SAFETY SYSTEM that was inoperable, or out of service, prior to the event occurring. As such, the proposed EALs will reduce the potential of declaring an Alert when events are in progress that do not involve an actual or potential substantial degradation of the level of safety of the plant, i.e., does not cause significant concern with shutting down or cooling down the plant. EALs CA6.1 and SA9.1 do not directly escalate to a Site Area Emergency or a General Emergency due to a hazardous event. The Fission Product Barrier and/or Abnormal Radiation Levels/Radiological Effluent recognition categories would provide an escalation path to a Site Area Emergency or a General Emergency. The EALs and the Basis sections have been revised to ensure potential escalations from an Unusual Event to an Alert, due to a hazardous event, is appropriate as the concern with these EALs is: (1) a hazardous event has occurred, (2) one SAFETY SYSTEM train is having performance issues as a result of the hazardous event, and (3) either the second SAFETY SYSTEM train is having performance issues or the VISIBLE DAMAGE is enough to be concerned that the second SAFETY SYSTEM train may have operability or reliability issues. The definition for VISIBLE DAMAGE has been revised to reflect the fact that the EALs are based upon SAFETY SYSTEM trains rather than individual components or structures.

NEI		WF3 EAL	Description
IC	Example EAL		
			Note 10 has been added to CA6.1 and SA9.1 as it meets the intent of the EALs, is consistent with other EALs (e.g., EAL HA5.1 which was previously endorsed by the NRC), and ensures that declared emergencies are based upon unplanned events with the potential to pose a radiological risk to the public. Note 11 has been added to CA6.1 and SA9.1 to help reinforce and succinctly capture the more detailed information from the revised basis section related to when conditions would require the declaration of an Alert. CA6.1 and SA9.1 are consistent with EP FAQ 2016-002 addressing degraded performance or visible damage to more than one safety system train caused by the specified events. **Based on the above information, this revised wording is an acceptable deviation from the generic NEI 99-01 Revision 6 guidance and is consistent with NRC-approved EP FAQ 2016-002.**

Category A

Abnormal Rad Levels / Rad Effluent

NEI IC#	NEI IC Wording and Mode Applicability	WF3 IC#(s)	WF3 IC Wording and Mode Applicability	Difference/Deviation Justification and/or Comments
AU1	Release of gaseous or liquid radioactivity greater than 2 times the (site-specific effluent release controlling document) limits for 60 minutes or longer. MODE: All	AU1	Release of gaseous or liquid radioactivity greater than 2 times the ODCM limits for 60 minutes or longer MODE: All	The WF3 ODCM is the site-specific effluent release controlling document.

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
1	Reading on **ANY** effluent radiation monitor greater than 2 times the (site-specific effluent release controlling document) limits for 60 minutes or longer: (site-specific monitor list and threshold values corresponding to 2 times the controlling document limits)	AU1.1	Reading on **any** Table A-1 effluent radiation monitor > column "UE" for ≥ 60 min. (Notes 1, 2, 3)	Example EALs #1 and #2 have been combined into a single EAL to simplify presentation. The NEI phrase "…effluent radiation monitor greater than 2 times the (site-specific effluent release controlling document)" and "effluent radiation monitor greater than 2 times the alarm setpoint established by a current radioactivity discharge permit " have been replaced with "…**any** Table A-1 effluent radiation monitor > column "UE." WF3 radiation monitors that detect radioactivity effluent release to the environment are listed in Table A-1. UE, Alert, SAE and GE thresholds for WF3 continuously monitored gaseous and liquid release pathways are listed in Table A-1 to consolidate the information in a single location and, thereby, simplify identification of the thresholds by the EAL-user. Gland steam condenser and main condenser exhausts – Monitored by PRM-IRE-0002: Per FSAR Section 2.1.1.3, the Turbine Gland Seal System exhaust and the Main Condenser Evacuation System exhaust are not normally radioactive. Since these systems are not sources for normally occurring continuous radioactivity releases or for planned batch releases from non-continuous release
2	Reading on **ANY** effluent radiation monitor greater than 2 times the alarm setpoint established by a current radioactivity discharge permit for 60 minutes or longer.			

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
				pathways, and are not normally radioactive, they do not meet the NEI 99-01 criteria for use as EAL thresholds. The values shown in Table A-1 column “UE,” consistent with the NEI bases, represent two times the ODCM release limits for gaseous and liquid releases.
3	Sample analysis for a gaseous or liquid release indicates a concentration or release rate greater than 2 times the (site-specific effluent release controlling document) limits for 60 minutes or longer.	AU1.2	Sample analysis for a gaseous or liquid release indicates a concentration or release rate > 2 x ODCM limits for ≥ 60 min. (Notes 1, 2)	The WF3 ODCM is the site-specific effluent release controlling document.
Notes	The Emergency Director should declare the Unusual Event promptly upon determining that 60 minutes has been exceeded, or will likely be exceeded. If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded 60 minutes. If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is no longer valid for classification	N/A	Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded. Note 2: If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded the specified time limit. Note 3: If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor	The classification timeliness note has been standardized across the WF3 EAL scheme by referencing the "time limit" specified within the EAL wording. Added “The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded” to reinforce the concept that the EAL timing component runs concurrent with the classification timeliness clock. The classification timeliness note has been standardized across the WF3 EAL scheme by referencing the "time limit" specified within the EAL wording. None

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
	purposes.		reading is **no** longer VALID for classification purposes.	

Table A-1 Effluent Monitor Classification Thresholds

Release Point		Monitor	GE	SAE	Alert	UE
Gaseous	Plant Stack WRGM	PRM-IRE-0110-4	4.01 E+08 μCi/sec	4.01 E+07 μCi/sec	4.01 E+06 μCi/sec	2.27 E+05 μCi/sec
		PRM-IRE-0110-1 to 3	6.54 E+01 μCi/cc	6.54 E+00 μCi/cc	6.54 E-01 μCi/cc	5.81 E-03 μCi/cc
	Fuel Handling Bldg. Exhaust WRGM	PRM-IRE-3032-4	1.48 E+10 μCi/sec	1.48 E+09 μCi/sec	1.48 E+08 μCi/sec	2.27 E+05 μCi/sec
		PRM-IRE-3032-1 to 3	7.85 E+03 μCi/cc	7.85 E+02 μCi/cc	7.85 E+01 μCi/cc	1.60 E-02 μCi/cc
Liquid	Circulating Water Discharge Monitor	PRM-IRE-1900	N/A	N/A	N/A	7.27 E-04 μCi/ml
	Liquid Waste Management Discharge Monitor	PRM-IRE-0647	N/A	N/A	N/A	2.40 E-03 μCi/ml
	Boron Management Discharge Monitor	PRM-IRE-0627	N/A	N/A	N/A	2.40 E-03 μCi/ml

NEI IC#	NEI IC Wording and Mode Applicability	WF3 IC#(s)	WF3 IC Wording and Mode Applicability	Difference/Deviation Justification and/or Comments
AU2	UNPLANNED loss of water level above irradiated fuel. MODE: All	AU2	UNPLANNED loss of water level above irradiated fuel MODE: All	None

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
1	a. UNPLANNED water level drop in the REFUELING PATHWAY as indicated by **ANY** of the following: (site-specific level indications). **AND** b. UNPLANNED rise in area radiation levels as indicated by **ANY** of the following radiation monitors. (site-specific list of area radiation monitors)	AU2.1	UNPLANNED water level drop in the REFUELING PATHWAY as indicated by SFP low level alarm or visual observation **AND** UNPLANNED rise in corresponding area radiation levels as indicated by **any** Table A-2 radiation monitor	Site-specific level indications incorporated. Site-specific area radiation monitors incorporated into Table A-2.

Table A-2 Irradiated Fuel Radiation Monitors	
• ARM-IRE-5024 • ARM-IRE-5025 • ARM-IRE-5026 • ARM-IRE-5027	Containment Purge Isolation Monitors
• ARM-IRE-0300.1 • ARM-IRE-0300.2 • ARM-IRE-0300.3 • ARM-IRE-0300.4	FHB Area Radiation Monitors
• PRM-IRE-5107A or B	FHB PIG Gas Channel

NEI IC#	NEI IC Wording	WF3 IC#(s)	WF3 IC Wording	Difference/Deviation Justification and/or Comments
AA1	Release of gaseous or liquid radioactivity resulting in offsite dose greater than 10 mrem TEDE or 50 mrem thyroid CDE. MODE: All	AA1	Release of gaseous or liquid radioactivity resulting in offsite dose greater than 10 mrem TEDE or 50 mrem thyroid CDE MODE: All	None

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
1	Reading on ANY of the following radiation monitors greater than the reading shown for 15 minutes or longer: (site-specific monitor list and threshold values)	AA1.1	Reading on **any** Table A-1 effluent radiation monitor > column "ALERT" for ≥ 15 min. (Notes 1, 2, 3, 4)	WF3 radiation monitors that detect radioactivity effluent release to the environment are listed in Table A-1. UE, Alert, SAE and GE thresholds for WF3 continuously monitored gaseous and liquid release pathways are listed in Table A-1 to consolidate the information in a single location and, thereby, simplify identification of the thresholds by the EAL-user. Gland steam condenser and main condenser exhausts – Monitored by PRM-IRE-0002: Per FSAR Section 2.1.1.3, the Turbine Gland Seal System exhaust and the Main Condenser Evacuation System exhaust are not normally radioactive. Since these systems are not sources for normally occurring continuous radioactivity releases or for planned batch releases from non-continuous release pathways, and are not normally radioactive, they do not meet the NEI 99-01 criteria for use as EAL thresholds. There is no direct association between the UE and the Alert thresholds in the Revision 6 EALs, as there was in the Revision 5 EALs. The Revision 6 Alert thresholds are 1/100 of the General Emergency (GE) thresholds and are based on a fuel clad accident source term, accident X/Qs, and EPA-400 dose conversion factors and protective action guideline (PAG) limits developed using the URI/RASCAL

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
				dose model. The Revision 5 Alert thresholds are 200x the ODCM limit and are based on annual release noble gas source term fractions, annual average X/Q, Regulatory Guide (RG) 1.109 dose conversion factors, and 10 CFR 20 limits. Revision 5 UE and Alert thresholds were factors of each other. Revision 6 UE and Alert thresholds are not factors of each other.
2	Dose assessment using actual meteorology indicates doses greater than 10 mrem TEDE or 50 mrem thyroid CDE at or beyond (site-specific dose receptor point).	AA1.2	Dose assessment using actual meteorology indicates doses > 10 mrem TEDE or 50 mrem thyroid CDE at or beyond the SITE BOUNDARY (Note 4)	The site boundary is the site-specific receptor point.
3	Analysis of a liquid effluent sample indicates a concentration or release rate that would result in doses greater than 10 mrem TEDE or 50 mrem thyroid CDE at or beyond (site-specific dose receptor point) for one hour of exposure.	AA1.3	Analysis of a liquid effluent sample indicates a concentration or release rate that would result in doses > 10 mrem TEDE or 50 mrem thyroid CDE at or beyond the SITE BOUNDARY for 60 min. of exposure (Notes 1, 2)	The site boundary is the site-specific receptor point.
4	Field survey results indicate **EITHER** of the following at or beyond (site-specific dose receptor point): ● Closed window dose rates greater than 10 mR/hr expected to continue for 60 minutes or longer. ● Analyses of field survey samples indicate thyroid CDE greater than 50 mrem for one hour of inhalation.	AA1.4	Field survey results indicate **EITHER** of the following at or beyond the SITE BOUNDARY: ● Closed window dose rates > 10 mR/hr expected to continue for ≥ 60 min. ● Analyses of field survey samples indicate thyroid CDE > 50 mrem for 60 min. of inhalation. (Notes 1, 2)	The site boundary is the site-specific receptor point.

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
Notes	The Emergency Director should declare the Alert promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.	N/A	Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.	The classification timeliness note has been standardized across the WF3 EAL scheme by referencing the "time limit" specified within the EAL wording. Added “The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded” to reinforce the concept that the EAL timing component runs concurrent with the classification timeliness clock.
	If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded 15 minutes.		Note 2: If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded the specified time limit.	The classification timeliness note has been standardized across the WF3 EAL scheme by referencing the "time limit" specified within the EAL wording.
	If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is no longer valid for classification purposes.		Note 3: If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is **no** longer VALID for classification purposes s.	None
	The pre-calculated effluent monitor values presented in EAL #1 should be used for emergency classification assessments until the results from a dose assessment using actual meteorology are available.		Note 4 The pre-calculated effluent monitor values presented in EALs AA1.1, AS1.1 and AG1.1 should be used for emergency classification assessments until the results from a dose assessment using actual meteorology are available.	Incorporated site-specific EAL numbers associated with generic EAL#1.

NEI IC#	NEI IC Wording	WF3 IC#(s)	WF3 IC Wording	Difference/Deviation Justification and/or Comments
AA2	Significant lowering of water level above, or damage to, irradiated fuel. MODE: All	AA2	Significant lowering of water level above, or damage to, irradiated fuel MODE: All	None

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
1	Uncovery of irradiated fuel in the REFUELING PATHWAY.	AA2.1	IMMINENT uncovery of irradiated fuel in the REFUELING PATHWAY	Added the defined term “IMMINENT.” Determination of irradiated fuel uncovery in the refueling pathway will always be an anticipatory determination as no direct indication is available to determine when the irradiated fuel has become uncovered.
2	Damage to irradiated fuel resulting in a release of radioactivity from the fuel as indicated by **ANY** of the following radiation monitors: (site-specific listing of radiation monitors, and the associated readings, setpoints and/or alarms)	AA2.2	Damage to irradiated fuel resulting in a release of radioactivity **AND** High alarm on **any** Table A-2 radiation monitor	Site-specific list of radiation monitors listed in Tables A-2. Radiation monitor high alarms specified.
3	Lowering of spent fuel pool level to (site-specific Level 2 value). [*See Developer Notes*]	AA2.3	Lowering of spent fuel pool level to 11 ft. (Level 2) on FS-ILI-3000(3001)	For WF3, Level 2 is 11 ft. as indicated on the SFP level instrument Site-specific information is added to the basis regarding both the instrument location and the methodology for reading the displayed data.

NEI IC#	NEI IC Wording	WF3 IC#(s)	WF3 IC Wording	Difference/Deviation Justification and/or Comments
AA3	Radiation levels that impede access to equipment necessary for normal plant operations, cooldown or shutdown MODE: All	AA3	Radiation levels that IMPEDE access to equipment necessary for normal plant operations, cooldown or shutdown MODE: All (AA3.2 Modes 1, 3 and 4 **only**)	EAL AA3.2 mode applicability has been limited to the applicable mode of Table A-3 (Modes 3 and 4).

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
1	Dose rate greater than 15 mR/hr in **ANY** of the following areas: ● Control Room ● Central Alarm Station ● (other site-specific areas/rooms)	AA3.1	Dose rate > 15 mR/hr in **EITHER** of the following areas: • Control Room (ARM-IRE-5001) • CAS (by survey)	No other site-specific areas requiring continuous occupancy exist at WF3. The Control Room is monitored for excessive radiation by ARM-IRE-5001. There are no permanently installed area radiation monitors in CAS that may be used to assess this EAL threshold. Therefore, this threshold is evaluated using local radiation survey for this area.
2	An UNPLANNED event results in radiation levels that prohibit or impede access to any of the following plant rooms or areas: (site-specific list of plant rooms or areas with entry-related mode applicability identified)	AA3.2	An UNPLANNED event results in radiation levels that prohibit or IMPEDE access to **any** Table A-3 room or area (Note 5)	The site-specific list of plant rooms or areas with entry-related mode applicability are tabularized in Table A-3. The bulleted bases item “the action for which room/area entry is required is of an administrative or record keeping nature (e.g., normal rounds or routine inspections)” was removed from the list of exceptions to classification in the basis information. These actions are a consideration when the site-specific list was developed. Rooms requiring entry for these types of actions are already excluded from the list when it was developed.

Note	If the equipment in the listed room or area was already inoperable or out-of-service before the event occurred, then no emergency classification is warranted.	N/A	Note 5	If the equipment in the listed room or area was already inoperable or out-of-service before the event occurred, then **no** emergency classification is warranted.	None

Table A-3 Safe Operation & Shutdown Rooms/Areas	
Room/Area	Mode
Turbine Building (all elevations and rooms)	1
Polisher Building (all elevations and rooms)	1
-4 RCA Letdown Valve Gallery	3
+21 RAB Switchgears A or B	3
-4 RCA Wing Area	4
-15 RCA Valve Gallery	4
-35 RCA Safeguard Rooms	4
+21 RAB Switchgears A or B	4

NEI IC#	NEI IC Wording	WF3 IC#(s)	WF3 IC Wording	Difference/Deviation Justification and/or Comments
AS1	Release of gaseous radioactivity resulting in offsite dose greater than 100 mrem TEDE or 500 mrem thyroid CDE MODE: All	AS1	Release of gaseous radioactivity resulting in offsite dose greater than 100 mrem TEDE or 500 mrem thyroid CDE MODE: All	None

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
1	Reading on ANY of the following radiation monitors greater than the reading shown for 15 minutes or longer: (site-specific monitor list and threshold values)	AS1.1	Reading on **any** Table A-1 effluent radiation monitor > column "SAE" for ≥ 15 min. (Notes 1, 2, 3, 4)	WF3 radiation monitors that detect radioactivity effluent release to the environment are listed in Table A-1. UE, Alert, SAE and GE thresholds for WF3 continuously monitored gaseous and liquid release pathways are listed in Table A-1 to consolidate the information in a single location and, thereby, simplify identification of the thresholds by the EAL-user. Gland steam condenser and main condenser exhausts – Monitored by PRM-IRE-0002: Per FSAR Section 2.1.1.3, the Turbine Gland Seal System exhaust and the Main Condenser Evacuation System exhaust are not normally radioactive. Since these systems are not sources for normally occurring continuous radioactivity releases or for planned batch releases from non-continuous release pathways, and are not normally radioactive, they do not meet the NEI 99-01 criteria for use as EAL thresholds.
2	Dose assessment using actual meteorology indicates doses greater than 100 mrem TEDE or 500 mrem thyroid CDE at or beyond (site-specific dose receptor point)	AS1.2	Dose assessment using actual meteorology indicates doses > 100 mrem TEDE or 500 mrem thyroid CDE at or beyond the SITE BOUNDARY (Note 4)	The site boundary is the site-specific receptor point.
3	Field survey results indicate **EITHER** of the following at or	AS1.3	Field survey results indicate **EITHER** of the following at or beyond the SITE	The site boundary is the site-specific receptor point.

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
	beyond (site-specific dose receptor point): ● Closed window dose rates greater than 100 mR/hr expected to continue for 60 minutes or longer. ● Analyses of field survey samples indicate thyroid CDE greater than 500 mrem for one hour of inhalation.		BOUNDARY: ● Closed window dose rates > 100 mR/hr expected to continue for ≥ 60 min. ● Analyses of field survey samples indicate thyroid CDE > 500 mrem for 60 min. of inhalation. (Notes 1, 2)	
Notes	The Emergency Director should declare the Site Area Emergency promptly upon determining that the applicable time has been exceeded, or will likely be exceeded. If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded 15 minutes. If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is no longer valid for classification purposes.	N/A	Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded Note 2: If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded the specified time limit. Note 3: If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is **no** longer VALID for classification purposes.	The classification timeliness note has been standardized across the WF3 EAL scheme by referencing the "time limit" specified within the EAL wording. Added “The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded” to reinforce the concept that the EAL timing component runs concurrent with the classification timeliness clock. The classification timeliness note has been standardized across the WF3 EAL scheme by referencing the "time limit" specified within the EAL wording. None

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
	The pre-calculated effluent monitor values presented in EAL #1 should be used for emergency classification assessments until the results from a dose assessment using actual meteorology are available.		Note 4 The pre-calculated effluent monitor values presented in EALs AA1.1, AS1.1 and AG1.1 should be used for emergency classification assessments until the results from a dose assessment using actual meteorology are available.	Incorporated site-specific EAL numbers associated with generic EAL#1.

NEI IC#	NEI IC Wording	WF3 IC#(s)	WF3 IC Wording	Difference/Deviation Justification and/or Comments
AS2	Spent fuel pool level at (site-specific Level 3 description) MODE: All	AS2	Spent fuel pool level at the top of the fuel racks MODE: All	Top of the fuel racks is the site-specific Level 3 description.

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
1	Lowering of spent fuel pool level to (site-specific Level 3 value)	AS2.1	Lowering of spent fuel pool level to 1 ft. (Level 3) on FS-ILI-3000(3001)	For WF3, Level 3 is 1 ft. as indicated on the SFP level instrument. Site-specific information is added to the basis regarding both the instrument location and the methodology for reading the displayed data.

NEI IC#	NEI IC Wording	WF3 IC#(s)	WF3 IC Wording	Difference/Deviation Justification and/or Comments
AG1	Release of gaseous radioactivity resulting in offsite dose greater than 1,000 mrem TEDE or 5,000 mrem thyroid CDE. MODE: All	AG1	Release of gaseous radioactivity resulting in offsite dose greater than 1,000 mrem TEDE or 5,000 mrem thyroid CDE MODE: All	None

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
1	Reading on ANY of the following radiation monitors greater than the reading shown for 15 minutes or longer: (site-specific monitor list and threshold values)	AG1.1	Reading on **any** Table A-1 effluent radiation monitor > column "GE" for ≥ 15 min. (Notes 1, 2, 3, 4)	WF3 radiation monitors that detect radioactivity effluent release to the environment are listed in Table A-1. UE, Alert, SAE and GE thresholds for WF3 continuously monitored gaseous and liquid release pathways are listed in Table A-1 to consolidate the information in a single location and, thereby, simplify identification of the thresholds by the EAL-user. Gland steam condenser and main condenser exhausts – Monitored by PRM-IRE-0002: Per FSAR Section 2.1.1.3, the Turbine Gland Seal System exhaust and the Main Condenser Evacuation System exhaust are not normally radioactive. Since these systems are not sources for normally occurring continuous radioactivity releases or for planned batch releases from non-continuous release pathways, and are not normally radioactive, they do not meet the NEI 99-01 criteria for use as EAL thresholds.
2	Dose assessment using actual meteorology indicates doses greater than 1,000 mrem TEDE or 5,000 mrem thyroid CDE at or beyond (site-specific dose receptor point).	AG1.2	Dose assessment using actual meteorology indicates doses > 1,000 mrem TEDE or 5,000 mrem thyroid CDE at or beyond the SITE BOUNDARY (Note 4)	The site boundary is the site-specific receptor point.
3	Field survey results indicate **EITHER** of the following at or	AG1.3	Field survey results indicate **EITHER** of the following at or	The site boundary is the site-specific receptor point.

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
	beyond (site-specific dose receptor point): ● Closed window dose rates greater than 1,000 mR/hr expected to continue for 60 minutes or longer. ● Analyses of field survey samples indicate thyroid CDE greater than 5,000 mrem for one hour of inhalation.		beyond the SITE BOUNDARY: ● Closed window dose rates > 1,000 mR/hr expected to continue for ≥ 60 min. ● Analyses of field survey samples indicate thyroid CDE > 5,000 mrem for 60 min. of inhalation. (Notes 1, 2)	
Notes	The Emergency Director should declare the Site Area Emergency promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.	N/A	Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.	The classification timeliness note has been standardized across the WF3 EAL scheme by referencing the "time limit" specified within the EAL wording. Added “The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded” to reinforce the concept that the EAL timing component runs concurrent with the classification timeliness clock.
	If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded 15 minutes.		Note 2: If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded the specified time limit.	The classification timeliness note has been standardized across the WF3 EAL scheme by referencing the "time limit" specified within the EAL wording.
	If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is no longer valid for classification		Note 3: If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then	None

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
	purposes. The pre-calculated effluent monitor values presented in EAL #1 should be used for emergency classification assessments until the results from a dose assessment using actual meteorology are available.		the effluent monitor reading is **no** longer VALID for classification purposes. Note 4 The pre-calculated effluent monitor values presented in EALs AA1.1, AS1.1 and AG1.1 should be used for emergency classification assessments until the results from a dose assessment using actual meteorology are available.	Incorporated site-specific EAL numbers associated with generic EAL#1.

NEI IC#	NEI IC Wording	WF3 IC#(s)	WF3 IC Wording	Difference/Deviation Justification and/or Comments
AG2	Spent fuel pool level cannot be restored to at least (site-specific Level 3 description) for 60 minutes or longer MODE: All	AG2	Spent fuel pool level **cannot** be restored to at least the top of the fuel racks for 60 minutes or longer MODE: All	Top of the fuel racks is the site-specific Level 3 description.

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
1	Spent fuel pool level cannot be restored to at least (site-specific Level 3 value) for 60 minutes or longer	AG2.1	Spent fuel pool level **cannot** be restored to at least 1 ft. (Level 3) on FS-ILI-3000(3001) for ≥ 60 min. (Note 1)	For WF3, Level 3 is 1 ft. as indicated on the SFP level instrument. Site-specific information is added to the basis regarding both the instrument location and the methodology for reading the displayed data.
Note	The Emergency Director should declare the General Emergency promptly upon determining that 60 minutes has been exceeded, or will likely be exceeded.	N/A	Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.	The classification timeliness note has been standardized across the WF3 EAL scheme by referencing the "time limit" specified within the EAL wording. Added “The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded” to reinforce the concept that the EAL timing component runs concurrent with the classification timeliness clock.

Category C

Cold Shutdown / Refueling System Malfunction

NEI IC#	NEI IC Wording	WF3 IC#(s)	WF3 IC Wording	Difference/Deviation Justification and/or Comments
CU1	UNPLANNED loss of (reactor vessel/RCS [*PWR*] or RPV [*BWR*]) inventory for 15 minutes or longer. MODE: Cold Shutdown, Refueling	CU1	UNPLANNED loss of RCS inventory MODE: 5 - Cold Shutdown, 6 - Refueling	Deleted the words "…for 15 minutes or longer" as the 15 minute criteria only applies to EAL #1

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
1	UNPLANNED loss of reactor coolant results in (reactor vessel/RCS [*PWR*] or RPV [*BWR*]) level less than a required lower limit for 15 minutes or longer.	CU1.1	UNPLANNED loss of reactor coolant results in RCS level less than a required lower limit for ≥ 15 min. (Note 1)	None
2	a. (Reactor vessel/RCS [*PWR*] or RPV [*BWR*]) level cannot be monitored. **AND** b. UNPLANNED increase in (site-specific sump and/or tank) levels.	CU1.2	RCS level **cannot** be monitored **AND EITHER** • UNPLANNED rise in Containment Sump or Reactor Drain Tank level due to loss of RCS inventory • Visual observation of UNISOLABLE RCS leakage	Replaced the term "increase" with the word "rise" consistent with allowed usage Added the words "…due to loss of RCS inventory" to be consistent with the IC wording. Containment Sump or Reactor Drain Tank are the site-specific applicable sumps and tanks. Added bulleted criteria "Visual observation of UNISOLABLE RCS leakage" to include direct observation of significant RCS leakage.
Note	The Emergency Director should declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.	N/A	Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The	The classification timeliness note has been standardized across the WF3 EAL scheme by referencing the "time limit" specified within the EAL wording. Added "The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded" to reinforce the concept that the EAL timing component runs concurrent with the classification timeliness clock.

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
			Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.	

NEI IC#	NEI IC Wording	WF3 IC#(s)	WF3 IC Wording	Difference/Deviation Justification and/or Comments
CU2	Loss of all but one AC power source to emergency buses for 15 minutes or longer. MODE: Cold Shutdown, Refueling, Defueled	CU2	Loss of **all but one** AC power source to safety buses for 15 minutes or longer. MODE: 5 - Cold Shutdown, 6 - Refueling, DEF - Defueled	“safety buses” is the WF3-specific terminology for “emergency buses”.

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
1	a. AC power capability to (site-specific emergency buses) is reduced to a single power source for 15 minutes or longer. **AND** b. Any additional single power source failure will result in loss of all AC power to SAFETY SYSTEMS.	CU2.1	AC power capability, Table C-2, to 4160 VAC safety buses 3A and 3B reduced to a single power source for ≥ 15 min. (Note 1) **AND** **Any** additional single power source failure will result in loss of **all** AC power to SAFETY SYSTEMS	4160 VAC safety buses 3A and 3B are the site-specific emergency (safety) buses. Site-specific AC power sources are tabularized in Table C-2.

Note	The Emergency Director should declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.	N/A	Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.	The classification timeliness note has been standardized across the WF3 EAL scheme by referencing the "time limit" specified within the EAL wording. Added “The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded” to reinforce the concept that the EAL timing component runs concurrent with the classification timeliness clock.

Table C-2 AC Power Sources	
Onsite	• Emergency Diesel Generator A • Emergency Diesel Generator B • Temporary Emergency Diesels (TEDs) (if already aligned)
Offsite	• Startup Transformer 3A • Startup Transformer 3B • Unit Auxiliary Transformer 3A (when back-fed from offsite) • Unit Auxiliary Transformer 3B (when back-fed from offsite)

NEI IC#	NEI IC Wording	WF3 IC#(s)	WF3 IC Wording	Difference/Deviation Justification and/or Comments
CU3	UNPLANNED increase in RCS temperature MODE: Cold Shutdown, Refueling	CU3	UNPLANNED rise in RCS temperature MODE: 5 - Cold Shutdown, 6 - Refueling	Replaced the term “increase” with the word “rise” consistent with allowed usage.

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
1	UNPLANNED increase in RCS temperature to greater than (site-specific Technical Specification cold shutdown temperature limit)	CU3.1	UNPLANNED rise in RCS temperature to > 200°F	Replaced the term “increase” with the word “rise” consistent with allowed usage 200°F is the site-specific Tech. Spec. cold shutdown temperature limit.
2	Loss of **ALL** RCS temperature and (reactor vessel/RCS [*PWR*] or RPV [*BWR*]) level indication for 15 minutes or longer.	CU3.2	Loss of **all** RCS temperature and RCS level indication for ≥ 15 min. (Note 1)	None
Note	The Emergency Director should declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded	N/A	Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.	The classification timeliness note has been standardized across the WF3 EAL scheme by referencing the "time limit" specified within the EAL wording. Added “The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded” to reinforce the concept that the EAL timing component runs concurrent with the classification timeliness clock.

NEI IC#	NEI IC Wording	WF3 IC#(s)	WF3 IC Wording	Difference/Deviation Justification and/or Comments
CU4	Loss of Vital DC power for 15 minutes or longer. MODE: Cold Shutdown, Refueling	CU4	Loss of Vital DC power for 15 minutes or longer. MODE: 5 - Cold Shutdown, 6 - Refueling	None

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
1	Indicated voltage is less than (site-specific bus voltage value) on required Vital DC buses for 15 minutes or longer.	CU4.1	Indicated voltage is < 108 VDC on required vital DC buses for ≥ 15 min. (Note 1)	108 VDC is the site-specific minimum vital DC bus voltage.
Note	The Emergency Director should declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.	N/A	Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.	The classification timeliness note has been standardized across the WF3 EAL scheme by referencing the "time limit" specified within the EAL wording. Added “The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded” to reinforce the concept that the EAL timing component runs concurrent with the classification timeliness clock.

NEI IC#	NEI IC Wording	WF3 IC#(s)	WF3 IC Wording	Difference/Deviation Justification and/or Comments
CU5	Loss of all onsite or offsite communications capabilities. MODE: Cold Shutdown, Refueling, Defueled	CU5	Loss of **all** onsite or offsite communications capabilities. MODE: 5 - Cold Shutdown, 6 - Refueling, DEF - Defueled	None

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
1	Loss of **ALL** of the following onsite communication methods: (site specific list of communications methods)	CU5.1	Loss of **all** Table C-4 onsite communication methods **OR** Loss of **all** Table C-4 State and local agency communication methods **OR** Loss of **all** Table C-4 NRC communication methods	Example EALs #1, 2 and 3 have been combined into a single EAL for simplification of presentation. Replaced “ORO” with “State and local agency” for clarification. Table C-4 provides a site-specific list of onsite, State and local agency (ORO) and NRC communications methods.
2	Loss of **ALL** of the following ORO communications methods: (site specific list of communications methods)			
3	Loss of **ALL** of the following NRC communications methods: (site specific list of communications methods)			

Table C-4 Communication Methods			
System	**Onsite**	**State/ Local**	**NRC**
Telephone System	X	X	X
Operational Hotline		X	
Plant Radio System (O&M)	X		
Plant Paging System	X		
Sound Powered Phone System	X		
Civil Defense Radio System		X	
Satellite Phones		X	X
Emergency Notification System (ENS)			X

NEI IC#	NEI IC Wording	WF3 IC#(s)	WF3 IC Wording	Difference/Deviation Justification and/or Comments
CA1	Loss of (reactor vessel/RCS [*PWR*] or RPV [*BWR*]) inventory MODE: Cold Shutdown, Refueling	CA1	Significant loss of RCS inventory MODE: 5 - Cold Shutdown, 6 - Refueling	Added the word “Significant…” to differentiate the Alert loss of RCS inventory IC from the Unusual Event IC which is “Unplanned loss of RCS inventory.”
1	Loss of (reactor vessel/RCS [*PWR*] or RPV [*BWR*]) inventory as indicated by level less than (site-specific level).	CA1.1	Loss of RCS inventory as indicated by RCS level < 13.46 ft.	RCS level of 13.46 ft. is at the hot leg centerline and the level corresponding to potential loss of suction by decay heat removal systems.
2	a. (Reactor vessel/RCS [*PWR*] or RPV [*BWR*]) level cannot be monitored for 15 minutes or longer **AND** b. UNPLANNED increase in (site-specific sump and/or tank) levels due to a loss of (reactor vessel/RCS [*PWR*] or RPV [*BWR*]) inventory.	CA1.2	RCS level **cannot** be monitored for ≥ 15 min. (Note 1) **AND EITHER** • UNPLANNED rise in Containment Sump or Reactor Drain Tank level due to loss of RCS inventory • Visual observation of UNISOLABLE RCS leakage	Replaced the term “increase” with the word “rise” consistent with allowed usage. Containment Sump or Reactor Drain Tank are the site-specific applicable sumps and tanks. Added bulleted criteria “Visual observation of UNISOLABLE RCS leakage” to include direct observation of significant RCS leakage.
Note	The Emergency Director should declare the Alert promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded	N/A	Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.	The classification timeliness note has been standardized across the WF3 EAL scheme by referencing the "time limit" specified within the EAL wording. Added “The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded” to reinforce the concept that the EAL timing component runs concurrent with the classification timeliness clock.

NEI IC#	NEI IC Wording	WF3 IC#(s)	WF3 IC Wording	Difference/Deviation Justification and/or Comments
CA2	Loss of all offsite and all onsite AC power to emergency buses for 15 minutes or longer MODE: Cold Shutdown, Refueling, Defueled	CA2	Loss of **all** offsite and **all** onsite AC power to safety buses for 15 minutes or longer. MODE: 5 - Cold Shutdown, 6 - Refueling, DEF - Defueled	“Safety buses” is the WF3-specific terminology for “emergency buses.”

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
1	Loss of **ALL** offsite and **ALL** onsite AC Power to (site-specific emergency buses) for 15 minutes or longer.	CA2.1	Loss of **all** offsite and **all** onsite AC power capability to 4160 VAC safety buses 3A and 3B for ≥ 15 min. (Note 1)	4160 VAC safety buses 3A and 3B are the site-specific emergency (safety) buses.
Note	The Emergency Director should declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.	N/A	Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.	The classification timeliness note has been standardized across the WF3 EAL scheme by referencing the "time limit" specified within the EAL wording. Added “The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded” to reinforce the concept that the EAL timing component runs concurrent with the classification timeliness clock.

NEI IC#	NEI IC Wording	WF3 IC#(s)	WF3 IC Wording	Difference/Deviation Justification and/or Comments
CA3	Inability to maintain the plant in cold shutdown. MODE: Cold Shutdown, Refueling	CA3	Inability to maintain plant in cold shutdown. MODE: 5 - Cold Shutdown, 6 - Refueling	None

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
1	UNPLANNED increase in RCS temperature to greater than (site-specific Technical Specification cold shutdown temperature limit) for greater than the duration specified in the following table.	CA3.1	UNPLANNED rise in RCS temperature to > 200°F for > Table C-3 duration (Note 1) **OR** UNPLANNED RCS pressure rise > 10 psia (this EAL does **not** apply during water-solid plant conditions)	Example EALs #1 and #2 have been combined into a single EAL as EAL #2 is the alternative threshold based on a loss of RCS temperature indication. Replaced the term “increase” with the word “rise” consistent with allowed usage. 200°F is the site-specific Tech. Spec. cold shutdown temperature limit. Table C-3 is the site-specific implementation of the generic RCS Reheat Duration Threshold table. 10 psia is the site-specific pressure rise readable by Control Room indications.
2	UNPLANNED RCS pressure increase greater than (site-specific pressure reading). (This EAL does not apply during water-solid plant conditions. [*PWR*])			
Note	The Emergency Director should declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.	N/A	Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the	The classification timeliness note has been standardized across the WF3 EAL scheme by referencing the "time limit" specified within the EAL wording. Added “The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded” to reinforce the concept that the EAL timing component runs concurrent with the classification timeliness clock.

Table C-3 RCS Heat-up Duration Thresholds		
RCS Status	**CONTAINMENT CLOSURE Status**	**Heat-up Duration**
Intact (but **not** lowered inventory) (< 20 ft MSL)	N/A	60 min.*
Not intact **OR** lowered inventory (< 20 ft MSL)	established	20 min.*
	not established	0 min.
* If an RCS heat removal system is in operation within this time frame and RCS temperature is being reduced, the EAL is **not** applicable.		

NEI IC#	NEI IC Wording	WF3 IC#(s)	WF3 IC Wording	Difference/Deviation Justification and/or Comments
CA6	Hazardous event affecting a SAFETY SYSTEM needed for the current operating mode. MODE: Cold Shutdown, Refueling	CA6	Hazardous event affecting SAFETY SYSTEMS needed for the current operating mode. MODE: 5 - Cold Shutdown, 6 - Refueling	Pluralized safety systems to be consistent with NRC EP FAQ 2016-002 that specifies degraded performance or visible damage in more than one safety system train.
1	a. The occurrence of **ANY** of the following hazardous events: ● Seismic event (earthquake) ● Internal or external flooding event ● High winds or tornado strike ● FIRE ● EXPLOSION ● (site-specific hazards) ● Other events with similar hazard characteristics as determined by the Shift Manager **AND** b. **EITHER** of the following: 1. Event damage has caused indications of degraded performance in at least one train of a SAFETY SYSTEM needed for the current operating mode. **OR** 2. The event has caused VISIBLE DAMAGE to a SAFETY SYSTEM component or structure needed for the current operating mode.	CA6.1	The occurrence of **any** Table C-5 hazardous event **AND** Event damage has caused indications of degraded performance on one train of a SAFETY SYSTEM needed for the current operating mode **AND EITHER**: ● Event damage has caused indications of degraded performance to the second train of the SAFETY SYSTEM needed for the current operating mode ● Event damage has resulted in VISIBLE DAMAGE to the second train of the SAFETY SYSTEM needed for the current operating mode (Notes 10, 11)	The hazardous events have been tabularized in Table C-5. CA6.1 reflects NRC FAQ 2016-002 requiring degraded performance or visible damage to more than one train of a safety system caused by the specified events. **This wording is a deviation from NEI 99-01 Revision 6 CA6 generic wording and bases but is deemed acceptable in order to ensure that an Alert is declared only when a hazardous event causes actual or potential performance issues with safety systems. This is consistent with NRC-approved EP FAQ 2016-002.** The word “a” is replaced with “the” in the EAL wording to provide agreement with the FAQ basis information indicating that the criteria is applicable to another train of the same safety system.

Notes	N/A N/A	N/A	Note 10: If the affected SAFETY SYSTEM train was already inoperable or out of service before the hazardous event occurred, then emergency classification is **not** warranted Note 11: If the hazardous event **only** resulted in VISIBLE DAMAGE, with **no** indications of degraded performance to at least one train of a SAFETY SYSTEM, then this emergency classification is **not** warranted.	Added Note 10 consistent with the recommendation of NRC EP FAQ 2016-002. Added Note 11 consistent with the recommendation of NRC EP FAQ 2016-002.

Table C-5 Hazardous Events
• Seismic event (earthquake) • Internal or external FLOODING event • High winds or tornado strike • FIRE • EXPLOSION • Other events with similar hazard characteristics as determined by the Shift Manager

NEI IC#	NEI IC Wording	WF3 IC#(s)	WF3 IC Wording	Difference/Deviation Justification and/or Comments
CS1	Loss of (reactor vessel/RCS [*PWR*] or RPV [*BWR*]) inventory affecting core decay heat removal capability. MODE: Cold Shutdown, Refueling	CS1	Loss of RCS inventory affecting core decay heat removal capability MODE: 5 - Cold Shutdown, 6 - Refueling	None

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
1	a. CONTAINMENT CLOSURE not established. **AND** b. (Reactor vessel/RCS [*PWR*] or RPV [*BWR*]) level less than (site-specific level).	CS1.1	CONTAINMENT CLOSURE **not** established **AND** RVLMS upper plenum level 0%	The closest indication of level near top of active fuel is provided by the RVLMS 0% sensor (#8), ~12.6 in. above the fuel alignment plate.
2	a. CONTAINMENT CLOSURE established. **AND** b. (Reactor vessel/RCS [*PWR*] or RPV [*BWR*]) level less than (site-specific level).	CS1.2	CONTAINMENT CLOSURE established **AND** Representative CETs indicate superheat	Superheated conditions in the core can only occur with core uncovery. Therefore superheated conditions, as indicated on representative CETs, is used as an indicator of reactor vessel level below the top of active fuel.
3	a. (Reactor vessel/RCS [*PWR*] or RPV [*BWR*]) level cannot be monitored for 30 minutes or longer. **AND** b. Core uncovery is indicated by **ANY** of the following:	CS1.3	RCS level **cannot** be monitored for ≥ 30 min. (Note 1) **AND** Core uncovery is indicated by **any** of the following: • UNPLANNED rise in Containment Sump or Reactor Drain Tank level of	Replaced the term “increase” with the word “rise” consistent with allowed usage. Containment Sump or Reactor Drain Tank are the site-specific applicable sumps and tanks.

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
	• (Site-specific radiation monitor) reading greater than (site-specific value) • Erratic source range monitor indication [*PWR*] • UNPLANNED increase in (site-specific sump and/or tank) levels of sufficient magnitude to indicate core uncovery • (Other site-specific indications)		sufficient magnitude to indicate core uncovery • Visual observation of UNISOLABLE RCS leakage of sufficient magnitude to indicate core uncovery • Containment High Range Radiation Monitor (ARM-IRE-5400AS or BS) > 10 R/hr • Erratic Source Range Monitor indication	Added bulleted criteria “Visual observation of UNISOLABLE RCS leakage” to include direct observation of significant RCS leakage. Containment High Range Radiation Monitors ARM-IRE-5400AS or BS are the site-specific radiation monitors that would be indicative of likely core uncovery in the Refueling mode. The dose rate due to core shine when the top of the core becomes uncovered should result in dose rates > 10 R/hr. There are no other site-specific indications of core uncovery in lieu of RCS water level indication.
Note	The Emergency Director should declare the Site Area Emergency promptly upon determining that 30 minutes has been exceeded, or will likely be exceeded	N/A	Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.	The classification timeliness note has been standardized across the WF3 EAL scheme by referencing the "time limit" specified within the EAL wording. Added “The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded” to reinforce the concept that the EAL timing component runs concurrent with the classification timeliness clock.

NEI IC#	NEI IC Wording	WF3 IC#(s)	WF3 IC Wording	Difference/Deviation Justification and/or Comments
CG1	Loss of (reactor vessel/RCS [*PWR*] or RPV [*BWR*]) inventory affecting fuel clad integrity with containment challenged MODE: Cold Shutdown, Refueling	CG1	Loss of RCS inventory affecting fuel clad integrity with containment challenged MODE: 5 - Cold Shutdown, 6 - Refueling	None

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
1	a. (Reactor vessel/RCS [*PWR*] or RPV [*BWR*]) level less than (site-specific level) for 30 minutes or longer. **AND** b. **ANY** indication from the Containment Challenge Table (see below).	CG1.1	Representative CETs indicate superheat for ≥ 30 min. (Note 1) **AND** **Any** Containment Challenge indication, Table C-1	Superheated conditions in the core can only occur with core uncovery. Therefore superheated conditions, as indicated on representative CETs, is used as an indicator of reactor vessel level below the top of active fuel. Table C-1 provides a tabularized list of containment challenge indications. 4% hydrogen concentration in the presence of oxygen represents an explosive mixture in containment.
2	a. (Reactor vessel/RCS [*PWR*] or RPV [*BWR*]) level cannot be monitored for 30 minutes or longer. **AND** b. Core uncovery is indicated by **ANY** of the following: ● (Site-specific radiation monitor) reading greater than (site-specific value) ● Erratic source range monitor indication [*PWR*]	CG1.2	RCS level **cannot** be monitored for ≥ 30 min. (Note 1) **AND** Core uncovery is indicated by **any** of the following: • UNPLANNED rise in Containment Sump or Reactor Drain Tank level of sufficient magnitude to indicate core uncovery • Visual observation of UNISOLABLE RCS leakage of sufficient magnitude to indicate core uncovery	Replaced the term “increase” with the word “rise” consistent with allowed usage. Containment Sump or Reactor Drain Tank are the site-specific applicable sumps and tanks. Added bulleted criteria “Visual observation of UNISOLABLE RCS leakage” to include direct observation of significant RCS leakage.

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
	• UNPLANNED increase in (site-specific sump and/or tank) levels of sufficient magnitude to indicate core uncovery • (Other site-specific indications) **AND** c. **ANY** indication from the Containment Challenge Table (see below).		• Containment High Range Radiation Monitor (ARM-IRE-5400A or B) > 10 R/hr • Erratic Source Range Monitor indication **AND** **Any** Containment Challenge indication, Table C-1	Containment High Range Radiation Monitors ARM-IRE-5400AS or BS are the site-specific radiation monitors that would be indicative of likely core uncovery in the Refueling mode. The dose rate due to core shine when the top of the core becomes uncovered should result in dose rates > 10 R/hr. There are no other site-specific indications of core uncovery in lieu of RCS water level indication. Table C-1 provides a tabularized list of containment challenge indications. 4% hydrogen concentration in the presence of oxygen represents an explosive mixture in containment.
Notes	The Emergency Director should declare the General Emergency promptly upon determining that 30 minutes has been exceeded, or will likely be exceeded. N/A	N/A	Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded. Note 6: If CONTAINMENT CLOSURE is re-established prior to exceeding the 30-minute time limit, declaration of a General Emergency is **not** required.	The classification timeliness note has been standardized across the WF3 EAL scheme by referencing the "time limit" specified within the EAL wording. Added “The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded” to reinforce the concept that the EAL timing component runs concurrent with the classification timeliness clock. Note 6 implements the asterisked note associated with the generic Containment Challenge table.

NEI 99-01 Rev 6 Containment Challenge Table:

Containment Challenge Table
▪ CONTAINMENT CLOSURE not established ▪ (Explosive mixture) exists inside containment ▪ UNPLANNED increase in containment pressure ▪ Secondary containment radiation monitor reading above (site-specific value) [BWR]

* If CONTAINMENT CLOSURE is re-established prior to exceeding the 30-minute time limit, then declaration of a General Emergency is not required.

WF3 Containment Challenge Table:

Table C-1 Containment Challenge Indications
• CONTAINMENT CLOSURE **not** established (Note 6) • Containment hydrogen concentration > 4% • UNPLANNED rise in containment pressure

Category D

Permanently Defueled Station Malfunction

NEI IC#	NEI IC Wording	WF3 IC#(s)	WF3 IC Wording	Difference/Deviation Justification and/or Comments
PD-AU1 PD-AU2 PD-SU1 PD-HU1 PD-HU2 PD-HU3 PD-AA1 PD-AA2 PD-HA1 PD-HA3	Recognition Category D Permanently Defueled Station	N/A	N/A	NEI Recognition Category PD ICs and EALs are applicable only to permanently defueled stations. WF3 is not a defueled station.

Category E

Independent Spent Fuel Storage Installation (ISFSI)

NEI IC#	NEI IC Wording	WF3 IC#(s)	WF3 IC Wording	Difference/Deviation Justification and/or Comments
E-HU1	Damage to a loaded cask CONFINEMENT BOUNDARY MODE: All	EU1	Damage to a loaded cask CONFINEMENT BOUNDARY MODE: All	None

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
1	Damage to a loaded cask CONFINEMENT BOUNDARY as indicated by an on-contact radiation reading greater than (2 times the site-specific cask specific technical specification allowable radiation level) on the surface of the spent fuel cask.	EU1.1	Damage to a loaded cask CONFINEMENT BOUNDARY as indicated by an on-contact radiation reading on the surface of a loaded spent fuel cask > **any** Table E-1 dose rate limit.	The specified dose rates represent 2 times the site-specific cask technical specification allowable levels per the ISFSI Technical Specifications (licensing document).

Table E-1 ISFSI Dose Rate Limits
HI-STORM (Note E)
126 mrem/hr Total Dose Rate Point A
338 mrem/hr Total Dose Rate Point B
326 mrem/hr Total Dose Rate Point C
60 mrem/hr Total Dose Rate Point D
60 mrem/hr Total Dose Rate Point E
374 mrem/hr Total Dose Rate Point F
136 mrem/hr Total Dose Rate Point G

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NOTE E: Survey points are described in DFS-007-003, Radiation Monitoring Requirements for Loading and Storage HI-STORM.

Category F

Fission Product Barrier Degradation

NEI IC#	NEI IC Wording	WF3 IC#(s)	WF3 IC Wording	Difference/Deviation Justification and/or Comments
FA1	Any Loss or any Potential Loss of either the Fuel Clad or RCS barrier. MODE: Power Operation, Hot Standby, Startup, Hot Shutdown	FA1	**Any** loss or **any** potential loss of either Fuel Clad or RCS barrier MODE: 1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 - Hot Shutdown	None

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
1	Any Loss or any Potential Loss of either the Fuel Clad or RCS barrier.	FA1.1	**Any** loss or **any** potential loss of either Fuel Clad or RCS barrier (Table F-1)	Table F-1 provides the fission product barrier loss and potential loss thresholds.

NEI IC#	NEI IC Wording	WF3 IC#(s)	WF3 IC Wording	Difference/Deviation Justification and/or Comments
FS1	Loss or Potential Loss of any two barriers MODE: Power Operation, Hot Standby, Startup, Hot Shutdown	FS1	Loss or potential loss of **any** two barriers MODE: 1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 - Hot Shutdown	None

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
1	Loss or Potential Loss of any two barriers	FS1.1	Loss or potential loss of **any** two barriers (Table F-1)	Table F-1 provides the fission product barrier loss and potential loss thresholds.

NEI IC#	NEI IC Wording	WF3 IC#(s)	WF3 IC Wording	Difference/Deviation Justification and/or Comments
FG1	Loss of any two barriers and Loss or Potential Loss of third barrier MODE: Power Operation, Hot Standby, Startup, Hot Shutdown	FG1	Loss of **any** two barriers and loss or potential loss of the third barrier MODE: 1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 - Hot Shutdown	None

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
1	Loss of any two barriers and Loss or Potential Loss of third barrier	FG1.1	Loss of **any** two barriers **AND** Loss or potential loss of the third barrier (Table F-1)	Table F-1 provides the fission product barrier loss and potential loss thresholds.

PWR Fuel Clad Fission Product Barrier Degradation Thresholds

NEI FPB#	NEI Threshold Wording	WF3 FPB #(s)	WF3 FPB Wording	Difference/Deviation Justification and/or Comments
FC Loss 1	**RCS or SG Tube Leakage** Not Applicable	N/A	N/A	N/A
FC Loss 2	**Inadequate Heat Removal** A. Core exit thermocouple readings greater than (site-specific temperature value).	FCB2	Representative CET readings > 1,200°F	CETs reading > 1,200°F indicate significant core exit superheating and core uncovery.

NEI FPB#	NEI Threshold Wording	WF3 FPB #(s)	WF3 FPB Wording	Difference/Deviation Justification and/or Comments
FC Loss 3	**CTMT Radiation/RCS Activity** A. Containment radiation monitor reading greater than (site-specific value) **OR** B. (Site-specific indications that reactor coolant activity is greater than 300 μCi/gm dose equivalent I-131)	FCB5	Containment High Range Radiation Monitor (ARM-IRE-5400AS or ARM-IRE-5400BS) > 900 R/hr (Note 14).	A 900 R/hr (943 R/hr rounded for readability) reading in the containment is used to indicate a loss of the Fuel Clad barrier and a release of reactor coolant, with elevated activity indicative of fuel damage, into the containment. This value assumes an instantaneous release and dispersal of the reactor coolant noble gas and iodine inventory associated with a concentration of approximately 300 µCi/gm dose equivalent I-131 into the containment atmosphere. The use of a 300 uCi/gm dose equivalent I-131 (DEI) source term for FCB5 (NEI Fuel Clad Barrier Loss threshold 3.A) provides agreement within the EAL scheme with FCB6 (NEI Fuel Clad Barrier Loss threshold 3.B) which directly refers to a 300 uCi/gm DEI value. The 2% - 5% rule of thumb used in the NEI basis for PWRs and BWRs originated in NUMARC/NESP-007 Rev 2 and could be confirmed using typical enrichment values and NUREG-1228 related source term/partitioning assumptions. Currently, most units operate with higher enrichment than what was common in the late 1980s and have been approved for power uprates. Additionally, newer source term and partitioning guidance such as NUREG-1940 are a factor. These combine such that typical reactor coolant concentrations to percent clad damage are approximately half of what was calculated using historical inputs and guidance. Site-specific information added to the basis and added Note 14 on the phenomenon of thermally induced current and its potential effects on the radiation monitor indication.

NEI FPB#	NEI Threshold Wording	WF3 FPB #(s)	WF3 FPB Wording	Difference/Deviation Justification and/or Comments
		FCB6	Reactor coolant activity > 300 µCi/gm dose equivalent I-131 as indicated by Chemistry sample	The 2% - 5% rule of thumb used in the NEI basis for PWRs and BWRs originated in NUMARC/NESP-007 Rev 2 and could be confirmed using typical enrichment values and NUREG-1228 related source term/partitioning assumptions. Currently, most units operate with higher enrichment than what was common in the late 1980s and have been approved for power uprates. Additionally, newer source term and partitioning guidance such as NUREG-1940 are a factor. These combine such that typical reactor coolant concentrations to percent clad damage are approximately half of what was calculated using historical inputs and guidance, in this case approximately 1% clad damage.
FC Loss 4	**CTMT Integrity or Bypass** Not Applicable	N/A	N/A	N/A
FC Loss 5	**Other Indications** A. (site-specific as applicable)	N/A	N/A	No other site-specific Fuel Clad Loss indication has been identified for WF3.
FC Loss 6	**ED Judgment** A. **ANY** condition in the opinion of the Emergency Director that indicates Loss of the Fuel Clad Barrier.	FCB7	**Any** condition in the opinion of the Emergency Director that indicates loss of the Fuel Clad barrier	None
FC P-Loss 1	**RCS or SG Tube Leakage** A. RCS/reactor vessel level less than (site-specific level)	FCB1	RVLMS upper plenum level 0%	The lowest indication on the RVLMS is 12.6 inches above the fuel alignment plate, which is approximately the top of the active fuel. RVLMS reading at this level therefore signals inadequate coolant inventory.
FC P-Loss 2	**Inadequate Heat Removal**	FCB3	Representative CET readings > 700°F	Indication of significant superheat (CETs > 700°F) is a potential Fuel Clad barrier loss condition because the possible rapid rise in cladding temperatures may lead to cladding failure.

NEI FPB#	NEI Threshold Wording	WF3 FPB #(s)	WF3 FPB Wording	Difference/Deviation Justification and/or Comments
	A. Core exit thermocouple readings greater than (site-specific temperature value) **OR** B. Inadequate RCS heat removal capability via steam generators as indicated by (site-specific indications).	FCB4	**Any** OP-902-008 Functional Recovery RCS/Core Heat Removal safety function criterion is **not** met for ≥ 15 min. (Note 1)	The threshold is aligned with EOP RCS heat removal safety function criteria. Fifteen minutes is used as a reasonable time period to determine that the safety function criterion cannot be recovered. Note 1 is added to address the timing component.
FC P-Loss 3	**CTMT Radiation/RCS Activity** Not Applicable	N/A	N/A	N/A
FC P-Loss 4	**CTMT Integrity or Bypass** Not Applicable	N/A	N/A	N/A
FC P-Loss 5	**Other Indications** A. (site-specific as applicable)	N/A	N/A	No other site-specific Fuel Clad Potential Loss indication has been identified for WF3.
FC P-Loss 6	**Emergency Director Judgment** A. **ANY** condition in the opinion of the Emergency Director that indicates Potential Loss of the Fuel Clad Barrier.	FCB8	**Any** condition in the opinion of the Emergency Director that indicates potential loss of the Fuel Clad barrier	None

NEI FPB#	NEI Threshold Wording	WF3 FPB #(s)	WF3 FPB Wording	Difference/Deviation Justification and/or Comments
Note	N/A	N/A	Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.	Added Note 1 to be consistent in its use for EAL thresholds with a timing component.
			Note 14: Evaluate Containment High Range Radiation Monitor readings for potential erratic indications as a result of thermally induced currents.	Site-specific information added to the basis and added Note 14 on the phenomenon of thermally induced current and its potential effects on the radiation monitor indication.

PWR RCS Fission Product Barrier Degradation Thresholds

NEI FPB#	NEI IC Wording	WF3 FPB #(s)	WF3 FPB Wording	Difference/Deviation Justification and/or Comments
RCS Loss 1	**RCS or SG Tube Leakage** A. An automatic or manual ECCS (SI) actuation is required by **EITHER** of the following: 1. UNISOLABLE RCS leakage **OR** 2. SG tube RUPTURE.	RCB1	An automatic or manual ECCS (SIAS) actuation required by **EITHER:** • UNISOLABLE RCS leakage • S/G tube RUPTURE	SIAS is the site-specific nomenclature for SI. Added "Failure to isolate the leak (from the Control Room or locally), within 15 minutes or if known that the leak cannot be isolated within 15 minutes, from the start of the leak requires immediate classification" to the basis. This provides agreement with the definition of "Unisolable" and ensures isolation attempts, both locally and remotely, are achieved in a timely manner.
RCS Loss 2	**Inadequate Heat Removal** Not Applicable	N/A	N/A	N/A
RCS Loss 3	**CTMT Radiation/RCS Activity** A. Containment radiation monitor reading greater than (site-specific value).	RCB5	Containment High Range Radiation Monitor (ARM-IRE-5400AS or ARM-IRE-5400BS) > 60 R/hr (Note 14).	A 60 R/hr (61.9 R/hr rounded for readability) reading in containment is used to indicate a loss of the RCS barrier and a release of reactor coolant, at the T.S. coolant activity limit, into the containment. This value assumes an instantaneous release and dispersal of the reactor coolant noble gas and iodine inventory associated T.S. coolant activity into the containment atmosphere. Site-specific information added to the basis and added Note 14 on the phenomenon of thermally induced current and its potential effects on the radiation monitor indication.
RCS Loss 4	**CTMT Integrity or Bypass** Not Applicable	N/A	N/A	N/A

NEI FPB#	NEI IC Wording	WF3 FPB #(s)	WF3 FPB Wording	Difference/Deviation Justification and/or Comments
RCS Loss 5	**Other Indications** A. (site-specific as applicable)	N/A	N/A	No other site-specific RCS Loss indication has been identified for WF3.
RCS Loss 6	**Emergency Director Judgment** A. **ANY** condition in the opinion of the Emergency Director that indicates Loss of the RCS Barrier.	RCB6	**Any** condition in the opinion of the Emergency Director that indicates loss of the RCS barrier	None
RCS P-Loss 1	**RCS or SG Tube Leakage** A. Operation of a standby charging (makeup) pump is required by **EITHER** of the following: 1. UNISOLABLE RCS leakage **OR** 2. SG tube leakage. **OR** B. RCS cooldown rate greater than (site-specific pressurized thermal shock criteria/limits defined by site-specific indications).	RCB2	UNISOLABLE RCS leakage or S/G tube leakage > 44 gpm excluding normal reductions in RCS inventory (e.g., letdown, RCP seal leakoff)	WF3 uses the alternative indication of the capacity of one pump for the threshold leakage value as described in the NEI guidance Added “Failure to isolate the leak (from the Control Room or locally), within 15 minutes or if known that the leak cannot be isolated within 15 minutes, from the start of the leak requires immediate classification” to the basis. This provides agreement with the definition of “Unisolable” and ensures isolation attempts, both locally and remotely, are achieved in a timely manner.
		RCB3	RCS cooldown rate > 100°F/hr **AND** Pressurizer pressure > maximum limits of the RCS Pressure and Temperature Limits (OP-902-009 Attachments 2-A thru D)	100°F/hr is the maximum Technical Specification LCO on RCS cooldown rate. The LCO for the rate of change of temperature restricts stresses caused by thermal gradients and also ensures the validity of the RCS Pressure – Temperature (P/T) limit curves. The RCS P/T curves define the acceptable combinations of RCS pressure and temperature.
RCS P-Loss 2	**Inadequate Heat Removal** A. Inadequate RCS heat removal capability via steam generators as indicated by (site-specific indications).	RCB4	**Any** OP-902-008 Functional Recovery RCS/Core Heat Removal safety function criterion is **not** met for ≥ 15 min. (Note 1)	The threshold is aligned with EOP RCS heat removal safety function criteria. Fifteen minutes is used as a reasonable time period to determine that the safety function criterion cannot be recovered. Note 1 is added to address the timing component.

NEI FPB#	NEI IC Wording	WF3 FPB #(s)	WF3 FPB Wording	Difference/Deviation Justification and/or Comments
RCS P-Loss 3	**CTMT Radiation/RCS Activity** Not Applicable	N/A	N/A	N/A
RCS P-Loss 4	**CTMT Integrity or Bypass** Not Applicable	N/A	N/A	N/A
RCS P-Loss 5	**Other Indications** A. (site-specific as applicable)	N/A	N/A	No other site-specific RCS Potential Loss indication has been identified for WF3.
RCS P-Loss 6	**Emergency Director Judgment** A. **ANY** condition in the opinion of the Emergency Director that indicates Potential Loss of the RCS Barrier.	RCB7	**Any** condition in the opinion of the Emergency Director that indicates potential loss of the RCS barrier	None

NEI FPB#	NEI IC Wording	WF3 FPB #(s)	WF3 FPB Wording	Difference/Deviation Justification and/or Comments
Note	N/A	N/A	Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.	Added Note 1 to be consistent in its use for EAL thresholds with a timing component.
			Note 14: Evaluate Containment High Range Radiation Monitor readings for potential erratic indications as a result of thermally induced currents.	Site-specific information added to the basis and added Note 14 on the phenomenon of thermally induced current and its potential effects on the radiation monitor indication.

PWR Containment Fission Product Barrier Degradation Thresholds

NEI FPB#	NEI IC Wording	WF3 FPB #(s)	WF3 FPB Wording	Difference/Deviation Justification and/or Comments
CTMT Loss 1	**RCS or SG Tube Leakage** A. A leaking or RUPTURED SG is FAULTED outside of containment.	CNB1	S/G tube leakage > 44 gpm (excluding normal reductions in RCS inventory) or that is RUPTURED is also FAULTED outside of containment	The threshold is reworded to clarify that the steam generator leakage is that level of leakage associated with the related NEI RCS barrier potential loss threshold 1.A (WF3 RCB2). Added language to the basis to exclude short term releases via the Emergency Feedwater Pump or Atmospheric Dump valve in order to execute a rapid RCS cooldown to 520° from consideration for failure of the containment barrier. These releases are isolable and meet the intent of the NEI guidance. Revised the table on page 2 of the basis information to reflect pump capacity values to align with the change made to the EAL.
CTMT Loss 2	**Inadequate Heat Removal** Not Applicable	N/A	N/A	N/A
CTMT Loss 3	**CTMT Radiation/RCS Activity** Not applicable	N/A	N/A	N/A

NEI FPB#	NEI IC Wording	WF3 FPB #(s)	WF3 FPB Wording	Difference/Deviation Justification and/or Comments
CTMT Loss 4	**CTMT Integrity or Bypass** A. Containment isolation is required **AND** **EITHER** of the following: 1. Containment integrity has been lost based on Emergency Director judgment. **OR** 2. UNISOLABLE pathway from the containment to the environment exists. **OR** B. Indications of RCS leakage outside of containment.	CNB4	Containment isolation is required **AND EITHER**: ▪ Containment integrity has been lost based on Emergency Director judgment • UNISOLABLE pathway from Containment to the environment exists	Added “Failure to isolate the leak (from the Control Room or locally), within 15 minutes or if known that the leak cannot be isolated within 15 minutes, from the start of the leak requires immediate classification” to the basis. This provides agreement with the definition of “Unisolable” and ensures isolation attempts, both locally and remotely, are achieved in a timely manner. Added site-specific information on operation of the containment shield building annular space ventilation system to the basis.
		CNB5	Indications of RCS leakage outside of Containment	None
CTMT Loss 5	**Other Indications** A. (site-specific as applicable)	N/A	N/A	No other site-specific Containment Loss indication has been identified for WF3.
CTMT Loss 6	**Emergency Director Judgment** **ANY** condition in the opinion of the Emergency Director that indicates Loss of the Containment Barrier.	CNB9	**Any** condition in the opinion of the Emergency Director that indicates loss of the Containment barrier	None
CTMT P-Loss 1	**RCS or SG Tube Leakage** Not Applicable	N/A	N/A	N/A

NEI FPB#	NEI IC Wording	WF3 FPB #(s)	WF3 FPB Wording	Difference/Deviation Justification and/or Comments
CTMT P-Loss 2	**Inadequate Heat Removal** A. 1. (Site-specific criteria for entry into core cooling restoration procedure) **AND** 2. Restoration procedure not effective within 15 minutes.	CNB2	Representative CET readings > 1,200°F **AND** Restoration procedures **not** effective within 15 min. (Note 1)	CETs reading > 1,200°F indicate significant core exit superheating and core uncovery. Added Note 1 consistent with other thresholds with a timing component.
CTMT P-Loss 3	**CTMT Radiation/RCS Activity** A. Containment radiation monitor reading greater than (site-specific value).	CNB3	Containment High Range Radiation Monitor (ARM-IRE-5400AS or ARM-IRE-5400BS) > 15,000 R/hr (Note 14).	A 15,000 R/hr reading in the containment is used to indicate a potential loss of the containment barrier and a release of reactor coolant, with significant activity indicative of 20% fuel damage, into the containment. This value assumes an instantaneous release and dispersal of the reactor coolant noble gas and iodine inventory associated with a concentration associated with 20% clad damage into the containment atmosphere. 7 Regarding the shift in EAL threshold for this reading, in the current Waterford calculation ECS03-008, the source term for 20% clad damage is 55% of the NUREG-1940 source term (8.3E+6 Ci vs 1.5E+7 Ci). ECS03-008 also uses MicroShield modeling where the detector is located outside containment where the upgraded calculation models the monitor inside containment. While the current Waterford basis for the containment rad monitor threshold is not in error, it is very conservative, resulting in meeting the loss of three FPBs much earlier than current guidance calls for. Site-specific information added to the basis and added Note 14 on the phenomenon of thermally induced current and its potential effects on the radiation monitor indication.

NEI FPB#	NEI IC Wording	WF3 FPB #(s)	WF3 FPB Wording	Difference/Deviation Justification and/or Comments
CTMT P-Loss 4	**CTMT Integrity or Bypass** A. Containment pressure greater than (site-specific value) **OR** B. Explosive mixture exists inside containment **OR** C. 1. Containment pressure greater than (site-specific pressure setpoint) **AND** 2. Less than one full train of (site-specific system or equipment) is operating per design for 15 minutes or longer.	CNB6	Containment pressure > 50 psia	50 psia is the site specific containment design pressure.
		CNB7	Containment hydrogen concentration > 4%	4% hydrogen concentration in the presence of oxygen represents an explosive mixture in containment.
		CNB8	Containment pressure > 17.7 psia with < one full train of containment heat removal systems operating per design for ≥ 15 min. (Notes 1, 9)	The containment pressure setpoint is the pressure at which the Containment Spray System should actuate and begin performing its function. Added Note 1 consistent with other thresholds with a timing component. Added new Note 9 to clarify what constitutes a full train of containment heat removal systems. NEI 99-01 revision 4 and 5 specified depressurization equipment operating for this potential loss of containment, where revision 6 specifies containment energy (heat) removal systems for this potential loss. This note contains the specific equipment and conditions needed to satisfy the Containment Temperature and Pressure Control safety function in the emergency operating procedures.
CTMT P-Loss 5	**Other Indications** A. (site-specific as applicable)	N/A	N/A	No other site-specific Containment Potential Loss indication has been identified for WF3.

NEI FPB#	NEI IC Wording	WF3 FPB #(s)	WF3 FPB Wording	Difference/Deviation Justification and/or Comments
CTMT P-Loss 6	**Emergency Director Judgment** A. **ANY** condition in the opinion of the Emergency Director that indicates Potential Loss of the Containment Barrier.	CNB10	**Any** condition in the opinion of the Emergency Director that indicates potential loss of the Containment barrier	None
Note	N/A	N/A	Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded	Added Note 1 to be consistent in its use for EAL thresholds with a timing component.
	N/A	N/A	Note 9: One full train of containment heat removal systems consists of either: • <u>One</u> train of the Containment Spray System (operating with ≥1750 gpm flow) **AND** <u>One</u> train of the Containment Cooling System (one fan cooler required) **OR** • <u>Two</u> trains of the Containment Spray System (operating with ≥1750 gpm flow each).	Added Note 9 to provide clarification as to what constitutes one full train of containment heat removal systems.

NEI FPB#	NEI IC Wording	WF3 FPB #(s)	WF3 FPB Wording	Difference/Deviation Justification and/or Comments
	N/A	N/A	Note 14: Evaluate Containment High Range Radiation Monitor readings for potential erratic indications as a result of thermally induced currents.	Site-specific information added to the basis and added Note 14 on the phenomenon of thermally induced current and its potential effects on the radiation monitor indication.

Category H

Hazards and Other Conditions Affecting Plant Safety

NEI IC#	NEI IC Wording	WF3 IC#(s)	WF3 IC Wording	Difference/Deviation Justification and/or Comments
HU1	Confirmed SECURITY CONDITION or threat MODE: All	HU1	Confirmed SECURITY CONDITION or threat. MODE: All	None

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
1	A SECURITY CONDITION that does not involve a HOSTILE ACTION as reported by the (site-specific security shift supervision).	HU1.1	A SECURITY CONDITION that does **not** involve a HOSTILE ACTION as reported by Security Shift Supervisor **OR** Notification of a credible security threat directed at the site **OR** A validated notification from the NRC providing information of an aircraft threat	Example EALs #1, 2 and 3 have been combined into a single EAL for ease of presentation and use.
2	Notification of a credible security threat directed at the site.			
3	A validated notification from the NRC providing information of an aircraft threat.			

NEI IC#	NEI IC Wording	WF3 IC#(s)	WF3 IC Wording	Difference/Deviation Justification and/or Comments
HU2	Seismic event greater than OBE levels MODE: All	HU2	Seismic event greater than OBE levels MODE: All	None

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
1	Seismic event greater than Operating Basis Earthquake (OBE) as indicated by: (site-specific indication that a seismic event met or exceeded OBE limits)	HU2.1	Seismic event > OBE as indicated by RED light on the seismic monitor panel	The seismic monitoring system panel (CP-47) is located in the Control Room. The seismic monitoring panel provides immediate indication when approaching or exceeding (RED light) the Operating Bases Earthquake (OBE) design limit of 0.05g horizontal or 0.033g vertical.

NEI IC#	NEI IC Wording	WF3 IC#(s)	WF3 IC Wording	Difference/Deviation Justification and/or Comments
HU3	Hazardous event. MODE: All	HU3	Hazardous event MODE: All	None

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
1	A tornado strike within the PROTECTED AREA.	HU3.1	A tornado strike within the PROTECTED AREA	None
2	Internal room or area flooding of a magnitude sufficient to require manual or automatic electrical isolation of a SAFETY SYSTEM component needed for the current operating mode.	HU3.2	Internal room or area FLOODING of a magnitude sufficient to require manual or automatic electrical isolation of a SAFETY SYSTEM component required by Technical Specifications for the current operating mode	Replaced the word “needed” with “…required by Technical Specifications…” consistent with the generic bases.
3	Movement of personnel within the PROTECTED AREA is impeded due to an offsite event involving hazardous materials (e.g., an offsite chemical spill or toxic gas release).	HU3.3	Movement of personnel within the PROTECTED AREA is IMPEDED due to an event external to the PROTECTED AREA involving hazardous materials (e.g., an offsite chemical spill or toxic gas release)	Changed the term “offsite” to “external to the PROTECTED AREA” to address events located external to the PROTECTED AREA but not considered offsite.
4	A hazardous event that results in on-site conditions sufficient to prohibit the plant staff from accessing the site via personal vehicles.	HU3.4	A hazardous event that results in on-site conditions sufficient to prohibit the plant staff from accessing the site via personal vehicles (Note 7)	Added reference to Note 7.

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
5	(Site-specific list of natural or technological hazard events)	N/A	N/A	No other site-specific hazard has been identified for WF3.
Note	EAL #4 does not apply to routine traffic impediments such as fog, snow, ice, or vehicle breakdowns or accidents.	N/A	Note 7: This EAL does **not** apply to routine traffic impediments such as fog, snow, ice, or vehicle breakdowns or accidents.	None

NEI IC#	NEI IC Wording	WF3 IC#(s)	WF3 IC Wording	Difference/Deviation Justification and/or Comments
HU4	FIRE potentially degrading the level of safety of the plant. MODE: All	HU4	FIRE potentially degrading the level of safety of the plant MODE: All	None

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
1	a. A FIRE is NOT extinguished within 15-minutes of **ANY** of the following FIRE detection indications: ● Report from the field (i.e., visual observation) ● Receipt of multiple (more than 1) fire alarms or indications ● Field verification of a single fire alarm	HU4.1	A FIRE is **not** extinguished within 15 min. of **any** of the following FIRE detection indications (Note 1): ● Report from the field (i.e., visual observation) ● Receipt of multiple (more than 1) fire alarms or indications (Note 12) ● Field verification of a single fire alarm	Table H-1 provides a list of site-specific fire areas. Added reference to Note 12. This is an added note not contained in the guidance that prevents unnecessary classifications when a steam environment exists in containment due to a LOCA or ESD. **This is an acceptable deviation from the generic NEI 99-01 Revision 6 guidance.** Added clarification of declaration timing requirements for single and multiple fire alarms.

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
	AND b. The FIRE is located within **ANY** of the following plant rooms or areas: (site-specific list of plant rooms or areas)		**AND** The FIRE is located within **any** Table H-1 area	
2	a. Receipt of a single fire alarm (i.e., no other indications of a FIRE). **AND** b. The FIRE is located within **ANY** of the following plant rooms or areas: (site-specific list of plant rooms or areas) **AND** c. The existence of a FIRE is not verified within 30-minutes of alarm receipt.	HU4.2	Receipt of a single fire alarm (i.e., **no** other indications of a FIRE) (Note 13) **AND** The fire alarm is indicating a FIRE within **any** Table H-1 area **AND** The existence of a FIRE is **not** verified (i.e., proved or disproved) within 30 min. of alarm receipt (Note 1)	Table H-1 provides a list of site-specific fire areas. Added basis information and Note 13 regarding the exclusion of containment in Modes 1 and 2. Modes 1 and 2 are excluded from this EAL for containment based on containment air flow design and Technical Specification requirements for operation of Containment Fan Coolers. WF3 EAL HU4.1 is applicable in these modes. **This is an acceptable deviation from the generic NEI 99-01 Revision 6 guidance.** To clarify the intent of the last bullet, the existing Basis wording "i.e., proved or disproved" is added as a parenthetical. This does not result in an intent change to the EAL. In addition, the wording in the Basis section supporting fire detection and response design is modified to remove specific reference to 10 CFR 50, Appendix R. The Basis statement relating to Criterion 3 of 10 CFR 50, Appendix A is maintained, along with generic statements that are applicable without regard to Appendix R. WF3 is an NFPA 805 plant; therefore, the requirements of Appendix R are no longer applicable. **This wording is a difference from NEI 99-01, Revision 6, HU4 generic wording and bases. This difference is acceptable in order to eliminate reference to an inappropriate licensing basis while maintaining sufficient information to address fire prevention and fire system**

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
3	A FIRE within the plant *or ISFSI* [*for plants with an ISFSI outside the plant Protected Area*] PROTECTED AREA not extinguished within 60-minutes of the initial report, alarm or indication.	HU4.3	A FIRE within the PROTECTED AREA **not** extinguished within 60 min. of the initial report, alarm or indication (Note 1)	WF3 has an ISFSI located inside the plant Protected Area.
4	A FIRE within the plant *or ISFSI* [*for plants with an ISFSI outside the plant Protected Area*] PROTECTED AREA that requires firefighting support by an offsite fire response agency to extinguish.	HU4.4	A FIRE within the PROTECTED AREA that requires firefighting support by an offsite fire response agency to extinguish	WF3 has an ISFSI located inside the plant Protected Area.
Notes	The Emergency Director should declare the Unusual Event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.	N/A	Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.	The classification timeliness note has been standardized across the WF3 EAL scheme by referencing the "time limit" specified within the EAL wording. Added “The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded” to reinforce the concept that the EAL timing component runs concurrent with the classification timeliness clock.
	N/A	N/A	Note 12: Bullet 2 of this EAL (multiple fire alarm indications) is **not** applicable when diagnosed into a LOCA or Excess Steam Demand event in Containment.	Added Note 12 to read “Bullet 2 of this EAL (multiple fire alarm indications) is **not** applicable when diagnosed into a LOCA or Excess Steam Demand event in Containment.” This Note is intended to prevent unnecessary EAL declaration when fire alarms are a result of steam environments such as those caused by LOCAs or ESDs. **This is an acceptable deviation from the generic NEI 99-01 Revision 6 guidance.**

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
	N/A	N/A		The WF3 Note 12 is consistent with that provided in the NRC-approved Arkansas Nuclear One NEI 99-01 Revision 6 EAL scheme (ML18337A247).
			Note 13: During Modes 1 and 2, HU4.2 is **not** applicable to a single fire alarm in containment. A fire in containment in these modes should be assessed under EAL HU4.1.	Added Note 13 excluding Modes 1 and 2 from WF3 EAL HU4.2 for containment. Modes 1 and 2 are excluded from this EAL for containment based on containment air flow design and Technical Specification requirements for operation of Containment Fan Coolers. WF3 EAL HU4.1 is applicable in these modes. **This is an acceptable deviation from the generic NEI 99-01 Revision 6 guidance.**

Table H-1 Fire Areas
• Containment • Cooling Tower Areas • Fuel Handling Building • Reactor Auxiliary Building

NEI IC#	NEI IC Wording	WF3 IC#(s)	WF3 IC Wording	Difference/Deviation Justification and/or Comments
HU7	Other conditions exist which in the judgment of the Emergency Director warrant declaration of a (NO)UE MODE: All	HU7	Other conditions exist that in the judgment of the Emergency Director warrant declaration of a UE MODE: All	None

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
1	Other conditions exist which in the judgment of the Emergency Director indicate that events are in progress or have occurred which indicate a potential degradation of the level of safety of the plant or indicate a security threat to facility protection has been initiated. No releases of radioactive material requiring offsite response or monitoring are expected unless further degradation of safety systems occurs.	HU7.1	Other conditions exist which in the judgment of the Emergency Director indicate that events are in progress or have occurred which indicate a potential degradation of the level of safety of the plant or indicate a security threat to facility protection has been initiated. **No** releases of radioactive material requiring offsite response or monitoring are expected unless further degradation of SAFETY SYSTEMS occurs.	None

NEI IC#	NEI IC Wording	WF3 IC#(s)	WF3 IC Wording	Difference/Deviation Justification and/or Comments
HA1	HOSTILE ACTION within the OWNER CONTROLLED AREA or airborne attack threat within 30 minutes. MODE: All	HA1	HOSTILE ACTION within the SECURITY OWNER CONTROLLED AREA or airborne attack threat within 30 minutes MODE: All	Entergy uses the Security Owner Controlled Area as allowed by the developer note in NEI 99-01, Revision 6, Appendix B, Definitions.

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
1	A HOSTILE ACTION is occurring or has occurred within the OWNER CONTROLLED AREA as reported by the (site-specific security shift supervision).	HA1.1	A HOSTILE ACTION is occurring or has occurred within the SECURITY OWNER CONTROLLED AREA as reported by Security Shift Supervisor **OR** A validated notification from NRC of an aircraft attack threat within 30 min. of the site	Example EALs #1 and #2 have been combined into a single EAL for ease of use. Entergy uses the Security Owner Controlled Area as allowed by the developer note in NEI 99-01, Revision 6, Appendix B, Definitions.
2	A validated notification from NRC of an aircraft attack threat within 30 minutes of the site.			

NEI IC#	NEI IC Wording	WF3 IC#(s)	WF3 IC Wording	Difference/Deviation Justification and/or Comments
HA5	Gaseous release impeding access to equipment necessary for normal plant operations, cooldown or shutdown. MODE: All	HA5	Gaseous release IMPEDING access to equipment necessary for normal plant operations, cooldown or shutdown MODE: 1 – Power Operation, 3 – Hot Standby, 4 – Hot Shutdown	The mode applicability has been limited to the mode restrictions of Table H-2, Modes 1, 3 and 4 only.

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
1	a. Release of a toxic, corrosive, asphyxiant or flammable gas into any of the following plant rooms or areas: (site-specific list of plant rooms or areas with entry-related mode applicability identified) **AND** b. Entry into the room or area is prohibited or impeded.	HA5.1	Release of a toxic, corrosive, asphyxiant or flammable gas into **any** Table H-2 room or area **AND** Entry into the room or area is prohibited or IMPEDED (Note 5)	The site-specific list of plant rooms or areas with entry-related mode applicability are tabularized in Table H-2. The bulleted bases item “the action for which room/area entry is required is of an administrative or record keeping nature (e.g., normal rounds or routine inspections)” was removed from the list of exceptions to classification in the basis information. These actions are a consideration when the site-specific list is developed. Rooms requiring entry for these types of actions are already excluded from the list. Added clarification that gas could originate either on site or off site.
Note	If the equipment in the listed room or area was already inoperable or out-of-service before the event occurred, then no emergency classification is warranted.	N/A	Note 5: If the equipment in the listed room or area was already inoperable or out-of-service before the event occurred, then **no** emergency classification is warranted.	None

Table H-2 Safe Operation & Shutdown Rooms/Areas	
Room/Area	Mode
Turbine Building (all elevations and rooms)	1
Polisher Building (all elevations and rooms)	1
-4 RCA Letdown Valve Gallery	3
+21 RAB Switchgears A or B	3
-4 RCA Wing Area	4
-15 RCA Valve Gallery	4
-35 RCA Safeguard Rooms	4
+21 RAB Switchgears A or B	4

NEI IC#	NEI IC Wording	WF3 IC#(s)	WF3 IC Wording	Difference/Deviation Justification and/or Comments
HA6	Control Room evacuation resulting in transfer of plant control to alternate locations. MODE: All	HA6	Control Room evacuation resulting in transfer of plant control to alternate locations MODE: All	None

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
1	An event has resulted in plant control being transferred from the Control Room to (site-specific remote shutdown panels and local control stations).	HA6.1	An event has resulted in plant control being transferred from the Control Room to the Remote Shutdown Panel (LCP-43)	None

NEI IC#	NEI IC Wording	WF3 IC#(s)	WF3 IC Wording	Difference/Deviation Justification and/or Comments
HA7	Other conditions exist which in the judgment of the Emergency Director warrant declaration of an Alert. MODE: All	HA7	Other conditions exist that in the judgment of the Emergency Director warrant declaration of an ALERT MODE: All	None

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
1	Other conditions exist which, in the judgment of the Emergency Director, indicate that events are in progress or have occurred which involve an actual or potential substantial degradation of the level of safety of the plant or a security event that involves probable life threatening risk to site personnel or damage to site equipment because of HOSTILE ACTION. Any releases are expected to be limited to small fractions of the EPA Protective Action Guideline exposure levels.	HA7.1	Other conditions exist which in the judgment of the Emergency Director indicate that events are in progress or have occurred which involve an actual or potential substantial degradation of the level of safety of the plant or a security event that involves probable life threatening risk to site personnel or damage to site equipment because of HOSTILE ACTION. **Any** releases are expected to be limited to small fractions of the EPA Protective Action Guideline exposure levels.	None

NEI IC#	NEI IC Wording	WF3 IC#(s)	WF3 IC Wording	Difference/Deviation Justification and/or Comments
HS1	HOSTILE ACTION within the PROTECTED AREA MODE: All	HS1	HOSTILE ACTION within the PROTECTED AREA MODE: All	None

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
1	A HOSTILE ACTION is occurring or has occurred within the PROTECTED AREA as reported by the (site-specific security shift supervision).	HS1.1	A HOSTILE ACTION is occurring or has occurred within the PROTECTED AREA as reported by Security Shift Supervisor	None

NEI IC#	NEI IC Wording	WF3 IC#(s)	WF3 IC Wording	Difference/Deviation Justification and/or Comments
HS6	Inability to control a key safety function from outside the Control Room. MODE: All	HS6	Inability to control a key safety function from outside the Control Room MODE: 1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 - Hot Shutdown, 5 - Cold Shutdown, 6 - Refueling	Deleted defueled mode applicability. Control of the cited safety functions is not critical for a defueled reactor as there is no energy source in the reactor vessel or RCS. This treatment is consistent with EP FAQ 2015-014. **This is an acceptable deviation from the generic NEI 99-01 Revision 6 guidance.**

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
1	a. An event has resulted in plant control being transferred from the Control Room to (site-specific remote shutdown panels and local control stations). **AND** b. Control of **ANY** of the following key safety functions is not reestablished within (site-specific number of minutes). ● Reactivity control ● Core cooling [*PWR*] / RPV water level [*BWR*] ● RCS heat removal	HS6.1	An event has resulted in plant control being transferred from the Control Room to the Remote Shutdown Panel (LCP-43) **AND** Control of **any** of the following key safety functions is **not** reestablished within 15 min. (Note 1): ● Reactivity Control (Modes 1, 2 and 3 **only**) ● Core Heat Removal ● RCS Heat Removal	The Mode applicability for the reactivity control safety function has been limited to Modes 1, 2, and 3 (hot operating conditions). In the cold operating modes adequate shutdown margin exists under all conditions. This treatment is consistent with EP FAQ 2015-014. **This is an acceptable deviation from the generic NEI 99-01 Revision 6 guidance.** The term “Core cooling” was changed to “Core Heat Removal” to align with site terminology. Added Note 1 consistent with other EALs with a timing component.
Note	N/A	N/A	Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded	Added Note 1 to be consistent in its use for EAL thresholds with a timing component.

NEI IC#	NEI IC Wording	WF3 IC#(s)	WF3 IC Wording	Difference/Deviation Justification and/or Comments
HS7	Other conditions exist which in the judgment of the Emergency Director warrant declaration of a Site Area Emergency. MODE: All	HS7	Other conditions exist that in the judgment of the Emergency Director warrant declaration of a SITE AREA EMERGENCY MODE: All	None

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
1	Other conditions exist which in the judgment of the Emergency Director indicate that events are in progress or have occurred which involve actual or likely major failures of plant functions needed for protection of the public or HOSTILE ACTION that results in intentional damage or malicious acts, (1) toward site personnel or equipment that could lead to the likely failure of or, (2) that prevent effective access to equipment needed for the protection of the public. Any releases are not expected to result in exposure levels which exceed EPA Protective Action Guideline exposure levels beyond the site boundary.	HS7.1	Other conditions exist which in the judgment of the Emergency Director indicate that events are in progress or have occurred which involve actual or likely major failures of plant functions needed for protection of the public or HOSTILE ACTION that results in intentional damage or malicious acts, (1) toward site personnel or equipment that could lead to the likely failure of or, (2) that prevent effective access to equipment needed for the protection of the public. **Any** releases are **not** expected to result in exposure levels which exceed EPA Protective Action Guideline exposure levels beyond the SITE BOUNDARY.	None

NEI IC#	NEI IC Wording	WF3 IC#(s)	WF3 IC Wording	Difference/Deviation Justification and/or Comments
HG1	HOSTILE ACTION resulting in loss of physical control of the facility. MODE: All	N/A	N/A	IC HG1 and the associated example EAL are not implemented in the WF3 scheme. There are several other ICs that are redundant with this IC, and are better suited to ensure timely and effective emergency declarations. In addition, the development of new spent fuel pool level EALs, as a result of NRC Order EA-12-051, clarified the intended emergency classification level for spent fuel pool level events. **This is an acceptable deviation from the generic NEI 99-01 Revision 6 guidance.**

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
1	a. A HOSTILE ACTION is occurring or has occurred within the PROTECTED AREA as reported by the (site-specific security shift supervision). **AND** b. **EITHER** of the following has occurred: 1. **ANY** of the following safety functions cannot be controlled or maintained. ● Reactivity control ● Core cooling [*PWR*]/RPV water level [*BWR*] ● RCS heat removal	N/A	N/A	IC HG1 and the associated example EAL are not implemented in the WF3 scheme. There are several other ICs that are redundant with this IC, and are better suited to ensure timely and effective emergency declarations. In addition, the development of new spent fuel pool level EALs, as a result of NRC Order EA-12-051, clarified the intended emergency classification level for spent fuel pool level events. This deviation is justified because: 1. Hostile Action in the Protected Area is bounded by ICs HS1 and HS7. Hostile Action resulting in a loss of physical control is bounded by EAL HG7, as well as any event that may lead to radiological releases to the public in excess of Environmental Protection Agency (EPA) Protective Action Guides (PAGs). a. If, for whatever reason, the Control Room must be evacuated, and control of safety functions (e.g., reactivity control, core cooling, and RCS heat

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
	OR 2. Damage to spent fuel has occurred or is IMMINENT.			removal) cannot be reestablished, then IC HS6 would apply, as well as IC HS7 if desired by the EAL decision-maker. b. Also, as stated above, any event (including Hostile Action) that could reasonably be expected to have a release exceeding EPA PAGs would be bounded by IC HG7. c. From a Hostile Action perspective, ICs HS1, HS7 and HG7 are appropriate, and therefore, make this part of HG1 redundant and unnecessary. d. From a loss of physical control perspective, ICs HS6, HS7 and HG7 are appropriate, and therefore, make this part of HG1 redundant and unnecessary. 2. Any event which causes a loss of spent fuel pool level will be bounded by ICs AA2, AS2 and AG2, regardless of whether it was based upon a Hostile Action or not, thus making this part of HG1 redundant and unnecessary. a. An event that leads to a radiological release will be bounded by ICs AU1, AA1, AS1 and AG1. Events that lead to radiological releases in excess of EPA PAGs will be bounded by EALs AG1 and HG7, thus making this part of HG1 redundant and unnecessary. ICs AA2, AS2, AG2, AS1, AG1, HS1, HS6, HS7 and HG7 have been implemented consistent with NEI 99-01 Revision 6 and thus HG1 is adequately bounded as described above. This treatment is consistent with EP FAQ 2015-013. **This is an acceptable deviation from the generic NEI 99-01 Revision 6 guidance.**

NEI IC#	NEI IC Wording	WF3 IC#(s)	WF3 IC Wording	Difference/Deviation Justification and/or Comments
HG7	Other conditions exist which in the judgment of the Emergency Director warrant declaration of a General Emergency MODE: All	HG7	Other conditions exist that in the judgment of the Emergency Director warrant declaration of a GENERAL EMERGENCY MODE: All	None

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
1	Other conditions exist which in the judgment of the Emergency Director indicate that events are in progress or have occurred which involve actual or IMMINENT substantial core degradation or melting with potential for loss of containment integrity or HOSTILE ACTION that results in an actual loss of physical control of the facility. Releases can be reasonably expected to exceed EPA Protective Action Guideline exposure levels offsite for more than the immediate site area.	HG7.1	Other conditions exist which in the judgment of the Emergency Director indicate that events are in progress or have occurred which involve actual or IMMINENT substantial core degradation or melting with potential for loss of containment integrity or HOSTILE ACTION that results in an actual loss of physical control of the facility. Releases can be reasonably expected to exceed EPA Protective Action Guideline exposure levels offsite for more than the immediate site area.	None

Category S

System Malfunction

NEI IC#	NEI IC Wording	WF3 IC#(s)	WF3 IC Wording	Difference/Deviation Justification and/or Comments
SU1	Loss of all offsite AC power capability to emergency buses for 15 minutes or longer. MODE: Power Operation, Startup, Hot Standby, Hot Shutdown	SU1	Loss of **all** offsite AC power capability to safety buses for 15 minutes or longer MODE: 1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 - Hot Shutdown	“safety buses” is the WF3-specific terminology for “emergency buses.”

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
1	Loss of **ALL** offsite AC power capability to (site-specific emergency buses) for 15 minutes or longer.	SU1.1	Loss of **all** offsite AC power capability, Table S-1, to 4160 VAC safety buses 3A and 3B for ≥ 15 min. (Note 1)	4160 VAC safety buses 3A and 3B are the site-specific emergency buses. Site-specific AC power sources are tabularized in Table S-1.
Note	The Emergency Director should declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.	N/A	Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.	The classification timeliness note has been standardized across the WF3 EAL scheme by referencing the "time limit" specified within the EAL wording. Added “The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded” to reinforce the concept that the EAL timing component runs concurrent with the classification timeliness clock

Table S-1 AC Power Sources	
Onsite	• Emergency Diesel Generator A • Emergency Diesel Generator B • Temporary Emergency Diesels (TEDs) (if already aligned) • Unit Auxiliary Transformer 3A • Unit Auxiliary Transformer 3B
Offsite	• Startup Transformer 3A • Startup Transformer 3B • Unit Auxiliary Transformer 3A (when back-fed from offsite) • Unit Auxiliary Transformer 3B (when back-fed from offsite)

NEI IC#	NEI IC Wording	WF3 IC#(s)	WF3 IC Wording	Difference/Deviation Justification and/or Comments
SU2	UNPLANNED loss of Control Room indications for 15 minutes or longer. MODE: Power Operation, Startup, Hot Standby, Hot Shutdown	SU3	UNPLANNED loss of Control Room indications for 15 minutes or longer. MODE: 1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 - Hot Shutdown	None

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
1	An UNPLANNED event results in the inability to monitor one or more of the following parameters from within the Control Room for 15 minutes or longer.	SU3.1	An UNPLANNED event results in the inability to monitor one or more Table S-2 parameters from within the Control Room for ≥ 15 min. (Note 1)	The site-specific Safety System Parameter list is tabulated in Table S-2. Added "…to at least one S/G" to Table S-2 SG emergency feed water flow. This is consistent with level in at least one S/G level indication.
Note	The Emergency Director should declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.	N/A	Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.	The classification timeliness note has been standardized across the WF3 EAL scheme by referencing the "time limit" specified within the EAL wording. Added "The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded" to reinforce the concept that the EAL timing component runs concurrent with the classification timeliness clock.

WF3 EAL Comparison Matrix

NEI 99-01 Rev 6 Safety System Parameter Table:

[*BWR parameter list*]	[*PWR parameter list*]
Reactor Power	Reactor Power
RPV Water Level	RCS Level
RPV Pressure	RCS Pressure
Primary Containment Pressure	In-Core/Core Exit Temperature
Suppression Pool Level	Levels in at least (site-specific number) steam generators
Suppression Pool Temperature	Steam Generator Auxiliary or Emergency Feed Water Flow

WF3 Safety System Parameter Table:

Table S-2 Safety System Parameters
• Reactor power • RCS level • RCS pressure • Core exit temperature • Level in at least one S/G • S/G emergency feed water flow to at least one S/G

NEI IC#	NEI IC Wording	WF3 IC#(s)	WF3 IC Wording	Difference/Deviation Justification and/or Comments
SU3	Reactor coolant activity greater than Technical Specification allowable limits. MODE: Power Operation, Startup, Hot Standby, Hot Shutdown	SU4	Reactor coolant activity greater than Technical Specification allowable limits MODE: 1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 - Hot Shutdown	None

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
1	(Site-specific radiation monitor) reading greater than (site-specific value).	N/A	N/A	WF3 does not have any site-specific radiation monitor that would provide a reading indicative of reactor coolant activity at the Technical Specification coolant activity limits.
2	Sample analysis indicates that a reactor coolant activity value is greater than an allowable limit specified in Technical Specifications.	SU4.1	RCS sample activity > 60 µCi/gm dose equivalent I-131 **OR** RCS sample activity > 1.0 µCi/gm dose equivalent I-131 for > 48 hours during one continuous time interval (Note 1) **OR** RCS sample activity >100/Ē µCi/gm	Changed “Reactor coolant” to read “RCS” for consistency with normally used terminology. The Technical Specification reactor coolant activity limits are specified in Technical Specification section 3.4.7. Added Note 1 consistent with other EALs with a timing component.
Note	N/A	N/A	Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is	Added Note 1 to be consistent in its use for EAL thresholds with a timing component.

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
			not allowed an additional 15 minutes to declare after the time limit is exceeded	

NEI IC#	NEI IC Wording	WF3 IC#(s)	WF3 IC Wording	Difference/Deviation Justification and/or Comments
SU4	RCS leakage for 15 minutes or longer. MODE: Power Operation, Startup, Hot Standby, Hot Shutdown	SU5	RCS leakage for 15 minutes or longer MODE: 1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 - Hot Shutdown	None

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
1	RCS unidentified or pressure boundary leakage greater than (site-specific value) for 15 minutes or longer.	SU5.1	RCS unidentified or pressure boundary leakage > 10 gpm for ≥ 15 min. (Note 1) **OR** RCS identified leakage > 25 gpm for ≥ 15 min. (Note 1) **OR** Reactor coolant leakage to a location outside containment > 25 gpm for ≥ 15 min. (Note 1)	Example EALs #1, 2 and 3 have been combined into a single EAL for usability. Added “Failure to isolate the leak (from the Control Room or locally), within 15 minutes or if known that the leak cannot be isolated within 15 minutes, from the start of the leak requires immediate classification” to the basis. This provides agreement with the definition of “Unisolable” and ensures isolation attempts, both locally and remotely, are achieved in a timely manner.
2	RCS identified leakage greater than (site-specific value) for 15 minutes or longer.			
3	Leakage from the RCS to a location outside containment greater than 25 gpm for 15 minutes or longer.			
Note	The Emergency Director should declare the Unusual Event promptly upon determining that	N/A	Note 1: The Emergency Director should declare the event promptly upon	The classification timeliness note has been standardized across the WF3 EAL scheme by referencing the "time limit" specified within the EAL wording.

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
	15 minutes has been exceeded, or will likely be exceeded.		determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.	Added “The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded” to reinforce the concept that the EAL timing component runs concurrent with the classification timeliness clock.

NEI IC#	NEI IC Wording	WF3 IC#(s)	WF3 IC Wording	Difference/Deviation Justification and/or Comments
SU5	Automatic or manual (trip [PWR] / scram [BWR]) fails to shutdown the reactor. MODE: Power Operation	SU6	Automatic or manual trip fails to shut down the reactor MODE: 1 - Power Operation	None

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
1	a. An automatic (trip [PWR] / scram [BWR]) did not shutdown the reactor. **AND** b. A subsequent manual action taken at the reactor control consoles is successful in shutting down the reactor.	SU6.1	An automatic trip did **not** shut down the reactor as indicated by reactor power > 5% after **any** RPS setpoint is exceeded **AND** A subsequent automatic trip or manual trip action taken at the reactor control console (manual reactor trip pushbuttons or DRT) is successful in shutting down the reactor as indicated by reactor power ≤ 5% (Note 8)	As specified in the generic developers guidance “Developers may include site-specific EOP criteria indicative of a successful reactor shutdown in an EAL statement, the Basis or both (e.g., a reactor power level).” Reactor power ≤ 5% is the site-specific indication of a successful reactor trip. Added the words "... as indicated by reactor power > 5% after **any** RPS setpoint is exceeded" to clarify that it is a failure of the automatic trip when a valid trip signal has been exceeded. Manual reactor trip pushbuttons and DRTon the reactor control console are the site-specific means to trip the reactor.

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
2	a. A manual trip ([PWR] / scram [BWR]) did not shutdown the reactor. **AND** b. **EITHER** of the following: 1. A subsequent manual action taken at the reactor control consoles is successful in shutting down the reactor. **OR** 2 A subsequent automatic (trip [PWR] / scram [BWR]) is successful in shutting down the reactor.	SU6.2	A manual trip did **not** shut down the reactor as indicated by reactor power > 5% after **any** manual trip action was initiated **AND** A subsequent automatic trip or manual trip action taken at the reactor control console (manual reactor trip push buttons or DRT) is successful in shutting down the reactor as indicated by reactor power ≤ 5% (Note 8)	As specified in the generic developers guidance “Developers may include site-specific EOP criteria indicative of a successful reactor shutdown in an EAL statement, the Basis or both (e.g., a reactor power level).” Reactor power ≤ 5% is the site-specific indication of a successful reactor trip. Added the words "... as indicated by reactor power > 5% after **any** manual trip action was initiated" to clarify that it is a failure of any manual trip when an actual manual trip signal has been inserted. Combined conditions b.1 and b.2 into a single statement to simplify the presentation. Manual reactor trip push buttons and DRTon the reactor control console are the site-specific means to trip the reactor.
Note	A manual action is any operator action, or set of actions, which causes the control rods to be rapidly inserted into the core, and does not include manually driving in control rods or implementation of boron injection strategies.	N/A	Note 8: A manual action is **any** operator action, or set of actions, which causes the control rods to be rapidly inserted into the core, and does **not** include manually driving in control rods or implementation of boron injection strategies.	None

NEI IC#	NEI IC Wording	WF3 IC#(s)	WF3 IC Wording	Difference/Deviation Justification and/or Comments
SU6	Loss of all onsite or offsite communications capabilities. MODE: Power Operation, Startup, Hot Standby, Hot Shutdown	SU7	Loss of **all** onsite or offsite communications capabilities. MODE: 1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 - Hot Shutdown	None

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
1	Loss of **ALL** of the following onsite communication methods: (site-specific list of communications methods)	SU7.1	Loss of **all** Table S-4 onsite communication methods **OR** Loss of **all** Table S-4 State and local agency communication methods **OR** Loss of **all** Table S-4 NRC communication methods	Example EALs #1, 2 and 3 have been combined into a single EAL for simplification of presentation. Replaced “ORO” with “State and local agency” for clarification. Table S-4 provides a site-specific list of onsite, State and local agency (ORO) and NRC communications methods.
2	Loss of **ALL** of the following ORO communications methods: (site-specific list of communications methods)			
3	Loss of **ALL** of the following NRC communications methods: (site-specific list of communications methods)			

Table S-4 Communication Methods			
System	**Onsite**	**State/ Local**	**NRC**
Telephone System	X	X	X
Operational Hotline		X	
Plant Radio System (O&M)	X		
Plant Paging System	X		
Sound Powered Phone System	X		
Civil Defense Radio System		X	
Satellite Phones		X	X
Emergency Notification System (ENS)			X

NEI IC#	NEI IC Wording	WF3 IC#(s)	WF3 IC Wording	Difference/Deviation Justification and/or Comments
SU7	Failure to isolate containment or loss of containment pressure control. [*PWR*] MODE: Power Operation, Startup, Hot Standby, Hot Shutdown	SU8	Failure to isolate containment or loss of containment pressure control MODE: 1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 - Hot Shutdown	None

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
1	a. Failure of containment to isolate when required by an actuation signal. **AND** b. **ALL** required penetrations are not closed within 15 minutes of the actuation signal.	SU8.1	**Any** penetration is **not** closed within 15 min. of a required actuation signal **OR** Containment pressure > 17.7 psia with < one full train of containment heat removal systems operating per design for ≥ 15 min. (Notes 1, 9)	Combined NEI example EALs 1 and 2 for ease of use. Reworded EAL to better describe the intent. Penetrations cannot close, but they can be isolated by closure of one or more isolation valves associated with that penetration. The revised wording maintains the generic example EAL intent while more clearly describing the failure to isolate threshold. The Containment pressure setpoint is the pressure at which the Containment Spray System should actuate and begin performing its function Added Note 1 consistent with other EALs with a timing component. Added Note 9 to specify what constitutes 1 full train of containment heat removal.
2	a. Containment pressure greater than (site-specific pressure). **AND** b. Less than one full train of (site-specific system or equipment) is operating per design for 15 minutes or longer.			

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
Notes	N/A	N/A	Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.	Added Note 1 to be consistent in its use for EAL thresholds with a timing component.
	N/A	N/A	Note 9: One full train of containment heat removal systems consists of either: • <u>One</u> train of the Containment Spray System (operating with ≥1750 gpm flow) **AND** <u>One</u> train of the Containment Cooling System (one fan cooler required) **OR** • <u>Two</u> trains of the Containment Spray System (operating with ≥1750 gpm flow each).	Added Note 9 to provide clarification as to what constitutes one full train of containment heat removal systems.

NEI IC#	NEI IC Wording	WF3 IC#(s)	WF3 IC Wording	Difference/Deviation Justification and/or Comments
SA1	Loss of all but one AC power source to emergency buses for 15 minutes or longer. MODE: Power Operation, Startup, Hot Standby, Hot Shutdown	SA1	Loss of **all but one** AC power source to safety buses for 15 minutes or longer. MODE: 1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 - Hot Shutdown	“Safety buses” is the WF3-specific terminology for “emergency buses.”

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
1	a. AC power capability to (site-specific emergency buses) is reduced to a single power source for 15 minutes or longer. **AND** b. Any additional single power source failure will result in a loss of all AC power to SAFETY SYSTEMS.	SA1.1	AC power capability, Table S-1, to 4160 VAC safety buses 3A and 3B reduced to a single power source for ≥ 15 min. (Note 1) **AND** **Any** additional single power source failure will result in loss of **all** AC power to SAFETY SYSTEMS	4160 VAC safety buses 3A and 3B are the site-specific emergency buses. Site-specific AC power sources are listed in Table S-1.
Note	The Emergency Director should declare the Alert promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.	N/A	Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.	The classification timeliness note has been standardized across the WF3 EAL scheme by referencing the "time limit" specified within the EAL wording. Added “The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded” to reinforce the concept that the EAL timing component runs concurrent with the classification timeliness clock.

Table S-1 AC Power Sources	
Onsite	• Emergency Diesel Generator A • Emergency Diesel Generator B • Temporary Emergency Diesels (TEDs) (if already aligned) • Unit Auxiliary Transformer 3A • Unit Auxiliary Transformer 3B
Offsite	• Startup Transformer 3A • Startup Transformer 3B • Unit Auxiliary Transformer 3A (when back-fed from offsite) • Unit Auxiliary Transformer 3B (when back-fed from offsite)

NEI IC#	NEI IC Wording	WF3 IC#(s)	WF3 IC Wording	Difference/Deviation Justification and/or Comments
SA2	UNPLANNED loss of Control Room indications for 15 minutes or longer with a significant transient in progress. MODE: Power Operation, Startup, Hot Standby, Hot Shutdown	SA3	UNPLANNED loss of Control Room indications for 15 minutes or longer with a significant transient in progress. MODE: 1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 - Hot Shutdown	None

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
1	An UNPLANNED event results in the inability to monitor one or more of the following parameters from within the Control Room for 15 minutes or longer. **AND** **ANY** of the following transient events in progress. ● Automatic or manual runback greater than 25% thermal reactor power ● Electrical load rejection greater than 25% full electrical load ● Reactor scram [*BWR*] / trip [*PWR*] ● ECCS (SI) actuation ● Thermal power oscillations greater than 10% [*BWR*]	SA3.1	An UNPLANNED event results in the inability to monitor one or more Table S-2 parameters from within the Control Room for ≥ 15 min. (Note 1) **AND** **Any** significant transient is in progress, Table S-3	The site-specific Safety System Parameter list is in Table S-2. Added "…to at least one S/G" to Table S-2 S/G emergency feed water flow consistent with S/G level indication. The site-specific significant transients list is in Table S-3. WF3 replaces the NEI 99-01 Rev 6 transient "automatic or manual runback greater than 25% thermal reactor power" with "turbine runback > 25% reactor power" as an equivalent transient event. WF3 replaces the NEI 99-01 Rev 6 transient "electrical load rejection greater than 25% full electrical load" with "electrical load rejection > 25% (300 MWE)" as an equivalent transient event. Table S-3 does not include "10% thermal power oscillations" because WF3 is a PWR.

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
Note	The Emergency Director should declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.	N/A	Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.	The classification timeliness note has been standardized across the WF3 EAL scheme by referencing the "time limit" specified within the EAL wording. Added “The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded” to reinforce the concept that the EAL timing component runs concurrent with the classification timeliness clock.

NEI 99-01 Rev 6 Safety System Parameter Table:

[*BWR parameter list*]	[*PWR parameter list*]
Reactor Power	Reactor Power
RPV Water Level	RCS Level
RPV Pressure	RCS Pressure
Primary Containment Pressure	In-Core/Core Exit Temperature
Suppression Pool Level	Levels in at least (site-specific number) steam generators
Suppression Pool Temperature	Steam Generator Auxiliary or Emergency Feed Water Flow

WF3 Safety System Parameter Table:

Table S-2 Safety System Parameters
• Reactor power • RCS level • RCS pressure • Core exit temperature • Level in at least one S/G • S/G emergency feed water flow to at least one S/G

Table S-3 Significant Transients
• Turbine runback > 25% reactor power • Electrical load rejection > 25% full electrical load (300 MWE) • Reactor trip • ECCS (SI) activation

NEI IC#	NEI IC Wording	WF3 IC#(s)	WF3 IC Wording	Difference/Deviation Justification and/or Comments
SA5	Automatic or manual (trip [PWR] / scram [BWR]) fails to shutdown the reactor, and subsequent manual actions taken at the reactor control consoles are not successful in shutting down the reactor. MODE: Power Operation	SA6	Automatic or manual trip fails to shut down the reactor and subsequent manual actions taken at the reactor control consoles are **not** successful in shutting down the reactor MODE: 1 - Power Operation	None

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
1	a. An automatic or manual (trip [PWR] / scram [BWR]) did not shutdown the reactor. **AND** b. Manual actions taken at the reactor control consoles are not	SA6.1	An automatic or manual trip fails to shut down the reactor as indicated by reactor power > 5% **AND** Manual trip actions taken at the reactor control console (manual	As specified in the generic developers guidance “Developers may include site-specific EOP criteria indicative of a successful reactor shutdown in an EAL statement, the Basis or both (e.g., a reactor power level).” Reactor power ≤ 5% is the site-specific indication of a successful reactor trip.

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
	successful in shutting down the reactor.		reactor trip pushbuttons and DRT) are **not** successful in shutting down the reactor as indicated by reactor power > 5% (Note 8)	Manual reactor trip pushbuttons and DRT on the reactor control console are the site-specific means to trip the reactor.
Note	A manual action is any operator action, or set of actions, which causes the control rods to be rapidly inserted into the core, and does not include manually driving in control rods or implementation of boron injection strategies.	N/A	Note 8: A manual action is **any** operator action, or set of actions, which causes the control rods to be rapidly inserted into the core, and does **not** include manually driving in control rods or implementation of boron injection strategies	None

NEI IC#	NEI IC Wording	WF3 IC#(s)	WF3 IC Wording	Difference/Deviation Justification and/or Comments
SA9	Hazardous event affecting a SAFETY SYSTEM needed for the current operating mode. MODE: Power Operation, Startup, Hot Standby, Hot Shutdown	SA9	Hazardous event affecting SAFETY SYSTEMS needed for the current operating mode MODE: 1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 - Hot Shutdown	Pluralized safety systems to be consistent with NRC EP FAQ 2016-002 that specifies degraded performance or visible damage in more than one safety system train.

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
1	a. The occurrence of **ANY** of the following hazardous events: ● Seismic event (earthquake) ● Internal or external flooding event ● High winds or tornado strike ● FIRE ● EXPLOSION ● (site-specific hazards) ● Other events with similar hazard characteristics as determined by the Shift Manager **AND** b. **EITHER** of the following: 1. Event damage has caused indications of degraded performance in at least one train of a SAFETY SYSTEM needed for the current operating mode. **OR** 2. The event has caused VISIBLE DAMAGE to a SAFETY SYSTEM component or structure needed for the current operating mode.	SA9.1	The occurrence of **any** Table S-6 hazardous event **AND** Event damage has caused indications of degraded performance on one train of a SAFETY SYSTEM needed for the current operating mode **AND EITHER**: ● Event damage has caused indications of degraded performance to the second train of the SAFETY SYSTEM needed for the current operating mode ● Event damage has resulted in VISIBLE DAMAGE to the second train of the SAFETY SYSTEM needed for the current operating mode (Notes 10, 11)	The hazardous events have been tabularized in Table S-6. SA9.1 reflects NRC FAQ 2016-002 requiring degraded performance or visible damage to more than one train of a safety system caused by the specified events. **This wording is a deviation from NEI 99-01 Revision 6 SA9 generic wording and bases but is deemed acceptable in order to ensure that an Alert is declared only when a hazardous event causes actual or potential performance issues with safety systems. This is consistent with NRC-approved EP FAQ 2016-002.** The word “a” is replaced with “the” in the FAQ wording to provide agreement with the FAQ basis information indicating that the criteria is applicable to another train of the same safety system.

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
Notes	N/A	N/A	Note 10: If the affected SAFETY SYSTEM train was already inoperable or out of service before the hazardous event occurred, then emergency classification is **not** warranted	Added Note 10 consistent with the recommendation of NRC EP FAQ 2016-002.
	N/A	N/A	Note 11: If the hazardous event **only** resulted in VISIBLE DAMAGE, with **no** indications of degraded performance to at least one train of a SAFETY SYSTEM, then this emergency classification is **not** warranted.	Added Note 11 consistent with the recommendation of NRC EP FAQ 2016-002.

Table S-6 Hazardous Events

- Seismic event (earthquake)
- Internal or external FLOODING event
- High winds or tornado strike
- FIRE
- EXPLOSION
- Other events with similar hazard characteristics as determined by the Shift Manager

NEI IC#	NEI IC Wording	WF3 IC#(s)	WF3 IC Wording	Difference/Deviation Justification and/or Comments
SS1	Loss of all offsite and all onsite AC power to emergency buses for 15 minutes or longer. MODE: Power Operation, Startup, Hot Standby, Hot Shutdown	SS1	Loss of **all** offsite and **all** onsite AC power to safety buses for 15 minutes or longer MODE: 1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 - Hot Shutdown	“safety buses” is the WF3-specific terminology for “emergency buses.”

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
1	Loss of **ALL** offsite and **ALL** onsite AC power to (site-specific emergency buses) for 15 minutes or longer.	SS1.1	Loss of **all** offsite and **all** onsite AC power to 4160 VAC safety buses 3A and 3B for ≥ 15 min. (Note 1)	4160 VAC safety buses 3A and 3B are the site-specific emergency buses.
Note	The Emergency Director should declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.	N/A	Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.	The classification timeliness note has been standardized across the WF3 EAL scheme by referencing the "time limit" specified within the EAL wording. Added “The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded” to reinforce the concept that the EAL timing component runs concurrent with the classification timeliness clock.

NEI IC#	NEI IC Wording	WF3 IC#(s)	WF3 IC Wording	Difference/Deviation Justification and/or Comments
SS5	Inability to shutdown the reactor causing a challenge to (core cooling [*PWR*] / RPV water level [*BWR*]) or RCS heat removal. MODE: Power Operation	SS6	Inability to shut down the reactor causing a challenge to core cooling or RCS heat removal MODE: 1 - Power Operation	None

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
1	a. An automatic or manual (trip [PWR] / scram [BWR]) did not shutdown the reactor. **AND** b. All manual actions to shutdown the reactor have been unsuccessful. **AND** c. **EITHER** of the following conditions exist: • (Site-specific indication of an inability to adequately remove heat from the core) • (Site-specific indication of an inability to adequately remove heat from the RCS)	SS6.1	An automatic or manual trip fails to shut down the reactor as indicated by reactor power > 5% **AND** **All** actions to shut down the reactor are **not** successful as indicated by reactor power > 5% **AND EITHER:** • Representative CET readings > 1,200ºF • **Any** OP-902-008 Functional Recovery RCS/Core Heat Removal safety function criterion is **not** met for ≥ 15 min. (Note 1)	As specified in the generic developers guidance “Developers may include site-specific EOP criteria indicative of a successful reactor shutdown in an EAL statement, the Basis or both (e.g., a reactor power level).” Reactor power ≤ 5% is the site-specific indication of a successful reactor trip. Deleted the word “manual” from the term “manual actions” of the second condition. For generic IC SS5, all actions to shut down the reactor can be credited, not just those actions from the reactor control panel that may be identified as “manual actions.” CETs reading > 1,200°F indicate significant core exit superheating and core uncovery. Indication that heat removal is extremely challenged is manifested by any RCS/Core Heat Removal safety function criterion not met for ≥ 15 min. This is consistent with the fission product barrier threshold used for WF3 FCB4 and RCB4. The RCS/Core Heat Removal safety function criteria are consistent with the RCS/Core Heat Removal safety function status acceptance criteria specified in the EOPs. Added Note 1 consistent with other EALs with a timing component.
Note	N/A	N/A	Note 1: The Emergency Director should declare the event promptly upon determining that the	Added Note 1 to be consistent in its use for EAL thresholds with a timing component.

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
			time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded	

NEI IC#	NEI IC Wording	WF3 IC#(s)	WF3 IC Wording	Difference/Deviation Justification and/or Comments
SS8	Loss of all Vital DC power for 15 minutes or longer. MODE: Power Operation, Startup, Hot Standby, Hot Shutdown	SS2	Loss of **all** vital DC power for 15 minutes or longer. MODE: 1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 - Hot Shutdown	None

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
1	Indicated voltage is less than (site-specific bus voltage value) on **ALL** (site-specific Vital DC busses) for 15 minutes or longer.	SS2.1	Indicated voltage is < 108 VDC on **all** vital DC buses for ≥ 15 min. (Note 1)	108 VDC is the site-specific minimum vital DC bus voltage.

Note	The Emergency Director should declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.	N/A	Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.	The classification timeliness note has been standardized across the WF3 EAL scheme by referencing the "time limit" specified within the EAL wording. Added “The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded” to reinforce the concept that the EAL timing component runs concurrent with the classification timeliness clock.

NEI IC#	NEI IC Wording	WF3 IC#(s)	WF3 IC Wording	Difference/Deviation Justification and/or Comments
SG1	Prolonged loss of all offsite and all onsite AC power to emergency buses. MODE: Power Operation, Startup, Hot Standby, Hot Shutdown	SG1a	Prolonged loss of **all** offsite and **all** onsite AC power to safety buses MODE: 1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 - Hot Shutdown	“safety buses” is the WF3-specific terminology for “emergency buses.”

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
1	a. Loss of **ALL** offsite and **ALL** onsite AC power to (site-specific emergency buses). **AND** b. **EITHER** of the following: • Restoration of at least one AC emergency bus	SG1.1	Loss of **all** offsite and **all** onsite AC power to 4160 VAC safety buses 3A and 3B **AND EITHER:** • Restoration of at least one 4160 VAC safety bus in < 4 hours is **not** likely (Note 1)	4160 VAC safety buses 3A and 3B are the site-specific emergency buses. 4 hours is the site-specific SBO coping analysis time. CETs reading > 1,200°F indicate significant core exit superheating and core uncovery.

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
	in less than (site-specific hours) is not likely. • (Site-specific indication of an inability to adequately remove heat from the core)		• Representative CETs reading > 1,200ºF	
Note	The Emergency Director should declare the General Emergency promptly upon determining that (site-specific hours) has been exceeded, or will likely be exceeded.	N/A	Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.	The classification timeliness note has been standardized across the WF3 EAL scheme by referencing the "time limit" specified within the EAL wording. Added “The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded” to reinforce the concept that the EAL timing component runs concurrent with the classification timeliness clock.

NEI IC#	NEI IC Wording	WF3 IC#(s)	WF3 IC Wording	Difference/Deviation Justification and/or Comments
SG8	Loss of all AC and Vital DC power sources for 15 minutes or longer. MODE: Power Operation, Startup, Hot Standby, Hot Shutdown	SG1b	Loss of **all** safety bus AC and vital DC power sources for 15 minutes or longer MODE: 1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 - Hot Shutdown	“safety buses” is the WF3-specific terminology for “emergency buses.”

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
1	a. Loss of **ALL** offsite and **ALL** onsite AC power to (site-specific emergency buses) for 15 minutes or longer. **AND** b. Indicated voltage is less than (site-specific bus voltage value) on ALL (site-specific Vital DC busses) for 15 minutes or longer.	SG1.2	Loss of **all** offsite and **all** onsite AC power to 4160 VAC safety buses 3A and 3B for ≥ 15 min. (Note 1) **AND** Indicated voltage is < 108 VDC on **all** vital DC buses for ≥ 15 min. (Note 1)	4160 VAC safety buses 3A and 3B are the site-specific emergency buses. 108 VDC is the site-specific minimum vital DC bus voltage.
Note	The Emergency Director should declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.	N/A	Note 1: The Emergency Director should declare the event promptly upon determining that the time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.	The classification timeliness note has been standardized across the WF3 EAL scheme by referencing the "time limit" specified within the EAL wording. Added “The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded” to reinforce the concept that the EAL timing component runs concurrent with the classification timeliness clock.

NEI Ex. EAL #	NEI Example EAL Wording	WF3 EAL #	WF3 EAL Wording	Difference/Deviation Justification and/or Comments
5.1	NRC regulations require the licensee to establish and maintain the capability to assess, classify, and declare an emergency condition within 15 minutes after the availability of indications to plant operators that an emergency action level has been exceeded and to promptly declare the emergency condition as soon as possible	3.1.1	Added sentence to NEI text in this section… For ICs and EALs that have a stipulated time duration (e.g., 15 minutes, 30 minutes, etc.), the Emergency Director is not allowed an additional 15 minutes to declare after the	Added sentence to General Considerations to clarify timeliness requirements.

	following identification of the appropriate emergency classification level. The NRC staff has provided guidance on implementing this requirement in NSIR/DPR-ISG-01, "Interim Staff Guidance, Emergency Planning for Nuclear Power Plants" (ref. 4.1.8).		specified time limit is exceeded.	
5.3	When multiple emergency events or conditions are present, the user will identify all met or exceeded EALs. The highest applicable ECL identified during this review is declared. For example: • If an Alert EAL and a Site Area Emergency EAL are met a Site Area Emergency should be declared. There is no “additive” effect from multiple EALs meeting the same ECL. For example: • If two Alert EALs are met an Alert should be declared.	3.2.1	Added sentence to NEI text in this section… If a declaration has been made and conditions for another EAL of the equal significance occurs, another initial declaration should not be made.	Added sentence to General Considerations to clarify timeliness requirements.

Enclosure, Attachment 4

W3F1-2020-0036

Waterford 3 EAL Wallchart (for information only)

(2 pages)

A — Abnorm. Rad Levels / Rad Effluent

GENERAL EMERGENCY

1 Rad Effluent

Release of gaseous radioactivity resulting in offsite dose greater than 1,000 mrem TEDE or 5,000 mrem thyroid CDE
1 2 3 4 5 6 DEF

AG1.1
Reading on **any** Table A-1 effluent radiation monitor > column "GE" for ≥ 15 min. (Notes 1, 2, 3, 4)

AG1.2
Dose assessment using actual meteorology indicates doses > 1,000 mrem TEDE or 5,000 mrem thyroid CDE at or beyond the SITE BOUNDARY (Note 4)

AG1.3
Field survey results indicate **EITHER** of the following at or beyond the SITE BOUNDARY:
- Closed window dose rates > 1,000 mR/hr expected to continue for ≥ 60 min.
- Analyses of field survey samples indicate thyroid CDE > 5,000 mrem for 60 min. of inhalation

(Notes 1, 2)

2 Irradiated Fuel Event

Spent fuel pool level **cannot** be restored to at least the top of the fuel racks for 60 minutes or longer
1 2 3 4 5 6 DEF

AG2.1
Spent fuel pool level **cannot** be restored to at least 1 ft. (Level 3) on FS-ILI-3000 (3001) for ≥ 60 min. (Note 1)

3 Area Rad Levels

Table A-1 Effluent Monitor Classification Thresholds

	Release Point	Monitor	GE	SAE	ALERT	UE
GASEOUS	Plant Stack WRGM	PRM-IRE-0110-4	4.01E+08 µCi/sec	4.01E+07 µCi/sec	4.01E+06 µCi/sec	2.27E+05 µCi/sec
		PRM-IRE-0110-1 to 3	6.54E+01 µCi/cc	6.54E+00 µCi/cc	6.54E-01 µCi/cc	5.81E-03 µCi/cc
	FHB Exhaust WRGM	PRM-IRE-3032-4	1.48E+10 µCi/sec	1.48E+09 µCi/sec	1.48E+08 µCi/sec	2.27E+05 µCi/sec
		PRM-IRE-3032-1 to 3	7.85E+03 µCi/cc	7.85E+02 µCi/cc	7.85E+01 µCi/cc	1.60E-02 µCi/cc
LIQUID	Circ. Water Discharge Monitor	PRM-IRE–1900	N/A	N/A	N/A	7.27E-04 µCi/ml
	Liquid Waste Mgmt. Discharge Monitor	PRM-IRE–0647	N/A	N/A	N/A	2.40E-03 µCi/ml
	Boron Mgmt. Discharge Monitor	PRM-IRE–0627	N/A	N/A	N/A	2.40E-03 µCi/ml

SITE AREA EMERGENCY

1 Rad Effluent

Release of gaseous radioactivity resulting in offsite dose greater than 100 mrem TEDE or 500 mrem thyroid CDE
1 2 3 4 5 6 DEF

AS1.1
Reading on **any** Table A-1 effluent radiation monitor > column "SAE" for ≥ 15 min. (Notes 1, 2, 3, 4)

AS1.2
Dose assessment using actual meteorology indicates doses > 100 mrem TEDE or 500 mrem thyroid CDE at or beyond the SITE BOUNDARY (Note 4)

AS1.3
Field survey results indicate **EITHER** of the following at or beyond the SITE BOUNDARY:
- Closed window dose rates > 100 mR/hr expected to continue for ≥ 60 min.
- Analyses of field survey samples indicate thyroid CDE > 500 mrem for 60 min. of inhalation

(Notes 1, 2)

2 Irradiated Fuel Event

Spent fuel pool level at the top of the fuel racks
1 2 3 4 5 6 DEF

AS2.1
Lowering of spent fuel pool level to 1 ft. (Level 3) on FS-ILI-3000 (3001)

3 Area Rad Levels

ALERT

1 Rad Effluent

Release of gaseous or liquid radioactivity resulting in offsite dose greater than 10 mrem TEDE or 50 mrem thyroid CDE
1 2 3 4 5 6 DEF

AA1.1
Reading on **any** Table A-1 effluent radiation monitor > column "ALERT" for ≥ 15 min. (Notes 1, 2, 3, 4)

AA1.2
Dose assessment using actual meteorology indicates doses > 10 mrem TEDE or 50 mrem thyroid CDE at or beyond the SITE BOUNDARY (Note 4)

AA1.3
Analysis of a liquid effluent sample indicates a concentration or release rate that would result in doses > 10 mrem TEDE or 50 mrem thyroid CDE at or beyond the SITE BOUNDARY for 60 min. of exposure (Notes 1, 2)

AA1.4
Field survey results indicate **EITHER** of the following at or beyond the SITE BOUNDARY:
- Closed window dose rates > 10 mR/hr expected to continue for ≥ 60 min.
- Analyses of field survey samples indicate thyroid CDE > 50 mrem for 60 min. of inhalation

(Notes 1, 2)

2 Irradiated Fuel Event

Significant lowering of water level above, or damage to, irradiated fuel
1 2 3 4 5 6 DEF

AA2.1
IMMINENT uncovery of irradiated fuel in the REFUELING PATHWAY

AA2.2
Damage to irradiated fuel resulting in a release of radioactivity
AND
High alarm on **any** Table A-2 radiation monitor

AA2.3
Lowering of spent fuel pool level to 11 ft. (Level 2) on FS-ILI-3000 (3001)

3 Area Rad Levels

Radiation levels that IMPEDE access to equipment necessary for normal plant operations, cooldown or shutdown
1 2 3 4 5 6 DEF

AA3.1
Dose rate > 15 mR/hr in **EITHER** of the following areas:
- Control Room (ARM-IRE-5001)
- CAS (by survey)

AA3.2 1 3 4

An UNPLANNED event results in radiation levels that prohibit or IMPEDE access to **any** Table A-3 room or area (Note 5)

Table A-2 Irradiated Fuel Radiation Monitors

• ARM-IRE-5024 • ARM-IRE-5025 • ARM-IRE-5026 • ARM-IRE-5027	Containment Purge Isolation Monitors
• ARM-IRE-0300.1 • ARM-IRE-0300.2 • ARM-IRE-0300.3 • ARM-IRE-0300.4	FHB Area Radiation Monitor
• PRM-IRE-5107A or B	FHB PIG Gas Channel

UNUSUAL EVENT

1 Rad Effluent

Release of gaseous or liquid radioactivity greater than 2 times the ODCM limits for 60 minutes or longer
1 2 3 4 5 6 DEF

AU1.1
Reading on **any** Table A-1 effluent radiation monitor > column "UE" for ≥ 60 min. (Notes 1, 2, 3)

AU1.2
Sample analysis for a gaseous or liquid release indicates a concentration or release rate > 2 x ODCM limits for ≥ 60 min. (Notes 1, 2)

2 Irradiated Fuel Event

UNPLANNED loss of water level above irradiated fuel
1 2 3 4 5 6 DEF

AU2.1
UNPLANNED water level drop in the REFUELING PATHWAY as indicated by low water level alarm or visual observation
AND
UNPLANNED rise in corresponding area radiation levels as indicated by **any** Table A-2 radiation monitor

3 Area Rad Levels

H — Hazards

GENERAL EMERGENCY

1 Security

Table A-3 Safe Operation & Shutdown Rooms/Areas

Room / Area	Mode
Turbine Building (all elevations and rooms) Polisher Building (all elevations and rooms)	1
- 4 RCA Letdown Valve Gallery + 21 RAB Switchgears A or B	3
- 4 RCA Wing Area - 15 RCA Valve Gallery - 35 RCA Safeguard Rooms + 21 RAB Switchgears A or B	4

None

2 Seismic Event

3 Natural or Technical Hazard

4 Fire

5 Hazardous Gas

6 Control Room Evacuation

None

7 ED Judgment

Other conditions exist which in the judgment of the Emergency Director warrant declaration of a GENERAL EMERGENCY
1 2 3 4 5 6 DEF

HG7.1
Other conditions exist which in the judgment of the Emergency Director indicate that events are in progress or have occurred which involve actual or IMMINENT substantial core degradation or melting with potential for loss of containment integrity or HOSTILE ACTION that results in an actual loss of physical control of the facility. Releases can be reasonably expected to exceed EPA Protective Action Guideline exposure levels offsite for more than the immediate site area

SITE AREA EMERGENCY

1 Security

HOSTILE ACTION within the PROTECTED AREA
1 2 3 4 5 6 DEF

HS1.1
A HOSTILE ACTION is occurring or has occurred within the PROTECTED AREA as reported by Security Shift Supervisor

2 Seismic Event

None

3 Natural or Technical Hazard

4 Fire

5 Hazardous Gas

6 Control Room Evacuation

Inability to control a key safety function from outside the Control Room
1 2 3 4 5 6

HS6.1
An event has resulted in plant control being transferred from the Control Room to the Remote Shutdown Panel (LCP-43)
AND
Control of **any** of the following key safety functions is **not** re-established within 15 min. (Note 1)
- Reactivity Control (Modes 1, 2 and 3 **only**)
- Core Heat Removal
- RCS Heat Removal

7 ED Judgment

Other conditions exist that in the judgment of the Emergency Director warrant declaration of a SITE AREA EMERGENCY
1 2 3 4 5 6 DEF

HS7.1
Other conditions exist which in the judgment of the Emergency Director indicate that events are in progress or have occurred which involve actual or likely major failures of plant functions needed for protection of the public or HOSTILE ACTION that results in intentional damage or malicious acts, (1) toward site personnel or equipment that could lead to the likely failure of or, (2) that prevent effective access to equipment needed for the protection of the public. **Any** releases are **not** expected to result in exposure levels which exceed EPA Protective Action Guideline exposure levels beyond the SITE BOUNDARY.

ALERT

1 Security

HOSTILE ACTION within the SECURITY OWNER CONTROLLED AREA or airborne attack threat within 30 minutes
1 2 3 4 5 6 DEF

HA1.1
A HOSTILE ACTION is occurring or has occurred within the SECURITY OWNER CONTROLLED AREA as reported by Security Shift Supervisor
OR
A validated notification from NRC of an aircraft attack threat within 30 min. of the site

2 Seismic Event

[Refer to SA9.1 for potential escalation due to a seismic event]

3 Natural or Technical Hazard

[Refer to SA9.1 for potential escalation due to a hazardous event]

4 Fire

[Refer to SA9.1 for potential escalation due to a fire]

5 Hazardous Gas

Gaseous release IMPEDING access to equipment necessary for normal plant operations, cooldown or shutdown
1 3 4

HA5.1
Release of a toxic, corrosive, asphyxiant or flammable gas into **any** Table H-2 room or area
AND
Entry into the room or area is prohibited or IMPEDED (Note 5)

6 Control Room Evacuation

Control Room evacuation resulting in transfer of plant control to alternate locations
1 2 3 4 5 6 DEF

HA6.1
An event has resulted in plant control being transferred from the Control Room to the Remote Shutdown Panel (LCP-43)

7 ED Judgment

Other conditions exist that in the judgment of the Emergency Director warrant declaration of an ALERT
1 2 3 4 5 6 DEF

HA7.1
Other conditions exist which in the judgment of the Emergency Director indicate that events are in progress or have occurred which involve an actual or potential substantial degradation of the level of safety of the plant or a security event that involves probable life threatening risk to site personnel or damage to site equipment because of HOSTILE ACTION. **Any** releases are expected to be limited to small fractions of the EPA Protective Action Guideline exposure levels.

UNUSUAL EVENT

1 Security

Confirmed SECURITY CONDITION or threat
1 2 3 4 5 6 DEF

HU1.1
A SECURITY CONDITION that does not involve a HOSTILE ACTION as reported by Security Shift Supervisor
OR
Notification of a credible security threat directed at the site
OR
A validated notification from the NRC providing information of an aircraft threat

2 Seismic Event

Seismic event greater than OBE levels
1 2 3 4 5 6 DEF

HU2.1
Seismic event > OBE as indicated by RED light on the seismic monitor panel

3 Natural or Technical Hazard

Natural or Technological Hazard
1 2 3 4 5 6 DEF

HU3.1
A tornado strike within the PROTECTED AREA

HU3.2
Internal room or area FLOODING of a magnitude sufficient to require manual or automatic electrical isolation of a SAFETY SYSTEM component required by Technical Specifications for the current operating mode

HU3.3
Movement of personnel within the PROTECTED AREA is IMPEDED due to an event external to the PROTECTED AREA involving hazardous materials (e.g., an offsite chemical spill or toxic gas release)

HU3.4
A hazardous event that results in on-site conditions sufficient to prohibit the plant staff from accessing the site via personal vehicles (Note 7)

4 Fire

FIRE potentially degrading the level of safety of the plant
1 2 3 4 5 6 DEF

HU4.1
A FIRE is **not** extinguished within 15 min. of **any** of the following FIRE detection indications (Note 1):
- Report from the field (i.e., visual observation)
- Receipt of multiple (more than 1) fire alarms or indications (Note 12)
- Field verification of a single fire alarm

AND
The FIRE is located within **any** Table H-1 area

HU4.2
Receipt of a single fire alarm (i.e., **no** other indications of a FIRE) (Note 13)
AND
The fire alarm is indicating a FIRE within **any** Table H-1 area
AND
The existence of a FIRE is **not** verified (i.e., proved **or** disproved) within 30 min. of alarm receipt (Note 1)

HU4.3
A FIRE within the PROTECTED AREA **not** extinguished within 60 min. of the initial report, alarm or indication (Note 1)

HU4.4
A FIRE within the PROTECTED AREA that requires firefighting support by an offsite fire response agency to extinguish

Table H-1 Fire Areas
- Containment
- Cooling Tower Areas
- Fuel Handling Building
- Reactor Auxiliary Building

5 Hazardous Gas

Table H-2 Safe Operation & Shutdown Rooms/Areas

Room / Area	Mode
Turbine Building (all elevations and rooms) Polisher Building (all elevations and rooms)	1
- 4 RCA Letdown Valve Gallery + 21 RAB Switchgears A or B	3
- 4 RCA Wing Area - 15 RCA Valve Gallery - 35 RCA Safeguard Rooms + 21 RAB Switchgears A or B	4

None

6 Control Room Evacuation

7 ED Judgment

Other conditions existing that in the judgment of the Emergency Director warrant declaration of a UE
1 2 3 4 5 6 DEF

HU7.1
Other conditions exist which in the judgment of the Emergency Director indicate that events are in progress or have occurred which indicate a potential degradation of the level of safety of the plant or indicate a security threat to facility protection has been initiated. **No** releases of radioactive material requiring offsite response or monitoring are expected unless further degradation of SAFETY SYSTEMS occurs.

E — ISFSI

None

Damage to a loaded cask CONFINEMENT BOUNDARY
1 2 3 4 5 DEF

EU1.1
Damage to a loaded cask CONFINEMENT BOUNDARY as indicated by an on-contact radiation reading on the surface of a loaded spent fuel cask > **any** Table E-1 dose rate limit.

Table E-1 ISFSI Dose Rate Limits

HI-STORM (Note E)
- 126 mrem/hr Total Dose Rate Point A
- 338 mrem/hr Total Dose Rate Point B
- 326 mrem/hr Total Dose Rate Point C
- 60 mrem/hr Total Dose Rate Point D
- 60 mrem/hr Total Dose Rate Point E
- 374 mrem/hr Total Dose Rate Point F
- 136 mrem/hr Total Dose Rate Point G

Note E: Survey points are described in DFS-007-003, Radiation Monitoring Requirements for Loading and Storage HI-STORM.

NOTES

Note 1: The Emergency Director should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Note 2: If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded the specified time limit.

Note 3: If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is **no** longer VALID for classification purposes.

Note 4: The pre-calculated effluent monitor values presented in EALs AA1.1, AS1.1 and AG1.1 should be used for emergency classification assessments until the results from a dose assessment using actual meteorology are available.

Note 5: If the equipment in the listed room or area was already inoperable or out-of-service before the event occurred, then **no** emergency classification is warranted.

Note 6: If CONTAINMENT CLOSURE is re-established prior to exceeding the 30-minute time limit, declaration of a General Emergency is **not** required.

Note 7: This EAL does **not** apply to routine traffic impediments such as fog, snow, ice, or vehicle breakdowns or accidents.

Note 8: A manual action is **any** operator action, or set of actions, which causes the control rods to be rapidly inserted into the core, and does **not** include manually driving in control rods or implementation of boron injection strategies.

Note 9: One full train of containment heat removal consists of **EITHER**:
- One train of the Containment Spray System (operating with ≥ 1750 gpm flow) **AND**
- One train of the Containment Cooling System (one fan cooler required)

OR
- Two trains of the Containment Spray System (operating with ≥ 1750 gpm flow each).

Note 10: If the affected SAFETY SYSTEM train was already inoperable or out of service before the hazardous event occurred, then emergency classification is **not** warranted.

Note 11: If the hazardous event **only** resulted in VISIBLE DAMAGE, with **no** indications of degraded performance to at least one train of a SAFETY SYSTEM, then this emergency classification is **not** warranted.

Note 12: Bullet 2 of this EAL (multiple fire alarm indications) is **not** applicable when diagnosed into a LOCA or Excess Steam Demand event in Containment.

Note 13: During Modes 1 and 2, HU4.2 is **not** applicable to a single fire alarm in containment. A fire in containment in these modes should be assessed under EAL HU4.1.

Note 14: Evaluate Containment High Range Radiation Monitor readings for potential erratic indications as a result of thermally induced currents.

Modes: 1 Power Operation | 2 Startup | 3 Hot Standby | 4 Hot Shutdown | 5 Cold Shutdown | 6 Refueling | DEF Defueled

Entergy — Waterford 3 SES — WF3 Rev. [x]

S — System Malfunct.

GENERAL EMERGENCY

1 Loss of Safety Bus AC Power

Prolonged loss of **all** offsite and **all** onsite AC power to safety buses
1 2 3 4

SG1.1
Loss of **all** offsite and **all** onsite AC power to 4160 VAC safety buses 3A and 3B
AND EITHER:
- Restoration of at least one 4160 VAC safety bus in < 4 hours is **not** likely (Note 1)
- Representative CETs reading > 1,200ºF

Loss of **all** safety bus AC and vital DC power sources for 15 minutes or longer
1 2 3 4

SG1.2
Loss of **all** offsite and **all** onsite AC power to 4160 VAC safety buses 3A and 3B for ≥ 15 min. (Note 1)
AND
Indicated voltage is < 108 VDC on vital DC buses for ≥ 15 min. (Note 1)

2 Loss of Vital DC Power

3 Loss of CR Indications

Table S-1 AC Power Sources

Onsite	- Emergency Diesel Generator A - Emergency Diesel Generator B - Temporary Emergency Diesels (TEDs) (if already aligned) - Unit Auxiliary Transformer 3A - Unit Auxiliary Transformer 3B
Offsite	- Startup Transformer 3A - Startup Transformer 3B - Unit Auxiliary Transformer 3A (when back-fed from offsite) - Unit Auxiliary Transformer 3B (when back-fed from offsite)

4 RCS Activity

5 RCS Leakage

None

6 RPS Failure

None

7 Loss of Comm.

None

8 CMT Failure

None

9 Hazardous Event Affecting Safety Systems

None

F Fission Product Barrier Degradation

FG1.1 1 2 3 4

Loss of **any** two barriers
AND
Loss or potential loss of the third barrier (Table F-1)

SITE AREA EMERGENCY

1 Loss of Safety Bus AC Power

Loss of **all** offsite and **all** onsite AC power to safety buses for 15 minutes or longer
1 2 3 4

SS1.1
Loss of **all** offsite and **all** onsite AC power to 4160 VAC safety buses 3A and 3B for ≥ 15 min. (Note 1)

2 Loss of Vital DC Power

Loss of **all** vital DC power for 15 minutes or longer
1 2 3 4

SS2.1
Indicated voltage is < 108 VDC on **all** vital DC buses for ≥ 15 min. (Note 1)

3 Loss of CR Indications

Table S-2 Safety System Parameters
- Reactor power
- RCS level
- RCS pressure
- Core exit temperature
- Level in at least one S/G
- S/G emergency feed water flow to at least one S/G

Table S-3 Significant Transients
- Turbine runback > 25% reactor power
- Electrical load rejection > 25% full electrical load (300 MWE)
- Reactor trip
- ECCS (SI) activation

4 RCS Activity

None

5 RCS Leakage

6 RPS Failure

Inability to shut down the reactor causing a challenge to core cooling or RCS heat removal
1

SS6.1
An automatic or manual trip fails to shut down the reactor as indicated by reactor power > 5%
AND
All actions to shut down the reactor are **not** successful as indicated by reactor power > 5%
AND EITHER:
- Representative CET readings > 1,200ºF
- **Any** OP-902-008 Functional Recovery RCS/Core Heat Removal safety function criterion is **not** met for ≥ 15 min. (Note 1)

7 Loss of Comm.

None

Table S-4 Communication Methods

System	Onsite	State/ Local	NRC
Telephone System	X	X	X
Operational Hotline		X	
Plant Radio System (O&M)	X		
Plant Paging System	X		
Sound Powered Phone System	X		
Civil Defense Radio System		X	
Satellite Phones		X	X
Emergency Notification System (ENS)			X

8 CMT Failure

None

9 Hazardous Event Affecting Safety Systems

Table S-5 Hazardous Events
- Seismic event (earthquake)
- Internal or external FLOODING event
- High winds or tornado strike
- FIRE
- EXPLOSION
- Other events with similar hazard characteristics as determined by the Shift Manager

FS1.1 1 2 3 4

Loss or potential loss of **any** two barriers (Table F-1)

ALERT

1 Loss of Safety Bus AC Power

Loss of **all but one** AC power source to safety buses for 15 minutes or longer
1 2 3 4

SA1.1
AC power capability, Table S-1, to 4160 VAC safety buses 3A and 3B reduced to a single power source for ≥ 15 min. (Note 1)
AND
Any additional single power source failure will result in loss of **all** AC power to SAFETY SYSTEMS

2 Loss of Vital DC Power

None

3 Loss of CR Indications

UNPLANNED loss of Control Room indications for 15 minutes or longer with a significant transient in progress
1 2 3 4

SA3.1
An UNPLANNED event results in the inability to monitor **one or more** Table S-2 parameters from within the Control Room for ≥ 15 min. (Note 1)
AND
Any significant transient is in progress, Table S-3

4 RCS Activity

Refer to Table F-1 for potential escalation due to degraded fuel clad barrier

5 RCS Leakage

Refer to Table F-1 for potential escalation due to degraded RCS barrier

6 RPS Failure

Automatic or manual trip fails to shut down the reactor and subsequent manual actions taken at the reactor control consoles are **not** successful in shutting down the reactor
1

SA6.1
An automatic or manual trip fails to shut down the reactor as indicated by reactor power > 5%
AND
Manual trip actions taken at the reactor control console (manual reactor trip push buttons and DRT) are **not** successful in shutting down the reactor as indicated by reactor power > 5% (Note 8)

7 Loss of Comm.

8 CMT Failure

9 Hazardous Event Affecting Safety Systems

Hazardous event affecting SAFETY SYSTEMS needed for the current operating mode
1 2 3 4

SA9.1
The occurrence of **any** Table S-5 hazardous event
AND
Event damage has caused indications of degraded performance on one train of a SAFETY SYSTEM needed for the current operating mode
AND EITHER:
- Event damage has caused indications of degraded performance to the second train of the SAFETY SYSTEM needed for the current operating mode
- Event damage has resulted in VISIBLE DAMAGE to the second train of the SAFETY SYSTEM needed for the current operating mode

(Notes 10, 11)

F Fission Product Barrier Degradation

FA1.1 1 2 3 4

Any loss or **any** potential loss of either Fuel Clad or RCS barrier (Table F-1)

UNUSUAL EVENT

1 Loss of Safety Bus AC Power

Loss of **all** offsite AC power capability to safety buses for 15 minutes or longer
1 2 3 4

SU1.1
Loss of **all** offsite AC power capability, Table S-1, to 4160 VAC safety buses 3A and 3B for ≥ 15 min. (Note 1)

2 Loss of Vital DC Power

None

3 Loss of CR Indications

UNPLANNED loss of Control Room indications for 15 minutes or longer
1 2 3 4

SU3.1
An UNPLANNED event results in the inability to monitor one or more Table S-2 parameters from within the Control Room for ≥ 15 min. (Note 1)

4 RCS Activity

Reactor coolant activity greater than Technical Specification allowable limits
1 2 3 4

SU4.1
RCS sample activity > 60 µCi/gm dose equivalent I-131
OR
RCS sample activity > 1.0 µCi/gm dose equivalent I-131 for > 48 hours during one continuous time interval (Note 1)
OR
RCS sample activity > 100/E µCi/gm

5 RCS Leakage

RCS leakage for 15 minutes or longer
1 2 3 4

SU5.1
RCS unidentified or pressure boundary leakage > 10 gpm for ≥ 15 min. (Note 1)
OR
RCS identified leakage > 25 gpm for ≥ 15 min. (Note 1)
OR
Reactor coolant leakage to a location outside containment > 25 gpm for ≥ 15 min. (Note 1)

6 RPS Failure

Automatic or manual trip fails to shut down the reactor
1

SU6.1
An automatic trip did **not** shut down the reactor as indicated by reactor power > 5% after **any** RPS setpoint is exceeded
AND
A subsequent automatic trip or manual trip action taken at the reactor control console (manual reactor trip push buttons or DRT) is successful in shutting down the reactor as indicated by reactor power ≤ 5% (Note 8)

SU6.2
A manual trip did **not** shut down the reactor as indicated by reactor power > 5% after **any** manual trip action was initiated
AND
A subsequent automatic trip or manual trip action taken at the reactor control console (manual reactor trip push buttons or DRT) is successful in shutting down the reactor as indicated by reactor power ≤ 5% (Note 8)

7 Loss of Comm.

Loss of **all** onsite or offsite communications capabilities
1 2 3 4

SU7.1
Loss of **all** Table S-4 onsite communication methods
OR
Loss of **all** Table S-4 State and local agency communication methods
OR
Loss of **all** Table S-4 NRC communication methods

8 CMT Failure

Failure to isolate containment or loss of containment pressure control
1 2 3 4

SU8.1
Any containment penetration is **not** closed within 15 min. of a required actuation signal
OR
Containment pressure > 17.7 psia with < one full train of containment heat removal systems (Note 9) operating per design for ≥ 15 min.
(Note 1)

9 Hazardous Event Affecting Safety Systems

Refer to Category H for potential Unusual Event due to a hazardous event

F Fission Product Barrier Degradation

Refer to SU8.1 for potential Unusual Event due to Containment failure

Table F-1 Fission Product Barrier Threshold Matrix

	Fuel Clad Barrier (FCB)		Reactor Coolant System Barrier (RCB)		Containment Barrier (CNB)	
	Loss	Potential Loss	Loss	Potential Loss	Loss	Potential Loss
A. RCS or S/G Tube Leakage	None	FCB1 RVLMS upper plenum level 0%	RCB1 An automatic or manual ECCS (SIAS) actuation required by **EITHER**: - UNISOLABLE RCS leakage - S/G tube RUPTURE	RCB2 UNISOLABLE RCS leakage or S/G tube leakage > 44 gpm excluding normal reductions in RCS inventory (e.g., letdown, RCP seal leakoff) RCB3 RCS cooldown rate > 100°F/hr **AND** Pressurizer pressure > maximum limits of the RCS Pressure and Temperature Limits (OP-902-009 Attachments 2-A thru D)	CNB1 S/G tube leakage > 44 gpm (excluding normal reductions in RCS inventory) or that is RUPTURED is also FAULTED outside of containment	None
B. Inadequate Heat Removal	FCB2 Representative CET readings > 1,200°F	FCB3 Representative CET readings > 700°F FCB4 **Any** OP-902-008 Functional Recovery RCS/Core Heat Removal safety function criterion is **not** met for ≥ 15 min. (Note 1)	None	RCB4 **Any** OP-902-008 Functional Recovery RCS/Core Heat Removal safety function criterion is **not** met for ≥ 15 min. (Note 1)	None	CNB2 Representative CET readings > 1,200°F **AND** Restoration procedures not effective within 15 min. (Note 1)
C. CTMT Radiation / RCS Activity	FCB5 Containment High Range Radiation Monitor (ARM-IRE-5400AS or ARM-IRE-5400BS) > 900 R/hr (Note 14) FCB6 Reactor coolant activity > 300 µCi/gm dose equivalent I-131 as indicated by chemistry sample.	None	RCB5 Containment High Range Radiation Monitor (ARM-IRE-5400AS or ARM-IRE-5400BS) > 60 R/hr (Note 14)	None	None	CNB3 Containment High Range Radiation Monitor (ARM-IRE-5400AS or ARM-IRE-5400BS) > 15,000 R/hr (Note 14)
D. CTMT Integrity or Bypass	None	None	None	None	CNB4 Containment isolation is required **AND EITHER** - Containment integrity has been lost based on Emergency Director judgment - UNISOLABLE pathway from Containment to the environment exists CNB5 Indications of RCS leakage outside of containment	CNB6 Containment pressure > 50 psia CNB7 Containment hydrogen concentration > 4% CNB8 Containment pressure > 17.7 psia with < one full train of heat removal systems operating per design for ≥ 15 min. (Note 1, 9)
E. ED Judgment	FCB7 **Any** condition in the opinion of the Emergency Director that indicates loss of the Fuel Clad barrier	FCB8 **Any** condition in the opinion of the Emergency Director that indicates potential loss of the Fuel Clad barrier	RCB6 **Any** condition in the opinion of the Emergency Director that indicates loss of the RCS barrier	RCB7 **Any** condition in the opinion of the Emergency Director that indicates potential loss of the RCS barrier	CNB9 **Any** condition in the opinion of the Emergency Director that indicates loss of the Containment barrier	CNB10 **Any** condition in the opinion of the Emergency Director that indicates potential loss of the Containment barrier

EAL- HOT MODES 1, 2, 3 & 4

A — Abnorm. Rad Levels / Rad Effluent

A.1 — Rad Effluent

General Emergency

Release of gaseous radioactivity resulting in offsite dose greater than 1,000 mrem TEDE or 5,000 mrem thyroid CDE

1 | 2 | 3 | 4 | 5 | 6 | DEF

AG1.1
Reading on **any** Table A-1 effluent radiation monitor > column "GE" for ≥ 15 min. (Notes 1, 2, 3, 4)

AG1.2
Dose assessment using actual meteorology indicates doses > 1,000 mrem TEDE or 5,000 mrem thyroid CDE at or beyond the SITE BOUNDARY (Note 4)

AG1.3
Field survey results indicate **EITHER** of the following at or beyond the SITE BOUNDARY:
- Closed window dose rates > 1,000 mR/hr expected to continue for ≥ 60 min.
- Analyses of field survey samples indicate thyroid CDE > 5,000 mrem for 60 min. of inhalation

(Notes 1, 2)

Site Area Emergency

Release of gaseous radioactivity resulting in offsite dose greater than 100 mrem TEDE or 500 mrem thyroid CDE

1 | 2 | 3 | 4 | 5 | 6 | DEF

AS1.1
Reading on **any** Table A-1 effluent radiation monitor > column "SAE" for ≥ 15 min. (Notes 1, 2, 3, 4)

AS1.2
Dose assessment using actual meteorology indicates doses > 100 mrem TEDE or 500 mrem thyroid CDE at or beyond the SITE BOUNDARY (Note 4)

AS1.3
Field survey results indicate **EITHER** of the following at or beyond the SITE BOUNDARY:
- Closed window dose rates > 100 mR/hr expected to continue for ≥ 60 min.
- Analyses of field survey samples indicate thyroid CDE > 500 mrem for 60 min. of inhalation

(Notes 1, 2)

Alert

Release of gaseous or liquid radioactivity resulting in offsite dose greater than 10 mrem TEDE or 50 mrem thyroid CDE

1 | 2 | 3 | 4 | 5 | 6 | DEF

AA1.1
Reading on **any** Table A-1 effluent radiation monitor > column "ALERT" for ≥ 15 min. (Notes 1, 2, 3, 4)

AA1.2
Dose assessment using actual meteorology indicates doses > 10 mrem TEDE or 50 mrem thyroid CDE at or beyond the SITE BOUNDARY (Note 4)

AA1.3
Analysis of a liquid effluent sample indicates a concentration or release rate that would result in doses > 10 mrem TEDE or 50 mrem thyroid CDE at or beyond the SITE BOUNDARY for 60 min. of exposure (Notes 1, 2)

AA1.4
Field survey results indicate **EITHER** of the following at or beyond the SITE BOUNDARY:
- Closed window dose rates > 10 mR/hr expected to continue for ≥ 60 min.
- Analyses of field survey samples indicate thyroid CDE > 50 mrem for 60 min. of inhalation

(Notes 1, 2)

Unusual Event

Release of gaseous or liquid radioactivity greater than 2 times the ODCM limits for 60 minutes or longer

1 | 2 | 3 | 4 | 5 | 6 | DEF

AU1.1
Reading on **any** Table A-1 effluent radiation monitor > column "UE" for ≥ 60 min. (Notes 1, 2, 3)

AU1.2
Sample analysis for a gaseous or liquid release indicates a concentration or release rate > 2 x ODCM limits for ≥ 60 min. (Notes 1, 2)

A.2 — Irradiated Fuel Event

General Emergency

Spent fuel pool level **cannot** be restored to at least the top of the fuel racks for 60 minutes or longer

1 | 2 | 3 | 4 | 5 | 6 | DEF

AG2.1
Spent fuel pool level **cannot** be restored to at least 1 ft. (Level 3) on FS-ILI-3000 (3001) for ≥ 60 min. (Note 1)

Table A-1 Effluent Monitor Classification Thresholds

	Release Point	Monitor	GE	SAE	ALERT	UE
GASEOUS	Plant Stack WRGM	PRM-IRE-0110-4	4.01E+08 µCi/sec	4.01E+07 µCi/sec	4.01E+06 µCi/sec	2.27E+05 µCi/sec
		PRM-IRE-0110-1 to 3	6.54E+01 µCi/cc	6.54E+00 µCi/cc	6.54E-01 µCi/cc	5.81E-03 µCi/cc
	FHB Exhaust WRGM	PRM-IRE-3032-4	1.48E+10 µCi/sec	1.48E+09 µCi/sec	1.48E+08 µCi/sec	2.27E+05 µCi/sec
		PRM-IRE-3032-1 to 3	7.85E+03 µCi/cc	7.85E+02 µCi/cc	7.85E+01 µCi/cc	1.60E-02 µCi/cc
LIQUID	Circ. Water Discharge Monitor	PRM-IRE–1900	N/A	N/A	N/A	7.27E-04 µCi/ml
	Liquid Waste Mgmt. Discharge Monitor	PRM-IRE–0647	N/A	N/A	N/A	2.40E-03 µCi/ml
	Boron Mgmt. Discharge Monitor	PRM-IRE–0627	N/A	N/A	N/A	2.40E-03 µCi/ml

Site Area Emergency

Spent fuel pool level at the top of the fuel racks

1 | 2 | 3 | 4 | 5 | 6 | DEF

AS2.1
Lowering of spent fuel pool level to 1 ft. (Level 3) on FS-ILI-3000 (3001)

Alert

Significant lowering of water level above, or damage to, irradiated fuel

1 | 2 | 3 | 4 | 5 | 6 | DEF

AA2.1
IMMINENT uncovery of irradiated fuel in the REFUELING PATHWAY

AA2.2
Damage to irradiated fuel resulting in a release of radioactivity
AND
High alarm on **any** Table A-2 radiation monitor

AA2.3
Lowering of spent fuel pool level to 11 ft. (Level 2) on FS-ILI-3000 (3001)

Unusual Event

UNPLANNED loss of water level above irradiated fuel

1 | 2 | 3 | 4 | 5 | 6 | DEF

AU2.1
UNPLANNED water level drop in the REFUELING PATHWAY as indicated by low water level alarm or visual observation
AND
UNPLANNED rise in corresponding area radiation levels as indicated by **any** Table A-2 radiation monitor

A.3 — Area Rad Levels

General Emergency

Radiation levels that IMPEDE access to equipment necessary for normal plant operations, cooldown or shutdown

1 | 2 | 3 | 4 | 5 | 6 | DEF

AA3.1
Dose rate > 15 mR/hr in **EITHER** of the following areas:
- Control Room (ARM-IRE-5001)
- CAS (by survey)

1 | 3 | 4

AA3.2
An UNPLANNED event results in radiation levels that prohibit or IMPEDE access to **any** Table A-3 room or area (Note 5)

Table A-2 Irradiated Fuel Radiation Monitors

• ARM-IRE-5024 • ARM-IRE-5025 • ARM-IRE-5026 • ARM-IRE-5027	Containment Purge Isolation Monitors
• ARM-IRE-0300.1 • ARM-IRE-0300.2 • ARM-IRE-0300.3 • ARM-IRE-0300.4	FHB Area Radiation Monitor
• PRM-IRE-5107A or B	FHB PIG Gas Channel

H — Hazards

H.1 — Security

Table A-3 Safe Operation & Shutdown Rooms/Areas

Room / Area	Mode
Turbine Building (all elevations and rooms) Polisher Building (all elevations and rooms)	1
- 4 RCA Letdown Valve Gallery + 21 RAB Switchgears A or B	3
- 4 RCA Wing Area - 15 RCA Valve Gallery - 35 RCA Safeguard Rooms + 21 RAB Switchgears A or B	4

General Emergency
None

Site Area Emergency

HOSTILE ACTION within the PROTECTED AREA

1 | 2 | 3 | 4 | 5 | 6 | DEF

HS1.1
A HOSTILE ACTION is occurring or has occurred within the PROTECTED AREA as reported by Security Shift Supervisor

Alert

HOSTILE ACTION within the SECURITY OWNER CONTROLLED AREA or airborne attack threat within 30 minutes

1 | 2 | 3 | 4 | 5 | 6 | DEF

HA1.1
A HOSTILE ACTION is occurring or has occurred within the SECURITY OWNER CONTROLLED AREA as reported by Security Shift Supervisor
OR
A validated notification from NRC of an aircraft attack threat within 30 min. of the site

Unusual Event

Confirmed SECURITY CONDITION or threat

1 | 2 | 3 | 4 | 5 | 6 | DEF

HU1.1
A SECURITY CONDITION that does not involve a HOSTILE ACTION as reported by Security Shift Supervisor
OR
Notification of a credible security threat directed at the site
OR
A validated notification from the NRC providing information of an aircraft threat

H.2 — Seismic Event

General Emergency
None

Site Area Emergency
None

Alert
[Refer to CA6.1 for potential escalation due to a seismic event]

Unusual Event

Seismic event greater than OBE levels

1 | 2 | 3 | 4 | 5 | 6 | DEF

HU2.1
Seismic event > OBE as indicated by RED light on the seismic monitor panel

H.3 — Natural or Technical Hazard

General Emergency

NOTES

Note 1: The Emergency Director should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded. The Emergency Director is **not** allowed an additional 15 minutes to declare after the time limit is exceeded.

Note 2: If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded the specified time limit.

Note 3: If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is **no** *longer* VALID for classification purposes.

Note 4: The pre-calculated effluent monitor values presented in EALs AA1.1, AS1.1 and AG1.1 should be used for emergency classification assessments until the results from a dose assessment using actual meteorology are available.

Note 5: If the equipment in the listed room or area was already inoperable or out-of-service before the event occurred, then **no** emergency classification is warranted.

Note 6: If CONTAINMENT CLOSURE is re-established prior to exceeding the 30-minute time limit, declaration of a General Emergency is **not** required.

Note 7: This EAL does **not** apply to routine traffic impediments such as fog, snow, ice, or vehicle breakdowns or accidents.

Note 8: A manual action is **any** operator action, or set of actions, which causes the control rods to be rapidly inserted into the core, and does **not** include manually driving in control rods or implementation of boron injection strategies.

Note 9: One full train of containment heat removal consists of **EITHER**:
- One train of the Containment Spray System (operating with ≥ 1750 gpm flow) **AND**
- One train of the Containment Cooling System (one fan cooler required)

OR
- Two trains of the Containment Spray System (operating with ≥ 1750 gpm flow each).

Note 10: If the affected SAFETY SYSTEM train was already inoperable or out of service before the hazardous event occurred, then emergency classification is **not** warranted.

Note 11: If the hazardous event **only** resulted in VISIBLE DAMAGE, with **no** indications of degraded performance to at least one train of a SAFETY SYSTEM, then this emergency classification is **not** warranted.

Note 12: Bullet 2 of this EAL (multiple fire alarm indications) is **not** applicable when diagnosed into a LOCA or Excess Steam Demand event in Containment.

Note 13: During Modes 1 and 2, HU4.2 is **not** applicable to a single fire alarm in containment. A fire in containment in these modes should be assessed under EAL HU4.1.

Note 14: Evaluate Containment High Range Radiation Monitor readings for potential erratic indications as a result of thermally induced currents.

Site Area Emergency
None

Alert
[Refer to CA6.1 for potential escalation due to a hazardous event]

Unusual Event

Natural or Technological Hazard

1 | 2 | 3 | 4 | 5 | 6 | DEF

HU3.1
A tornado strike within the PROTECTED AREA

HU3.2
Internal room or area FLOODING of a magnitude sufficient to require manual or automatic electrical isolation of a SAFETY SYSTEM component required by Technical Specifications for the current operating mode

HU3.3
Movement of personnel within the PROTECTED AREA is IMPEDED due to an event external to the PROTECTED AREA involving hazardous materials (e.g., an offsite chemical spill or toxic gas release)

HU3.4
A hazardous event that results in on-site conditions sufficient to prohibit the plant staff from accessing the site via personal vehicles (Note 7)

H.4 — Fire

General Emergency
None

Site Area Emergency
None

Alert
[Refer to CA6.1 for potential escalation due to a fire]

Table H-1 Fire Areas
- Containment
- Cooling Tower Areas
- Fuel Handling Building
- Reactor Auxiliary Building

Unusual Event

FIRE potentially degrading the level of safety of the plant

1 | 2 | 3 | 4 | 5 | 6 | DEF

HU4.1
A FIRE is **not** extinguished within 15 min. of **any** of the following FIRE detection indications (Note 1):
- Report from the field (i.e., visual observations)
- Receipt of multiple (more than 1) fire alarms or indications (Note 12)
- Field verification of a single fire alarm

AND
The FIRE is located within **any** Table H-1 area

HU4.2
Receipt of a single fire alarm (i.e., **no** other indications of a FIRE) (Note 13)
AND
The fire alarm is indicating a FIRE within **any** Table H-1 area
AND
The existence of a FIRE is **not** verified (i.e., proved **or** disproved) within 30 min. of alarm receipt (Note 1)

HU4.3
A FIRE within the PROTECTED AREA **not** extinguished within 60 min. of the initial report, alarm or indication (Note 1)

HU4.4
A FIRE within the PROTECTED AREA that requires firefighting support by an offsite fire response agency to extinguish

H.5 — Hazardous Gas

General Emergency
None

Site Area Emergency
None

Alert

Gaseous release IMPEDING access to equipment necessary for normal plant operations, cooldown or shutdown

1 | 3 | 4

HA5.1
Release of a toxic, corrosive, asphyxiant or flammable gas into **any** Table H-2 room or area
AND
Entry into the room or area is prohibited or IMPEDED (Note 5)

Unusual Event

Table H-2 Safe Operation & Shutdown Rooms/Areas

Room / Area	Mode
Turbine Building (all elevations and rooms) Polisher Building (all elevations and rooms)	1
- 4 RCA Letdown Valve Gallery + 21 RAB Switchgears A or B	3
- 4 RCA Wing Area - 15 RCA Valve Gallery - 35 RCA Safeguard Rooms + 21 RAB Switchgears A or B	4

None

H.6 — Control Room Evacuation

General Emergency
None

Site Area Emergency

Inability to control a key safety function from outside the Control Room

1 | 2 | 3 | 4 | 5 | 6

HS6.1
An event has resulted in plant control being transferred from the Control Room to the Remote Shutdown Panel (LCP-43)
AND
Control of **any** of the following key safety functions is **not** re-established within 15 min. (Note 1):
- Reactivity Control (Modes 1, 2 and 3 **only**)
- Core Heat Removal
- RCS Heat Removal

Alert

Control Room evacuation resulting in transfer of plant control to alternate locations

1 | 2 | 3 | 4 | 5 | 6 | DEF

HA6.1
An event has resulted in plant control being transferred from the Control Room to the Remote Shutdown Panel (LCP-43)

Unusual Event
None

H.7 — ED Judgment

General Emergency

Other conditions exist which in the judgment of the Emergency Director warrant declaration of a GENERAL EMERGENCY

1 | 2 | 3 | 4 | 5 | 6 | DEF

HG7.1
Other conditions exist which in the judgment of the Emergency Director indicate that events are in progress or have occurred which involve actual or IMMINENT substantial core degradation or melting with potential for loss of containment integrity or HOSTILE ACTION that results in an actual loss of physical control of the facility. Releases can be reasonably expected to exceed EPA Protective Action Guideline exposure levels offsite for more than the immediate site area

Site Area Emergency

Other conditions exist that in the judgment of the Emergency Director warrant declaration of a SITE AREA EMERGENCY

1 | 2 | 3 | 4 | 5 | 6 | DEF

HS7.1
Other conditions exist which in the judgment of the Emergency Director indicate that events are in progress or have occurred which involve actual or likely major failures of plant functions needed for protection of the public or HOSTILE ACTION that results in intentional damage or malicious acts, (1) toward site personnel or equipment that could lead to the likely failure of or, (2) that prevent effective access to equipment needed for the protection of the public. **Any** releases are **not** expected to result in exposure levels which exceed EPA Protective Action Guideline exposure levels beyond the SITE BOUNDARY.

Alert

Other conditions exist that in the judgment of the Emergency Director warrant declaration of an ALERT

1 | 2 | 3 | 4 | 5 | 6 | DEF

HA7.1
Other conditions exist which in the judgment of the Emergency Director indicate that events are in progress or have occurred which involve an actual or potential substantial degradation of the level of safety of the plant or a security event that involves probable life threatening risk to site personnel or damage to site equipment because of HOSTILE ACTION. **Any** releases are expected to be limited to small fractions of the EPA Protective Action Guideline exposure levels.

Unusual Event

Other conditions existing that in the judgment of the Emergency Director warrant declaration of a UE

1 | 2 | 3 | 4 | 5 | 6 | DEF

HU7.1
Other conditions exist which in the judgment of the Emergency Director indicate that events are in progress or have occurred which indicate a potential degradation of the level of safety of the plant or indicate a security threat to facility protection has been initiated. **No** releases of radioactive material requiring offsite response or monitoring are expected unless further degradation of SAFETY SYSTEMS occurs.

E — ISFSI

E.1

General Emergency
None

Site Area Emergency
None

Alert

Table E-1 ISFSI Dose Rate Limits

HI-STORM (Note E)
- 126 mrem/hr Total Dose Rate Point A
- 338 mrem/hr Total Dose Rate Point B
- 326 mrem/hr Total Dose Rate Point C
- 60 mrem/hr Total Dose Rate Point D
- 60 mrem/hr Total Dose Rate Point E
- 374 mrem/hr Total Dose Rate Point F
- 136 mrem/hr Total Dose Rate Point G

Note E: Survey points are described in DFS-007-003, Radiation Monitoring Requirements for Loading and Storage HI-STORM.

Unusual Event

Damage to a loaded cask CONFINEMENT BOUNDARY

1 | 2 | 3 | 4 | 5 | DEF

EU1.1
Damage to a loaded cask CONFINEMENT BOUNDARY as indicated by an on-contact radiation reading on the surface of a loaded spent fuel cask > **any** Table E-1 dose rate limit.

C — Cold SD/ Refuel System Malfunct.

C.1 — RCS Level

General Emergency

Loss of RCS inventory affecting fuel clad integrity with containment challenged

5 | 6

CG1.1
Representative CETs indicate superheat for ≥ 30 min.
AND
Any Containment Challenge indication, Table C-1

CG1.2
RCS level **cannot** be monitored for ≥ 30 min.
AND
Core uncovery is indicated by **any** of the following:
- UNPLANNED rise in Containment Sump or Reactor Drain Tank level of sufficient magnitude to indicate core uncovery
- Visual observation of UNISOLABLE RCS leakage of sufficient magnitude to indicate core uncovery
- Containment High Range Radiation Monitor (ARM-IRE-5400AS or BS) > 10 R/hr
- Erratic Source Range Monitor indication

AND
Any Containment Challenge indication, Table C-1

Site Area Emergency

Loss of RCS inventory affecting core decay heat removal capability

5 | 6

CS1.1
CONTAINMENT CLOSURE **not** established
AND
RVLMS upper plenum 0%

CS1.2
CONTAINMENT CLOSURE established
AND
Representative CETs indicate superheat

CS1.3
RCS level **cannot** be monitored for ≥ 30 min. (Note 1)
AND
Core uncovery is indicated by **any** of the following:
- UNPLANNED rise in Containment Sump or Reactor Drain Tank level of sufficient magnitude to indicate core uncovery
- Visual observation of UNISOLABLE RCS leakage of sufficient magnitude to indicate core uncovery
- Containment High Range Radiation Monitor (ARM-IRE-5400AS or BS) > 10 R/hr
- Erratic Source Range Monitor indication

Alert

Significant loss of RCS inventory

5 | 6

CA1.1
Loss of RCS inventory as indicated by RCS level < 13.46 ft.

CA1.2
RCS level **cannot** be monitored for ≥ 15 min. (Note 1)
AND EITHER
- UNPLANNED rise in Containment Sump or Reactor Drain Tank level due to loss of RCS Inventory
- Visual observation of UNISOLABLE RCS leakage

Unusual Event

UNPLANNED loss of RCS inventory

5 | 6

CU1.1
UNPLANNED loss of reactor coolant results in RCS level less than a required lower limit for ≥ 15 min. (Note 1)

CU1.2
RCS level **cannot** be monitored
AND EITHER
- UNPLANNED rise in Containment Sump or Reactor Drain Tank level due to loss of RCS inventory
- Visual observation of UNISOLABLE RCS leakage

C.2 — Loss of Safety Bus AC Power

General Emergency
None

Site Area Emergency
None

Alert

Loss of **all** offsite and **all** onsite AC power to safety buses for 15 minutes or longer

5 | 6 | DEF

CA2.1
Loss of **all** offsite and **all** onsite AC power to 4160 VAC safety buses 3A and 3B for ≥ 15 min. (Note 1)

Unusual Event

Loss of **all but one** AC power source to safety buses for 15 minutes or longer

5 | 6 | DEF

CU2.1
AC power capability, Table C-2, to 4160 VAC safety buses 3A and 3B reduced to a single power source for ≥ 15 min. (Note1)
AND
Any additional single power source failure will result in loss of **all** AC power to SAFETY SYSTEMS

C.3 — RCS Temp.

General Emergency
None

Site Area Emergency
None

Alert

Inability to maintain plant in cold shutdown

5 | 6

CA3.1
UNPLANNED rise in RCS temperature to > 200°F for > Table C-3 duration (Note 1)
OR
UNPLANNED RCS pressure rise > 10 psia (this EAL does **not** apply during water-solid plant conditions)

Unusual Event

UNPLANNED rise in RCS temperature

5 | 6

CU3.1
UNPLANNED rise in RCS temperature to > 200°F

CU3.2
Loss of **all** RCS temperature and RCS level indication for ≥ 15 min. (Note 1)

C.4 — Loss of Vital DC Power

General Emergency
None

Site Area Emergency
None

Alert
None

Unusual Event

Loss of vital DC power for 15 minutes or longer

5 | 6

CU4.1
Indicated voltage is < 108 VDC on required vital DC buses for ≥ 15 min. (Note 1)

C.5 — Loss of Comm.

General Emergency
None

Site Area Emergency
None

Alert
None

Unusual Event

Loss of **all** onsite or offsite communications capabilities

5 | 6 | DEF

CU5.1
Loss of **all** Table C-4 onsite communication methods
OR
Loss of **all** Table C-4 State and local agency communication methods
OR
Loss of **all** Table C-4 NRC communication methods

C.6 — Hazardous Event Affecting Safety Systems

General Emergency
None

Site Area Emergency
None

Alert

Hazardous event affecting SAFETY SYSTEMS needed for the current operating mode

5 | 6

CA6.1
The occurrence of **any** Table C-5 hazardous event
AND
Event damage has caused indications of degraded performance on one train of a SAFETY SYSTEM needed for the current operating mode
AND EITHER:
- Event damage has caused indications of degraded performance to the second train of the SAFETY SYSTEM needed for the current operating mode
- Event damage has resulted in VISIBLE DAMAGE to the second train of the SAFETY SYSTEM needed for the current operating mode

(Notes 10, 11)

Unusual Event
[Refer to Category H for potential Unusual Event due to a hazardous event]

Table C-1 Containment Challenge Indications
- CONTAINMENT CLOSURE **not** established (Note 6)
- Containment hydrogen concentration > 4%
- UNPLANNED rise in containment pressure

Table C-2 AC Power Sources

Onsite	- Emergency Diesel Generator A - Emergency Diesel Generator B - Temporary Emergency Diesels (TEDs) (if already aligned)
Offsite	- Startup Transformer 3A - Startup Transformer 3B - Unit Auxiliary Transformer 3A (when back-fed from offsite) - Unit Auxiliary Transformer 3B (when back-fed from offsite)

Table C-3 RCS Reheat Duration Thresholds

RCS Status	CONTAINMENT CLOSURE Status	Heat-up Duration
Intact (but **not** lowered inventory)	N/A	60 min.*
Not intact **OR** lowered inventory	established	20 min.*
	not established	0 min.

* If an RCS heat removal system is in operation within this time frame and RCS temperature is being reduced, the EAL is **not** applicable

Table C-4 Communication Methods

System	Onsite	State/ Local	NRC
Telephone System	X	X	X
Operational Hotline		X	
Plant Radio System (O&M)	X		
Plant Paging System	X		
Sound Powered Phone System	X		
Civil Defense Radio System		X	
Satellite Phones		X	X
Emergency Notification System (ENS)			X

Table C-5 Hazardous Events
- Seismic event (earthquake)
- Internal or external FLOODING event
- High winds or tornado strike
- FIRE
- EXPLOSION
- Other events with similar hazard characteristics as determined by the Shift Manager

Modes: 1 Power Operation | 2 Startup | 3 Hot Standby | 4 Hot Shutdown | 5 Cold Shutdown | 6 Refueling | DEF Defueled

Entergy — Waterford 3 SES

WF3
Rev. [x]

EAL - COLD MODES 5, 6 & Defueled

Enclosure, Attachment 5

W3F1-2020-0036

Supporting Referenced Document Pages

Entergy	Waterford 3 SES EAL Basis Document Revision XXX Attachment 2 – Safe Operation & Shutdown Areas Tables A-3 & H-2 Bases

Background

NEI 99-01 Revision 6 ICs AA3 and HA5 prescribe declaration of an Alert based on impeded access to rooms or areas (due to either area radiation levels or hazardous gas concentrations) where equipment necessary for normal plant operations, cooldown or shutdown is located. These areas are intended to be plant operating mode dependent. Specifically the Developers Notes for AA3 and HA5 states:

> *The "site-specific list of plant rooms or areas with entry-related mode applicability identified" should specify those rooms or areas that contain equipment which require a manual/local action as specified in operating procedures used for normal plant operation, cooldown and shutdown. Do not include rooms or areas in which actions of a contingent or emergency nature would be performed (e.g., an action to address an off-normal or emergency condition such as emergency repairs, corrective measures or emergency operations). In addition, the list should specify the plant mode(s) during which entry would be required for each room or area.*
>
> *The list should not include rooms or areas for which entry is required solely to perform actions of an administrative or record keeping nature (e.g., normal rounds or routine inspections).*

Further, as specified in IC HA5:

> *The list need not include the Control Room if adequate engineered safety/design features are in place to preclude a Control Room evacuation due to the release of a hazardous gas. Such features may include, but are not limited to, capability to draw air from multiple air intakes at different and separate locations, inner and outer atmospheric boundaries, or the capability to acquire and maintain positive pressure within the Control Room envelope.*

WF3 Table A-3 and H-2 Bases

A review was conducted of site procedures that direct normal plant operations to cooldown or shutdown. The applicable procedure was OP-010-005, Plant Shutdown. The following steps were identified that contain action in rooms or areas that contain equipment which require a manual/local action, and that action is required to reach the target mode. Local actions for administrative purposes or system alignment actions not required to reach shutdown and/or cooldown conditions are not included in the table below.

AREA	MODES	PURPOSE	REFERENCE
Turbine Building +46 and +21 Areas	1	Secure Heater Drain Pumps	OP-010-005, step 9.1.13
Polisher Building	1	Remove Condensate Polishers from service	OP-010-005, step 9.1.16
Turbine Building +46 and +21 Areas	1	Remove Main Feedwater Pump from service	OP-010-005, step 9.1.17
-4 RCA Letdown Valve Gallery	3	Align Letdown Flow Control and Backpressure valves	OP-010-005, step 9.2.22.3 and 9.2.22.4
+21 RAB Switchgear	3	Close local breakers to support SIT Tank isolation	OP-010-005, step 9.2.30.1
-4 RCA Wing Area -15 RCA Valve Gallery -35 RCA Safeguard Rooms +21 RAB Switchgears A or B	4	Remove Containment Spray from service and align Shutdown Cooling Trains to service	OP-010-005, step 9.4.1 OP-009-005, step 5.1.2, 5.2.2, 5.3.4, 5.3.5, 5.3.7, 5.3.11, 5.4.4, 5.4.5, 5.4.10
-15 RCA Valve Gallery	4	Isolate RWSP from the suction of SDC Trains	OP-010-005, step 9.4.30.1

These rooms and areas were reviewed for common ventilation and cross air flow, as well as accessibility to the required areas. The Polisher and Turbine buildings were included in their entirety since these buildings are almost entirely made of of floor gratings and due to having 1 single air ventilation system. Additionally, these buildings areas are not separated by any walls that would serve to specify specific component areas, nor would any gasses be limited to any specific building area. Areas in the Reactor Auxiliary Building and the Radiation Controlled Area Building are floor and room/area specific.

The Waterford 3 Control Room ventilation system has adequate engineered safety/design features in place to preclude a Control Room evacuation due to the release of a hazardous gas. Therefore the Control Room is not included in this assessment or in the corresponding table.

Table A-3 & H-2 Results

Table A-3 & H-2 Safe Operation & Shutdown Rooms/Areas	
Room/Area	Mode
Turbine Building (all elevations and rooms)	1
Polisher Building (all elevations and rooms)	1
-4 RCA Letdown Valve Gallery	3
+21 RAB Switchgears A or B	3
-4 RCA Wing Area	4
-15 RCA Valve Gallery	4
-35 RCA Safeguard Rooms	4
+21 RAB Switchgears A or B	4

Attachment 2

Engineering Calculation Process

☐ ANO 1	☐ ANO 2	☐ GGNS	☐ IP 2	☐ IP 3	☐ PLP
☐ BRP	☐ RBS	☒ W3	☐ NP GGNS 3	☐ NP RBS 3	

CALCULATION COVER PAGE	(1) **EC #** 86890	(2) **Page 1 of**	38

(3) Design Basis Calc.	☒ YES	☐ NO	(4) ☒ CALCULATION	☐ EC Markup

(5) **Calculation No: ECS20-001**	(6) **Revision: 0**
(7) **Title:** Radiological Effluent EAL Values	(8) **Editorial** ☐ **YES** ☒ **NO**
(9) **System(s): RM**	(10) **Review Org (Department): Design**
(11) **Safety Class:**	(12) **Component/Equipment/Structure Type/Number:**
☒ **Safety / Quality Related** ☐ **Augmented Quality Program** ☐ **Non-Safety Related**	
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REVIEWS

(15) Name/Signature/Date Michelle Groome	(16) Name/Signature/Date William Steelman	(17) Name/Signature/Date James Hoss
Responsible Engineer	☒ **Design Verifier** ☐ **Reviewer** ☐ Comments Attached	**Supervisor/Approval** ☐ Comments Attached

Attachment 3

Calculation Reference Sheet

CALCULATION REFERENCE SHEET	CALCULATION NO: ECS20-001 REVISION: 0

I. **EC Markups Incorporated** (N/A to NP calculations)

1. NA
2.
3.
4.
5.

II. Relationships	Sht	Rev	Input Doc	Output Doc	Impact Y/N	Tracking No.
1. EPA-400-R-92-001, Manual of Protective action Guides and Protective Actions for Nuclear Incidents, May 1992			☒	☐	N	
2. NUREG-1940, RASCAL 4: Description of Models and Methods, December 2012			☒	☐	N	
3. NUREG-1228, Source Term Estimation During Incident Response to Severe Nuclear Power Plant Accidents, October 1988			☒	☐	N	
4. ECS10-001, Waterford-3 Cycle 24 Reload Analysis Groundrules, Revision 7			☒	☐	N	
5. W3-DBD-32, Radiation Monitoring System Design Basis Document, Revision 301			☒	☐	N	

Attachment 3

Calculation Reference Sheet

III. CROSS REFERENCES:

1. NEI 99-01 R6, Development of Emergency Action Levels for Non-Passive Reactors, September 2012
2. Regulatory Guide 1.183, Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors, July 2000
3. Waterford 3 Technical Specification Section 3/4.4.7, RCS Specific Activity

IV. SOFTWARE USED:

Title: _____NA_____ Version/Release: _____ Disk/CD No._____

V. DISK/CDS INCLUDED:

Title: _____NA____ Version/Release: _____ Disk/CD No._____

VI. OTHER CHANGES:

Attachment 1

Record of Revision

Revision	Record of Revision
0	Initial Issue. This is a vendor calculation to support EPLAN EAL revision to NEI 99-01 Revision 6.

Waterford 3 Steam Electric Station (WF3)

Radiological Effluent EAL Values

EC 86890
EP-CALC-WF3-1701

Document Author: _____ 05/05/2020
Scott McCain Date

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1. Purpose

The Waterford 3 Steam Electric Station (WF3) Emergency Action Level (EAL) Technical Bases Manual contains background information, event declaration thresholds, bases and references for the EAL and Fission Product Barrier (FPB) values used to implement the Nuclear Energy Institute (NEI) 99-01 Revision 6 EAL guidance. This calculation document provides additional technical detail specific to the derivation of the gaseous and liquid radiological effluent EAL values developed in accordance with NEI 99-01 Revision 6 guidance.

Documentation of the assumptions, calculations and results are provided for the Ax1 series EAL effluent monitor values associated with the following NEI 99-01 Revision 6 EALs listed below:

- NEI EAL AU1.1 (gaseous and liquid)
- NEI EAL AA1.1 (gaseous and liquid)
- NEI EAL AS1.1 (gaseous)
- NEI EAL AG1.1 (gaseous)

2. DEVELOPMENT METHODOLOGY AND BASES

2.1. Threshold Limits

2.1.1. AU1.1 Liquid Threshold Limits

Guidance Criteria

AU1 addresses a release of gaseous or liquid radioactivity greater than 2 times the Offsite Dose Calculation Manual (ODCM) limits for 60 minutes or longer.

WF3 Bases

ODCM Section 5.3.2 states that liquid effluent monitor setpoints be established so that the concentration of radioactive liquid effluents released from the site to unrestricted areas is limited to:

- Ten (10) times the concentrations specified in 10 CFR Part 20, Appendix B, Table 2, Column 2 for radionuclides other than dissolved or entrained noble gases
- 2.0E-04 µCi/ml total activity for dissolved or entrained noble gases

The site specific AU1.1 liquid effluent EAL threshold values will equate to 2 times the ODCM limit.

2.1.2. AU1.1 Gaseous Threshold Limits

Guidance Criteria

AU1 addresses a release of gaseous or liquid radioactivity greater than 2 times the Offsite Dose Calculation Manual (ODCM) limits for 60 minutes or longer.

WF3 Bases

The ODCM Section 5.4.1 limits for the concentration of radioactive gaseous effluents at the site boundary are as follows:

- Less than or equal to 500 mrem/yr to the total body (Noble Gasses)
- Less than or equal to 3000 mrem/yr to the skin (Noble Gasses)
- Less than or equal to 1500 mrem/yr to any organ (I-131, I-133, tritium, and particulate with half-lives greater than 8 days)

  ODCM setpoint calculations are based on the noble gas limits. Organ dose includes inhalation, ingestion and deposition pathways and are applied in unrestricted area site boundary effluent dose calculations used in the Annual Radioactive Effluent Release Report. Ingestion pathway bases are not compatible or directly comparable with short term event considerations, and are not a significant contribution to the total dose (total body or skin dose limits from noble gas are the major exposure pathway). Thus, the organ dose limit is not applicable for EAL threshold determination.

The site specific AU1.1 gaseous effluent EAL threshold values will equate to 2 times the ODCM limit for the lesser of the total body or skin exposure pathways from noble gas.

2.1.3. AA1.1 Liquid Threshold Limits

Guidance Criteria

AA1 addresses a release of radioactivity resulting in offsite dose greater than 10 mrem TEDE or 50 mrem thyroid CDE.

This is based on values at 1% of the EPA Protective Action Guides (PAGs).

Per NEI 99-01, the effluent monitor readings should correspond to the above dose limits at the “site-specific dose receptor point” (consistent with the calculation methodology employed) for one hour of exposure.

WF3 Bases

Liquid effluent limits are based on water concentration values given in 10 CFR 20 Appendix B Table 2 Column 2 (see Section 2.1.1 above). The 10 CFR 20 values are equivalent to the radionuclide concentrations which, if ingested continuously over the course of a year, would produce a total effective dose equivalent of 0.05 rem (50 millirem). EPA PAGs are based on a TEDE dose from immersion, inhalation and deposition. The 10 CFR 20 limits and the EPA limits do not represent the same type of exposure and thus cannot be compared on a one to one basis.

Thus, the site specific EALs will not contain an AA1.1 liquid effluent monitor threshold value that equates to 1% of the EPA PAG. However, EALs AA1.3 (liquid effluent sample

analysis) and AA1.4 (field survey results) will remain applicable for liquid effluent releases that exceed their respective thresholds.

2.1.4. AA1.1 Gaseous Threshold Limits

Guidance Criteria

AA1 addresses a release of radioactivity resulting in offsite dose greater than 10 mrem TEDE or 50 mrem thyroid CDE.

Per NEI 99-01, the effluent monitor readings are based on values at 1% of the EPA Protective Action Guides (PAGs) at the “site-specific dose receptor point” (consistent with the calculation methodology employed) for one hour of exposure.

WF3 Bases

The gaseous effluent limits for AA1.1 are based on values that equate to an offsite dose greater than 10 mrem TEDE or 50 mrem CDE thyroid, which are 1% of the EPA PAGs.

2.1.5. AS1.1 Gaseous Threshold Limits

Guidance Criteria

AS1 addresses a release of radioactivity resulting in offsite dose greater than 100 mrem TEDE or 500 mrem thyroid CDE.

This is based on values at 10% of the EPA Protective Action Guides (PAGs) at the “site-specific dose receptor point” (consistent with the calculation methodology employed) for one hour of exposure.

WF3 Bases

The gaseous effluent limits for AS1.1 are based on values that equate to an offsite dose greater than 100 mrem TEDE or 500 mrem CDE thyroid, which are 10% of the EPA PAGs.

2.1.6. AG1.1 Gaseous Threshold Limits

Guidance Criteria

AG1 addresses a release of radioactivity resulting in offsite dose greater than 1,000 mrem TEDE or 5,000 mrem thyroid CDE.

This is based on values at 100% of the EPA Protective Action Guides (PAGs) at the “site-specific dose receptor point” (consistent with the calculation methodology employed) for one hour of exposure.

WF3 Bases

The gaseous effluent limits for RG1.1 are based on values that equate to an offsite dose greater than 1,000 mrem TEDE or 5,000 mrem CDE thyroid, which are 100% of the EPA PAGs.

2.2. Effluent Release Points

Note – All effluent release points assume a background reading of zero to conservatively account for all modes of operation applicable to the EALs.

2.2.1. Liquid Release Points

Guidance Criteria

Per NEI 99-01, the AU1 IC addresses normally occurring continuous radioactivity releases from monitored gaseous or liquid effluent pathways (EAL AU1.1) and planned batch releases from non-continuous release pathways (EAL AU1.2).

Per NEI 99-01, the AA1 IC includes events or conditions involving a radiological release, whether gaseous or liquid, monitored or un-monitored. Classification based on effluent monitor readings assumes that a release path to the environment is established. If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is no longer valid for classification purposes.

The “site-specific monitor list and threshold values” should be determined with consideration of the selection of the appropriate installed gaseous and liquid effluent monitors.

WF3 Bases

Per FSAR Section 2.1.1.3 and ODCM Attachment 7.11, the primary liquid radioactive waste release point is the Circulating Water (CW) discharge canal to the Mississippi River. There are three monitors that measure discharges to the river.

Additionally, ODCM Attachment 7.11 includes the 40 Arpent canal as an additional potential liquid release point for the Dry Cooling Tower Sumps and the Turbine Building Industrial Waste Sumps when not aligned to the CW discharge canal.

Monitor	River	Canal
PRM-IRE-0627 (Boron Management Discharge Monitor)	X	
PRM-IRE-0647 (Liquid Waste Management Discharge Monitor)	X	
PRM-IRE-1900 (Circulating Water Discharge Monitor)	X	
PRM-IRE-6775-1 and 6776-1 (Dry Cooling Tower Sump Monitors)	X	X
PRM-IRE-6778 (Turbine Building Industrial Waste Monitor)	X	X

Per FSAR 11.2.1, The contents of turbine building sumps and detergent wastes will be routinely discharged unprocessed due to their very small potential for radioactive contamination (the Turbine Building and Dry Cooling Tower Sumps are monitored as discharges for Tritium, but do not typically contain gamma emitting isotopes). Per historic discharge permit records, discharges to the canal are not performed. Thus, the canal pathway is not used for Turbine Building and Dry Cooling Tower Sump EAL thresholds.

2.2.2. Gaseous Release Points

Guidance Criteria

Per NEI 99-01, the AU1 IC addresses normally occurring continuous radioactivity releases from monitored gaseous or liquid effluent pathways (NEI AU1 EAL #1) and planned batch releases from non-continuous release pathways (NEI AU1 EAL #2).

Per NEI 99-01, the AA1 IC includes events or conditions involving a radiological release, whether gaseous or liquid, monitored or un-monitored. Classification based on effluent monitor readings assumes that a release path to the environment is established. If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is no longer valid for classification purposes.

Per NEI 99-01, the AS1 and AG1 ICs address monitored and un-monitored releases of gaseous radioactivity. Classification based on effluent monitor readings assumes that a release path to the environment is established. If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is no longer valid for classification purposes.

The “site-specific monitor list and threshold values” should include the effluent monitors described in emergency plan and emergency dose assessment procedures.

WF3 Bases

There are multiple sources for gaseous effluent release to the environment (ODCM Attachment 7.12):

- Vent gas, containment purge, annulus, Aux Building and Shield Building sources – Monitored by Plant Stack PRM-IRE-0100.1S and PRM-IRE-0100.2S (normal) and PRM-IRE-0110 (emergency).

  Per W3-DBD-032, the Plant Stack WRGM PRM-IRE-0110 has a low scale of 1E-7 µCi/cc (1E+1 µCi/sec), which is effectively the same as the Plant Stack Gas monitors PRM-IRE-0100.1S and PRM-IRE-0100.2S. Since the Plant Stack WRGM PRM-IRE-0110 is capable of measuring below the AU1.1 threshold it is used for the EAL thresholds. The Plant Stack Gas monitors PRM-IRE-0100.1S and PRM-IRE-0100.2S are not used for EAL thresholds.

- Waste gas and containment vent sources – Monitored by PRM-IRE-0648.

  This monitor is upstream of the Plant Stack filters and monitors. Thus, this monitor is not used for EAL thresholds.

- Fuel Handling Building exhaust – Monitored by PRM-IRE-5107A and PRM-IRE-5107B (normal) and PRM-IRE-3032 (emergency).

Per FSAR Section 9.4.2.2.2, upon the occurrence of a fuel handling accident Class 1E radiation monitors produce a fuel handling accident signal (Alert Alarm setpoint at 10 mr/hr and High Alarm setpoint at 100 mr/hr). The accident signal will stop the normal air handling unit, normal exhaust fans, close isolation dampers, and start the safety-related emergency filtration exhaust units. Thus, the FHB emergency exhaust is the appropriate pathway for use as EAL thresholds.

- Gland steam condenser and main condenser exhausts – Monitored by PRM-IRE-0002.

  Per FSAR Section 2.1.1.3, the Turbine Gland Seal System exhaust and the Main Condenser Evacuation System exhaust are not normally radioactive. Since these systems are not sources for normally occurring continuous radioactivity releases or for planned batch releases from non-continuous release pathways, and are not normally radioactive, they do not meet the NEI 99-01 criteria for use as EAL thresholds.

The effluent release point gaseous monitors applicable to the EAL thresholds are as follows:

1. PRM-IRE-0110 (Plant Stack– WRGM)
2. PRM-IRE-3032 (FHB Exhaust – WRGM)

2.3. Source Term

2.3.1. AU1.1 Liquid Source Term

Guidance Criteria

NEI 99-01 does not provide specific guidance for AU1 liquid source term assumptions.

WF3 Bases

The 10 CFR 20 Appendix B, Table 2, Column 2 unlisted radionuclide limit of 1E-8 µCi/ml is used as the most restrictive liquid effluent release value for an unknown mix.

2.3.2. AU1.1 Gaseous Source Term

Guidance Criteria

NEI 99-01 does not provide specific guidance for AU1 gaseous source term assumptions.

WF3 Bases

The AU1.1 gaseous effluent EAL threshold is based upon ENERCON-NISYS-LP-164-008 Table 2, GALE Gaseous Results.

	Release Rate (Ci/y)	Noble Gas Fraction
Ar-41	3.40E+01	4.32E-03
Kr-85m	1.40E+01	1.78E-03
Kr-85	2.70E+03	3.43E-01
Kr-87	8.00E+00	1.02E-03
Kr-88	2.10E+01	2.67E-03
Xe-131m	1.50E+03	1.91E-01
Xe-133m	4.70E+01	5.98E-03
Xe-133	3.40E+03	4.32E-01
Xe-135m	6.00E+00	7.63E-04
Xe-135	1.30E+02	1.65E-02
Xe-138	5.00E+00	6.36E-04
Totals	**7.87E+03**	**1.00E+00**

2.3.3. AA1.1, AS1.1 and AG1.1 Gaseous Source Terms

Guidance Criteria

NEI 99-01 specifies that the calculation of monitor readings will require use of an assumed release isotopic mix; the selected mix should be the same for ICs AA1, AS1 and AG1.

WF3 Bases

The AA1.1, AS1.1 and AG1.1 gaseous EAL thresholds are based upon the WF3 URI dose model results using input assumptions applicable to the event, pathway and particular monitor.

The source term used in the URI dose model is taken from NUREG-1940 Table 1.1 (URI Requirements Specification Appendix A Section A.2).

The process reductions used in the URI dose model are taken from NUREG-1228 and NUREG-1465 (URI Requirements Specification Appendix A Sections A.4 and A.5).

Note – HUT is hold-up time.

URI input assumptions for the gaseous release points are as follows:

RCS	**Containment** HUT <2 hrs Sprays Off	**Filters** Working	**Plant Stack**	**Env**

Release path 'C' selected to model a LOCA type event with fuel clad damage.

Spent Fuel Under Water	**FHB** HUT <2 hrs	**Filters** Working	**FHB Emergency Vent**	**Env**

Release path 'M' selected to model a spent fuel pool accident.

For RCS initiated accidents, a 1 hour time after shutdown (TAS) is used for the source decay period as it is long enough for plant conditions to deteriorate for core damage to occur and a significant release to start.

For the spent fuel accident, the new fuel age option is used with a default of 80 hours for time after shutdown (TAS).

2.4. Effluent Flow

2.4.1. Effluent Liquid Discharge and Dilution Flow

Guidance Criteria

NEI 99-01 does not provide specific guidance for effluent liquid flow assumptions.

WF3 Bases

Discharge pump flow rates are the rated flows from the associated design basis document.

Liquid discharge dilution rates are based on 3 Circ Water pumps in operation, which is a typical representative lineup for discharges.

2.4.2. Effluent Gaseous Vent Flow

Guidance Criteria

NEI 99-01 does not provide specific guidance for effluent gaseous vent flow assumptions.

WF3 Bases

Vent flows for AU1.1 are taken from CE-003-516.

Vent flows for AA1.1, AS1.1 and AG1.1 are taken from their applicable design basis documents.

2.5. Release Duration

Guidance Criteria

Per NEI 99-01, the effluent monitor readings for AA1.1, AS1.1 and AG1.1 gaseous EAL threshold values should correspond to a dose at the "site-specific dose receptor point" (consistent with the calculation methodology employed) for one hour of exposure.

WF3 Bases

The effluent monitor readings for AA1.1, AS1.1 and AG1.1 gaseous EAL threshold values are calculated for a release duration of one hour.

2.6. Meteorology

Guidance Criteria

The effluent monitor readings should correspond to the applicable dose limit at the "site-specific dose receptor point." The "site-specific dose receptor point" is the distance(s) and/or locations used by the licensee to distinguish between on-site and offsite doses. The selected distance(s) and/or locations should reflect the content of the emergency plan, and the procedural methodology used to determine offsite doses and protective action recommendations. This is typically the boundary of the Owner Controlled Area.

Monitor readings will be calculated using a set of assumed meteorological data or atmospheric dispersion factors; the data or factors selected for use should be the same for ICs AA1, AS1 and AG1.

WF3 Bases

The site specific meteorology used for the EAL calculation inputs are based upon the ODCM and the last 5 years of data presented in the annual radiological effluent release reports as documented below.

2.6.1. ODCM Gaseous Dispersion Factor (ODCM Attachment 7.2)

The ODCM highest historical annual average X/Q at the site boundary of 1.6E-05 sec/m^3 in sectors 'B' or 'D'. This equates to a wind direction from the SSW (202.5º) or WSW (247.5º) into the NNE (022.5º) or ENE (067.5º).

2.6.2. Stability Class

The previous 5 years of meteorological data in the Waterford 3 Annual Radioactive Effluent Release Reports were used to identify the predominant stability class. The following results were obtained:

	2014	2015	2016	2017	2018
Stability Class	D	D	D	D	E

Thus, a stability class of "D" is the predominant stability class and is used as the URI input for purposes of the EAL calculations.

Historical annual release report meteorological stability is used as a basis for the EAL thresholds to provide a reasonable input. Any changes in annual stability results do not require a redetermination of this input.

2.6.3. Wind Speed

The previous 5 years of meteorological data in the Waterford 3 Annual Radioactive Effluent Release Reports were used to identify the predominant wind speed. The following results were obtained:

	0.22 - 0.5	0.51 - 0.75	0.76 - 1	1.1 - 1.5	1.6 - 2	2.1 - 3	3.1 - 5	5.1 - 7	7.1 - 10	10.1 - 13	13.1 - 18	>18
2014	60	267	435	1158	1063	2168	2689	735	130	0	0	0
2015	60	306	427	1124	1084	2202	2702	744	106	4	0	0
2016	71	351	497	1098	1058	2114	2680	775	135	4	0	0
2017	86	324	476	1138	1047	1981	2592	818	125	1	0	0
2018	137	355	480	1280	1117	2035	2516	631	75	2	0	0
Totals	414	1603	2315	5798	5369	10500	13179	3703	571	11	0	0

Based on the above, the predominant wind speed band is 3.1 to 5.0 m/s. Since the next highest prevalence is 2.1 to 3.0 m/s, the value used as the URI fixed wind speed input is selected as 3.1 m/s for purposes of the EAL calculations.

Historical annual release report wind speed is used as a basis for the EAL thresholds to provide a reasonable input. Any changes in wind speed results do not require a redetermination of this input.

2.6.4. Wind Direction

The previous 5 years of meteorological data in the Waterford 3 Annual Radioactive Effluent Release Reports were used to identify the predominant wind direction. The following results were obtained:

	2014	2015	2016	2017	2018	Total
N	717	776	792	542	687	3514
NNE	676	662	635	546	513	3032
NE	959	1148	947	977	802	4833
ENE	368	472	346	392	457	2035
E	125	197	194	217	248	981
ESE	170	279	259	247	235	1190
SE	364	421	458	489	418	2150
SSE	986	844	1041	966	877	4714
S	884	644	864	967	725	4084
SSW	731	684	755	782	755	3707
SW	646	580	516	552	598	2892
WSW	519	563	520	540	546	2688
W	390	455	431	445	534	2255
WNW	340	289	306	277	403	1615
NW	300	242	265	247	324	1378
NNW	529	464	451	402	509	2355

Based on the above, the predominant wind direction is from the NE (045º), which is used as the URI wind direction input for purposes of the EAL calculations.

Historical annual release report wind direction is used as a basis for the EAL thresholds to provide a reasonable input. Any changes in annual wind direction results do not require a redetermination of this input.

2.6.5. Other Parameters

No precipitation is assumed to occur for the duration of the release and plume transport across the EPZ.

3. DESIGN INPUTS

3.1. General Constants and Conversion Factors

3.1.1. 472 cc/sec per cfm

3.1.2. 10^6 µCi per Ci

3.2. Liquid Effluent

3.2.1. Liquid Effluent Monitor Ranges

1) PRM-IRE-0627 – Boron Management Discharge (RMS Data Base Manual) ..... 1E-5 to 1E-0 µCi/cc

2) PRM-IRE-0647 – Liquid Waste Management Discharge (RMS Data Base Manual) ..... 1E-5 to 1E-0 µCi/cc

3) PRM-IRE-1900 – Circulating Water Discharge (W3-DBD-032 3.2.1.1.1.A.2) ..... 4.2E-8 to 4.2E-2 µCi/cc

4) PRM-IRE-6775-1/6776-1 – Dry Cooling Tower Sumps (W3-DBD-032 3.2.1.1.8.A.2)

..... 4.2E-8 to 4.2E-2 µCi/cc

5) PRM-IRE-6778 – Turbine Building Industrial Waste (W3-DBD-032 3.2.1.1.7.A.2) ..... 1E-8 to 1E-2 µCi/cc

3.2.2. Liquid Effluent Dilution Flow – *F* (representative value from release permits)

1) Circulating water discharge into the Mississippi River (3 CW pumps) .....7.5E+05 gpm

3.2.3. Liquid Effluent Source Flow – *f*

1) PRM-IRE-0627, Boron Management Discharge (W3-DBD-050) .....50 gpm

2) PRM-IRE-0647, Liquid Waste Management (W3-DBD-050) .....50 gpm

3) PRM-IRE-1900, Circulating Water Discharge (W3-DBD-009) .....165 gpm

4) PRM-IRE-6775-1/6776-1, Dry Cooling Tower Sumps (ECM99-010).....350 gpm

5) PRM-IRE-6778, Turbine Building Industrial Waste (MN-54).....500 gpm

3.2.4. 10CFR20 Appendix B, Table 2, Column 2 Limit

Note – [from 10 CFR 20] Any single radionuclide not listed above with decay mode other than alpha emission or spontaneous fission and with radioactive half-life greater than 2 hours.

unlisted radionuclide..... 1E-08 µCi/ml

3.3. Gaseous Effluent

3.3.1. Gaseous Effluent Monitor Ranges (W3-DBD-032)

1) PRM-IRE-0100.1S/2S – Plant Stack Gas ..... 1E-07 to 1E-01 μCi/cc

2) PRM-IRE-0110 – Plant Stack WRGM ..... 1E-07 to 1E+05 μCi/cc

3) PRM-IRE-0110 – Plant Stack WRGM RR ..... 1E+01 to 1E+13 μCi/sec

4) PRM-IRE-5107A/B – FHB Exhaust Gas ..... 1E-07 to 1E-01 μCi/cc

5) PRM-IRE-3032 – FHB Exhaust WRGM ..... 1E-07 to 1E+05 μCi/cc

6) PRM-IRE-3032 – FHB Exhaust WRGM RR ..... 1E+01 to 1E+13 μCi/sec

3.3.2. AU1.1 Gaseous Effluent Source Flow (*f*)

1) Plant Stack – RAB Normal Mode (CE-003-516 Section 10.4.4.8) ..... 93,000 cfm

2) FHB Exhaust – Normal Mode (CE-003-516 Section 10.4.4.8)..... 30,000 cfm

3.3.3. AG1.1, AS1.1 and AA1.1 Gaseous Effluent Source Flow (*f*)

1) Plant Stack – Median Accident Flow Rate (RMS Database) ..... 13,000 cfm

2) FHB Exhaust – Emergency Mode (W3-DBD-040)..... 4,000 cfm

3.3.4. AU1.1 Dispersion Factor (X/Q)

Dispersion Factor (ODCM Attachment 7.2).....1.6E-05 sec/m^3

3.3.5. ODCM Dose Factors (ODCM Attachment 7.4)

	γ – Body Ki (mrem/yr per μCi/m^3)	β – Skin Li (mrem/yr per μCi/m^3)	γ – Air Mi (mrad/yr per μCi/m^3)
Ar-41	8.84E+03	2.69E+03	9.30E+03
Kr-85m	1.17E+03	1.46E+03	1.23E+03
Kr-85	1.61E+01	1.34E+03	1.72E+01
Kr-87	5.92E+03	9.73E+03	6.17E+03
Kr-88	1.47E+04	2.37E+03	1.52E+04
Xe-131m	9.15E+01	4.76E+02	1.56E+02
Xe-133m	2.51E+02	9.94E+02	3.27E+02
Xe-133	2.94E+02	3.06E+02	3.53E+02
Xe-135m	3.12E+03	7.11E+02	3.36E+03
Xe-135	1.81E+03	1.86E+03	1.92E+03
Xe-138	8.83E+03	4.13E+03	9.21E+03

4. Calculations

4.1. AU1.1 Liquid Release

4.1.1. Liquid Effluent Monitor ODCM Limit (derived from ODCM Section 5.3.2.1)

$$.. = \frac{SF \times RF \times (F + f) \times \sum_i ECL_i}{f}$$

Where:	
SP	Setpoint equivalent of the liquid effluent monitor measuring the radioactivity concentration in the effluent line prior to complete dilution and subsequent release. (µCi/ml)
SF	Safety Factor – normal 0.8 used for EAL threshold determination
RF	Release Fraction – Not used for EAL threshold determination
F	dilution flow (gpm)
f	undiluted discharge flow from the source of the release (gpm)
ECL_i	10 times the corresponding effluent concentration value listed in 10 CFR 20, Appendix B, Table 2, Column 2 (µCi/ml)

4.1.2. AU1.1 Liquid Release EAL Threshold

$$AU1.1 = 2 \times SP$$

See Attachment 1 for the spreadsheet calculations that develop the AU1.1 liquid effluent EAL threshold values for each applicable monitor.

4.2. AU1.1 Gaseous Release

4.2.1. ODCM Gaseous Release Limit (derived from ODCM Section 5.4.4)

$$SP_{Total\ body}(\mu\text{Ci/sec}) = \left(\frac{500 \times SF \times RF}{X/_{Q_{RP}} \times \sum(Q_i \times K_i)}\right)$$

$$SP_{Total\ body}(\mu\text{Ci/cc}) = \left(\frac{500 \times SF \times RF}{472 \times f \times X/_{Q_{RP}} \times \sum(Q_i \times K_i)}\right)$$

$$SP_{skin}(\mu\text{Ci/sec}) = \left(\frac{3000 \times SF \times RF}{X/_{Q_{RP}} \times \sum(Q_i \times (L_i + 1.1M_i))}\right)$$

$$SP_{skin}(\mu\text{Ci/cc}) = \left(\frac{3000 \times SF \times RF}{472 \times f \times X/_{Q_{RP}} \times \sum(Q_i \times (L_i + 1.1M_i))}\right)$$

Where:	
SP	radiation monitor setpoint equivalent to the ODCM limit (µCi/cc)
500/3000	ODCM Limit – 500 total body or 3000 skin (mrem/yr)
SF	Safety Factor – Not used for EAL threshold determination
RF	Release Fraction – Not used for EAL threshold determination
472	conversion factor (cc/ft^3 per sec/min)
f	vent flow (cfm)
X/Q_{RP}	highest annual average dispersion factor for the release point (sec/m^3)
Q_i	isotopic fraction of the mix activity released (fraction – unit less)
K_i	total body dose factor (mrem/yr per µCi/m^3)
$L_i + 1.1M_i$	skin dose factor (mrem/yr per µCi/m^3)

4.2.2. AU1.1 Gaseous Release EAL Threshold

AU1.1 is two times (2x) the lesser of the calculated total body or skin value ODCM limit setpoint.

See Attachment 2 for the spreadsheet calculations that develop the AU1.1 gaseous effluent EAL threshold values for each applicable monitor.

4.3. AA1.1, AS1.1 and AG1.1 Gaseous Release

The AA1.1, AS1.1 and AG1.1 gaseous release EAL thresholds are developed using the site specific URI dose assessment model with the inputs described in Section 2 above.

Refer to Attachment 3 for the results of the URI gaseous effluent EAL threshold calculations.

5. Conclusions

5.1. Effluent Monitor Reading Results

	Release Point	Monitor	GE	SAE	Alert	UE	Monitor Range
Gaseous	Plant Stack (WRGM)	PRM-IRE-0110 RE0110-4	4.01E+08 (µCi/sec)	4.01E+07 (µCi/sec)	4.01E+06 (µCi/sec)	2.27E+05 (µCi/sec)	1E+01 to 1E+13 (µCi/sec)
		PRM-IRE-0110 RE0110-1 to 3	6.54E+01 (µCi/cc)	6.54E+00 (µCi/cc)	6.54E-01 (µCi/cc)	5.81E-03 (µCi/cc)	1E-07 to 1E+05 (µCi/cc)
	FHB Exhaust (WRGM)	PRM-IRE-3032 RE3032-4	1.48E+10 (µCi/sec)	1.48E+09 (µCi/sec)	1.48E+08 (µCi/sec)	2.27E+05 (µCi/sec)	1E+01 to 1E+13 (µCi/cc)
		PRM-IRE-3032 RE3032-1 to 3	7.85E+03 (µCi/cc)	7.85E+02 (µCi/cc)	7.85E+01 (µCi/cc)	1.60E-02 (µCi/cc)	1E-07 to 1E+05 (µCi/cc)
Liquid	Boron Management Discharge	PRM-IRE-0627	N/A	N/A	N/A	2.40E-3 (µCi/ml)	1E-5 to 1E-0 (µCi/cc)
	Liquid Waste Management Discharge	PRM-IRE-0647	N/A	N/A	N/A	2.40E-3 (µCi/ml)	1E-5 to 1E-0 (µCi/cc)
	Circulating Water Discharge	PRM-IRE-1900	N/A	N/A	N/A	7.27E-4 (µCi/ml)	4.2E-8 to 4.2E-2 (µCi/cc)
	Dry Cooling Tower Sumps	PRM-IRE-6775-1 PRM-IRE-6776-1	N/A	N/A	N/A	3.43E-4 (µCi/ml)	4.2E-8 to 4.2E-2 µCi/cc)
	Turbine Building Industrial Waste	PRM-IRE-6778	N/A	N/A	N/A	2.40E-4 (µCi/ml)	1E-8 to 1E-2 (µCi/cc)

Note – EAL threshold results are within range of the applicable monitors.

6. References

6.1. NEI 99-01 Revision 6, Methodology for Development of Emergency Action Levels, November 2012

6.2. 10 CFR 20 Appendix B Table 2 Column 2

6.3. NUREG-1228, Source Term Estimation During Incident Response to Severe Nuclear Power Plant Accidents, October 1988

6.4. NUREG-1465, Accident Source Terms for Light-Water Nuclear Power Plants, February 1995

6.5. NUREG-1940, RASCAL 4: Description of Models and Methods, December 2012

6.6. UNT-005-014, Waterford 3 Offsite Dose Calculation Manual (ODCM), Revision 306

6.7. Unified RASCAL Interface Requirement Specification, Version 3.4 071719

6.8. Unified RASCAL Interface Requirements Specification, Waterford 3 Site Annex, Version 3.4.0.1

6.9. ENERCON-NISYS-LP-164-008, Parametric Study of Waterford-3 Nuclear Power Plant Offsite Dose Due to Power Uprate, Revision 0

6.10. W3-DBD-009, Reactor Coolant System & Steam Generator Blowdown System, Revision 305

6.11. W3-DBD-032, Radiation Monitoring system, Revision 301

6.12. W3-DBD-040, Fuel Handling Building Ventilation System, Revision 1

6.13. W3-DBD-050, Boron Management System, Revision 1

6.14. ECM99-010, OCT Basin Ponding Analysis, Revision 1

6.15. MN-54, Sump Pumps, 02/08/1974

6.16. W3F1-2015-0033, Annual Radiological Effluent Release Report – 2014

6.17. W3F1-2016-0038, Annual Radiological Effluent Release Report - 2015

6.18. W3F1-2017-0038, Annual Radiological Effluent Release Report – 2016

6.19. W3F1-2018-0023, Annual Radiological Effluent Release Report – 2017

6.20. W3F1-2019-0029, Annual Radiological Effluent Release Report – 2018

6.21. Waterford 3 FSAR

- Section 2.1.1.3, Boundaries for Establishing Effluent Release Limits, Revision 15
- Section 9.4.2.2.2, Emergency Operation, Revision 12-A
- Section 11.2.1, Liquid Waste Management System Design Bases, Revision 308

6.22. CE-003-516, Calculation and Adjustment of Radiation Monitoring Setpoints, Revision 302

6.23. BMW

- W3LB2017-016 [42.08 gpm / 7.5E+5 gpm]
- W3LB2017-086 [45.31 gpm / 7.5E+5 gpm]
- W3LB2017-107 [45.39 gpm / 5.0E+5 gpm]

6.24. LWM

- W3LB2017-015 [43.11 gpm / 7.5E+5 gpm]
- W3LB2017-160 [41.79 gpm / 1.0E+6 gpm]

6.25. Dry Cooling Tower Sumps

- W3LC2017-004 [350 gpm / 7.5E+5 gpm]
- W3LC2017-005 [350 gpm / 7.5E+5 gpm]
- W3LC2017-034 [350 gpm / 7.5E+5 gpm]
- W3LC2017-077 [350 gpm / 7.5E+5 gpm]
- W3LC2017-144 [350 gpm / 1.0E+6 gpm]
- W3LC2017-186 [350 gpm / 7.5E+5 gpm]

6.26. Turbine Building Industrial Waste

- W3LC2017-009 [500 gpm / 7.5E+5 gpm]
- W3LC2017-044 [500 gpm / 7.5E+5 gpm]
- W3LC2017-128 [500 gpm / 5.0E+5 gpm]

Attachment 1 **AU1.1 Liquid Effluent EAL Calculations**

Monitor	Dilution Flow - F (gpm)	Discharge Flow - f (gpm)	Radiation Monitor Setpoint - SP (µCi/ml)	AU1.1 EAL Threshold Value (µCi/ml)
PRM-IRE-0627 (Boron Management Discharge Monitor)	7.50E+05	50	1.20E-03	2.40E-03
PRM-IRE-0647 (Liquid Waste Management Discharge Monitor)	7.50E+05	50	1.20E-03	2.40E-03
PRM-IRE-1900 (Circulating Water Discharge Monitor)	7.50E+05	165	3.64E-04	7.27E-04
PRM-IRE-6775-1 and 6776-1 (Dry Cooling Tower Sump Monitors)	7.50E+05	350	1.72E-04	3.43E-04
PRM-IRE-6778 (Turbine Building Industrial Waste Monitor)	7.50E+05	500	1.20E-04	2.40E-04

Unlisted Radionuclide 10 CFR 20 Liquid Limit (µCi/ml):	1.00E-08
ODCM Liquid Limit [10x 10 CFR 20 Limit] ECLi (µCi/ml):	1.00E-07
Safety Factor (SF):	0.8

Attachment 2 AU1.1 Gaseous Effluent EAL Calculations

	γ – Body Ki (mrem/yr per µCi/m3)	β – Skin Li (mrem/yr per µCi/m3)	γ – Air Mi (mrad/yr per µCi/m3)	Source Term - (Ci/yr)	Source Term Fraction - Qi	Qi x Ki (mrem/yr per µCi/m3)	Qi x (Li + 1.1Mi) (mrem/yr per µCi/m3)
Ar-41	8.84E+03	2.69E+03	9.30E+03	3.40E+01	4.32E-03	3.82E+01	5.59E+01
Kr-85m	1.17E+03	1.46E+03	1.23E+03	1.40E+01	1.78E-03	2.08E+00	5.01E+00
Kr-85	1.61E+01	1.34E+03	1.72E+01	2.70E+03	3.43E-01	5.53E+00	4.67E+02
Kr-87	5.92E+03	9.73E+03	6.17E+03	8.00E+00	1.02E-03	6.02E+00	1.68E+01
Kr-88	1.47E+04	2.37E+03	1.52E+04	2.10E+01	2.67E-03	3.92E+01	5.10E+01
Xe-131m	9.15E+01	4.76E+02	1.56E+02	1.50E+03	1.91E-01	1.75E+01	1.24E+02
Xe-133m	2.51E+02	9.94E+02	3.27E+02	4.70E+01	5.98E-03	1.50E+00	8.09E+00
Xe-133	2.94E+02	3.06E+02	3.53E+02	3.40E+03	4.32E-01	1.27E+02	3.00E+02
Xe-135m	3.12E+03	7.11E+02	3.36E+03	6.00E+00	7.63E-04	2.38E+00	3.36E+00
Xe-135	1.81E+03	1.86E+03	1.92E+03	1.30E+02	1.65E-02	2.99E+01	6.57E+01
Xe-138	8.83E+03	4.13E+03	9.21E+03	5.00E+00	6.36E-04	5.61E+00	9.07E+00
				7.87E+03	**1.00E+00**	2.75E+02	1.10E+03

Calculation Constants

	PV	FHB
Dispersion - X/Q (sec/m3):	1.60E-05	1.60E-05
Effluent Flow - f (cfm):	9.30E+04	3.00E+04

Total Body Limit (mRem/yr):	500	UCF (cc/sec per cfm):	472
Skin Limit (mRem/yr):	3000	DCF (mrad to mrem):	1.1

Calculated Setpoint Results

	PV	FHB
SP-TB (µCi/sec):	1.14E+05	1.14E+05
SP-Skin (µCi/sec):	1.70E+05	1.70E+05
SP-TB (µCi/cc):	2.59E-03	8.02E-03
SP-Skin (µCi/cc):	3.87E-03	1.20E-02

Calculated Setpoint Results

	PV	FHB
AU1.1 (µCi/sec):	**2.27E+05**	**2.27E+05**
AU1.1 (µCi/cc):	**5.18E-03**	**1.60E-02**

Plant Stack WRGM Release Rate – General Emergency

This is a Drill **Dose Assessment** **This is a Drill**

Waterford 3 SES **April 30, 2020 13:41**

Method: Detailed Assessment - Monitored Release **Computer ID: WF3-LPF16MFXX**

Release Pathway: <RCS> <Cont> <Filters> <Stack> <Env> PRF: 4.00E-03

Containment HUT: = < 2 Hours Containment Sprays: = OFF Purge Filters: = Working Steam Generator: = N/A

RABldg HUT: = N/A RABldg Filters: = N/A

Source Term: Reactor Core Accident - Clad Primary 33 foot

Time After S/D (hh:mm): 1:00 Wind: From 45° @ 3.1 m/s

Release Duration (hh:mm): 1:00 ETE (hh:mm): [N/A] Stability Class: D

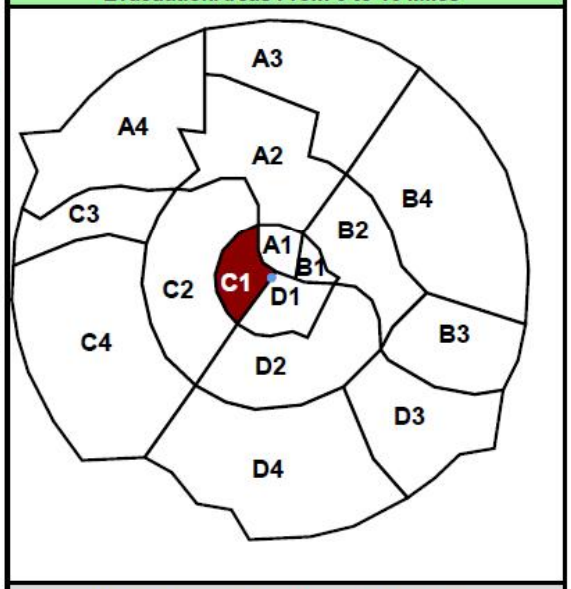
Precipitation: None

Monitor: Stack WRGM Rate Readings: 4.01E+08 uCi/sec

Distance (Miles)	Exposure Rate (mR/hr)	External Plume DDE (mRem)	Inhalation CEDE (mRem)	Deposition Ground DDE (mRem)	TEDE (mRem)	CDE Thyroid (mRem)
S.B.	4.43E+02	2.73E+02	1.98E+02	9.99E+01	5.71E+02	5.00E+03
0.7	3.49E+02	2.15E+02	1.38E+02	6.96E+01	4.22E+02	3.49E+03
1.0	2.36E+02	1.45E+02	7.95E+01	4.09E+01	2.65E+02	1.95E+03
1.5	1.37E+02	8.39E+01	4.16E+01	2.17E+01	1.47E+02	1.00E+03
2.0	9.16E+01	5.62E+01	2.59E+01	1.37E+01	9.58E+01	6.03E+02
3.0	7.68E+01	4.78E+01	1.40E+01	8.20E+00	7.00E+01	3.36E+02
4.0	3.25E+01	2.21E+01	6.87E+00	4.01E+00	3.30E+01	1.61E+02
5.0	2.68E+01	1.77E+01	5.53E+00	3.24E+00	2.65E+01	1.29E+02
7.0	2.13E+01	1.46E+01	4.68E+00	1.35E+00	2.06E+01	1.07E+02
10.0	1.62E+01	1.13E+01	3.79E+00	8.85E-01	1.59E+01	8.52E+01

Assessment Data Results Saved to File:
Waterford 3 SES 10Miles Monitored Release 04302020 134139.URI7

EvacuationAreas From 0 to 10 Miles



PAGs Exceeded in Designated Areas

*** * * Recommended Classification: General Emergency * * ***

Release Rates (Ci / sec)	
Particulate	1.55E-01 (0.0%)
Iodine	2.98E+00 (0.7%)
Noble Gas	4.01E+02 (99.2%)

Reviewed By: _____

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Plant Stack WRGM Release Rate – Site Area Emergency

This is a Drill **Dose Assessment** **This is a Drill**

Waterford 3 SES **April 30, 2020 13:44**

Method: Detailed Assessment - Monitored Release **Computer ID: WF3-LPF16MFXX**

Release Pathway: <RCS> <Cont> <Filters> <Stack> <Env> PRF: 4.00E-03

Containment HUT: = < 2 Hours Containment Sprays: = OFF Purge Filters: = Working Steam Generator: = N/A

RABldg HUT: = N/A RABldg Filters: = N/A

Source Term: Reactor Core Accident - Clad Primary 33 foot

Time After S/D (hh:mm): 1:00 Wind: From 45° @ 3.1 m/s

Release Duration (hh:mm): 1:00 ETE (hh:mm): [N/A] Stability Class: D

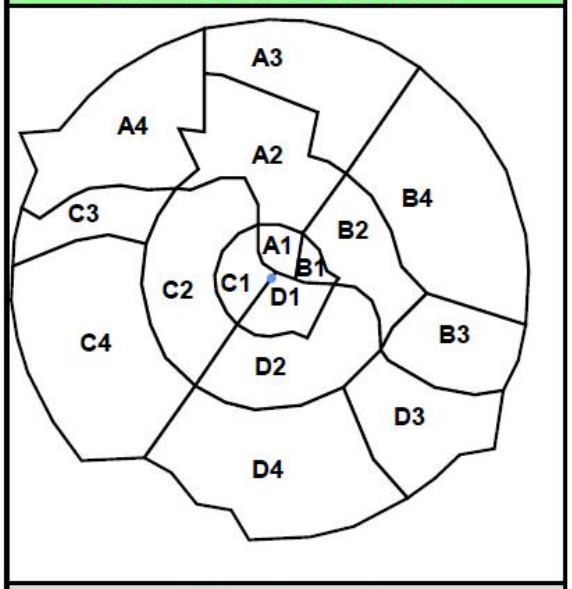
Precipitation: None

Monitor: Stack WRGM Rate Readings: 4.01E+07 uCi/sec

Distance (Miles)	Exposure Rate (mR/hr)	External Plume DDE (mRem)	Inhalation CEDE (mRem)	Deposition Ground DDE (mRem)	TEDE (mRem)	CDE Thyroid (mRem)
S.B.	4.43E+01	2.73E+01	1.98E+01	9.99E+00	5.71E+01	5.00E+02
0.7	3.49E+01	2.15E+01	1.38E+01	6.96E+00	4.22E+01	3.49E+02
1.0	2.36E+01	1.45E+01	7.95E+00	4.09E+00	2.65E+01	1.95E+02
1.5	1.37E+01	8.39E+00	4.16E+00	2.17E+00	1.47E+01	1.00E+02
2.0	9.16E+00	5.62E+00	2.59E+00	1.37E+00	9.58E+00	6.03E+01
3.0	7.68E+00	4.78E+00	1.40E+00	8.20E-01	7.00E+00	3.36E+01
4.0	3.25E+00	2.21E+00	6.87E-01	4.01E-01	3.30E+00	1.61E+01
5.0	2.68E+00	1.77E+00	5.53E-01	3.24E-01	2.65E+00	1.29E+01
7.0	2.13E+00	1.46E+00	4.68E-01	1.35E-01	2.06E+00	1.07E+01
10.0	1.62E+00	1.13E+00	3.79E-01	0.00E+00	1.50E+00	8.52E+00

Assessment Data Results Saved to File:
Waterford 3 SES 10Miles Monitored Release 04302020 134450.URI7

EvacuationAreas From 0 to 10 Miles



No PAGs Exceeded

*** * * Recommended Classification: Site Area Emergency * * ***

Release Rates (Ci / sec)	
Particulate	1.55E-02 (0.0%)
Iodine	2.98E-01 (0.7%)
Noble Gas	4.01E+01 (99.2%)

Reviewed By: _____

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Plant Stack WRGM Release Rate – Alert

This is a Drill **Dose Assessment** **This is a Drill**

Waterford 3 SES **April 30, 2020 13:45**

Method: Detailed Assessment - Monitored Release **Computer ID: WF3-LPF16MFXX**

Release Pathway: <RCS> <Cont> <Filters> <Stack> <Env> PRF: 4.00E-03

Containment HUT: = < 2 Hours Containment Sprays: = OFF Purge Filters: = Working Steam Generator: = N/A

RABldg HUT: = N/A RABldg Filters: = N/A

Source Term: Reactor Core Accident - Clad Primary 33 foot

Time After S/D (hh:mm): 1:00 Wind: From 45° @ 3.1 m/s

Release Duration (hh:mm): 1:00 ETE (hh:mm): [N/A] Stability Class: D

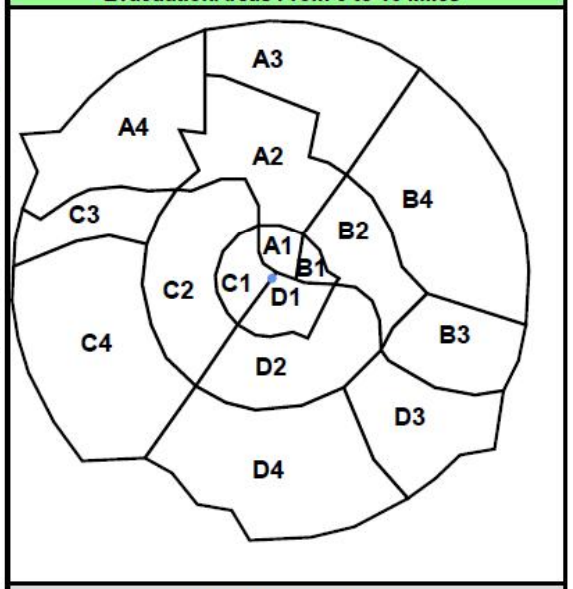
Precipitation: None

Monitor: Stack WRGM Rate Readings: 4.01E+06 uCi/sec

Distance (Miles)	Exposure Rate (mR/hr)	External Plume DDE (mRem)	Inhalation CEDE (mRem)	Deposition Ground DDE (mRem)	TEDE (mRem)	CDE Thyroid (mRem)
S.B.	4.43E+00	2.73E+00	1.98E+00	9.99E-01	5.71E+00	5.00E+01
0.7	3.49E+00	2.15E+00	1.38E+00	6.96E-01	4.22E+00	3.49E+01
1.0	2.36E+00	1.45E+00	7.95E-01	4.09E-01	2.65E+00	1.95E+01
1.5	1.37E+00	8.39E-01	4.16E-01	2.17E-01	1.47E+00	1.00E+01
2.0	9.16E-01	5.62E-01	2.59E-01	1.37E-01	9.58E-01	6.03E+00
3.0	7.68E-01	4.78E-01	1.40E-01	0.00E+00	6.18E-01	3.36E+00
4.0	3.25E-01	2.21E-01	0.00E+00	0.00E+00	2.21E-01	1.61E+00
5.0	2.68E-01	1.77E-01	0.00E+00	0.00E+00	1.77E-01	1.29E+00
7.0	2.13E-01	1.46E-01	0.00E+00	0.00E+00	1.46E-01	1.07E+00
10.0	1.62E-01	1.13E-01	0.00E+00	0.00E+00	1.13E-01	8.52E-01

Assessment Data Results Saved to File:
Waterford 3 SES 10Miles Monitored Release 04302020 134546.URI7

EvacuationAreas From 0 to 10 Miles



No PAGs Exceeded

*** * * Recommended Classification: Validate against Emergency Action Levels * * ***

Release Rates (Ci / sec)	
Particulate	1.55E-03 (0.0%)
Iodine	2.98E-02 (0.7%)
Noble Gas	4.01E+00 (99.2%)

Reviewed By: _____

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Plant Stack WRGM Concentration – General Emergency

This is a Drill **Dose Assessment** **This is a Drill**

Waterford 3 SES **April 30, 2020 14:46**

Method: Detailed Assessment - Monitored Release **Computer ID: WF3-LPF16MFXX**

Release Pathway: <RCS> <Cont> <Filters> <Stack> <Env> PRF: 4.00E-03

Containment HUT: = < 2 Hours Containment Sprays: = OFF Purge Filters: = Working Steam Generator: = N/A

RABldg HUT: = N/A RABldg Filters: = N/A

Source Term: Reactor Core Accident - Clad Primary 33 foot

Time After S/D (hh:mm): 1:00 Wind: From 45° @ 3.1 m/s

Release Duration (hh:mm): 1:00 ETE (hh:mm): [N/A] Stability Class: D

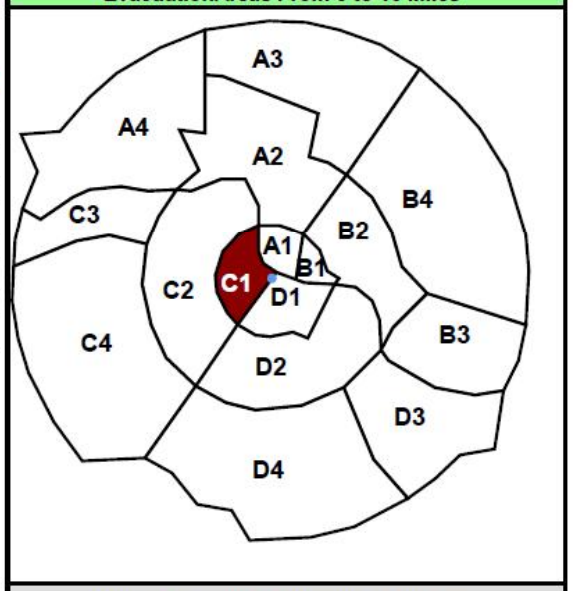
Precipitation: None

Monitor: Stack WRGM conc Readings: 6.54E+01 uCi/cc Flowrate: 13000 CFM

Distance (Miles)	Exposure Rate (mR/hr)	External Plume DDE (mRem)	Inhalation CEDE (mRem)	Deposition Ground DDE (mRem)	TEDE (mRem)	CDE Thyroid (mRem)
S.B.	4.43E+02	2.74E+02	1.98E+02	9.99E+01	5.71E+02	5.00E+03
0.7	3.49E+02	2.15E+02	1.38E+02	6.97E+01	4.22E+02	3.49E+03
1.0	2.36E+02	1.45E+02	7.95E+01	4.09E+01	2.65E+02	1.95E+03
1.5	1.37E+02	8.40E+01	4.16E+01	2.17E+01	1.47E+02	1.00E+03
2.0	9.16E+01	5.63E+01	2.59E+01	1.37E+01	9.59E+01	6.03E+02
3.0	7.68E+01	4.78E+01	1.40E+01	8.20E+00	7.00E+01	3.36E+02
4.0	3.25E+01	2.21E+01	6.87E+00	4.02E+00	3.30E+01	1.61E+02
5.0	2.68E+01	1.78E+01	5.53E+00	3.24E+00	2.65E+01	1.29E+02
7.0	2.13E+01	1.46E+01	4.68E+00	1.35E+00	2.06E+01	1.07E+02
10.0	1.63E+01	1.13E+01	3.79E+00	8.85E-01	1.59E+01	8.53E+01

Assessment Data Results Saved to File:
Waterford 3 SES 10Miles Monitored Release 04302020 144603.URI7

EvacuationAreas From 0 to 10 Miles



PAGs Exceeded in Designated Areas

*** * * Recommended Classification: General Emergency * * ***

Release Rates (Ci / sec)	
Particulate	1.55E-01 (0.0%)
Iodine	2.98E+00 (0.7%)
Noble Gas	4.01E+02 (99.2%)

Reviewed By: _____

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Plant Stack WRGM Concentration – Site Area Emergency

This is a Drill **Dose Assessment** **This is a Drill**

Waterford 3 SES **April 30, 2020 14:46**

Method: Detailed Assessment - Monitored Release **Computer ID: WF3-LPF16MFXX**

Release Pathway: <RCS> <Cont> <Filters> <Stack> <Env> PRF: 4.00E-03

Containment HUT: = < 2 Hours Containment Sprays: = OFF Purge Filters: = Working Steam Generator: = N/A

RABldg HUT: = N/A RABldg Filters: = N/A

Source Term: Reactor Core Accident - Clad Primary 33 foot

Time After S/D (hh:mm): 1:00 Wind: From 45° @ 3.1 m/s

Release Duration (hh:mm): 1:00 ETE (hh:mm): [N/A] Stability Class: D

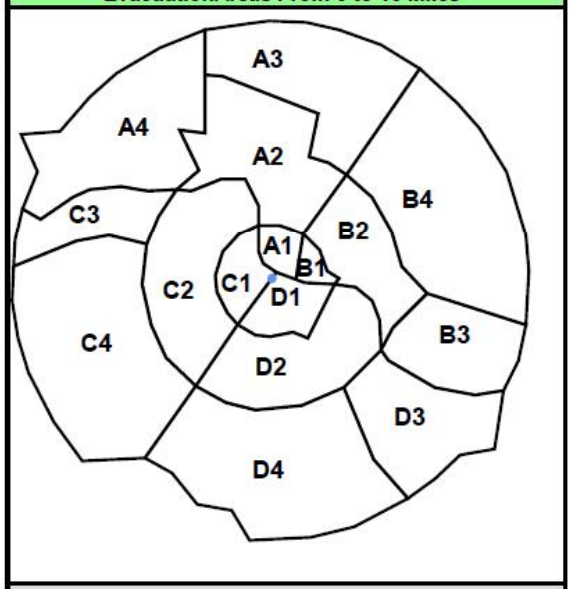
Precipitation: None

Monitor: Stack WRGM conc Readings: 6.54E+00 uCi/cc Flowrate: 13000 CFM

Distance (Miles)	Exposure Rate (mR/hr)	External Plume DDE (mRem)	Inhalation CEDE (mRem)	Deposition Ground DDE (mRem)	TEDE (mRem)	CDE Thyroid (mRem)
S.B.	4.43E+01	2.74E+01	1.98E+01	9.99E+00	5.71E+01	5.00E+02
0.7	3.49E+01	2.15E+01	1.38E+01	6.97E+00	4.22E+01	3.49E+02
1.0	2.36E+01	1.45E+01	7.95E+00	4.09E+00	2.65E+01	1.95E+02
1.5	1.37E+01	8.40E+00	4.16E+00	2.17E+00	1.47E+01	1.00E+02
2.0	9.16E+00	5.63E+00	2.59E+00	1.37E+00	9.59E+00	6.03E+01
3.0	7.68E+00	4.78E+00	1.40E+00	8.20E-01	7.00E+00	3.36E+01
4.0	3.25E+00	2.21E+00	6.87E-01	4.02E-01	3.30E+00	1.61E+01
5.0	2.68E+00	1.78E+00	5.53E-01	3.24E-01	2.65E+00	1.29E+01
7.0	2.13E+00	1.46E+00	4.68E-01	1.35E-01	2.06E+00	1.07E+01
10.0	1.63E+00	1.13E+00	3.79E-01	0.00E+00	1.50E+00	8.53E+00

Assessment Data Results Saved to File:
Waterford 3 SES 10Miles Monitored Release 04302020 144653.URI7

EvacuationAreas From 0 to 10 Miles



No PAGs Exceeded

*** * * Recommended Classification: Site Area Emergency * * ***

Release Rates (Ci / sec)	
Particulate	1.55E-02 (0.0%)
Iodine	2.98E-01 (0.7%)
Noble Gas	4.01E+01 (99.2%)

Reviewed By: _____

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Plant Stack WRGM Concentration – Alert

This is a Drill **Dose Assessment** **This is a Drill**

Waterford 3 SES **April 30, 2020 14:47**

Method: Detailed Assessment - Monitored Release **Computer ID: WF3-LPF16MFXX**

Release Pathway: <RCS> <Cont> <Filters> <Stack> <Env> PRF: 4.00E-03

Containment HUT: = < 2 Hours Containment Sprays: = OFF Purge Filters: = Working Steam Generator: = N/A

RABldg HUT: = N/A RABldg Filters: = N/A

Source Term: Reactor Core Accident - Clad Primary 33 foot

Time After S/D (hh:mm): 1:00 Wind: From 45° @ 3.1 m/s

Release Duration (hh:mm): 1:00 ETE (hh:mm): [N/A] Stability Class: D

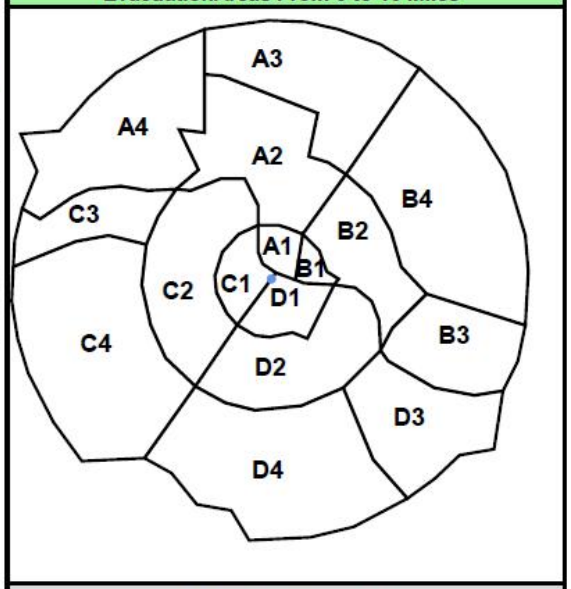
Precipitation: None

Monitor: Stack WRGM conc Readings: 6.54E-01 uCi/cc Flowrate: 13000 CFM

Distance (Miles)	Exposure Rate (mR/hr)	External Plume DDE (mRem)	Inhalation CEDE (mRem)	Deposition Ground DDE (mRem)	TEDE (mRem)	CDE Thyroid (mRem)
S.B.	4.43E+00	2.74E+00	1.98E+00	9.99E-01	5.71E+00	5.00E+01
0.7	3.49E+00	2.15E+00	1.38E+00	6.97E-01	4.22E+00	3.49E+01
1.0	2.36E+00	1.45E+00	7.95E-01	4.09E-01	2.65E+00	1.95E+01
1.5	1.37E+00	8.40E-01	4.16E-01	2.17E-01	1.47E+00	1.00E+01
2.0	9.16E-01	5.63E-01	2.59E-01	1.37E-01	9.59E-01	6.03E+00
3.0	7.68E-01	4.78E-01	1.40E-01	0.00E+00	6.18E-01	3.36E+00
4.0	3.25E-01	2.21E-01	0.00E+00	0.00E+00	2.21E-01	1.61E+00
5.0	2.68E-01	1.78E-01	0.00E+00	0.00E+00	1.78E-01	1.29E+00
7.0	2.13E-01	1.46E-01	0.00E+00	0.00E+00	1.46E-01	1.07E+00
10.0	1.63E-01	1.13E-01	0.00E+00	0.00E+00	1.13E-01	8.53E-01

Assessment Data Results Saved to File:
Waterford 3 SES 10Miles Monitored Release 04302020 144737.URI7

EvacuationAreas From 0 to 10 Miles



No PAGs Exceeded

*** * * Recommended Classification: Validate against Emergency Action Levels * * ***

Release Rates (Ci / sec)	
Particulate	1.55E-03 (0.0%)
Iodine	2.98E-02 (0.7%)
Noble Gas	4.01E+00 (99.2%)

Reviewed By: _____

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Fuel Handling Building Exhaust WRGM Release Rate – General Emergency

This is a Drill **Dose Assessment** **This is a Drill**

Waterford 3 SES **April 30, 2020 14:03**

Method: Detailed Assessment - Monitored Release **Computer ID: WF3-LPF16MFXX**

Release Pathway: <SF> <Under Water> <FHB> <Filters> <FHB Emerg Vent> <Env> PRF: 4.00E-05

Containment HUT: = N/A Containment Sprays: = N/A Purge Filters: = N/A Steam Generator: = N/A

RABldg HUT: = < 2 Hours RABldg Filters: = Working

Source Term: Spent Fuel Accident - Under Water Damage: 0.175 % Primary 33 foot

Time Since Irradiated (hh:mm): 80:00 Wind: From 45° @ 3.1 m/s

Release Duration (hh:mm): 1:00 ETE (hh:mm): [N/A] Stability Class: D

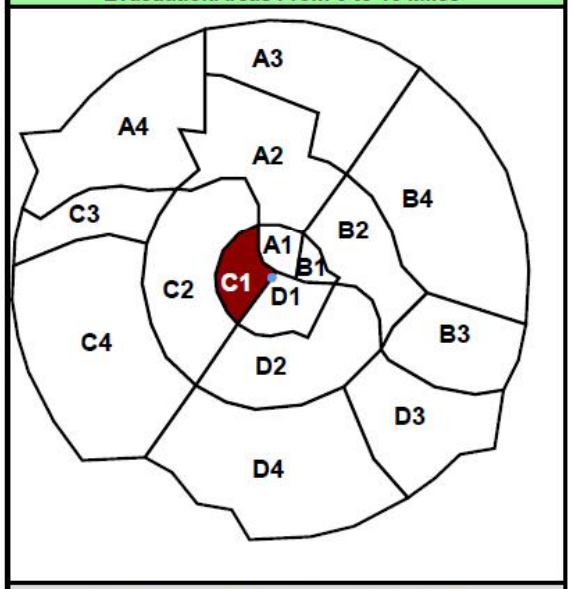
Precipitation: None

Monitor: FHB WRGM Rate Readings: 1.48E+10 uCi/sec

Distance (Miles)	Exposure Rate (mR/hr)	External Plume DDE (mRem)	Inhalation CEDE (mRem)	Deposition Ground DDE (mRem)	TEDE (mRem)	CDE Thyroid (mRem)
Total released activity exceeds the estimated available activity. Inventory comparison warning raio of 566.19 was OVERRIDDEN by the user.						
S.B.	1.43E+03	1.00E+03	8.48E-01	3.30E-01	1.00E+03	1.88E+01
0.7	1.01E+03	7.07E+02	5.64E-01	2.19E-01	7.08E+02	1.25E+01
1.0	5.76E+02	4.03E+02	2.98E-01	1.16E-01	4.03E+02	6.62E+00
1.5	2.84E+02	1.98E+02	1.48E-01	0.00E+00	1.99E+02	3.29E+00
2.0	1.68E+02	1.17E+02	0.00E+00	0.00E+00	1.17E+02	1.96E+00
3.0	1.42E+02	9.66E+01	0.00E+00	0.00E+00	9.66E+01	1.11E+00
4.0	9.00E+01	5.96E+01	0.00E+00	0.00E+00	5.96E+01	6.30E-01
5.0	6.96E+01	4.96E+01	0.00E+00	0.00E+00	4.96E+01	5.23E-01
7.0	5.60E+01	3.95E+01	0.00E+00	0.00E+00	3.95E+01	4.14E-01
10.0	4.96E+01	3.36E+01	0.00E+00	0.00E+00	3.36E+01	3.52E-01

Assessment Data Results Saved to File:
Waterford 3 SES 10Miles Monitored Release 04302020 140330.URI7

EvacuationAreas From 0 to 10 Miles



PAGs Exceeded in Designated Areas

*** * * Recommended Classification: General Emergency * * ***

Release Rates (Ci / sec)	
Particulate	1.23E-03 (0.0%)
Iodine	2.92E-03 (0.0%)
Noble Gas	1.48E+04 (100.0%)

Reviewed By: _____

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Fuel Handling Building Exhaust WRGM Release Rate – Site Area Emergency

This is a Drill **Dose Assessment** **This is a Drill**

Waterford 3 SES **April 30, 2020 14:04**

Method: Detailed Assessment - Monitored Release **Computer ID: WF3-LPF16MFXX**

Release Pathway: <SF> <Under Water> <FHB> <Filters> <FHB Emerg Vent> <Env> PRF: 4.00E-05

Containment HUT: = N/A Containment Sprays: = N/A Purge Filters: = N/A Steam Generator: = N/A

RABldg HUT: = < 2 Hours RABldg Filters: = Working

Source Term: Spent Fuel Accident - Under Water Damage: 0.175 % Primary 33 foot

Time Since Irradiated (hh:mm): 80:00 Wind: From 45° @ 3.1 m/s

Release Duration (hh:mm): 1:00 ETE (hh:mm): [N/A] Stability Class: D

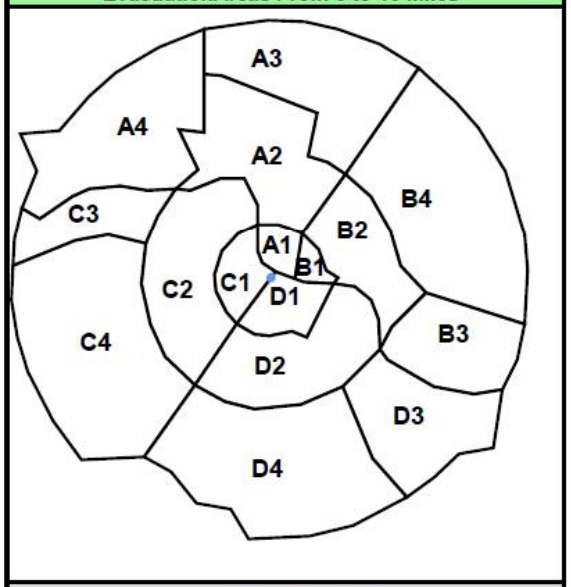
Precipitation: None

Monitor: FHB WRGM Rate Readings: 1.48E+09 uCi/sec

Distance (Miles)	Exposure Rate (mR/hr)	External Plume DDE (mRem)	Inhalation CEDE (mRem)	Deposition Ground DDE (mRem)	TEDE (mRem)	CDE Thyroid (mRem)
Total released activity exceeds the estimated available activity. Inventory comparison warning raio of 56.62 was OVERRIDDEN by the user.						
S.B.	1.43E+02	1.00E+02	0.00E+00	0.00E+00	1.00E+02	1.88E+00
0.7	1.01E+02	7.07E+01	0.00E+00	0.00E+00	7.07E+01	1.25E+00
1.0	5.76E+01	4.03E+01	0.00E+00	0.00E+00	4.03E+01	6.62E-01
1.5	2.84E+01	1.98E+01	0.00E+00	0.00E+00	1.98E+01	3.29E-01
2.0	1.68E+01	1.17E+01	0.00E+00	0.00E+00	1.17E+01	1.96E-01
3.0	1.42E+01	9.66E+00	0.00E+00	0.00E+00	9.66E+00	1.11E-01
4.0	9.00E+00	5.96E+00	0.00E+00	0.00E+00	5.96E+00	0.00E+00
5.0	6.96E+00	4.96E+00	0.00E+00	0.00E+00	4.96E+00	0.00E+00
7.0	5.60E+00	3.95E+00	0.00E+00	0.00E+00	3.95E+00	0.00E+00
10.0	4.96E+00	3.36E+00	0.00E+00	0.00E+00	3.36E+00	0.00E+00

Assessment Data Results Saved to File:
Waterford 3 SES 10Miles Monitored Release 04302020 140427.URI7

EvacuationAreas From 0 to 10 Miles



No PAGs Exceeded

*** * * Recommended Classification: Site Area Emergency * * ***

Release Rates (Ci / sec)	
Particulate	1.23E-04 (0.0%)
Iodine	2.92E-04 (0.0%)
Noble Gas	1.48E+03 (100.0%)

Reviewed By: _____

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Fuel Handling Building Exhaust WRGM Release Rate – Alert

This is a Drill **Dose Assessment** **This is a Drill**

Waterford 3 SES **April 30, 2020 14:05**

Method: Detailed Assessment - Monitored Release **Computer ID: WF3-LPF16MFXX**

Release Pathway: <SF> <Under Water> <FHB> <Filters> <FHB Emerg Vent> <Env> PRF: 4.00E-05

Containment HUT: = N/A Containment Sprays: = N/A Purge Filters: = N/A Steam Generator: = N/A

RABldg HUT: = < 2 Hours RABldg Filters: = Working

Source Term: Spent Fuel Accident - Under Water Damage: 0.175 % Primary 33 foot

Time Since Irradiated (hh:mm): 80:00 Wind: From 45° @ 3.1 m/s

Release Duration (hh:mm): 1:00 ETE (hh:mm): [N/A] Stability Class: D

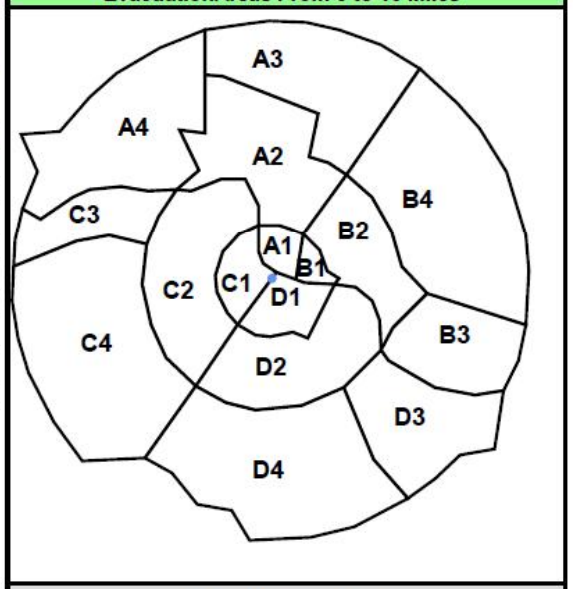
Precipitation: None

Monitor: FHB WRGM Rate Readings: 1.48E+08 uCi/sec

Distance (Miles)	Exposure Rate (mR/hr)	External Plume DDE (mRem)	Inhalation CEDE (mRem)	Deposition Ground DDE (mRem)	TEDE (mRem)	CDE Thyroid (mRem)
Total released activity exceeds the estimated available activity. Inventory comparison warning raio of 5.66 was OVERRIDDEN by the user.						
S.B.	1.43E+01	1.00E+01	0.00E+00	0.00E+00	1.00E+01	1.88E-01
0.7	1.01E+01	7.07E+00	0.00E+00	0.00E+00	7.07E+00	1.25E-01
1.0	5.76E+00	4.03E+00	0.00E+00	0.00E+00	4.03E+00	0.00E+00
1.5	2.84E+00	1.98E+00	0.00E+00	0.00E+00	1.98E+00	0.00E+00
2.0	1.68E+00	1.17E+00	0.00E+00	0.00E+00	1.17E+00	0.00E+00
3.0	1.42E+00	9.66E-01	0.00E+00	0.00E+00	9.66E-01	0.00E+00
4.0	9.00E-01	5.96E-01	0.00E+00	0.00E+00	5.96E-01	0.00E+00
5.0	6.96E-01	4.96E-01	0.00E+00	0.00E+00	4.96E-01	0.00E+00
7.0	5.60E-01	3.95E-01	0.00E+00	0.00E+00	3.95E-01	0.00E+00
10.0	4.96E-01	3.36E-01	0.00E+00	0.00E+00	3.36E-01	0.00E+00

Assessment Data Results Saved to File:
Waterford 3 SES 10Miles Monitored Release 04302020 140504.URI7

EvacuationAreas From 0 to 10 Miles



No PAGs Exceeded

*** * * Recommended Classification: Validate against Emergency Action Levels * * ***

Release Rates (Ci / sec)	
Particulate	1.23E-05 (0.0%)
Iodine	2.92E-05 (0.0%)
Noble Gas	1.48E+02 (100.0%)

Reviewed By: _____

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Fuel Handling Building Exhaust WRGM Concentration – General Emergency

This is a Drill **Dose Assessment** **This is a Drill**

Waterford 3 SES **April 30, 2020 14:12**

Method: Detailed Assessment - Monitored Release **Computer ID: WF3-LPF16MFXX**

Release Pathway: <SF> <Under Water> <FHB> <Filters> <FHB Emerg Vent> <Env> PRF: 4.00E-05

Containment HUT: = N/A Containment Sprays: = N/A Purge Filters: = N/A Steam Generator: = N/A

RABldg HUT: = < 2 Hours RABldg Filters: = Working

Source Term: Spent Fuel Accident - Under Water Damage: 0.175 % Primary 33 foot

Time Since Irradiated (hh:mm): 80:00 Wind: From 45° @ 3.1 m/s

Release Duration (hh:mm): 1:00 ETE (hh:mm): [N/A] Stability Class: D

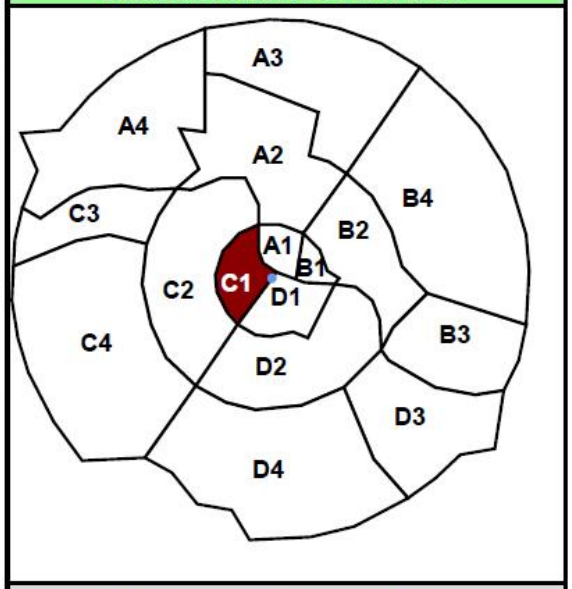
Precipitation: None

Monitor: FHB WRGM Conc Readings: 7.85E+03 uCi/cc Flowrate: 4000 CFM

Distance (Miles)	Exposure Rate (mR/hr)	External Plume DDE (mRem)	Inhalation CEDE (mRem)	Deposition Ground DDE (mRem)	TEDE (mRem)	CDE Thyroid (mRem)
Total released activity exceeds the estimated available activity. Inventory comparison warning raio of 566.91 was OVERRIDDEN by the user.						
S.B.	1.43E+03	1.00E+03	8.49E-01	3.30E-01	1.00E+03	1.89E+01
0.7	1.01E+03	7.08E+02	5.64E-01	2.19E-01	7.09E+02	1.25E+01
1.0	5.76E+02	4.04E+02	2.99E-01	1.16E-01	4.04E+02	6.64E+00
1.5	2.84E+02	1.99E+02	1.48E-01	0.00E+00	1.99E+02	3.30E+00
2.0	1.68E+02	1.17E+02	0.00E+00	0.00E+00	1.17E+02	1.96E+00
3.0	1.42E+02	9.67E+01	0.00E+00	0.00E+00	9.67E+01	1.11E+00
4.0	9.00E+01	5.97E+01	0.00E+00	0.00E+00	5.97E+01	6.33E-01
5.0	6.96E+01	4.97E+01	0.00E+00	0.00E+00	4.97E+01	5.25E-01
7.0	5.60E+01	3.96E+01	0.00E+00	0.00E+00	3.96E+01	4.16E-01
10.0	4.96E+01	3.36E+01	0.00E+00	0.00E+00	3.36E+01	3.53E-01

Assessment Data Results Saved to File:
Waterford 3 SES 10Miles Monitored Release 04302020 141242.URI7

EvacuationAreas From 0 to 10 Miles



PAGs Exceeded in Designated Areas

*** * * Recommended Classification: General Emergency * * ***

Release Rates (Ci / sec)	
Particulate	1.23E-03 (0.0%)
Iodine	2.93E-03 (0.0%)
Noble Gas	1.48E+04 (100.0%)

Reviewed By: _____

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Fuel Handling Building Exhaust WRGM Concentration – Site Area Emergency

This is a Drill **Dose Assessment** **This is a Drill**

Waterford 3 SES **April 30, 2020 14:29**

Method: Detailed Assessment - Monitored Release **Computer ID: WF3-LPF16MFXX**

Release Pathway: <SF> <Under Water> <FHB> <Filters> <FHB Emerg Vent> <Env> PRF: 4.00E-05

Containment HUT: = N/A Containment Sprays: = N/A Purge Filters: = N/A Steam Generator: = N/A

RABldg HUT: = < 2 Hours RABldg Filters: = Working

Source Term: Spent Fuel Accident - Under Water Damage: 0.175 % Primary 33 foot

Time Since Irradiated (hh:mm): 80:00 Wind: From 45° @ 3.1 m/s

Release Duration (hh:mm): 1:00 ETE (hh:mm): [N/A] Stability Class: D

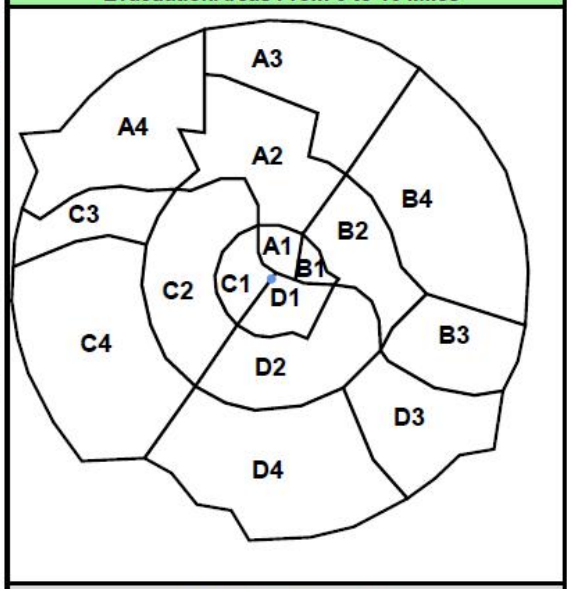
Precipitation: None

Monitor: FHB WRGM Conc Readings: 7.85E+02 uCi/cc Flowrate: 4000 CFM

Distance (Miles)	Exposure Rate (mR/hr)	External Plume DDE (mRem)	Inhalation CEDE (mRem)	Deposition Ground DDE (mRem)	TEDE (mRem)	CDE Thyroid (mRem)
Total released activity exceeds the estimated available activity. Inventory comparison warning raio of 56.69 was OVERRIDDEN by the user.						
S.B.	1.43E+02	1.00E+02	0.00E+00	0.00E+00	1.00E+02	1.89E+00
0.7	1.01E+02	7.08E+01	0.00E+00	0.00E+00	7.08E+01	1.25E+00
1.0	5.76E+01	4.04E+01	0.00E+00	0.00E+00	4.04E+01	6.64E-01
1.5	2.84E+01	1.99E+01	0.00E+00	0.00E+00	1.99E+01	3.30E-01
2.0	1.68E+01	1.17E+01	0.00E+00	0.00E+00	1.17E+01	1.96E-01
3.0	1.42E+01	9.67E+00	0.00E+00	0.00E+00	9.67E+00	1.11E-01
4.0	9.00E+00	5.97E+00	0.00E+00	0.00E+00	5.97E+00	0.00E+00
5.0	6.96E+00	4.97E+00	0.00E+00	0.00E+00	4.97E+00	0.00E+00
7.0	5.60E+00	3.96E+00	0.00E+00	0.00E+00	3.96E+00	0.00E+00
10.0	4.96E+00	3.36E+00	0.00E+00	0.00E+00	3.36E+00	0.00E+00

Assessment Data Results Saved to File:
Waterford 3 SES 10Miles Monitored Release 04302020 142924.URI7

EvacuationAreas From 0 to 10 Miles



No PAGs Exceeded

*** * * Recommended Classification: Site Area Emergency * * ***

Release Rates (Ci / sec)	
Particulate	1.23E-04 (0.0%)
Iodine	2.93E-04 (0.0%)
Noble Gas	1.48E+03 (100.0%)

Reviewed By: _____

Page 1 of 3 Waterford 3 SES / 3.4.0.1 \ 1950295

Fuel Handling Building Exhaust WRGM Concentration – Alert

This is a Drill **Dose Assessment** **This is a Drill**

Waterford 3 SES **April 30, 2020 14:30**

Method: Detailed Assessment - Monitored Release **Computer ID: WF3-LPF16MFXX**

Release Pathway: <SF> <Under Water> <FHB> <Filters> <FHB Emerg Vent> <Env> PRF: 4.00E-05

Containment HUT: = N/A Containment Sprays: = N/A Purge Filters: = N/A Steam Generator: = N/A

RABldg HUT: = < 2 Hours RABldg Filters: = Working

Source Term: Spent Fuel Accident - Under Water Damage: 0.175 % Primary 33 foot

Time Since Irradiated (hh:mm): 80:00 Wind: From 45° @ 3.1 m/s

Release Duration (hh:mm): 1:00 ETE (hh:mm): [N/A] Stability Class: D

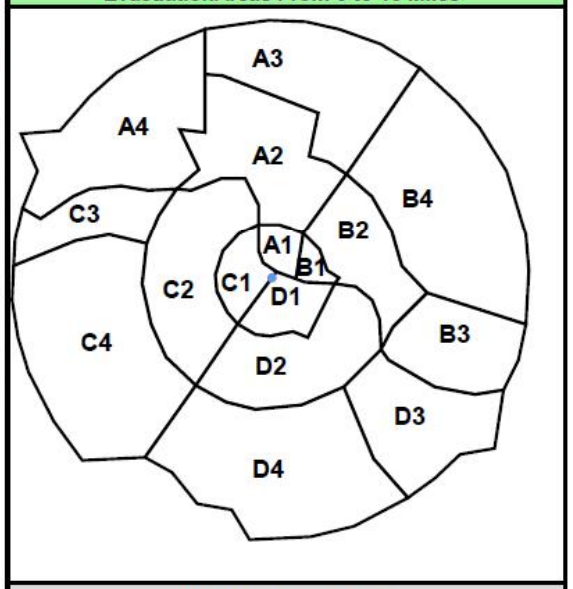
Precipitation: None

Monitor: FHB WRGM Conc Readings: 7.85E+01 uCi/cc Flowrate: 4000 CFM

Distance (Miles)	Exposure Rate (mR/hr)	External Plume DDE (mRem)	Inhalation CEDE (mRem)	Deposition Ground DDE (mRem)	TEDE (mRem)	CDE Thyroid (mRem)
Total released activity exceeds the estimated available activity. Inventory comparison warning raio of 5.67 was OVERRIDDEN by the user.						
S.B.	1.43E+01	1.00E+01	0.00E+00	0.00E+00	1.00E+01	1.89E-01
0.7	1.01E+01	7.08E+00	0.00E+00	0.00E+00	7.08E+00	1.25E-01
1.0	5.76E+00	4.04E+00	0.00E+00	0.00E+00	4.04E+00	0.00E+00
1.5	2.84E+00	1.99E+00	0.00E+00	0.00E+00	1.99E+00	0.00E+00
2.0	1.68E+00	1.17E+00	0.00E+00	0.00E+00	1.17E+00	0.00E+00
3.0	1.42E+00	9.67E-01	0.00E+00	0.00E+00	9.67E-01	0.00E+00
4.0	9.00E-01	5.97E-01	0.00E+00	0.00E+00	5.97E-01	0.00E+00
5.0	6.96E-01	4.97E-01	0.00E+00	0.00E+00	4.97E-01	0.00E+00
7.0	5.60E-01	3.96E-01	0.00E+00	0.00E+00	3.96E-01	0.00E+00
10.0	4.96E-01	3.36E-01	0.00E+00	0.00E+00	3.36E-01	0.00E+00

Assessment Data Results Saved to File:
Waterford 3 SES 10Miles Monitored Release 04302020 143016.URI7

EvacuationAreas From 0 to 10 Miles



No PAGs Exceeded

*** * * Recommended Classification: Validate against Emergency Action Levels * * ***

Release Rates (Ci / sec)	
Particulate	1.23E-05 (0.0%)
Iodine	2.93E-05 (0.0%)
Noble Gas	1.48E+02 (100.0%)

Reviewed By: _____

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Attachment 2

Engineering Calculation Process

☐ ANO 1	☐ ANO 2	☐ GGNS	☐ IP 2	☐ IP 3	☐ PLP
☐ BRP	☐ RBS	☒ W3	☐ NP GGNS 3	☐ NP RBS 3	

CALCULATION COVER PAGE	(1) **EC #** **86890**	(2) **Page 1 of**	**20**

(3) Design Basis Calc.	☒ YES	☐ NO	(4) ☒ CALCULATION	☐ EC Markup

(5) **Calculation No: ECS20-002**	(6) **Revision: 0**
(7) **Title:** Containment High Range Radiation EAL Values	(8) **Editorial** ☐ **YES** ☒ **NO**
(9) **System(s): RM**	(10) **Review Org (Department): Design**
(11) **Safety Class:**	(12) **Component/Equipment/Structure Type/Number:**
☒ **Safety / Quality Related** ☐ **Augmented Quality Program** ☐ **Non-Safety Related**	
(13) **Document Type: B13.40**	
(14) **Keywords (Description/Topical Codes):**	
EPLAN	

REVIEWS

(15) Name/Signature/Date Michelle Groome	(16) Name/Signature/Date William Steelman	(17) Name/Signature/Date James Hoss
Responsible Engineer	☒ **Design Verifier** ☐ **Reviewer** ☐ Comments Attached	**Supervisor/Approval** ☐ Comments Attached

Attachment 3

Calculation Reference Sheet

CALCULATION REFERENCE SHEET	CALCULATION NO: ECS20-002 REVISION: 0

I. **EC Markups Incorporated** (N/A to NP calculations)

1. NA
2.
3.
4.
5.

II. Relationships	Sht	Rev	Input Doc	Output Doc	Impact Y/N	Tracking No.
1. EPA-400-R-92-001, Manual of Protective action Guides and Protective Actions for Nuclear Incidents, May 1992			☒	☐	N	
2. NUREG-1940, RASCAL 4: Description of Models and Methods, December 2012			☒	☐	N	
3. NUREG-1228, Source Term Estimation During Incident Response to Severe Nuclear Power Plant Accidents, October 1988			☒	☐	N	
4. ECS10-001, Waterford-3 Cycle 24 Reload Analysis Groundrules, Revision 7			☒	☐	N	
5. W3-DBD-32, Radiation Monitoring System Design Basis Document, Revision 301			☒	☐	N	

Attachment 3

Calculation Reference Sheet

III. CROSS REFERENCES:

1. NEI 99-01 R6, Development of Emergency Action Levels for Non-Passive Reactors, September 2012
2. Regulatory Guide 1.183, Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors, July 2000
3. Waterford 3 Technical Specification Section 3/4.4.7, RCS Specific Activity

IV. SOFTWARE USED:

Title: _____NA_____ Version/Release: _____ Disk/CD No._____

V. DISK/CDS INCLUDED:

Title: _____NA____ Version/Release: _____ Disk/CD No._____

VI. OTHER CHANGES:

Attachment 1

Record of Revision

Revision	Record of Revision
0	Initial Issue. This is a vendor calculation to support EPLAN EAL revision to NEI 99-01 Revision 6.

Waterford 3 Steam Electric Station (WF3)

Containment High Range Radiation EAL Values

EC 86890
EP-CALC-WF3-1702

Document Author: _____ 05/05/2020
Scott McCain Date

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1. PURPOSE

The Waterford 3 Steam Electric Station (WF3) Emergency Action Level (EAL) Technical Bases Manual contains background information, event declaration thresholds, bases and references for the EAL and fission product barrier (FPB) values used to implement the Nuclear Energy Institute (NEI) 99-01 Revision 6 EAL guidance. This calculation document provides additional technical detail specific to the derivation of the FPB containment high range radiation monitor (CHRRM) readings developed in accordance with the guidance in NEI 99-01 Revision 6.

Documentation of the assumptions, calculations and results are provided for the values associated with the NEI 99-01 Revision 6 Table 9-F-3, PWR EAL Fission Product Barrier Table, thresholds listed below.

- NEI Fuel Clad Loss 3.A
- NEI Reactor Coolant Loss 3.A
- NEI Containment Potential Loss 3.A

2. DEVELOPMENT METHODS AND BASES

2.1. Fuel Clad Loss

Guidance Criteria

Per NEI 99-01 Revision 6, this radiation monitor reading corresponds to an instantaneous release of all reactor coolant mass into the primary containment, assuming that reactor coolant activity equals 300 µCi/gm dose equivalent I-131 (DEI-131). Reactor coolant activity above this level is greater than that expected for iodine spikes and corresponds to an approximate range of 2% to 5% fuel clad damage. Since this condition indicates that a significant amount of fuel clad damage has occurred, it represents a loss of the fuel clad barrier.

The radiation monitor reading in this threshold is higher than that specified for the RCS barrier loss threshold since it indicates a loss of both the fuel clad barrier and the RCS barrier.

The reading should be determined assuming the instantaneous release and dispersal of the reactor coolant noble gas and iodine inventory, with RCS radioactivity concentration equal to 300 µCi/gm dose equivalent I-131, into the primary containment atmosphere.

WF3 Bases

The fuel clad FPB threshold value is based on an instantaneous release of reactor coolant into the containment at a percent fuel clad damage equivalent to 300 µCi/gm DEI-131 RCS activity. That percent fuel clad damage value is ratioed to a containment radiation reading for 100% fuel clad damage to determine the fuel clad FPB threshold value in R/hr.

2.2. Reactor Coolant System Loss

Guidance Criteria

Per NEI 99-01 Revision 6, this radiation monitor reading corresponds to an instantaneous release of all reactor coolant mass into the primary containment, assuming that reactor coolant activity equals Technical Specification allowable limits. This value is lower than that specified for the fuel clad barrier loss threshold since it indicates a loss of the RCS barrier only.

The reading should be determined assuming the instantaneous release and dispersal of the reactor coolant noble gas and iodine inventory, with RCS activity at Technical Specification allowable limits, into the primary containment atmosphere. RCS activity at this level will typically result in primary containment radiation levels that can be more readily detected by primary containment radiation monitors, and more readily differentiated from those caused by piping or component “shine” sources. If desired, a plant may use a lesser value of RCS activity for determining this value.

In some cases, the site-specific physical location and sensitivity of the containment radiation monitor(s) may be such that radiation from a cloud of released RCS gases cannot be distinguished from radiation emanating from piping and components containing elevated reactor coolant activity. If so, determine if an alternate indication is available.

WF3 Bases

The WF3 technical specification (TS) high value for DEI-131 is 60 µCi/cc. By direct ratio, a TS activity of 60 µCi/cc would yield a containment radiation monitor reading approximately 5x lower (~190 R/hr) than the fuel clad loss fission product barrier containment radiation reading equivalent to 300 µCi/cc (~940 R/hr).

NUREG-1940 Figure 1-1 provides estimates for standard plant containment radiation based on spiked RCS activity (no spray), which when corrected for WF3 rated power, is about 3x less (~62 R/hr) than the value obtained by the 300 µCi/cc to 60 µCi/cc DEI-131 ratio (~190 R/hr).

NUREG-1940 Figure 1-1 models a spiked RCS activity that is lower than the RCS activity equivalent to 60 µCi/gm DEI-131 described above (the NUREG-1940 graph is based on a release into containment of 100 times the non-noble gas fission products normally found in the coolant). This is the preferred value for the RCS loss threshold as it provides for a containment monitor escalation of approximately one decade between fission product barrier thresholds at the 1 hour point. NEI 99-01 guidance criteria allows the use of a lesser value for RCS activity (see guidance criteria section above).

The WF3 RCS FPB threshold value is based on NUREG-1940 standard plant containment radiation readings for an instantaneous release of spiked reactor coolant with no spray and is adjusted for the site specific power rating.

2.3. Containment Potential Loss

Guidance Criteria

Per NEI 99-01 Revision 6, this radiation monitor reading corresponds to an instantaneous release of all reactor coolant mass into the primary containment, assuming that 20% of the fuel cladding has failed. This level of fuel clad failure is well above that used to determine the analogous fuel clad and RCS barrier loss thresholds.

NUREG-1228 indicates the fuel clad failure must be greater than approximately 20% in order for there to be a major release of radioactivity requiring offsite protective actions. For this condition to exist, there must already have been a loss of the RCS and the fuel clad barriers. It is therefore prudent to treat this condition as a potential loss of containment which would then escalate the classification level to a General Emergency.

NUREG-1228 provides the basis for using the 20% fuel cladding failure value. Unless there is a site-specific analysis justifying a different value, the reading should be determined assuming the instantaneous release and dispersal of the reactor coolant noble gas and iodine inventory associated with 20% fuel clad failure into the primary containment atmosphere.

WF3 Bases

The containment FPB threshold value is based on an instantaneous release of reactor coolant into the containment at an equivalent of 20% fuel clad damage.

The WF3 FPB containment radiation reading value equivalent to 20% fuel clad damage is obtained by ratio of the 100% fuel clad damage containment radiation reading value to 20% fuel clad damage.

2.4. Source Term

Guidance Criteria

NEI 99-01 does not specify a basis for the source term activity or the reduction factors.

RG 1.183 provides assumptions for a LOCA used as a reference for FSAR design basis event analysis. Per RG 1.183 Section 1.1.4, Emergency Preparedness Applications:

> *Requirements for emergency preparedness at nuclear power plants are set forth in 10 CFR 50.47, "Emergency Plans." Additional requirements are set forth in Appendix E, "Emergency Planning and Preparedness for Production and Utilization Facilities," to 10 CFR Part 50. The planning basis for many of these requirements was published in NUREG-0396, "Planning Basis for the Development of State and Local Government Radiological Emergency Response Plans in Support of Light Water Nuclear Power Plants". This joint effort by the Environmental Protection Agency (EPA) and the NRC considered the principal characteristics (such as nuclides released and distances) likely to be involved for a spectrum of design basis and severe (core melt) accidents. No single accident scenario is the basis of the required preparedness. The objective of the planning is to provide public protection that would encompass a wide spectrum of possible events with a sufficient basis for extension of response efforts for unanticipated events. These requirements were issued after a long period of involvement by numerous stakeholders, including the Federal*

Emergency Management Agency, other Federal agencies, local and State governments (and in some cases, foreign governments), private citizens, utilities, and industry groups.

Although the AST provided in this guide was based on a limited spectrum of severe accidents, the particular characteristics have been tailored specifically for DBA analysis use. The AST is not representative of the wide spectrum of possible events that make up the planning basis of emergency preparedness. Therefore, the AST is insufficient by itself as a basis for requesting relief from the emergency preparedness requirements of 10 CFR 50.47 and Appendix E to 10 CFR Part 50.

Thus, RG 1.183 is not used as a basis for the containment radiation monitor thresholds.

Guidance contained in NUREG-1940 is considered representative of the wide spectrum of possible events that make up the emergency preparedness planning basis and provides radiological consequence assessment methods which are acceptable to the NRC. Additionally, the source term used to develop the effluent EAL thresholds and in the Unified RASCAL Interface/Radiological Assessment System for Consequence Analysis (URI/RASCAL) dose assessment model is from NUREG-1940. Thus, NUREG-1940 has been selected as a source term basis for the fission product barrier containment radiation thresholds for conformance to NRC guidance and consistency with other source term bases used within the Entergy emergency preparedness program.

WF3 Bases

2.4.1. The NUREG-1940 source term inputs used for the fission product barrier containment radiation thresholds are as follows:

Fuel Clad Damage Equivalent to 300 µCi/g DEI-131 – NUREG-1940 Table 1-1 equilibrium core activity, in conjunction with the NUREG-1940 Table 1-5 non-noble gas release fraction, is used to develop the site specific iodine source term.

Fuel Clad and Containment Barrier Thresholds – NUREG-1940 Figure 1-1 for cladding failure is used as a basis to establish these thresholds.

RCS Barrier Threshold – NUREG-1940 Figure 1-1 for spiked coolant is used as a basis to establish this threshold.

Note – Source term reduction from containment spray is not included as an assumption for these thresholds.

2.4.2. NUREG-1940 source term is based on a generic plant with a power rating of 3000 MWt. The WF3 site specific source term is derived from the licensed core thermal power output of 3,716 megawatts (ECS10-001 COR.1).

2.4.3. Dose equivalent iodine 131 (DEI-131) dose conversion factors (DCFs) are developed from EPA-400-R-92-001 isotopic DCFs. EPA-400 is the basis for the protective action guidelines and is the appropriate source for DCFs used in emergency preparedness.

The DEI-131 dose conversion factors are not based on the FSAR Chapter 15 or other 10 CFR 20 reference sources as those are not reflective of the exposure assumptions used within the EPA guidance for emergency preparedness use.

2.5. Decay Considerations

Guidance Criteria

Fission product barrier thresholds and their associated EALs are applicable only when the plant is in Hot Shutdown, Startup, or Power Operation modes (known as the hot operating modes).

The events for these thresholds correspond to an instantaneous release of all reactor coolant mass into the primary containment.

WF3 Bases

Consistent with the NUREG-1940 graphs, the instantaneous release of the RCS to the containment is assumed to occur one hour after the damage event / reactor scram to account for damage progression, dispersion of activity and decay of the very short half-life isotopes.

3. DESIGN INPUTS

3.1. Constants and Conversion Factors

3.1.1. 453.592 gm per lbm water conversion factor

3.1.2. 28,316.85 cc per ft^3 volume conversion factor

3.2. Plant Inputs

3.2.1. Rated Power

1) Standard Plant (NUREG-1940 Section 1.2.4) .....3,000 MWt

2) Waterford 3 (ECS10-001 COR.1) .....3,716 MWt

3.2.2. RCS Water Mass (ECS10-001 RCS.25)

1) Primary Coolant Volume for Dose Calculations .....2.96E+8 cc

3.2.3. Standard Plant Containment Radiation Reading (NUREG-1940 Figure 1-1)

1) 100% fuel clad damage (spray off) ..... 60,000 R/hr (@ 1 hr after shutdown)

2) 100% spiked coolant (spray off)..... 50 R/hr (@ 1 hr after shutdown)

3.2.4. Monitor Range (W3-DBD-032)

1) ARM-IRE-5400AS/BS.....1.00E+0 – 1.00E+8 R/hr

3.3. Source Term

3.3.1. Source Term Activity (NUREG-1940 Table 1-1)

	Core Activity (Ci/MWt)
1-131	2.67E+04
1-132	3.88E+04
1-133	5.42E+04
1-134	5.98E+04
1-135	5.18E+04

3.3.2. Release Fractions – RF_{Core} (NUREG-1940 Table 1-5)

1) Non-Noble Gasses (I, Cs, Rb) – Fuel Clad Damage 0.05 (5%)

3.3.3. Iodine Dose Conversion Factors (EPA-400 Table 5-2)

	Rem/hr per µCi/cc
1-131	1.3E+06
1-132	7.7E+03
1-133	2.2E+05
1-134	1.3E+03
1-135	3.8E+04

4. CALCULATIONS

4.1. Fuel Clad Damage Estimate Based on 300 µCi/cc DEI-131

See Attachment 1 for the spreadsheet calculations that develop the fuel clad damage source term activity and the % fuel clad damage.

4.1.1. Equivalent Iodine Core Activity

$$100\%\ Core\ Acti....\ _i(Ci) = Core\ Activity_i(Ci/MWt) \times 3{,}716\ MWt$$

	Core Activity (Ci)
1-131	9.92E+07
1-132	1.44E+08
1-133	2.01E+08
1-134	2.22E+08
1-135	1.92E+08
Total	8.60E+08

4.1.2. 100% Core Activity Equivalent Reactor Coolant Iodine Concentrations

$$100\%\ Core\ RCS\ Activity_i(\mu Ci/cc) = \frac{100\%\ Core\ RCS\ Activity_i(Ci) \times 10^6}{RCS\ Mass\ (cc)}$$

	RCS Activity (µCi/cc)
1-131	3.35E+05
1-132	4.87E+05
1-133	6.80E+05
1-134	7.51E+05
1-135	6.50E+05
Total	2.90E+06

4.1.3. 100% Fuel Clad Damage Activity Equivalent Reactor Coolant Iodine Concentrations

$$100\%\ Clad\ Damage\ RCS\ Activity_i(\mu Ci/cc) = 100\%\ Core\ RCS\ Activity_i(\mu Ci/cc) \times RF_{Core}$$

	RCS Activity (µCi/cc)
1-131	1.68E+04
1-132	2.44E+04
1-133	3.40E+04
1-134	3.75E+04
1-135	3.25E+04
Total	1.45E+05

4.1.4. 100% Fuel Clad Damage Activity Equivalent Reactor Coolant DEI-131 Concentrations

$$100\%\ DEI\ RCS\ Activity\ (\mu Ci/cc) = \sum 100\%\ Clad\ Damage\ RCS\ Activity_i(\mu Ci/cc) \times DEI\ DCF_i$$

Note – The DEI DCF value for each iodine isotope is determined as follows:

$$DEI\ DCF_i = \frac{EPA - 400\ Table\ 5 - 2\ Iodine\ DCF_i(Rem/hr\ per\ \mu Ci/cc)}{EPA - 400\ Table\ 5 - 2\ Iodine\ DCF_{I-131}(Rem/hr\ per\ \mu Ci/cc)}$$

	RCS Activity (µCi/cc)	DEI DCF (unit less)
1-131	1.68E+04	1.00E+00
1-132	1.44E+02	5.92E-03
1-133	5.76E+03	1.69E-01
1-134	3.75E+01	1.00E-03
1-135	9.50E+02	2.92E-02
Total	2.36E+04	

4.1.5. % Fuel Clad Damage Activity Equivalent Reactor Coolant at 300 µCi/cc DEI-131

$$\%\ Clad\ Damage = \frac{300\ \mu Ci/cc}{100\%\ DEI\ RCS\ Activity\ (\mu Ci/cc)} \times 100$$

300 µCi/cc DEI-131..... 1.27% Fuel Clad Damage

4.2. Fission Product Barrier Thresholds

See Attachment 2 for the spreadsheet calculations that develop the FPB threshold monitor readings.

4.2.1. Containment Potential Loss (20% Fuel Clad Damage Monitor Reading)

$$\mathrm{WF3}_{\bar{A}\bar{A}\%\ clad}(R/hr) = Std\ Plant_{\bar{A}\bar{A}\bar{A}\%\ clad}(R/hr) \times 0.2\ (20\%) \times \frac{MWt_{WF3}}{MWt_{Std\ Plant}}$$

Containment Potential Loss Threshold Monitor Reading ..... 1.49E+4 R/hr

4.2.2. Fuel Clad Loss (300 µCi/gm DEI-131 Equivalent Clad Damage Monitor Reading)

$$\mathrm{WF3}_{0.97\%\ clad}(R/hr) = Std\ Plant_{\bar{A}\bar{A}\bar{A}\%\ clad}(R/hr) \times 0.0127\ (1.27\%)\ \times \frac{MWt_{WF3}}{MWt_{Std\ Plant}}$$

Fuel Clad Loss Threshold Monitor Reading ..... 9.43E+2 R/hr

4.2.3. RCS Loss (Spiked Coolant Monitor Reading)

$$WF3_{Spiked}\ (R/hr) = Std\ Plant_{\bar{A}\bar{A}\bar{A}\%\ Spiked}\ (R/hr) \times \frac{MWt_{WF3}}{MWt_{Std\ Plant}}$$

RCS Loss Threshold Monitor Reading ..... 6.19E+1 R/hr

5. CONCLUSIONS

5.1. 300 µCi/cc DEI-131 is equivalent to 1.27% fuel clad (gap) damage.

5.2. Calculated containment high range radiation monitor values are as follows:

	Fuel Clad Loss	RCS Loss	Containment Potential Loss
ARM-IRE-5400AS/BS	9.43E+2 R/hr	6.19+1 R/hr	1.49E+4 R/hr

Based on monitor accuracy/readability and human factors, the EAL Fission Product Barrier thresholds are established as follows:

	Fuel Clad Loss	RCS Loss	Containment Potential Loss
ARM-IRE-5400AS/BS	900 R/hr	60 R/hr	15,000 R/hr

Note – EAL threshold results are within rage of the containment high range radiation monitors.

6. REFERENCES

6.1. NEI 99-01 R6, Development of Emergency Action Levels for Non-Passive Reactors, September 2012

6.2. EPA-400-R-92-001, Manual of Protective action Guides and Protective Actions for Nuclear Incidents, May 1992

6.3. NUREG-1940, RASCAL 4: Description of Models and Methods, December 2012

6.4. NUREG-1228, Source Term Estimation During Incident Response to Severe Nuclear Power Plant Accidents, October 1988

6.5. Regulatory Guide 1.183, Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors, July 2000

6.6. ECS10-001, Waterford-3 Cycle 24 Reload Analysis Groundrules, Revision 7

6.7. W3-DBD-32, Radiation Monitoring System Design Basis Document, Revision 301

6.8. Waterford 3 Technical Specifications

1) Section 3/4.4.7, RCS Specific Activity, Amendment No. 184

Attachment 1 300 µCi/gm DEI-131 Equivalent Fuel Clad Damage

	NUREG-1940 Table 1-1 Core Activity (Ci/MWt)	WF3 Core Activity (Ci)	WF3 RCS Activity (µCi/cc 100% Core)	WF3 RCS Activity (µCi/cc 100% Clad)	EPA-400 Table 5-2 Dose Conversion Factors (Rem/hr per µCi/cc)	DEI DCF	WF3 RCS Activity (µCi/cc 100% Gap DEI)
I-131	2.67E+04	9.92E+07	3.35E+05	1.68E+04	1.30E+06	1.00E+00	1.68E+04
I-132	3.88E+04	1.44E+08	4.87E+05	2.44E+04	7.70E+03	5.92E-03	1.44E+02
I-133	5.42E+04	2.01E+08	6.80E+05	3.40E+04	2.20E+05	1.69E-01	5.76E+03
I-134	5.98E+04	2.22E+08	7.51E+05	3.75E+04	1.30E+03	1.00E-03	3.75E+01
I-135	5.18E+04	1.92E+08	6.50E+05	3.25E+04	3.80E+04	2.92E-02	9.50E+02
Total	2.31E+05	8.60E+08	2.90E+06	1.45E+05			2.36E+04

Rated Power (MWt): 3716

Primary Coolant Volume for Dose Calculations (cc): 2.96E+08

Halogen Release Fraction: 5.0%

Target DEI-131 (µCi/gm): 3.00E+02

% Clad Damage: 1.27%

Attachment 2 Fission Product Barrier Threshold Values

	Reading for 20% Clad Failure (R/hr)	% Damage for 300 µCi/gm DEI-131 RCS Activity	Reading for 300 µCi/gm RCS Activity (R/hr)	Reading for Spiked RCS Activity (R/hr)
ARM-IRE-5400AS/BS	1.49E+04	1.27%	9.43E+02	6.19E+01

NUREG-1940 100% Clad Failure (R/hr):	6.00E+04
WF3 100% Clad Failure (R/hr):	7.43E+04
NUREG-1940 100% Spiked Coolant (R/hr):	5.00E+01
Standard Plant (MWt):	3000
WF3 Rated Power (MWt):	3716

Attachment 3 NUREG-1940 Figure 1-1 PWR Containment Monitor Response

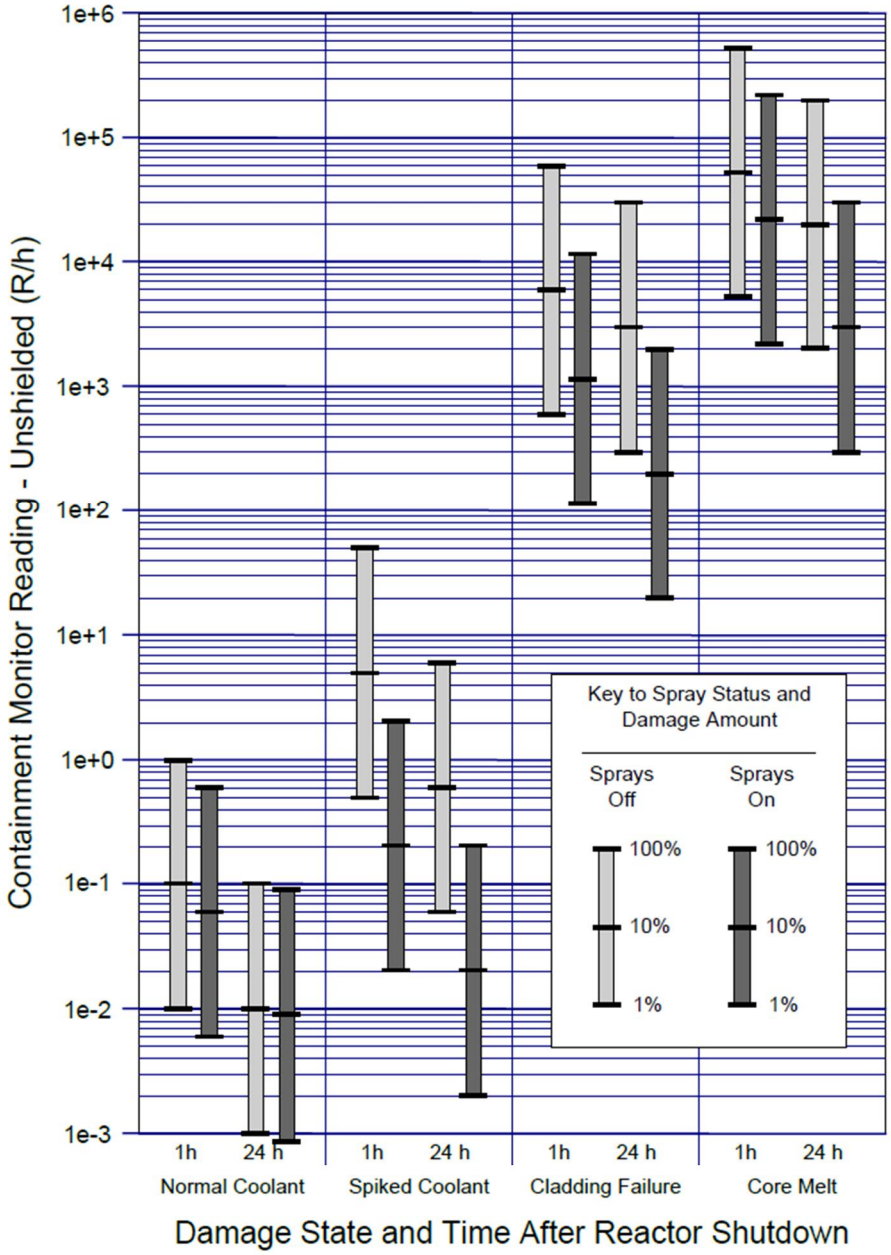

Figure 1-1 PWR containment monitor response

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