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ONS-2015-045

10 CFR 50.90
10 CFR 50 Appendix E

June 23, 2015

ATTN: Document Control Desk
US Nuclear Regulatory Commission
11555 Rockville Pike
Rockville, MD 20582-2746

Duke Energy Carolinas, LLC (Duke Energy)

Oconee Nuclear Station (ONS), Units 1, 2 and 3
Docket Number 50-269, 50-270, and 50-287
Renewed License Nos. DPR-38, DPR-47, and DPR-55

Subject: License Amendment Request to Change the Oconee Nuclear Station (ONS) Emergency Plan to Upgrade ONS Emergency Action Levels Based on NEI 99-01, Revision 6
License Amendment Request No. 2015-04

In accordance with the provisions of 10 CFR 50.90 and 10 CFR 50, Appendix E, "Emergency Planning and Preparedness for Production and Utilization Facilities," Section IV.B, Duke Energy is submitting a license amendment request to change the Oconee Nuclear Station (ONS) Emergency Plan, Section D, Emergency Classification System.

The enclosed proposed changes involve upgrading ONS Emergency Action Levels (EALs) based on NEI 99-01, Revision 6, "Development of Emergency Action Levels for Non-Passive Reactors," using the guidance of NRC Regulatory Issue Summary 2003-18, Supplement 2, "Use of Nuclear Energy Institute (NEI) 99-01, Methodology for Development of Emergency Action Levels." ONS currently uses an emergency classification scheme based on NUMARC/NESP-007 (Revision 2, January 1992), "Methodology for Development of Emergency Action Levels" (endorsed by the Nuclear Regulatory Commission in Regulatory Guide 1.101, "Emergency Planning and Preparedness for Nuclear Power Reactors," Revision 3, August 1992). The plan, as changed, would continue to meet the standards in 10 CFR 50.47(b) and the requirements in Appendix E to 10 CFR 50. Pursuant to 10 CFR 50, Appendix E, Section IV.B, Duke Energy requests NRC approval of this proposed change to the ONS Emergency Plan prior to implementation.

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NRR

This License Amendment Request includes the following enclosures:

- Enclosure 1 - Evaluation of Proposed Changes
- Enclosure 2 - Oconee Nuclear Station NEI 99-01 Revision 6 EAL Comparison Matrix
- Enclosure 3 - Emergency Action Level Technical Bases Document (Retyped Version)
- Enclosure 4 Emergency Action Level Technical Bases Document (Redline and Strikeout Version)
- Enclosure 5 - Oconee Nuclear Station (ONS) Radiological Effluent EAL Values
- Enclosure 6 - ONS Emergency Action Level Wallcharts

Duke Energy requests approval of the proposed changes by June 23, 2016, with a 180 day implementation period.

In accordance with 10 CFR 50.91, a copy of this application, with enclosures, is being provided to the designated South Carolina State Officials.

Duke Energy commits to review the new classification scheme with State and local emergency management officials following NRC approval and prior to implementation.

If you have any questions, please contact Sandra N. Severance, ONS Regulatory Affairs, at (864) 873-3466.

I declare under penalty of perjury that the foregoing is true and correct. Executed on June 23, 2015.

Sincerely,

Scott L. Batson
Vice President
Oconee Nuclear Station

Enclosures:

1. Evaluation of Proposed Changes
2. Oconee Nuclear Station NEI 99-01 Revision 6 EAL Comparison Matrix
3. Emergency Action Level Technical Bases Document (Retyped Version)
4. Emergency Action Level Technical Bases Document (Redline and Strikeout Version)
5. Oconee Nuclear Station (ONS) Radiological Effluent EAL Values
6. ONS Emergency Action Level Wallcharts

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ENCLOSURE 1

EVALUATION OF THE PROPOSED CHANGES

8 Pages Follow

ENCLOSURE 1

EVALUATION OF PROPOSED CHANGES

LICENSE AMENDMENT REQUEST NO. 2015-04

Subject: License Amendment Request to Change the Oconee Nuclear Station (ONS) Emergency Plan to Upgrade ONS Emergency Action Levels Based on NEI 99-01, Revision 6

1 SUMMARY DESCRIPTION

The proposed changes involve upgrading ONS Emergency Action Levels (EALs) based on NEI 99-01, Revision 6, "Methodology for Development of Emergency Action Levels," using the guidance of NRC Regulatory Issue Summary 2003-18, Supplement 2, "Use of Nuclear Energy Institute (NEI) 99-01, Methodology for Development of Emergency Action Levels." ONS currently uses an emergency classification scheme based on NUMARC/NESP-007 (Revision 2, January 1992) "Methodology for Development of Emergency Action Levels," (endorsed by the Nuclear Regulatory Commission in Regulatory Guide 1.101, "Emergency Planning and Preparedness for Nuclear Power Reactors," Revision 3, August 1992 and approved for ONS in Reference 5). The plan, as changed, would continue to meet the standards in 10 CFR 50.47(b) and the requirements in Appendix E to 10 CFR 50.

2 DETAILED DESCRIPTION

ONS currently uses an emergency classification scheme based on NUMARC/NESP-007 (Revision 2, January 1992), "Methodology for Development of Emergency Action Levels," endorsed by the NRC in Regulatory Guide 1.101, "Emergency Planning and Preparedness for Nuclear Power Reactors," Revision 3, August 1992. Duke Energy requests approval to change the ONS scheme basis to that described in NEI 99-01, Revision 6.

3 TECHNICAL EVALUATION

An Initiating Conditions (ICs) and EALs matrix that comprises the proposed scheme is presented in Enclosure 2. This matrix provides a cross-reference between each generic IC and EAL contained in NEI 99-01, Revision 6 and the proposed ONS-specific IC and EAL. Differences and deviations are identified in accordance with the guidance discussed in Regulatory Issue Summary (RIS) 2003-18, Supplement 1, dated July 13, 2004, and updated in Supplement 2, dated December 12, 2005. Differences and deviations are defined as follows:

- 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. Expanded clarification provided in Supplement 2: Administrative changes that do not actually change the text 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.
- 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.).

Within Enclosure 2, the basis for each difference between NEI 99-01, Revision 6 guidance and the final products being evaluated within this LAR is provided. These differences do not alter the meaning or intent of the ICs or EALs. There are no deviations being proposed from the NEI 99-01, Revision 6 guidance.

The matrix follows the presentation order of NEI 99-01, Revision 6 - Abnormal Rad Levels/Radiological Effluent, Cold Shutdown/Refueling System Malfunction, Events Related to Independent Spent Fuel Storage Installation (ISFSI), Fission Product Barrier Degradation, Hazards and Other Conditions Affecting Plant Safety, and System Malfunction. The Permanently Defueled Station section is not applicable since no ONS units have permanently ceased operation.

Where applicable, information from Emergency Action Level Frequently Asked Questions (EALFAQs) has been incorporated into Enclosure 2 and Enclosure 3, EAL Technical Basis Document. Enclosure 3 includes the ONS-specific technical basis for each recognition category for the proposed scheme. This document includes appropriate information from the basis information contained in NEI 99-01, Revision 6. A redline and strikeout version is provided in Enclosure 4.

Enclosure 5 contains the supporting calculation for ONS EAL Table R-1, "Effluent Monitor Classification Thresholds." Enclosure 6 contains the revised ONS EAL Wallcharts.

Operational Modes and Applicability

Mode applicability of the proposed ICs and EALs is consistent with the NEI 99-01, Revision 6 basis scheme with the exception of Hot Standby and Hot Shutdown temperature. The Modes, as defined in Section 1.0 of the current ONS Technical Specifications, are listed below.

MODE	TITLE	REACTIVITY CONDITION (k_{eff})	% RATED THERMAL POWER[(a)]	Average Reactor Coolant Temperature (°F)
1	Power Operation	≥ 0.99	> 5	NA
2	Startup	≥ 0.99	≤ 5	NA
3	Hot Standby	< 0.99	NA	≥ 250
4	Hot Shutdown[(b)]	< 0.99	NA	250 > Tavg > 200
5	Cold Shutdown[(b)]	< 0.99	NA	≤ 200
6	Refueling	NA	NA	NA

[(a)] Excluding decay heat.

[(b)] All reactor vessel head closure bolts fully tensioned.

[(c)] One or more reactor vessel head closure bolts less than fully tensioned.

In addition to these operating modes, NEI 99-01, Revision 6 defines the following additional Mode:

Defueled - All reactor fuel removed from Reactor Vessel (full core off load during refueling or extended outage)

ONS procedures recognize this condition as "No Mode".

State / Local Government Review of Proposed Changes

Duke Energy meets periodically with the state of South Carolina and local emergency management agencies. The State and local emergency management officials are advised of any EAL changes actually implemented. In the case of this EAL scheme revision, Duke Energy has committed to provide a review of the new classification scheme to State and local emergency management officials following NRC approval and prior to implementation.

Implementation Description

Duke Energy plans to implement the proposed emergency classification scheme in the third quarter of 2016[1]. When implemented, the changes to the EALs presented in Enclosure 3 will become effective as the new ONS Emergency Plan, Section D, Emergency Classification System. The Emergency Action Level Technical Basis Documents (Enclosure 3) will be revised and maintained as a training and background reference resource. Changes to the approved ICs and EALs will be made in accordance with 10 CFR 50.54(q).

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[1] This plan is contingent on several factors including the anticipated time required for NRC review and approval and the Unit 1 Refueling Outage to be conducted in Fall of 2016.

4 REGULATORY EVALUATION

4.1 Applicable Regulatory Requirements/Criteria

10 CFR 50.47(b)(4) states, "A standard emergency classification and action level scheme, the bases of which include facility system and effluent parameters, is in use by the nuclear facility licensee, and State and local response plans call for reliance on information provided by facility licensees for determinations of minimum initial offsite response measures."

10 CFR 50 Appendix E, section IV. Content of Emergency Plans, item B, Assessment Actions states,

1. "The means to be used for determining the magnitude of, and for continually assessing the impact of, the release of radioactive materials shall be described, including emergency action levels that are to be used as criteria for determining the need for notification and participation of local and State agencies, the Commission, and other Federal agencies, and the emergency action levels that are to be used for determining when and what type of protective measures should be considered within and outside the site boundary to protect health and safety. The emergency action levels shall be based on in-plant conditions and instrumentation in addition to onsite and offsite monitoring. By June 20, 2012, for nuclear power reactor licensees, these action levels must include hostile action that may adversely affect the nuclear power plant. The initial emergency action levels shall be discussed and agreed on by the applicant or licensee and state and local governmental authorities, and approved by the NRC. Thereafter, emergency action levels shall be reviewed with the State and local governmental authorities on an annual basis.

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

Regulatory Guide 1.101, Emergency Planning and Preparedness for Nuclear Power Reactors, Revision 4, Section C. Regulatory Position states:

> "The guidance in NUMARC/NESP-007 (Revision 2, January 1992), "Methodology for Development of Emergency Action Levels," is acceptable to the NRC staff as an alternative method to that described in Appendix 1 to NUREG-0654/FEMA-REP-1 for developing EALs required in Section IV.B of Appendix E to 10 CFR Part 50 and 10 CFR 50.47(b)(4). In addition, the guidance contained in NEI 99-01 (Revision 4, January 2003), "Methodology for Development of Emergency Action Levels," is acceptable to the NRC staff as an alternative method to that described in Appendix 1 to NUREG-0654/FEMA-REP-1 and NUMARC/NESP-007 for developing EALs required in Section IV of Appendix E to 10 CFR Part 50 and 10 CFR 50.47(b)(4)."

4.2 Significant Hazards Consideration

Duke Energy Carolinas, LLC (Duke Energy) has evaluated whether or not a significant hazards consideration is involved with the proposed amendment to Oconee Nuclear Station (ONS) Facility Operating Licenses DPR-38, DPR-47, and DPR-55 by focusing on the three standards set forth in 10 CFR 50.92, "Issuance of Amendment," as discussed below.

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

   Response: No.
   These changes affect the ONS Emergency Plan and do not alter the requirements of the Operating License or the Technical Specifications. The proposed changes do not modify plant equipment and do not impact failure modes that could lead to an accident. Additionally, the proposed changes do not impact the consequence of an analyzed accident since the changes do not affect equipment related to accident mitigation. Based on this discussion, the proposed amendment does not increase the probability or consequences of an accident previously evaluated.

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

   Response: No.
   These changes affect the ONS Emergency Plan and do not alter the requirements of the Operating License or the Technical Specifications. They do not modify plant equipment and there is no impact on the capability of the existing equipment to perform their intended functions. No system setpoints are being modified and no changes are being made to the method in which plant operations are conducted. No new failure modes are introduced by the proposed changes. The proposed amendment does not introduce an accident initiator or malfunction that would cause a new or different kind of accident. Therefore, the proposed amendment does not create the possibility of a new or different kind of accident from an accident previously evaluated.

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

   Response: No.
   These changes affect the ONS Emergency Plan and do not alter the requirements of the Operating License or the Technical Specifications. The proposed changes do not affect the assumptions used in the accident analysis, nor do they affect the operability requirements for equipment important to plant safety. Therefore, the proposed changes will not result in a significant reduction in the margin of safety as defined in the bases for technical specifications covered in this license amendment request.

4.3 Conclusion

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 ENVIRONMENTAL CONSIDERATION

Duke Energy has determined that the proposed amendment would not change requirements with respect to use of a facility component located within the restricted area, as defined by 10 CFR 20, nor would it change inspection or surveillance requirements. Duke Energy has evaluated the proposed change and has determined that the change does not involve:

I. A Significant Hazards Consideration,
II. A significant change in the types or significant increase in the amounts of any effluent that may be released off site, or
III. A significant increase in individual or cumulative occupational radiation exposure.

Accordingly, the proposed amendment meets the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c)(9) and (10)(ii). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed amendment.

6 REFERENCES

1. NUMARC/NESP-007, "Methodology for Development of Emergency Action Levels," dated January 1992 (ADAMS Accession No. ML041120174)

2. NEI 99-01, Revision 6, "Development of Emergency Action Levels for Non-Passive Reactors," dated November 2012 (ADAMS Accession No. ML12326A805)

3. NRC Regulatory Issue Summary 2003-18, "Use of Nuclear Energy Institute (NEI) 99-01, Methodology for Development of Emergency Action Levels," dated October 8, 2003 (ADAMS Accession No. ML032580518); Supplement 1 dated July 13, 2004 (ADAMS Accession No. ML041550395); and, Supplement 2 dated December 12, 2005 (ADAMS Accession No. ML051450482)

4. Regulatory Guide 1.101, "Emergency Planning and Preparedness for Nuclear Power Reactors," Revision 3 dated August 1992 (ADAMS Accession No. ML003740302) and Revision 4 dated July 2003 (ADAMS Accession No. ML032020276)

5. Letter from Leonard Wiens (USNRC) to Mr. J. W. Hampton (Duke Energy) dated April 10, 1995, "Safety Evaluation of Duke Power Company's Proposed Emergency Action Level Changes for the Oconee Nuclear Station, Units 1, 2, and 3 - (TAC Nos. M89467, M89468, and M89469)"

ENCLOSURE 2

OCONEE NUCLEAR STATION
NEI 99-01 REVISION 6 EAL COMPARISON MATRIX

116 Pages Follow

Oconee Nuclear Station
NEI 99-01 Revision 6
EAL Comparison Matrix

Revision 0 [6/16/15]

Table of Contents

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 the Oconee Nuclear Station (ONS) ICs, Mode Applicability and EALs. This document provides a means of assessing ONS differences and deviations from the NRC endorsed guidance given in NEI 99-01. Discussion of ONS 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. ***ONS has taken no deviation from the generic guidance.***

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
- ONSEAL/IC identifier
- ONSEAL/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"

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 ONS EAL Technical Bases Document for the ONS EALs.

The print and paragraph formatting conventions summarized below guide presentation of the ONS 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 ONS 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, NM – No Mode. ONS defines NM the same as NEI 99-01 defines Defueled as follows: "Reactor Vessel contains no irradiated fuel"
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 reduce EAL-user reading burden, ONS 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. The term "Emergency Director" has been replaced by "Emergency Coordinator" consistent with site-specific nomenclature.
7. Wherever the generic bracketed PWR term "reactor vessel/RCS" is provided, ONS uses the term "RCS" as the site-specific nomenclature.
8. IC/EAL identification:
   - NEI Recognition Category A "Abnormal Radiation Levels/ Radiological Effluents" has been changed to Category R "Abnormal Rad Levels / Rad Effluents." The designator "R" is more intuitively associated with radiation (rad) or radiological events. NEI IC designators beginning with "A" have likewise been changed to "R."
   - NEI 99-01 defines the thresholds requiring emergency classification (example EALs) and assigns them to ICs which, in turn, are grouped in "Recognition Categories." The ONS 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 thereby, speeds identification of the EAL that applies to the emergency.
     b. Within each of the above three groups, assignment of EALs to categories/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 ONS 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

EAL Identifier

XXX.X

Category (R, H, E, S, F, C)
Emergency classification (G, S, A, U)
Sequential number within subcategory/classification
Subcategory number (1 if no subcategory)

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 ERO responders (who may not be in the same facility as the EC) 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 ONS 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 ONS 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 ONS proposed EAL.

Administrative changes that do not actually change the textual content are neither differences nor deviations. Likewise, any 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 ONS (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 ONS 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 Justification" columns in the remaining sections of this document identify each difference between the NEI 99-01 IC/EAL wording and the ONS 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 effect 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. ONS has identified no deviations from the NEI 99-01 guidance as represented in Table 3.

Table 1 – ONS EAL Categories/Subcategories

ONS EALs		NEI Recognition Category
Category	**Subcategory**	
Group: Any Operating Mode:		
R – Abnormal Rad Levels/Rad Effluent	1 – Radiological Effluent 2 – Irradiated Fuel Event 3 – Area Radiation Levels	Abnormal **R**ad 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 Gases 6 – Control Room Evacuation 7 – Emergency Coordinator 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 Essential 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 Essential 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 / ONS EAL Identification Cross-Reference

NEI		ONS	
IC	Example EAL	Category and Subcategory	EAL
AU1	1	R – Abnormal Rad Levels / Rad Effluent, 1 – Radiological Effluent	RU1.1
AU1	2	R – Abnormal Rad Levels / Rad Effluent, 1 – Radiological Effluent	RU1.1
AU1	3	R – Abnormal Rad Levels / Rad Effluent, 1 – Radiological Effluent	RU1.2
AU2	1	R – Abnormal Rad Levels / Rad Effluent, 2 – Irradiated Fuel Event	RU2.1
AA1	1	R – Abnormal Rad Levels / Rad Effluent, 1 – Radiological Effluent	RA1.1
AA1	2	R – Abnormal Rad Levels / Rad Effluent, 1 – Radiological Effluent	RA1.2
AA1	3	R – Abnormal Rad Levels / Rad Effluent, 1 – Radiological Effluent	RA1.3
AA1	4	R – Abnormal Rad Levels / Rad Effluent, 1 – Radiological Effluent	RA1.4
AA2	1	R – Abnormal Rad Levels / Rad Effluent, 2 – Irradiated Fuel Event	RA2.1
AA2	2	R – Abnormal Rad Levels / Rad Effluent, 2 – Irradiated Fuel Event	RA2.2
AA2	3	R – Abnormal Rad Levels / Rad Effluent, 2 – Irradiated Fuel Event	RA2.3
AA3	1	R – Abnormal Rad Levels / Rad Effluent, 3 – Area Radiation Levels	RA3.1
AA3	2	R – Abnormal Rad Levels / Rad Effluent, 3 – Area Radiation Levels	RA3.2
AS1	1	R – Abnormal Rad Levels / Rad Effluent, 1 – Radiological Effluent	RS1.1
AS1	2	R – Abnormal Rad Levels / Rad Effluent, 1 – Radiological Effluent	RS1.2
AS1	3	R – Abnormal Rad Levels / Rad Effluent, 1 – Radiological Effluent	RS1.3

NEI		ONS	
IC	Example EAL	Category and Subcategory	EAL
AS2	1	R – Abnormal Rad Levels / Rad Effluent, 2 – Irradiated Fuel Event	RS2.1
AG1	1	R – Abnormal Rad Levels / Rad Effluent, 1 – Radiological Effluent	RG1.1
AG1	2	R – Abnormal Rad Levels / Rad Effluent, 1 – Radiological Effluent	RG1.2
AG1	3	R – Abnormal Rad Levels / Rad Effluent, 1 – Radiological Effluent	RG1.3
AG2	1	R – Abnormal Rad Levels / Rad Effluent, 2 – Irradiated Fuel Event	RG2.1
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 ESF 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 ESF 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	N/A	N/A

NEI		ONS	
IC	Example EAL	Category and Subcategory	EAL
CS1	2	N/A	N/A
CS1	3	C – Cold SD/ Refueling System Malfunction, 1 – RCS Level	CS1.1
CG1	1	N/A	N/A
CG1	2	C – Cold SD/ Refueling System Malfunction, 1 – RCS Level	CG1.1
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	HU3.5
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		ONS	
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
N/A	N/A	H – Hazards and Other Conditions Affecting Plant Safety, 3 – Natural or Technological Hazard	HS3.1
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	H – Hazards and Other Conditions Affecting Plant Safety, 1 – Security	HG1.1
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

NEI		ONS	
IC	Example EAL	Category and Subcategory	EAL
SU5	2	S – System Malfunction, 6 – RPS Failure	SU6.2
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		ONS EAL	Description
IC	Example EAL		
N/A	N/A	N/A	N/A

Category A

Abnormal Rad Levels / Radiological Effluent

NEI IC#	NEI IC Wording and Mode Applicability	ONS IC#(s)	ONS IC Wording and Mode Applicability	Difference Justification
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	RU1	Release of gaseous or liquid radioactivity greater than 2 times the SLC/TS limits for 60 minutes or longer MODE: All	The ONS SLC/TS is the site-specific effluent release controlling document.

NEI Ex. EAL #	NEI Example EAL Wording	ONS EAL #	ONS EAL Wording	Difference Justification
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)	RU1.1	Reading on **any** Table R-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. 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 R-1 effluent radiation monitor > column "UE". UE thresholds for all ONS continuously monitored gaseous release pathways are listed in Table R-1 to consolidate the information in a single location and, thereby, simplify identification of the thresholds by the EAL user. The values shown in Table R-1 column "UE", consistent with the NEI bases, represent two times the SLC/TS release limits for both liquid and gaseous 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.			
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	RU1.2	Sample analysis for a gaseous or liquid release indicates a concentration or release rate > SLC/TS limits for ≥ 60 min. (Notes 1, 2)	The ONS SLC/TS is the site-specific effluent release controlling document.

NEI Ex. EAL #	NEI Example EAL Wording	ONS EAL #	ONS EAL Wording	Difference Justification
	60 minutes or longer.			
Notes	• The Emergency Director should declare the Unusual Event promptly upon determining that 60 minutes has been exceeded, or will likely be exceeded.	N/A	Note 1: The Emergency Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.	The classification timeliness note has been standardized across the ONS EAL scheme by referencing the "time limit" specified within the EAL wording.
	• If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded 60 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 ONS 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, indicating that the release path is isolated, the effluent monitor reading is no longer VALID for classification purposes.	None

Table R-1 Effluent Monitor Classification Thresholds						
Release Point		Monitor	GE	SAE	Alert	UE
Gaseous	Unit 1/2/3 Plant Vent	RIA-45	----	----	----	1.41E+5 cpm
	Unit 1/2/3 Plant Vent	RIA-46	3.00E+5 cpm	3.00E+4 cpm	3.00E+3 cpm	----
Liquid	Liquid Radwaste Discharge	RIA-33	----	----	----	4.79E+5 cpm

NEI IC#	NEI IC Wording and Mode Applicability	ONS IC#(s)	ONS IC Wording and Mode Applicability	Difference Justification
AU2	UNPLANNED loss of water level above irradiated fuel. MODE: All	RU2	Unplanned loss of water level above irradiated fuel MODE: All	None

NEI Ex. EAL #	NEI Example EAL Wording	ONS EAL #	ONS EAL Wording	Difference Justification
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)	RU2.1	UNPLANNED water level drop in the REFUELING PATHWAY as indicated by low water level alarm or indication **AND** UNPLANNED rise in corresponding area radiation levels as indicated by **EITHER** of the following radiation monitors: • RIA-3 RB Refueling Deck Shield Wall • RIA-6 Spent Fuel Building Wall • Portable area monitors on the main bridge or SFP bridge	The term "corresponding" has been added to the EAL to associate the area of the level drop with the area experiencing the rise in area radiation. The site-specific list of radiation monitors are listed in bullet format for ease of reading.

NEI IC#	NEI IC Wording	ONS IC#(s)	ONS IC Wording	Difference Justification
AA1	Release of gaseous or liquid radioactivity resulting in offsite dose greater than 10 mrem TEDE or 50 mrem thyroid CDE. MODE: All	RA1	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	ONS EAL #	ONS EAL Wording	Difference Justification
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)	RA1.1	Reading on **any** Table R-1 effluent radiation monitor > column "ALERT" for ≥ 15 min. (Notes 1, 2, 3, 4)	The ONS radiation monitors that detect radioactivity effluent release to the environment are listed in Table R-1. UE, Alert, SAE and GE thresholds for all ONS continuously monitored gaseous and liquid release pathways are listed in Table R-1 to consolidate the information in a single location and, thereby, simplify identification of the thresholds by the EAL-user.
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).	RA1.2	Dose assessment using actual meteorology indicates doses > 10 mrem TEDE or 50 mrem thyroid CDE at or beyond the SITE BOUNDARY (Notes 3, 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.	RA1.3	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.	RA1.4	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.
Notes	• The Emergency Director should declare the Alert 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. • The pre-calculated effluent monitor values presented in EAL #1 should be used for emergency classification	N/A	Note 1: The Emergency Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be 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, indicating that the release path is isolated, the effluent monitor reading is no longer VALID for classification purposes. Note 4 The pre-calculated effluent monitor values presented in EALs RA1.1, RS1.1 and RG1.1 should be used for emergency classification	The classification timeliness note has been standardized across the ONS EAL scheme by referencing the "time limit" specified within the EAL wording. The classification timeliness note has been standardized across the ONS EAL scheme by referencing the "time limit" specified within the EAL wording. None Incorporated site-specific EAL numbers associated with generic EAL#1.

	assessments until the results from a dose assessment using actual meteorology are available.		assessments until the results from a dose assessment using actual meteorology are available.		

NEI IC#	NEI IC Wording	ONS IC#(s)	ONS IC Wording	Difference Justification
AA2	Significant lowering of water level above, or damage to, irradiated fuel. MODE: All	RA2	Significant lowering of water level above, or damage to, irradiated fuel MODE: All	None

NEI Ex. EAL #	NEI Example EAL Wording	ONS EAL #	ONS EAL Wording	Difference Justification
1	Uncovery of irradiated fuel in the REFUELING PATHWAY.	RA2.1	Uncovery of irradiated fuel in the REFUELING PATHWAY	None
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)	RA2.2	Damage to irradiated fuel resulting in a release of radioactivity **AND** HIGH alarm on **any** of the following radiation monitors: • RIA-3 RB Refueling Deck Shield Wall • RIA-6 Spent Fuel Building Wall • RIA-41 Spend Fuel Pool Gas • RIA-49 RB Gas • Portable area monitors on the main bridge or SFP bridge	The NEI phrase "...from the fuel as indicated by ANY of the following radiation monitors" has been replaced with "...AND HIGH alarm on **any** of the following radiation monitors" for clarification that the classification requires two conditions: damage to fuel and a resultant high radiation alarm. The site-specific list of radiation monitors are listed in bullet format for ease of reading. The high alarm setpoint for the radiation monitors are indicative of significant increases in area and/or airborne radiation.
3	Lowering of spent fuel pool level to (site-specific Level 2 value). *[See Developer Notes]*	RA2.3	Lowering of spent fuel pool level to -13.5 ft.	SFP level instruments 1/2/3SFP0010 (primary) and 011 (backup) measure SFP level relative to normal water level (El. 840 ft.) from + 1 ft. to -23.5 ft. (El. 816.4 ft). For ONS Level 2 corresponds to an indicated water level of -13.5 ft. (El. 826.5 ft.) (ref. 1).

NEI IC#	NEI IC Wording	ONS IC#(s)	ONS IC Wording	Difference Justification
AA3	Radiation levels that impede access to equipment necessary for normal plant operations, cooldown or shutdown MODE: All	RA3	Radiation levels that IMPEDE access to equipment necessary for normal plant operations, cooldown or shutdown MODE: All	None

NEI Ex. EAL #	NEI Example EAL Wording	ONS EAL #	ONS EAL Wording	Difference Justification
1	Dose rate greater than 15 mR/hr in **ANY** of the following areas: • Control Room • Central Alarm Station • (other site-specific areas/rooms)	RA3.1	Dose rate > 15 mR/hr in **EITHER** of the following areas: • Control Room (RIA-1) • Central Alarm Station (by survey)	No other site-specific areas requiring continuous occupancy exist at ONS. ARM RIA-1 is a permanently installed radiation monitor in the Control Room. The CAS does not have installed area radiation monitoring and thus must be determined by survey.
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)	RA3.2	An UNPLANNED event results in radiation levels that prohibit or IMPEDE access to any Table R-2 rooms or areas (Note 5)	Table R-2 contains the site-specific list of plant rooms or areas with entry-related mode applicability identified.
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.	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 R-2 Safe Operation & Shutdown Rooms/Areas	
Room/Area	**Mode Applicability**
Turbine Building	1, 2, 3
Equipment and Cable Rooms	1, 2, 3
Auxiliary Building	1, 2, 3, 4, 5
Reactor Buildings	3, 4, 5

NEI IC#	NEI IC Wording	ONS IC#(s)	ONS IC Wording	Difference Justification
AS1	Release of gaseous radioactivity resulting in offsite dose greater than 100 mrem TEDE or 500 mrem thyroid CDE MODE: All	RS1	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	ONS EAL #	ONS EAL Wording	Difference Justification
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)	RS1.1	Reading on **any** Table R-1 effluent radiation monitor > column "SAE" for ≥ 15 min. (Notes 1, 2, 3, 4)	The ONS radiation monitors that detect radioactivity effluent release to the environment are listed in Table R-1. UE, Alert, SAE and GE thresholds for all ONS continuously monitored gaseous and liquid release pathways are listed in Table R-1 to consolidate the information in a single location and, thereby, simplify identification of the thresholds by the EAL-user.
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)	RS1.2	Dose assessment using actual meteorology indicates doses > 100 mrem TEDE or 500 mrem thyroid CDE at or beyond the SITE BOUNDARY (Notes 3, 4)	The site boundary is the site-specific receptor point.
3	Field survey results indicate **EITHER** of the following at or 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	RS1.3	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.	The site boundary is the site-specific receptor point.

	CDE greater than 500 mrem for one hour 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. • 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 1: The Emergency Coordinator should declare the event *promptly upon determining* that time limit has been exceeded, or will likely be 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, indicating that *the release path is isolated*, the effluent monitor reading is no longer VALID for classification purposes. Note 4: The pre-calculated effluent monitor values presented in EALs RA1.1, RS1.1 and RG1.1 should be used for emergency classification assessments until the results from a dose assessment using actual meteorology are available.	The classification timeliness note has been standardized across the ONS EAL scheme by referencing the "time limit" specified within the EAL wording. The classification timeliness note has been standardized across the ONS EAL scheme by referencing the "time limit" specified within the EAL wording. None Incorporated site-specific EAL numbers associated with generic EAL#1.

NEI IC#	NEI IC Wording	ONS IC#(s)	ONS IC Wording	Difference Justification
AS2	Spent fuel pool level at (site-specific Level 3 description) MODE: All	RS2	Spent fuel pool level at the top of the fuel racks	Top of the fuel racks is the site-specific Level 3 description.

NEI Ex. EAL #	NEI Example EAL Wording	ONS EAL #	ONS EAL Wording	Difference Justification
1	*Lowering of spent fuel pool level* to (site-specific Level 3 value)	RS2.1	*Lowering of spent fuel pool level* ≤ -23.5 ft.	SFP level *instruments* 1/2/3SFP0010 (primary) *and* 011 (backup) measure SFP level relative to normal water level (El. 840 ft.) from + 1 ft. to -23.5 ft. (El. 816.4 ft). For ONS Level 3 corresponds to an indicated water level of -23.5 ft. (El. 816.5 ft.)

NEI IC#	NEI IC Wording	ONS IC#(s)	ONS IC Wording	Difference Justification
AG1	Release of gaseous radioactivity resulting in offsite dose greater than 1,000 mrem TEDE or 5,000 mrem thyroid CDE. MODE: All	RG1	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	ONS EAL #	ONS EAL Wording	Difference Justification
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)	RG1.1	Reading on **any** Table R-1 effluent radiation monitor > column "GE" for ≥ 15 min. (Notes 1, 2, 3, 4)	The ONS radiation monitors that detect radioactivity effluent release to the environment are listed in Table R-1. UE, Alert, SAE and GE thresholds for all ONS continuously monitored gaseous or liquid release pathways are listed in Table R-1 to consolidate the information in a single location and, thereby, simplify identification of the thresholds by the EAL-user.
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).*	RG1.2	*Dose assessment using actual meteorology indicates doses > 1,000 mrem TEDE or 5,000 mrem thyroid CDE at or beyond the SITE BOUNDARY (Notes 3, 4)*	*The site boundary is the site-specific receptor point.*
3	Field survey results indicate **EITHER** of the following at or 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	RG1.3	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.	The site boundary is the site-specific receptor point.

	one hour 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. • 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 1: The Emergency Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be 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, indicating that the release path is isolated, the effluent monitor reading is no longer VALID for classification purposes. Note 4 The pre-calculated effluent monitor values presented in EALs RA1.1, RS1.1 and RG1.1 should be used for emergency classification assessments until the results from a dose assessment using actual meteorology are available.	The classification timeliness note has been standardized across the ONS EAL scheme by referencing the "time limit" specified within the EAL wording. The classification timeliness note has been standardized across the ONS EAL scheme by referencing the "time limit" specified within the EAL wording. None Incorporated site-specific EAL numbers associated with generic EAL#1.

NEI IC#	NEI IC Wording	ONS IC#(s)	ONS IC Wording	Difference Justification
AG2	Spent fuel pool level cannot be restored to at least (site-specific Level 3 description) for 60 minutes or longer MODE: All	RG2	Spent fuel pool level cannot be restored to at least the top of the fuel racks for 60 minutes or longer	Top of the fuel racks is the site-specific Level 3 description.

NEI Ex. EAL #	NEI Example EAL Wording	ONS EAL #	ONS EAL Wording	Difference Justification
1	Spent fuel pool level cannot be restored to at least (site-specific Level 3 value) for 60 minutes or longer	RG2.1	Spent fuel pool level cannot be restored to at least -23.5 ft. for ≥ 60 min. (Note 1)	SFP level instruments 1/2/3SFP0010 (primary) and 011 (backup) measure SFP level relative to normal water level (El. 840 ft.) from + 1 ft. to -23.5 ft. (El. 816.4 ft). *For ONS Level 3 corresponds to an indicated water level of* -23.5 ft. (El. 816.5 ft.)
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 Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.	The classification timeliness note has been standardized across the ONS EAL scheme by referencing the "time limit" specified within the EAL wording.

Category C

Cold Shutdown / Refueling System Malfunction

NEI IC#	NEI IC Wording	ONS IC#(s)	ONS IC Wording	Difference Justification
CU1	UNPLANNED loss of (reactor vessel/RCS [*PWR*] or RCP [*BWR*]) inventory for 15 minutes or longer. MODE: Cold Shutdown, Refueling	CU1	UNPLANNED loss of RCS inventory for 15 minutes or longer MODE: 5 - Cold Shutdown, 6 - Refueling	None

NEI Ex. EAL #	NEI Example EAL Wording	ONS EAL #	ONS EAL Wording	Difference Justification
1	UNPLANNED loss of reactor coolant results in (reactor vessel/RCS [*PWR*] or RCP [*BWR*]) level less than a required lower limit for 15 minutes or longer.	CU1.1	UNPLANNED loss of reactor coolant results in RCS water level less than a required lower limit for ≥ 15 min. (Note 1)	None
2	a. (Reactor vessel/RCS [*PWR*] or RCP [*BWR*]) level cannot be monitored. **AND** b. UNPLANNED increase in (*site-specific sump and/or tank*) levels.	CU1.2	RCS water level **cannot** be monitored **AND EITHER** • UNPLANNED increase in any Table C-1 sump/tank level due to loss of RCS inventory • Visual observation of UNISOLABLE RCS leakage	Added the phrase "due to a loss of RCS inventory" because the NEI basis states: "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." Added bulleted criterion "Visual observation of UNISOLABLE RCS leakage" to include direct observation of RCS leakage. Table C-1 lists the site-specific sumps and tanks.
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 Coordinator should declare the event promptly upon determining that time limit has been	The classification timeliness note has been standardized across the ONS EAL scheme by referencing the "time limit" specified within the EAL wording.

				exceeded, or will likely be exceeded.	

Table C-1 Sumps / Tanks
• RB Normal Sumps • RB Emergency Sumps • Core Flood Tank • Quench Tank • Low Activity Waste Tank • High Activity Waste Tank • Miscellaneous Waste Holdup Tank • LPI Room Sumps

NEI IC#	NEI IC Wording	ONS IC#(s)	ONS IC Wording	Difference Justification
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 essential buses for 15 minutes or longer. MODE: 5 - Cold Shutdown, 6 - Refueling, NM – No Mode	The ONS essential buses are the site-specific emergency buses.

NEI Ex. EAL #	NEI Example EAL Wording	ONS EAL #	ONS EAL Wording	Difference Justification
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-3, to essential 4160 V buses MFB-1 and MFB-2 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	4160V buses MFB-1and MFB-2 are the site-specific emergency buses. Site-specific AC power sources are listed in Table C-3.
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 Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.	The classification timeliness note has been standardized across the ONS EAL scheme by referencing the "time limit" specified within the EAL wording.

Table C-3 AC Power Sources
Offsite: • Unit Normal Transformer (backcharged) • Unit Startup Transformer (SWYD) • Another Unit Startup Transformer (aligned) (SWYD) • CT5 (Central/energizing Standby Bus) **Emergency:** • Unit Startup Transformer (Keowee) • Another Unit Startup Transformer (aligned) (Keowee) • CT4 • CT5 (dedicated line/energizing Standby Bus)

NEI IC#	NEI IC Wording	ONS IC#(s)	ONS IC Wording	Difference Justification
CU3	UNPLANNED increase in RCS temperature MODE: Cold Shutdown, Refueling	CU3	UNPLANNED increase in RCS temperature MODE: 5 - Cold Shutdown, 6 - Refueling	None

NEI Ex. EAL #	NEI Example EAL Wording	ONS EAL #	ONS EAL Wording	Difference Justification
1	UNPLANNED increase in RCS temperature to greater than (site-specific Technical Specification cold shutdown temperature limit)	CU3.1	UNPLANNED increase in RCS temperature to > 200°F due to loss of decay heat removal capability	200°F is the site-specific Tech. Spec. cold shutdown temperature limit. Added "due to loss of decay heat removal capability" to reinforce the generic bases that states "EAL #1 involves a loss of decay heat removal capability"
2	Loss of **ALL** RCS temperature and (reactor vessel/RCS [*PWR*] or RCP [*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 Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.	The classification timeliness note has been standardized across the ONS EAL scheme by referencing the "time limit" specified within the EAL wording.

NEI IC#	NEI IC Wording	ONS IC#(s)	ONS IC Wording	Difference Justification
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	ONS EAL #	ONS EAL Wording	Difference Justification
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 < 105VDC on vital DC buses **required** by Technical Specifications for ≥ 15 min. (Note 1)	105 VDC is the site-specific minimum vital DC bus voltage. DC operability requirements are specified in Technical Specifications.
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 Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.	The classification timeliness note has been standardized across the ONS EAL scheme by referencing the "time limit" specified within the EAL wording.

NEI IC#	NEI IC Wording	ONS IC#(s)	ONS IC Wording	Difference Justification
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, NM – No Mode	None

NEI Ex. EAL #	NEI Example EAL Wording	ONS EAL #	ONS EAL Wording	Difference Justification
1	Loss of **ALL** of the following onsite communication methods: (site specific list of communications methods)	CU5.1	Loss of **all** Table C-5 onsite communication methods **OR** Loss of **all** Table C-5 offsite communication methods **OR** Loss of **all** Table C-5 NRC communication methods	Example EALs #1, 2 and 3 have been combined into a single EAL for simplification of presentation. Changed "ORO" to read "offsite" as ORO is not a known acronym at ONS. Table C-5 provides a site-specific list of onsite, offsite (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-5 Communication Methods			
System	**Onsite**	**Offsite**	**NRC**
Commercial phone service	X	X	X
ONS site phone system	X	X	X
EOF phone system	X	X	X
Public Address system	X		
Onsite radio system	X		
DEMNET		X	
Offsite radio system		X	
NRC Emergency Telephone System			X
Satellite Phone	X	X	X

NEI IC#	NEI IC Wording	ONS IC#(s)	ONS IC Wording	Difference Justification
CA1	Loss of (reactor vessel/RCS [*PWR*] or RCP [*BWR*]) inventory MODE: Cold Shutdown, Refueling	CA1	Loss of RCS inventory MODE: 5 - Cold Shutdown, 6 - Refueling	None

NEI Ex. EAL #	NEI Example EAL Wording	ONS EAL #	ONS EAL Wording	Difference Justification
1	Loss of (reactor vessel/RCS [*PWR*] or RCP [*BWR*]) inventory as indicated by level less than (site-specific level).	CA1.1	Loss of RCS inventory as indicated by RCS water level < 10" (LT-5)	10" RCS level indication is the lowest level for continued operation of LPI pumps for decay heat removal.
2	a. (Reactor vessel/RCS [*PWR*] or RCP [*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 RCP [*BWR*]) inventory.	CA1.2	RCS water level **cannot** be monitored for ≥ 15 min. (Note 1) **AND EITHER** • UNPLANNED increase in any Table C-1 Sump / Tank level due to a loss of RCS inventory • Visual observation of UNISOLABLE RCS leakage	Added the phrase "due to a loss of RCS inventory" because the NEI basis states: "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." Added bulleted criterion "Visual observation of UNISOLABLE RCS leakage" to include direct observation of RCS leakage. Table C-1 lists the site-specific sumps and tanks.
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 Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.	The classification timeliness note has been standardized across the ONS EAL scheme by referencing the "time limit" specified within the EAL wording.

NEI IC#	NEI IC Wording	ONS IC#(s)	ONS IC Wording	Difference Justification
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** emergency AC power to essential buses for 15 minutes or longer. MODE: 5 - Cold Shutdown, 6 - Refueling, NM – No Mode	The ONS essential buses are the emergency buses. “emergency” is the ONS-specific term for ‘onsite’ AC power.

NEI Ex. EAL #	NEI Example EAL Wording	ONS EAL #	ONS EAL Wording	Difference Justification
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** emergency AC power capability, Table C-3, to essential 4160V buses MFB-1 and MFB-2 for ≥ 15 min. (Note 1)	4160V buses MFB-1and MFB-2 are the site-specific emergency buses. Site-specific AC power sources are tabularized in Table C-3. “emergency” is the ONS-specific term for ‘onsite’ AC power.
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 Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.	The classification timeliness note has been standardized across the ONS EAL scheme by referencing the "time limit" specified within the EAL wording.

NEI IC#	NEI IC Wording	ONS IC#(s)	ONS IC Wording	Difference Justification
CA3	Inability to maintain the plant in cold shutdown. MODE: Cold Shutdown, Refueling	CA3	Inability to maintain the plant in cold shutdown. MODE: 5 - Cold Shutdown, 6 - Refueling	None

NEI Ex. EAL #	NEI Example EAL Wording	ONS EAL #	ONS EAL Wording	Difference Justification
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 increase in RCS temperature to > 200°F for > Table C-4 duration (Note 1) **OR** UNPLANNED RCS pressure increase > 10 psig due to a loss of RCS cooling (this EAL does not apply during water-solid plant conditions)	Example EALs #1 and #2 have been combined into a single EAL. 200°F is the site-specific Tech. Spec. cold shutdown temperature limit. Table C-4 is the site-specific implementation of the generic RCS Heat-up Duration Threshold table. 10 psig is the site-specific pressure increase 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 Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.	The classification timeliness note has been standardized across the ONS EAL scheme by referencing the "time limit" specified within the EAL wording.

Table: RCS Heat-up Duration Thresholds		
RCS Status	**Containment Closure Status**	**Heat-up Duration**
Intact (but not at reduced inventory [*PWR*])	Not applicable	60 minutes*
Not intact (or at reduced inventory [*PWR*])	Established	20 minutes*
	Not Established	0 minutes
* 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: RCS Heat-up Duration Thresholds		
RCS Status	**CONTAINMENT CLOSURE Status**	**Heat-up Duration**
Intact (but **not** REDUCED INVENTORY)	N/A	60 min.*
Not intact **OR** REDUCED 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.		

NEI IC#	NEI IC Wording	ONS IC#(s)	ONS IC Wording	Difference Justification
CA6	Hazardous event affecting a SAFETY SYSTEM needed for the current operating mode. MODE: Cold Shutdown, Refueling	CA6	Hazardous event affecting a SAFETY SYSTEM needed for the current operating mode. MODE: 5 - Cold Shutdown, 6 - Refueling	None

NEI Ex. EAL #	NEI Example EAL Wording	ONS EAL #	ONS EAL Wording	Difference Justification
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-6 hazardous event **AND EITHER**: • Event damage has caused indications of degraded performance in at least one train of a SAFETY SYSTEM needed for the current operating mode • The event has caused VISIBLE DAMAGE to a SAFETY SYSTEM component or structure needed for the current operating mode	The hazardous events have been tabularized in Table C-6.

Table C-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	ONS IC#(s)	ONS IC Wording	Difference Justification
CS1	Loss of (reactor vessel/RCS [*PWR*] or RCP [*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	ONS EAL #	ONS EAL Wording	Difference Justification
1	a. CONTAINMENT CLOSURE not established. **AND** b. (Reactor vessel/RCS [*PWR*] or RCP [*BWR*]) level less than (site-specific level).	N/A	N/A	The design and operation of water level instrumentation is such that the "site-specific level" (6" below the bottom ID of the RCS loop) cannot be determined at any time during Cold Shutdown or Refueling modes, Classification is accomplished in accordance with EAL #3.
2	a. CONTAINMENT CLOSURE established. **AND** b. (Reactor vessel/RCS [*PWR*] or RCP [*BWR*]) level less than (site-specific level).	N/A	N/A	The design and operation of water level instrumentation is such that the "site-specific level" (top of active fuel) cannot be determined at any time during Cold Shutdown or Refueling modes, Classification is accomplished in accordance with EAL #3.
3	a. (Reactor vessel/RCS [*PWR*] or RCP [*BWR*]) level cannot be monitored for 30 minutes or longer. **AND** b. Core uncovery is indicated by **ANY** of the following:	CS1.1	RCS water level **cannot** be monitored for ≥ 30 min. (Note 1) **AND** Core uncovery is indicated by **any** of the following: • UNPLANNED increase in any Table C-1 sump/tank	Added the phrase "due to a loss of RCS inventory" because the NEI basis states: "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." Added bulleted criterion "Visual observation of UNISOLABLE RCS leakage" to include direct observation of RCS leakage. Table C-1 lists the site-specific sumps and tanks.

	• (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)		level due to a loss of RCS inventory • Visual observation of unisolable RCS leakage • High alarm on RIA-3 RB Refueling Deck Shield Wall • Erratic Source Range Monitor indication	RIA-3 RB Refueling Deck Shield Wall monitor is located in the containment in proximity to the reactor cavity and is designed to provide monitoring of radiation due to a fuel handling event or loss of shielding during refueling operations. If this radiation monitor reaches and exceeds the high alarm, a loss of inventory with potential to uncover the core is likely to have occurred.
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 Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.	The classification timeliness note has been standardized across the ONS EAL scheme by referencing the "time limit" specified within the EAL wording.

NEI IC#	NEI IC Wording	ONS IC#(s)	ONS IC Wording	Difference Justification
CG1	Loss of (reactor vessel/RCS [*PWR*] or RCP [*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	ONS EAL #	ONS EAL Wording	Difference Justification
1	a. (Reactor vessel/RCS [*PWR*] or RCP [*BWR*]) level less than (site-specific level) for 30 minutes or longer. **AND** b. **ANY** indication from the Containment Challenge Table (see below).	N/A	N/A	The design and operation of water level instrumentation is such that the "site-specific level" (top of active fuel) cannot be determined at any time during Cold Shutdown or Refueling modes, Classification is accomplished in accordance with EAL #2.
2	a. (Reactor vessel/RCS [*PWR*] or RCP [*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*]	CG1.1	RCS water level **cannot** be monitored for ≥ 30 min. (Note 1 **AND** Core uncovery is indicated by **any** of the following: • UNPLANNED increase in any Table C-1 sump/tank level • Visual observation of UNISOLABLE RCS leakage • High alarm on RIA-3 RB	Added bulleted criterion "Visual observation of UNISOLABLE RCS leakage" to include direct observation of RCS leakage. Table C-1 lists the site-specific sumps and tanks. RIA-3 RB Refueling Deck Shield Wall monitor is located in the containment in proximity to the reactor cavity and is designed to provide monitoring of radiation due to a fuel handling event or loss of shielding during refueling operations. If this radiation monitor reaches and exceeds the high alarm, a loss of inventory with potential to uncover the core is likely to have occurred. Erratic Wide Range Flux Monitor indication has been added to the ONS EAL because it may provide indication of core uncovery. Table C-2 provides a tabularized list of containment challenge indications.

	• 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).		Refueling Deck Shield Wall • Erratic Source Range Monitor indication **AND** **Any** Containment Challenge indication, Table C-2	4% hydrogen concentration in the presence of oxygen represents combustible mixture in containment.
Note	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 Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be 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 ONS EAL scheme by referencing the "time limit" specified within the EAL wording. Note 6 implements the asterisked note associated with the generic 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.

Table C-2 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	ONS IC#(s)	ONS IC Wording	Difference Justification
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. ONS is not a defueled station.

Category E

Independent Spent Fuel Storage Installation

NEI IC#	NEI IC Wording	ONS IC#(s)	ONS IC Wording	Difference Justification
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	ONS EAL #	ONS EAL Wording	Difference Justification
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 canister CONFINEMENT BOUNDARY as indicated by an on-contact radiation reading on the surface of a loaded spent fuel cask > **any** Table E-1 IFSFI dose limit	The Table E-1 radiation readings are 2 times the site-specific cask specific technical specification allowable radiation levels for a loaded DSC.

Table E-1 ISFSI Dose Limits			
Location	**24PHB**	**37PTH**	**69BTH**
HSM front bird screen	1,050 mrem/hr	1,050 mrem/hr	500 mrem/hr
Outside HSM door	40 mrem/hr	4 mrem/hr	4 mrem/hr
End shield wall exterior	550 mrem/hr	8 mrem/hr	8 mrem/hr

Category F

Fission Product Barrier Degradation

NEI IC#	NEI IC Wording	ONS IC#(s)	ONS IC Wording	Difference Justification
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	ONS EAL #	ONS EAL Wording	Difference Justification
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	ONS IC#(s)	ONS IC Wording	Difference Justification
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	ONS EAL #	ONS EAL Wording	Difference Justification
1	Loss or Potential Loss of any two barriers	FS1.1	Loss or potential loss of **any** two barriers	Table F-1 provides the fission product barrier loss and potential loss thresholds.

NEI IC#	NEI IC Wording	ONS IC#(s)	ONS IC Wording	Difference Justification
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	ONS EAL #	ONS EAL Wording	Difference Justification
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	ONS FPB #(s)	ONS FPB Wording	Difference Justification
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).	FC Loss B.1	CETCs > 1200°F	None
FC Loss 3	**RCS Activity/CMT Rad** 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)	FC Loss C.1	1/2/3RIA 57/58 > Table F-2 column "FC Loss"	RIA 57 and RIA 58 are the site-specific containment high range radiation monitors. The Table F-2 readings are derived assuming the instantaneous release and dispersal of the reactor coolant noble gas and iodine inventory associated with approximately 4% fuel cladding failure into the Containment atmosphere. The values are based on time after shutdown.
		FC Loss C.2	Coolant activity > 300 μCi/ml DEI	None
FC Loss 4	**CMT 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 ONS.

NEI FPB#	NEI Threshold Wording	ONS FPB #(s)	ONS FPB Wording	Difference Justification
FC Loss 6	**ED Judgment** A. **ANY** condition in the opinion of the Emergency Director that indicates Loss of the Fuel Clad Barrier.	FC Loss E.1	**Any** condition in the judgment of the Emergency Coordinator that indicates loss of the fuel clad barrier	Replaced the word "opinion" with "judgment" to align with the category title and with the Hazards judgment EAL wording.
FC P-Loss 1	**RCS or SG Tube Leakage** A. RCS/reactor vessel level less than (site-specific level)	FC P-Loss A.1	RVLS ≤ 0" (Note 9) Note 9: RVLS is **not** valid if **EITHER** of the following exists: - One or more RCPs are running **OR** - LPI pump(s) are running **AND** taking suction from the LPI drop line	RVLS indicated level ≤ 0" with all RCPs and both LPI pumps taking suction from the drop line not running represents reactor vessel level below the bottom of the RCS hotleg (without instrument uncertainty considered). This is the lowest measurable reactor vessel level and is used in lieu of actual reactor vessel level indication of level at or below top of active fuel. Note 9 added to specify conditions under which RVLS cannot be used.
FC P-Loss 2	**Inadequate Heat Removal** 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).	FC P-Loss B.1	CETCs > 700°F	None
		FC P-Loss B.2	RCS heat removal cannot be established **AND** RCS subcooling < 0°F	RCS subcooling < 0°F is indicative of a loss of RCS heat removal and entry into HPI forced cooling.
FC P-Loss 3	**RCS Activity/CMT Rad** Not Applicable	N/A	N/A	N/A

NEI FPB#	NEI Threshold Wording	ONS FPB #(s)	ONS FPB Wording	Difference Justification
FC P-Loss 4	**CMT 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 ONS.
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.	FC P-Loss E.1	**Any** condition in the judgment of the Emergency Coordinator that indicates potential loss of the fuel clad barrier	Replaced the word "opinion" with "judgment" to align with the category title and with the Hazards judgment EAL wording.

PWR RCS Fission Product Barrier Degradation Thresholds

NEI FPB#	NEI IC Wording	ONS FPB #(s)	ONS FPB Wording	Difference Justification
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.	RCS Loss A.1	An automatic or manual ES actuation required by **EITHER**: • UNISOLABLE RCS leakage • SG tube RUPTURE	None
RCS Loss 2	**Inadequate Heat Removal** Not Applicable	N/A	N/A	N/A
RCS Loss 3	**RCS Activity/CMT Rad** A. Containment radiation monitor reading greater than (site-specific value).	RCS Loss C.1	Containment radiation: • 1,3 RIA 57/58 > 1.0 R/hr • 2 RIA 57 > 1.6 R/hr • 2 RIA 58 > 1.0 R/hr	RIA 57 and RIA 58 are the site-specific containment high range radiation monitors. The readings assume the instantaneous release and dispersal of the reactor coolant noble gas and iodine inventory associated with normal operating concentrations (i.e., within Technical Specifications) into the Containment atmosphere. The difference in the threshold values is due to the relative strength of the detector check source which affects the background readings for the detector (the source for 2RIA-57 is stronger than that for the other detectors).
RCS Loss 4	**CNMT Integrity or Bypass** Not Applicable	N/A	N/A	N/A

NEI FPB#	NEI IC Wording	ONS FPB #(s)	ONS FPB Wording	Difference Justification
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 ONS.
RCS Loss 6	**Emergency Director Judgment** A. **ANY** condition in the opinion of the Emergency Director that indicates Loss of the RCS Barrier.	RCS Loss E.1	**Any** condition in the judgment of the Emergency Coordinator that indicates loss of the RCS barrier	Replaced the word "opinion" with "judgment" to align with the category title and with the Hazards judgment EAL wording.
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).	RCS P-Loss A.1	RCS leakage > normal makeup capacity due to **EITHER:** • UNISOLABLE RCS leakage • SG tube leakage	ONS normal makeup capacity is not limited by makeup (HPI) capacity but rather makeup line size. The startup of a second makeup would not increase RCS makeup rate.
		RCS P-Loss A.2	RCS cooldown < 400°F at > 100°F/hr **OR** HPI has operated in the injection mode with **no** RCPs operating	400°F is the temperature below which a cooldown greater than 100°F/hr requires implementation of Pressure Thermal Shock (PTS) guidance (Rule 8). HPI operating in the injection mode with **no** RCPs operating is also a PTS entry criteria (Rule 8).
RCS P-Loss 2	**Inadequate Heat Removal** A. Inadequate RCS heat removal capability via steam generators as indicated by (site-specific indications).	RCS P-Loss B.1	RCS heat removal cannot be established **AND** RCS subcooling < 0°F	RCS subcooling < 0°F is indicative of a significant loss of RCS heat removal and entry into HPI forced cooling.

NEI FPB#	NEI IC Wording	ONS FPB #(s)	ONS FPB Wording	Difference Justification
RCS P-Loss 3	**CS Activity/CMT Rad** Not Applicable	N/A	N/A	N/A
RCS P-Loss 4	**CMT Integrity or Bypass** Not Applicable	N/A	N/A	N/A
RCS P-Loss 5	**Other Indications** A. (site-specific as applicable)	RCS P-Loss B.2	HPI forced cooling initiated	HPI forced cooling requires once-through RCS cooling (breach of the RCS barrier) and is thus a loss of the RCS barrier.
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.	RCS P-Loss E.1	**Any** condition in the judgment of the Emergency Coordinator that indicates potential loss of the RCS barrier	Replaced the word "opinion" with "judgment" to align with the category title and with the Hazards judgment EAL wording.

PWR Containment Fission Product Barrier Degradation Thresholds

NEI FPB#	NEI IC Wording	ONS FPB #(s)	ONS FPB Wording	Difference Justification
CMT Loss 1	**RCS or SG Tube Leakage** A. A leaking or RUPTURED SG is FAULTED outside of containment.	CMT Loss A.1	A leaking SG is FAULTED outside of containment	Deleted the words "or RUPTURED" as they are unnecessary. The term rupture is a subset of the term leakage. For ONS, the term "Ruptured" is not normally used in an operationally significant way.
CMT Loss 2	**Inadequate Heat Removal** Not Applicable	N/A	N/A	N/A
CMT Loss 3	**RCS Activity/CMT Rad** Not applicable	N/A	N/A	N/A
CMT Loss 4	**CMT 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.	CMT Loss D.1	Containment isolation is required **AND EITHER:** • Containment integrity has been lost based on Emergency Coordinator judgment • UNISOLABLE pathway from containment to the environment exists	None
		CMT Loss D.2	Indications of RCS leakage outside of containment	None

NEI FPB#	NEI IC Wording	ONS FPB #(s)	ONS FPB Wording	Difference Justification
CMT Loss 5	**Other Indications** A. (site-specific as applicable)	N/A	N/A	No other site-specific Containment Loss indication has been identified for ONS.
CMT Loss 6	**Emergency Director Judgment** **ANY** *condition in the opinion of the* Emergency Director that indicates Loss of the Containment Barrier.	CMT Loss E.1	**Any** condition in the judgment of the Emergency Coordinator that indicates loss of the containment barrier	Replaced the word "opinion" with "judgment" to align with the category title and with the Hazards judgment EAL wording.
CMT P-Loss 1	**RCS or SG Tube Leakage** Not Applicable	N/A	N/A	N/A
CMT 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.	CMT P-Loss B.1	1. CETCs > 1200°F **AND** Restoration procedures **not** effective within 15 min. (Note 1)	The CETC readings are indicative of entry into core cooling restoration procedures. Added Note 1 consistent with other thresholds with a timing component.
CMT P-Loss 3	**RCS Activity/CMNT Rad** A. Containment radiation monitor reading greater than (site-specific value).	CMT P-Loss C.1	1/2/3RIA 57/58 > Table F-2 column "CMT Potential Loss"	RIA 57 and RIA 58 are the site-specific containment high range radiation monitors. The readings are derived assuming the instantaneous release and dispersal of the reactor coolant noble gas and iodine inventory associated with 20% clad failure into the Containment atmosphere. The values are based on calculated readings for time after shutdown.

NEI FPB#	NEI IC Wording	ONS FPB #(s)	ONS FPB Wording	Difference Justification
CMT P-Loss 4	**CNMT 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.	CMT P-Loss D.1	Containment pressure > 59 psig	59 psig is the containment design pressure.
		CMT P-Loss D.2	Containment hydrogen concentration ≥ 4%	4% hydrogen concentration in the lower limit of hydrogen flammability and represents an explosive mixture in containment.
		CMT P-Loss D.3	Containment pressure > 10 psig with < one full train of containment heat removal system (1 RBS with > 700 gpm spray flow **OR** 2 RBCUs) operating per design for ≥ 15 min. (Note 1)	The Containment pressure setpoint (10 psig) is the pressure at which the Reactor Building Spray System should actuate and begin performing its function. 1 RBS with > 700 gpm spray flow **OR** 2 RBCUs operating per design are the site-specific containment cooling trains. Added Note 1 consistent with other thresholds with a timing component.
CMT 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 ONS.
CMT P-Loss 6	**Emergency Director Judgment** A. **ANY** condition in the opinion of the Emergency Director that indicates Potential Loss of the Containment Barrier.	CMT P-Loss E.1	**Any** condition in the judgment of the Emergency Coordinator that indicates potential loss of the containment barrier	Replaced the word "opinion" with "judgment" to align with the category title and with the Hazards judgment EAL wording.

Table F-2 Containment Radiation – R/hr (1/2/3RIA 57/58)				
Time After S/D (Hrs)	**FC Loss**		**CMT Potential Loss**	
	RIA 57	**RIA 58**	**RIA 57**	**RIA 58**
0 - < 0.5	300	140	1500	700
0.5 - < 2.0	80	40	400	195
2.0 - < 8.0	32	15	160	75
≥ 8.0	10	5	50	25

Category H

Hazards and Other Conditions Affecting Plant Safety

NEI IC#	NEI IC Wording	ONS IC#(s)	ONS IC Wording	Difference Justification
HU1	Confirmed SECURITY CONDITION or threat MODE: All	HU1	Confirmed SECURITY CONDITION or threat. MODE: All	None

NEI Ex. EAL #	NEI Example EAL Wording	ONS EAL #	ONS EAL Wording	Difference Justification
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 the Security Shift Supervision **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. The Security Shift Supervision is defined as the Security Shift Supervision.
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	ONS IC#(s)	ONS IC Wording	Difference Justification
HU2	Seismic event greater than OBE level MODE: All	HU2	Seismic event greater than DBE level MODE: All	The design basis earthquake ground acceleration at the site is 0.05g. The maximum hypothetical earthquake ground acceleration is 0.10g. and 0.15g for Class 1 structures founded on bedrock and overburden respectively. For ONS, the Operating Basis Earthquake (OBE) is equivalent to the Design Basis Earthquake (DBE).

NEI Ex. EAL #	NEI Example EAL Wording	ONS EAL #	ONS EAL Wording	Difference Justification
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 > DBE as indicated by any of the following: • 1SA-9/E-1 (SEISMIC TRIGGER) alarm • 3SA-9/E-1 (SEISMIC TRIGGER) alarm	Earthquake instrumentation is the SMA-3 system consisting of a central recording system, control panel, one TS-3 triaxial seismic trigger package, and two force-balance triaxial accelerometer packages. The seismic trigger and one accelerometer of the SMA-3 system are located in the Unit 1 Tendon Gallery. Also, a second accelerometer is located directly above at elevation 797' +6" in the Oconee 1 Reactor Building. The recorder for the system is located in the Unit 1 Cable Room. Also, a seismic trigger/switch is located in the Unit 1 tendon gallery. The TS-3 has a preset acceleration threshold of 0.05g (DBE) which activates the listed statalarm in Units 1 and 3 control rooms, when design conditions occur.

NEI IC#	NEI IC Wording	ONS IC#(s)	ONS IC Wording	Difference Justification
HU3	Hazardous event. MODE: All	HU3	Hazardous event MODE: All	None

NEI Ex. EAL #	NEI Example EAL Wording	ONS EAL #	ONS EAL Wording	Difference Justification
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 needed for the current operating mode	None
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 offsite event involving hazardous materials (e.g., an offsite chemical spill or toxic gas release)	None
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.
5	(Site-specific list of natural or technological hazard events)	HU3.5	Condition B has been declared for the Jocassee Dam	Jocassee Hydro is located upstream of the Oconee Nuclear Station. The mitigation strategies for a Condition B for the Jocassee Dam includes shutdown of all operating Oconee Nuclear units and relocation and installation of other equipment in anticipation of the Condition B escalating to a Condition A. This

				EAL is based on an existing license commitment.
Note	EAL #3 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.	This note, designated Note #7, is intended to apply to generic example EAL #4, not #3 as specified in the generic guidance.

NEI IC#	NEI IC Wording	ONS IC#(s)	ONS IC Wording	Difference Justification
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	ONS EAL #	ONS EAL Wording	Difference Justification
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 **AND** b. The FIRE is located within **ANY** of the following plant rooms or areas: (site-specific list of plant rooms or areas)	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 • Field verification of a single fire alarm **AND** The FIRE is located within **any** Table H-1 area	Table H-1 provides a tabularized list of site-specific fire areas.
2	a. Receipt of a single fire alarm (i.e., no other indications of a FIRE). **AND** b. The FIRE is located within	HU4.2	Receipt of a single fire alarm (i.e., **no** other indications of a FIRE) **AND** The fire alarm is indicating a	Table H-1 provides a list of site-specific fire areas.

	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.		FIRE within **any** Table H-1 area **AND** The existence of a FIRE is **not** verified within 30 min. of alarm receipt (Note 1)	
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 plant PROTECTED AREA **not** extinguished within 60 min. of the initial report, alarm or indication (Note 1)	ONS 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 plant PROTECTED AREA that requires firefighting support by an offsite fire response agency to extinguish	ONS has an ISFSI located inside the plant Protected Area.
Note	**Note:** 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 Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.	The classification timeliness note has been standardized across the ONS EAL scheme by referencing the "time limit" specified within the EAL wording.

Table H-1 Fire Areas
• Reactor Building • Auxiliary Building • Turbine Building • Standby Shutdown Facility • Intake Structure • Electrical Blockhouse • Keowee Hydro & associated transformers • Transformer Yard • Protected Service Water Building • Essential Siphon Vacuum Building

NEI IC#	NEI IC Wording	ONS IC#(s)	ONS IC Wording	Difference Justification
HU7	Other conditions exist which in the judgment of the Emergency Director warrant declaration of a (NO)UE MODE: All	HU7	Other conditions existing that in the judgment of the Emergency Coordinator warrant declaration of a UE MODE: All	None

NEI Ex. EAL #	NEI Example EAL Wording	ONS EAL #	ONS EAL Wording	Difference Justification
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 Coordinator 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	ONS IC#(s)	ONS IC Wording	Difference Justification
HA1	HOSTILE ACTION within the OWNER CONTROLLED AREA or airborne attack threat within 30 minutes. MODE: All	HA1	HOSTILE ACTION within the OWNER CONTROLLED AREA or airborne attack threat within 30 minutes MODE: All	None

NEI Ex. EAL #	NEI Example EAL Wording	ONS EAL #	ONS EAL Wording	Difference Justification
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 OWNER CONTROLLED AREA as reported by the Security Shift Supervision **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. *The Security Shift Supervision is the site-specific security shift* supervision.
2	A validated notification from NRC of an aircraft attack threat within 30 minutes of the site.			

NEI IC#	NEI IC Wording	ONS IC#(s)	ONS IC Wording	Difference Justification
HA5	Gaseous release impeding access to equipment necessary for normal plant operations, cooldown or shutdown. MODE: All	N/A	Gaseous release IMPEDING access to equipment necessary for normal plant operations, cooldown or shutdown. MODE: All	None

NEI Ex. EAL #	NEI Example EAL Wording	ONS EAL #	ONS EAL Wording	Difference Justification
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 rooms or areas **AND** Entry into the room or area is prohibited or IMPEDED (Note 5)	Table H-2 provides a list of safe shutdown rooms/areas and applicable operating modes.
Note	**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.	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 Applicability**
Turbine Building	1, 2, 3
Equipment and Cable Rooms	1, 2, 3
Auxiliary Building	1, 2, 3, 4, 5
Reactor Buildings	3, 4, 5

NEI IC#	NEI IC Wording	ONS IC#(s)	ONS IC Wording	Difference Justification
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	ONS EAL #	ONS EAL Wording	Difference Justification
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 Auxiliary* Shutdown Panel or Standby Shutdown Facility	The Auxiliary Shutdown Panel and Standby Shutdown Facility are the site-specific remote shutdown panels/local control stations.

NEI IC#	NEI IC Wording	ONS IC#(s)	ONS IC Wording	Difference Justification
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 Coordinator warrant declaration of an Alert MODE: All	None

NEI Ex. EAL #	NEI Example EAL Wording	ONS EAL #	ONS EAL Wording	Difference Justification
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 Coordinator, 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	ONS IC#(s)	ONS IC Wording	Difference Justification
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	ONS EAL #	ONS EAL Wording	Difference Justification
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 the Security Shift Supervision	The Security Shift Supervision is the site-specific security shift supervision.

NEI IC#	NEI IC Wording	ONS IC#(s)	ONS IC Wording	Difference Justification
N/A	N/A	HS3	Dam Failure MODE: All	N/A

NEI Ex. EAL #	NEI Example EAL Wording	ONS EAL #	ONS EAL Wording	Difference Justification
N/A	N/A	HS3.1	IMMINENT/actual dam failure exists involving any of the following: - Keowee Hydro Dam - Little River Dam - Dikes A,B,C,D - Intake Canal Dike - Jocassee Dam - Condition A	The Keowee Hydro Dam project includes the Keowee Hydro Dam, Little River Dam and Dikes A, B, C, D, and the Intake Canal Dike. Dam failure of any portion of the Keowee Hydro Dam would result in loss of the emergency AC power supply and the potential to lose the ultimate heat sink source. Some flooding of the site may result. Evaluation of the plant status following failure of the dam would determine the need to escalate to a General Emergency. Failure of the Jocassee Dam has the potential to result in the failure of the Keowee Hydro Project Dams/Dikes. This EAL is based on an existing license commitment.

NEI IC#	NEI IC Wording	ONS IC#(s)	ONS IC Wording	Difference Justification
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: All	None

NEI Ex. EAL #	NEI Example EAL Wording	ONS EAL #	ONS EAL Wording	Difference Justification
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]* / RCP water level *[BWR]* • RCS heat removal	HS6.1	An event has resulted in plant control being transferred from the Control Room to the Auxiliary Shutdown Panel or Standby Shutdown Facility **AND** Control of **any** of the following key safety functions is **not** reestablished within 15 min. (Note 1): • Reactivity • Core cooling • RCS heat removal	The Auxiliary Shutdown Panel and Standby Shutdown Facility are the site-specific remote shutdown panels/local control stations.

NEI IC#	NEI IC Wording	ONS IC#(s)	ONS IC Wording	Difference Justification
HS7	Other conditions exist which in the judgment of the Emergency Director warrant declaration of a Site Area Emergency. MODE: All	HS7	Other conditions existing that in the judgment of the Emergency Coordinator warrant declaration of a Site Area Emergency MODE: All	None

NEI Ex. EAL #	NEI Example EAL Wording	ONS EAL #	ONS EAL Wording	Difference Justification
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 Coordinator 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	ONS IC#(s)	ONS IC Wording	Difference Justification
HG1	HOSTILE ACTION resulting in loss of physical control of the facility. MODE: All	HG1	HOSTILE ACTION resulting in loss of physical control of the facility MODE: All	None

NEI Ex. EAL #	NEI Example EAL Wording	ONS EAL #	ONS EAL Wording	Difference Justification
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*]/RCP water level [*BWR*] • RCS heat removal **OR** 2. Damage to spent fuel has occurred or is IMMINENT.	HG1.1	A HOSTILE ACTION is occurring or has occurred within the PROTECTED AREA as reported by the Security Shift Supervision **AND EITHER** of the following has occurred: **Any** of the following safety functions cannot be controlled or maintained • Reactivity • Core cooling • RCS heat removal **OR** Damage to spent fuel has occurred or is IMMINENT	The Security Shift Supervision is the site-specific security shift supervision. Deleted the word "control" from" reactivity" because it is redundant.

NEI IC#	NEI IC Wording	ONS IC#(s)	ONS IC Wording	Difference Justification
HG7	Other conditions exist which in the judgment of the Emergency Director warrant declaration of a General Emergency MODE: All	HG7	Other conditions exist which in the judgment of the Emergency Coordinator warrant declaration of a General Emergency MODE: All	None

NEI Ex. EAL #	NEI Example EAL Wording	ONS EAL #	ONS EAL Wording	Difference Justification
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 Coordinator 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	ONS IC#(s)	ONS IC Wording	Difference Justification
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 essential buses for 15 minutes or longer MODE: 1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 - Hot Shutdown	The ONS essential buses are the emergency buses.

NEI Ex. EAL #	NEI Example EAL Wording	ONS EAL #	ONS EAL Wording	Difference Justification
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 essential 4160V buses MFB-1 and MFB-2 for ≥ 15 min. (Note 1)	4160V buses MFB-1 and MFB-2 are the site-specific emergency buses. Site-specific AC power sources are listed 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 Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.	The classification timeliness note has been standardized across the ONS EAL scheme by referencing the "time limit" specified within the EAL wording.

Table S-1 AC Power Sources
Offsite: • Unit Normal Transformer (backcharged) • Unit Startup Transformer (SWYD) • Another Unit Startup Transformer (aligned) (SWYD) • CT5 (Central/energizing Standby Bus) **Emergency:** • Unit Startup Transformer (Keowee) • Another Unit Startup Transformer (aligned) (Keowee) • CT4 • CT5 (dedicated line/energizing Standby Bus)

NEI IC#	NEI IC Wording	ONS IC#(s)	ONS IC Wording	Difference Justification
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	ONS EAL #	ONS EAL Wording	Difference Justification
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 Parameters are listed in Table S-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 Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.	The classification timeliness note has been standardized across the ONS EAL scheme by referencing the "time limit" specified within the EAL wording.

[BWR parameter list]	*[PWR parameter list]*
Reactor Power	Reactor Power
RCP Water Level	RCS Level
RCP 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

Table S-2 Safety System Parameters
• Reactor power • RCS level • RCS pressure • CETC temperature • Level in at least one S/G • EFW flow to at least one S/G

NEI IC#	NEI IC Wording	ONS IC#(s)	ONS IC Wording	Difference Justification
SU3	Reactor coolant activity greater than Technical Specification allowable limits. MODE: Power Operation, Startup, Hot Standby, Hot Shutdown	SU4	RCS activity greater than Technical Specification allowable limits MODE: 1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 - Hot Shutdown	Changed 'reactor coolant activity" to "RCS activity" to conform to site specific terminology.

NEI Ex. EAL #	NEI Example EAL Wording	ONS EAL #	ONS EAL Wording	Difference Justification
1	(Site-specific radiation monitor) reading greater than (site-specific value).	N/A	N/A	ONS does not have any site-specific radiation monitor that can provide readings that correspond to TS 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 activity > 50 µCi/gm Dose Equivalent I-131 for > 48 hr continuous period **OR** RCS activity > 280 µCi/gm Dose Equivalent Xe-133 for > 48 hr continuous period	Changed 'reactor coolant activity" to "RCS activity" to conform to site specific terminology. ONS T.S. Section 3.4.11 provides the TS allowable coolant activity limits.

NEI IC#	NEI IC Wording	ONS IC#(s)	ONS IC Wording	Difference Justification
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	ONS EAL #	ONS EAL Wording	Difference Justification
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. **OR** RCS identified leakage > 25 gpm for ≥ 15 min. **OR** Leakage from the RCS 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.
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 15 minutes has been exceeded, or will likely be exceeded.	N/A	Note 1: The Emergency Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.	The classification timeliness note has been standardized across the ONS EAL scheme by referencing the "time limit" specified within the EAL wording.

NEI IC#	NEI IC Wording	ONS IC#(s)	ONS IC Wording	Difference Justification
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	ONS EAL #	ONS EAL Wording	Difference Justification
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 the manual trip pushbutton 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 exceed. There is a separate set of switch contacts in series with the output of each reactor trip component. All switch contacts are actuated through a mechanical linkage from a single reactor trip pushbutton.
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**	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 the manual trip pushbutton 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. There is a separate set of switch contacts in series with the output of each reactor trip component. All switch contacts are actuated

	2 A subsequent automatic (trip [PWR] / scram [BWR]) is successful in shutting down the reactor.			through a mechanical linkage from a single pushbutton.
Notes	**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	ONS IC#(s)	ONS IC Wording	Difference Justification
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	ONS EAL #	ONS EAL Wording	Difference Justification
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 offsite 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. Changed "ORO" to read "offsite" as ORO is not a known acronym at ONS. Table S-4 provides a site-specific list of onsite, offsite 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**	**Offsite**	**NRC**
Commercial phone service	X	X	X
ONS site phone system	X	X	X
EOF phone system	X	X	X
Public Address system	X		
Onsite radio system	X		
DEMNET		X	
Offsite radio system		X	
NRC Emergency Telephone System			X
Satellite Phone	X	X	X

NEI IC#	NEI IC Wording	ONS IC#(s)	ONS IC Wording	Difference Justification
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	ONS EAL #	ONS EAL Wording	Difference Justification
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 VALID ES actuation signal **OR** Containment pressure > 10 psig with < one full train of containment heat removal system (1 RBS with > 700 gpm spray flow **OR** 2 RBCUs) operating per design for ≥ 15 min. (Note 1)	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 failure to isolate threshold. The Containment pressure setpoint (10 psig) is the pressure at which the Reactor Building Spray System should actuate and begin performing its function. 1 RBS with > 700 gpm spray flow **OR** 2 RBCUs operating per design are the site-specific containment cooling trains.
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.			
N/A	N/A	N/A	Note 1: The Emergency Coordinator should declare the event	Added Note 1 to be consistent in its use for EAL thresholds with a timing component.

			promptly upon determining that time limit has been exceeded, or will likely be exceeded.	

NEI IC#	NEI IC Wording	ONS IC#(s)	ONS IC Wording	Difference Justification
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 essential buses for 15 minutes or longer. MODE: 1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 - Hot Shutdown	The ONS essential buses are the emergency buses.

NEI Ex. EAL #	NEI Example EAL Wording	ONS EAL #	ONS EAL Wording	Difference Justification
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 essential 4160V buses MFB-1 and MFB-2 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	4160V buses MFB-1 and MFB-2 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 Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.	The classification timeliness note has been standardized across the ONS EAL scheme by referencing the "time limit" specified within the EAL wording.

Table S-1 AC Power Sources
Offsite: • Unit Normal Transformer (backcharged) • Unit Startup Transformer (SWYD) • Another Unit Startup Transformer (aligned) (SWYD) • CT5 (Central/energizing Standby Bus) **Emergency:** • Unit Startup Transformer (Keowee) • Another Unit Startup Transformer (aligned) (Keowee) • CT4 • CT5 (dedicated line/energizing Standby Bus)

NEI IC#	NEI IC Wording	ONS IC#(s)	ONS IC Wording	Difference Justification
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	ONS EAL #	ONS EAL Wording	Difference Justification
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 Parameters are listed in Table S-2. The site-specific significant transients are listed in Table S-3. ONS is a PWR and thus does not include thermal power oscillations > 10%.

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 Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.	The classification timeliness note has been standardized across the ONS EAL scheme by referencing the "time limit" specified within the EAL wording.

[BWR parameter list]	*[PWR parameter list]*
Reactor Power	Reactor Power
RCP Water Level	RCS Level
RCP 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

Table S-2 Safety System Parameters
• Reactor power • RCS level • RCS pressure • CETC temperature • Level in at least one S/G • EFW flow to at least one S/G

Table S-3 Significant Transients
• Reactor trip • Runback > 25% thermal power • Electrical load rejection > 25% electrical load • ECCS actuation

NEI IC#	NEI IC Wording	ONS IC#(s)	ONS IC Wording	Difference Justification
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	ONS EAL #	ONS EAL Wording	Difference Justification
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 successful in shutting down the reactor.	SA6.1	An automatic or manual trip fails to shut down the reactor as indicated by reactor power ≥ 5% **AND** Manual trip pushbutton is **not** 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. There is a separate set of switch contacts in series with the output of each reactor trip component. All switch contacts are actuated through a mechanical linkage from a single pushbutton.
Notes	**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	ONS IC#(s)	ONS IC Wording	Difference Justification
SA9	Hazardous event affecting a SAFETY SYSTEM needed for the current operating mode. MODE: Power Operation, Startup, Hot Standby, Hot Shutdown	SA9.1	Hazardous event affecting a SAFETY SYSTEM needed for the current operating mode MODE: 1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 - Hot Shutdown	None

NEI Ex. EAL #	NEI Example EAL Wording	ONS EAL #	ONS EAL Wording	Difference Justification
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-5 hazardous event **AND EITHER:** • Event damage has caused indications of degraded performance in at least one train of a SAFETY SYSTEM needed for the current *operating mode* • The event has caused VISIBLE DAMAGE to a SAFETY SYSTEM component or structure needed for the current operating mode	The hazardous events have been listed in Table S-5.

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

NEI IC#	NEI IC Wording	ONS IC#(s)	ONS IC Wording	Difference Justification
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** emergency AC power to essential buses for 15 minutes or longer MODE: 1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 - Hot Shutdown	The ONS essential buses are the emergency buses. "emergency" is the ONS-specific term for 'onsite' AC power.

NEI Ex. EAL #	NEI Example EAL Wording	ONS EAL #	ONS EAL Wording	Difference Justification
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** emergency AC power capability, Table S-1, to essential 4160V buses 1 MFB-1 and MFB-2 for ≥ 15 min. (Note 1)	4160V buses MFB-1 and MFB-2 are the site-specific emergency buses. Site-specific AC power sources are listed in Table S-1. "emergency" is the ONS-specific term for 'onsite' AC power.
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 Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.	The classification timeliness note has been standardized across the ONS EAL scheme by referencing the "time limit" specified within the EAL wording.

NEI IC#	NEI IC Wording	ONS IC#(s)	ONS IC Wording	Difference Justification
SS5	Inability to shutdown the reactor causing a challenge to (core cooling [*PWR*] / RCP 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	ONS EAL #	ONS EAL Wording	Difference Justification
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:** • CETCs >1200°F on ICCM • RCS subcooling < 0°F	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. Indication that core cooling is extremely challenged is manifested by CETCs >1200°F on ICCM. Indication that heat removal is extremely challenged is manifested by subcooling margin < 0°F.

NEI IC#	NEI IC Wording	ONS IC#(s)	ONS IC Wording	Difference Justification
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	ONS EAL #	ONS EAL Wording	Difference Justification
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	*Loss of all 125 VDC power* based on battery bus voltage indications < 105 VDC on both vital DC Distribution Centers DCA and DCB for ≥ 15 min (Note 1)	105 VDC is the site-specific minimum vital DC bus voltage. DC Distribution Centers DCA and DCB are the site-specific vital DC 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 Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.	The classification timeliness note has been standardized across the ONS EAL scheme by referencing the "time limit" specified within the EAL wording.

NEI IC#	NEI IC Wording	ONS IC#(s)	ONS IC Wording	Difference Justification
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** emergency and **all** onsite AC power to essential buses MODE: 1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 - Hot Shutdown	NEI ICs SG1 and SG8 are grouped under the same ONS IC for simplification. The ONS essential buses are the emergency buses. "emergency" is the ONS-specific term for 'onsite' AC power.

NEI Ex. EAL #	NEI Example EAL Wording	ONS EAL #	ONS EAL Wording	Difference Justification
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 in less than (site-specific hours) is not likely. • (Site-specific indication of an inability to adequately remove heat from the core)	SG1.1	Loss of **all** offsite and **all** emergency AC power capability to essential 4160V buses MFB-1 and MFB-2 **AND** Failure to power SSF equipment and PSW unavailable **AND EITHER:** • Restoration of at least one emergency bus in < 4 hours is **not** likely (Note 1) • CETC reading > 1200°F	4160V buses MFB-1 and MFB-2 are the site-specific emergency buses. "emergency" is the ONS-specific term for 'onsite' AC power. The Standby Shutdown Facility (SSF) consists of standby systems for use in an extreme emergency and is equipped with a manually started diesel generator and Protected Service Water (PSW) power supply that can supply power necessary to maintain hot shutdown of the reactors of each unit in the event of loss of power. Although the SSF requires manual initiation, it is considered in this EAL because it may be capable of powering the SSF load center. 4 hours is the site-specific SBO coping analysis time. CETC reading > 1200°F indicates significant core exit superheating and core uncovery.
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 Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.	The classification timeliness note has been standardized across the ONS EAL scheme by referencing the "time limit" specified within the EAL wording.

NEI IC#	NEI IC Wording	ONS IC#(s)	ONS IC Wording	Difference Justification
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 essential** AC and vital DC power sources for 15 minutes or longer MODE: 1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 - Hot Shutdown	NEI ICs SG1 and SG8 are grouped under the same ONS IC for simplification.

NEI Ex. EAL #	NEI Example EAL Wording	ONS EAL #	ONS EAL Wording	Difference Justification
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** emergency AC power capability, Table S-1, to emergency 4160V buses MFB-1 and MFB-2 for ≥ 15 min. **AND** Failure to power SSF equipment and PSW unavailable **AND** Loss of all 125 VDC power based on battery bus voltage indications < 105 VDC on both vital DC Distribution Centers DCA and DCB for ≥ 15 min. (Note 1)	4160V buses MFB-1 and MFB-2 are the site-specific emergency buses. "emergency" is the ONS-specific term for 'onsite' AC power. Site-specific AC power sources are listed in Table S-1. The Standby Shutdown Facility (SSF) consists of standby systems for use in an extreme emergency and is equipped with a manually started diesel generator and Protected Service Water (PSW) power supply that can supply power necessary to maintain hot shutdown of the reactors of each unit in the event of loss of power. Although the SSF requires manual initiation, it is considered in this EAL because it may be capable of powering the SSF load center. 105 VDC is the site-specific minimum vital DC bus voltage. Distribution Centers DCA and DCB are the site-specific vital DC 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 Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.	The classification timeliness note has been standardized across the ONS EAL scheme by referencing the "time limit" specified within the EAL wording.

ONS-2015-045
Enclosure 3

ENCLOSURE 3

EMERGENCY ACTION LEVEL TECHNICAL BASES DOCUMENT

(Retyped Version)

239 Pages Follow

EMERGENCY ACTION LEVEL TECHNICAL BASES

(Clean Version)

Revision 0 6/16/15

Table of Contents

1.0 PURPOSE

This document provides an explanation and rationale for each Emergency Action Level (EAL) included in the EAL Upgrade Project for Oconee Nuclear Station (ONS). It should be used to facilitate review of the ONS EALs and provide historical documentation for future reference. Decision-makers responsible for implementation of RP/0/A/1000/001, Emergency Classification, may use this document as a technical reference in support of EAL interpretation. This information may assist the Emergency Coordinator 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 Coordinator 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 ONS 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 (ADAMS Accession Number ML12326A805) (ref. 4.1.1), ONS 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 an increased probability of barrier loss and decreased certainty of maintaining the barrier.

The primary fission product barriers are:

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

B. Reactor Coolant System (RCS): 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 (CMT): The Containment (Reactor Building) Barrier includes the Reactor 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 Reactor 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 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 ONS 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 mode or No 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 ONS EAL categories are aligned to and represent the NEI 99-01 "Recognition Categories." Subcategories are used in the ONS scheme as necessary to further divide the EALs of a category into logical sets of possible emergency classification thresholds. The ONS EAL categories and subcategories are listed below.

EAL Groups, Categories and Subcategories

EAL Group/Category	EAL Subcategory
Any Operating Mode:	
R – Abnormal **R**ad 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 Coordinator Judgment
E – Independent Spent Fuel Storage Installation (ISFSI)	1 – Confinement Boundary
Hot Conditions:	
S – **S**ystem Malfunction	1 – Loss of Essential 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 Essential AC Power 3 – RCS Temperature 4 – Loss of Vital DC Power 5 – Loss of Communications 6 – Hazardous Event Affecting Safety Systems

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 Attachments 1 & 2 of this document for such information.

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 (R, C, H, S, E and F) 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 (R, C, H, S, E or F)
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, NM – No Mode, or Any. (See Section 2.6 for operating mode definitions)

Definitions:

If the EAL 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:

A Plant-Specific basis section that provides ONS-relevant information concerning the EAL. This is followed by a Generic basis section that provides a description of the rationale for the EAL as provided in NEI 99-01 Rev. 6.

ONS Basis Reference(s):

Site-specific source documentation from which the EAL is derived

2.6 Operating Mode Applicability (ref. 4.1.6)

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

2 Startup
$K_{eff} \geq 0.99$ and reactor thermal power $\leq$ 5%

3 Hot Standby
$K_{eff} < 0.99$ and average coolant temperature $\geq$ 250°F

4 Hot Shutdown
$K_{eff} < 0.99$ and average coolant temperature 250°F > T_{avg} > 200°F and all reactor vessel head closure bolts fully tensioned

5 Cold Shutdown
$K_{eff} < 0.99$ and average coolant temperature $\leq$ 200°F and all reactor vessel head closure bolts fully tensioned

6 Refueling
One or more reactor vessel head closure bolts less than fully tensioned

NM No Mode
Reactor vessel contains no irradiated fuel

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 Coordinator 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.

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. 4.1.9).

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.

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.

3.1.3 Imminent Conditions

For ICs and EALs that have a stipulated time duration (e.g., 15 minutes, 30 minutes, etc.), the Emergency Coordinator 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 Coordinator 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 Coordinator with the ability to classify events and conditions based upon judgment using EALs that are consistent with the ECL definitions (refer to Category H). The Emergency Coordinator 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. 4.1.9).

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.

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 Coordinator 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 Coordinator, 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 Downgrading

An ECL may be downgraded when the event or condition that meets the highest IC and EAL no longer exists, and other site-specific downgrading requirements are met. If downgrading the ECL is deemed appropriate, the new ECL would then be based on a lower applicable IC(s) and EAL(s). The ECL may also simply be terminated.

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.

EAL momentarily met during expected plant response - In instances where 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.

EAL momentarily met but the condition is corrected prior to an emergency declaration – 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. Reactor vessel level rapidly decreases and 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 Coordinator 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 1.1-1 Modes

4.1.7 OP/1,2,3/A/1502/000 Containment Closure Control

4.1.8 Procedure Writer's Manual, Revision 012

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

4.1.10 Oconee Nuclear Site Emergency Plan

4.1.11 S.D.1.3.5 Shutdown Protection Plan

4.1.12 Duke Energy Physical Security Plan for ONS

4.2 Implementing

4.2.1 RP/0/A/1000/001 Emergency Classification

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

4.2.3 ONS EAL Matrix

5.0 DEFINITIONS, ACRONYMS & ABBREVIATIONS

5.1 Definitions (ref. 4.1.1 except as noted)

Selected terms used in Initiating Condition and Emergency Action Level statements 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 small fractions of the EPA Protective Action Guideline exposure levels.

Confinement Barrier

The barrier(s) between spent fuel and the environment once the spent fuel is processed for dry storage. As related to the ONS ISFSI, Confinement Boundary is comprised of the DSC (dry shielded canister) shell, inner bottom cover plate, inner top cover plate, siphon & vent block, siphon & vent port cover plate, and the welds that join them together.

Containment Closure

The action to secure containment and its associated structures, systems, and components as a functional barrier to fission product release under all plant conditions up to and including a loss of decay heat removal or fuel handling accident inside containment (ref. 4.1.11).

As applied to ONS, Containment Closure is established when the requirements of OP/1,2,3/A/1502/000, Containment Closure Control, are met (ref. 4.1.7).

EPA PAGs

Environment Protection Agency Protective Action Guidelines. The EPA PAGs are expressed in terms of dose commitment: 1 Rem TEDE or 5 Rem CDE Thyroid. Actual or projected offsite exposures in excess of the EPA PAGs requires ONS to recommend protective actions for the general public to offsite planning agencies.

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.

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 actions that result 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.

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 ONS 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 ONS. Non-terrorism-based EALs should be used to address such activities (i.e., this may include violent acts between individuals in the owner controlled area).

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.

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.

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).

Intrusion

The act of entering without authorization. Discovery of a bomb in a specified area is indication of intrusion into that area by a hostile force.

Maintain

Take appropriate action to hold the value of an identified parameter within specified limits.

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

Area outside the PROTECTED AREA fence that immediately surrounds the plant. Access to this area is generally restricted to those entering on official business.

Projectile

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

Protected Area

That part of the nuclear station property consisting of the Reactor, Auxiliary, Turbine, and Service Building and grounds, contained within the owner controlled security fence (ref. 4.1.10).

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, pressurizer manway and safeties installed).

Reduced Inventory

Condition with fuel in the reactor vessel and the level lower than approximately three feet below the reactor vessel flange (RCS level < 50" on LT-5) (ref. 4.1.11).

Refueling Pathway

The spent fuel pool and/or fuel transfer canal comprise the refueling pathway.

Restore

Take the appropriate action required to return the value of an identified parameter to the applicable limits.

Ruptured

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

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.

Site Area Emergency

Events are in process or have occurred which involve actual or likely major failures of plant functions needed for protection of the public or hostile actions that result 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 Guidelines exposure levels beyond the site boundary.

Site Boundary

That area, including the PROTECTED AREA, in which Duke Energy has the authority to control all activities including exclusion or removal of personnel and property (1 mile radius) from the center of Unit 2. (ref. 4.1.10).

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 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 Acronyms and Abbreviations

°F .... Degrees Fahrenheit
° .... Degrees
AC .... Alternating Current
AP .... Abnormal Operating Procedure
ATWS .... Anticipated Transient Without Scram
BWST .... Borated Water Storage Tank
CETC .... Core Exit Thermocouple
CDE .... Committed Dose Equivalent
CFR .... Code of Federal Regulations
CMT .... Containment
DBA .... Design Basis Accident
DBE .... Design Basis Earthquake
DC .... Direct Current
DSC .... Dry Shielded Canister
EAL .... Emergency Action Level
ECCS .... Emergency Core Cooling System
ECL .... Emergency Classification Level
EOF .... Emergency Operations Facility
EOP .... Emergency Operating Procedure
EPA .... Environmental Protection Agency
ERG .... Emergency Response Guideline
EPIP .... Emergency Plan Implementing Procedure
ESF .... Engineered Safety Feature
FAA .... Federal Aviation Administration
FBI .... Federal Bureau of Investigation
FEMA .... Federal Emergency Management Agency
GE .... General Emergency
HPI .... High Pressure Injection
IC .... Initiating Condition
IPEEE .... Individual Plant Examination of External Events (Generic Letter 88-20)
ISFSI .... Independent Spent Fuel Storage Installation
K_{eff} .... Effective Neutron Multiplication Factor
LCO .... Limiting Condition of Operation

LEC .... Law Enforcement Center
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
MSL .... Main Steam Line
MW .... Megawatt
NEI ....Nuclear Energy Institute
NESP...National Environmental Studies Project
NM .... No Mode
NPP .... Nuclear Power Plant
NRC...Nuclear Regulatory Commission
NORAD.. North American Aerospace Defense Command
(NO)UE.. Notification of Unusual Event
OBE .... Operating Basis Earthquake
OCA..Owner Controlled Area
ODCM...Off-site Dose Calculation Manual
ORO .... Offsite Response Organization
PA.. Protected Area
PAG .... Protective Action Guideline
PRA .... Probabilistic Risk Assessment
PSA .... Probabilistic Safety Assessment
PWR .... Pressurized Water Reactor
PSIG..Pounds per Square Inch Gauge
PSW .... Protected Service Water
R.. Roentgen
RCS .... Reactor Coolant System
Rem, rem, REM ....Roentgen Equivalent Man
Rep CET..Representative Core Exit Thermocouples
RETS.. Radiological Effluent Technical Specifications
RPS ....Reactor Protective System
RV ....Reactor Vessel
RVLIS ....Reactor Vessel Level Indicating System

SAR .... Safety Analysis Report
SBO .... Station Blackout
SCBA .... Self-Contained Breathing Apparatus
SG .... Steam Generator
SLC .... Selected License Commitment
SPDS .... Safety Parameter Display System
SRO .... Senior Reactor Operator
TEDE .... Total Effective Dose Equivalent
TSC .... Technical Support Center
UFSAR .... Updated Final Safety Analysis Report

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

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

ONS	NEI 99-01 Rev. 6	
EAL	IC	Example EAL
RU1.1	AU1	1, 2
RU1.2	AU1	3
RU2.1	AU2	1
RA1.1	AA1	1
RA1.2	AA1	2
RA1.3	AA1	3
RA1.4	AA1	4
RA2.1	AA2	1
RA2.2	AA2	2
RA2.3	AA2	3
RA3.1	AA3	1
RA3.2	AA3	2
RS1.1	AS1	1
RS1.2	AS1	2
RS1.3	AS1	3
RS2.1	AS2	1
RG1.1	AG1	1
RG1.2	AG1	2
RG1.3	AG1	3
RG2.1	AG2	1
CU1.1	CU1	1
CU1.2	CU1	2

ONS	NEI 99-01 Rev. 6	
EAL	**IC**	**Example EAL**
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	3
CG1.1	CG1	2
FA1.1	FA1	1
FS1.1	FS1	1
FG1.1	FG1	1
HU1.1	HU1	1, 2, 3
HU2.1	HU2	1
HU3.1	HU3	1
HU3.2	HU3	2
HU3.3	HU3	3
HU3.4	HU3	4
HU3.5	HU3	5
HU4.1	HU4	1
HU4.2	HU4	2
HU4.3	HU4	3

ONS	NEI 99-01 Rev. 6	
EAL	**IC**	**Example EAL**
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
HS3.1	N/A	N/A
HS6.1	HS6	1
HS7.1	HS7	1
HG1.1	HG1	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
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

ONS	NEI 99-01 Rev. 6	
EAL	**IC**	**Example EAL**
SS2.1	SS8	1
SS6.1	SS5	1
SG1.1	SG1	1
SG1.2	SG8	1
EU1.1	EU1	1

7.0 ATTACHMENTS

7.1 Attachment 1, Emergency Action Level Technical Bases

7.2 Attachment 2, Fission Product Barrier Matrix and Basis

Category R – Abnormal Rad Release / 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 the 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: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 1 – Radiological Effluent

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

EAL:

RU1.1 **Unusual Event**
Reading on **any** Table R-1 effluent radiation monitor > column "UE" for ≥ 60 min. (Notes 1, 2, 3)

Note 1: The Emergency Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be 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, indicating that the release path is isolated, the effluent monitor reading is no longer VALID for classification purposes.

Table R-1 Effluent Monitor Classification Thresholds

	Release Point	Monitor	GE	SAE	Alert	UE
Gaseous	Unit 1/2/3 Plant Vent	RIA-45	----	----	----	1.41E+5 cpm
Gaseous	Unit 1/2/3 Plant Vent	RIA-46	3.00E+5 cpm	3.00E+4 cpm	3.00E+3 cpm	----
Liquid	Liquid Radwaste Discharge	RIA-33	----	----	----	4.79E+5 cpm

Mode Applicability:

All

Definition(s):

None

ONS Basis:

The column "UE" release values in Table R-1 represent two times the appropriate SLC and Technical Specification release rate and concentration limits associated with the specified monitors (ref. 1, 2, 3, 4, 5, 6).

<u>Gaseous Releases</u>

Instrumentation that may be used to assess this EAL: (ref. 1):

- Unit 1/2/3 Plant Vent Noble Gas Low Monitor – RIA-45(L)

Liquid Releases

Instrumentation that may be used to assess this EAL: (ref. 1):

- Liquid Radwaste Discharge Monitor – RIA-33 (batch release)

NEI 99-01 Basis:

This IC addresses a potential decrease in the level of safety of the plant as indicated by a low-level radiological release that exceeds regulatory commitments for an extended period of time (e.g., an uncontrolled release). 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.

Escalation of the emergency classification level would be via IC RA1.

ONS Basis Reference(s):

1. UFSAR Section 11.5, Process and Effluent Radiological Monitoring and Sampling Systems
2. Oconee Nuclear Station Units 1, 2 and 3 Offsite Dose Calculation Manual
3. ONS-SLC 16.11.1 Radioactive Liquid Effluents
4. ONS-SLC 16.11.2 Radioactive Gaseous Effluents
5. EP-EALCALC-ONS-1401 ONS Radiological Effluent EAL Values, Rev. 0
6. Technical Specification Section 5.5.5
7. NEI 99-01 AU1

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 1 – Radiological Effluent

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

EAL:

RU1.2	**Unusual Event**
Sample analysis for a gaseous or liquid release indicates a concentration or release rate > 2 x SLC/TS limits for ≥ 60 min. (Notes 1, 2)	

Note 1: The Emergency Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be 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

ONS Basis:

None

NEI 99-01 Basis:

This IC addresses a potential decrease in the level of safety of the plant as indicated by a low-level radiological release that exceeds regulatory commitments for an extended period of time (e.g., an uncontrolled release). 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 RA1.

ONS Basis Reference(s):

1. UFSAR Section 11.5, Process and Effluent Radiological Monitoring and Sampling Systems
2. Oconee Nuclear Station Units 1, 2 and 3 Offsite Dose Calculation Manual
3. ONS-SLC 16.11.1 Radioactive Liquid Effluents
4. ONS-SLC 16.11.2 Radioactive Gaseous Effluents
5. AD-RP-ALL-2003 Investigation of Unusual Radiological Occurrences
6. NEI 99-01 AU1

Category: R – 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:

RA1.1 Alert

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

Note 1: The Emergency Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be 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, indicating that the release path is isolated, the effluent monitor reading is no longer VALID for classification purposes.

Note 4 The pre-calculated effluent monitor values presented in EALs RA1.1, RS1.1 and RG1.1 should be used for emergency classification assessments until the results from a dose assessment using actual meteorology are available.

Table R-1 Effluent Monitor Classification Thresholds

	Release Point	Monitor	GE	SAE	Alert	UE
Gaseous	Unit 1/2/3 Plant Vent	RIA-45	----	----	----	1.41E+5 cpm
Gaseous	Unit 1/2/3 Plant Vent	RIA-46	3.00E+5 cpm	3.00E+4 cpm	3.00E+3 cpm	----
Liquid	Liquid Radwaste Discharge	RIA-33	----	----	----	4.79E+5 cpm

Mode Applicability:

All

Definition(s):

None

ONS Basis:

This EAL addresses gaseous radioactivity releases, that for whatever reason, cause effluent radiation monitor readings corresponding to site boundary doses that exceed either:

- 10 mRem TEDE
- 50 mRem CDE Thyroid

The column "ALERT" gaseous effluent release values in Table R-1 correspond to calculated doses of 1% (10% of the SAE thresholds) of the EPA Protective Action Guidelines (TEDE or CDE Thyroid) (ref. 1, 2, 3, 4).

Instrumentation that may be used to assess this EAL: (ref. 1):

- Unit 1/2/3 Plant Vent Noble Gas Medium Monitor – RIA-46(M)

NEI 99-01 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 RS1.

ONS Basis Reference(s):

1. UFSAR Section 11.5 Process and Effluent Radiological Monitoring and Sampling Systems
2. Oconee Nuclear Station Units 1, 2 and 3 Offsite Dose Calculation Manual
3. EP-EALCALC-ONS-1401 ONS Radiological Effluent EAL Values, Rev. 0
4. SDQA-70400-COM, "Unified RASCAL Interface (URI)"
5. NEI 99-01 AA1

Category: R – 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:

RA1.2	**Alert**
Dose assessment using actual meteorology indicates doses > 10 mrem TEDE or 50 mrem thyroid CDE at or beyond the SITE BOUNDARY (Notes 3, 4)	

Note 3: If the effluent flow past an effluent monitor is known to have stopped, indicating that the release path is isolated, the effluent monitor reading is no longer VALID for classification purposes.

Note 4: The pre-calculated effluent monitor values presented in EALs RA1.1, RS1.1 and RG1.1 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 - That area, including the PROTECTED AREA, in which Duke Energy has the authority to control all activities including exclusion or removal of personnel and property (1 mile radius) from the center of Unit 2.

ONS Basis:

Dose assessments are performed by computer-based methods (ref. 1, 2).

NEI 99-01 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 RS1.

ONS Basis Reference(s):

1. RP/0/A/1000/001 Emergency Classification
2. AD-EP-ALL-0202 Emergency Response Offsite Dose Assessment
3. NEI 99-01 AA1

Category: R – 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:

RA1.3	**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 Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be 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 - That area, including the PROTECTED AREA, in which Duke Energy has the authority to control all activities including exclusion or removal of personnel and property (1 mile radius) from the center of Unit 2.

ONS Basis:

Dose assessments based on liquid releases are performed per Offsite Dose Calculation Manual (ref. 1).

NEI 99-01 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 RS1.

ONS Basis Reference(s):

1. Oconee Nuclear Station Units 1, 2 and 3 Offsite Dose Calculation Manual
2. NEI 99-01 AA1

Category: R – 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:

RA1.4 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 Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be 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 - That area, including the PROTECTED AREA, in which DPC has the authority to control all activities including exclusion or removal of personnel and property (1 mile radius) from the center of Unit 2.

ONS Basis:

SH/0/B/2005/002 Protocol for the Field Monitoring Coordinator During Emergency Conditions provides guidance for emergency or post-accident radiological environmental monitoring (ref. 1).

NEI 99-01 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 RS1.

ONS Basis Reference(s):

1. SH/0/B/2005/002 Protocol for the Field Monitoring Coordinator During Emergency Conditions
2. NEI 99-01 AA1

Category: R – 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:

RS1.1 **Site Area Emergency**
Reading on **any** Table R-1 effluent radiation monitor > column "SAE" for ≥ 15 min. (Notes 1, 2, 3, 4)

Note 1: *The Emergency Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be 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, indicating that the release path is isolated, the effluent monitor reading is no longer VALID for classification purposes.

Note 4: The pre-calculated effluent monitor values presented in EALs RA1.1, RS1.1 and RG1.1 should be used for emergency classification assessments until the results from a dose assessment using actual meteorology are available.

Table R-1 Effluent Monitor Classification Thresholds

	Release Point	Monitor	GE	SAE	Alert	UE
Gaseous	Unit 1/2/3 Plant Vent	RIA-45	----	----	----	1.41E+5 cpm
Gaseous	Unit 1/2/3 Plant Vent	RIA-46	3.00E+5 cpm	3.00E+4 cpm	3.00E+3 cpm	----
Liquid	Liquid Radwaste Discharge	RIA-33	----	----	----	4.79E+5 cpm

Mode Applicability:

All

Definition(s):

None

ONS Basis:

This EAL addresses gaseous radioactivity releases, that for whatever reason, cause effluent radiation monitor readings corresponding to site boundary doses that exceed either:

- 100 mRem TEDE
- 500 mRem CDE Thyroid

The column "SAE" gaseous effluent release value in Table R-1 corresponds to calculated doses of 10% of the EPA Protective Action Guidelines (TEDE or CDE Thyroid) (ref. 1, 3).

Instrumentation that may be used to assess this EAL: (ref. 2):

- Unit 1/2/3 Plant Vent Noble Gas Medium Monitor – RIA-46(M)

NEI 99-01 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 RG1.

ONS Basis Reference(s):

1. EP-EALCALC-ONS-1401 ONS Radiological Effluent EAL Values, Rev. 0
2. UFSAR Section 11.5 Process and Effluent Radiological Monitoring and Sampling Systems
3. SDQA-70400-COM, "Unified RASCAL Interface (URI)"
4. NEI 99-01 AS1

Category: R – 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:

RS1.2	**Site Area Emergency**
Dose assessment using actual meteorology indicates doses > 100 mrem TEDE or 500 mrem thyroid CDE at or beyond the SITE BOUNDARY (Notes 3, 4)	

Note 3: If the effluent flow past an effluent monitor is known to have stopped, indicating that the release path is isolated, the effluent monitor reading is no longer VALID for classification purposes.

Note 4: The pre-calculated effluent monitor values presented in EALs RA1.1, RS1.1 and RG1.1 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 - That area, including the PROTECTED AREA, in which Duke Energy has the authority to control all activities including exclusion or removal of personnel and property (1 mile radius) from the center of Unit 2.

ONS Basis:

Dose assessments are performed by computer-based methods (ref. 1, 2).

NEI 99-01 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 RG1.

ONS Basis Reference(s):

1. RP/0/A/1000/001 Emergency Classification
2. AD-EP-ALL-0202 Emergency Response Offsite Dose Assessment
3. NEI 99-01 AS1

Category: R – 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:

RS1.3 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 Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be 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 - That area, including the PROTECTED AREA, in which Duke Energy has the authority to control all activities including exclusion or removal of personnel and property (1 mile radius) from the center of Unit 2.

ONS Basis:

SH/0/B/2005/002 Protocol for the Field Monitoring Coordinator During Emergency Conditions provides guidance for emergency or post-accident radiological environmental monitoring (ref. 1).

NEI 99-01Basis:

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 RG1.

ONS Basis Reference(s):

1. SH/0/B/2005/002 Protocol for the Field Monitoring Coordinator During Emergency Conditions
2. NEI 99-01 AS1

Category: R – 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:

RG1.1 General Emergency

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

Note 1: The Emergency Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be 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, indicating that the release path is isolated, the effluent monitor reading is no longer VALID for classification purposes.

Note 4: The pre-calculated effluent monitor values presented in EALs RA1.1, RS1.1 and RG1.1 should be used for emergency classification assessments until the results from a dose assessment using actual.

Table R-1 Effluent Monitor Classification Thresholds

Release Point		Monitor	GE	SAE	Alert	UE
Gaseous	Unit 1/2/3 Plant Vent	RIA-45	----	----	----	1.41E+5 cpm
Gaseous	Unit 1/2/3 Plant Vent	RIA-46	3.00E+5 cpm	3.00E+4 cpm	3.00E+3 cpm	----
Liquid	Liquid Radwaste Discharge	RIA-33	----	----	----	4.79E+5 cpm

Mode Applicability:

All

Definition(s):

None

ONS Basis:

This EAL addresses gaseous radioactivity releases, that for whatever reason, cause effluent radiation monitor readings corresponding to site boundary doses that exceed either:

- 1000 mRem TEDE
- 5000 mRem CDE Thyroid

The column "GE" gaseous effluent release values in Table R-1 correspond to calculated doses of 100% of the EPA Protective Action Guidelines (TEDE or CDE Thyroid) (ref. 1, 3).

Instrumentation that may be used to assess this EAL: (ref. 2):

- Unit 1/2/3 Plant Vent Noble Gas Medium Monitor – RIA-46(M)

NEI 99-01Basis:

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.

ONS Basis Reference(s):

1. EP-EALCALC-ONS-1401 ONS Radiological Effluent EAL Values, Rev. 0
2. UFSAR Section 11.5 Process and Effluent Radiological Monitoring and Sampling Systems
3. SDQA-70400-COM, "Unified RASCAL Interface (URI)"
4. NEI 99-01 AG1

Category: R – 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:

RG1.2 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 (Notes 3, 4)

Note 3: If the effluent flow past an effluent monitor is known to have stopped, indicating that the release path is isolated, the effluent monitor reading is no longer VALID for classification purposes.

Note 4: The pre-calculated effluent monitor values presented in EALs RA1.1, RS1.1 and RG1.1 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 - That area, including the PROTECTED AREA, in which Duke Energy has the authority to control all activities including exclusion or removal of personnel and property (1 mile radius) from the center of Unit 2.

ONS Basis:

Dose assessments are performed by computer-based methods (ref. 1, 2).

NEI 99-01 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.

ONS Basis Reference(s):

1. RP/0/A/1000/001 Emergency Classification
2. AD-EP-ALL-0202 Emergency Response Offsite Dose Assessment
3. NEI 99-01 AG1

Category: R – 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:

RG1.3 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 Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be 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 - That area, including the PROTECTED AREA, in which Duke Energy has the authority to control all activities including exclusion or removal of personnel and property (1 mile radius) from the center of Unit 2.

ONS Basis:

SH/0/B/2005/002 Protocol for the Field Monitoring Coordinator During Emergency Conditions provides guidance for emergency or post-accident radiological environmental monitoring (ref. 1).

NEI 99-01 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.

ONS Basis Reference(s):

1. SH/0/B/2005/002 Protocol for the Field Monitoring Coordinator During Emergency Conditions
2. NEI 99-01 AG1

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 2 – Irradiated Fuel Event

Initiating Condition: UNPLANNED loss of water level above irradiated fuel

EAL:

RU2.1 Unusual Event

UNPLANNED water level drop in the REFUELING PATHWAY as indicated by low water level alarm or indication

AND

UNPLANNED rise in corresponding area radiation levels as indicated by **any** of the following radiation monitors:

- RIA-3 RB Refueling Deck Shield Wall
- RIA-6 Spent Fuel Building Wall
- Portable area monitors on the main bridge or SFP bridge

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- The spent fuel pool and/or fuel transfer canal comprise the refueling pathway.

ONS Basis:

The spent fuel pool low water level alarm setpoint is actuated at -1.8 ft. below normal level (ref. 1). Water level restoration instructions are performed in accordance with Abnormal Operating Procedures (APs) (ref. 2).

The specified radiation monitors are those expected to see increase area radiation levels as a result of a loss of REFUELING PATHWAY inventory (ref. 3). Increasing radiation indications on these monitors in the absence of indications of decreasing water level are not classifiable under this EAL. Radiation levels in the Reactor Building refueling area are monitored by RIA-3. Radiation levels in the Spent Fuel Pool area are monitored RIA-6. When a fuel bridge is being used to handle fuel, radiation levels are monitored by a portable area monitor mounted on the bridge. (ref. 3, 4)

When the spent fuel pool and reactor cavity are connected, there could exist the possibility of uncovering irradiated fuel. Therefore, this EAL is applicable for conditions in which irradiated fuel is being transferred to and from the reactor vessel and spent fuel pool.

NEI 99-01 Basis:

This IC addresses a decrease 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 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 an increase 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 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 RA2.

ONS Basis Reference(s):

1. OP/1/A/6101/009 Alarm Response Guide 1SA-09, A-5; OP/2/A/6102/009; OP/3/A/6103/009
2. AP/1-2,3/A/1700/035 Loss of SPF Cooling and/or Level
3. UFSAR Table 12-3 Area Radiation Monitors
4. OP/1,2,3/A/1502/007, Enclosure 1, Defueling/Refueling Prerequisites
5. NEI 99-01 AU2

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 2 – Irradiated Fuel Event

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

EAL:

RA2.1	**Alert**
Uncovery of irradiated fuel in the REFUELING PATHWAY	

Mode Applicability:

All

Definition(s):

REFUELING PATHWAY- The spent fuel pool and/or fuel transfer canal comprise the refueling pathway.

ONS Basis:

None.

NEI 99-01 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. 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 escalates from RU2.1 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 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.

Escalation of the emergency classification level would be via IC RS1.

ONS Basis Reference(s):

1. AP/1-2,3/A/1700/035 Loss of SPF Cooling and/or Level
2. NEI 99-01 AA2

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 2 – Irradiated Fuel Event

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

EAL:

RA2.2 Alert

Damage to irradiated fuel resulting in a release of radioactivity

AND

HIGH alarm on **any** of the following radiation monitors:

- RIA-3 RB Refueling Deck Shield Wall
- RIA-6 Spent Fuel Building Wall
- RIA-41 Spend Fuel Pool Gas
- RIA-49 RB Gas
- Portable area monitors on the main bridge or SFP bridge

Mode Applicability:

All

Definition(s):

None

ONS Basis:

The specified radiation monitors are those expected to see increase area radiation levels as a result of damage to irradiated fuel. Radiation levels in the Reactor Building refueling area are monitored by RIA-3. Radiation levels in the Spent Fuel Pool area are monitored RIA-6. When a fuel bridge is being used to handle fuel, radiation levels are monitored by a portable area monitor mounted on the bridge. (ref. 1, 2, 3)

The HIGH alarm for RIA-3 (containment area monitor) and RIA-49 (RB gaseous process monitor) corresponds to the setpoints established to assure that 10 CFR 20 limits are not exceeded.

The HIGH alarm setpoint for RIA-6 (SFP bridge area monitor) is designed to make operators aware of increased readings above 10 CFR 20 limits. The HIGH alarm setpoint for RIA-41 (Spent Fuel Pool gaseous atmosphere) is set to alarm if 4 times the limits of 10 CFR 20 are exceeded based upon Xe-133. RIA-49 monitors the reactor building gas. Portable monitors are established during refueling outages and are located on the main bridge, and the spent fuel pool bridge.

NEI 99-01 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. 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.

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

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 RS1.

ONS Basis Reference(s):

1. OP/1/A/6101/008, Alarm Response Guide 1SA-08 B-9; OP/2/A/6101/008; OP/3/A/6101/008
2. AP/1,2,3/A/1700/018, Abnormal Release of Radioactivity
3. OP/1,2,3/A/1502/007, Enclosure 1, Defueling/Refueling Prerequisites
4. NEI 99-01 AA2

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 2 – Irradiated Fuel Event

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

EAL:

RA2.3	**Alert**
Lowering of spent fuel pool level to -13.5 ft.	

Mode Applicability:

All

Definition(s):

None

ONS Basis:

This EAL is applicable once the post-Fukushima level instrumentation becomes operational on its associated unit.

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).

SFP level instruments 1/2/3SFP0010 (primary) and 011 (backup) measure SFP level relative to normal water level (El. 840 ft.) from + 1 ft. to -23.5 ft. (El. 816.4 ft).

For ONS Level 2 corresponds to an indicated water level of -13.5 ft. (El. 826.5 ft.) (ref. 1).

NEI 99-01 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. 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.

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

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 RS1.

ONS Basis Reference(s):

1. Engineering Change EC 105805 & 105806
2. NEI 99-01 AA2

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 2 – Irradiated Fuel Event

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

EAL:

RS2.1	**Site Area Emergency**
Lowering of spent fuel pool level to -23.5 ft.	

Mode Applicability:

All

Definition(s):

None

ONS Basis:

This EAL is applicable once the post-Fukushima level instrumentation becomes operational on its associated unit.

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).

SFP level instruments 1/2/3SFP0010 (primary) and 011 (backup) measure SFP level relative to normal water level (El. 840 ft.) from + 1 ft. to -23.5 ft. (El. 816.4 ft).

For ONS Level 3 corresponds to an indicated water level of -23.5 ft. (El. 816.5 ft.) (ref. 1).

NEI 99-01 Basis:

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 RG2.

ONS Basis Reference(s):

1. Engineering Change EC 105805 & 105806
2. NEI 99-01 AS2

Category: R – 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:

RG2.1	**General Emergency**
Spent fuel pool level **cannot** be restored to at least -23 ft. for ≥ 60 min. (Note 1)	

Note 1: The Emergency Coordinator should declare the event promptly upon determining that time limit has *been exceeded, or will likely be exceeded.*

Mode Applicability:

All

Definition(s):

None

ONS Basis:

This EAL is applicable once the post-Fukushima level instrumentation becomes operational on its associated unit.

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).

SFP level instruments 1/2/3SFP0010 (primary) and 011 (backup) measure SFP level relative to normal water level (El. 840 ft.) from + 1 ft. to -23.5 ft. (El. 816.4 ft).

For ONS Level 3 corresponds to an indicated water level of -23.5 ft. (El. 816.5 ft.) (ref. 1).

NEI 99-01 Basis:

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.

ONS Basis Reference(s):

1. Engineering Change EC 105805 & 105806
2. NEI 99-01 AG2

Category: R – 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:

RA3.1 Alert

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

- Control Room (RIA-1)
- Central Alarm Station (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).

ONS Basis:

Areas that meet this threshold include the Control Room (CR) and the Central Alarm Station (CAS). RIA-1 monitors the Control room for area radiation (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 the CAS that may be used to assess this EAL threshold. Therefore, this threshold is evaluated using local radiation survey for this area (ref. 1).

NEI 99-01 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 Coordinator should consider the cause of the increased radiation levels and determine if another IC may be applicable.

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

ONS Basis Reference(s):

1. UFSAR Table 12-3 Area Radiation Monitors
2. NEI 99-01 AA3

Category: R – 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:

RA3.2 Alert

An UNPLANNED event results in radiation levels that prohibit or IMPEDE access to **any** Table R-2 rooms or areas (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 R-2 Safe Operation & Shutdown Rooms/Areas	
Room/Area	**Mode Applicability**
Turbine Building	1, 2, 3
Equipment and Cable Rooms	1, 2, 3
Auxiliary Building	1, 2, 3, 4, 5
Reactor Buildings	3, 4, 5

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).

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.

ONS Basis:

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).

NEI 99-01 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 Coordinator should consider the cause of the increased radiation levels and determine if another IC may be applicable.

For RA3.2, 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.
- 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.

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

ONS Basis Reference(s):

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

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.

A Notification of 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.

Category: ISFSI

Subcategory: Confinement Boundary

Initiating Condition: Damage to a loaded cask CONFINEMENT BOUNDARY

EAL:

EU1.1 Unusual Event

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

Table E-1 ISFSI Dose Limits			
Location	**24PHB**	**37PTH**	**69BTH**
HSM front bird screen	1,050 mrem/hr	1,050 mrem/hr	500 mrem/hr
Outside HSM door	40 mrem/hr	4 mrem/hr	4 mrem/hr
End shield wall exterior	550 mrem/hr	8 mrem/hr	8 mrem/hr

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. As related to the ONS ISFSI, Confinement Boundary is comprised of the DSC (dry shielded canister) shell, inner bottom cover plate, inner top cover plate, siphon & vent block, siphon & vent port cover plate, and the welds that join them together.

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.

ONS Basis:

The ONS ISFSI utilizes the NUHOMS System dry spent fuel storage system for dry spent fuel storage.

The Standardized NUHOMS® System is a horizontal canister system composed of a steel dry shielded canister (DSC), a reinforced concrete horizontal storage module (HSM), and a transfer cask (TC). The welded DSC provides confinement and criticality control for the storage and transfer of irradiated fuel. The concrete module provides radiation shielding while allowing cooling of the DSC and fuel by natural convection during storage (ref. 1, 2). The ONS ISFSI utilizes the 24PHB, 37PTH and 69BTH DSC designs.

Confinement boundary is defined as the barrier(s) between areas containing radioactive substances and the environment. Therefore, damage to a confinement boundary must be a confirmed physical breach between the spent fuel and the environment for the TSC.

The Table E-1 values shown are 2 times the limits specified in the ISFSI Certificate of Compliance Technical Specifications for radiation external to the applicable loaded DSC (ref. 1, 2).

NEI 99-01 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 technical specification multiple of "2 times", which is also used in Recognition Category R IC RU1, 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.

ONS Basis Reference(s):

1. USNRC Certificate of Compliance for Spent Fuel Storage Casks, No. 1004, Amendment 13, Attachment A, Technical Specifications for Transnuclear, Inc., Standardized NUHOMS Horizontal Modular Storage System
2. OSC-8716, Oconee ISFSI Dose Rate Evaluations, Rev. 0 (4/29/05)
3. NEI 99-01 E-HU1

Category C – Cold Shutdown / Refueling System Malfunction

EAL Group: Cold Conditions (RCS temperature ≤ 200°F); 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, NM – No Mode).

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 Essential AC Power

Loss of essential 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 4160V AC essential buses.

3. RCS Temperature

Uncontrolled or inadvertent temperature or pressure increases 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 125V DC vital 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 for 15 minutes or longer

EAL:

CU1.1 **Unusual Event**
UNPLANNED loss of reactor coolant results in RCS water level less than a required lower limit for ≥ 15 min. (Note 1)

Note 1: The Emergency Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be 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.

ONS Basis:

RCS water level less than a required lower limit is meant to be less than the lower end of the level control band being procedurally maintained for the current condition or evolution.

RCS water level instrumentation requirements to begin an RCS inventory reduction with fuel in the core to below 80" (lowered inventory) or 50" (reduced inventory) are the following (ref. 1):

- Both channels of LT-5 prior to reducing RCS inventory below 80".
- Both channels of LT-5 and both hot leg and cold leg ultrasonic monitors prior to reducing RCS inventory below 50".

NEI 99-01 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 decrease RCS water inventory are carefully planned and controlled. An UNPLANNED event that results in water level decreasing 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.

ONS Basis Reference(s):

1. S. D. 1.3.5 Shutdown Protection Plan, Section 5.2.7
2. NEI 99-01 CU1

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 1 – RCS Level

Initiating Condition: UNPLANNED loss of RCS inventory for 15 minutes or longer

EAL:

CU1.2 Unusual Event

RCS level **cannot** be monitored

AND EITHER

- UNPLANNED increase in **any** Table C-1 sump/tank level due to loss of RCS inventory
- Visual observation of UNISOLABLE RCS leakage

Table C-1 Sumps / Tanks
• RB Normal Sumps • RB Emergency Sumps • Core Flood Tank • Quench Tank • Low Activity Waste Tank • High Activity Waste Tank • Miscellaneous Waste Holdup Tank • LPI Room Sumps

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.

ONS Basis:

A RCS leak should be considered UNISOLABLE if the leak cannot be isolated within 15 min.

In Cold Shutdown mode, the RCS will normally be intact and standard RCS level monitoring means are available.

In the Refuel mode, the RCS is not intact and reactor vessel level may be monitored by different means, including the ability to monitor level visually.

In this EAL, all water level indication is unavailable and the RCS inventory loss must be detected by indirect leakage indications (Table C-1). Level increases must be evaluated

against other potential sources of leakage such as cooling water sources inside the containment to ensure they are indicative of RCS leakage. If the make-up rate to the RCS unexplainably rises above the pre-established rate, a loss of RCS inventory may be occurring even if the source of the leakage cannot be immediately identified. Visual observation of significant leakage from systems connected to the RCS that cannot be isolated could also be indicative of a loss of RCS inventory (ref. 1, 2).

NEI 99-01 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 decrease RCS water inventory are carefully planned and controlled. An UNPLANNED event that results in water level decreasing 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 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 (Table C-1). 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.

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

ONS Basis Reference(s):

1. AP/1,2,3/A/1700/002 Excessive RCS Leakage
2. AP/1-2,3/A/1700/030 Auxiliary Building Flood
3. NEI 99-01 CU1

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 1 – RCS Level

Initiating Condition: Loss of RCS inventory

EAL:

CA1.1	**Alert**
Loss of RCS inventory as indicated by RCS level < 10" (LT-5)	

Mode Applicability:

5 - Cold Shutdown, 6 – Refueling

Definition(s):

None

ONS Basis:

RCS water level of 10" as indicated on LT-5 is the lowest level for continued operation of LPI pumps for decay heat removal (ref. 1). Two LPI pumps and two coolers normally perform the decay heat removal function for each unit (ref. 2).

The threshold was chosen because a loss of suction to decay heat removal systems may occur. The inability to restore and maintain level after reaching this setpoint infers a failure of the RCS Barrier.

NEI 99-01 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, a lowering of RCS water level below 10 in. indicates that operator actions have not been successful in restoring and maintaining RCS 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, 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 Decay Heat Removal suction point). An increase in RCS temperature caused by a loss of decay heat removal capability is evaluated under IC CA3.

If RCS water level continues to lower, then escalation to Site Area Emergency would be via IC CS1.

ONS Basis Reference(s):

1. AP/1,2,3/A/1700/026 Loss of Decay Heat Removal
2. UFSAR Section 9.3.3 Low Pressure Injection System
3. NEI 99-01 CA1

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 1 – RCS Level

Initiating Condition: Loss of RCS inventory

EAL:

CA1.2 Alert

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

AND EITHER

- UNPLANNED increase in **any** Table C-1 Sump / Tank level due to a loss of RCS inventory
- Visual observation of UNISOLABLE RCS leakage

Note 1: The Emergency Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.

Table C-1 Sumps / Tanks
• RB Normal Sumps
• RB Emergency Sumps
• Core Flood Tank
• Quench Tank
• Low Activity Waste Tank
• High Activity Waste Tank
• Miscellaneous Waste Holdup Tank
• LPI Room Sumps

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.

ONS Basis:

A RCS leak should be considered UNISOLABLE if the leak cannot be isolated within 15 minutes.

In Cold Shutdown mode, the RCS will normally be intact and standard RCS level monitoring means are available.

In the Refuel mode, the RCS is not intact and RCS level may be monitored by different means, including the ability to monitor level visually.

In this EAL, all RCS water level indication would be unavailable for greater than 15 minutes, and the RCS inventory loss must be detected by indirect leakage indications (Table C-1). Level increases must be evaluated against other potential sources of leakage such as cooling water sources inside the containment to ensure they are indicative of RCS leakage. If the make-up rate to the RCS unexplainably rises above the pre-established rate, a loss of RCS inventory may be occurring even if the source of the leakage cannot be immediately identified. Visual observation of significant leakage from systems connected to the RCS that cannot be isolated could also be indicative of a loss of RCS inventory (ref. 1, 2).

NEI 99-01 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.

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.

ONS Basis Reference(s):

1. AP/1,2,3/A/1700/002 Excessive RCS Leakage
2. AP/1-2,3/A/1700/030 Auxiliary Building Flood
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

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

AND

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

- UNPLANNED increase in **any** Table C-1 sump/tank level
- Visual observation of UNISOLABLE RCS leakage
- High alarm on RIA-3 RB Refueling Deck Shield Wall
- Erratic Source Range Monitor Indication

Note 1: The Emergency Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.

Table C-1 Sumps / Tanks
• RB Normal Sumps • RB Emergency Sumps • Core Flood Tank • Quench Tank • Low Activity Waste Tank • High Activity Waste Tank • Miscellaneous Waste Holdup Tank • LPI Room Sumps

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.

ONS Basis:

A RCS leak should be considered UNISOLABLE if the leak cannot be isolated within 15 minutes.

In Cold Shutdown mode, the RCS will normally be intact and standard RCS level monitoring means are available.

In the Refueling mode, the RCS is not intact and RCS level may be monitored by different means, including the ability to monitor level visually.

In this EAL, all RCS water level indication would be unavailable for greater than 30 minutes, and the RCS inventory loss must be detected by indirect leakage indications (Table C-1). Level increases must be evaluated against other potential sources of leakage such as cooling water sources inside the containment to ensure they are indicative of RCS leakage. If the make-up rate to the RCS unexplainably rises above the pre-established rate, a loss of RCS inventory may be occurring even if the source of the leakage cannot be immediately identified. Visual observation of significant leakage from systems connected to the RCS that cannot be isolated could also be indicative of a loss of RCS inventory (ref. 1, 2).

Sump or tank level increases should be of a magnitude that correlates to a volume sufficient to indicate fuel has been uncovered or uncovery is imminent.

The Reactor Vessel inventory loss may be detected by a reduction in water shielding that causes a high alarm on the Refueling Deck Shield Wall area radiation monitor (ref. 3).

Post-TMI accident studies indicated that the installed PWR nuclear instrumentation will operate erratically when the core is uncovered and that this should be used as a tool for making such determinations (ref. 4, 5, 6).

NEI 99-01 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 a 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 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.

Escalation of the emergency classification level would be via IC CG1 or RG1.

ONS Basis Reference(s):

1. AP/1,2,3/A/1700/002 Excessive RCS Leakage
2. AP/1-2,3/A/1700/030 Auxiliary Building Flood
3. UFSAR Table 12-3 Area Radiation Monitors
4. UFSAR Section 7.4.1 Nuclear Instrumentation
5. OP/1,2,3/A/5102/002 Alarm Response Guide 1,2,3SA-02, A-6
6. Nuclear Safety Analysis Center (NSAC), 1980, "Analysis of Three Mile Island - Unit 2 Accident," NSAC-1
7. 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

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

AND

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

- UNPLANNED increase in **any** Table C-1 sump/tank level due to a loss of RCS inventory
- Visual observation of UNISOLABLE RCS leakage
- High alarm on RIA-3 RB Refueling Deck Shield Wall
- Erratic Source Range Monitor Indication

AND

Any Containment Challenge indication, Table C-2

Note 1: The Emergency Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be 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 Sumps / Tanks
• RB Normal Sumps • RB Emergency Sumps • Core Flood Tank • Quench Tank • Low Activity Waste Tank • High Activity Waste Tank • Miscellaneous Waste Holdup Tank • LPI Room Sumps

Table C-2 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 action to secure containment and its associated structures, systems, and components as a functional barrier to fission product release under all plant conditions up to and including a loss of decay heat removal or fuel handling accident inside containment.

As applied to ONS, Containment Closure is established when the requirements of OP/1,2,3/A/1502/009, Containment Closure Control, are met.

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.

ONS Basis:

A RCS leak should be considered UNISOLABLE if the leak cannot be isolated within 15 minutes.

In Cold Shutdown mode, the RCS will normally be intact and standard RCS level monitoring means are available.

In the Refueling mode, the RCS is not intact and RCS level may be monitored by different means, including the ability to monitor level visually.

In this EAL, all RCS water level indication would be unavailable for greater than 30 minutes, and the RCS inventory loss must be detected by indirect leakage indications (Table C-1). Level increases must be evaluated against other potential sources of leakage such as cooling water sources inside the containment to ensure they are indicative of RCS leakage. If the make-up rate to the RCS unexplainably rises above the pre-established rate, a loss of RCS inventory may be occurring even if the source of the leakage cannot be immediately identified. Visual observation of significant leakage from systems connected to the RCS that cannot be isolated could also be indicative of a loss of RCS inventory (ref. 1, 2).

Sump or tank level increases should be of a magnitude that correlates to a volume sufficient to indicate fuel has been uncovered or uncovery is imminent.

The Reactor Vessel inventory loss may be detected by a reduction in water shielding that causes a high alarm on the Refueling Deck Shield Wall area radiation monitor (ref. 3).

Post-TMI accident studies indicated that the installed PWR nuclear instrumentation will operate erratically when the core is uncovered and that this should be used as a tool for making such determinations (ref. 4, 5, 6).

Three conditions are associated with a challenge to Containment integrity:

1. CONTAINMENT CLOSURE not established - The status of containment closure is tracked if plant conditions change that could raise the risk of a fission product release as a result of a loss of decay heat removal (ref. 7). If containment closure is re-established prior to exceeding the 30 minute core uncovery time limit then escalation to GE would not occur.
2. Containment hydrogen ≥ 4% - The 4% hydrogen concentration threshold is generally considered the lower limit for hydrogen combustion. ONS is equipped with a Containment Hydrogen Monitoring System (CHMS) that provides continuous indication of hydrogen concentration in the containment atmosphere. The measurement capability is provided over the range of 0% to 10%. A continuous indication of the hydrogen concentration is not required in the control room at all times during normal operation. If continuous indication of the hydrogen concentration is not available at all times, continuous indication and recording shall be functioning within 90 minutes of the initiation of the safety injection. (ref. 8, 9)
3. UNPLANNED rise in containment pressure - An unplanned pressure rise in containment while in cold shutdown or refueling modes can threaten Containment Closure capability and thus containment potentially cannot be relied upon as a barrier to fission product release.

NEI 99-01 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 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.

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.*

ONS Basis Reference(s):

1. AP/1,2,3/A/1700/002 Excessive RCS Leakage
2. AP/1-2,3/A/1700/030 Auxiliary Building Flood
3. UFSAR Table 12-3 Area Radiation Monitors
4. UFSAR Section 7.4.1 Nuclear Instrumentation
5. OP/1/A/6101/002; OP/2/A/6102/002; OP/3/A/6103/002 Alarm Response Guide 1,2,3SA-02, A-6
6. Nuclear Safety Analysis Center (NSAC), 1980, "Analysis of Three Mile Island - Unit 2 Accident," NSAC-1
7. OP/1,2,3/A/1502/009 Containment Closure Control
8. UFSAR Section 9.3.7 Containment Hydrogen Monitoring System
9. UFSAR Section 15.16.3 Evaluation of Hydrogen Concentrations
10. NEI 99-01 CG1

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 2 – Loss of Essential AC Power

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

EAL:

CU2.1 Unusual Event

AC power capability, Table C-3, to essential 4160 V buses MFB-1 and MFB-2 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 Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.

Table C-3 AC Power Sources
Offsite: • Unit Normal Transformer (backcharged) • Unit Startup Transformer (SWYD) • Another Unit Startup Transformer (aligned) (SWYD) • CT5 (Central/energizing Standby Bus)
Emergency: • Unit Startup Transformer (Keowee) • Another Unit Startup Transformer (aligned) (Keowee) • CT4 • CT5 (dedicated line/energizing Standby Bus)

Mode Applicability:

5 - Cold Shutdown, 6 – Refueling, NM – No Mode

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.

ONS Basis:

For emergency classification purposes, "capability" means that an AC power source is available to and capable of powering the emergency bus(es) within 15 min, whether or not the buses are currently powered from it.

The condition indicated by this EAL is the degradation of the offsite and onsite power sources such that any additional single failure would result in a loss of all AC power to the emergency buses. 4160 V buses MFB-1 and MFB-2 are the essential buses (ref. 1).

Each unit is provided with two physically independent circuits from the switching station. One is the circuit from the 230 kV switching station through the startup transformer, which is designed to be available within a few seconds following a loss of coolant accident. The second circuit is the path from the switchyard through the main step-up transformer, the main generator bus and the unit auxiliary transformer with the generator disconnected from the main bus. The second circuit is currently used during refueling as an additional power feed for the shutdown unit(s) from the 230 kV switchyard. Whenever there is inadequate power from the generating units, the 230 kV switching station and the hydro units, power is available to the standby power buses either directly from the 100 kV Central Tie Substation or from Lee Steam Station via a Transformer CT5 (ref. 2).

Upon loss of power from the Oconee generating unit and 230 kV switchyard, power is supplied from both Keowee Hydro Station units through two separate and independent routes. One route is an underground feeder to Transformer CT4 which supplies the two redundant Main Feeder Buses (MFB-1 and MFB-2). The other route is an overhead feeder to the 230 KV switching station which supplies each unit startup transformer (ref. 3).

The Standby Shutdown Facility (SSF) consists of standby systems for use in an extreme emergency and is equipped with a manually started diesel generator that can supply power necessary to maintain hot shutdown of the reactors of each unit in the event of loss of power. However, the SSF cannot supply power to the essential buses and therefore not credited in this EAL (ref. 3).

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

NEI 99-01 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 no mode, this condition is not classified as an Alert because of the increased 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 APs and EOPs, and capable of supplying required power to an essential bus. Some examples of this condition are presented below.

- A loss of all offsite power with a concurrent failure of all but one essential power source (e.g., CT4, CT5, CT1 (Keowee).
- A loss of essential power sources (e.g., CT4, CT5, CT1, 2, 3 (Keowee)) with a single train of essential buses being back-fed from an offsite power source.

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.

ONS Basis Reference(s):

1. UFSAR Figure 8.1 Single Line Diagram
2. UFSAR Section 8.2 Offsite Power System
3. UFSAR Section 8.3 Onsite Power Systems
4. NEI 99-01 CU2

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 2 – Loss of Essential AC Power

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

EAL:

CA2.1 **Alert**
Loss of **all** offsite and **all** emergency AC power capability, Table C-3, to essential 4160 V buses MFB-1 and MFB-2 for ≥ 15 min. (Note 1)

Note 1: The Emergency Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.

Table C-3 AC Power Sources
Offsite: • Unit Normal Transformer (backcharged) • Unit Startup Transformer (SWYD) • Another Unit Startup Transformer (aligned) (SWYD) • CT5 (Central/energizing Standby Bus) **Emergency:** • Unit Startup Transformer (Keowee) • Another Unit Startup Transformer (aligned) (Keowee) • CT4 • CT5 (dedicated line/energizing Standby Bus)

Mode Applicability:

5 - Cold Shutdown, 6 - Refueling, NM – No Mode

ONS Basis:

For emergency classification purposes, "capability" means that an AC power source is available to and capable of powering the emergency bus(es) within 15 min, whether or not the buses are currently powered from it.

The condition indicated by this EAL is the degradation of the offsite and onsite power sources resulting in a loss of all AC power to the emergency buses. 4160 V buses MFB-1 and MFB-2 are the essential buses (ref. 1).

Each unit is provided with two physically independent circuits from the switching station. One is the circuit from the 230 kV switching station through the startup transformer, which is designed to be available within a few seconds following a loss of coolant accident. The second circuit is the path from the switchyard through the main step-up transformer, the main generator bus and the unit auxiliary transformer with the generator disconnected from the main bus. The second circuit is currently used during refueling as an additional power feed for the shutdown unit(s) from the 230 kV switchyard. Whenever there is inadequate power from the generating

units, the 230 kV switching station and the hydro units, power is available to the standby power buses either directly from the 100 kV Central Tie Substation or from Lee Steam Station via a Transformer CT5. (ref. 2)

Upon loss of power from the Oconee generating unit and 230 kV switchyard, power is supplied from both Keowee Hydro Station units through two separate and independent routes. One route is an underground feeder to Transformer CT4 which supplies the two redundant Main Feeder Buses (MFB-1 and MFB-2). The other route is an overhead feeder to the 230 KV switching station which supplies each unit startup transformer. (ref. 3)

The Standby Shutdown Facility (SSF) consists of standby systems for use in an extreme emergency and is equipped with a manually started diesel generator that can supply power necessary to maintain hot shutdown of the reactors of each unit in the event of loss of power. However, the SSF cannot supply power to the essential buses and therefore not credited in this EAL (ref. 3).

This cold condition EAL is equivalent to the hot condition loss of all offsite AC power EAL SS1.1.

NEI 99-01 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.

When in the cold shutdown, refueling, or no mode, this condition is not classified as a Site Area Emergency because of the increased time available to restore an 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 RS1.

ONS Basis Reference(s):

1. UFSAR Figure 8.1 Single Line Diagram
2. UFSAR Section 8.2 Offsite Power System
3. UFSAR Section 8.3 Onsite Power Systems
4. NEI 99-01 CA2

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 3 – RCS Temperature

Initiating Condition: UNPLANNED increase in RCS temperature

EAL:

CU3.1	**Unusual Event**
UNPLANNED increase in RCS temperature to > 200°F due to loss of decay heat removal capability	

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.

ONS Basis:

Several instruments are capable of providing indication of RCS temperature with respect to the Technical Specification cold shutdown temperature limit (200°F, ref. 1). These include cold leg (T_c) temperature indications, hot leg (T_h) temperature indications with RCPs running, CETCs and LPI cooler outlet temperature indications (ref. 2).

However, if Low Pressure Injection (LPI) flow is lost, the normal temperature elements used to monitor RCS temperature are not accurate indicators of RCS temperature. The CETCs are the design instruments for these conditions. For some periods of time the CETCs may not be available. The current practices concerning determining time to boil can be used in the evaluation of these EALs. Without CETC indication and with a loss of LPI flow the following guidance should be used (ref. 2):

- Use the predetermined "time to boil" data for evaluating these EALs. This approach reflects the relatively small numerical difference between the typical Technical Specification cold shutdown temperature limit of 200°F and the boiling temperature of RCS water with the plant in Mode 5 or 6.
- Alternately, the Control Room staff may use a procedure or user aid to determine when RCS temperature will likely exceed 200°F given the actual plant conditions (e.g., using a heat-up curve).

NEI 99-01 Basis:

This IC addresses an UNPLANNED increase 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 Coordinator should also refer to IC CA3.

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 reduced inventory may result in a rapid increase 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.

ONS Basis Reference(s):

1. ONS Technical Specifications Table 1.1-1
2. AP/1,2,3/A/1700/026 Loss of Decay Heat Removal
3. NEI 99-01 CU3

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 3 – RCS Temperature

Initiating Condition: UNPLANNED increase 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 Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.

Mode Applicability:

5 - Cold Shutdown, 6- Refueling

Definition(s):

None

ONS Basis:

Several instruments are capable of providing indication of RCS temperature with respect to the Technical Specification cold shutdown temperature limit (200°F, ref. 1). These include cold leg (T_c) temperature indications, hot leg (T_h) temperature indications with RCPs running, CETCs and LPI cooler outlet temperature indications (ref. 2).

Several instruments are capable of providing indication of RCS level including pressurizer level, RVLIS, LT-5 and local monitor (ref. 3).

NEI 99-01 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 Coordinator should also refer to IC CA3.

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.

ONS Basis Reference(s):

1. ONS Technical Specifications Table 1.1-1
2. AP/1,2,3/A/1700/026 Loss of Decay Heat Removal
3. UFSAR Section 7.5.2.2 Inadequate Core Cooling Instruments
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 increase in RCS temperature to > 200°F for > Table C-4 duration (Note 1)

OR

UNPLANNED RCS pressure increase > 10 psig due to a loss of RCS cooling (this EAL does not apply during water-solid plant conditions)

Note 1: The Emergency Coordinator should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.

Table C-4: RCS Heat-up Duration Thresholds

RCS Status	CONTAINMENT CLOSURE Status	Heat-up Duration
Intact (but **not** REDUCED INVENTORY)	N/A	60 min.*
Not intact **OR** REDUCED 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.

Mode Applicability:

5 - Cold Shutdown, 6 – Refueling

Definition(s):

CONTAINMENT CLOSURE - The action to secure containment and its associated structures, systems, and components as a functional barrier to fission product release under all plant conditions up to and including a loss of decay heat removal or fuel handling accident inside containment.

As applied to ONS, Containment Closure is established when the requirements of OP/1,2,3/A/1502/009, Containment Closure Control, are met.

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.

REDUCED INVENTORY - Condition with fuel in the reactor vessel and the level lower than three feet below the reactor vessel flange (RCS level < 50" on LT-5)

ONS Basis:

Several instruments are capable of providing indication of RCS temperature with respect to the Technical Specification cold shutdown temperature limit (200°F, ref. 1). These include cold leg (T_c) temperature indications, hot leg (T_h) temperature indications with RCPs running, CETCs and LPI cooler outlet temperature indications (ref. 2).

However, if Low Pressure Injection (LPI) flow is lost, the normal temperature elements used to monitor RCS temperature are not accurate indicators of RCS temperature. The CETCs are the design instruments for these conditions. For some periods of time the CETCs may not be available. The current practices concerning determining time to boil can be used in the evaluation of these EALs. Without CETC indication and with a loss of LPI flow the following guidance should be used (ref. 2):

- Use the predetermined "time to boil" data for evaluating these EALs. This approach reflects the relatively small numerical difference between the typical Technical Specification cold shutdown temperature limit of 200°F and the boiling temperature of RCS water with the plant in Mode 5 or 6.
- Alternately, the Control Room staff may use a procedure or user aid to determine when RCS temperature will likely exceed 200°F given the actual plant conditions (e.g., using a heat-up curve).

Numerous RCS pressure instruments are capable of measuring pressure to less than 10 psia including RCS low range cooldown pressure indicators RC-P-0086A/B (ref. 3).

NEI 99-01 Basis:

This IC 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 an increase in RCS temperature when CONTAINMENT CLOSURE is established but the RCS is not intact, or RCS inventory is reduced (e.g., mid-loop operation). The 20-minute criterion was included to allow time for operator action to address the temperature increase.

The RCS Heat-up Duration Thresholds table also addresses an increase 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 without a substantial degradation in plant safety.

Finally, in the case where there is an increase in RCS temperature, the RCS is not intact or is at reduced 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 increase 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 RS1.

ONS Basis Reference(s):

1. ONS Technical Specifications Table 1.1-1
2. AP/1,2,3/A/1700/026 Loss of Decay Heat Removal
3. IP/1,2,3/A/0200/047A Reactor Coolant System LTOP Instrument Calibration
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 < 105VDC on vital DC buses **required** by Technical Specifications for ≥ 15 min. (Note 1)	

Note 1: The Emergency Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.

Mode Applicability:

5 - Cold Shutdown, 6 - Refueling

Definition(s):

None

ONS Basis:

The purpose of this EAL is to recognize a loss of DC power compromising the ability to monitor and control the removal of decay heat during cold shutdown or refueling operations. This EAL is intended to be anticipatory in as much as the operating crew may not have necessary indication and control of equipment needed to respond to the loss. The fifteen minute interval is intended to exclude transient or momentary power losses.

For each unit, two independent and physically separated 125 volt DC batteries and DC buses are provided for the vital instrumentation and control power system. (ref. 1, 2). Minimum DC bus voltage is 110 VDC (ref. 3).

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

NEI 99-01 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 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 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 R.

ONS Basis Reference(s):

1. UFSAR Figure 8.5 Typical DC and AC Vital Power System - Single Line
2. UFSAR Section 8.3.2 DC Power Systems
3. EP/*/A/1800/001 Blackout Tab
4. Technical Specifications 3.8.4 DC 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-5 onsite communication methods

OR

Loss of **all** Table C-5 offsite communication methods

OR

Loss of **all** Table C-5 NRC communication methods

Table C-5 Communication Methods

System	Onsite	Offsite	NRC
Commercial phone service	X	X	X
ONS site phone system	X	X	X
EOF phone system	X	X	X
Public Address system	X		
Onsite radio system	X		
DEMNET		X	
Offsite radio system		X	
NRC Emergency Telephone System			X
Satellite Phone	X	X	X

Mode Applicability:

5 - Cold Shutdown, 6 - Refueling, NM – No Mode

Definition(s):

None

ONS Basis:

Onsite, offsite and NRC communications include one or more of the systems listed in Table C-5 (ref. 1).

1. Commercial phone service

   The Commercial phone service does not go through the site telephone system.

2. ONS site phone system

   The site phone system is generator and battery backed with:

   - Fiber-Optic to Charlotte GO (65 lines)
   - Telephone line to Easley (6 circuits)
   - Anderson (4 lines)
   - Six Mile (4 lines)
   - Site Telephone System: Inward and outward direct dial available from the Control Room, TSC, and OSC

3. EOF phone system

   The emergency communications systems at the Charlotte EOF are designed to ensure the reliable, timely flow of information between all parties having an emergency response role.

4. Public Address (Paging) system

   The paging system provides paging and party line communications between stations located throughout the plant. Inside and outside type wall and desk-mounted stations are used to communicate between roaming personnel and fixed work locations. Plant-wide instructions are issued using the paging feature.

5. Onsite radio system

   The onsite radio system receives emergency backup power from Keowee Hydro Units supporting communications with: Control Room 1&2, 3, Fire Brigade, Chemistry, Safety, Radiation Protection, Maintenance, Medical Emergency Response Team, and Hazardous Materials Response Team.

6. DEMNET

   DEMNET is the primary means of offsite communication. This circuit allows intercommunication among the EOF, TSC, control room, counties, and states. DEMNET operates as an internet based (VoIP) communications system with a satellite back-up. Should the internet transfer rate become slow or unavailable, the DEMNET will automatically transfer to satellite mode.

7. Offsite radio system

   The offsite radio system is battery backed supporting communications with: Control Room Units 1&2, TSC, Field Monitoring Teams, EOF, counties and State of South Carolina.

8. NRC Emergency Telephone System (ETS)

   The NRC uses a Duke Energy dedicated telephone line which allows direct telephone communications from the plant to NRC regional and national offices. The Duke Energy communications line provides a link independent of the local public telephone network. Telephones connected to this network are located in the Oconee Control Rooms, Technical Support Center, and Emergency Operations Facility and can be used to establish NRC Emergency Notification System (ENS) and Health Physics Network (HPN) capability.

9. Satellite Phone

   Satellite Phones can be used for both internal and external communications

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

NEI 99-01 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 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 OROs of an emergency declaration. The OROs referred to here are the State EOC and FEO, Pickens County LEC and EOC, and Oconee County LEC and EOC.

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

ONS Basis Reference(s):

1. ONS Emergency Plan, Section 7.2 Communications Systems
2. NEI 99-01 CU5

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 6 – Hazardous Event Affecting Safety Systems

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

EAL:

CA6.1 Alert

The occurrence of **any** Table C-6 hazardous event

AND EITHER:

- Event damage has caused indications of degraded performance in at least one train of a SAFETY SYSTEM needed for the current operating mode
- The event has caused VISIBLE DAMAGE to a SAFETY SYSTEM component or structure needed for the current operating mode

Table C-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

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 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.

ONS Basis:

- The significance of seismic events are discussed under EAL HU2.1 (ref. 1).
- Internal FLOODING may be caused by events such as component failures, equipment misalignment, or outage activity mishaps.
- External flooding at ONS is highly unlikely since the probable maximum flood (PMF) would be contained by the Keowee Reservoir. Plant grade elevation is 796.0 ft MSL. The minimum external access elevation for the Auxiliary, Turbine, and Service Buildings is 796.5 ft MSL which provides a 6 inch water sill. (ref. 2)
- High winds in excess of design (95 mph) or tornado strikes can cause significant structural damage (ref. 3).
- Areas containing functions and systems required for safe shutdown of the plant are identified by fire area (ref. 4, 5).
- An explosion that degrades the performance of a SAFETY SYSTEM train or visibly damages a SAFETY SYSTEM component or structure would be classified under this EAL.

NEI 99-01 Basis:

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.

The first conditional 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.

The second conditional 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 RS1.

ONS Basis Reference(s):

1. AP/0/A/1700/005 Earthquake
2. UFSAR Section 3.4.1.1 Flood Protection Measures for Seismic Class 1 Structures
3. UFSAR Section 3.3.1.1 Design Wind Velocity
4. OSS-0254.00-00-4008 Design Bases Specification for Fire Protection
5. AP/1,2,3/A/1700/050 Challenging Plant Fire
6. NEI 99-01 CA6

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 Technology 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 Coordinator 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 Coordinator the latitude to classify emergency conditions consistent with the established classification criteria based upon Emergency Coordinator 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 the Security Shift Supervision

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):

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.

HOSTILE ACTION - An act toward ONS 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 ONS. Non-terrorism-based EALs should be used to address such activities (i.e., this may include violent acts between individuals in the owner controlled area).

ONS Basis:

This EAL is based on the Duke Energy Physical Security Plan for ONS (ref. 1).

NEI 99-01 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, 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].*

The first threshold references the Security Shift Supervision because these are the individuals 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 Duke Energy Physical Security Plan for ONS.

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 AP/0/A/1700/045 Site Security Threats (ref. 2).

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 Duke Energy Physical Security Plan for ONS (ref. 1).

Escalation of the emergency classification level would be via IC HA1.

ONS Basis Reference(s):

1. Duke Energy Physical Security Plan for ONS
2. AP/0/A/1700/045 Site Security Threats
3. NEI 99-01 HU1

Category: H – Hazards

Subcategory: 1 – Security

Initiating Condition: Hostile action within the OWNER CONTROLLED AREA or airborne attack threat within 30 minutes

EAL:

HA1.1	**Alert**

A HOSTILE ACTION is occurring or has occurred within the OWNER CONTROLLED AREA as reported by the Security Shift Supervision

OR

A validated notification from NRC of an aircraft attack threat within 30 min. of the site

Mode Applicability:

All

Definition(s):

HOSTILE ACTION - An act toward ONS 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 ONS. Non-terrorism-based EALs should be used to address such activities (i.e., this may include violent acts between individuals in the owner controlled area).

OWNER CONTROLLED AREA - Area outside the PROTECTED AREA fence that immediately surrounds the plant. Access to this area is generally restricted to those entering on official business.

ONS Basis:

None

NEI 99-01 Basis:

This IC addresses the occurrence of a HOSTILE ACTION within the 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 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 OWNER CONTROLLED AREA. This includes any action directed against an ISFSI that is located outside the plant PROTECTED 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 AP/0/A/1700/045 Site Security Threats (ref. 2).

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 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 Duke Energy Physical Security Plan for ONS (ref. 1).

Escalation of the emergency classification level would be via IC HS1.

ONS Basis Reference(s):

1. Duke Energy Physical Security Plan for ONS
2. AP/0/A/1700/045 Site Security Threats
3. 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 the Security Shift Supervision	

Mode Applicability:

All

Definition(s):

HOSTILE ACTION - An act toward ONS 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 ONS. Non-terrorism-based EALs should be used to address such activities (i.e., this may include violent acts between individuals in the owner controlled area).

PROTECTED AREA - That part of the nuclear station property consisting of the Reactor, Auxiliary, Turbine, and Service Building and grounds, contained within the owner controlled security fence.

ONS Basis:

The Security Shift Supervision are the designated on-site personnel qualified and trained to confirm that a security event is occurring or has occurred. Training on security event classification confirmation is closely controlled due to the strict secrecy controls placed on the Duke Energy Physical Security Contingency Plan for ONS (Safeguards) information. (ref. 1)

NEI 99-01 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 (ref. 1, 2).

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 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 Duke Energy Physical Security Plan for ONS (ref. 1).

Escalation of the emergency classification level would be via IC HG1.

ONS Basis Reference(s):

1. Duke Energy Physical Security Plan for ONS
2. AP/0/A/1700/045 Site Security Threats
3. NEI 99-01 HS1

Category: H – Hazards

Subcategory: 1 – Security

Initiating Condition: Hostile Action resulting in loss of physical control of the facility

EAL:

HG1.1 General Emergency

A HOSTILE ACTION is occurring or has occurred within the PROTECTED AREA as reported by the Security Shift Supervision

AND EITHER of the following has occurred:

Any of the following safety functions cannot be controlled or maintained

- Reactivity
- Core cooling
- RCS heat removal

OR

Damage to spent fuel has occurred or is IMMINENT

Mode Applicability:

All

Definition(s):

HOSTILE ACTION - An act toward ONS 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 ONS. Non-terrorism-based EALs should be used to address such activities (i.e., this may include violent acts between individuals in the owner controlled area).

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

PROTECTED AREA - That part of the nuclear station property consisting of the Reactor, Auxiliary, Turbine, and Service Building and grounds, contained within the owner controlled security fence.

ONS Basis:

Indications of damaged spent fuel are provided in AP/1,2,3/A/1700/009 Spent Fuel Damage (ref. 4).

NEI 99-01 Basis:

This IC addresses an event in which a HOSTILE FORCE has taken physical control of the facility to the extent that the plant staff can no longer operate equipment necessary to maintain key safety functions. It also addresses a HOSTILE ACTION leading to a loss of physical

control that results in actual or IMMINENT damage to spent fuel due to 1) damage to a spent fuel pool cooling system (e.g., pumps, heat exchangers, controls, etc.) or, 2) loss of spent fuel pool integrity such that sufficient water level cannot be maintained.

Timely and accurate communications between the Security Shift Supervision and the Control Room is essential for proper classification of a security-related event (ref. 2, 3).

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].*

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 Duke Energy Physical Security Plan for ONS (ref.1).

ONS Basis Reference(s):

1. Duke Energy Physical Security Plan for ONS
2. AP/0/A/1700/045 Site Security Threats
3. AP/0/A/1700/046 Extensive Damage Mitigation
4. AP/1,2,3/A/1700/009 Spent Fuel Damage
5. NEI 99-01 HG1

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 2 – Seismic Event

Initiating Condition: Seismic event greater than DBE levels

EAL:

HU2.1	**Unusual Event**

Seismic event > DBE as indicated by **EITHER** of the following:

- 1SA-9/E-1 (SEISMIC TRIGGER) alarm
- 3SA-9/E-1 (SEISMIC TRIGGER) alarm

Mode Applicability:

All

Definition(s):

None

ONS Basis:

This EAL is based on a VALID receipt of either of the specified seismic trigger alarms. In addition, exceedance of Operating Basis Earthquake ground acceleration can also be determined by either of the following assessments (ref. 2):

- Strong Motion Accelerometer Recorder tape analysis ≥ 0.05g
- Tendon Gallery Peak Acceleration Recorder results per AM/1/A/0125/002A ≥ 0.05g

However, the above assessments cannot be completed within 15 minutes of the seismic event.

The design basis earthquake ground acceleration at the site is 0.05g. The maximum hypothetical earthquake ground acceleration is 0.10g and 0.15g for Class 1 structures founded on bedrock and overburden respectively. For ONS, the Operating Basis Earthquake (OBE) is equivalent to the Design Basis Earthquake (DBE). (ref. 1)

If an earthquake of ≥ 0.05 g has occurred on site, all units are required to be shut down to Mode 5 once a plant damage assessment is complete along with the completion of any needed repairs to support the units ability to achieve safe shutdown. (ref. 2)

Earthquake instrumentation is the SMA-3 system consisting of a central recording system, control panel, one TS-3 triaxial seismic trigger package, and two force-balance triaxial accelerometer packages. The seismic trigger and one accelerometer of the SMA-3 system are located in the Unit 1 Tendon Gallery. Also, a second accelerometer is located directly above at elevation 797' +6" in the Oconee 1 Reactor Building. The recorder for the system is located in the Unit 1 Cable Room. Also, a seismic trigger/switch is located in the Unit 1 tendon gallery. The TS-3 has a preset acceleration threshold of 0.05g which activates the statalarm in Units 1 and 3 control rooms, when design conditions occur. (ref. 3)

To avoid inappropriate emergency classification resulting from spurious actuation of the seismic instrumentation or felt motion not attributable to seismic activity, an offsite agency (USGS, National Earthquake Information Center (NEIC)) 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. The NEIC can be contacted by calling **(303) 273-8500** (ref. 2). Select **option #1** and inform the analyst you wish to confirm recent seismic activity in the vicinity of ONS. If requested, provide the analyst with the following ONS coordinates: **34° 47' 38.2" north latitude, 82° 53' 55.4" west longitude** (ref. 4). Alternatively, near real-time seismic activity can be accessed via the NEIC website:

http://earthquake.usgs.gov/eqcenter/

NEI 99-01 Basis:

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 Coordinator may seek external verification if deemed appropriate (e.g., a call to the 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.

ONS Basis Reference(s):

1. UFSAR Section 3.2.1.3 Seismic Loading Conditions
2. AP/0/A/1700/005 Earthquake
3. UFSAR Section 3.7.4 Seismic Instrumentation Program
4. UFSAR Section 2.1.1.1 Specification of Location
5. 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 - That part of the nuclear station property consisting of the Reactor, Auxiliary, Turbine, and Service Building and grounds, contained within the owner controlled security fence.

ONS Basis:

Response actions associated with a tornado onsite is provided in AP/0/A/1700/006, Natural Disaster (ref. 1).

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.

NEI 99-01 Basis:

This IC addresses hazardous events that are considered to represent a potential degradation of the level of safety of the plant.

EAL HU3.1 addresses a tornado striking (touching down) within the PROTECTED AREA.

Escalation of the emergency classification level would be based on ICs in Recognition Categories R, F, S or C.

ONS Basis Reference(s):

1. AP/0/A/1700/006 Natural Disaster
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 needed 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.

ONS Basis:

Areas susceptible to internal flooding are the Turbine Building and Auxiliary Building (ref.1, 2).

Refer to EAL CA6.1 for internal flooding affecting one or more SAFETY SYSTEM trains.

NEI 99-01 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 R, F, S or C.

ONS Basis Reference(s):

1. AP/1,2,3/A/1700/010 Turbine Building Flood
2. AP/1-2,3/A/1700/030 Auxiliary Building Flood
3. 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 offsite event 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 - That part of the nuclear station property consisting of the Reactor, Auxiliary, Turbine, and Service Building and grounds, contained within the owner controlled security fence.

ONS Basis:

As used here, the term "offsite" is meant to be areas external to the ONS PROTECTED AREA.

NEI 99-01 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 an offsite location 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 R, F, S or C.

ONS Basis 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):

None

ONS Basis:

None

NEI 99-01 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 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 R, F, S or C.

ONS Basis 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:

HU3.5	**Unusual Event**
Condition B has been declared for the Jocassee Dam	

Mode Applicability:

All

Definition(s):

None

ONS Basis:

Jocassee Hydro is located upstream of the Oconee Nuclear Station. The mitigation strategies for a Condition B for the Jocassee Dam includes shutdown of all operating Oconee Nuclear Units and relocation and installation of other equipment in anticipation of the Condition B escalating to a Condition A (ref. 1, 2).

NEI 99-01 Basis:

None

ONS Basis Reference(s):

1. SR/0/A/2000/003 Activation of the Emergency Operations Facility
2. Letter from Duke Power to USNRC dated 5/5/1994 "Submission of Section D, Oconee Nuclear Site Emergency Plan Adoption of NUMARC/NESP-007 Rev. 2 Classification Scheme

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 3 – Natural or Technological Hazard

Initiating Condition: Dam failure

EAL:

HS3.1 Site Area Emergency

IMMINENT/actual dam failure exists involving any of the following:

- Keowee Hydro Dam
- Little River Dam
- Dikes A,B,C,D
- Intake Canal Dike
- Jocassee Dam - Condition A

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.

ONS Basis:

The Keowee Hydro Dam project includes the Keowee Hydro Dam, Little River Dam and Dikes A, B, C, D, and the Intake Canal Dike. Dam failure of any portion of the Keowee Hydro Dam would result in loss of the emergency AC power supply AND the potential to lose the ultimate heat sink source. Some flooding of the site may result. Evaluation of the plant status following failure of the dam would determine the need to escalate to a General Emergency. Failure of the Jocassee Dam has the potential to result in the failure of the Keowee Hydro Project Dams/Dikes (ref. 1, 2).

NEI 99-01 Basis:

None

ONS Basis Reference(s):

1. SR/0/A/2000/003 Activation of the Emergency Operations Facility
2. Letter from Duke Power to USNRC dated 5/5/1994 "Submission of Section D, Oconee Nuclear Site Emergency Plan Adoption of NUMARC/NESP-007 Rev. 2 Classification Scheme

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
- Field verification of a single fire alarm

AND

The FIRE is located within **any** Table H-1 area

Note 1: The Emergency Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.

Table H-1 Fire Areas
• Reactor Building • Auxiliary Building • Turbine Building • Standby Shutdown Facility • Intake Structure • Electrical Blockhouse • Keowee Hydro & associated transformers • Transformer Yard • Protected Service Water Building • Essential Siphon Vacuum 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.

ONS Basis:

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, 2).

NEI 99-01 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.

For EAL HU4.1 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 IC CA6 or SA9.

ONS Basis Reference(s):

1. OSS-0254.00-00-4008 Design Bases Specification for Fire Protection
2. AP/1,2,3/A/1700/050 Challenging Plant Fire
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:

HU4.2	**Unusual Event**
Receipt of a single fire alarm (i.e., **no** other indications of a FIRE)	
AND	
The fire alarm is indicating a FIRE within **any** *Table H-1 area*	
AND	
The existence of a FIRE is **not** verified within 30 min. of alarm receipt (Note 1)	

Note 1: The Emergency Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.

Table H-1 Fire Areas
• Reactor Building • Auxiliary Building • Turbine Building • Standby Shutdown Facility • Intake Structure • Electrical Blockhouse • Keowee Hydro & associated transformers • Transformer Yard • Protected Service Water Building • Essential Siphon Vacuum 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.

ONS Basis:

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.

Control Room indications that may be used to validate a single fire alarm include (ref. 3):

- Remote camera system
- CRD service structure air temperature
- PZR tailpipe temperature
- RB dome temperature
- RBCU inlet and outlet temperatures
- RCP parameters
- Status lights of components located inside RB

Table H-1 Fire Areas are those areas that contain equipment necessary for safe operation and shutdown of the plant (ref. 1, 2).

The ONS Fire Protection Program is based on 10 CFR 50.48 (a) and (c) requiring compliance with NFPA 805. The NFPA 805 based Fire Protection Program requirements provide are consistent with the NEI 99-01 basis stated below (ref. 1, 4).

NEI 99-01 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.

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 Requirements from Appendix R</u>

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 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 CA6 or SA9.

ONS Basis Reference(s):

1. OSS-0254.00-00-4008 Design Bases Specification for Fire Protection
2. AP/1,2,3/A/1700/050 Challenging Plant Fire
3. OP/1,2,3/A/6101/003
4. NRC Letter to T. Preston Gillespie (Duke); ONS Units 1, 2, and 3, Issuance of Amendments Regarding Transition to a Risk-Informed, Performance-Based Fire Protection Program in Accordance With 10 CFR 50.48(c); dated December 29, 2010
5. 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 Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be 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 - That part of the nuclear station property consisting of the Reactor, Auxiliary, Turbine, and Service Building and grounds, contained within the owner controlled security fence.

ONS Basis:

None

NEI 99-01 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 IC CA6 or SA9.

ONS Basis 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 - That part of the nuclear station property consisting of the Reactor, Auxiliary, Turbine, and Service Building and grounds, contained within the owner controlled security fence.

ONS Basis:

None

NEI 99-01 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 IC CA6 or SA9.

ONS Basis Reference(s):

1. NEI 99-01 HU4

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 5 – Hazardous Gases

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 rooms or areas

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 Applicability**
Turbine Building	1, 2, 3
Equipment and Cable Rooms	1, 2, 3
Auxiliary Building	1, 2, 3, 4, 5
Reactor Buildings	3, 4, 5

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).

ONS Basis:

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).

NEI 99-01 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.

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 Coordinator'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 automatically or manually activate a fire suppression system in an area..

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

ONS Basis Reference(s):

1. Attachment 3 Safe Operation & Shutdown Rooms/Areas Tables R-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 Auxiliary Shutdown Panel or Standby Shutdown Facility	

Mode Applicability:

All

Definition(s):

None

ONS Basis:

The Control Room Supervisor (CRS) determines if the Control Room is uninhabitable and requires evacuation. Control Room inhabitability may be caused by fire, dense smoke, noxious fumes, bomb threat in or adjacent to the Control Room, or other life threatening conditions.

AP/1,2,3/A/1700/008, Loss of Control Room, provides the instructions for tripping the unit, and maintaining RCS inventory and Hot Shutdown conditions from outside the Control Room due to reasons other than fire (ref. 1).

AP/1,2,3/A/1700/050, Challenging Plant Fire, provides the instructions for tripping the unit, and maintaining RCS inventory and Hot Shutdown conditions from outside the Control Room due to a fire (ref. 2).

If normal post-trip conditions cannot be maintained with the Auxiliary Shutdown Panel or there is a challenging fire in an SSF risk area, plant shutdown may be directed from the Standby Shutdown Facility (ref. 3, 4).

Inability to establish plant control from outside the Control Room escalates this event to a Site Area Emergency per EAL HS6.1.

NEI 99-01 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.

Escalation of the emergency classification level would be via IC HS6.

ONS Basis Reference(s):

1. AP/1,2,3/A/1700/008 Loss of Control Room
2. AP/1,2,3/A/1700/050 Challenging Plant Fire
3. AP/0/A/1700/025 Standby Shutdown Facility Emergency Operating Procedure
4. AP/0/A/1700/043 Fire Brigade Response Procedure
5. 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 Auxiliary Shutdown Panel or Standby Shutdown Facility

AND

Control of **any** of the following key safety functions is **not** re-established within 15 min. (Note 1):

- Reactivity
- Core cooling
- RCS heat removal

Note 1: The Emergency Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.

Mode Applicability:

All

Definition(s):

None

ONS Basis:

The Control Room Supervisor (CRS) determines if the Control Room is uninhabitable and requires evacuation. Control Room inhabitability may be caused by fire, dense smoke, noxious fumes, bomb threat in or adjacent to the Control Room, or other life threatening conditions.

AP/1,2,3/A/1700/008, Loss of Control Room, provides the instructions for tripping the unit, and maintaining RCS inventory and Hot Shutdown conditions from outside the Control Room due to reasons other than fire (ref. 1).

AP/1,2,3/A/1700/050, Challenging Plant Fire, provides the instructions for tripping the unit, and maintaining RCS inventory and Hot Shutdown conditions from outside the Control Room due to a fire (ref. 2).

If normal post-trip conditions cannot be maintained with the Auxiliary Shutdown Panel or there is a challenging fire in an SSF risk area, plant shutdown may be directed from the Standby Shutdown Facility (ref. 3, 4).

The intent of this EAL is to capture events in which control of the plant cannot be reestablished in a timely manner. The fifteen minute time for transfer starts when the Control Room is evacuated (when CRS leaves the Control Room, not when AP/1,2,3/A/1700/008 or AP/1,2,3/A/1700/050 is entered). The time interval is based on how quickly control must be reestablished without core uncovery and/or core damage. The determination of whether or not

control is established from outside the Control Room is based on Emergency Coordinator judgment. The Emergency Coordinator is expected to make a reasonable, informed judgment that control of the plant from outside the Control Room cannot be established within the fifteen minute interval.

Once the Control Room is evacuated, the objective is to establish control of important plant equipment and maintain knowledge of important plant parameters in a timely manner. Primary emphasis should be placed on components and instruments that supply protection for and information about safety functions. Typically, these safety functions are reactivity control (ability to shutdown the reactor and maintain it shutdown), RCS inventory (ability to cool the core), and secondary heat removal (ability to maintain a heat sink).

NEI 99-01 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 Coordinator judgment. The Emergency Coordinator 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).

Escalation of the emergency classification level would be via IC FG1 or CG1

ONS Basis Reference(s):

1. AP/1,2,3/A/1700/008 Loss of Control Room
2. AP/1,2,3/A/1700/050 Challenging Plant Fire
3. AP/0/A/1700/025 Standby Shutdown Facility Emergency Operating Procedure
4. AP/0/A/1700/043 Fire Brigade Response Procedure
5. NEI 99-01 HS6

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 7 – Emergency Coordinator Judgment

Initiating Condition: Other conditions existing that in the judgment of the Emergency Coordinator warrant declaration of a UE

EAL:

HU7.1	**Unusual Event**
Other conditions exist which in the judgment of the Emergency Coordinator 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.

ONS Basis:

The Emergency Coordinator is the designated onsite individual having the responsibility and authority for implementing the ONS Emergency Plan (ref. 1). The Operations Shift Manager (SM) initially acts in the capacity of the Emergency Coordinator and takes actions as outlined in the Emergency Plan implementing procedures (ref. 2). If required by the emergency classification or if deemed appropriate by the Emergency Coordinator, emergency response personnel are notified and instructed to report to their emergency response locations. In this manner, the individual usually in charge of activities in the Control Room is responsible for initiating the necessary emergency response, but plant management is expected to manage the emergency response as soon as available to do so in anticipation of the possible wide-ranging responsibilities associated with managing a major emergency.

NEI 99-01 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 Coordinator to fall under the emergency classification level description for an Unusual Event.

ONS Basis Reference(s):

1. ONS Emergency Plan Section A Assignment of Responsibility
2. RP/0/A/1000/001 Emergency Classification
3. NEI 99-01 HU7

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 7 – Emergency Coordinator Judgment

Initiating Condition: Other conditions exist that in the judgment of the Emergency Coordinator warrant declaration of an Alert

EAL:

HA7.1 **Alert**
Other conditions exist which, in the judgment of the Emergency Coordinator, 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):

HOSTILE ACTION - An act toward ONS 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 ONS. Non-terrorism-based EALs should be used to address such activities (i.e., this may include violent acts between individuals in the owner controlled area).

ONS Basis:

The Emergency Coordinator is the designated onsite individual having the responsibility and authority for implementing the ONS Emergency Plan (ref. 1). The Operations Shift Manager (OSM) initially acts in the capacity of the Emergency Coordinator and takes actions as outlined in the Emergency Plan implementing procedures (ref. 2). If required by the emergency classification or if deemed appropriate by the Emergency Coordinator, emergency response personnel are notified and instructed to report to their emergency response locations. In this manner, the individual usually in charge of activities in the Control Room is responsible for initiating the necessary emergency response, but Plant Management is expected to manage the emergency response as soon as available to do so in anticipation of the possible wide-ranging responsibilities associated with managing a major emergency.

NEI 99-01 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 Coordinator to fall under the emergency classification level description for an Alert.

ONS Basis Reference(s):

1. ONS Emergency Plan Section A Assignment of Responsibility
2. RP/0/A/1000/001 Emergency Classification
3. NEI 99-01 HA7

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 7 – Emergency Coordinator Judgment

Initiating Condition: Other conditions existing that in the judgment of the Emergency Coordinator warrant declaration of a Site Area Emergency

EAL:

HS7.1 **Site Area Emergency**
Other conditions exist which in the judgment of the Emergency Coordinator 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):

HOSTILE ACTION - An act toward ONS 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 ONS. Non-terrorism-based EALs should be used to address such activities (i.e., this may include violent acts between individuals in the owner controlled area).

SITE BOUNDARY - That area, including the PROTECTED AREA, in which Duke Energy has the authority to control all activities including exclusion or removal of personnel and property (1 mile radius) from the center of Unit 2.

ONS Basis:

The Emergency Coordinator is the designated onsite individual having the responsibility and authority for implementing the ONS Emergency Plan (ref. 1). The Operations Shift Manager (OSM) initially acts in the capacity of the Emergency Coordinator and takes actions as outlined in the Emergency Plan implementing procedures (ref. 2). If required by the emergency classification or if deemed appropriate by the Emergency Coordinator, emergency response personnel are notified and instructed to report to their emergency response locations. In this manner, the individual usually in charge of activities in the Control Room is responsible for initiating the necessary emergency response, but Plant Management is expected to manage the emergency response as soon as available to do so in anticipation of the possible wide-ranging responsibilities associated with managing a major emergency.

NEI 99-01 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 Coordinator to fall under the emergency classification level description for a Site Area Emergency.

ONS Basis Reference(s):

1. ONS Emergency Plan Section A Assignment of Responsibility
2. RP/0/A/1000/001 Emergency Classification
3. NEI 99-01 HS7

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 7 – Emergency Coordinator Judgment

Initiating Condition: Other conditions exist which in the judgment of the Emergency Coordinator warrant declaration of a General Emergency

EAL:

HG7.1	**General Emergency**
Other conditions exist which in the judgment of the Emergency Coordinator 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):

HOSTILE ACTION - An act toward ONS 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 ONS. Non-terrorism-based EALs should be used to address such activities (i.e., this may include violent acts between individuals in the owner controlled area).

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.

ONS Basis:

The Emergency Coordinator is the designated onsite individual having the responsibility and authority for implementing the ONS Emergency Plan (ref. 1). The Operations Shift Manager (OSM) initially acts in the capacity of the Emergency Coordinator and takes actions as outlined in the Emergency Plan implementing procedures (ref. 2). If required by the emergency classification or if deemed appropriate by the Emergency Coordinator, emergency response personnel are notified and instructed to report to their emergency response locations. In this manner, the individual usually in charge of activities in the Control Room is responsible for initiating the necessary emergency response, but Plant Management is expected to manage the emergency response as soon as available to do so in anticipation of the possible wide-ranging responsibilities associated with managing a major emergency.

Releases can reasonably be expected to exceed EPA PAG plume exposure levels outside the Site Boundary.

NEI 99-01 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 Coordinator to fall under the emergency classification level description for a General Emergency.

ONS Basis Reference(s):

1. ONS Emergency Plan Section A Assignment of Responsibility
2. RP/0/A/1000/001 Emergency Classification
3. NEI 99-01 HG7

Category S – System Malfunction

EAL Group: Hot Conditions (RCS temperature > 210°F); 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 Essential AC Power

Loss of essential 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 4160V AC essential 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 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 Protective 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 Essential AC Power

Initiating Condition: Loss of **all** offsite AC power capability to essential buses for 15 minutes or longer

EAL:

SU1.1	**Unusual Event**
Loss of **all** offsite AC power capability, Table S-1, to essential 4160 V buses MFB-1 and MFB-2 for ≥ 15 min. (Note 1)	

Note 1: The Emergency Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.

Table S-1 AC Power Sources
Offsite: • Unit Normal Transformer (backcharged) • Unit Startup Transformer (SWYD) • Another Unit Startup Transformer (aligned) (SWYD) • CT5 (Central/energizing Standby Bus)
Emergency: • Unit Startup Transformer (Keowee) • Another Unit Startup Transformer (aligned) (Keowee) • CT4 • CT5 (dedicated line/energizing Standby Bus)

Mode Applicability:

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

Definition(s):

None

ONS Basis:

The 4160 V AC System provides the power requirements for operation and safe shutdown of the plant. 4160 V buses MFB-1 and MFB-2 are the essential buses (ref. 1).

The condition indicated by this EAL is the degradation of all offsite AC power sources such that only onsite AC power capability exists for 15 minutes or longer.

Each unit is provided with two physically independent circuits from the switching station. One is the circuit from the 230 kV switching station through the startup transformer, which is designed to be available within a few seconds following a loss of coolant accident. The second circuit is the path from the switchyard through the main step-up transformer, the main generator bus and the unit auxiliary transformer with the generator disconnected from the main bus. The second circuit is currently used during refueling as an additional power feed for the shutdown

unit(s) from the 230 kV switchyard. Whenever there is inadequate power from the generating units, the 230 kV switching station and the hydro units, power is available to the standby power buses either directly from the 100 kV Central Tie Substation or from Lee Steam Station via Transformer CT5. (ref. 2)

Upon loss of power from the Oconee generating unit and 230 kV switchyard, power is supplied from both Keowee Hydro Station units through two separate and independent routes. One route is an underground feeder to Transformer CT4 which supplies the two redundant Main Feeder Buses (MFB-1 and MFB-2). The other route is an overhead feeder to the 230 KV switching station which supplies each unit startup transformer. (ref. 3)

The Standby Shutdown Facility (SSF) consists of standby systems for use in an extreme emergency and is equipped with a manually started diesel generator that can supply power necessary to maintain hot shutdown of the reactors of each unit in the event of loss of power. However, the SSF cannot supply power to the essential buses and therefore not credited in this EAL (ref. 3).

The 15-minute interval was selected as a threshold to exclude transient or momentary power losses.

NEI 99-01 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 essential 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 essential 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.

ONS Basis Reference(s):

1. UFSAR Figure 8.1 Single Line Diagram
2. UFSAR Section 8.2 Offsite Power System
3. UFSAR Section 8.3 Onsite Power Systems
4. NEI 99-01 SU1

Category: S – System Malfunction

Subcategory: 1 – Loss of Essential AC Power

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

EAL:

SA1.1 Alert

AC power capability, Table S-1, to essential 4160 V buses MFB-1 and MFB-2 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 Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.

Table S-1 AC Power Sources
Offsite: • Unit Normal Transformer (backcharged) • Unit Startup Transformer (SWYD) • Another Unit Startup Transformer (aligned) (SWYD) • CT5 (Central/energizing Standby Bus) **Emergency:** • Unit Startup Transformer (Keowee) • Another Unit Startup Transformer (aligned) (Keowee) • CT4 • CT5 (dedicated line/energizing Standby Bus)

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.

ONS Basis:

For emergency classification purposes, "capability" means that an AC power source is available to and capable of powering the emergency bus(es) within 15 min, whether or not the buses are currently powered from it.

The 4160 V AC System provides the power requirements for operation and safe shutdown of the plant. 4160 V buses MFB-1 and MFB-2 are the essential buses (ref. 1).

The condition indicated by this EAL is the degradation of the offsite and onsite power sources such that any additional single failure would result in a loss of all AC power to the essential buses.

Each unit is provided with two physically independent circuits from the switching station. One is the circuit from the 230 kV switching station through the startup transformer, which is designed to be available within a few seconds following a loss of coolant accident. The second circuit is the path from the switchyard through the main step-up transformer, the main generator bus and the unit auxiliary transformer with the generator disconnected from the main bus. The second circuit is currently used during refueling as an additional power feed for the shutdown unit(s) from the 230 kV switchyard. Whenever there is inadequate power from the generating units, the 230 kV switching station and the hydro units, power is available to the standby power buses either directly from the 100 kV Central Tie Substation or from Lee Steam Station via a Transformer CT5. (ref. 2)

Upon loss of power from the Oconee generating unit and 230 kV switchyard, power is supplied from both Keowee Hydro Station units through two separate and independent routes. One route is an underground feeder to Transformer CT4 which supplies the two redundant Main Feeder Buses (MFB-1 and MFB-2). The other route is an overhead feeder to the 230 KV switching station which supplies each unit startup transformer. (ref. 3)

The Standby Shutdown Facility (SSF) consists of standby systems for use in an extreme emergency and is equipped with a manually started diesel generator that can supply power necessary to maintain hot shutdown of the reactors of each unit in the event of loss of power. However, the SSF cannot supply power to the essential buses and therefore not credited in this EAL (ref. 3).

The 15-minute interval was selected as a threshold to exclude transient or momentary power losses. If the capability of a second source of emergency bus power is not restored within 15 minutes, an Alert is declared under this EAL.

NEI 99-01 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 APs and EOPs, and capable of supplying required power to an essential bus. Some examples of this condition are presented below.

- A loss of all offsite power with a concurrent failure of all but one essential power source

(e.g., CT4, CT5, CT1, 2 ,3 (Keowee)).

- A loss of essential power sources (e.g., CT4, CT5, CT1, CT2, CT3 (Keowee)) with a single train of essential buses being back-fed from an offsite power source.

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.

ONS Basis Reference(s):

1. UFSAR Figure 8.1 Single Line Diagram
2. UFSAR Section 8.2 Offsite Power System
3. UFSAR Section 8.3 Onsite Power Systems
4. NEI 99-01 SA1

Category: S – System Malfunction

Subcategory: 1 – Loss of Essential AC Power

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

EAL:

SS1.1 **Site Area Emergency**
Loss of **all** offsite and **all** emergency AC power capability, Table S-1, to essential 4160 V buses MFB-1 and MFB-2 for ≥ 15 min. (Note 1)

Note 1: The Emergency Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.

Table S-1 AC Power Sources
Offsite: • Unit Normal Transformer (backcharged) • Unit Startup Transformer (SWYD) • Another Unit Startup Transformer (aligned) (SWYD) • CT5 (Central/energizing Standby Bus) **Emergency:** • Unit Startup Transformer (Keowee) • Another Unit Startup Transformer (aligned) (Keowee) • CT4 • CT5 (dedicated line/energizing Standby Bus)

Mode Applicability:

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

Definition(s):

None

ONS Basis:

For emergency classification purposes, "capability" means that an AC power source is available to and capable of powering the emergency bus(es) within 15 minutes, whether or not the buses are currently powered from it.

The condition indicated by this EAL is the degradation of the offsite and emergency power sources resulting in a loss of all AC power to the emergency buses. 4160 V buses MFB-1 and MFB-2 are the essential buses (ref. 1).

Each unit is provided with two physically independent circuits from the switching station. One is the circuit from the 230 kV switching station through the startup transformer, which is designed to be available within a few seconds following a loss of coolant accident. The second circuit is the path from the switchyard through the main step-up transformer, the main generator bus

and the unit auxiliary transformer with the generator disconnected from the main bus. The second circuit is currently used during refueling as an additional power feed for the shutdown unit(s) from the 230 kV switchyard. Whenever there is inadequate power from the generating units, the 230 kV switching station and the hydro units, power is available to the standby power buses either directly from the 100 kV Central Tie Substation or from Lee Steam Station via a Transformer CT5. (ref. 2)

Upon loss of power from the Oconee generating unit and 230 kV switchyard, power is supplied from both Keowee Hydro Station units through two separate and independent routes. One route is an underground feeder to Transformer CT4 which supplies the two redundant Main Feeder Buses (MFB-1 and MFB-2). The other route is an overhead feeder to the 230 KV switching station which supplies each unit startup transformer. (ref. 3)

The Standby Shutdown Facility (SSF) consists of standby systems for use in an extreme emergency and is equipped with a manually started diesel generator that can supply power necessary to maintain hot shutdown of the reactors of each unit in the event of loss of power. However, the SSF cannot supply power to the essential buses and therefore not credited in this EAL. (ref. 3).

The 15-minute interval was selected as a threshold to exclude transient or momentary power losses. The interval begins when both offsite and onsite AC power capability are lost.

NEI 99-01 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. 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 ICs RG1, FG1 or SG1.

ONS Basis Reference(s):

1. UFSAR Figure 8.1 Single Line Diagram
2. UFSAR Section 8.2 Offsite Power System
3. UFSAR Section 8.3 Onsite Power Systems
4. NEI 99-01 SS1

Category: S –System Malfunction

Subcategory: 1 – Loss of Essential AC Power

Initiating Condition: Prolonged loss of **all** offsite and **all** emergency AC power to essential buses

EAL:

SG1.1	**General Emergency**

Loss of **all** offsite and **all** emergency AC power capability to essential 4160 V buses MFB-1 and MFB-2

AND

Failure to power SSF equipment and PSW unavailable

AND EITHER:

- Restoration of at least one essential bus in < 4 hour is **not** likely (Note 1)
- CETC reading > 1200°F

Note 1: The Emergency Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.

Table S-1 AC Power Sources
Offsite:
• Unit Normal Transformer (backcharged)
• Unit Startup Transformer (SWYD)
• Another Unit Startup Transformer (aligned) (SWYD)
• CT5 (Central/energizing Standby Bus)
Emergency:
• Unit Startup Transformer (Keowee)
• Another Unit Startup Transformer (aligned) (Keowee)
• CT4
• CT5 (dedicated line/energizing Standby Bus)

Mode Applicability:

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

Definition(s):

None

ONS Basis:

For emergency classification purposes, "capability" means that an AC power source is available to and capable of powering the essential bus(es), whether or not the buses are currently powered from it. 4160 V buses MFB-1 and MFB-2 are the essential buses (ref. 1).

Each unit is provided with two physically independent circuits from the switching station. One is the circuit from the 230 kV switching station through the startup transformer, which is designed to be available within a few seconds following a loss of coolant accident. The second circuit is the path from the switchyard through the main step-up transformer, the main generator bus and the unit auxiliary transformer with the generator disconnected from the main bus. The second circuit is currently used during refueling as an additional power feed for the shutdown unit(s) from the 230 kV switchyard. Whenever there is inadequate power from the generating units, the 230 kV switching station and the hydro units, power is available to the standby power buses either directly from the 100 kV Central Tie Substation or from Lee Steam Station via Transformer CT5. (ref. 2)

Upon loss of power from the Oconee generating unit and 230 kV switchyard, power is supplied from both Keowee Hydro Station units through two separate and independent routes. One route is an underground feeder to Transformer CT4 which supplies the two redundant Main Feeder Buses (MFB-1 and MFB-2). The other route is an overhead feeder to the 230 KV switching station which supplies each unit startup transformer. (ref. 3)

The Standby Shutdown Facility (SSF) consists of standby systems for use in an extreme emergency and is equipped with a manually started diesel generator and Protected Service Water (PSW) power supply that can supply power necessary to maintain hot shutdown of the reactors of each unit in the event of loss of power. Although the SSF requires manual initiation, it is considered in this EAL because it may be capable of powering the SSF load center (ref. 3, 4).

The station blackout coping period is four hours (ref. 5).

Core Exit Thermocouple readings of 1200°F are indicative of superheat conditions and inability to adequately remove heat from the core (ref. 6).

NEI 99-01 Basis:

This IC addresses a prolonged loss of all power sources to AC essential 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. 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 essential 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 an increased likelihood of challenges to multiple fission product barriers.

The estimate for restoring at least one essential 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.

ONS Basis Reference(s):

1. UFSAR Figure 8.1 Single Line Diagram
2. UFSAR Section 8.2 Offsite Power System
3. UFSAR Section 8.3 Onsite Power Systems
4. UFSAR Section 9.6 Standby Shutdown Facility
5. UFSAR Section 8.3.2.2.4 Station Blackout Analysis
6. RP/0/A/1000/18 Core Damage Assessment
7. NEI 99-01 SG1

Category: S –System Malfunction

Subcategory: 1 – Loss of Essential AC Power

Initiating Condition: Loss of **all** essential AC and vital DC power sources for 15 minutes or longer

EAL:

SG1.2 General Emergency
Loss of **all** offsite and **all** emergency AC power capability, Table S-1, to essential 4160 V buses MFB-1 and MFB-2 for ≥ 15 min. **AND** Failure to power SSF equipment and PSW unavailable **AND** Loss of 125 VDC power based on battery bus voltage indications < 105 VDC on **both** vital DC Distribution Centers DCA and DCB for ≥ 15 min. (Note 1)

Note 1: The Emergency Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.

Table S-1 AC Power Sources
Offsite: • Unit Normal Transformer (backcharged) • Unit Startup Transformer (SWYD) • Another Unit Startup Transformer (aligned) (SWYD) • CT5 (Central/energizing Standby Bus) **Emergency:** • Unit Startup Transformer (Keowee) • Another Unit Startup Transformer (aligned) (Keowee) • CT4 • CT5 (dedicated line/energizing Standby Bus)

Mode Applicability:

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

Definition(s):

None

ONS Basis:

This EAL is indicated by the loss of all offsite and emergency AC power capability to 4160 V essential buses MFB-1 and MFB-2 for greater than 15 minutes in combination with degraded vital DC power voltage. This EAL addresses operating experience from the March 2011 accident at Fukushima Daiichi.

For emergency classification purposes, "capability" means that an AC power source is available to and capable of powering the emergency bus(es) within 15 minutes, whether or not the buses are currently powered from it.

Each unit is provided with two physically independent circuits from the switching station. One is the circuit from the 230 kV switching station through the startup transformer, which is designed to be available within a few seconds following a loss of coolant accident. The second circuit is the path from the switchyard through the main step-up transformer, the main generator bus and the unit auxiliary transformer with the generator disconnected from the main bus. The second circuit is currently used during refueling as an additional power feed for the shutdown unit(s) from the 230 kV switchyard. Whenever there is inadequate power from the generating units, the 230 kV switching station and the hydro units, power is available to the standby power buses either directly from the 100 kV Central Tie Substation or from Lee Steam Station via Transformer CT5. (ref. 2)

Upon loss of power from the Oconee generating unit and 230 kV switchyard, power is supplied from both Keowee Hydro Station units through two separate and independent routes. One route is an underground feeder to Transformer CT4 which supplies the two redundant Main Feeder Buses (MFB-1 and MFB-2). The other route is an overhead feeder to the 230 KV switching station which supplies each unit startup transformer. (ref. 3)

The Standby Shutdown Facility (SSF) consists of standby systems for use in an extreme emergency and is equipped with a manually started diesel generator and Protected Service Water (PSW) power supply that can supply power necessary to maintain hot shutdown of the reactors of each unit in the event of loss of power. Although the SSF requires manual initiation, it is considered in this EAL because it may be capable of powering the SSF load center (ref. 3).

For each unit, two independent and physically separated 125 volt DC batteries and DC buses are provided for the vital instrumentation and control power system. (ref. 4, 5). Minimum DC bus voltage is 105 VDC (ref. 6).

NEI 99-01 Basis:

This IC addresses a concurrent and prolonged loss of both emergency AC and Vital DC power. A loss of all emergency 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 emergency 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.

ONS Basis Reference(s):

1. UFSAR Figure 8.1 Single Line Diagram
2. UFSAR Section 8.2 Offsite Power System
3. UFSAR Section 8.3 Onsite Power Systems
4. UFSAR Figure 8.5 Typical DC and AC Vital Power System - Single Line
5. UFSAR Section 8.3.2 DC Power Systems
6. EP/*/A/1800/001 Blackout Tab
7. 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**
Loss of 125 VDC power based on battery bus voltage indications < 105 VDC on **both** vital DC Distribution Centers DCA and DCB for ≥ 15 min. (Note 1)	

Note 1: The Emergency Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.

Mode Applicability:

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

Definition(s):

None

ONS Basis:

For each unit, two independent and physically separated 125 volt DC batteries and DC buses are provided for the vital instrumentation and control power system. (ref. 1, 2). Minimum DC bus voltage is 105 VDC (ref. 3).

NEI 99-01 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.

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

Escalation of the emergency classification level would be via ICs RG1, FG1 or SG1.

ONS Basis Reference(s):

1. UFSAR Figure 8.5 Typical DC and AC Vital Power System - Single Line
2. UFSAR Section 8.3.2 DC Power Systems
3. EP/*/A/1800/001 Blackout Tab
4. Technical Specifications 3.8.3 DC Sources – Operating
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 Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.

Table S-2 Safety System Parameters
• Reactor power • RCS level • RCS pressure • CETC temperature • Level in at least one S/G • EFW flow to at least one S/G

Mode Applicability:

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

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.

ONS Basis:

SAFETY SYSTEM parameters listed in Table S-2 are monitored in the Control Room through a combination of hard control panel indicators as well as computer based information systems. The SPDS serves as a redundant compensatory indicator which may be utilized in lieu of normal Control Room indicators (ref. 1).

NEI 99-01 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 reactor vessel 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 SA3.

ONS Basis Reference(s):

1. UFSAR Section 7.5 Display Instrumentation
2. 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 Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.

Table S-2 Safety System Parameters
• Reactor power • RCS level • RCS pressure • CETC temperature • Level in at least one S/G • EFW flow to at least one S/G

Table S-3 Significant Transients
• Reactor trip • Runback > 25% thermal power • Electrical load rejection > 25% electrical load • ECCS actuation

Mode Applicability:

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

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.

ONS Basis:

SAFETY SYSTEM parameters listed in Table S-2 are monitored in the Control Room through a combination of hard control panel indicators as well as computer based information systems. The SPDS serves as a redundant compensatory indicator which may be utilized in lieu of normal Control Room indicators (ref. 1).

Significant transients are listed in Table S-3 and include response to automatic or manually initiated functions such as reactor trips, runbacks involving greater than 25% thermal power change, electrical load rejections of greater than 25% full electrical load, reactor power cutbacks or ECCS (SI) injection actuations.

NEI 99-01 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 reactor vessel 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 ICs FS1 or IC RS1

ONS Basis Reference(s):

1. UFSAR Section 7.5 Display Instrumentation
2. 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 activity > 50 μCi/gm Dose Equivalent I-131 for > 48 hr continuous period	
OR	
RCS activity > 280 μCi/gm Dose Equivalent Xe-133 for > 48 hr continuous period	

Mode Applicability:

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

Definition(s):

None

ONS Basis:

The specific iodine activity is limited to ≤ 50 μCi/gm Dose Equivalent I-131 for > 48 hr continuous period. The specific Xe-133 activity is limited to ≤ 280 μCi/gm Dose Equivalent Xe-133 for > 48 hr continuous period. Entry into Condition C of LCO 3.4.11 meets the intent of this EAL (ref 1).

NEI 99-01 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 ICs FA1 or the Recognition Category R ICs.

ONS Basis Reference(s):

1. ONS Technical Specifications LCO 3.4.11 RCS 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.

OR

RCS identified leakage > 25 gpm for ≥ 15 min.

OR

Leakage from the RCS to a location outside containment > 25 gpm for ≥ 15 min. (Note 1)

Note 1: The Emergency Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.

Mode Applicability:

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

Definition(s):

None

ONS Basis:

Manual or computer-based methods of performing an RCS inventory balance are normally used to determine RCS leakage (ref. 1).

Identified leakage includes (ref. 2):

- Leakage such as that from pump seals or valve packing (except reactor coolant pump (RCP) seal water injection or leakoff), that is captured and conducted to collection systems or a sump or collecting tank, or
- Leakage into the containment atmosphere from sources that are both specifically located and known either not to interfere with the operation of leakage detection systems or not to be pressure boundary leakage, or
- RCS leakage through a steam generator to the secondary system.

Unidentified leakage is all leakage (except RCP seal water injection or leakoff) that is not identified leakage (ref. 2).

Pressure Boundary leakage is leakage (except SG leakage) through a nonisolable fault in an RCS component body, pipe wall, or vessel wall (ref. 2).

Reactor coolant leakage outside of the containment that is not considered identified or unidentified leakage per Technical Specifications includes leakage via interfacing systems.

Escalation of this EAL to the Alert level is via Category F, Fission Product Barrier Degradation, EAL FA1.1.

NEI 99-01 Basis:

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.

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.

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 R or F.

ONS Basis Reference(s):

1. PT/1,2,3/A/0600/010 Reactor Coolant Leakage
2. ONS Technical Specifications Section 1.1 Definitions
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 the manual trip pushbutton is successful in shutting down the reactor as indicated by reactor power < 5% (Note 8)	

Note 8: A manual trip 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

ONS Basis:

The first condition of this EAL identifies the need to cease critical reactor operations by actuation of the automatic Reactor Protective System (RPS) trip function. A reactor trip is automatically initiated by the RPS when certain continuously monitored parameters exceed predetermined setpoints (ref. 1).

Following a successful reactor trip, rapid insertion of the control rods occurs. Nuclear power promptly drops to a fraction of the original power level and then decays to a level several decades less with a negative startup rate. The reactor power drop continues until reactor power reaches the point at which the influence of source neutrons on reactor power starts to be observable. A predictable post-trip response from an automatic reactor trip signal should therefore consist of a prompt drop in reactor power as sensed by the nuclear instrumentation and a lowering of power into the source range. For the purpose of emergency classification a successful trip has occurred when there is sufficient rod insertion from the trip of RPS to bring the reactor power below the Power Operation Mode threshold of 5% (ref. 2).

5% rated power is the Power Operation mode threshold. Below 5%, plant response will be similar to that observed during a normal shutdown. Nuclear instrumentation can be used to determine if reactor power is greater than or equal to 5 % power (ref. 1, 2).

For the purposes of emergency classification, a successful manual trip action is that which can be quickly performed from the reactor control console (actuation of the manual trip pushbutton). There is a separate set of switch contacts in series with the output of each reactor trip component. All switch contacts are actuated through a mechanical linkage from a single pushbutton. Reactor shutdown achieved by use of other trip actions such as opening supply

breakers, emergency boration, or manually driving control rods) do not constitute a successful manual trip (ref. 3).

Following any automatic RPS trip signal, insertion of redundant manual trip signals are performed to back up the automatic RPS trip function and ensure reactor shutdown is achieved. Even if the first subsequent manual trip signal inserts all control rods to the full-in position immediately after the initial failure of the automatic trip, the lowest level of classification that must be declared is an Unusual Event.

In the event that the operator identifies a reactor trip is imminent and initiates a successful manual reactor trip before the automatic RPS 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. However, if subsequent manual reactor trip actions fail to reduce reactor power below 5%, the event escalates to the Alert under EAL SA6.1.

If by procedure, operator actions include the initiation of an immediate manual trip following receipt of an automatic trip signal and there are no clear indications that the automatic trip failed (such as a time delay following indications that a trip setpoint was exceeded), it may be difficult to determine if the reactor was shut down because of automatic trip or manual actions. If a subsequent review of the trip actuation indications reveals that the automatic trip did not cause the reactor to be shut down, consideration should be given to evaluating the fuel for potential damage, and the reporting requirements of 10CFR50.72 should be considered for the transient event.

NEI 99-01 Basis:

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.

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). This action does not include manually driving in control rods or implementation of boron injection strategies. Actions taken at back-panels or other locations within the Control Room, or any location outside the Control Room, are not considered to be "at the reactor control consoles".

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 causes a plant transient that should have included an automatic reactor trip and the RPS fails to automatically shutdown the reactor, then this IC and the EALs are applicable, and should be evaluated.
- If the signal 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 the EALs are not applicable and no classification is warranted.

ONS Basis Reference(s):

1. ONS Technical Specifications Section 3.3.1 Reactor Protective System (RPS) Instrumentation – Operating
2. ONS Technical Specifications Table 1.1-1 Modes
3. UFSAR Section 7.2.3.7 Manual Trip
4. OSC-02820 Emergency Procedure Setpoints, Setpoint No. 7.1.7.5
5. 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 the manual trip pushbutton is successful in shutting down the reactor as indicated by reactor power < 5% (Note 8)

Note 8: A manual trip 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

ONS Basis:

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 (ref. 1).

Following a successful reactor trip, rapid insertion of the control rods occurs. Nuclear power promptly drops to a fraction of the original power level and then decays to a level several decades less with a negative startup rate. The reactor power drop continues until reactor power reaches the point at which the influence of source neutrons on reactor power starts to be observable. A predictable post-trip response from an automatic reactor trip signal should therefore consist of a prompt drop in reactor power as sensed by the nuclear instrumentation and a lowering of power into the source range. For the purpose of emergency classification a successful trip has occurred when there is sufficient rod insertion from the manual trip to bring the reactor power below the Power Operation Mode threshold level of 5% (ref. 2).

5% rated power is the Power Operation mode threshold. Below 5%, plant response will be similar to that observed during a normal shutdown. Nuclear instrumentation can be used to determine if reactor power is greater than or equal to 5% power (ref. 1, 2).

For the purposes of emergency classification, a successful manual trip action is that which can be quickly performed from the reactor control console (actuation of the manual trip pushbutton). There is a separate set of switch contacts in series with the output of each reactor trip component. All switch contacts are actuated through a mechanical linkage from a single pushbutton. Reactor shutdown achieved by use of other trip actions such as opening supply

breakers, emergency boration, or manually driving control rods) do not constitute a successful manual trip (ref. 3).

Following any automatic RPS trip signal, insertion of redundant manual trip signals are performed to back up the automatic RPS trip function and ensure reactor shutdown is achieved. Even if a subsequent automatic trip signal or the first subsequent manual trip signal inserts all control rods to the full-in position immediately after the initial failure of the manual trip, the lowest level of classification that must be declared is an Unusual Event.

If both subsequent automatic and subsequent manual reactor trip actions in the Control Room fail to reduce reactor power < 5% following a failure of an initial manual trip, the event escalates to an Alert under EAL SA6.1.

NEI 99-01 Basis:

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.

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 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). This action does not include manually driving in control rods or implementation of boron injection strategies. Actions taken at back-panels or other locations within the Control Room, or any location outside the Control Room, are not considered to be "at the reactor control consoles".

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 causes a plant transient that should have included an automatic reactor trip and the RPS fails to automatically shutdown the reactor, then this IC and the EALs are applicable, and should be evaluated.
- If the signal 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 the EALs are not applicable and no classification is warranted.

ONS Basis Reference(s):

1. ONS Technical Specifications Section 3.3.1 Reactor Protective System (RPS) Instrumentation – Operating
2. ONS Technical Specifications Table 1.1-1
3. UFSAR Section 7.2.3.7 Manual Trip
4. OSC-02820 Emergency Procedure Setpoints, Setpoint No. 7.1.7.5
5. NEI 99-01 SU5

Category: S – System Malfunction

Subcategory: 2 – 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 pushbutton is **not** successful in shutting down the reactor as indicated by reactor power ≥ 5% (Note 8)

Note 8: A manual trip 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

ONS Basis:

This EAL addresses any automatic or manual reactor trip signal that fails to shut down the reactor followed by a subsequent manual trip that fails to shut down the reactor to an extent the reactor is producing significant power (ref. 1).

Following a successful reactor trip, rapid insertion of the control rods occurs. Nuclear power promptly drops to a fraction of the original power level and then decays to a level several decades less with a negative startup rate. The reactor power drop continues until reactor power reaches the point at which the influence of source neutrons on reactor power starts to be observable. A predictable post-trip response from an automatic reactor trip signal should therefore consist of a prompt drop in reactor power as sensed by the nuclear instrumentation and a lowering of power into the source range. For the purpose of emergency classification a successful trip has occurred when there is sufficient rod insertion from the manual trip to bring the reactor power below 5% (ref. 2).

5% rated power is the Power Operation mode threshold. Below 5%, plant response will be similar to that observed during a normal shutdown. Nuclear instrumentation can be used to determine if reactor power is greater than or equal to 5% power (1, 2).

For the purposes of emergency classification, a successful manual trip action is that which can be quickly performed from the reactor control console (actuation of the manual trip pushbutton). There is a separate set of switch contacts in series with the output of each reactor trip component. All switch contacts are actuated through a mechanical linkage from a single

pushbutton. Reactor shutdown achieved by use of other trip actions such as opening supply breakers, emergency boration, or manually driving control rods) do not constitute a successful manual trip (ref. 3).

Escalation of this event to a Site Area Emergency would be under EAL SS6.1 or Emergency Coordinator judgment.

NEI 99-01 Basis:

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). 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, 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.

A reactor shutdown is determined in accordance with applicable Emergency Operating Procedure criteria.

ONS Basis Reference(s):

1. ONS Technical Specifications Section 3.3.1 Reactor Protective System (RPS) Instrumentation – Operating
2. ONS Technical Specifications Table 1.1-1
3. UFSAR Section 7.2.3.7 Manual Trip
4. OSC-02820 Emergency Procedure Setpoints, Setpoint No. 7.1.7.5
5. NEI 99-01 SA5

Category: S – System Malfunction

Subcategory: 2 – 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:

- CETCs >1200°F on ICCM
- RCS subcooling < 0°F

Mode Applicability:

1 - Power Operation

Definition(s):

None

ONS Basis:

This EAL addresses the following:

- Any automatic reactor trip signal (ref. 1) followed by a manual trip that fails to shut down the reactor to an extent the reactor is producing energy in excess of the heat load for which the safety systems were designed (ref. 5), and
- Indications that either core cooling is extremely challenged or heat removal is extremely challenged.

The combination of failure of both front line and backup protection systems to function in response to a plant transient, along with the continued production of heat, poses a direct threat to the Fuel Clad and RCS Barriers.

Reactor shutdown achieved by use of other trip actions such as opening supply breakers, emergency boration, or manually driving control rods are also credited as a successful manual trip provided reactor power can be reduced below 5% before indications of an extreme challenge to either core cooling or heat removal exist (ref. 2, 3).

5% rated power is the Power Operation mode threshold. Below 5%, plant response will be similar to that observed during a normal shutdown. Nuclear instrumentation can be used to determine if reactor power is greater than or equal to 5% power.

Indication of continuing core cooling degradation is manifested by CETCs are reading greater than 1200°F. This setpoint is used as an indication of an extreme ICC condition and entry into the Oconee Severe Accident Guidelines (OSAG) is initiated for further mitigative actions (ref. 4).

Indication of inability to adequately remove heat from the RCS is manifested by subcooling less than 0°F (ref. 6).

NEI 99-01 Basis:

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 shut down 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.

Escalation of the emergency classification level would be via IC RG1 or FG1.

ONS Basis Reference(s):

1. ONS Technical Specifications Section 3.3.1 Reactor Protective System (RPS) Instrumentation – Operating
2. ONS Technical Specifications Table 1.1-1
3. UFSAR Section 7.2.3.7 Manual Trip
4. OSC-02820 Emergency Procedure Setpoints, Setpoint No. 7.1.1.7
5. OSC-02820 Emergency Procedure Setpoints, Setpoint No. 7.1.7.5
6. EP/1,2,3/A/1800/001 Loss of Subcooling Margin
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 offsite communication methods

OR

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

Table S-4 Communication Methods

System	Onsite	Offsite	NRC
Commercial phone service	X	X	X
ONS site phone system	X	X	X
EOF phone system	X	X	X
Public Address system	X		
Onsite radio system	X		
DEMNET		X	
Offsite radio system		X	
NRC Emergency Telephone System			X
Satellite Phone	X	X	X

Mode Applicability:

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

Definition(s):

None

ONS Basis:

Onsite, offsite and NRC communications include one or more of the systems listed in Table S-4 (ref. 1).

1. Commercial phone service

   The Commercial phone service does not go through the site telephone system.

2. ONS site phone system

   The site phone system is generator and battery backed with:

   - Fiber-Optic to Charlotte GO (65 lines)
   - Telephone line to Easley (6 circuits)
   - Anderson (4 lines)
   - Six Mile (4 lines)
   - Site Telephone System: Inward and outward direct dial available from the Control Room, TSC, and OSC

3. EOF phone system

   The emergency communications systems at the Charlotte EOF are designed to ensure the reliable, timely flow of information between all parties having an emergency response role.

4. Public Address (Paging) system

   The paging system provides paging and party line communications between stations located throughout the plant. Inside and outside type wall and desk-mounted stations are used to communicate between roaming personnel and fixed work locations. Plant-wide instructions are issued using the paging feature.

5. Onsite radio system

   The onsite radio system receives emergency backup power from Keowee Hydro Units supporting communications with: Control Room 1&2, 3, Fire Brigade, Chemistry, Safety, Radiation Protection, Maintenance, Medical Emergency Response Team, and Hazardous Materials Response Team.

6. DEMNET

   DEMNET is the primary means of offsite communication. This circuit allows intercommunication among the EOF, TSC, control room, counties, and states. DEMNET operates as an internet based (VoIP) communications system with a satellite back-up. Should the internet transfer rate become slow or unavailable, the DEMNET will automatically transfer to satellite mode.

7. Offsite radio system

   The offsite radio system is battery backed supporting communications with: Control Room Units 1&2, TSC, Field Monitoring Teams, EOF, counties and State of South Carolina.

8. NRC Emergency Telephone System (ETS)

   The NRC uses a Duke Energy dedicated telephone line which allows direct telephone communications from the plant to NRC regional and national offices. The Duke Energy communications line provides a link independent of the local public telephone network. Telephones connected to this network are located in the Oconee Control Rooms, TSC, and EOF and can be used to establish NRC Emergency Notification System (ENS) and Health Physics Network (HPN) capability.

9. Satellite Phone

   Satellite Phones can be used for both internal and external communications

This EAL is the hot condition equivalent of the cold condition EAL CU5.1.

NEI 99-01 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 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 OROs of an emergency declaration. The OROs referred to here are the State EOC and FEO, Pickens County LEC and EOC, and Oconee County LEC and EOC.

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

ONS Basis Reference(s):

1. ONS Emergency Plan, Section 7.2 Communications Systems
2. 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 VALID ES actuation signal
OR
Containment pressure > 10 psig with < one full train of containment heat removal system (1 RBS with > 700 gpm spray flow **OR** 2 RBCUs) operating per design for ≥ 15 min.
(Note 1)

Note 1: *The Emergency Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.*

Mode Applicability:

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

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.

ONS Basis:

Reactor Building isolations are initiated by Engineered Safeguards Actuation Channels 5 and 6 in response to a high reactor building pressure signal (3.0 psig) (ref. 1, 2, 4).

Two engineered safeguards systems, the Reactor Building Spray System and the Reactor Building Cooling System, are provided to remove heat from the containment atmosphere following an accident. Both the Reactor Building Spray System and the Reactor Building Cooling System, with either at full capacity, are individually capable of maintaining the containment pressure below the design limit following a LOCA or MSLB. (ref. 1, 3)

The Reactor Building Spray (RBS) System consists of two separate trains of equal capacity. Spray flow greater or equal to 700 gpm satisfies the spray flow design requirement. The Reactor Building pressure setpoint (10 psig) is the pressure at which the Reactor Building Spray equipment should actuate and begin performing its function (ref. 1, 2, 3, 5).

Each of three Reactor Building Cooling Units (RBCUs) consists of a fan, cooling coils, and the required distribution duct work. The Reactor Building atmosphere is circulated past cooling coils by fans and returned to the building. Cooling water for the cooling units is supplied by the Low Pressure Service Water System. The Reactor Building Cooling System provides the design heat removal capacity with two of three coolers operating (ref. 1).

NEI 99-01 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 APs 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.

ONS Basis Reference(s):

1. UFSAR Section 6.2.2 Containment Heat Removal Systems
2. UFSAR Table 7-2 Engineered Safeguards Actuation Conditions
3. UFSAR Table 6-25 Minimum Acceptable Combinations of Containment Heat Removal Equipment Performance
4. OSC-02820 Emergency Procedure Setpoints, Setpoint No. 7.1.1.1
5. OSC-02820 Emergency Procedure Setpoints, Setpoint No. 7.4.1.2
6. NEI 99-01 SU7

Category: S – System Malfunction

Subcategory: 9 – Hazardous Event Affecting Safety Systems

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

EAL:

SA9.1 Alert

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

AND EITHER:

- Event damage has caused indications of degraded performance in at least one train of a SAFETY SYSTEM needed for the current operating mode
- The event has caused VISIBLE DAMAGE to a SAFETY SYSTEM component or structure needed for the current operating mode

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 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.

ONS Basis:

- The significance of seismic events are discussed under EAL HU2.1 (ref. 1).
- Internal FLOODING may be caused by events such as component failures, equipment misalignment, or outage activity mishaps.
- External flooding at ONS is highly unlikely since the probable maximum flood (PMF) would be contained by the Keowee Reservoir. Plant grade elevation is 796.0 ft MSL. The minimum external access elevation for the Auxiliary, Turbine, and Service Buildings is 796.5 ft MSL which provides a 6 inch water sill. (ref. 2)
- High winds in excess of design (95 mph) or tornado strikes can cause significant structural damage (ref. 3).
- Areas containing functions and systems required for safe shutdown of the plant are identified by fire area (ref. 4, 5).
- An explosion that degrades the performance of a SAFETY SYSTEM train or visibly damages a SAFETY SYSTEM component or structure would be classified under this EAL.

NEI 99-01 Basis:

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.

The first condition 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.

The second condition 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 RS1.

ONS Basis Reference(s):

1. AP/0/A/1700/005 Earthquake
2. UFSAR Section 3.4.1.1 Flood Protection Measures for Seismic Class 1 Structures
3. UFSAR Section 3.3.1.1 Design Wind Velocity
4. OSS-0254.00-00-4008 Design Bases Specification for Fire Protection
5. AP/1,2,3/A/1700/050 Challenging Plant Fire
6. NEI 99-01 SA9

Category F – Fission Product Barrier Degradation

EAL Group: Hot Conditions (RCS temperature > 200°F); 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 (FC): The Fuel Clad Barrier consists of the cladding material that contains the fuel pellets.
B. Reactor Coolant System (RCS): 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 (CMT): The Containment (Reactor Building) Barrier includes the Reactor 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 Reactor Building up to and including the outermost secondary side isolation valve. Containment Barrier thresholds are used as criteria for escalation of the ECL from 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 (Attachment 2). "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 RG1 has been exceeded.

- The fission product barrier thresholds specified within a scheme reflect plant-specific ONS 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 primary containment, an interfacing system, or outside of the primary 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 Coordinator would have more assurance that there was no immediate need to escalate to a General Emergency.

Category: 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

ONS Basis:

Fuel Clad, RCS and Containment comprise the fission product barriers. Table F-1 (Attachment 2) 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

NEI 99-01 Basis:

None

ONS Basis Reference(s):

1. NEI 99-01 FA1

Category: 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):

None

ONS Basis:

Fuel Clad, RCS and Containment comprise the fission product barriers. Table F-1 (Attachment 2) 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, the Emergency Coordinator would have greater assurance that escalation to a General Emergency is less imminent.

NEI 99-01 Basis:

None

ONS Basis Reference(s):

1. NEI 99-01 FS1

Category: Fission Product Barrier Degradation

Subcategory: N/A

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

EAL:

FG1.1	**General Emergency**

Loss of **any** two barriers

AND

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

Mode Applicability:

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

Definition(s):

None

ONS Basis:

Fuel Clad, RCS and Containment comprise the fission product barriers. Table F-1 (Attachment 2) 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

NEI 99-01 Basis:

None

ONS Basis Reference(s):

1. NEI 99-01 FG1

Introduction

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 SG Tube Leakage

B. Inadequate Heat removal

C. CMT Radiation / RCS Activity

D. CMT Integrity or Bypass

E. Emergency Coordinator 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 Loss and Potential Loss column beginning with number one. In this manner, a threshold can be identified by its category title and number. For example, the first Fuel Clad Barrier Loss in Category A would be assigned "FC Loss A.1," the third Containment Barrier Potential Loss in Category C would be assigned "CMT P-Loss C.3," etc.

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 (FC) Barrier		Reactor Coolant System (RCS) Barrier		Containment (CMT) Barrier	
Category	**Loss**	**Potential Loss**	**Loss**	**Potential Loss**	**Loss**	**Potential Loss**
A **RCS or SG Tube Leakage**	None	1. RVLS ≤ 0 (Note 9)	1. An automatic or manual ES actuation required by **EITHER:** • UNISOLABLE RCS leakage • SG tube RUPTURE	1. RCS leakage > normal makeup capacity due to **EITHER:** • UNISOLABLE RCS leakage • SG tube leakage 2. RCS cooldown < 400°F at > 100°F/hr **OR** HPI has operated in the injection mode with **no** RCPs operating	1. A leaking SG is FAULTED outside of containment	None
B **Inadequate Heat Removal**	1. CETCs > 1200°F	1. CETCs > 700°F 2. RCS heat removal **cannot** be established **AND** RCS subcooling < 0 °F	None	1. RCS heat removal **cannot** be *established* **AND** RCS subcooling < 0 °F 2. HPI forced cooling initiated	None	1. CETCs > 1200°F **AND** Restoration procedures **not** effective within 15 min. (Note 1)
C **CMT Radiation / RCS Activity**	1. 1/2/3RIA 57/58 > Table F-2 column "FC Loss" 2. Coolant activity > 300 μCi/ml DEI	None	1. Containment radiation: • 1,3 RIA 57/58 > 1.0 R/hr • 2 RIA 57 > 1.6 R/hr • 2 RIA 58 > 1.0 R/hr	None	None	1. 1/2/3RIA 57/58 > Table F-2 column "CMT Potential Loss"
D **CMT Integrity or Bypass**	None	None	None	None	1. Containment isolation is required **AND EITHER:** • Containment integrity has been lost based on Emergency Coordinator judgment • *UNISOLABLE* pathway from Containment to the environment exists 2. Indications of RCS leakage outside of Containment	1. Containment pressure > 59 psig 2. Containment hydrogen concentration > 4% 3. Containment pressure > 10 psig with < one full train of containment heat removal system (1 RBS with > 700 gpm spray flow **OR** 2 RBCUs) operating per design for ≥ 15 min. (Note 1)
E **EC Judgment**	1. **Any** condition in the opinion of the Emergency Coordinator that indicates loss of the fuel clad barrier	1. **Any** condition in the judgment of the Emergency Coordinator that indicates potential loss of the Fuel Clad Barrier	1. **Any** condition in the judgment of the Emergency Coordinator that indicates loss of the RCS Barrier	1. **Any** condition in the judgment of the Emergency Coordinator that indicates potential loss of the RCS Barrier	1. **Any** condition in the judgment of the Emergency Coordinator that indicates loss of the Containment Barrier	1. **Any** condition in the judgment of the Emergency Coordinator that indicates potential loss of the Containment Barrier

Barrier: Fuel Clad

Category: A. RCS or SG Tube Leakage

Degradation Threat: Loss

Threshold:

None

Barrier: Fuel Clad

Category: A. RCS or SG Tube Leakage

Degradation Threat: Potential Loss

Threshold:

1. RVLS ≤ 0" (Note 9)

Note 9: RVLS is **not** valid if **EITHER** of the following exists:
- One or more RCPs are running

OR
- LPI pump(s) are running **AND** taking suction from the LPI drop line

Definition(s):

None

ONS Basis:

RVLS indicated level ≤ 0" with all RCPs not running and both LPI pumps taking suction from the drop line not running represents reactor vessel level below the bottom of the RCS hotleg (without instrument uncertainty considered). This is the lowest measurable reactor vessel level and is used in lieu of actual reactor vessel level indication of level at or below top of active fuel.

NEI 99-01 Basis:

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

ONS Basis Reference(s):

1. OSC-2820 Emergency Procedure Setpoints, Setpoint No. 7.1.6.5
2. NEI 99-01 RCS or SG Tube Leakage Potential Loss 1.A

Barrier: Fuel Clad

Category: B. Inadequate Heat Removal

Degradation Threat: Loss

Threshold:

1. CETCs > 1200°F

Definition(s):

None

ONS Basis:

CETCs > 1200°F indicates extreme ICC conditions that may result in at least 516°F of superheat.

NEI 99-01 Basis:

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

ONS Basis Reference(s):

1. OSC-2820 Emergency Procedure Setpoints, Setpoint No. 7.1.1.7
2. NEI 99-01 Inadequate Heat Removal Loss 2.A

Barrier: Fuel Clad

Category: B. Inadequate Heat Removal

Degradation Threat: Potential Loss

Threshold:

1. CETCs > 700°F

Definition(s):

None

ONS Basis:

CETCs > 700°F indicates conditions that may result in at least ~16°F of superheat and that may indicate core uncovery.

NEI 99-01 Basis:

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

ONS Basis Reference(s):

1. OSC-2820 Emergency Procedure Setpoints, Setpoint No. 7.1.1.6
2. NEI 99-01 Inadequate Heat Removal Potential Loss 2.A

Barrier: Fuel Clad

Category: B. Inadequate Heat Removal

Degradation Threat: Potential Loss

Threshold:

2. RCS heat removal cannot be established

   AND

   RCS subcooling < 0°F

Definition(s):

None

ONS Basis:

In combination with RCS Potential Loss B.1, meeting this threshold results in a Site Area Emergency.

The combination of these conditions indicates the ultimate heat sink function is under extreme challenge (i.e., superheated). This threshold addresses loss of functions required for hot shutdown with the reactor at pressure and temperature and thus a potential loss of the Fuel Clad Barrier (ref. 1).

NEI 99-01 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 threshold is not warranted.

ONS Basis Reference(s):

1. OSC-2820 Emergency Procedure Setpoints, Setpoint No. 7.1.3.1
2. NEI 99-01 Inadequate Heat Removal Potential Loss 2.B

Barrier: Fuel Clad

Category: C. CMT Radiation / RCS Activity

Degradation Threat: Loss

Threshold:

1. 1/2/3RIA 57/58 > Table F-2 column "FC Loss"

Table F-2 Containment Radiation – R/hr (1/2/3RIA 57/58)				
Time After S/D (Hrs)	**FC Loss**		**CMT Potential Loss**	
	RIA 57	**RIA 58**	**RIA 57**	**RIA 58**
0 - < 0.5	300	140	1500	700
0.5 - < 2.0	80	40	400	195
2.0 - < 8.0	32	15	160	75
≥ 8.0	10	5	50	25

Definition(s):

None

ONS Basis:

The specified containment radiation monitor readings (ref. 1) indicate the release of reactor coolant, with elevated activity indicative of fuel damage, into the Containment. The readings are derived assuming the instantaneous release and dispersal of the reactor coolant noble gas and iodine inventory associated with approximately 4% fuel cladding failure into the Containment atmosphere. Reactor coolant concentrations of this magnitude are several times larger than the maximum concentrations (including iodine spiking) allowed within technical specifications. This value is higher than that specified for RCS barrier Loss #3.

Monitors used for this fission product barrier loss threshold are the Containment High Range Radiation Monitors RIA 57 and RIA 58 (ref. 1).

NEI 99-01 Basis:

The radiation monitor reading 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 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 RCS Barrier Loss threshold C.1 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.

ONS Basis Reference(s):

1. OSC-5283 ONS Core Damage Assessment Guidelines, Rev. 2, 2/27/12
2. NEI 99-01 CMT Radiation / RCS Activity FC Loss 3.A

Barrier: Fuel Clad

Category: C. CMT Radiation / RCS Activity

Degradation Threat: Loss

Threshold:

2. Coolant activity > 300 µCi/ml DEI

Definition(s):

None

Basis:

Elevated reactor coolant activity represents a potential degradation in the level of safety of the plant and a potential precursor of more serious problems. The threshold Dose Equivalent I-131 (DEI) concentration is well above that expected for iodine spikes and corresponds to about 2% to 5% fuel clad damage. When reactor coolant activity reaches this level the Fuel Clad Barrier is considered lost (ref. 1).

NEI 99-01 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 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.

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 Potential Loss threshold associated with RCS Activity / Containment Radiation.

ONS Basis Reference(s):

1. NEI 99-01 CMT Radiation / RCS Activity Fuel Clad Loss 3.B

Barrier: Fuel Clad

Category: C. CMT Radiation / RCS Activity

Degradation Threat: Potential Loss

Threshold:

None

Barrier: Fuel Clad

Category: D. CMT Integrity or Bypass

Degradation Threat: Loss

Threshold:

None

Barrier: Fuel Clad

Category: D. CMT Integrity or Bypass

Degradation Threat: Potential Loss

Threshold:

None

Barrier: Fuel Clad

Category: E. Emergency Coordinator Judgment

Degradation Threat: Loss

Threshold:

1. **Any** condition in the judgment of the Emergency Coordinator that indicates loss of the Fuel Clad Barrier

Definition(s):

None

ONS Basis:

The Emergency Coordinator judgment threshold addresses any other factors relevant to determining if the Fuel Clad Barrier is lost. Such a determination should include imminent barrier degradation, barrier monitoring capability and dominant accident sequences.

- Imminent barrier degradation exists if the degradation will likely occur within relatively short period of time based on a projection of current safety system performance. The term "imminent" refers to recognition of the inability to reach safety function acceptance criteria before completion of all checks.
- Barrier monitoring capability is decreased if there is a loss or lack of reliable indicators. This assessment should include instrumentation operability concerns, readings from portable instrumentation and consideration of offsite monitoring results.
- Dominant accident sequences lead to degradation of all fission product barriers and likely entry to the EOPs. The Emergency Coordinator should be mindful of the Loss of AC power (Station Blackout) and ATWS EALs to assure timely emergency classification declarations.

NEI 99-01 Basis:

This threshold addresses any other factors that are to be used by the Emergency Coordinator in determining whether the Fuel Clad barrier is lost

ONS Basis Reference(s):

1. NEI 99-01 Emergency Director Judgment Fuel Clad Loss 6.A

Barrier: Fuel Clad

Category: E. Emergency Coordinator Judgment

Degradation Threat: Potential Loss

Threshold:

1. **Any** condition in the judgment of the Emergency Coordinator that indicates potential loss of the Fuel Clad Barrier

ONS Basis:

The Emergency Coordinator judgment threshold addresses any other factors relevant to determining if the Fuel Clad Barrier is potentially lost. Such a determination should include imminent barrier degradation, barrier monitoring capability and dominant accident sequences.

- Imminent barrier degradation exists if the degradation will likely occur within relatively short period of time based on a projection of current safety system performance. The term "imminent" refers to recognition of the inability to reach safety function acceptance criteria before completion of all checks.
- Barrier monitoring capability is decreased if there is a loss or lack of reliable indicators. This assessment should include instrumentation operability concerns, readings from portable instrumentation and consideration of offsite monitoring results.
- Dominant accident sequences lead to degradation of all fission product barriers and likely entry to the EOPs. The Emergency Coordinator should be mindful of the Loss of AC power (Station Blackout) and ATWS EALs to assure timely emergency classification declarations.

NEI 99-01 Basis:

This threshold addresses any other factors that are to be used by the Emergency Coordinator in determining whether the Fuel Clad barrier is potentially lost. The Emergency Coordinator should also consider whether or not to declare the barrier potentially lost in the event that barrier status cannot be monitored.

ONS Basis Reference(s):

1. NEI 99-01 Emergency Director Judgment Potential Fuel Clad Loss 6.A

Barrier: Reactor Coolant System

Category: A. RCS or SG Tube Leakage

Degradation Threat: Loss

Threshold:

1. An automatic or manual ES actuation required by **EITHER:**
    - UNISOLABLE RCS leakage
    - SG tube RUPTURE

Definition(s):

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

RUPTURE - The condition of a steam generator in which primary-to-secondary leakage is of sufficient magnitude to require a safety injection.

ONS Basis:

A RCS leak should be considered UNISOLABLE if the leak cannot be isolated within 15 minutes

NEI 99-01 Basis:

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 will also be met.

ONS Basis Reference(s):

1. UFSAR Section 7.3 Engineered Safeguards Protective System
2. NEI 99-01 RCS or SG Tube Leakage Reactor Coolant System Loss 1.A

ATTACHMENT 2
Fission Product Barrier Loss/Potential Loss Matrix and Bases

Barrier: Reactor Coolant System

Category: A. RCS or SG Tube Leakage

Degradation Threat: Potential Loss

Threshold:

1. RCS leakage > normal makeup capacity due to **EITHER**:
   - UNISOLABLE RCS leakage
   - SG tube leakage

Definition(s):

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

ONS Basis:

A RCS leak should be considered UNISOLABLE if the leak cannot be isolated within 15 min.

This threshold is based on the inability to maintain liquid inventory within the RCS by normal operation of the High Pressure Injection System (HPI). The HPI includes three pumps. (ref. 1)

Any one HPI pump runout flow rate is 475 gpm (ref. 2).

NEI 99-01 Basis:

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 ES actuation has not occurred. The threshold is met when an operating procedure, or operating crew supervision, directs that a HPI (makeup) pump be placed in service to restore and maintain pressurizer level.

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 will also be met.

ONS Basis Reference(s):

1. UFSAR Section 9.3.2 High Pressure Injection System
2. OSC-2820 Emergency Procedure Setpoints, Setpoint No. 7.3.1.2
3. NEI 99-01 RCS or SG Tube Leakage Reactor Coolant System Potential Loss 1.A

Barrier: Reactor Coolant System

Category: A. RCS or SG Tube Leakage

Degradation Threat: Potential Loss

Threshold:

2. RCS cooldown to < 400°F at > 100°F/hr

   OR

   HPI has operated in the injection mode with no RCPs operating

Definition(s):

None

ONS Basis:

400°F is the temperature below which a cooldown greater than 100°F/hr requires implementation of Pressurized Thermal Shock (PTS) guidance (rule 8) (ref. 1, 2).

HPI operating in the injection mode with no RCPs operating also invokes Rule 8 (ref. 3).

NEI 99-01 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 while the RCS is in Mode 3 or higher (i.e., hot and pressurized).

ONS Basis Reference(s):

1. OSC-2820 Emergency Procedure Setpoints, Setpoint No. 7.1.2.7
2. OSC-2820 Emergency Procedure Setpoints, Setpoint No. 7.1.8.7
3. EP/*/A/1800/001 Rule 8 Pressurized Thermal Shock (PTS)
4. 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:

1. RCS heat removal cannot be established

   AND

   RCS subcooling < 0°F

Definition(s):

None

ONS Basis:

In combination with FC Potential Loss B.1, meeting this threshold results in a Site Area Emergency.

The combination of these conditions indicates the ultimate heat sink function is under extreme challenge (i.e., superheated). This threshold addresses loss of functions required for hot shutdown with the reactor at pressure and temperature and thus a potential loss of the RCS Barrier.

NEI 99-01 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 threshold is not warranted.

Meeting this threshold results in a Site Area Emergency because this threshold is identical to Fuel Clad Barrier Potential Loss threshold B.2; 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 RCS pressure to the point where mass will be lost from the system.

ONS Basis Reference(s):

1. OSC-2820 Emergency Procedure Setpoints, Setpoint No. 7.1.3.6
2. NEI 99-01 Inadequate Heat Removal RCS Loss 2.B

Barrier: Reactor Coolant System

Category: B. Inadequate Heat Removal

Degradation Threat: Potential Loss

Threshold:

2. HPI forced cooling initiated

Definition(s):

None

ONS Basis:

HPI Forced Cooling (Rule 4) is used when the SGs are not capable of heat removal and RCS pressure is greater than 2300 psig. A Pressurizer PORV is opened to relieve pressure until HPI cools the reactor (feed and bleed). (ref. 1)

NEI 99-01 Basis:

None

ONS Basis Reference(s):

1. OSC-2820 Emergency Procedure Setpoints, Setpoint No. 7.1.4.16
2. NEI 99-01 Other Indications Potential Loss 5.A

Barrier: Reactor Coolant System

Category: C. CMT Radiation/ RCS Activity

Degradation Threat: Loss

Threshold:

1. Containment radiation:
   - 1,3 RIA 57/58 > 1.0 R/hr
   - 2 RIA 57 > 1.6 R/hr
   - 2 RIA 58 > 1.0 R/hr

Definition(s):

N/A

ONS Basis:

Containment radiation monitor readings greater than the specified values (ref. 1) indicate the release of reactor coolant to the Containment. The readings assume the instantaneous release and dispersal of the reactor coolant noble gas and iodine inventory associated with normal operating concentrations (i.e., within Technical Specifications) into the Containment atmosphere. Because of the very high fuel clad integrity, only small amounts of noble gases would be dissolved in the primary coolant.

Monitors used for this fission product barrier loss threshold are the Containment High Range Radiation Monitors RIA-57 and RIA-58. The difference in the threshold values is due to the relative strength of the detector check source which affects the background readings for the detector (the source for 2RIA-57 is stronger than that for the other detectors). (ref. 1)

NEI 99-01 Basis:

The radiation monitor reading corresponds to an instantaneous release of all reactor coolant mass into the containment, assuming that reactor coolant activity equals Technical Specification allowable limits. This value is lower than that specified for Fuel Clad Barrier Loss threshold C.1 since it indicates a loss of the RCS Barrier only.

There is no Potential Loss threshold associated with RCS Activity / Containment Radiation.

ONS Basis Reference(s):

1. OSC-4244 ONS High Range Containment Monitor Correlation Factors for RIA-57 and RIA-58
2. NEI 99-01 CMT Radiation / RCS Activity RCS Loss 3.A

ATTACHMENT 2
Fission Product Barrier Loss/Potential Loss Matrix and Bases

Barrier: Reactor Coolant System

Category: B. CMT Radiation/ RCS Activity

Degradation Threat: Potential Loss

Threshold:

None

Barrier: Reactor Coolant System

Category: D. CMT Integrity or Bypass

Degradation Threat: Loss

Threshold:

None

Barrier: Reactor Coolant System

Category: D. CMT Integrity or Bypass

Degradation Threat: Potential Loss

Threshold:

None

Barrier: Reactor Coolant System

Category: E. Emergency Coordinator Judgment

Degradation Threat: Loss

Threshold:

1. **Any** condition in the judgment of the Emergency Coordinator that indicates loss of the RCS Barrier

Definition(s):

None

ONS Basis:

The Emergency Coordinator judgment threshold addresses any other factors relevant to determining if the RCS Barrier is lost. Such a determination should include imminent barrier degradation, barrier monitoring capability and dominant accident sequences.

- Imminent barrier degradation exists if the degradation will likely occur within relatively short period of time based on a projection of current safety system performance. The term "imminent" refers to recognition of the inability to reach safety function acceptance criteria before completion of all checks.
- Barrier monitoring capability is decreased if there is a loss or lack of reliable indicators. This assessment should include instrumentation operability concerns, readings from portable instrumentation and consideration of offsite monitoring results.
- Dominant accident sequences lead to degradation of all fission product barriers and likely entry to the EOPs. The Emergency Coordinator should be mindful of the Loss of AC power (Station Blackout) and ATWS EALs to assure timely emergency classification declarations.

NEI 99-01 Basis:

This threshold addresses any other factors that may be used by the Emergency Coordinator in determining whether the RCS Barrier is lost.

ONS Basis Reference(s):

1. NEI 99-01 Emergency Director Judgment RCS Loss 6.A

Barrier: Reactor Coolant System

Category: E. Emergency Coordinator Judgment

Degradation Threat: Potential Loss

Threshold:

1. **Any** condition in the judgment of the Emergency Coordinator that indicates potential loss of the RCS Barrier

Definition(s):

None

ONS Basis:

The Emergency Coordinator judgment threshold addresses any other factors relevant to determining if the RCS Barrier is potentially lost. Such a determination should include imminent barrier degradation, barrier monitoring capability and dominant accident sequences.

- Imminent barrier degradation exists if the degradation will likely occur within relatively short period of time based on a projection of current safety system performance. The term "imminent" refers to recognition of the inability to reach safety function acceptance criteria before completion of all checks.
- Barrier monitoring capability is decreased if there is a loss or lack of reliable indicators. This assessment should include instrumentation operability concerns, readings from portable instrumentation and consideration of offsite monitoring results.
- Dominant accident sequences lead to degradation of all fission product barriers and likely entry to the EOPs. The Emergency Coordinator should be mindful of the Loss of AC power (Station Blackout) and ATWS EALs to assure timely emergency classification declarations.

NEI 99-01 Basis:

This threshold addresses any other factors that may be used by the Emergency Coordinator 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.

ONS Basis Reference(s):

1. NEI 99-01 Emergency Director Judgment RCS Potential Loss 6.A

Barrier: Containment

Category: A. RCS or SG Tube Leakage

Degradation Threat: Loss

Threshold:

1. A leaking SG is 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.

ONS Basis:

None

NEI 99-01 Basis:

This threshold addresses a leaking Steam Generator (SG) that is also FAULTED outside of containment. The condition of the SG leakage, is determined in accordance with the thresholds for RCS Barrier Potential Loss A.1 and Loss A.1, 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 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 steam generator directly to atmosphere to cooldown the plant. These type of condition 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.

Steam releases associated with the expected operation of a SG Atmospheric Dump Valve(s) 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 an SG tube leak, there may be minor radiological releases through a secondary-side system component (e.g., air ejectors, gland seal exhausters, valve packing, steam traps, terry turbine exhaust, etc.). These types of releases do not constitute a loss or potential loss of containment but should be evaluated using the Recognition Category R ICs.

The ECLs resulting from primary-to-secondary leakage, with or without a steam release from the FAULTED SG, are summarized below.

	Affected SG 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 normal makeup pump capacity (*RCS Barrier Potential Loss*)	Site Area Emergency per FS1.1	Alert per FA1.1
Requires an automatic or manual ECCS (ES) actuation (*RCS Barrier Loss*)	Site Area Emergency per FS1.1	Alert per FA1.1

There is no Potential Loss threshold associated with RCS or SG Tube Leakage.

ONS Basis Reference(s):

1. NEI 99-01 RCS or SG Tube Leakage Containment Loss 1.A

ATTACHMENT 2
Fission Product Barrier Loss/Potential Loss Matrix and Bases

Barrier: Containment

Category: A. RCS or SG 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:

1. CETCs > 1200°F

   AND

   Restoration procedures **not** effective within 15 min. (Note 1)

Note 1: The Emergency Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.

Definition(s):

None

ONS Basis:

Core Exit Thermocouples (CETCs) are a component of Inadequate Core Cooling Instrumentation and provide an indirect indication of fuel clad temperature by measuring the temperature of the reactor coolant that leaves the core region. Although clad rupture due to high temperature is not expected for CETC readings less than the threshold, temperatures of this magnitude signal significant superheating of the reactor coolant and core uncover (ref. 1).

The restoration procedures are those emergency operating procedures that address the recovery of the RCS and core heat removal acceptance criteria. The procedure is considered effective if the temperature is decreasing or if the vessel water level is increasing (ref. 1).The 15 minute threshold starts when operator action begins taking procedurally directed functional recovery actions.

If CETC readings are greater than 1,200°F, Fuel Clad barrier is also lost.

NEI 99-01 Basis:

This threshold addresses any other factors that may be used by the Emergency Coordinator 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.

ONS Basis Reference(s):

1. EP/1,2,3/A/1800/001 Inadequate Core Cooling
2. NEI 99-01 Inadequate Heat Removal Containment Potential Loss 2.A

Barrier: Containment

Category: C. CMT Radiation/RCS Activity

Degradation Threat: Loss

Threshold:

None

Barrier: Containment

Category: C. CMT Radiation/RCS Activity

Degradation Threat: Potential Loss

Threshold:

1. 1/2/3RIA 57/58 > Table F-2 column "CMT Potential Loss"

Table F-2 Containment Radiation – R/hr (1/2/3RIA 57/58)				
Time After S/D (Hrs)	FC Loss		CMT Potential Loss	
	RIA 57	RIA 58	RIA 57	RIA 58
0 - < 0.5	300	140	1500	700
0.5 - < 2.0	80	40	400	195
2.0 - < 8.0	32	15	160	75
≥ 8.0	10	5	50	25

Definition(s):

None

ONS Basis:

Containment radiation monitor readings greater than the values shown (ref. 1) indicate significant fuel damage well in excess of that required for loss of the RCS Barrier and the Fuel Clad Barrier.

The specified containment radiation monitor readings (ref. 1) indicate the release of reactor coolant, with significant fuel damage well in excess of that required for loss of the RCS Barrier and the Fuel Clad Barrier, into the Containment. The readings are derived assuming the instantaneous release and dispersal of the reactor coolant noble gas and iodine inventory associated with 20% clad failure into the Containment atmosphere.

Containment radiation readings at or above the Containment Barrier Potential Loss threshold signify a loss of two fission product barriers and Potential Loss of a third, indicating the need to upgrade the emergency classification to a General Emergency.

Monitors used for this fission product barrier loss threshold are the Containment High Range Radiation Monitors RIA-57 and RIA-58 (ref. 1).

NEI 99-01 Basis:

The 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. 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.

ONS Basis Reference(s):

1. OSC-5283 ONS Core Damage Assessment Guidelines, Rev. 2, 2/27/12
2. NEI 99-01 CMT Radiation / RCS Activity Containment Potential Loss 3.A

Barrier: Containment

Category: D. CMT Integrity or Bypass

Degradation Threat: Loss

Threshold:

1. Containment isolation is required

   AND EITHER:

   - *Containment integrity has been lost based on Emergency Coordinator judgment*
   - UNISOLABLE pathway from Containment to the environment exists

Definition(s):

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

ONS Basis:

The pathway should be considered UNISOLABLE if the Containment cannot be isolated within 15 min.

Reactor Building Essential and Non-essential Isolation occurs on an Engineered Safeguards signal of 3 psig (ref. 1).

NEI 99-01 Basis:

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 Coordinator 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 R 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.

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 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 R ICs.

The status of the containment barrier during an event involving steam generator tube leakage is assessed using Loss Threshold A.1.

ONS Basis Reference(s):

1. UFSAR Section 6.2.3 Containment Isolation System
2. NEI 99-01 CMT Integrity or Bypass Containment Loss 4.A

Barrier: Containment

Category: D. CMT Integrity or Bypass

Degradation Threat: Loss

Threshold:

2. Indications of RCS leakage outside of Containment

Definition(s):

None

ONS Basis:

None

NEI 99-01 Basis:

Containment sump, temperature, pressure and/or radiation levels will increase if reactor coolant mass is leaking into the containment. If these parameters have not increased, then the reactor coolant mass may be leaking outside of containment (i.e., a containment bypass sequence). Increases 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 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.

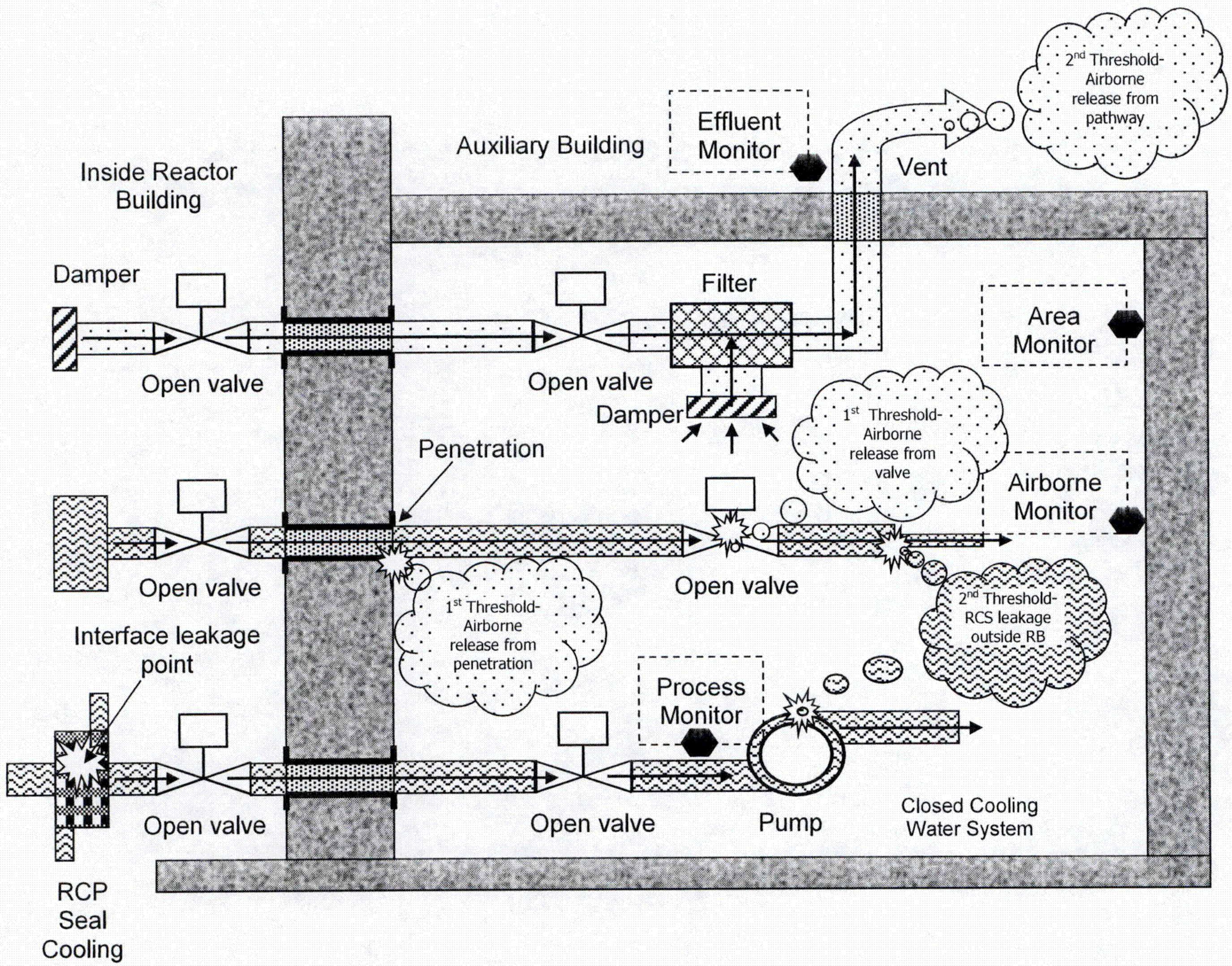
Refer to the middle piping run of Figure 1. In this simplified example, a leak has occurred at a reducer on a pipe carrying reactor coolant in the Auxiliary Building. Depending upon radiation monitor locations and sensitivities, the leakage could be detected by any of the four monitors depicted in the figure and cause threshold D.1 to be met as well.

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 and/or Potential Loss threshold A.1 to be met.

ONS Basis Reference(s):

1. NEI 99-01 CMT Integrity or Bypass Containment Loss

Figure 1: Containment Integrity or Bypass Examples



Barrier: Containment

Category: D. CMT Integrity or Bypass

Degradation Threat: Potential Loss

Threshold:

1. Containment pressure > 59 psig

Definition(s):

None

ONS Basis:

The Reactor Building is designed for an internal pressure of 59 psig (ref. 1).

NEI 99-01 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.

ONS Basis Reference(s):

1. UFSAR Section 6.2.1 Containment Functional Design
2. NEI 99-01 CMT Integrity or Bypass Containment Potential Loss 4.A

ATTACHMENT 2
Fission Product Barrier Loss/Potential Loss Matrix and Bases

Barrier: Containment

Category: D. CMT Integrity or Bypass

Degradation Threat: Potential Loss

Threshold:

2. Containment hydrogen concentration ≥ 4%

Definition(s):

None

ONS Basis:

Following a design basis accident, hydrogen gas may be generated inside the containment by reactions such as zirconium metal with water, corrosion of materials of construction and radiolysis of aqueous solution in the core and sump.

The 4% hydrogen concentration threshold is generally considered the lower limit for hydrogen deflagrations. ONS is equipped with a Containment Hydrogen Monitoring System (CHMS) that provides continuous indication of hydrogen concentration in the containment atmosphere. The measurement capability is provided over the range of 0% to 10%. A continuous indication of the hydrogen concentration is not required in the control room at all times during normal operation. If continuous indication of the hydrogen concentration is not available at all times, continuous indication and recording shall be functioning within 90 minutes of the initiation of the safety injection. (ref. 1, 2)

NEI 99-01 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). 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.

ONS Basis Reference(s):

1. UFSAR Section 9.3.7 Containment Hydrogen Monitoring System
2. UFSAR Section 15.16.3 Evaluation of Hydrogen Concentrations
3. NEI 99-01 CMT Integrity or Bypass Containment Potential Loss 4.B

ATTACHMENT 2
Fissión Product Barrier Loss/Potential Loss Matrix and Bases

Barrier: Containment

Category: D. CMT Integrity or Bypass

Degradation Threat: Potential Loss

Threshold:

3.	Containment pressure > 10 psig with < one full train of containment heat removal system (1 RBS with > 700 gpm spray flow **OR** 2 RBCUs) operating per design for ≥ 15 min. (Note 1)

Note 1: The Emergency Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.

Definition(s):

None

ONS Basis:

Two engineered safeguards systems, the Reactor Building Spray System and the Reactor Building Cooling System, are provided to remove heat from the containment atmosphere following an accident. Both the Reactor Building Spray System and the Reactor Building Cooling System, with either at full capacity, are individually capable of maintaining the containment pressure below the design limit following a LOCA or MSLB. (ref. 1, 3)

- The Reactor Building Spray (RBS) System consists of two separate trains of equal capacity. Spray flow greater or equal to 700 gpm satisfies the spray flow design requirement. The Reactor Building pressure setpoint (10 psig) is the pressure at which the Reactor Building Spray equipment should actuate and begin performing its function (ref. 1, 2, 3, 4).

- Each of three Reactor Building Cooling Units (RBCUs) consists of a fan, cooling coils, and the required distribution duct work. The Reactor Building atmosphere is circulated past cooling coils by fans and returned to the building. Cooling water for the cooling units is supplied by the Low Pressure Service Water System. The Reactor Building Cooling System provides the design heat removal capacity with two of three coolers operating (ref. 1).

<u>NEI 99-01 Basis:</u>

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.

ONS Basis Reference(s):

1. UFSAR Section 6.2.2 Containment Heat Removal Systems
2. UFSAR Table 7-2 Engineered Safeguards Actuation Conditions
3. UFSAR Table 6-25 Minimum Acceptable Combinations of Containment Heat Removal Equipment Performance
4. OSC-02820 Emergency Procedure Setpoints, Setpoint No. 7.4.1.2
5. NEI 99-01 CMT Integrity or Bypass Containment Potential Loss 4.C

Barrier: Containment

Category: E. Emergency Coordinator Judgment

Degradation Threat: Loss

Threshold:

1. **Any** condition in the judgment of the Emergency Coordinator that indicates loss of the Containment Barrier

Definition(s):

None

ONS Basis:

The Emergency Coordinator judgment threshold addresses any other factors relevant to determining if the Containment Barrier is lost. Such a determination should include imminent barrier degradation, barrier monitoring capability and dominant accident sequences.

- Imminent barrier degradation exists if the degradation will likely occur within relatively short period of time based on a projection of current safety system performance. The term "imminent" refers to recognition of the inability to reach safety function acceptance criteria before completion of all checks.
- Barrier monitoring capability is decreased if there is a loss or lack of reliable indicators. This assessment should include instrumentation operability concerns, readings from portable instrumentation and consideration of offsite monitoring results.
- Dominant accident sequences lead to degradation of all fission product barriers and likely entry to the EOPs. The Emergency Coordinator should be mindful of the Loss of AC power (Station Blackout) and ATWS EALs to assure timely emergency classification declarations.

NEI 99-01 Basis:

This threshold addresses any other factors that may be used by the Emergency Coordinator in determining whether the Containment Barrier is lost.

ONS Basis Reference(s):

1. NEI 99-01 Emergency Director Judgment PC Loss 6.A

Barrier: Containment

Category: E. Emergency Coordinator Judgment

Degradation Threat: Potential Loss

Threshold:

1. **Any** condition in the judgment of the Emergency Coordinator that indicates potential loss of the Containment Barrier

Definition(s):

None

ONS Basis:

The Emergency Coordinator judgment threshold addresses any other factors relevant to determining if the Containment Barrier is potentially lost. Such a determination should include imminent barrier degradation, barrier monitoring capability and dominant accident sequences.

- Imminent barrier degradation exists if the degradation will likely occur within relatively short period of time based on a projection of current safety system performance. The term "imminent" refers to recognition of the inability to reach safety function acceptance criteria before completion of all checks.
- Barrier monitoring capability is decreased if there is a loss or lack of reliable indicators. This assessment should include instrumentation operability concerns, readings from portable instrumentation and consideration of offsite monitoring results.
- Dominant accident sequences lead to degradation of all fission product barriers and likely entry to the EOPs. The Emergency Coordinator should be mindful of the Loss of AC power (Station Blackout) and ATWS EALs to assure timely emergency classification declarations.

NEI 99-01 Basis:

This threshold addresses any other factors that may be used by the Emergency Coordinator in determining whether the Containment Barrier is lost.

ONS Basis Reference(s):

1. NEI 99-01 Emergency Director Judgment PC Potential Loss 6.A

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.*

ATTACHMENT 3

Safe Operation & Shutdown Rooms/Areas Tables R-2 & H-2 Bases

ONS Table R-2 and H-2 Bases

NEI 99-01 Rev 06 addresses elevated radiation levels and hazardous gases 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 shutdown and cool down.

Power Operation was reviewed to determine if any actions are "necessary" to maintain power operations. Over reasonable periods (several days), there are some actions outside the Control Room that are required to be performed to maintain normal operations. The following table lists the locations into which an operator may be dispatched in order perform a normal plant operation, shutdown and cool down.

The review was completed using the following procedures as the controlling documents:

- OP/*/A/1102/010 (Controlling Procedure for Unit Shutdown)
- OP/*/A/1106/001 (Turbine Generator)
- OP/*/A/1106/015 (EHC System)
- OP/*/A/1103/004A (RCS Boration)
- OP/*/A/1104/027 (Bleed Transfer Pump Recirculation)
- PT/*/A/0600/001 B (Surveillance to go to Mode 3)
- OP/*/A/1102/010 (Unit SD Mode 1 to Mode 3)
- IP/*/A/0200/047 (LTOP Calibration)
- OP/*/A/1103/006 (RCP Operations)
- OP/*/A/1104/012 (CCW Pump Operations)
- CP/1/A/2002/014 (RCS Sampling)
- OP/*/A/1104/049 (LTOP Operation)
- OP/1/A/1104/001 (Core Flood Operations)
- OP/0/A/1104/048 (TBS Operations)
- OP/*/A/1104/004 (Low Pressure Injection System)
- OP/*/A/1103/008 (RCS Crud Burst)

Travel paths to the locations where the equipment is operated were considered as part of the determination of affected rooms. ONS Reactor and Auxiliary Building design consist of mostly single entry rooms located off of a common hallway, therefore access to the hallway is required to access a given room. Some equipment is located within the hallway itself.

Room	Mode	Procedure	Enclosure	Steps
TB	1	OP/1/A/1102/010	4.1	Unit SD
TB	1	OP/1/A/1106/001	4.2	TG
TB	1	OP/1/A/1106/014	4.3	MSRH
TB	1	OP/1/A/1106/015	4.2	EHC
A-2 LDST Hatch area	1,2,3	OP/1/A/1103/004 A	4.1	RCS Boration
A-1 hallway 8' S/ col 65	1,2,3	OP/1/A/1103/004 A	4.2	RCS Boration
A-1 hallway 8' S/ col 65	1,2,3	OP/1/A/1103/004 A	4.3	RCS Boration
Unit 1 BTP Rm	1,2,3	OP/1/A/1103/004 A	4.3	RCS Boration

ATTACHMENT 3

Safe Operation & Shutdown Rooms/Areas Tables R-2 & H-2 Bases

Unit 1 BTP Rm	1,2,3	OP/1/A/1103/004 A	4.4	RCS Boration
A-1 hallway 8' S/ col 65	1,2,3	OP/1/A/1103/004 A	4.4	RCS Boration
A-2-Unit 2 LDST Hatch area	1,2,3	OP/1/A/1103/004 A	4.4	RCS Boration
Unit 2 BTP Rm	1,2,3	OP/1/A/1103/004 A	4.4	RCS Boration
A-1-hallway N of Col 82	1,2,3	OP/1/A/1103/004 A	4.4	RCS Boration
A-1 hallway 5' S/ col 67	1,2,3	OP/1/A/1103/004 A	4.4	RCS Boration
A-1 hallway col 82	1,2,3	OP/1/A/1103/004 A	4.4	RCS Boration
A-2 Unit 3 LDST Hatch area	1,2,3	OP/1/A/1103/004 A	4.5	RCS Boration
Unit 3 BTP Rm	1,2,3	OP/1/A/1103/004 A	4.5	RCS Boration
A-1 hallway 10' S/col 96)	1,2,3	OP/1/A/1103/004 A	4.5	RCS Boration
A-1 hallway 5' S/ col 67	1,2,3	OP/1/A/1103/004 A	4.5	RCS Boration
LPI Cooler Rm 1' W/ North door	1,2,3	OP/1/A/1103/004 A	4.5	RCS Boration
A-1- BAMT Rm	1	OP/1/A/1103/004 A	4.6	RCS Boration
A-1 Unit 1 & 2 BAMT Rm	1	OP/1/A/1103/004 A	4.6	RCS Boration
Rm 111	1	OP/1/A/1103/004 A	4.6	RCS Boration
A-2 LDST Hatch area	1	OP/1/A/1103/004 A	4.6	RCS Boration
CTT Rm	1	OP/1/A/1103/004 A	4.6	RCS Boration
A-2-1&2 Chem. Add Panel	1	OP/1/A/1103/004 A	4.6	RCS Boration
A-1-Col Q70	1	OP/1/A/1103/004 A	4.7	RCS Boration
A-2-LDST Hatch area	1	OP/1/A/1103/004 A	4.7	RCS Boration
A-1-Unit 1 CBAST Rm	1	OP/1/A/1103/004 A	4.7	RCS Boration
Unit 1 BTP Rm	1	OP/1/A/1104/027	4.19	BTP Recirc
Unit 1 BTP Rm	1	OP/1/A/1104/027	4.20.	BTP Recirc
	1	OP/1/A/1102/010	4.2	Unit SD
	1	PT/1/A/0600/001 B	13.2	Surv. Mode3
Unit 1-BTP Rm	1,2	OP/1/A/1103/004	4.5	Makeup
Unit 1-BTP Rm	1,2	OP/1/A/1103/004	4.6	Makeup
	1,2,3	OP/1/A/1102/010	4.3	SD Mode 1 to 3
	3	OP/1/A/1102/010	4.4	
RB 779', Cable Room, 1UB2	3	IP/1/A/0200/047		LTOP Calibration
RB 779'	3	IP/1/A/0200/047		LTOP Calibration
1UB2	3	IP/1/A/0200/047		LTOP Calibration
1AT7	3	IP/1/A/0200/047		LTOP Calibration
1MTC-4	3	IP/1/A/0200/047		LTOP Calibration
1AT5	3	IP/1/A/0200/047		LTOP Calibration
LPI Cooler Room	3	OP/1/A/1103/006	4.12	
	3	OP/1/A/1102/010	4.7	
		OP/1/A/1104/012 A	4.2	CCW Pump
	3	OP/1/A/1102/010	4.7	
Unit 1 Primary Sample Hood		CP/1/A/2002/014	4.2	
AB SAMPLE RM.308		CP/1/A/2002/014	4.2	
A-4-402 PZR Heaters	3	OP/1/A/1102/010	4.7	

ATTACHMENT 3

Safe Operation & Shutdown Rooms/Areas Tables R-2 & H-2 Bases

Equip Rm XO/XP	3	OP/1/A/1102/010	4.7	
Equip Rm XO/XP	3	OP/1/A/1104/049	4.2	
A-4-402 PZR Heaters	3	OP/1/A/1104/049	4.2	
	3	OP/1/A/1104/001	4.14	
A-4-409	3	OP/1/A/1104/001	4.4	
A-3-308	3	OP/1/A/1104/001	4.4	
A-2 Hallway	3	OP/1/A/1104/001	4.4	
R-1G-W	3	OP/1/A/1104/001	4.4	
R-1-around "A" CFT	3	OP/1/A/1104/001	4.4	
R-B above Emer Sump	3	OP/1/A/1104/001	4.4	
R-B above RBNS	3	OP/1/A/1104/001	4.4	
R-1-around "B" CFT	3	OP/1/A/1104/001	4.4	
R-B-20' above LD Clr RM	3	OP/1/A/1104/001	4.4	
Equip Rm XO/XP	3	OP/1/A/1104/001	4.14	
A-4-W Pent Rm	3	OP/1/A/1104/001	4.14	
A-4-E Pent	3	OP/1/A/1104/049	4.2	
R-3G East Side	3	OP/1/A/1104/049	4.2	
A-4-402	3	OP/1/A/1104/049	4.2	LTOP Alignment
A-2-Col. P-63)	3	OP/1/A/1104/049	4.2	LTOP Alignment
T-3-Equip Rm)	3	OP/1/A/1104/049	4.2	LTOP Alignment
	3	OP/1/A/1102/010	4.7	
	3	OP/1/A/1102/010	4.15	
A-2-Unit 1 BAMT, in hallway	3	OP/1/A/1104/002	4.17	
Turbine Building	3	OP/1/A/1106/002 A	4.14	
Turbine Building	3	OP/0/A/1104/048	4.4	Step 3.7
		OP/1/A/1102/010	4.7	
		Next actions---LPI		
LPI System Start-up (CR & SSF-CR)	3	OP/1/A/1104/004	4.2	LPI Fill & S/U
AB 1st Floor	3	OP/1/A/1104/004	4.5	Valve lineup for LPI
AB Pent. Rooms	3	OP/1/A/1102/010	4.1	Breaker line up S/D
TB-3 & CR	3	OP/1/A/1102/010		Secondary Steam SD
TB All Levels	3	OP/1/A/1102/010	4.1	Align FDW clean-up
AB-2	4 & 5	OP/1/A/1102/010	4.11	RCS H2 Sampling
RB, AB-1, 2 & 3rd	5	OP/1/A/1103/008		RCS Crud Burst

ATTACHMENT 3

Safe Operation & Shutdown Rooms/Areas Tables R-2 & H-2 Bases

Unit Shutdown Room List	Mode
Turbine Building	1,2,3
A-1 hallway 8' S/ col 65	1,2,3
A-1-hallway N of Col 82	1,2,3
A-1 hallway 5' S/ col 67	1,2,3
A-1 hallway col 82	1,2,3
A-1 hallway 10' S/col 96)	1,2,3
A-1- BAMT Rm	1
A-1 Unit 1 & 2 BAMT Rm	1
A-1-Col Q70	1
A-2 LDST Hatch area	1,2,3
A-2-Unit 2 LDST Hatch area	1,2,3
A-2 Unit 3 LDST Hatch area	1,2,3
A-2-1&2 Chem. Add Panel	1
A-2-Col. P-63	3
A-2-Unit 1 BAMT, in hallway	3
A-2 Hallway	3
A-3-308	3
A-4-402	3
A-4-409	3
A-4-W Pent Rm	3
A-4-E Pent	3
Unit 1 BTP Rm	1,2,3
Unit 2 BTP Rm	1,2,3
Unit 3 BTP Rm	1,2,3
U1 LPI Cooler Rm	1,2,3
RB 779', Cable Room, 1UB2	3
RB 779'	3
R-1G-W	3
R-1-around "A" CFT	3
R-1-around "B" CFT	3
R-B above Emer. Sump	3
R-B above RBNS	3
R-B-20' above LD Cooler RM	3
R-3G East Side	3
1UB2	3
1AT7	3
1MTC-4	3
1AT5	3
Unit 1 Primary Sample Hood	3
AB SAMPLE RM.308	3
RB, AB	4 & 5

ATTACHMENT 3

Safe Operation & Shutdown Rooms/Areas Tables R-2 & H-2 Bases

Table R-2 & H-2 Results

Table R-2 & H-2 Safe Operation & Shutdown Rooms/Areas	
Room/Area	**Mode Applicability**
Turbine Building	1, 2, 3
Equipment and Cable Rooms	1, 2, 3
Auxiliary Building	1, 2, 3, 4, 5
Reactor Buildings	3, 4, 5

ENCLOSURE 4

EMERGENCY ACTION LEVEL TECHNICAL BASES DOCUMENT
(REDLINE AND STRIKEOUT VERSION)

258 Pages Follow

EMERGENCY ACTION LEVEL TECHNICAL BASES

(Redline and Strikeout Version)

Revision 0 6/16/15

Table of Contents

1.0 PURPOSE

This document provides an explanation and rationale for each Emergency Action Level (EAL) included in the EAL Upgrade Project for Oconee Nuclear Station (ONS). It should be used to facilitate review of the ONS EALs and provide historical documentation for future reference. Decision-makers responsible for implementation of RP/0/A/1000/001, Emergency Classification, may use this document as a technical reference in support of EAL interpretation. This information may assist the Emergency Coordinator 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 Coordinator 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 ONS 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 (ADAMS Accession Number ML12326A805) (ref. 4.1.1), ONS 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 an increased probability of barrier loss and decreased certainty of maintaining the barrier.

The primary fission product barriers are:

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

B. Reactor Coolant System (RCS): 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 (CMT): The Containment (Reactor Building) Barrier includes the Reactor 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 Reactor 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 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 ONS EAL scheme includes the following features:

- Division of the EAL set into three broad groups:
    - EALs applicable under any plant operating modes – This group would be reviewed by the EAL-user any time emergency classification is considered.
    - EALs applicable only under hot 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 cold operating modes – This group would only be reviewed by the EAL-user when the plant is in Cold Shutdown, Refueling mode or No 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 ONS EAL categories are aligned to and represent the NEI 99-01 "Recognition Categories." Subcategories are used in the ONS scheme as necessary to further divide the EALs of a category into logical sets of possible emergency classification thresholds. The ONS EAL categories and subcategories are listed below.

EAL Groups, Categories and Subcategories

EAL Group/Category	EAL Subcategory
Any Operating Mode:	
R – Abnormal **R**ad 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 Coordinator Judgment
E – Independent Spent Fuel Storage Installation (ISFSI)	1 – Confinement Boundary
Hot Conditions:	
S – **S**ystem Malfunction	1 – Loss of Essential 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 Essential AC Power 3 – RCS Temperature 4 – Loss of Vital DC Power 5 – Loss of Communications 6 – Hazardous Event Affecting Safety Systems

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 Attachments 1 & 2 of this document for such information.

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 (R, C, H, S, E and F) 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:

<u>Category Letter & Title</u>

<u>Subcategory Number & Title</u>

<u>Initiating Condition (IC)</u>

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

<u>EAL Identifier (enclosed in rectangle)</u>

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 (R, C, H, S, E or F)
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).

<u>Classification (enclosed in rectangle):</u>

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

<u>EAL (enclosed in rectangle)</u>

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

<u>Mode Applicability</u>

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, NM – No Mode, or Any. (See Section 2.6 for operating mode definitions)

<u>Definitions:</u>

If the EAL 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:

A Plant-Specific basis section that provides ONS-relevant information concerning the EAL. This is followed by a Generic basis section that provides a description of the rationale for the EAL as provided in NEI 99-01 Rev. 6.

ONS Basis Reference(s):

Site-specific source documentation from which the EAL is derived

2.6 Operating Mode Applicability (ref. 4.1.6)

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

2 Startup
$K_{eff} \geq 0.99$ and reactor thermal power $\leq$ 5%

3 Hot Standby
$K_{eff} < 0.99$ and average coolant temperature $\geq$ 250°F

4 Hot Shutdown
$K_{eff} < 0.99$ and average coolant temperature 250°F > T_{avg} > 200°F and all reactor vessel head closure bolts fully tensioned

5 Cold Shutdown
$K_{eff} < 0.99$ and average coolant temperature $\leq$ 200°F and all reactor vessel head closure bolts fully tensioned

6 Refueling
One or more reactor vessel head closure bolts less than fully tensioned

NM No Mode
Reactor vessel contains no irradiated fuel

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 Coordinator 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.

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. 4.1.9).

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.

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.

3.1.3 Imminent Conditions

For ICs and EALs that have a stipulated time duration (e.g., 15 minutes, 30 minutes, etc.), the Emergency Coordinator 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 Coordinator 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 Coordinator with the ability to classify events and conditions based upon judgment using EALs that are consistent with the ECL definitions (refer to Category H). The Emergency Coordinator 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. 4.1.9).

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.

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 Coordinator 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 Coordinator, 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 Downgrading

An ECL may be downgraded when the event or condition that meets the highest IC and EAL no longer exists, and other site-specific downgrading requirements are met. If downgrading the ECL is deemed appropriate, the new ECL would then be based on a lower applicable IC(s) and EAL(s). The ECL may also simply be terminated.

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.

EAL momentarily met during expected plant response - In instances where 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.

EAL momentarily met but the condition is corrected prior to an emergency declaration – 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. Reactor vessel level rapidly decreases and 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 Coordinator 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 1.1-1 Modes

4.1.7 OP/1,2,3/A/1502/000 Containment Closure Control

4.1.8 Procedure Writer's Manual, Revision 012

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

4.1.10 Oconee Nuclear Site Emergency Plan

4.1.11 S.D.1.3.5 Shutdown Protection Plan

4.1.12 Duke Energy Physical Security Plan for ONS

4.2 Implementing

4.2.1 RP/0/A/1000/001 Emergency Classification

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

4.2.3 ONS EAL Matrix

5.0 DEFINITIONS, ACRONYMS & ABBREVIATIONS

5.1 Definitions (ref. 4.1.1 except as noted)

Selected terms used in Initiating Condition and Emergency Action Level statements 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 small fractions of the EPA Protective Action Guideline exposure levels.

Confinement Barrier

The barrier(s) between spent fuel and the environment once the spent fuel is processed for dry storage. As related to the ONS ISFSI, Confinement Boundary is comprised of the DSC (dry shielded canister) shell, inner bottom cover plate, inner top cover plate, siphon & vent block, siphon & vent port cover plate, and the welds that join them together.

Containment Closure

The action to secure containment and its associated structures, systems, and components as a functional barrier to fission product release under all plant conditions up to and including a loss of decay heat removal or fuel handling accident inside containment (ref. 4.1.11). ~~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 ONS, Containment Closure is established when the requirements of OP/1,2,3/A/1502/000, Containment Closure Control, are met (ref. 4.1.7).

EPA PAGs

Environment Protection Agency Protective Action Guidelines. The EPA PAGs are expressed in terms of dose commitment: 1 Rem TEDE or 5 Rem CDE Thyroid. Actual or projected offsite exposures in excess of the EPA PAGs requires ONS to recommend protective actions for the general public to offsite planning agencies.

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.

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 actions that result 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.

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 ONS 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 ONS. Non-terrorism-based EALs should be used to address such activities (i.e., this may include violent acts between individuals in the owner controlled area).

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.

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.

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).

Intrusion

The act of entering without authorization. Discovery of a bomb in a specified area is indication of intrusion into that area by a hostile force.

Maintain

Take appropriate action to hold the value of an identified parameter within specified limits.

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

Area outside the PROTECTED AREA fence that immediately surrounds the plant. Access to this area is generally restricted to those entering on official business.

Projectile

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

Protected Area

That part of the nuclear station property consisting of the Reactor, Auxiliary, Turbine, and Service Building and grounds, contained within the owner controlled security fence (ref. 4.1.10).

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, pressurizer manway and safeties installed).

Reduced Inventory

Condition with fuel in the reactor vessel and the level lower than approximately three feet below the reactor vessel flange (RCS level < 50" on LT-5) (ref. 4.1.11).

Refueling Pathway

The spent fuel pool and/or fuel transfer canal comprise the refueling pathway.

Restore

Take the appropriate action required to return the value of an identified parameter to the applicable limits.

Ruptured

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

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.

Site Area Emergency

Events are in process or have occurred which involve actual or likely major failures of plant functions needed for protection of the public or hostile actions that result 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 Guidelines exposure levels beyond the site boundary.

Site Boundary

That area, including the PROTECTED AREA, in which Duke Energy has the authority to control all activities including exclusion or removal of personnel and property (1 mile radius) from the center of Unit 2. (ref. 4.1.10).

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 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 Acronyms and Abbreviations

°F .... Degrees Fahrenheit
° .... Degrees
AC .... Alternating Current
AP .... Abnormal Operating Procedure
ATWS .... Anticipated Transient Without Scram
BWST .... Borated Water Storage Tank
CETC .... Core Exit Thermocouple
CDE .... Committed Dose Equivalent
CFR .... Code of Federal Regulations
CMT .... Containment
DBA .... Design Basis Accident
DBE .... Design Basis Earthquake
DC .... Direct Current
DSC .... Dry Shielded Canister
EAL .... Emergency Action Level
ECCS .... Emergency Core Cooling System
ECL .... Emergency Classification Level
EOF .... Emergency Operations Facility
EOP .... Emergency Operating Procedure
EPA .... Environmental Protection Agency
ERG .... Emergency Response Guideline
EPIP .... Emergency Plan Implementing Procedure
ESF .... Engineered Safety Feature
FAA .... Federal Aviation Administration
FBI .... Federal Bureau of Investigation
FEMA .... Federal Emergency Management Agency
GE .... General Emergency
HPI .... High Pressure Injection
IC .... Initiating Condition
IPEEE .... Individual Plant Examination of External Events (Generic Letter 88-20)
ISFSI .... Independent Spent Fuel Storage Installation
K_{eff} .... Effective Neutron Multiplication Factor
LCO .... Limiting Condition of Operation

LEC .... Law Enforcement Center
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
MSL .... Main Steam Line
MW .... Megawatt
NEI ....Nuclear Energy Institute
NESP...National Environmental Studies Project
NM .... No Mode
NPP .... Nuclear Power Plant
NRC...Nuclear Regulatory Commission
NORAD.. North American Aerospace Defense Command
(NO)UE .... Notification of Unusual Event
OBE .... Operating Basis Earthquake
OCA..Owner Controlled Area
ODCM...Off-site Dose Calculation Manual
ORO .... Offsite Response Organization
PA.. Protected Area
PAG .... Protective Action Guideline
PRA .... Probabilistic Risk Assessment
PSA .... Probabilistic Safety Assessment
PWR .... Pressurized Water Reactor
PSIG ....Pounds per Square Inch Gauge
PSW .... Protected Service Water
R .... Roentgen
RCS .... Reactor Coolant System
Rem, rem, REM ....Roentgen Equivalent Man
Rep CET...Representative Core Exit Thermocouples
RETS .... Radiological Effluent Technical Specifications
RPS ....Reactor Protective System
RV .... Reactor Vessel
RVLIS .... Reactor Vessel Level Indicating System

SAR .... Safety Analysis Report
SBO .... Station Blackout
SCBA .... Self-Contained Breathing Apparatus
SG .... Steam Generator
SLC .... Selected License Commitment
SPDS .... Safety Parameter Display System
SRO .... Senior Reactor Operator
TEDE .... Total Effective Dose Equivalent
TSC .... Technical Support Center
UFSAR .... Updated Final Safety Analysis Report

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

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

ONS	NEI 99-01 Rev. 6	
EAL	**IC**	**Example EAL**
RU1.1	AU1	1, 2
RU1.2	AU1	3
RU2.1	AU2	1
RA1.1	AA1	1
RA1.2	AA1	2
RA1.3	AA1	3
RA1.4	AA1	4
RA2.1	AA2	1
RA2.2	AA2	2
RA2.3	AA2	3
RA3.1	AA3	1
RA3.2	AA3	2
RS1.1	AS1	1
RS1.2	AS1	2
RS1.3	AS1	3
RS2.1	AS2	1
RG1.1	AG1	1
RG1.2	AG1	2
RG1.3	AG1	3
RG2.1	AG2	1
CU1.1	CU1	1
CU1.2	CU1	2

ONS	NEI 99-01 Rev. 6	
EAL	IC	Example EAL
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	3
CG1.1	CG1	2
FA1.1	FA1	1
FS1.1	FS1	1
FG1.1	FG1	1
HU1.1	HU1	1, 2, 3
HU2.1	HU2	1
HU3.1	HU3	1
HU3.2	HU3	2
HU3.3	HU3	3
HU3.4	HU3	4
HU3.5	HU3	5
HU4.1	HU4	1
HU4.2	HU4	2
HU4.3	HU4	3

ONS	NEI 99-01 Rev. 6	
EAL	IC	Example EAL
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
HS3.1	N/A	N/A
HS6.1	HS6	1
HS7.1	HS7	1
HG1.1	HG1	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
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

ONS	NEI 99-01 Rev. 6	
EAL	IC	Example EAL
SS2.1	SS8	1
SS6.1	SS5	1
SG1.1	SG1	1
SG1.2	SG8	1
EU1.1	EU1	1

7.0 ATTACHMENTS

7.1 Attachment 1, Emergency Action Level Technical Bases

7.2 Attachment 2, Fission Product Barrier Matrix and Basis

Category R – Abnormal Rad Release / 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 the 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: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 1 – Radiological Effluent

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

EAL:

RU1.1 Unusual Event

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

Note 1: The Emergency Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be 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, indicating that the release path is isolated, the effluent monitor reading is no longer VALID for classification purposes.

Table R-1 Effluent Monitor Classification Thresholds

	Release Point	Monitor	GE	SAE	Alert	UE
Gaseous	Unit 1/2/3 Plant Vent	RIA-45	----	----	----	1.41E+5 cpm
Gaseous	Unit 1/2/3 Plant Vent	RIA-46	3.00E+5 cpm	3.00E+4 cpm	3.00E+3 cpm	----
Liquid	Liquid Radwaste Discharge	RIA-33	----	----	----	4.79E+5 cpm

Mode Applicability:

All

Definition(s):

None

ONS Basis:

The column "UE" release values in Table R-1 represent two times the appropriate SLC and Technical Specification release rate and concentration limits associated with the specified monitors (ref. 1, 2, 3, 4, 5, 6).

Gaseous Releases

Instrumentation that may be used to assess this EAL: (ref. 1):

- Unit 1/2/3 Plant Vent Noble Gas Low Monitor – RIA-45(L)

Liquid Releases

Instrumentation that may be used to assess this EAL: (ref. 1):

- Liquid Radwaste Discharge Monitor – RIA-33 (batch release)

NEI 99-01 Basis:

This IC addresses a potential decrease in the level of safety of the plant as indicated by a low-level radiological release that exceeds regulatory commitments for an extended period of time (e.g., an uncontrolled release). 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~~RA1.

ONS Basis Reference(s):

1. UFSAR Section 11.5, Process and Effluent Radiological Monitoring and Sampling Systems
2. Oconee Nuclear Station Units 1, 2 and 3 Offsite Dose Calculation Manual
3. ONS-SLC 16.11.1 Radioactive Liquid Effluents
4. ONS-SLC 16.11.2 Radioactive Gaseous Effluents
5. EP-EALCALC-ONS-1401 ONS Radiological Effluent EAL Values, Rev. 0

6. Technical Specification Section 5.5.5
7. NEI 99-01 AU1

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 1 – Radiological Effluent

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

EAL:

RU1.2	**Unusual Event**
Sample analysis for a gaseous or liquid release indicates a concentration or release rate > 2 x SLC/TS limits for ≥ 60 min. (Notes 1, 2)	

Note 1: The Emergency Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be 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

ONS Basis:

None

NEI 99-01 Basis:

This IC addresses a potential decrease in the level of safety of the plant as indicated by a low-level radiological release that exceeds regulatory commitments for an extended period of time (e.g., an uncontrolled release). 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~~RA1.

ONS Basis Reference(s):

1. UFSAR Section 11.5, Process and Effluent Radiological Monitoring and Sampling Systems
2. Oconee Nuclear Station Units 1, 2 and 3 Offsite Dose Calculation Manual
3. ONS-SLC 16.11.1 Radioactive Liquid Effluents
4. ONS-SLC 16.11.2 Radioactive Gaseous Effluents
5. AD-RP-ALL-2003 Investigation of Unusual Radiological Occurrences
6. NEI 99-01 AU1

Category: R – 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:

RA1.1 Alert

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

Note 1: The Emergency Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be 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, indicating that the release path is isolated, the effluent monitor reading is no longer VALID for classification purposes.

Note 4 The pre-calculated effluent monitor values presented in EALs RA1.1, RS1.1 and RG1.1 should be used for emergency classification assessments until the results from a dose assessment using actual meteorology are available.

Table R-1 Effluent Monitor Classification Thresholds

Release Point		Monitor	GE	SAE	Alert	UE
Gaseous	Unit 1/2/3 Plant Vent	RIA-45	----	----	----	1.41E+5 cpm
Gaseous	Unit 1/2/3 Plant Vent	RIA-46	3.00E+5 cpm	3.00E+4 cpm	3.00E+3 cpm	----
Liquid	Liquid Radwaste Discharge	RIA-33	----	----	----	4.79E+5 cpm

Mode Applicability:

All

Definition(s):

None

ONS Basis:

This EAL addresses gaseous radioactivity releases, that for whatever reason, cause effluent radiation monitor readings corresponding to site boundary doses that exceed either:

- 10 mRem TEDE
- 50 mRem CDE Thyroid

The column "ALERT" gaseous effluent release values in Table R-1 correspond to calculated doses of 1% (10% of the SAE thresholds) of the EPA Protective Action Guidelines (TEDE or CDE Thyroid) (ref. 1, 2, 3, 4).

Instrumentation that may be used to assess this EAL: (ref. 1):

- Unit 1/2/3 Plant Vent Noble Gas Medium Monitor – RIA-46(M)

NEI 99-01 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~~RS1.

ONS Basis Reference(s):

1. UFSAR Section 11.5 Process and Effluent Radiological Monitoring and Sampling Systems
2. Oconee Nuclear Station Units 1, 2 and 3 Offsite Dose Calculation Manual
3. EP-EALCALC-ONS-1401 ONS Radiological Effluent EAL Values, Rev. 0
4. SDQA-70400-COM, "Unified RASCAL Interface (URI)"
5. NEI 99-01 AA1

Category: R – 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:

RA1.2	**Alert**
Dose assessment using actual meteorology indicates doses > 10 mrem TEDE or 50 mrem thyroid CDE at or beyond the SITE BOUNDARY (Notes 3, 4)	

Note 3: If the effluent flow past an effluent monitor is known to have stopped, indicating that the release path is isolated, the effluent monitor reading is no longer VALID for classification purposes.

Note 4: The pre-calculated effluent monitor values presented in EALs RA1.1, RS1.1 and RG1.1 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 - That area, including the PROTECTED AREA, in which Duke Energy has the authority to control all activities including exclusion or removal of personnel and property (1 mile radius) from the center of Unit 2.

ONS Basis:

Dose assessments are performed by computer-based methods (ref. 1, 2).

NEI 99-01 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~~RS1.

ONS Basis Reference(s):

1. RP/0/A/1000/001 Emergency Classification
2. AD-EP-ALL-0202 Emergency Response Offsite Dose Assessment
3. NEI 99-01 AA1

Category: R – 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:

RA1.3	**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 Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be 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 - That area, including the PROTECTED AREA, in which Duke Energy has the authority to control all activities including exclusion or removal of personnel and property (1 mile radius) from the center of Unit 2.

ONS Basis:

Dose assessments based on liquid releases are performed per Offsite Dose Calculation Manual (ref. 1).

NEI 99-01 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~~RS1.

ONS Basis Reference(s):

1. Oconee Nuclear Station Units 1, 2 and 3 Offsite Dose Calculation Manual
2. NEI 99-01 AA1

Category: R – 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:

RA1.4 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 Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be 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 - That area, including the PROTECTED AREA, in which DPC has the authority to control all activities including exclusion or removal of personnel and property (1 mile radius) from the center of Unit 2.

ONS Basis:

SH/0/B/2005/002 Protocol for the Field Monitoring Coordinator During Emergency Conditions provides guidance for emergency or post-accident radiological environmental monitoring (ref. 1).

NEI 99-01 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~~RS1.

ONS Basis Reference(s):

1. SH/0/B/2005/002 Protocol for the Field Monitoring Coordinator During Emergency Conditions
2. NEI 99-01 AA1

Category: R – 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:

RS1.1	**Site Area Emergency**
Reading on **any** Table R-1 effluent radiation monitor > column "SAE" for ≥ 15 min. (Notes 1, 2, 3, 4)	

Note 1: The Emergency Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be 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, indicating that the release path is isolated, the effluent monitor reading is no longer VALID for classification purposes.

Note 4: The pre-calculated effluent monitor values presented in EALs RA1.1, RS1.1 and RG1.1 should be used for emergency classification assessments until the results from a dose assessment using actual meteorology are available.

Table R-1 Effluent Monitor Classification Thresholds

Release Point		Monitor	GE	SAE	Alert	UE
Gaseous	Unit 1/2/3 Plant Vent	RIA-45	----	----	----	1.41E+5 cpm
Gaseous	Unit 1/2/3 Plant Vent	RIA-46	3.00E+5 cpm	3.00E+4 cpm	3.00E+3 cpm	----
Liquid	Liquid Radwaste Discharge	RIA-33	----	----	----	4.79E+5 cpm

Mode Applicability:

All

Definition(s):

None

ONS Basis:

This EAL addresses gaseous radioactivity releases, that for whatever reason, cause effluent radiation monitor readings corresponding to site boundary doses that exceed either:

- 100 mRem TEDE
- 500 mRem CDE Thyroid

The column "SAE" gaseous effluent release value in Table R-1 corresponds to calculated doses of 10% of the EPA Protective Action Guidelines (TEDE or CDE Thyroid) (ref. 1, 3).

Instrumentation that may be used to assess this EAL: (ref. 2):

- Unit 1/2/3 Plant Vent Noble Gas Medium Monitor – RIA-46(M)

NEI 99-01 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~~RG1.

ONS Basis Reference(s):

1. EP-EALCALC-ONS-1401 ONS Radiological Effluent EAL Values, Rev. 0
2. UFSAR Section 11.5 Process and Effluent Radiological Monitoring and Sampling Systems
3. SDQA-70400-COM, "Unified RASCAL Interface (URI)"
4. NEI 99-01 AS1

Category: R – 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:

RS1.2	**Site Area Emergency**
Dose assessment using actual meteorology indicates doses > 100 mrem TEDE or 500 mrem thyroid CDE at or beyond the SITE BOUNDARY (Notes 3, 4)	

Note 3: If the effluent flow past an effluent monitor is known to have stopped, indicating that the release path is isolated, the effluent monitor reading is no longer VALID for classification purposes.

Note 4: The pre-calculated effluent monitor values presented in EALs RA1.1, RS1.1 and RG1.1 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 - That area, including the PROTECTED AREA, in which Duke Energy has the authority to control all activities including exclusion or removal of personnel and property (1 mile radius) from the center of Unit 2.

ONS Basis:

Dose assessments are performed by computer-based methods (ref. 1, 2).

NEI 99-01 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~~RG1.

ONS Basis Reference(s):

1. RP/0/A/1000/001 Emergency Classification
2. AD-EP-ALL-0202 Emergency Response Offsite Dose Assessment
3. NEI 99-01 AS1

Category: R – 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:

RS1.3	**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 Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be 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 - That area, including the PROTECTED AREA, in which Duke Energy has the authority to control all activities including exclusion or removal of personnel and property (1 mile radius) from the center of Unit 2.

ONS Basis:

SH/0/B/2005/002 Protocol for the Field Monitoring Coordinator During Emergency Conditions provides guidance for emergency or post-accident radiological environmental monitoring (ref. 1).

NEI 99-01Basis:

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~~RG1.

ONS Basis Reference(s):

1. SH/0/B/2005/002 Protocol for the Field Monitoring Coordinator During Emergency Conditions

2. NEI 99-01 AS1

Category: R – 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:

RG1.1 General Emergency

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

Note 1: The Emergency Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be 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, indicating that the release path is isolated, the effluent monitor reading is no longer VALID for classification purposes.

Note 4: The pre-calculated effluent monitor values presented in EALs RA1.1, RS1.1 and RG1.1 should be used for emergency classification assessments until the results from a dose assessment using actual.

Table R-1 Effluent Monitor Classification Thresholds

Release Point		Monitor	GE	SAE	Alert	UE
Gaseous	Unit 1/2/3 Plant Vent	RIA-45	----	----	----	1.41E+5 cpm
Gaseous	Unit 1/2/3 Plant Vent	RIA-46	3.00E+5 cpm	3.00E+4 cpm	3.00E+3 cpm	----
Liquid	Liquid Radwaste Discharge	RIA-33	----	----	----	4.79E+5 cpm

Mode Applicability:

All

Definition(s):

None

ONS Basis:

This EAL addresses gaseous radioactivity releases, that for whatever reason, cause effluent radiation monitor readings corresponding to site boundary doses that exceed either:

- 1000 mRem TEDE
- 5000 mRem CDE Thyroid

The column "GE" gaseous effluent release values in Table R-1 correspond to calculated doses of 100% of the EPA Protective Action Guidelines (TEDE or CDE Thyroid) (ref. 1, 3).

Instrumentation that may be used to assess this EAL: (ref. 2):

- Unit 1/2/3 Plant Vent Noble Gas Medium Monitor – RIA-46(M)

NEI 99-01Basis:

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.

ONS Basis Reference(s):

1. EP-EALCALC-ONS-1401 ONS Radiological Effluent EAL Values, Rev. 0
2. UFSAR Section 11.5 Process and Effluent Radiological Monitoring and Sampling Systems
3. SDQA-70400-COM, "Unified RASCAL Interface (URI)"
4. NEI 99-01 AG1

Category: R – 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:

RG1.2	**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 (Notes 3, 4)	

Note 3: If the effluent flow past an effluent monitor is known to have stopped, indicating that the release path is isolated, the effluent monitor reading is no longer VALID for classification purposes.

Note 4: The pre-calculated effluent monitor values presented in EALs RA1.1, RS1.1 and RG1.1 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 - That area, including the PROTECTED AREA, in which Duke Energy has the authority to control all activities including exclusion or removal of personnel and property (1 mile radius) from the center of Unit 2.

ONS Basis:

Dose assessments are performed by computer-based methods (ref. 1, 2).

NEI 99-01 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.

ONS Basis Reference(s):

1. RP/0/A/1000/001 Emergency Classification
2. AD-EP-ALL-0202 Emergency Response Offsite Dose Assessment
3. NEI 99-01 AG1

Category: R – 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:

RG1.3 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 Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be 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 - That area, including the PROTECTED AREA, in which Duke Energy has the authority to control all activities including exclusion or removal of personnel and property (1 mile radius) from the center of Unit 2.

ONS Basis:

SH/0/B/2005/002 Protocol for the Field Monitoring Coordinator During Emergency Conditions provides guidance for emergency or post-accident radiological environmental monitoring (ref. 1).

NEI 99-01 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.~~

ONS Basis Reference(s):

1. SH/0/B/2005/002 Protocol for the Field Monitoring Coordinator During Emergency Conditions

2. NEI 99-01 AG1

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 2 – Irradiated Fuel Event

Initiating Condition: UNPLANNED loss of water level above irradiated fuel

EAL:

RU2.1 Unusual Event

UNPLANNED water level drop in the REFUELING PATHWAY as indicated by low water level alarm or indication

AND

UNPLANNED rise in corresponding area radiation levels as indicated by **any** of the following radiation monitors:

- RIA-3 RB Refueling Deck Shield Wall
- RIA-6 Spent Fuel Building Wall
- Portable area monitors on the main bridge or SFP bridge

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- The spent fuel pool and/or fuel transfer canal comprise the refueling pathway.

ONS Basis:

The spent fuel pool low water level alarm setpoint is actuated at -1.8 ft. below normal level (ref. 1). Water level restoration instructions are performed in accordance with Abnormal Operating Procedures (APs) (ref. 2).

The specified radiation monitors are those expected to see increase area radiation levels as a result of a loss of REFUELING PATHWAY inventory (ref. 3). Increasing radiation indications on these monitors in the absence of indications of decreasing water level are not classifiable under this EAL. Radiation levels in the Reactor Building refueling area are monitored by RIA-3. Radiation levels in the Spent Fuel Pool area are monitored RIA-6. When a fuel bridge is being used to handle fuel, radiation levels are monitored by a portable area monitor mounted on the bridge. (ref. 3, 4)

When the spent fuel pool and reactor cavity are connected, there could exist the possibility of uncovering irradiated fuel. Therefore, this EAL is applicable for conditions in which irradiated fuel is being transferred to and from the reactor vessel and spent fuel pool.

NEI 99-01 Basis:

This IC addresses a decrease 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 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 an increase 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 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~~RA2.

ONS Basis Reference(s):

1. OP/1/A/6101/009 Alarm Response Guide 1SA-09, A-5; OP/2/A/6102/009; OP/3/A/6103/009
2. AP/1-2,3/A/1700/035 Loss of SPF Cooling and/or Level
3. UFSAR Table 12-3 Area Radiation Monitors
4. OP/1,2,3/A/1502/007, Enclosure 1, Defueling/Refueling Prerequisites
5. NEI 99-01 AU2

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 2 – Irradiated Fuel Event

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

EAL:

RA2.1	**Alert**
Uncovery of irradiated fuel in the REFUELING PATHWAY	

Mode Applicability:

All

Definition(s):

REFUELING PATHWAY- The spent fuel pool and/or fuel transfer canal comprise the refueling pathway.

ONS Basis:

None.

NEI 99-01 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~~(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 or C ICs.~~

~~EAL #1~~

This EAL escalates from ~~AU2~~-RU2.1 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 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 ICs ~~AS1~~ RS1 ~~or AS2 (*see AS2 Developer Notes*)~~.

ONS Basis Reference(s):

1. AP/1-2,3/A/1700/035 Loss of SPF Cooling and/or Level
2. NEI 99-01 AA2

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 2 – Irradiated Fuel Event

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

EAL:

RA2.2 Alert

Damage to irradiated fuel resulting in a release of radioactivity

AND

HIGH alarm on **any** of the following radiation monitors:

- RIA-3 RB Refueling Deck Shield Wall
- RIA-6 Spent Fuel Building Wall
- RIA-41 Spend Fuel Pool Gas
- RIA-49 RB Gas
- Portable area monitors on the main bridge or SFP bridge

Mode Applicability:

All

Definition(s):

None

ONS Basis:

The specified radiation monitors are those expected to see increase area radiation levels as a result of damage to irradiated fuel. Radiation levels in the Reactor Building refueling area are monitored by RIA-3. Radiation levels in the Spent Fuel Pool area are monitored RIA-6. When a fuel bridge is being used to handle fuel, radiation levels are monitored by a portable area monitor mounted on the bridge. (ref. 1, 2, 3)

The HIGH alarm for RIA-3 (containment area monitor) and RIA-49 (RB gaseous process monitor) corresponds to the setpoints established to assure that 10 CFR 20 limits are not exceeded.

The HIGH alarm setpoint for RIA-6 (SFP bridge area monitor) is designed to make operators aware of increased readings above 10 CFR 20 limits. The HIGH alarm setpoint for RIA-41 (Spent Fuel Pool gaseous atmosphere) is set to alarm if 4 times the limits of 10 CFR 20 are exceeded based upon Xe-133. RIA-49 monitors the reactor building gas. Portable monitors are established during refueling outages and are located on the main bridge, and the spent fuel pool bridge.

NEI 99-01 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 ~~(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~~R 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 #3Spent 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 ICs ~~AS1~~ RS1~~or AS2 (*see AS2 Developer Notes*)~~.

ONS Basis Reference(s):

1. OP/1/A/6101/008, Alarm Response Guide 1SA-08 B-9; OP/2/A/6101/008; OP/3/A/6101/008
2. AP/1,2,3/A/1700/018, Abnormal Release of Radioactivity
3. OP/1,2,3/A/1502/007, Enclosure 1, Defueling/Refueling Prerequisites
4. NEI 99-01 AA2

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 2 – Irradiated Fuel Event

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

EAL:

RA2.3	**Alert**
Lowering of spent fuel pool level to -13.5 ft.	

Mode Applicability:

All

Definition(s):

None

ONS Basis:

This EAL is applicable once the post-Fukushima level instrumentation becomes operational on its associated unit.

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).

SFP level instruments 1/2/3SFP0010 (primary) and 011 (backup) measure SFP level relative to normal water level (El. 840 ft.) from + 1 ft. to -23.5 ft. (El. 816.4 ft).

For ONS Level 2 corresponds to an indicated water level of -13.5 ft. (El. 826.5 ft.) (ref. 1).

NEI 99-01 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 ~~(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~~ R 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 ICs ~~AS1~~ RS1~~or AS2 (*see AS2 Developer Notes*)~~.

ONS Basis Reference(s):

1. Engineering Change EC 105805 & 105806
2. NEI 99-01 AA2

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 2 – Irradiated Fuel Event

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

EAL:

RS2.1	**Site Area Emergency**
Lowering of spent fuel pool level to -23.5 ft.	

Mode Applicability:

All

Definition(s):

None

ONS Basis:

This EAL is applicable once the post-Fukushima level instrumentation becomes operational on its associated unit.

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).

SFP level instruments 1/2/3SFP0010 (primary) and 011 (backup) measure SFP level relative to normal water level (El. 840 ft.) from + 1 ft. to -23.5 ft. (El. 816.4 ft).

For ONS Level 3 corresponds to an indicated water level of -23.5 ft. (El. 816.5 ft.) (ref. 1).

NEI 99-01 Basis:

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~~RG2.

ONS Basis Reference(s):

1. Engineering Change EC 105805 & 105806
2. NEI 99-01 AS2

Category: R – 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:

RG2.1	**General Emergency**
Spent fuel pool level **cannot** be restored to at least -23 ft. for ≥ 60 min. (Note 1)	

Note 1: The Emergency Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.

Mode Applicability:

All

Definition(s):

None

ONS Basis:

This EAL is applicable once the post-Fukushima level instrumentation becomes operational on its associated unit.

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).

SFP level instruments 1/2/3SFP0010 (primary) and 011 (backup) measure SFP level relative to normal water level (El. 840 ft.) from + 1 ft. to -23.5 ft. (El. 816.4 ft).

For ONS Level 3 corresponds to an indicated water level of -23.5 ft. (El. 816.5 ft.) (ref. 1).

NEI 99-01 Basis:

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.

ONS Basis Reference(s):

1. Engineering Change EC 105805 & 105806
2. NEI 99-01 AG2

Category: R – 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:

RA3.1	**Alert**

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

- Control Room (RIA-1)
- Central Alarm Station (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).

ONS Basis:

Areas that meet this threshold include the Control Room (CR) and the Central Alarm Station (CAS). RIA-1 monitors the Control room for area radiation (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 the CAS that may be used to assess this EAL threshold. Therefore, this threshold is evaluated using local radiation survey for this area (ref. 1).

NEI 99-01 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~~Emergency Coordinator should consider the cause of the increased 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 AR, C or F ICs.

ONS Basis Reference(s):

1. UFSAR Table 12-3 Area Radiation Monitors
2. NEI 99-01 AA3

Category: R – 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:

RA3.2	**Alert**
An UNPLANNED event results in radiation levels that prohibit or IMPEDE access to **any** Table R-2 rooms or areas (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 R-2 Safe Operation & Shutdown Rooms/Areas	
Room/Area	**Mode Applicability**
Turbine Building	1, 2, 3
Equipment and Cable Rooms	1, 2, 3
Auxiliary Building	1, 2, 3, 4, 5
Reactor Buildings	3, 4, 5

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).

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.

ONS Basis:

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).

NEI 99-01 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~~Emergency Coordinator should consider the cause of the increased radiation levels and determine if another IC may be applicable.

For ~~EAL #2~~RA3.2, 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.
- 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.

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

ONS Basis Reference(s):

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

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.

A Notification of 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.

Category: ISFSI

Subcategory: Confinement Boundary

Initiating Condition: Damage to a loaded cask CONFINEMENT BOUNDARY

EAL:

EU1.1 Unusual Event

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

Table E-1 ISFSI Dose Limits			
Location	**24PHB**	**37PTH**	**69BTH**
HSM front bird screen	1,050 mrem/hr	1,050 mrem/hr	500 mrem/hr
Outside HSM door	40 mrem/hr	4 mrem/hr	4 mrem/hr
End shield wall exterior	550 mrem/hr	8 mrem/hr	8 mrem/hr

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. As related to the ONS ISFSI, Confinement Boundary is comprised of the DSC (dry shielded canister) shell, inner bottom cover plate, inner top cover plate, siphon & vent block, siphon & vent port cover plate, and the welds that join them together.

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.

ONS Basis:

The ONS ISFSI utilizes the NUHOMS System dry spent fuel storage system for dry spent fuel storage.

The Standardized NUHOMS® System is a horizontal canister system composed of a steel dry shielded canister (DSC), a reinforced concrete horizontal storage module (HSM), and a transfer cask (TC). The welded DSC provides confinement and criticality control for the storage and transfer of irradiated fuel. The concrete module provides radiation shielding while allowing cooling of the DSC and fuel by natural convection during storage (ref. 1, 2). The ONS ISFSI utilizes the 24PHB, 37PTH and 69BTH DSC designs.

Confinement boundary is defined as the barrier(s) between areas containing radioactive substances and the environment.- Therefore, damage to a confinement boundary must be a confirmed physical breach between the spent fuel and the environment for the TSC.

The Table E-1 values shown are 2 times the limits specified in the ISFSI Certificate of Compliance Technical Specifications for radiation external to the applicable loaded DSC (ref. 1, 2).

NEI 99-01 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 technical specification multiple of "2 times", which is also used in Recognition Category ~~A~~R IC R~~A~~U1, 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.

ONS Basis Reference(s):

1. USNRC Certificate of Compliance for Spent Fuel Storage Casks, No. 1004, Amendment 13, Attachment A, Technical Specifications for Transnuclear, Inc., Standardized NUHOMS Horizontal Modular Storage System
2. OSC-8716, Oconee ISFSI Dose Rate Evaluations, Rev. 0 (4/29/05)
3. NEI 99-01 E-HU1

Category C – Cold Shutdown / Refueling System Malfunction

EAL Group: Cold Conditions (RCS temperature ≤ 200°F); 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, NM – No Mode).

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 Essential AC Power

Loss of essential 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 4160V AC essential buses.

3. RCS Temperature

Uncontrolled or inadvertent temperature or pressure increases 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 125V DC vital 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 for 15 minutes or longer

EAL:

CU1.1 Unusual Event
UNPLANNED loss of reactor coolant results in RCS water level less than a required lower limit for ≥ 15 min. (Note 1)

Note 1: The Emergency Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be 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.

ONS Basis:

RCS water level less than a required lower limit is meant to be less than the lower end of the level control band being procedurally maintained for the current condition or evolution.

RCS water level instrumentation requirements to begin an RCS inventory reduction with fuel in the core to below 80" (lowered inventory) or 50" (reduced inventory) are the following (ref. 1):

- Both channels of LT-5 prior to reducing RCS inventory below 80".
- Both channels of LT-5 and both hot leg and cold leg ultrasonic monitors prior to reducing RCS inventory below 50".

NEI 99-01 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 RCS water inventory are carefully planned and controlled. An UNPLANNED event that results in water level decreasing 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.

ONS Basis Reference(s):

1. S. D. 1.3.5 Shutdown Protection Plan, Section 5.2.7
2. NEI 99-01 CU1

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 1 – RCS Level

Initiating Condition: UNPLANNED loss of RCS inventory for 15 minutes or longer

EAL:

CU1.2 Unusual Event

RCS level **cannot** be monitored

AND EITHER

- UNPLANNED increase in **any** Table C-1 sump/tank level due to loss of RCS inventory
- Visual observation of UNISOLABLE RCS leakage

Table C-1 Sumps / Tanks
• RB Normal Sumps
• RB Emergency Sumps
• Core Flood Tank
• Quench Tank
• Low Activity Waste Tank
• High Activity Waste Tank
• Miscellaneous Waste Holdup Tank
• LPI Room Sumps

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.

ONS Basis:

A RCS leak should be considered UNISOLABLE if the leak cannot be isolated within 15 min.

In Cold Shutdown mode, the RCS will normally be intact and standard RCS level monitoring means are available.

In the Refuel mode, the RCS is not intact and reactor vessel level may be monitored by different means, including the ability to monitor level visually.

In this EAL, all water level indication is unavailable and the RCS inventory loss must be detected by indirect leakage indications (Table C-1). Level increases must be evaluated

against other potential sources of leakage such as cooling water sources inside the containment to ensure they are indicative of RCS leakage. If the make-up rate to the RCS unexplainably rises above the pre-established rate, a loss of RCS inventory may be occurring even if the source of the leakage cannot be immediately identified. Visual observation of significant leakage from systems connected to the RCS that cannot be isolated could also be indicative of a loss of RCS inventory (ref. 1, 2).

NEI 99-01 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 RCS water inventory are carefully planned and controlled. An UNPLANNED event that results in water level decreasing 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 (Table C-1). 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.

ONS Basis Reference(s):

1. AP/1,2,3/A/1700/002 Excessive RCS Leakage
2. AP/1-2,3/A/1700/030 Auxiliary Building Flood
3. NEI 99-01 CU1

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 1 – RCS Level

Initiating Condition: Loss of RCS inventory

EAL:

CA1.1	**Alert**
Loss of RCS inventory as indicated by RCS level < 10" (LT-5)	

Mode Applicability:

5 - Cold Shutdown, 6 – Refueling

Definition(s):

None

ONS Basis:

RCS water level of 10" as indicated on LT-5 is the lowest level for continued operation of LPI pumps for decay heat removal (ref. 1). Two LPI pumps and two coolers normally perform the decay heat removal function for each unit (ref. 2).

The threshold was chosen because a loss of suction to decay heat removal systems may occur. The inability to restore and maintain level after reaching this setpoint infers a failure of the RCS Barrier.

NEI 99-01 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~~ #1~~, a lowering of RCS water level below 1~~01 (site-specific level) ft. 6~~0 in. 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 as the available water inventory is reduced. A continuing decrease 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~~ Decay Heat Removal suction point). An increase in ~~RCS~~ 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 RCS ~~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.

ONS Basis Reference(s):

1. AP/1,2,3/A/1700/026 Loss of Decay Heat Removal
2. UFSAR Section 9.3.3 Low Pressure Injection System
3. NEI 99-01 CA1

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 1 – RCS Level

Initiating Condition: Loss of RCS inventory

EAL:

CA1.2 Alert

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

AND EITHER

- UNPLANNED increase in **any** Table C-1 Sump / Tank level due to a loss of RCS inventory
- Visual observation of UNISOLABLE RCS leakage

Note 1: The Emergency Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.

Table C-1 Sumps / Tanks
• RB Normal Sumps
• RB Emergency Sumps
• Core Flood Tank
• Quench Tank
• Low Activity Waste Tank
• High Activity Waste Tank
• Miscellaneous Waste Holdup Tank
• LPI Room Sumps

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.

ONS Basis:

A RCS leak should be considered UNISOLABLE if the leak cannot be isolated within 15 minutes.

In Cold Shutdown mode, the RCS will normally be intact and standard RCS level monitoring means are available.

In the Refuel mode, the RCS is not intact and RCS level may be monitored by different means, including the ability to monitor level visually.

In this EAL, all RCS water level indication would be unavailable for greater than 15 minutes, and the RCS inventory loss must be detected by indirect leakage indications (Table C-1). Level increases must be evaluated against other potential sources of leakage such as cooling water sources inside the containment to ensure they are indicative of RCS leakage. If the make-up rate to the RCS unexplainably rises above the pre-established rate, a loss of RCS inventory may be occurring even if the source of the leakage cannot be immediately identified. Visual observation of significant leakage from systems connected to the RCS that cannot be isolated could also be indicative of a loss of RCS inventory (ref. 1, 2).

NEI 99-01 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 RCS ~~(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 level continues to lower, then escalation to Site Area Emergency would be via IC CS1.

ONS Basis Reference(s):

1. AP/1,2,3/A/1700/002 Excessive RCS Leakage
2. AP/1-2,3/A/1700/030 Auxiliary Building Flood
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

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

AND

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

- UNPLANNED increase in **any** Table C-1 sump/tank level
- Visual observation of UNISOLABLE RCS leakage
- High alarm on RIA-3 RB Refueling Deck Shield Wall
- Erratic Source Range Monitor Indication

Note 1: The Emergency Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.

Table C-1 Sumps / Tanks
• RB Normal Sumps
• RB Emergency Sumps
• Core Flood Tank
• Quench Tank
• Low Activity Waste Tank
• High Activity Waste Tank
• Miscellaneous Waste Holdup Tank
• LPI Room Sumps

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.

ONS Basis:

A RCS leak should be considered UNISOLABLE if the leak cannot be isolated within 15 minutes.

In Cold Shutdown mode, the RCS will normally be intact and standard RCS level monitoring means are available.

In the Refueling mode, the RCS is not intact and RCS level may be monitored by different means, including the ability to monitor level visually.

In this EAL, all RCS water level indication would be unavailable for greater than 30 minutes, and the RCS inventory loss must be detected by indirect leakage indications (Table C-1). Level increases must be evaluated against other potential sources of leakage such as cooling water sources inside the containment to ensure they are indicative of RCS leakage. If the make-up rate to the RCS unexplainably rises above the pre-established rate, a loss of RCS inventory may be occurring even if the source of the leakage cannot be immediately identified. Visual observation of significant leakage from systems connected to the RCS that cannot be isolated could also be indicative of a loss of RCS inventory (ref. 1, 2).

Sump or tank level increases should be of a magnitude that correlates to a volume sufficient to indicate fuel has been uncovered or uncovery is imminent.

The Reactor Vessel inventory loss may be detected by a reduction in water shielding that causes a high alarm on the Refueling Deck Shield Wall area radiation monitor (ref. 3).

Post-TMI accident studies indicated that the installed PWR nuclear instrumentation will operate erratically when the core is uncovered and that this should be used as a tool for making such determinations (ref. 4, 5, 6).

NEI 99-01 Basis:

This IC addresses a significant and prolonged loss of ~~(~~reactor vessel/~~RCS~~ RCS ~~[PWR] or RPV [BWR])~~ inventory control and makeup capability leading to IMMINENT fuel damage. The lost inventory may be due to a 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~~RCS 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 RCS ~~(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 RCS~~(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.

Escalation of the emergency classification level would be via IC CG1 or ~~AG1~~RG1.

ONS Basis Reference(s):

1. AP/1,2,3/A/1700/002 Excessive RCS Leakage
2. AP/1-2,3/A/1700/030 Auxiliary Building Flood
3. UFSAR Table 12-3 Area Radiation Monitors
4. UFSAR Section 7.4.1 Nuclear Instrumentation
5. OP/1,2,3/A/5102/002 Alarm Response Guide 1,2,3SA-02, A-6
6. Nuclear Safety Analysis Center (NSAC), 1980, "Analysis of Three Mile Island - Unit 2 Accident," NSAC-1
7. 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

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

AND

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

- UNPLANNED increase in **any** Table C-1 sump/tank level due to a loss of RCS inventory
- Visual observation of UNISOLABLE RCS leakage
- High alarm on RIA-3 RB Refueling Deck Shield Wall
- Erratic Source Range Monitor Indication

AND

Any Containment Challenge indication, Table C-2

Note 1: The Emergency Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be 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 Sumps / Tanks
• RB Normal Sumps
• RB Emergency Sumps
• Core Flood Tank
• Quench Tank
• Low Activity Waste Tank
• High Activity Waste Tank
• Miscellaneous Waste Holdup Tank
• LPI Room Sumps

Table C-2 **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 action to secure containment and its associated structures, systems, and components as a functional barrier to fission product release under all plant conditions up to and including a loss of decay heat removal or fuel handling accident inside containment.

As applied to ONS, Containment Closure is established when the requirements of OP/1,2,3/A/1502/009, Containment Closure Control, are met.

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.

ONS Basis:

A RCS leak should be considered UNISOLABLE if the leak cannot be isolated within 15 minutes.

In Cold Shutdown mode, the RCS will normally be intact and standard RCS level monitoring means are available.

In the Refueling mode, the RCS is not intact and RCS level may be monitored by different means, including the ability to monitor level visually.

In this EAL, all RCS water level indication would be unavailable for greater than 30 minutes, and the RCS inventory loss must be detected by indirect leakage indications (Table C-1). Level increases must be evaluated against other potential sources of leakage such as cooling water sources inside the containment to ensure they are indicative of RCS leakage. If the make-up rate to the RCS unexplainably rises above the pre-established rate, a loss of RCS inventory may be occurring even if the source of the leakage cannot be immediately identified. Visual observation of significant leakage from systems connected to the RCS that cannot be isolated could also be indicative of a loss of RCS inventory (ref. 1, 2).

Sump or tank level increases should be of a magnitude that correlates to a volume sufficient to indicate fuel has been uncovered or uncovery is imminent.

The Reactor Vessel inventory loss may be detected by a reduction in water shielding that causes a high alarm on the Refueling Deck Shield Wall area radiation monitor (ref. 3).

Post-TMI accident studies indicated that the installed PWR nuclear instrumentation will operate erratically when the core is uncovered and that this should be used as a tool for making such determinations (ref. 4, 5, 6).

Three conditions are associated with a challenge to Containment integrity:

1. CONTAINMENT CLOSURE not established - The status of containment closure is tracked if plant conditions change that could raise the risk of a fission product release as a result of a loss of decay heat removal (ref. 7). If containment closure is re-established prior to exceeding the 30 minute core uncovery time limit then escalation to GE would not occur.
2. Containment hydrogen ≥ 4% - The 4% hydrogen concentration threshold is generally considered the lower limit for hydrogen combustion. ONS is equipped with a Containment Hydrogen Monitoring System (CHMS) that provides continuous indication of hydrogen concentration in the containment atmosphere. The measurement capability is provided over the range of 0% to 10%. A continuous indication of the hydrogen concentration is not required in the control room at all times during normal operation. If continuous indication of the hydrogen concentration is not available at all times, continuous indication and recording shall be functioning within 90 minutes of the initiation of the safety injection. (ref. 8, 9)
3. UNPLANNED rise in containment pressure - An unplanned pressure rise in containment while in cold shutdown or refueling modes can threaten Containment Closure capability and thus containment potentially cannot be relied upon as a barrier to fission product release.

NEI 99-01 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 ~~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*])~~.

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*.

ONS Basis Reference(s):

1. AP/1,2,3/A/1700/002 Excessive RCS Leakage
2. AP/1-2,3/A/1700/030 Auxiliary Building Flood
3. UFSAR Table 12-3 Area Radiation Monitors
4. UFSAR Section 7.4.1 Nuclear Instrumentation
5. OP/1/A/6101/002; OP/2/A/6102/002; OP/3/A/6103/002 Alarm Response Guide 1,2,3SA-02, A-6
6. Nuclear Safety Analysis Center (NSAC), 1980, "Analysis of Three Mile Island - Unit 2 Accident," NSAC-1
7. OP/1,2,3/A/1502/009 Containment Closure Control
8. UFSAR Section 9.3.7 Containment Hydrogen Monitoring System
9. UFSAR Section 15.16.3 Evaluation of Hydrogen Concentrations
10. NEI 99-01 CG1

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 2 – Loss of Essential AC Power

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

EAL:

CU2.1	**Unusual Event**

AC power capability, Table C-3, to essential 4160 V buses MFB-1 and MFB-2 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 Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.

Table C-3 AC Power Sources
Offsite:
• Unit Normal Transformer (backcharged)
• Unit Startup Transformer (SWYD)
• Another Unit Startup Transformer (aligned) (SWYD)
• CT5 (Central/energizing Standby Bus)
Emergency:
• Unit Startup Transformer (Keowee)
• Another Unit Startup Transformer (aligned) (Keowee)
• CT4
• CT5 (dedicated line/energizing Standby Bus)

Mode Applicability:

5 - Cold Shutdown, 6 – Refueling, NM – No Mode

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.

ONS Basis:

For emergency classification purposes, "capability" means that an AC power source is available to and capable of powering the emergency bus(es) within 15 min, whether or not the buses are currently powered from it.

The condition indicated by this EAL is the degradation of the offsite and onsite power sources such that any additional single failure would result in a loss of all AC power to the emergency buses. 4160 V buses MFB-1 and MFB-2 are the essential buses (ref. 1).

Each unit is provided with two physically independent circuits from the switching station. One is the circuit from the 230 kV switching station through the startup transformer, which is designed to be available within a few seconds following a loss of coolant accident. The second circuit is the path from the switchyard through the main step-up transformer, the main generator bus and the unit auxiliary transformer with the generator disconnected from the main bus. The second circuit is currently used during refueling as an additional power feed for the shutdown unit(s) from the 230 kV switchyard. Whenever there is inadequate power from the generating units, the 230 kV switching station and the hydro units, power is available to the standby power buses either directly from the 100 kV Central Tie Substation or from Lee Steam Station via a Transformer CT5 (ref. 2).

Upon loss of power from the Oconee generating unit and 230 kV switchyard, power is supplied from both Keowee Hydro Station units through two separate and independent routes. One route is an underground feeder to Transformer CT4 which supplies the two redundant Main Feeder Buses (MFB-1 and MFB-2). The other route is an overhead feeder to the 230 KV switching station which supplies each unit startup transformer (ref. 3).

The Standby Shutdown Facility (SSF) consists of standby systems for use in an extreme emergency and is equipped with a manually started diesel generator that can supply power necessary to maintain hot shutdown of the reactors of each unit in the event of loss of power. However, the SSF cannot supply power to the essential buses and therefore not credited in this EAL (ref. 3).

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

NEI 99-01 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~~ no mode, this condition is not classified as an Alert because of the increased 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 A~~O~~Ps and EOPs, and capable of supplying required power to an essential bus. Some examples of this condition are presented below.

- A loss of all offsite power with a concurrent failure of all but one ~~emergency~~ essential power source ~~(e.g., an onsite diesel generator)~~ (e.g., CT4, CT5, CT1 (Keowee).
- ~~A loss of all offsite power and loss of all emergency power sources (e.g., onsite diesel generators) with a single train of emergency buses being back-fed from the unit main generator.~~
- A loss of ~~emergency~~ essential power sources ~~(e.g., onsite diesel generators)~~ (e.g., CT4, CT5, CT1, 2, 3 (Keowee)) with a single train of ~~emergency~~ essential buses being back-fed from an offsite power source.

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.

ONS Basis Reference(s):

1. UFSAR Figure 8.1 Single Line Diagram
2. UFSAR Section 8.2 Offsite Power System
3. UFSAR Section 8.3 Onsite Power Systems
4. NEI 99-01 CU2

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 2 – Loss of Essential AC Power

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

EAL:

CA2.1 Alert

Loss of **all** offsite and **all** emergency AC power capability, Table C-3, to essential 4160 V buses MFB-1 and MFB-2 for ≥ 15 min. (Note 1)

Note 1: The Emergency Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.

Table C-3 AC Power Sources
Offsite:
• Unit Normal Transformer (backcharged)
• Unit Startup Transformer (SWYD)
• Another Unit Startup Transformer (aligned) (SWYD)
• CT5 (Central/energizing Standby Bus)
Emergency:
• Unit Startup Transformer (Keowee)
• Another Unit Startup Transformer (aligned) (Keowee)
• CT4
• CT5 (dedicated line/energizing Standby Bus)

Mode Applicability:

5 - Cold Shutdown, 6 - Refueling, NM – No Mode

ONS Basis:

For emergency classification purposes, "capability" means that an AC power source is available to and capable of powering the emergency bus(es) within 15 min, whether or not the buses are currently powered from it.

The condition indicated by this EAL is the degradation of the offsite and onsite power sources resulting in a loss of all AC power to the emergency buses. 4160 V buses MFB-1 and MFB-2 are the essential buses (ref. 1).

Each unit is provided with two physically independent circuits from the switching station. One is the circuit from the 230 kV switching station through the startup transformer, which is designed to be available within a few seconds following a loss of coolant accident. The second circuit is the path from the switchyard through the main step-up transformer, the main generator bus and the unit auxiliary transformer with the generator disconnected from the main bus. The second circuit is currently used during refueling as an additional power feed for the shutdown unit(s) from the 230 kV switchyard. Whenever there is inadequate power from the generating

units, the 230 kV switching station and the hydro units, power is available to the standby power buses either directly from the 100 kV Central Tie Substation or from Lee Steam Station via a Transformer CT5. (ref. 2)

Upon loss of power from the Oconee generating unit and 230 kV switchyard, power is supplied from both Keowee Hydro Station units through two separate and independent routes. One route is an underground feeder to Transformer CT4 which supplies the two redundant Main Feeder Buses (MFB-1 and MFB-2). The other route is an overhead feeder to the 230 KV switching station which supplies each unit startup transformer. (ref. 3)

The Standby Shutdown Facility (SSF) consists of standby systems for use in an extreme emergency and is equipped with a manually started diesel generator that can supply power necessary to maintain hot shutdown of the reactors of each unit in the event of loss of power. However, the SSF cannot supply power to the essential buses and therefore not credited in this EAL (ref. 3).

This cold condition EAL is equivalent to the hot condition loss of all offsite AC power EAL SS1.1.

NEI 99-01 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.

When in the cold shutdown, refueling, or ~~defueled~~ no mode, this condition is not classified as a Site Area Emergency because of the increased time available to restore an 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~~RS1.

ONS Basis Reference(s):

1. UFSAR Figure 8.1 Single Line Diagram
2. UFSAR Section 8.2 Offsite Power System
3. UFSAR Section 8.3 Onsite Power Systems
4. NEI 99-01 CA2

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 3 – RCS Temperature

Initiating Condition: UNPLANNED increase in RCS temperature

EAL:

CU3.1	**Unusual Event**
UNPLANNED increase in RCS temperature to > 200°F due to loss of decay heat removal capability	

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.

ONS Basis:

Several instruments are capable of providing indication of RCS temperature with respect to the Technical Specification cold shutdown temperature limit (200°F, ref. 1). These include cold leg (T_c) temperature indications, hot leg (T_h) temperature indications with RCPs running, CETCs and LPI cooler outlet temperature indications (ref. 2).

However, if Low Pressure Injection (LPI) flow is lost, the normal temperature elements used to monitor RCS temperature are not accurate indicators of RCS temperature. The CETCs are the design instruments for these conditions. For some periods of time the CETCs may not be available. The current practices concerning determining time to boil can be used in the evaluation of these EALs. Without CETC indication and with a loss of LPI flow the following guidance should be used (ref. 2):

- Use the predetermined "time to boil" data for evaluating these EALs. This approach reflects the relatively small numerical difference between the typical Technical Specification cold shutdown temperature limit of 200°F and the boiling temperature of RCS water with the plant in Mode 5 or 6.
- Alternately, the Control Room staff may use a procedure or user aid to determine when RCS temperature will likely exceed 200°F given the actual plant conditions (e.g., using a heat-up curve).

NEI 99-01 Basis:

This IC 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~~ RCS is not intact and CONTAINMENT CLOSURE is not established during this event, the ~~Emergency Director~~Emergency Coordinator should also refer to IC CA3.

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~~ 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 inventory may result in a rapid increase 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.

ONS Basis Reference(s):

1. ONS Technical Specifications Table 1.1-1
2. AP/1,2,3/A/1700/026 Loss of Decay Heat Removal
3. NEI 99-01 CU3

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 3 – RCS Temperature

Initiating Condition: UNPLANNED increase 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 Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.

Mode Applicability:

5 - Cold Shutdown, 6- Refueling

Definition(s):

None

ONS Basis:

Several instruments are capable of providing indication of RCS temperature with respect to the Technical Specification cold shutdown temperature limit (200°F, ref. 1). These include cold leg (T_c) temperature indications, hot leg (T_h) temperature indications with RCPs running, CETCs and LPI cooler outlet temperature indications (ref. 2).

Several instruments are capable of providing indication of RCS level including pressurizer level, RVLIS, LT-5 and local monitor (ref. 3).

NEI 99-01 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~~Emergency Coordinator should also refer to IC CA3.

~~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.

ONS Basis Reference(s):

1. ONS Technical Specifications Table 1.1-1
2. AP/1,2,3/A/1700/026 Loss of Decay Heat Removal
3. UFSAR Section 7.5.2.2 Inadequate Core Cooling Instruments
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 increase in RCS temperature to > 200°F for > Table C-4 duration (Note 1)

OR

UNPLANNED RCS pressure increase > 10 psig due to a loss of RCS cooling (this EAL does not apply during water-solid plant conditions)

Note 1: The Emergency Coordinator should declare the event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.

Table C-4: RCS Heat-up Duration Thresholds

RCS Status	CONTAINMENT CLOSURE Status	Heat-up Duration
Intact (but **not** REDUCED INVENTORY)	N/A	60 min.*
Not intact **OR** REDUCED 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.

Mode Applicability:

5 - Cold Shutdown, 6 – Refueling

Definition(s):

CONTAINMENT CLOSURE - The action to secure containment and its associated structures, systems, and components as a functional barrier to fission product release under all plant conditions up to and including a loss of decay heat removal or fuel handling accident inside containment.

As applied to ONS, Containment Closure is established when the requirements of OP/1,2,3/A/1502/009, Containment Closure Control, are met.

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.

REDUCED INVENTORY - Condition with fuel in the reactor vessel and the level lower than three feet below the reactor vessel flange (RCS level < 50" on LT-5)

ONS Basis:

Several instruments are capable of providing indication of RCS temperature with respect to the Technical Specification cold shutdown temperature limit (200°F, ref. 1). These include cold leg (T_c) temperature indications, hot leg (T_h) temperature indications with RCPs running, CETCs and LPI cooler outlet temperature indications (ref. 2).

However, if Low Pressure Injection (LPI) flow is lost, the normal temperature elements used to monitor RCS temperature are not accurate indicators of RCS temperature. The CETCs are the design instruments for these conditions. For some periods of time the CETCs may not be available. The current practices concerning determining time to boil can be used in the evaluation of these EALs. Without CETC indication and with a loss of LPI flow the following guidance should be used (ref. 2):

- Use the predetermined "time to boil" data for evaluating these EALs. This approach reflects the relatively small numerical difference between the typical Technical Specification cold shutdown temperature limit of 200°F and the boiling temperature of RCS water with the plant in Mode 5 or 6.
- Alternately, the Control Room staff may use a procedure or user aid to determine when RCS temperature will likely exceed 200°F given the actual plant conditions (e.g., using a heat-up curve).

Numerous RCS pressure instruments are capable of measuring pressure to less than 10 psia including RCS low range cooldown pressure indicators RC-P-0086A/B (ref. 3).

NEI 99-01 Basis:

This IC 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 an increase in RCS temperature when CONTAINMENT CLOSURE is established but the RCS is not intact, or RCS inventory is reduced (e.g., mid-loop operation~~ in PWRs~~). The 20-minute criterion was included to allow time for operator action to address the temperature increase.

The RCS Heat-up Duration Thresholds table also addresses an increase 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 without a substantial degradation in plant safety.

Finally, in the case where there is an increase in RCS temperature, the RCS is not intact or is at reduced 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 increase 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~~RS1.

ONS Basis Reference(s):

1. ONS Technical Specifications Table 1.1-1
2. AP/1,2,3/A/1700/026 Loss of Decay Heat Removal
3. IP/1,2,3/A/0200/047A Reactor Coolant System LTOP Instrument Calibration
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 < 105VDC on vital DC buses **required** by Technical Specifications for ≥ 15 min. (Note 1)	

Note 1: The Emergency Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.

Mode Applicability:

5 - Cold Shutdown, 6 - Refueling

Definition(s):

None

ONS Basis:

The purpose of this EAL is to recognize a loss of DC power compromising the ability to monitor and control the removal of decay heat during cold shutdown or refueling operations. This EAL is intended to be anticipatory in as much as the operating crew may not have necessary indication and control of equipment needed to respond to the loss. The fifteen minute interval is intended to exclude transient or momentary power losses.

For each unit, two independent and physically separated 125 volt DC batteries and DC buses are provided for the vital instrumentation and control power system. (ref. 1, 2). Minimum DC bus voltage is 110 VDC (ref. 3).

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

NEI 99-01 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 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 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 AR.

ONS Basis Reference(s):

1. UFSAR Figure 8.5 Typical DC and AC Vital Power System - Single Line
2. UFSAR Section 8.3.2 DC Power Systems
3. EP/*/A/1800/001 Blackout Tab
4. Technical Specifications 3.8.4 DC 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-5 onsite communication methods

OR

Loss of **all** Table C-5 offsite communication methods

OR

Loss of **all** Table C-5 NRC communication methods

Table C-5 Communication Methods			
System	**Onsite**	**Offsite**	**NRC**
Commercial phone service	X	X	X
ONS site phone system	X	X	X
EOF phone system	X	X	X
Public Address system	X		
Onsite radio system	X		
DEMNET		X	
Offsite radio system		X	
NRC Emergency Telephone System			X
Satellite Phone	X	X	X

Mode Applicability:

5 - Cold Shutdown, 6 - Refueling, NM – No Mode

Definition(s):

None

ONS Basis:

Onsite, offsite and NRC communications include one or more of the systems listed in Table C-5 (ref. 1).

1. Commercial phone service

   The Commercial phone service does not go through the site telephone system.

2. ONS site phone system

   The site phone system is generator and battery backed with:

   - Fiber-Optic to Charlotte GO (65 lines)
   - Telephone line to Easley (6 circuits)
   - Anderson (4 lines)
   - Six Mile (4 lines)
   - Site Telephone System: Inward and outward direct dial available from the Control Room, TSC, and OSC

3. EOF phone system

   The emergency communications systems at the Charlotte EOF are designed to ensure the reliable, timely flow of information between all parties having an emergency response role.

4. Public Address (Paging) system

   The paging system provides paging and party line communications between stations located throughout the plant. Inside and outside type wall and desk-mounted stations are used to communicate between roaming personnel and fixed work locations. Plant-wide instructions are issued using the paging feature.

5. Onsite radio system

   The onsite radio system receives emergency backup power from Keowee Hydro Units supporting communications with: Control Room 1&2, 3, Fire Brigade, Chemistry, Safety, Radiation Protection, Maintenance, Medical Emergency Response Team, and Hazardous Materials Response Team.

6. DEMNET

   DEMNET is the primary means of offsite communication. This circuit allows intercommunication among the EOF, TSC, control room, counties, and states. DEMNET operates as an internet based (VoIP) communications system with a satellite back-up. Should the internet transfer rate become slow or unavailable, the DEMNET will automatically transfer to satellite mode.

7. Offsite radio system

   The offsite radio system is battery backed supporting communications with: Control Room Units 1&2, TSC, Field Monitoring Teams, EOF, counties and State of South Carolina.

8. NRC Emergency Telephone System (ETS)

   The NRC uses a Duke Energy dedicated telephone line which allows direct telephone communications from the plant to NRC regional and national offices. The Duke Energy communications line provides a link independent of the local public telephone network. Telephones connected to this network are located in the Oconee Control Rooms, Technical Support Center, and Emergency Operations Facility and can be used to establish NRC Emergency Notification System (ENS) and Health Physics Network (HPN) capability.

9. Satellite Phone

   Satellite Phones can be used for both internal and external communications

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

NEI 99-01 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 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 of an emergency declaration. The OROs referred to here are~~ (see Developer Notes)~~ the State EOC and FEO, Pickens County ~~EOCs~~LEC and EOC, and Oconee County LEC and EOC.~~,~~

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

ONS Basis Reference(s):

1. ONS Emergency Plan, Section 7.2 Communications Systems
2. NEI 99-01 CU5

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 6 – Hazardous Event Affecting Safety Systems

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

EAL:

CA6.1 Alert

The occurrence of **any** Table C-6 hazardous event

AND EITHER:

- Event damage has caused indications of degraded performance in at least one train of a SAFETY SYSTEM needed for the current operating mode
- The event has caused VISIBLE DAMAGE to a SAFETY SYSTEM component or structure needed for the current operating mode

Table C-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

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 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.

ONS Basis:

- The significance of seismic events are discussed under EAL HU2.1 (ref. 1).
- Internal FLOODING may be caused by events such as component failures, equipment misalignment, or outage activity mishaps.
- External flooding at ONS is highly unlikely since the probable maximum flood (PMF) would be contained by the Keowee Reservoir. Plant grade elevation is 796.0 ft MSL. The minimum external access elevation for the Auxiliary, Turbine, and Service Buildings is 796.5 ft MSL which provides a 6 inch water sill. (ref. 2)
- High winds in excess of design (95 mph) or tornado strikes can cause significant structural damage (ref. 3).
- Areas containing functions and systems required for safe shutdown of the plant are identified by fire area (ref. 4, 5).
- An explosion that degrades the performance of a SAFETY SYSTEM train or visibly damages a SAFETY SYSTEM component or structure would be classified under this EAL.

NEI 99-01 Basis:

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~~The first conditional 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~~The second conditional 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~~RS1.

ONS Basis Reference(s):

1. AP/0/A/1700/005 Earthquake
2. UFSAR Section 3.4.1.1 Flood Protection Measures for Seismic Class 1 Structures
3. UFSAR Section 3.3.1.1 Design Wind Velocity
4. OSS-0254.00-00-4008 Design Bases Specification for Fire Protection
5. AP/1,2,3/A/1700/050 Challenging Plant Fire
6. NEI 99-01 CA6

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 Technology 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 Coordinator 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 Coordinator the latitude to classify emergency conditions consistent with the established classification criteria based upon Emergency Coordinator 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 the Security Shift Supervision

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):

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.

HOSTILE ACTION - An act toward ONS 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 ONS. Non-terrorism-based EALs should be used to address such activities (i.e., this may include violent acts between individuals in the owner controlled area).

ONS Basis:

This EAL is based on the Duke Energy Physical Security Plan for ONS (ref. 1).

NEI 99-01 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, 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 Supervision because these are the individuals 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 Duke Energy Physical Security Plan for ONS.

~~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 AP/0/A/1700/045 Site Security Threats (ref. 2)~~(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 Duke Energy Physical Security Plan for ONS (ref. 1).

Escalation of the emergency classification level would be via IC HA1.

ONS Basis Reference(s):

1. Duke Energy Physical Security Plan for ONS
2. AP/0/A/1700/045 Site Security Threats
3. NEI 99-01 HU1

Category: H – Hazards

Subcategory: 1 – Security

Initiating Condition: Hostile action within the OWNER CONTROLLED AREA or airborne attack threat within 30 minutes

EAL:

HA1.1	**Alert**
A HOSTILE ACTION is occurring or has occurred within the OWNER CONTROLLED AREA as reported by the Security Shift Supervision	
OR	
A validated notification from NRC of an aircraft attack threat within 30 min. of the site	

Mode Applicability:

All

Definition(s):

HOSTILE ACTION - An act toward ONS 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 ONS. Non-terrorism-based EALs should be used to address such activities (i.e., this may include violent acts between individuals in the owner controlled area).

OWNER CONTROLLED AREA - Area outside the PROTECTED AREA fence that immediately surrounds the plant. Access to this area is generally restricted to those entering on official business.

ONS Basis:

None

NEI 99-01 Basis:

This IC addresses the occurrence of a HOSTILE ACTION within the 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 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 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 AP/0/A/1700/045 Site Security Threats (ref. 2). ~~(site-specific proced~~

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 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 Duke Energy Physical Security Plan for ONS (ref. 1).

Escalation of the emergency classification level would be via IC HS1.

ONS Basis Reference(s):

1. Duke Energy Physical Security Plan for ONS
2. AP/0/A/1700/045 Site Security Threats
3. 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 the Security Shift Supervision

Mode Applicability:

All

Definition(s):

HOSTILE ACTION - An act toward ONS 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 ONS. Non-terrorism-based EALs should be used to address such activities (i.e., this may include violent acts between individuals in the owner controlled area).

PROTECTED AREA - That part of the nuclear station property consisting of the Reactor, Auxiliary, Turbine, and Service Building and grounds, contained within the owner controlled security fence.

ONS Basis:

The Security Shift Supervision are the designated on-site personnel qualified and trained to confirm that a security event is occurring or has occurred. Training on security event classification confirmation is closely controlled due to the strict secrecy controls placed on the Duke Energy Physical Security Contingency Plan for ONS (Safeguards) information. (ref. 1)

NEI 99-01 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 (ref. 1, 2).

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 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 Duke Energy Physical Security Plan for ONS (ref. 1).

Escalation of the emergency classification level would be via IC HG1.

ONS Basis Reference(s):

1. Duke Energy Physical Security Plan for ONS
2. AP/0/A/1700/045 Site Security Threats
3. NEI 99-01 HS1

Category: H – Hazards

Subcategory: 1 – Security

Initiating Condition: Hostile Action resulting in loss of physical control of the facility

EAL:

HG1.1 General Emergency

A HOSTILE ACTION is occurring or has occurred within the PROTECTED AREA as reported by the Security Shift Supervision

AND EITHER of the following has occurred:

Any of the following safety functions cannot be controlled or maintained

- Reactivity
- Core cooling
- RCS heat removal

OR

Damage to spent fuel has occurred or is IMMINENT

Mode Applicability:

All

Definition(s):

HOSTILE ACTION - An act toward ONS 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 ONS. Non-terrorism-based EALs should be used to address such activities (i.e., this may include violent acts between individuals in the owner controlled area).

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

PROTECTED AREA - That part of the nuclear station property consisting of the Reactor, Auxiliary, Turbine, and Service Building and grounds, contained within the owner controlled security fence.

ONS Basis:

Indications of damaged spent fuel are provided in AP/1,2,3/A/1700/009 Spent Fuel Damage (ref. 4).

NEI 99-01 Basis:

This IC addresses an event in which a HOSTILE FORCE has taken physical control of the facility to the extent that the plant staff can no longer operate equipment necessary to maintain key safety functions. It also addresses a HOSTILE ACTION leading to a loss of physical

control that results in actual or IMMINENT damage to spent fuel due to 1) damage to a spent fuel pool cooling system (e.g., pumps, heat exchangers, controls, etc.) or, 2) loss of spent fuel pool integrity such that sufficient water level cannot be maintained.

Timely and accurate communications between the Security Shift Supervision and the Control Room is essential for proper classification of a security-related event (ref. 2, 3).

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]*.

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 Duke Energy Physical Security Plan for ONS (ref.1).

ONS Basis Reference(s):

1. Duke Energy Physical Security Plan for ONS
2. AP/0/A/1700/045 Site Security Threats
3. AP/0/A/1700/046 Extensive Damage Mitigation
4. AP/1,2,3/A/1700/009 Spent Fuel Damage
5. NEI 99-01 HG1

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 2 – Seismic Event

Initiating Condition: Seismic event greater than DBE levels

EAL:

HU2.1 Unusual Event

Seismic event > DBE as indicated by **EITHER** of the following:

- 1SA-9/E-1 (SEISMIC TRIGGER) alarm
- 3SA-9/E-1 (SEISMIC TRIGGER) alarm

Mode Applicability:

All

Definition(s):

None

ONS Basis:

This EAL is based on a VALID receipt of either of the specified seismic trigger alarms. In addition, exceedance of Operating Basis Earthquake ground acceleration can also be determined by either of the following assessments (ref. 2):

- Strong Motion Accelerometer Recorder tape analysis ≥ 0.05g
- Tendon Gallery Peak Acceleration Recorder results per AM/1/A/0125/002A ≥ 0.05g

However, the above assessments cannot be completed within 15 minutes of the seismic event.

The design basis earthquake ground acceleration at the site is 0.05g. The maximum hypothetical earthquake ground acceleration is 0.10g and 0.15g for Class 1 structures founded on bedrock and overburden respectively. For ONS, the Operating Basis Earthquake (OBE) is equivalent to the Design Basis Earthquake (DBE). (ref. 1)

If an earthquake of ≥ 0.05 g has occurred on site, all units are required to be shut down to Mode 5 once a plant damage assessment is complete along with the completion of any needed repairs to support the units ability to achieve safe shutdown. (ref. 2)

Earthquake instrumentation is the SMA-3 system consisting of a central recording system, control panel, one TS-3 triaxial seismic trigger package, and two force-balance triaxial accelerometer packages. The seismic trigger and one accelerometer of the SMA-3 system are located in the Unit 1 Tendon Gallery. Also, a second accelerometer is located directly above at elevation 797' +6" in the Oconee 1 Reactor Building. The recorder for the system is located in the Unit 1 Cable Room. Also, a seismic trigger/switch is located in the Unit 1 tendon gallery. The TS-3 has a preset acceleration threshold of 0.05g which activates the statalarm in Units 1 and 3 control rooms, when design conditions occur. (ref. 3)

To avoid inappropriate emergency classification resulting from spurious actuation of the seismic instrumentation or felt motion not attributable to seismic activity, an offsite agency (USGS, National Earthquake Information Center (NEIC)) 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. The NEIC can be contacted by calling **(303) 273-8500** (ref. 2). Select **option #1** and inform the analyst you wish to confirm recent seismic activity in the vicinity of ONS. If requested, provide the analyst with the following ONS coordinates: **34° 47' 38.2" north latitude, 82° 53' 55.4" west longitude** (ref. 4). Alternatively, near real-time seismic activity can be accessed via the NEIC website:

http://earthquake.usgs.gov/eqcenter/

NEI 99-01 Basis:

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~~ Coordinator may seek external verification if deemed appropriate (e.g., a call to the 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.

ONS Basis Reference(s):

1. UFSAR Section 3.2.1.3 Seismic Loading Conditions
2. AP/0/A/1700/005 Earthquake
3. UFSAR Section 3.7.4 Seismic Instrumentation Program
4. UFSAR Section 2.1.1.1 Specification of Location
5. 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 - That part of the nuclear station property consisting of the Reactor, Auxiliary, Turbine, and Service Building and grounds, contained within the owner controlled security fence.

ONS Basis:

Response actions associated with a tornado onsite is provided in AP/0/A/1700/006, Natural Disaster (ref. 1).

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.

NEI 99-01 Basis:

This IC addresses hazardous events that are considered to represent a potential degradation of the level of safety of the plant.

~~EAL #1~~EAL HU3.1 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 AR, F, S or C.

ONS Basis Reference(s):

1. AP/0/A/1700/006 Natural Disaster
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 needed 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.

ONS Basis:

Areas susceptible to internal flooding are the Turbine Building and Auxiliary Building (ref.1, 2).

Refer to EAL CA6.1 for internal flooding affecting one or more SAFETY SYSTEM trains.

NEI 99-01 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 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 AR, F, S or C.

ONS Basis Reference(s):

1. AP/1,2,3/A/1700/010 Turbine Building Flood
2. AP/1-2,3/A/1700/030 Auxiliary Building Flood
3. 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 offsite event 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 - That part of the nuclear station property consisting of the Reactor, Auxiliary, Turbine, and Service Building and grounds, contained within the owner controlled security fence.

ONS Basis:

As used here, the term "offsite" is meant to be areas external to the ONS PROTECTED AREA.

NEI 99-01 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 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~~R, F, S or C.

ONS Basis 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):

None

ONS Basis:

None

NEI 99-01 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 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 AR, F, S or C.

ONS Basis 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:

HU3.5	**Unusual Event**
Condition B has been declared for the Jocassee Dam	

Mode Applicability:

All

Definition(s):

None

ONS Basis:

Jocassee Hydro is located upstream of the Oconee Nuclear Station. The mitigation strategies for a Condition B for the Jocassee Dam includes shutdown of all operating Oconee Nuclear Units and relocation and installation of other equipment in anticipation of the Condition B escalating to a Condition A (ref. 1, 2).

NEI 99-01 Basis:

None

ONS Basis Reference(s):

1. SR/0/A/2000/003 Activation of the Emergency Operations Facility
2. Letter from Duke Power to USNRC dated 5/5/1994 "Submission of Section D, Oconee Nuclear Site Emergency Plan Adoption of NUMARC/NESP-007 Rev. 2 Classification Scheme

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 3 – Natural or Technological Hazard

Initiating Condition: Dam failure

EAL:

HS3.1 Site Area Emergency

IMMINENT/actual dam failure exists involving any of the following:

- Keowee Hydro Dam
- Little River Dam
- Dikes A,B,C,D
- Intake Canal Dike
- Jocassee Dam - Condition A

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.

ONS Basis:

The Keowee Hydro Dam project includes the Keowee Hydro Dam, Little River Dam and Dikes A, B, C, D, and the Intake Canal Dike. Dam failure of any portion of the Keowee Hydro Dam would result in loss of the emergency AC power supply AND the potential to lose the ultimate heat sink source. Some flooding of the site may result. Evaluation of the plant status following failure of the dam would determine the need to escalate to a General Emergency. Failure of the Jocassee Dam has the potential to result in the failure of the Keowee Hydro Project Dams/Dikes (ref. 1, 2).

NEI 99-01 Basis:

None

ONS Basis Reference(s):

1. SR/0/A/2000/003 Activation of the Emergency Operations Facility
2. Letter from Duke Power to USNRC dated 5/5/1994 "Submission of Section D, Oconee Nuclear Site Emergency Plan Adoption of NUMARC/NESP-007 Rev. 2 Classification Scheme

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
- Field verification of a single fire alarm

AND

The FIRE is located within **any** Table H-1 area

Note 1: The Emergency Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.

Table H-1 Fire Areas
• Reactor Building • Auxiliary Building • Turbine Building • Standby Shutdown Facility • Intake Structure • Electrical Blockhouse • Keowee Hydro & associated transformers • Transformer Yard • Protected Service Water Building • Essential Siphon Vacuum 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.

ONS Basis:

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, 2).

NEI 99-01 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~~ For EAL HU4.1 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 CA6 or SA9.

ONS Basis Reference(s):

1. OSS-0254.00-00-4008 Design Bases Specification for Fire Protection
2. AP/1,2,3/A/1700/050 Challenging Plant Fire
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:

HU4.2 Unusual Event

Receipt of a single fire alarm (i.e., **no** other indications of a FIRE)

AND

The fire alarm is indicating a FIRE within **any** Table H-1 area

AND

The existence of a FIRE is **not** verified within 30 min. of alarm receipt (Note 1)

Note 1: The Emergency Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.

Table H-1 Fire Areas
• Reactor Building • Auxiliary Building • Turbine Building • Standby Shutdown Facility • Intake Structure • Electrical Blockhouse • Keowee Hydro & associated transformers • Transformer Yard • Protected Service Water Building • Essential Siphon Vacuum 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.

ONS Basis:

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.

Control Room indications that may be used to validate a single fire alarm include (ref. 3):

- Remote camera system
- CRD service structure air temperature
- PZR tailpipe temperature
- RB dome temperature
- RBCU inlet and outlet temperatures
- RCP parameters
- Status lights of components located inside RB

Table H-1 Fire Areas are those areas that contain equipment necessary for safe operation and shutdown of the plant (ref. 1, 2).

The ONS Fire Protection Program is based on 10 CFR 50.48 (a) and (c) requiring compliance with NFPA 805. The NFPA 805 based Fire Protection Program requirements provide are consistent with the NEI 99-01 basis stated below (ref. 1, 4).

NEI 99-01 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~~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 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~~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 CA6 or SA9.

ONS Basis Reference(s):

1. OSS-0254.00-00-4008 Design Bases Specification for Fire Protection
2. AP/1,2,3/A/1700/050 Challenging Plant Fire
3. OP/1,2,3/A/6101/003
4. NRC Letter to T. Preston Gillespie (Duke); ONS Units 1, 2, and 3, Issuance of Amendments Regarding Transition to a Risk-Informed, Performance-Based Fire Protection Program in Accordance With 10 CFR 50.48(c); dated December 29, 2010
5. 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 Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be 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 - That part of the nuclear station property consisting of the Reactor, Auxiliary, Turbine, and Service Building and grounds, contained within the owner controlled security fence.

ONS Basis:

None

NEI 99-01 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 CA6 or SA9.

ONS Basis 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 - That part of the nuclear station property consisting of the Reactor, Auxiliary, Turbine, and Service Building and grounds, contained within the owner controlled security fence.

ONS Basis:

None

NEI 99-01 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 CA6 or SA9.

ONS Basis Reference(s):

1. NEI 99-01 HU4

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 5 – Hazardous Gases

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 rooms or areas

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 Applicability**
Turbine Building	1, 2, 3
Equipment and Cable Rooms	1, 2, 3
Auxiliary Building	1, 2, 3, 4, 5
Reactor Buildings	3, 4, 5

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).

ONS Basis:

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).

NEI 99-01 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.

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~~ Emergency Coordinator'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 automatically or manually activate a fire suppression system in an area~~, or to intentional inerting of containment. (BWR only)~~.

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

ONS Basis Reference(s):

1. Attachment 3 Safe Operation & Shutdown Rooms/Areas Tables R-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 Auxiliary Shutdown Panel or Standby Shutdown Facility

Mode Applicability:

All

Definition(s):

None

ONS Basis:

The Control Room Supervisor (CRS) determines if the Control Room is uninhabitable and requires evacuation. Control Room inhabitability may be caused by fire, dense smoke, noxious fumes, bomb threat in or adjacent to the Control Room, or other life threatening conditions.

AP/1,2,3/A/1700/008, Loss of Control Room, provides the instructions for tripping the unit, and maintaining RCS inventory and Hot Shutdown conditions from outside the Control Room due to reasons other than fire (ref. 1).

AP/1,2,3/A/1700/050, Challenging Plant Fire, provides the instructions for tripping the unit, and maintaining RCS inventory and Hot Shutdown conditions from outside the Control Room due to a fire (ref. 2).

If normal post-trip conditions cannot be maintained with the Auxiliary Shutdown Panel or there is a challenging fire in an SSF risk area, plant shutdown may be directed from the Standby Shutdown Facility (ref. 3, 4).

Inability to establish plant control from outside the Control Room escalates this event to a Site Area Emergency per EAL HS6.1.

NEI 99-01 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.

Escalation of the emergency classification level would be via IC HS6.

ONS Basis Reference(s):

1. AP/1,2,3/A/1700/008 Loss of Control Room
2. AP/1,2,3/A/1700/050 Challenging Plant Fire
3. AP/0/A/1700/025 Standby Shutdown Facility Emergency Operating Procedure
4. AP/0/A/1700/043 Fire Brigade Response Procedure
5. 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 Auxiliary Shutdown Panel or Standby Shutdown Facility

AND

Control of **any** of the following key safety functions is **not** re-established within 15 min. (Note 1):

- Reactivity
- Core cooling
- RCS heat removal

Note 1: The Emergency Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.

Mode Applicability:

All

Definition(s):

None

ONS Basis:

The Control Room Supervisor (CRS) determines if the Control Room is uninhabitable and requires evacuation. Control Room inhabitability may be caused by fire, dense smoke, noxious fumes, bomb threat in or adjacent to the Control Room, or other life threatening conditions.

AP/1,2,3/A/1700/008, Loss of Control Room, provides the instructions for tripping the unit, and maintaining RCS inventory and Hot Shutdown conditions from outside the Control Room due to reasons other than fire (ref. 1).

AP/1,2,3/A/1700/050, Challenging Plant Fire, provides the instructions for tripping the unit, and maintaining RCS inventory and Hot Shutdown conditions from outside the Control Room due to a fire (ref. 2).

If normal post-trip conditions cannot be maintained with the Auxiliary Shutdown Panel or there is a challenging fire in an SSF risk area, plant shutdown may be directed from the Standby Shutdown Facility (ref. 3, 4).

The intent of this EAL is to capture events in which control of the plant cannot be reestablished in a timely manner. The fifteen minute time for transfer starts when the Control Room is evacuated (when CRS leaves the Control Room, not when AP/1,2,3/A/1700/008 or AP/1,2,3/A/1700/050 is entered). The time interval is based on how quickly control must be reestablished without core uncovery and/or core damage. The determination of whether or not

control is established from outside the Control Room is based on Emergency Coordinator judgment. The Emergency Coordinator is expected to make a reasonable, informed judgment that control of the plant from outside the Control Room cannot be established within the fifteen minute interval.

Once the Control Room is evacuated, the objective is to establish control of important plant equipment and maintain knowledge of important plant parameters in a timely manner. Primary emphasis should be placed on components and instruments that supply protection for and information about safety functions. Typically, these safety functions are reactivity control (ability to shutdown the reactor and maintain it shutdown), RCS inventory (ability to cool the core), and secondary heat removal (ability to maintain a heat sink).

NEI 99-01 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~~ Coordinator judgment. The Emergency ~~Director~~ Coordinator 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).

Escalation of the emergency classification level would be via IC FG1 or CG1

ONS Basis Reference(s):

1. AP/1,2,3/A/1700/008 Loss of Control Room
2. AP/1,2,3/A/1700/050 Challenging Plant Fire
3. AP/0/A/1700/025 Standby Shutdown Facility Emergency Operating Procedure
4. AP/0/A/1700/043 Fire Brigade Response Procedure
5. NEI 99-01 HS6

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 7 – Emergency Coordinator Judgment

Initiating Condition: Other conditions existing that in the judgment of the Emergency Coordinator warrant declaration of a UE

EAL:

HU7.1	**Unusual Event**
Other conditions exist which in the judgment of the Emergency Coordinator 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.

ONS Basis:

The Emergency Coordinator is the designated onsite individual having the responsibility and authority for implementing the ONS Emergency Plan (ref. 1). The Operations Shift Manager (SM) initially acts in the capacity of the Emergency Coordinator and takes actions as outlined in the Emergency Plan implementing procedures (ref. 2). If required by the emergency classification or if deemed appropriate by the Emergency Coordinator, emergency response personnel are notified and instructed to report to their emergency response locations. In this manner, the individual usually in charge of activities in the Control Room is responsible for initiating the necessary emergency response, but plant management is expected to manage the emergency response as soon as available to do so in anticipation of the possible wide-ranging responsibilities associated with managing a major emergency.

NEI 99-01 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~~ Coordinator to fall under the emergency classification level description for an ~~NOUE~~Unusual Event.

ONS Basis Reference(s):

1. ONS Emergency Plan Section A Assignment of Responsibility
2. RP/0/A/1000/001 Emergency Classification
3. NEI 99-01 HU7

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 7 – Emergency Coordinator Judgment

Initiating Condition: Other conditions exist that in the judgment of the Emergency Coordinator warrant declaration of an Alert

EAL:

HA7.1	**Alert**
Other conditions exist which, in the judgment of the Emergency Coordinator, 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):

HOSTILE ACTION - An act toward ONS 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 ONS. Non-terrorism-based EALs should be used to address such activities (i.e., this may include violent acts between individuals in the owner controlled area).

ONS Basis:

The Emergency Coordinator is the designated onsite individual having the responsibility and authority for implementing the ONS Emergency Plan (ref. 1). The Operations Shift Manager (OSM) initially acts in the capacity of the Emergency Coordinator and takes actions as outlined in the Emergency Plan implementing procedures (ref. 2). If required by the emergency classification or if deemed appropriate by the Emergency Coordinator, emergency response personnel are notified and instructed to report to their emergency response locations. In this manner, the individual usually in charge of activities in the Control Room is responsible for initiating the necessary emergency response, but Plant Management is expected to manage the emergency response as soon as available to do so in anticipation of the possible wide-ranging responsibilities associated with managing a major emergency.

NEI 99-01 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~~ Coordinator to fall under the emergency classification level description for an Alert.

ONS Basis Reference(s):

1. ONS Emergency Plan Section A Assignment of Responsibility
2. RP/0/A/1000/001 Emergency Classification
3. NEI 99-01 HA7

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 7 – Emergency Coordinator Judgment

Initiating Condition: Other conditions existing that in the judgment of the Emergency Coordinator warrant declaration of a Site Area Emergency

EAL:

HS7.1 Site Area Emergency
Other conditions exist which in the judgment of the Emergency Coordinator 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):

HOSTILE ACTION - An act toward ONS 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 ONS. Non-terrorism-based EALs should be used to address such activities (i.e., this may include violent acts between individuals in the owner controlled area).

SITE BOUNDARY - That area, including the PROTECTED AREA, in which Duke Energy has the authority to control all activities including exclusion or removal of personnel and property (1 mile radius) from the center of Unit 2.

ONS Basis:

The Emergency Coordinator is the designated onsite individual having the responsibility and authority for implementing the ONS Emergency Plan (ref. 1). The Operations Shift Manager (OSM) initially acts in the capacity of the Emergency Coordinator and takes actions as outlined in the Emergency Plan implementing procedures (ref. 2). If required by the emergency classification or if deemed appropriate by the Emergency Coordinator, emergency response personnel are notified and instructed to report to their emergency response locations. In this manner, the individual usually in charge of activities in the Control Room is responsible for initiating the necessary emergency response, but Plant Management is expected to manage the emergency response as soon as available to do so in anticipation of the possible wide-ranging responsibilities associated with managing a major emergency.

NEI 99-01 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~~ Coordinator to fall under the emergency classification level description for a Site Area Emergency.

ONS Basis Reference(s):

1. ONS Emergency Plan Section A Assignment of Responsibility
2. RP/0/A/1000/001 Emergency Classification
3. NEI 99-01 HS7

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 7 – Emergency Coordinator Judgment

Initiating Condition: Other conditions exist which in the judgment of the Emergency Coordinator warrant declaration of a General Emergency

EAL:

HG7.1	**General Emergency**

Other conditions exist which in the judgment of the Emergency Coordinator 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):

HOSTILE ACTION - An act toward ONS 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 ONS. Non-terrorism-based EALs should be used to address such activities (i.e., this may include violent acts between individuals in the owner controlled area).

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.

ONS Basis:

The Emergency Coordinator is the designated onsite individual having the responsibility and authority for implementing the ONS Emergency Plan (ref. 1). The Operations Shift Manager (OSM) initially acts in the capacity of the Emergency Coordinator and takes actions as outlined in the Emergency Plan implementing procedures (ref. 2). If required by the emergency classification or if deemed appropriate by the Emergency Coordinator, emergency response personnel are notified and instructed to report to their emergency response locations. In this manner, the individual usually in charge of activities in the Control Room is responsible for initiating the necessary emergency response, but Plant Management is expected to manage the emergency response as soon as available to do so in anticipation of the possible wide-ranging responsibilities associated with managing a major emergency.

Releases can reasonably be expected to exceed EPA PAG plume exposure levels outside the Site Boundary.

NEI 99-01 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~~ Coordinator to fall under the emergency classification level description for a General Emergency.

ONS Basis Reference(s):

1. ONS Emergency Plan Section A Assignment of Responsibility
2. RP/0/A/1000/001 Emergency Classification
3. NEI 99-01 HG7

Category S – System Malfunction

EAL Group: Hot Conditions (RCS temperature > 210°F); 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 Essential AC Power

Loss of essential 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 4160V AC essential 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 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 Protective 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 Essential AC Power

Initiating Condition: Loss of **all** offsite AC power capability to essential buses for 15 minutes or longer

EAL:

SU1.1 Unusual Event
Loss of **all** offsite AC power capability, Table S-1, to essential 4160 V buses MFB-1 and MFB-2 for ≥ 15 min. (Note 1)

Note 1: The Emergency Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.

Table S-1 AC Power Sources
Offsite:
• Unit Normal Transformer (backcharged)
• Unit Startup Transformer (SWYD)
• Another Unit Startup Transformer (aligned) (SWYD)
• CT5 (Central/energizing Standby Bus)
Emergency:
• Unit Startup Transformer (Keowee)
• Another Unit Startup Transformer (aligned) (Keowee)
• CT4
• CT5 (dedicated line/energizing Standby Bus)

Mode Applicability:

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

Definition(s):

None

ONS Basis:

The 4160 V AC System provides the power requirements for operation and safe shutdown of the plant. 4160 V buses MFB-1 and MFB-2 are the essential buses (ref. 1).

The condition indicated by this EAL is the degradation of all offsite AC power sources such that only onsite AC power capability exists for 15 minutes or longer.

Each unit is provided with two physically independent circuits from the switching station. One is the circuit from the 230 kV switching station through the startup transformer, which is designed to be available within a few seconds following a loss of coolant accident. The second circuit is the path from the switchyard through the main step-up transformer, the main generator bus and the unit auxiliary transformer with the generator disconnected from the main bus. The second circuit is currently used during refueling as an additional power feed for the shutdown

unit(s) from the 230 kV switchyard. Whenever there is inadequate power from the generating units, the 230 kV switching station and the hydro units, power is available to the standby power buses either directly from the 100 kV Central Tie Substation or from Lee Steam Station via Transformer CT5. (ref. 2)

Upon loss of power from the Oconee generating unit and 230 kV switchyard, power is supplied from both Keowee Hydro Station units through two separate and independent routes. One route is an underground feeder to Transformer CT4 which supplies the two redundant Main Feeder Buses (MFB-1 and MFB-2). The other route is an overhead feeder to the 230 KV switching station which supplies each unit startup transformer. (ref. 3)

The Standby Shutdown Facility (SSF) consists of standby systems for use in an extreme emergency and is equipped with a manually started diesel generator that can supply power necessary to maintain hot shutdown of the reactors of each unit in the event of loss of power. However, the SSF cannot supply power to the essential buses and therefore not credited in this EAL (ref. 3).

The 15-minute interval was selected as a threshold to exclude transient or momentary power losses.

NEI 99-01 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~~ essential 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~~ essential 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.

ONS Basis Reference(s):

1. UFSAR Figure 8.1 Single Line Diagram
2. UFSAR Section 8.2 Offsite Power System
3. UFSAR Section 8.3 Onsite Power Systems
4. NEI 99-01 SU1

Category: S – System Malfunction

Subcategory: 1 – Loss of Essential AC Power

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

EAL:

SA1.1 Alert

AC power capability, Table S-1, to essential 4160 V buses MFB-1 and MFB-2 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 Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.

Table S-1 AC Power Sources
Offsite: • Unit Normal Transformer (backcharged) • Unit Startup Transformer (SWYD) • Another Unit Startup Transformer (aligned) (SWYD) • CT5 (Central/energizing Standby Bus)
Emergency: • Unit Startup Transformer (Keowee) • Another Unit Startup Transformer (aligned) (Keowee) • CT4 • CT5 (dedicated line/energizing Standby Bus)

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.

ONS Basis:

For emergency classification purposes, "capability" means that an AC power source is available to and capable of powering the emergency bus(es) within 15 min, whether or not the buses are currently powered from it.

The 4160 V AC System provides the power requirements for operation and safe shutdown of the plant. 4160 V buses MFB-1 and MFB-2 are the essential buses (ref. 1).

The condition indicated by this EAL is the degradation of the offsite and onsite power sources such that any additional single failure would result in a loss of all AC power to the essential buses.

Each unit is provided with two physically independent circuits from the switching station. One is the circuit from the 230 kV switching station through the startup transformer, which is designed to be available within a few seconds following a loss of coolant accident. The second circuit is the path from the switchyard through the main step-up transformer, the main generator bus and the unit auxiliary transformer with the generator disconnected from the main bus. The second circuit is currently used during refueling as an additional power feed for the shutdown unit(s) from the 230 kV switchyard. Whenever there is inadequate power from the generating units, the 230 kV switching station and the hydro units, power is available to the standby power buses either directly from the 100 kV Central Tie Substation or from Lee Steam Station via a Transformer CT5. (ref. 2)

Upon loss of power from the Oconee generating unit and 230 kV switchyard, power is supplied from both Keowee Hydro Station units through two separate and independent routes. One route is an underground feeder to Transformer CT4 which supplies the two redundant Main Feeder Buses (MFB-1 and MFB-2). The other route is an overhead feeder to the 230 KV switching station which supplies each unit startup transformer. (ref. 3)

The Standby Shutdown Facility (SSF) consists of standby systems for use in an extreme emergency and is equipped with a manually started diesel generator that can supply power necessary to maintain hot shutdown of the reactors of each unit in the event of loss of power. However, the SSF cannot supply power to the essential buses and therefore not credited in this EAL (ref. 3).

The 15-minute interval was selected as a threshold to exclude transient or momentary power losses. If the capability of a second source of emergency bus power is not restored within 15 minutes, an Alert is declared under this EAL.

NEI 99-01 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 an ~~emergency~~ essential bus. Some examples of this condition are presented below.

- A loss of all offsite power with a concurrent failure of all but one ~~emergency~~ essential power source ~~(e.g., an onsite diesel generator)~~ (e.g., CT4, CT5, CT1, 2 ,3 (Keowee)).
- ~~A loss of all offsite power and loss of all emergency power sources (e.g., onsite diesel generators) with a single train of emergency buses being back-fed from the unit main generator.~~
- A loss of ~~emergency~~ essential power sources ~~(e.g., onsite diesel generators)~~ (e.g., CT4, CT5, CT1, CT2, CT3 (Keowee)) with a single train of ~~emergency~~ essential buses being back-fed from an offsite power source.

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.

ONS Basis Reference(s):

1. UFSAR Figure 8.1 Single Line Diagram
2. UFSAR Section 8.2 Offsite Power System
3. UFSAR Section 8.3 Onsite Power Systems
4. NEI 99-01 SA1

Category: S – System Malfunction

Subcategory: 1 – Loss of Essential AC Power

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

EAL:

SS1.1	**Site Area Emergency**
Loss of **all** offsite and **all** emergency AC power capability, Table S-1, to essential 4160 V buses MFB-1 and MFB-2 for ≥ 15 min. (Note 1)	

Note 1: The Emergency Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.

Table S-1 AC Power Sources
Offsite:
• Unit Normal Transformer (backcharged)
• Unit Startup Transformer (SWYD)
• Another Unit Startup Transformer (aligned) (SWYD)
• CT5 (Central/energizing Standby Bus)
Emergency:
• Unit Startup Transformer (Keowee)
• Another Unit Startup Transformer (aligned) (Keowee)
• CT4
• CT5 (dedicated line/energizing Standby Bus)

Mode Applicability:

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

Definition(s):

None

ONS Basis:

For emergency classification purposes, "capability" means that an AC power source is available to and capable of powering the emergency bus(es) within 15 minutes, whether or not the buses are currently powered from it.

The condition indicated by this EAL is the degradation of the offsite and emergency power sources resulting in a loss of all AC power to the emergency buses. 4160 V buses MFB-1 and MFB-2 are the essential buses (ref. 1).

Each unit is provided with two physically independent circuits from the switching station. One is the circuit from the 230 kV switching station through the startup transformer, which is designed to be available within a few seconds following a loss of coolant accident. The second circuit is the path from the switchyard through the main step-up transformer, the main generator bus

and the unit auxiliary transformer with the generator disconnected from the main bus. The second circuit is currently used during refueling as an additional power feed for the shutdown unit(s) from the 230 kV switchyard. Whenever there is inadequate power from the generating units, the 230 kV switching station and the hydro units, power is available to the standby power buses either directly from the 100 kV Central Tie Substation or from Lee Steam Station via a Transformer CT5. (ref. 2)

Upon loss of power from the Oconee generating unit and 230 kV switchyard, power is supplied from both Keowee Hydro Station units through two separate and independent routes. One route is an underground feeder to Transformer CT4 which supplies the two redundant Main Feeder Buses (MFB-1 and MFB-2). The other route is an overhead feeder to the 230 KV switching station which supplies each unit startup transformer. (ref. 3)

The Standby Shutdown Facility (SSF) consists of standby systems for use in an extreme emergency and is equipped with a manually started diesel generator that can supply power necessary to maintain hot shutdown of the reactors of each unit in the event of loss of power. However, the SSF cannot supply power to the essential buses and therefore not credited in this EAL. (ref. 3).

The 15-minute interval was selected as a threshold to exclude transient or momentary power losses. The interval begins when both offsite and onsite AC power capability are lost.

NEI 99-01 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. 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 ICs ~~AG1~~RG1, FG1 or SG1.

ONS Basis Reference(s):

1. UFSAR Figure 8.1 Single Line Diagram
2. UFSAR Section 8.2 Offsite Power System
3. UFSAR Section 8.3 Onsite Power Systems
4. NEI 99-01 SS1

Category: S –System Malfunction

Subcategory: 1 – Loss of Essential AC Power

Initiating Condition: Prolonged loss of **all** offsite and **all** emergency AC power to essential buses

EAL:

SG1.1 General Emergency

Loss of **all** offsite and **all** emergency AC power capability to essential 4160 V buses MFB-1 and MFB-2

AND

Failure to power SSF equipment and PSW unavailable

AND EITHER:

- Restoration of at least one essential bus in < 4 hour is **not** likely (Note 1)
- CETC reading > 1200°F

Note 1: The Emergency Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.

Table S-1 AC Power Sources
Offsite: • Unit Normal Transformer (backcharged) • Unit Startup Transformer (SWYD) • Another Unit Startup Transformer (aligned) (SWYD) • CT5 (Central/energizing Standby Bus) **Emergency:** • Unit Startup Transformer (Keowee) • Another Unit Startup Transformer (aligned) (Keowee) • CT4 • CT5 (dedicated line/energizing Standby Bus)

Mode Applicability:

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

Definition(s):

None

ONS Basis:

For emergency classification purposes, "capability" means that an AC power source is available to and capable of powering the essential bus(es), whether or not the buses are currently powered from it. 4160 V buses MFB-1 and MFB-2 are the essential buses (ref. 1).

Each unit is provided with two physically independent circuits from the switching station. One is the circuit from the 230 kV switching station through the startup transformer, which is designed to be available within a few seconds following a loss of coolant accident. The second circuit is the path from the switchyard through the main step-up transformer, the main generator bus and the unit auxiliary transformer with the generator disconnected from the main bus. The second circuit is currently used during refueling as an additional power feed for the shutdown unit(s) from the 230 kV switchyard. Whenever there is inadequate power from the generating units, the 230 kV switching station and the hydro units, power is available to the standby power buses either directly from the 100 kV Central Tie Substation or from Lee Steam Station via Transformer CT5. (ref. 2)

Upon loss of power from the Oconee generating unit and 230 kV switchyard, power is supplied from both Keowee Hydro Station units through two separate and independent routes. One route is an underground feeder to Transformer CT4 which supplies the two redundant Main Feeder Buses (MFB-1 and MFB-2). The other route is an overhead feeder to the 230 KV switching station which supplies each unit startup transformer. (ref. 3)

The Standby Shutdown Facility (SSF) consists of standby systems for use in an extreme emergency and is equipped with a manually started diesel generator and Protected Service Water (PSW) power supply that can supply power necessary to maintain hot shutdown of the reactors of each unit in the event of loss of power. Although the SSF requires manual initiation, it is considered in this EAL because it may be capable of powering the SSF load center (ref. 3, 4).

The station blackout coping period is four hours (ref. 5).

Core Exit Thermocouple readings of 1200°F are indicative of superheat conditions and inability to adequately remove heat from the core (ref. 6).

NEI 99-01 Basis:

This IC addresses a prolonged loss of all power sources to AC ~~emergency~~ essential 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. 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~~ essential 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 an increased likelihood of challenges to multiple fission product barriers.

The estimate for restoring at least one ~~emergency~~ essential 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.

ONS Basis Reference(s):

1. UFSAR Figure 8.1 Single Line Diagram
2. UFSAR Section 8.2 Offsite Power System
3. UFSAR Section 8.3 Onsite Power Systems
4. UFSAR Section 9.6 Standby Shutdown Facility
5. UFSAR Section 8.3.2.2.4 Station Blackout Analysis
6. RP/0/A/1000/18 Core Damage Assessment
7. NEI 99-01 SG1

Category: S –System Malfunction

Subcategory: 1 – Loss of Essential AC Power

Initiating Condition: Loss of **all** essential AC and vital DC power sources for 15 minutes or longer

EAL:

SG1.2 **General Emergency**
Loss of **all** offsite and **all** emergency AC power capability, Table S-1, to essential 4160 V buses MFB-1 and MFB-2 for ≥ 15 min.
AND
Failure to power SSF equipment and PSW unavailable
AND
Loss of 125 VDC power based on battery bus voltage indications < 105 VDC on **both** vital DC Distribution Centers DCA and DCB for ≥ 15 min. (Note 1)

Note 1: The Emergency Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.

Table S-1 AC Power Sources
Offsite: • Unit Normal Transformer (backcharged) • Unit Startup Transformer (SWYD) • Another Unit Startup Transformer (aligned) (SWYD) • CT5 (Central/energizing Standby Bus)
Emergency: • Unit Startup Transformer (Keowee) • Another Unit Startup Transformer (aligned) (Keowee) • CT4 • CT5 (dedicated line/energizing Standby Bus)

Mode Applicability:

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

Definition(s):

None

ONS Basis:

This EAL is indicated by the loss of all offsite and emergency AC power capability to 4160 V essential buses MFB-1 and MFB-2 for greater than 15 minutes in combination with degraded vital DC power voltage. This EAL addresses operating experience from the March 2011 accident at Fukushima Daiichi.

For emergency classification purposes, “capability” means that an AC power source is available to and capable of powering the emergency bus(es) within 15 minutes, whether or not the buses are currently powered from it.

Each unit is provided with two physically independent circuits from the switching station. One is the circuit from the 230 kV switching station through the startup transformer, which is designed to be available within a few seconds following a loss of coolant accident. The second circuit is the path from the switchyard through the main step-up transformer, the main generator bus and the unit auxiliary transformer with the generator disconnected from the main bus. The second circuit is currently used during refueling as an additional power feed for the shutdown unit(s) from the 230 kV switchyard. Whenever there is inadequate power from the generating units, the 230 kV switching station and the hydro units, power is available to the standby power buses either directly from the 100 kV Central Tie Substation or from Lee Steam Station via Transformer CT5. (ref. 2)

Upon loss of power from the Oconee generating unit and 230 kV switchyard, power is supplied from both Keowee Hydro Station units through two separate and independent routes. One route is an underground feeder to Transformer CT4 which supplies the two redundant Main Feeder Buses (MFB-1 and MFB-2). The other route is an overhead feeder to the 230 KV switching station which supplies each unit startup transformer. (ref. 3)

The Standby Shutdown Facility (SSF) consists of standby systems for use in an extreme emergency and is equipped with a manually started diesel generator and Protected Service Water (PSW) power supply that can supply power necessary to maintain hot shutdown of the reactors of each unit in the event of loss of power. Although the SSF requires manual initiation, it is considered in this EAL because it may be capable of powering the SSF load center (ref. 3).

For each unit, two independent and physically separated 125 volt DC batteries and DC buses are provided for the vital instrumentation and control power system. (ref. 4, 5). Minimum DC bus voltage is 105 VDC (ref. 6).

NEI 99-01 Basis:

This IC addresses a concurrent and prolonged loss of both emergency AC and Vital DC power. A loss of all emergency 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 emergency 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.

ONS Basis Reference(s):

1. UFSAR Figure 8.1 Single Line Diagram
2. UFSAR Section 8.2 Offsite Power System
3. UFSAR Section 8.3 Onsite Power Systems
4. UFSAR Figure 8.5 Typical DC and AC Vital Power System - Single Line
5. UFSAR Section 8.3.2 DC Power Systems
6. EP/*/A/1800/001 Blackout Tab
7. 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**
Loss of 125 VDC power based on battery bus voltage indications < 105 VDC on **both** vital DC Distribution Centers DCA and DCB for ≥ 15 min. (Note 1)	

Note 1: The Emergency Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.

Mode Applicability:

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

Definition(s):

None

ONS Basis:

For each unit, two independent and physically separated 125 volt DC batteries and DC buses are provided for the vital instrumentation and control power system. (ref. 1, 2). Minimum DC bus voltage is 105 VDC (ref. 3).

NEI 99-01 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.

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

Escalation of the emergency classification level would be via ICs ~~AG1~~RG1, FG1 or ~~SG8~~SG1.

ONS Basis Reference(s):

1. UFSAR Figure 8.5 Typical DC and AC Vital Power System - Single Line
2. UFSAR Section 8.3.2 DC Power Systems
3. EP/*/A/1800/001 Blackout Tab
4. Technical Specifications 3.8.3 DC Sources – Operating
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 Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.

Table S-2 Safety System Parameters
• Reactor power • RCS level • RCS pressure • CETC temperature • Level in at least one S/G • EFW flow to at least one S/G

Mode Applicability:

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

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.

ONS Basis:

SAFETY SYSTEM parameters listed in Table S-2 are monitored in the Control Room through a combination of hard control panel indicators as well as computer based information systems. The SPDS serves as a redundant compensatory indicator which may be utilized in lieu of normal Control Room indicators (ref. 1).

NEI 99-01 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 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~~SA3.

ONS Basis Reference(s):

1. UFSAR Section 7.5 Display Instrumentation
2. 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 Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.

Table S-2 Safety System Parameters
• Reactor power • RCS level • RCS pressure • CETC temperature • Level in at least one S/G • EFW flow to at least one S/G

Table S-3 Significant Transients
• Reactor trip • Runback > 25% thermal power • Electrical load rejection > 25% electrical load • ECCS actuation

Mode Applicability:

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

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.

ONS Basis:

SAFETY SYSTEM parameters listed in Table S-2 are monitored in the Control Room through a combination of hard control panel indicators as well as computer based information systems. The SPDS serves as a redundant compensatory indicator which may be utilized in lieu of normal Control Room indicators (ref. 1).

Significant transients are listed in Table S-3 and include response to automatic or manually initiated functions such as reactor trips, runbacks involving greater than 25% thermal power change, electrical load rejections of greater than 25% full electrical load, reactor power cutbacks or ECCS (SI) injection actuations.

NEI 99-01 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 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 ICs FS1 or IC ~~AS1~~RS1

ONS Basis Reference(s):

1. UFSAR Section 7.5 Display Instrumentation
2. 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 activity > 50 µCi/gm Dose Equivalent I-131 for > 48 hr continuous period

OR

RCS activity > 280 µCi/gm Dose Equivalent Xe-133 for > 48 hr continuous period

Mode Applicability:

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

Definition(s):

None

ONS Basis:

The specific iodine activity is limited to ≤ 50 µCi/gm Dose Equivalent I-131 for > 48 hr continuous period. The specific Xe-133 activity is limited to ≤ 280 µCi/gm Dose Equivalent Xe-133 for > 48 hr continuous period. Entry into Condition C of LCO 3.4.11 meets the intent of this EAL (ref 1).

NEI 99-01 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 ICs FA1 or the Recognition Category A-R ICs.

ONS Basis Reference(s):

1. ONS Technical Specifications LCO 3.4.11 RCS 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.

OR

RCS identified leakage > 25 gpm for ≥ 15 min.

OR

Leakage from the RCS to a location outside containment > 25 gpm for ≥ 15 min. (Note 1)

Note 1: The Emergency Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.

Mode Applicability:

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

Definition(s):

None

ONS Basis:

Manual or computer-based methods of performing an RCS inventory balance are normally used to determine RCS leakage (ref. 1).

Identified leakage includes (ref. 2):

- Leakage such as that from pump seals or valve packing (except reactor coolant pump (RCP) seal water injection or leakoff), that is captured and conducted to collection systems or a sump or collecting tank, or
- Leakage into the containment atmosphere from sources that are both specifically located and known either not to interfere with the operation of leakage detection systems or not to be pressure boundary leakage, or
- RCS leakage through a steam generator to the secondary system.

Unidentified leakage is all leakage (except RCP seal water injection or leakoff) that is not identified leakage (ref. 2).

Pressure Boundary leakage is leakage (except SG leakage) through a nonisolable fault in an RCS component body, pipe wall, or vessel wall (ref. 2).

Reactor coolant leakage outside of the containment that is not considered identified or unidentified leakage per Technical Specifications includes leakage via interfacing systems.

Escalation of this EAL to the Alert level is via Category F, Fission Product Barrier Degradation, EAL FA1.1.

NEI 99-01 Basis:

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.

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.

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~~R or F.

ONS Basis Reference(s):

1. PT/1,2,3/A/0600/010 Reactor Coolant Leakage
2. ONS Technical Specifications Section 1.1 Definitions
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 the manual trip pushbutton is successful in shutting down the reactor as indicated by reactor power < 5% (Note 8)

Note 8: A manual trip 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

ONS Basis:

The first condition of this EAL identifies the need to cease critical reactor operations by actuation of the automatic Reactor Protective System (RPS) trip function. A reactor trip is automatically initiated by the RPS when certain continuously monitored parameters exceed predetermined setpoints (ref. 1).

Following a successful reactor trip, rapid insertion of the control rods occurs. Nuclear power promptly drops to a fraction of the original power level and then decays to a level several decades less with a negative startup rate. The reactor power drop continues until reactor power reaches the point at which the influence of source neutrons on reactor power starts to be observable. A predictable post-trip response from an automatic reactor trip signal should therefore consist of a prompt drop in reactor power as sensed by the nuclear instrumentation and a lowering of power into the source range. For the purpose of emergency classification a successful trip has occurred when there is sufficient rod insertion from the trip of RPS to bring the reactor power below the Power Operation Mode threshold of 5% (ref. 2).

5% rated power is the Power Operation mode threshold. Below 5%, plant response will be similar to that observed during a normal shutdown. Nuclear instrumentation can be used to determine if reactor power is greater than or equal to 5 % power (ref. 1, 2).

For the purposes of emergency classification, a successful manual trip action is that which can be quickly performed from the reactor control console (actuation of the manual trip pushbutton). There is a separate set of switch contacts in series with the output of each reactor trip component. All switch contacts are actuated through a mechanical linkage from a single pushbutton. Reactor shutdown achieved by use of other trip actions such as opening supply

breakers, emergency boration, or manually driving control rods) do not constitute a successful manual trip (ref. 3).

Following any automatic RPS trip signal, insertion of redundant manual trip signals are performed to back up the automatic RPS trip function and ensure reactor shutdown is achieved. Even if the first subsequent manual trip signal inserts all control rods to the full-in position immediately after the initial failure of the automatic trip, the lowest level of classification that must be declared is an Unusual Event.

In the event that the operator identifies a reactor trip is imminent and initiates a successful manual reactor trip before the automatic RPS 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. However, if subsequent manual reactor trip actions fail to reduce reactor power below 5%, the event escalates to the Alert under EAL SA6.1.

If by procedure, operator actions include the initiation of an immediate manual trip following receipt of an automatic trip signal and there are no clear indications that the automatic trip failed (such as a time delay following indications that a trip setpoint was exceeded), it may be difficult to determine if the reactor was shut down because of automatic trip or manual actions. If a subsequent review of the trip actuation indications reveals that the automatic trip did not cause the reactor to be shut down, consideration should be given to evaluating the fuel for potential damage, and the reporting requirements of 10CFR50.72 should be considered for the transient event.

NEI 99-01 Basis:

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.

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*] / 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*])~~). This action does not include manually driving in control rods or

implementation of boron injection strategies. Actions taken at back-panels or other locations within the Control Room, or any location outside the Control Room, are not considered to be "at the reactor control consoles".~~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 causes a plant transient 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 EALs are applicable, and should be evaluated.
- If the signal 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 EALs are not applicable and no classification is warranted.

ONS Basis Reference(s):

1. ONS Technical Specifications Section 3.3.1 Reactor Protective System (RPS) Instrumentation – Operating
2. ONS Technical Specifications Table 1.1-1 Modes
3. UFSAR Section 7.2.3.7 Manual Trip
4. OSC-02820 Emergency Procedure Setpoints, Setpoint No. 7.1.7.5
5. 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 the manual trip pushbutton is successful in shutting down the reactor as indicated by reactor power < 5% (Note 8)	

Note 8: A manual trip 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

ONS Basis:

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 (ref. 1).

Following a successful reactor trip, rapid insertion of the control rods occurs. Nuclear power promptly drops to a fraction of the original power level and then decays to a level several decades less with a negative startup rate. The reactor power drop continues until reactor power reaches the point at which the influence of source neutrons on reactor power starts to be observable. A predictable post-trip response from an automatic reactor trip signal should therefore consist of a prompt drop in reactor power as sensed by the nuclear instrumentation and a lowering of power into the source range. For the purpose of emergency classification a successful trip has occurred when there is sufficient rod insertion from the manual trip to bring the reactor power below the Power Operation Mode threshold level of 5% (ref. 2).

5% rated power is the Power Operation mode threshold. Below 5%, plant response will be similar to that observed during a normal shutdown. Nuclear instrumentation can be used to determine if reactor power is greater than or equal to 5% power (ref. 1, 2).

For the purposes of emergency classification, a successful manual trip action is that which can be quickly performed from the reactor control console (actuation of the manual trip pushbutton). There is a separate set of switch contacts in series with the output of each reactor trip component. All switch contacts are actuated through a mechanical linkage from a single pushbutton. Reactor shutdown achieved by use of other trip actions such as opening supply

breakers, emergency boration, or manually driving control rods) do not constitute a successful manual trip (ref. 3).

Following any automatic RPS trip signal, insertion of redundant manual trip signals are performed to back up the automatic RPS trip function and ensure reactor shutdown is achieved. Even if a subsequent automatic trip signal or the first subsequent manual trip signal inserts all control rods to the full-in position immediately after the initial failure of the manual trip, the lowest level of classification that must be declared is an Unusual Event.

If both subsequent automatic and subsequent manual reactor trip actions in the Control Room fail to reduce reactor power < 5% following a failure of an initial manual trip, the event escalates to an Alert under EAL SA6.1.

NEI 99-01 Basis:

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.

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*] / 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*])~~). This action does not include manually driving in control rods or implementation of boron injection strategies. Actions taken at back-panels or other locations within the Control Room, or any location outside the Control Room, are not considered to be "at the reactor control consoles".

~~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 causes a plant transient 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 EALs are applicable, and should be evaluated.
- If the signal 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 EALs are not applicable and no classification is warranted.

ONS Basis Reference(s):

1. ONS Technical Specifications Section 3.3.1 Reactor Protective System (RPS) Instrumentation – Operating
2. ONS Technical Specifications Table 1.1-1
3. UFSAR Section 7.2.3.7 Manual Trip
4. OSC-02820 Emergency Procedure Setpoints, Setpoint No. 7.1.7.5
5. NEI 99-01 SU5

Category: S – System Malfunction

Subcategory: 2 – 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 pushbutton is **not** successful in shutting down the reactor as indicated by reactor power ≥ 5% (Note 8)

Note 8: A manual trip 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

ONS Basis:

This EAL addresses any automatic or manual reactor trip signal that fails to shut down the reactor followed by a subsequent manual trip that fails to shut down the reactor to an extent the reactor is producing significant power (ref. 1).

Following a successful reactor trip, rapid insertion of the control rods occurs. Nuclear power promptly drops to a fraction of the original power level and then decays to a level several decades less with a negative startup rate. The reactor power drop continues until reactor power reaches the point at which the influence of source neutrons on reactor power starts to be observable. A predictable post-trip response from an automatic reactor trip signal should therefore consist of a prompt drop in reactor power as sensed by the nuclear instrumentation and a lowering of power into the source range. For the purpose of emergency classification a successful trip has occurred when there is sufficient rod insertion from the manual trip to bring the reactor power below 5% (ref. 2).

5% rated power is the Power Operation mode threshold. Below 5%, plant response will be similar to that observed during a normal shutdown. Nuclear instrumentation can be used to determine if reactor power is greater than or equal to 5% power (1, 2).

For the purposes of emergency classification, a successful manual trip action is that which can be quickly performed from the reactor control console (actuation of the manual trip pushbutton). There is a separate set of switch contacts in series with the output of each reactor trip component. All switch contacts are actuated through a mechanical linkage from a single

pushbutton. Reactor shutdown achieved by use of other trip actions such as opening supply breakers, emergency boration, or manually driving control rods) do not constitute a successful manual trip (ref. 3).

Escalation of this event to a Site Area Emergency would be under EAL SS6.1 or Emergency Coordinator judgment.

NEI 99-01 Basis:

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])~~). 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, or any location outside the Control Room, are not considered to be "at the reactor control consoles".

~~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~~ 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.

ONS Basis Reference(s):

1. ONS Technical Specifications Section 3.3.1 Reactor Protective System (RPS) Instrumentation – Operating
2. ONS Technical Specifications Table 1.1-1
3. UFSAR Section 7.2.3.7 Manual Trip

4. OSC-02820 Emergency Procedure Setpoints, Setpoint No. 7.1.7.5
5. NEI 99-01 SA5

Category: S – System Malfunction

Subcategory: 2 – 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:

- CETCs >1200°F on ICCM
- RCS subcooling < 0°F

Mode Applicability:

1 - Power Operation

Definition(s):

None

ONS Basis:

This EAL addresses the following:

- Any automatic reactor trip signal (ref. 1) followed by a manual trip that fails to shut down the reactor to an extent the reactor is producing energy in excess of the heat load for which the safety systems were designed (ref. 5), and
- Indications that either core cooling is extremely challenged or heat removal is extremely challenged.

The combination of failure of both front line and backup protection systems to function in response to a plant transient, along with the continued production of heat, poses a direct threat to the Fuel Clad and RCS Barriers.

Reactor shutdown achieved by use of other trip actions such as opening supply breakers, emergency boration, or manually driving control rods are also credited as a successful manual trip provided reactor power can be reduced below 5% before indications of an extreme challenge to either core cooling or heat removal exist (ref. 2, 3).

5% rated power is the Power Operation mode threshold. Below 5%, plant response will be similar to that observed during a normal shutdown. Nuclear instrumentation can be used to determine if reactor power is greater than or equal to 5% power.

Indication of continuing core cooling degradation is manifested by CETCs are reading greater than 1200°F. This setpoint is used as an indication of an extreme ICC condition and entry into the Oconee Severe Accident Guidelines (OSAG) is initiated for further mitigative actions (ref. 4).

Indication of inability to adequately remove heat from the RCS is manifested by subcooling less than 0°F (ref. 6).

NEI 99-01 Basis:

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 shut down 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.

Escalation of the emergency classification level would be via IC ~~AG1~~ RG1 or FG1.

ONS Basis Reference(s):

1. ONS Technical Specifications Section 3.3.1 Reactor Protective System (RPS) Instrumentation – Operating
2. ONS Technical Specifications Table 1.1-1
3. UFSAR Section 7.2.3.7 Manual Trip
4. OSC-02820 Emergency Procedure Setpoints, Setpoint No. 7.1.1.7
5. OSC-02820 Emergency Procedure Setpoints, Setpoint No. 7.1.7.5
6. EP/1,2,3/A/1800/001 Loss of Subcooling Margin
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 offsite communication methods

OR

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

Table S-4 Communication Methods			
System	**Onsite**	**Offsite**	**NRC**
Commercial phone service	X	X	X
ONS site phone system	X	X	X
EOF phone system	X	X	X
Public Address system	X		
Onsite radio system	X		
DEMNET		X	
Offsite radio system		X	
NRC Emergency Telephone System			X
Satellite Phone	X	X	X

Mode Applicability:

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

Definition(s):

None

ONS Basis:

Onsite, offsite and NRC communications include one or more of the systems listed in Table S-4 (ref. 1).

1. Commercial phone service

   The Commercial phone service does not go through the site telephone system.

2. ONS site phone system

   The site phone system is generator and battery backed with:

   - Fiber-Optic to Charlotte GO (65 lines)
   - Telephone line to Easley (6 circuits)
   - Anderson (4 lines)
   - Six Mile (4 lines)
   - Site Telephone System: Inward and outward direct dial available from the Control Room, TSC, and OSC

3. EOF phone system

   The emergency communications systems at the Charlotte EOF are designed to ensure the reliable, timely flow of information between all parties having an emergency response role.

4. Public Address (Paging) system

   The paging system provides paging and party line communications between stations located throughout the plant. Inside and outside type wall and desk-mounted stations are used to communicate between roaming personnel and fixed work locations. Plant-wide instructions are issued using the paging feature.

5. Onsite radio system

   The onsite radio system receives emergency backup power from Keowee Hydro Units supporting communications with: Control Room 1&2, 3, Fire Brigade, Chemistry, Safety, Radiation Protection, Maintenance, Medical Emergency Response Team, and Hazardous Materials Response Team.

6. DEMNET

   DEMNET is the primary means of offsite communication. This circuit allows intercommunication among the EOF, TSC, control room, counties, and states. DEMNET operates as an internet based (VoIP) communications system with a satellite back-up. Should the internet transfer rate become slow or unavailable, the DEMNET will automatically transfer to satellite mode.

7. Offsite radio system

   The offsite radio system is battery backed supporting communications with: Control Room Units 1&2, TSC, Field Monitoring Teams, EOF, counties and State of South Carolina.

8. NRC Emergency Telephone System (ETS)

   The NRC uses a Duke Energy dedicated telephone line which allows direct telephone communications from the plant to NRC regional and national offices. The Duke Energy communications line provides a link independent of the local public telephone network. Telephones connected to this network are located in the Oconee Control Rooms, TSC, and EOF and can be used to establish NRC Emergency Notification System (ENS) and Health Physics Network (HPN) capability.

9. Satellite Phone

   Satellite Phones can be used for both internal and external communications

This EAL is the hot condition equivalent of the cold condition EAL CU5.1.

NEI 99-01 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 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 of an emergency declaration. The OROs referred to here are ~~(see Developer Notes)~~ the State EOC and FEO, Pickens County LEC and EOC, and Oconee County LEC and EOC.

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

ONS Basis Reference(s):

1. ONS Emergency Plan, Section 7.2 Communications Systems
2. 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 VALID ES actuation signal

OR

Containment pressure > 10 psig with < one full train of containment heat removal system (1 RBS with > 700 gpm spray flow **OR** 2 RBCUs) operating per design for ≥ 15 min.

(Note 1)

Note 1: The Emergency Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.

Mode Applicability:

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

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.

ONS Basis:

Reactor Building isolations are initiated by Engineered Safeguards Actuation Channels 5 and 6 in response to a high reactor building pressure signal (3.0 psig) (ref. 1, 2, 4).

Two engineered safeguards systems, the Reactor Building Spray System and the Reactor Building Cooling System, are provided to remove heat from the containment atmosphere following an accident. Both the Reactor Building Spray System and the Reactor Building Cooling System, with either at full capacity, are individually capable of maintaining the containment pressure below the design limit following a LOCA or MSLB. (ref. 1, 3)

The Reactor Building Spray (RBS) System consists of two separate trains of equal capacity. Spray flow greater or equal to 700 gpm satisfies the spray flow design requirement. The Reactor Building pressure setpoint (10 psig) is the pressure at which the Reactor Building Spray equipment should actuate and begin performing its function (ref. 1, 2, 3, 5).

Each of three Reactor Building Cooling Units (RBCUs) consists of a fan, cooling coils, and the required distribution duct work. The Reactor Building atmosphere is circulated past cooling coils by fans and returned to the building. Cooling water for the cooling units is supplied by the Low Pressure Service Water System. The Reactor Building Cooling System provides the design heat removal capacity with two of three coolers operating (ref. 1).

NEI 99-01 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 A~~O~~Ps 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.

ONS Basis Reference(s):

1. UFSAR Section 6.2.2 Containment Heat Removal Systems
2. UFSAR Table 7-2 Engineered Safeguards Actuation Conditions
3. UFSAR Table 6-25 Minimum Acceptable Combinations of Containment Heat Removal Equipment Performance
4. OSC-02820 Emergency Procedure Setpoints, Setpoint No. 7.1.1.1
5. OSC-02820 Emergency Procedure Setpoints, Setpoint No. 7.4.1.2
6. NEI 99-01 SU7

Category: S – System Malfunction

Subcategory: 9 – Hazardous Event Affecting Safety Systems

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

EAL:

SA9.1 Alert

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

AND EITHER:

- Event damage has caused indications of degraded performance in at least one train of a SAFETY SYSTEM needed for the current operating mode
- The event has caused VISIBLE DAMAGE to a SAFETY SYSTEM component or structure needed for the current operating mode

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 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.

ONS Basis:

- The significance of seismic events are discussed under EAL HU2.1 (ref. 1).
- Internal FLOODING may be caused by events such as component failures, equipment misalignment, or outage activity mishaps.
- External flooding at ONS is highly unlikely since the probable maximum flood (PMF) would be contained by the Keowee Reservoir. Plant grade elevation is 796.0 ft MSL. The minimum external access elevation for the Auxiliary, Turbine, and Service Buildings is 796.5 ft MSL which provides a 6 inch water sill. (ref. 2)
- High winds in excess of design (95 mph) or tornado strikes can cause significant structural damage (ref. 3).
- Areas containing functions and systems required for safe shutdown of the plant are identified by fire area (ref. 4, 5).
- An explosion that degrades the performance of a SAFETY SYSTEM train or visibly damages a SAFETY SYSTEM component or structure would be classified under this EAL.

NEI 99-01 Basis:

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~~The first condition 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~~The second condition 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~~RS1.

ONS Basis Reference(s):

1. AP/0/A/1700/005 Earthquake
2. UFSAR Section 3.4.1.1 Flood Protection Measures for Seismic Class 1 Structures
3. UFSAR Section 3.3.1.1 Design Wind Velocity
4. OSS-0254.00-00-4008 Design Bases Specification for Fire Protection
5. AP/1,2,3/A/1700/050 Challenging Plant Fire
6. NEI 99-01 SA9

Category F – Fission Product Barrier Degradation

EAL Group: Hot Conditions (RCS temperature > 200°F); 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 (FC): The Fuel Clad Barrier consists of the cladding material that contains the fuel pellets.
B. Reactor Coolant System (RCS): 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 (CMT): The Containment (Reactor Building) Barrier includes the Reactor 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 Reactor Building up to and including the outermost secondary side isolation valve. Containment Barrier thresholds are used as criteria for escalation of the ECL from 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 (Attachment 2). "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 RG1 has been exceeded.

- The fission product barrier thresholds specified within a scheme reflect plant-specific ONS 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 primary containment, an interfacing system, or outside of the primary 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 Coordinator would have more assurance that there was no immediate need to escalate to a General Emergency.

Category: 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

ONS Basis:

Fuel Clad, RCS and Containment comprise the fission product barriers. Table F-1 (Attachment 2) 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

NEI 99-01 Basis:

None

ONS Basis Reference(s):

1. NEI 99-01 FA1

Category: 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):

None

ONS Basis:

Fuel Clad, RCS and Containment comprise the fission product barriers. Table F-1 (Attachment 2) 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, the Emergency Coordinator would have greater assurance that escalation to a General Emergency is less imminent.

NEI 99-01 Basis:

None

ONS Basis Reference(s):

1. NEI 99-01 FS1

Category: Fission Product Barrier Degradation

Subcategory: N/A

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

EAL:

FG1.1 General Emergency

Loss of **any** two barriers

AND

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

Mode Applicability:

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

Definition(s):

None

ONS Basis:

Fuel Clad, RCS and Containment comprise the fission product barriers. Table F-1 (Attachment 2) 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

NEI 99-01 Basis:

None

ONS Basis Reference(s):

1. NEI 99-01 FG1

Introduction

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 SG Tube Leakage

B. Inadequate Heat removal

C. CMT Radiation / RCS Activity

D. CMT Integrity or Bypass

E. Emergency Coordinator 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 Loss and Potential Loss column beginning with number one. In this manner, a threshold can be identified by its category title and number. For example, the first Fuel Clad Barrier Loss in Category A would be assigned "FC Loss A.1," the third Containment Barrier Potential Loss in Category C would be assigned "CMT P-Loss C.3," etc.

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.

ATTACHMENT 2
Fission Product Barrier Loss/Potential Loss Matrix and Bases

Table F-1 Fission Product Barrier Threshold Matrix

	Fuel Clad (FC) Barrier		Reactor Coolant System (RCS) Barrier		Containment (CMT) Barrier	
Category	**Loss**	**Potential Loss**	**Loss**	**Potential Loss**	**Loss**	**Potential Loss**
A **RCS or SG Tube Leakage**	None	1. RVLS ≤ 0 (Note 9)	1. An automatic or manual ES actuation required by **EITHER:** • UNISOLABLE RCS leakage • SG tube RUPTURE	1. RCS leakage > normal makeup capacity due to **EITHER:** • UNISOLABLE RCS leakage • SG tube leakage 2. RCS cooldown < 400°F at > 100°F/hr **OR** HPI has operated in the injection mode with **no** RCPs operating	1. A leaking SG is FAULTED outside of containment	None
B **Inadequate Heat Removal**	1. CETCs > 1200°F	1. CETCs > 700°F 2. RCS heat removal **cannot** be established **AND** RCS subcooling < 0 °F	None	1. RCS heat removal **cannot** be established **AND** RCS subcooling < 0 °F 2. HPI forced cooling initiated	None	1. CETCs > 1200°F **AND** Restoration procedures **not** effective within 15 min. (Note 1)
C **CMT Radiation / RCS Activity**	1. 1/2/3RIA 57/58 > Table F-2 column "FC Loss" 2. Coolant activity > 300 μCi/ml DEI	None	1. Containment radiation: • 1,3 RIA 57/58 > 1.0 R/hr • 2 RIA 57 > 1.6 R/hr • 2 RIA 58 > 1.0 R/hr	None	None	1. 1/2/3RIA 57/58 > Table F-2 column "CMT Potential Loss"
D **CMT Integrity or Bypass**	None	None	None	None	1. Containment isolation is required **AND EITHER:** • Containment integrity has been lost based on Emergency Coordinator judgment • UNISOLABLE pathway from Containment to the environment exists 2. Indications of RCS leakage outside of Containment	1. Containment pressure > 59 psig 2. Containment hydrogen concentration > 4% 3. Containment pressure > 10 psig with < one full train of containment heat removal system (1 RBS with > 700 gpm spray flow **OR** 2 RBCUs) operating per design for ≥ 15 min. (Note 1)
E **EC Judgment**	1. **Any** condition in the opinion of the Emergency Coordinator that indicates loss of the fuel clad barrier	1. **Any** condition in the judgment of the Emergency Coordinator that indicates potential loss of the Fuel Clad Barrier	1. **Any** condition in the judgment of the Emergency Coordinator that indicates loss of the RCS Barrier	1. **Any** condition in the judgment of the Emergency Coordinator that indicates potential loss of the RCS Barrier	1. **Any** condition in the judgment of the Emergency Coordinator that indicates loss of the Containment Barrier	1. **Any** condition in the judgment of the Emergency Coordinator that indicates potential loss of the Containment Barrier

Barrier: Fuel Clad

Category: A. RCS or SG Tube Leakage

Degradation Threat: Loss

Threshold:

None

Barrier: Fuel Clad

Category: A. RCS or SG Tube Leakage

Degradation Threat: Potential Loss

Threshold:

1. RVLS ≤ 0" (Note 9)

Note 9: RVLS is **not** valid if **EITHER** of the following exists:
- One or more RCPs are running
  OR
- LPI pump(s) are running **AND** taking suction from the LPI drop line

Definition(s):

None

ONS Basis:

RVLS indicated level ≤ 0" with all RCPs not running and both LPI pumps taking suction from the drop line not running represents reactor vessel level below the bottom of the RCS hotleg (without instrument uncertainty considered). This is the lowest measurable reactor vessel level and is used in lieu of actual reactor vessel level indication of level at or below top of active fuel.

NEI 99-01 Basis:

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

ONS Basis Reference(s):

1. OSC-2820 Emergency Procedure Setpoints, Setpoint No. 7.1.6.5
2. NEI 99-01 RCS or SG Tube Leakage Potential Loss 1.A

Barrier: Fuel Clad

Category: B. Inadequate Heat Removal

Degradation Threat: Loss

Threshold:

1. CETCs > 1200°F

Definition(s):

None

ONS Basis:

CETCs > 1200°F indicates extreme ICC conditions that may result in at least 516°F of superheat.

NEI 99-01 Basis:

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

ONS Basis Reference(s):

1. OSC-2820 Emergency Procedure Setpoints, Setpoint No. 7.1.1.7
2. NEI 99-01 Inadequate Heat Removal Loss 2.A

Barrier: Fuel Clad

Category: B. Inadequate Heat Removal

Degradation Threat: Potential Loss

Threshold:

1. CETCs > 700°F

Definition(s):

None

ONS Basis:

CETCs > 700°F indicates conditions that may result in at least ~16°F of superheat and that may indicate core uncovery.

NEI 99-01 Basis:

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

ONS Basis Reference(s):

1. OSC-2820 Emergency Procedure Setpoints, Setpoint No. 7.1.1.6
2. NEI 99-01 Inadequate Heat Removal Potential Loss 2.A

Barrier: Fuel Clad

Category: B. Inadequate Heat Removal

Degradation Threat: Potential Loss

Threshold:

2. RCS heat removal cannot be established

    AND

    RCS subcooling < 0°F

Definition(s):

None

ONS Basis:

In combination with RCS Potential Loss B.1, meeting this threshold results in a Site Area Emergency.

The combination of these conditions indicates the ultimate heat sink function is under extreme challenge (i.e., superheated). This threshold addresses loss of functions required for hot shutdown with the reactor at pressure and temperature and thus a potential loss of the Fuel Clad Barrier (ref. 1).

NEI 99-01 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 threshold is not warranted.

ONS Basis Reference(s):

1. OSC-2820 Emergency Procedure Setpoints, Setpoint No. 7.1.3.1
2. NEI 99-01 Inadequate Heat Removal Potential Loss 2.B

Barrier: Fuel Clad

Category: C. CMT Radiation / RCS Activity

Degradation Threat: Loss

Threshold:

1. 1/2/3RIA 57/58 > Table F-2 column "FC Loss"

Table F-2 Containment Radiation – R/hr (1/2/3RIA 57/58)				
Time After S/D (Hrs)	**FC Loss**		**CMT Potential Loss**	
	RIA 57	**RIA 58**	**RIA 57**	**RIA 58**
0 - < 0.5	300	140	1500	700
0.5 - < 2.0	80	40	400	195
2.0 - < 8.0	32	15	160	75
≥ 8.0	10	5	50	25

Definition(s):

None

ONS Basis:

The specified containment radiation monitor readings (ref. 1) indicate the release of reactor coolant, with elevated activity indicative of fuel damage, into the Containment. The readings are derived assuming the instantaneous release and dispersal of the reactor coolant noble gas and iodine inventory associated with approximately 4% fuel cladding failure into the Containment atmosphere. Reactor coolant concentrations of this magnitude are several times larger than the maximum concentrations (including iodine spiking) allowed within technical specifications. This value is higher than that specified for RCS barrier Loss #3.

Monitors used for this fission product barrier loss threshold are the Containment High Range Radiation Monitors RIA 57 and RIA 58 (ref. 1).

NEI 99-01 Basis:

The radiation monitor reading 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 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 RCS Barrier Loss threshold C.1 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.

ONS Basis Reference(s):

1. OSC-5283 ONS Core Damage Assessment Guidelines, Rev. 2, 2/27/12
2. NEI 99-01 CMT Radiation / RCS Activity FC Loss 3.A

Barrier: Fuel Clad

Category: C. CMT Radiation / RCS Activity

Degradation Threat: Loss

Threshold:

2. Coolant activity > 300 µCi/ml DEI

Definition(s):

None

Basis:

Elevated reactor coolant activity represents a potential degradation in the level of safety of the plant and a potential precursor of more serious problems. The threshold Dose Equivalent I-131 (DEI) concentration is well above that expected for iodine spikes and corresponds to about 2% to 5% fuel clad damage. When reactor coolant activity reaches this level the Fuel Clad Barrier is considered lost (ref. 1).

NEI 99-01 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 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.

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 Potential Loss threshold associated with RCS Activity / Containment Radiation.

ONS Basis Reference(s):

1. NEI 99-01 CMT Radiation / RCS Activity Fuel Clad Loss 3.B

Barrier: Fuel Clad

Category: C. CMT Radiation / RCS Activity

Degradation Threat: Potential Loss

Threshold:

None

Barrier: Fuel Clad

Category: D. CMT Integrity or Bypass

Degradation Threat: Loss

Threshold:

None

Barrier: Fuel Clad

Category: D. CMT Integrity or Bypass

Degradation Threat: Potential Loss

Threshold:

None

Barrier: Fuel Clad

Category: E. Emergency Coordinator Judgment

Degradation Threat: Loss

Threshold:

1. **Any** condition in the judgment of the Emergency Coordinator that indicates loss of the Fuel Clad Barrier

Definition(s):

None

ONS Basis:

The Emergency Coordinator judgment threshold addresses any other factors relevant to determining if the Fuel Clad Barrier is lost. Such a determination should include imminent barrier degradation, barrier monitoring capability and dominant accident sequences.

- Imminent barrier degradation exists if the degradation will likely occur within relatively short period of time based on a projection of current safety system performance. The term "imminent" refers to recognition of the inability to reach safety function acceptance criteria before completion of all checks.
- Barrier monitoring capability is decreased if there is a loss or lack of reliable indicators. This assessment should include instrumentation operability concerns, readings from portable instrumentation and consideration of offsite monitoring results.
- Dominant accident sequences lead to degradation of all fission product barriers and likely entry to the EOPs. The Emergency Coordinator should be mindful of the Loss of AC power (Station Blackout) and ATWS EALs to assure timely emergency classification declarations.

NEI 99-01 Basis:

This threshold addresses any other factors that are to be used by the Emergency ~~Director~~ Coordinator in determining whether the Fuel Clad barrier is lost

ONS Basis Reference(s):

1. NEI 99-01 Emergency Director Judgment Fuel Clad Loss 6.A

Barrier: Fuel Clad

Category: E. Emergency Coordinator Judgment

Degradation Threat: Potential Loss

Threshold:

1. **Any** condition in the judgment of the Emergency Coordinator that indicates potential loss of the Fuel Clad Barrier

ONS Basis:

The Emergency Coordinator judgment threshold addresses any other factors relevant to determining if the Fuel Clad Barrier is potentially lost. Such a determination should include imminent barrier degradation, barrier monitoring capability and dominant accident sequences.

- Imminent barrier degradation exists if the degradation will likely occur within relatively short period of time based on a projection of current safety system performance. The term "imminent" refers to recognition of the inability to reach safety function acceptance criteria before completion of all checks.
- Barrier monitoring capability is decreased if there is a loss or lack of reliable indicators. This assessment should include instrumentation operability concerns, readings from portable instrumentation and consideration of offsite monitoring results.
- Dominant accident sequences lead to degradation of all fission product barriers and likely entry to the EOPs. The Emergency Coordinator should be mindful of the Loss of AC power (Station Blackout) and ATWS EALs to assure timely emergency classification declarations.

NEI 99-01 Basis:

This threshold addresses any other factors that are to be used by the Emergency Coordinator~~Director~~ in determining whether the Fuel Clad barrier is potentially lost. The Emergency ~~Director~~ Coordinator should also consider whether or not to declare the barrier potentially lost in the event that barrier status cannot be monitored.

ONS Basis Reference(s):

1. NEI 99-01 Emergency Director Judgment Potential Fuel Clad Loss 6.A

Barrier: Reactor Coolant System

Category: A. RCS or SG Tube Leakage

Degradation Threat: Loss

Threshold:

1. An automatic or manual ES actuation required by **EITHER:**
   - UNISOLABLE RCS leakage
   - SG tube RUPTURE

Definition(s):

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

RUPTURE - The condition of a steam generator in which primary-to-secondary leakage is of sufficient magnitude to require a safety injection.

ONS Basis:

A RCS leak should be considered UNISOLABLE if the leak cannot be isolated within 15 minutes

NEI 99-01 Basis:

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 will also be met.

ONS Basis Reference(s):

1. UFSAR Section 7.3 Engineered Safeguards Protective System
2. NEI 99-01 RCS or SG Tube Leakage Reactor Coolant System Loss 1.A

Barrier: Reactor Coolant System

Category: A. RCS or SG Tube Leakage

Degradation Threat: Potential Loss

Threshold:

1. RCS leakage > normal makeup capacity due to **EITHER**:
   - UNISOLABLE RCS leakage
   - SG tube leakage

Definition(s):

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

ONS Basis:

A RCS leak should be considered UNISOLABLE if the leak cannot be isolated within 15 min.

This threshold is based on the inability to maintain liquid inventory within the RCS by normal operation of the High Pressure Injection System (HPI). The HPI includes three pumps. (ref. 1)

Any one HPI pump runout flow rate is 475 gpm (ref. 2).

NEI 99-01 Basis:

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 (SI)~~ES actuation has not occurred. The threshold is met when an operating procedure, or operating crew supervision, directs that a ~~standby charging~~HPI (makeup) pump be placed in service to restore and maintain pressurizer level.

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 will also be met.

ONS Basis Reference(s):

1. UFSAR Section 9.3.2 High Pressure Injection System
2. OSC-2820 Emergency Procedure Setpoints, Setpoint No. 7.3.1.2
3. NEI 99-01 RCS or SG Tube Leakage Reactor Coolant System Potential Loss 1.A

Barrier: Reactor Coolant System

Category: A. RCS or SG Tube Leakage

Degradation Threat: Potential Loss

Threshold:

2.	RCS cooldown to < 400°F at > 100°F/hr **OR** HPI has operated in the injection mode with no RCPs operating

Definition(s):

None

ONS Basis:

400°F is the temperature below which a cooldown greater than 100°F/hr requires implementation of Pressurized Thermal Shock (PTS) guidance (rule 8) (ref. 1, 2).

HPI operating in the injection mode with no RCPs operating also invokes Rule 8 (ref. 3).

NEI 99-01 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 while the RCS is in Mode 3 or higher (i.e., hot and pressurized).

ONS Basis Reference(s):

1. OSC-2820 Emergency Procedure Setpoints, Setpoint No. 7.1.2.7
2. OSC-2820 Emergency Procedure Setpoints, Setpoint No. 7.1.8.7
3. EP/*/A/1800/001 Rule 8 Pressurized Thermal Shock (PTS)
4. 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:

1. RCS heat removal cannot be established

   AND

   RCS subcooling < 0°F

Definition(s):

None

ONS Basis:

In combination with FC Potential Loss B.1, meeting this threshold results in a Site Area Emergency.

The combination of these conditions indicates the ultimate heat sink function is under extreme challenge (i.e., superheated). This threshold addresses loss of functions required for hot shutdown with the reactor at pressure and temperature and thus a potential loss of the RCS Barrier.

NEI 99-01 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 threshold is not warranted.

Meeting this threshold results in a Site Area Emergency because this threshold is identical to Fuel Clad Barrier Potential Loss threshold ~~2.~~B.2; 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 RCS pressure to the point where mass will be lost from the system.

ONS Basis Reference(s):

1. OSC-2820 Emergency Procedure Setpoints, Setpoint No. 7.1.3.6
2. NEI 99-01 Inadequate Heat Removal RCS Loss 2.B

Barrier: Reactor Coolant System

Category: B. Inadequate Heat Removal

Degradation Threat: Potential Loss

Threshold:

2. HPI forced cooling initiated

Definition(s):

None

ONS Basis:

HPI Forced Cooling (Rule 4) is used when the SGs are not capable of heat removal and RCS pressure is greater than 2300 psig. A Pressurizer PORV is opened to relieve pressure until HPI cools the reactor (feed and bleed). (ref. 1)

NEI 99-01 Basis:

None

ONS Basis Reference(s):

1. OSC-2820 Emergency Procedure Setpoints, Setpoint No. 7.1.4.16
2. NEI 99-01 Other Indications Potential Loss 5.A

Barrier: Reactor Coolant System

Category: C. CMT Radiation/ RCS Activity

Degradation Threat: Loss

Threshold:

1. Containment radiation:
   - 1,3 RIA 57/58 > 1.0 R/hr
   - 2 RIA 57 > 1.6 R/hr
   - 2 RIA 58 > 1.0 R/hr

Definition(s):

N/A

ONS Basis:

Containment radiation monitor readings greater than the specified values (ref. 1) indicate the release of reactor coolant to the Containment. The readings assume the instantaneous release and dispersal of the reactor coolant noble gas and iodine inventory associated with normal operating concentrations (i.e., within Technical Specifications) into the Containment atmosphere. Because of the very high fuel clad integrity, only small amounts of noble gases would be dissolved in the primary coolant.

Monitors used for this fission product barrier loss threshold are the Containment High Range Radiation Monitors RIA-57 and RIA-58. The difference in the threshold values is due to the relative strength of the detector check source which affects the background readings for the detector (the source for 2RIA-57 is stronger than that for the other detectors). (ref. 1)

NEI 99-01 Basis:

The radiation monitor reading corresponds to an instantaneous release of all reactor coolant mass into the containment, assuming that reactor coolant activity equals Technical Specification allowable limits. This value is lower than that specified for Fuel Clad Barrier Loss threshold ~~3.~~AC.1 since it indicates a loss of the RCS Barrier only.

There is no Potential Loss threshold associated with RCS Activity / Containment Radiation.

ONS Basis Reference(s):

1. OSC-4244 ONS High Range Containment Monitor Correlation Factors for RIA-57 and RIA-58
2. NEI 99-01 CMT Radiation / RCS Activity RCS Loss 3.A

Barrier: Reactor Coolant System

Category: B. CMT Radiation/ RCS Activity

Degradation Threat: Potential Loss

Threshold:

None

Barrier: Reactor Coolant System

Category: D. CMT Integrity or Bypass

Degradation Threat: Loss

Threshold:

None

Barrier: Reactor Coolant System

Category: D. CMT Integrity or Bypass

Degradation Threat: Potential Loss

Threshold:

None

Barrier: Reactor Coolant System

Category: E. Emergency Coordinator Judgment

Degradation Threat: Loss

Threshold:

1. **Any** condition in the judgment of the Emergency Coordinator that indicates loss of the RCS Barrier

Definition(s):

None

ONS Basis:

The Emergency Coordinator judgment threshold addresses any other factors relevant to determining if the RCS Barrier is lost. Such a determination should include imminent barrier degradation, barrier monitoring capability and dominant accident sequences.

- Imminent barrier degradation exists if the degradation will likely occur within relatively short period of time based on a projection of current safety system performance. The term "imminent" refers to recognition of the inability to reach safety function acceptance criteria before completion of all checks.
- Barrier monitoring capability is decreased if there is a loss or lack of reliable indicators. This assessment should include instrumentation operability concerns, readings from portable instrumentation and consideration of offsite monitoring results.
- Dominant accident sequences lead to degradation of all fission product barriers and likely entry to the EOPs. The Emergency Coordinator should be mindful of the Loss of AC power (Station Blackout) and ATWS EALs to assure timely emergency classification declarations.

NEI 99-01 Basis:

This threshold addresses any other factors that may be used by the Emergency ~~Director~~ Coordinator in determining whether the RCS Barrier is lost.

ONS Basis Reference(s):

1. NEI 99-01 Emergency Director Judgment RCS Loss 6.A

Barrier: Reactor Coolant System

Category: E. Emergency Coordinator Judgment

Degradation Threat: Potential Loss

Threshold:

1. **Any** condition in the judgment of the Emergency Coordinator that indicates potential loss of the RCS Barrier

Definition(s):

None

ONS Basis:

The Emergency Coordinator judgment threshold addresses any other factors relevant to determining if the RCS Barrier is potentially lost. Such a determination should include imminent barrier degradation, barrier monitoring capability and dominant accident sequences.

- Imminent barrier degradation exists if the degradation will likely occur within relatively short period of time based on a projection of current safety system performance. The term "imminent" refers to recognition of the inability to reach safety function acceptance criteria before completion of all checks.
- Barrier monitoring capability is decreased if there is a loss or lack of reliable indicators. This assessment should include instrumentation operability concerns, readings from portable instrumentation and consideration of offsite monitoring results.
- Dominant accident sequences lead to degradation of all fission product barriers and likely entry to the EOPs. The Emergency Coordinator should be mindful of the Loss of AC power (Station Blackout) and ATWS EALs to assure timely emergency classification declarations.

NEI 99-01 Basis:

This threshold addresses any other factors that may be used by the Emergency ~~Director~~ Coordinator 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.

ONS Basis Reference(s):

1. NEI 99-01 Emergency Director Judgment RCS Potential Loss 6.A

Barrier: Containment

Category: A. RCS or SG Tube Leakage

Degradation Threat: Loss

Threshold:

1. A leaking SG is 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.

ONS Basis:

None

NEI 99-01 Basis:

This threshold addresses a leaking Steam Generator (SG) that is also FAULTED outside of containment. The condition of the SG ~~, whether leaking or RUPTURED~~leakage, is determined in accordance with the thresholds for RCS Barrier Potential Loss ~~1.~~A.1 and Loss ~~1.~~A.1, 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 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~~. 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.

Steam releases associated with the expected operation of a SG ~~power operated relief valve or safety relief valve~~ Atmospheric Dump Valve(s) 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 an SG tube leak ~~or rupture~~, there may be minor radiological releases through a secondary-side system component (e.g., air ejectors, gland seal exhausters, valve packing, steam traps, terry turbine exhaust, etc.). These types of releases do not constitute a loss or potential loss of containment but should be evaluated using the Recognition Category ~~A~~R ICs.

The ~~emergency classification level~~ECLs resulting from primary-to-secondary leakage, with or without a steam release from the FAULTED SG, are summarized below.

	Affected SG 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)~~ Greater than normal makeup pump capacity (*RCS Barrier Potential Loss*)	Site Area Emergency per FS1.1	Alert per FA1.1
Requires an automatic or manual ECCS (~~SIAS~~ES) actuation (*RCS Barrier Loss*)	Site Area Emergency per FS1.1	Alert per FA1.1

There is no Potential Loss threshold associated with RCS or SG Tube Leakage.

ONS Basis Reference(s):

1. NEI 99-01 RCS or SG Tube Leakage Containment Loss 1.A

Barrier: Containment

Category: A. RCS or SG Tube Leakage

Degradation Threat: Potential Loss

Threshold:

None

Barrier: Containment

Category: B. Inadequate Heat Removal

Degradation Threat: Loss

Threshold:

None

ATTACHMENT 2
Fission Product Barrier Loss/Potential Loss Matrix and Bases

Barrier: Containment

Category: B. Inadequate Heat Removal

Degradation Threat: Potential Loss

Threshold:

1. CETCs > 1200°F **AND** Restoration procedures **not** effective within 15 min. (Note 1)

Note 1: The Emergency Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.

Definition(s):

None

ONS Basis:

Core Exit Thermocouples (CETCs) are a component of Inadequate Core Cooling Instrumentation and provide an indirect indication of fuel clad temperature by measuring the temperature of the reactor coolant that leaves the core region. Although clad rupture due to high temperature is not expected for CETC readings less than the threshold, temperatures of this magnitude signal significant superheating of the reactor coolant and core uncover (ref. 1).

The restoration procedures are those emergency operating procedures that address the recovery of the RCS and core heat removal acceptance criteria. The procedure is considered effective if the temperature is decreasing or if the vessel water level is increasing (ref. 1).The 15 minute threshold starts when operator action begins taking procedurally directed functional recovery actions.

If CETC readings are greater than 1,200°F, Fuel Clad barrier is also lost.

NEI 99-01 Basis:

This threshold addresses any other factors that may be used by the Emergency ~~Director~~ Coordinator 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.

ONS Basis Reference(s):

1. EP/1,2,3/A/1800/001 Inadequate Core Cooling
2. NEI 99-01 Inadequate Heat Removal Containment Potential Loss 2.A

Barrier: Containment

Category: C. CMT Radiation/RCS Activity

Degradation Threat: Loss

Threshold:

None

Barrier: Containment

Category: C. CMT Radiation/RCS Activity

Degradation Threat: Potential Loss

Threshold:

1. 1/2/3RIA 57/58 > Table F-2 column "CMT Potential Loss"

Table F-2 Containment Radiation – R/hr (1/2/3RIA 57/58)

Time After S/D (Hrs)	FC Loss		CMT Potential Loss	
	RIA 57	RIA 58	RIA 57	RIA 58
0 - < 0.5	300	140	1500	700
0.5 - < 2.0	80	40	400	195
2.0 - < 8.0	32	15	160	75
≥ 8.0	10	5	50	25

Definition(s):

None

ONS Basis:

Containment radiation monitor readings greater than the values shown (ref. 1) indicate significant fuel damage well in excess of that required for loss of the RCS Barrier and the Fuel Clad Barrier.

The specified containment radiation monitor readings (ref. 1) indicate the release of reactor coolant, with significant fuel damage well in excess of that required for loss of the RCS Barrier and the Fuel Clad Barrier, into the Containment. The readings are derived assuming the instantaneous release and dispersal of the reactor coolant noble gas and iodine inventory associated with 20% clad failure into the Containment atmosphere.

Containment radiation readings at or above the Containment Barrier Potential Loss threshold signify a loss of two fission product barriers and Potential Loss of a third, indicating the need to upgrade the emergency classification to a General Emergency.

Monitors used for this fission product barrier loss threshold are the Containment High Range Radiation Monitors RIA-57 and RIA-58 (ref. 1).

NEI 99-01 Basis:

The 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. 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.

ONS Basis Reference(s):

1. OSC-5283 ONS Core Damage Assessment Guidelines, Rev. 2, 2/27/12
2. NEI 99-01 CMT Radiation / RCS Activity Containment Potential Loss 3.A

Barrier: Containment

Category: D. CMT Integrity or Bypass

Degradation Threat: Loss

Threshold:

1. Containment isolation is required

   AND EITHER:

   - Containment integrity has been lost based on Emergency Coordinator judgment
   - UNISOLABLE pathway from Containment to the environment exists

Definition(s):

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

ONS Basis:

The pathway should be considered UNISOLABLE if the Containment cannot be isolated within 15 min.

Reactor Building Essential and Non-essential Isolation occurs on an Engineered Safeguards signal of 3 psig (ref. 1).

NEI 99-01 Basis:

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~~ Coordinator 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~~R 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.

Refer to the top piping run of Figure ~~9-F-~~41. 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-~~41. 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 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~~R ICs.

The status of the containment barrier during an event involving steam generator tube leakage is assessed using Loss Threshold ~~1.~~A.1.

ONS Basis Reference(s):

1. UFSAR Section 6.2.3 Containment Isolation System
2. NEI 99-01 CMT Integrity or Bypass Containment Loss 4.A

Barrier: Containment

Category: D. CMT Integrity or Bypass

Degradation Threat: Loss

Threshold:

2. Indications of RCS leakage outside of Containment

Definition(s):

None

ONS Basis:

None

NEI 99-01 Basis:

Containment sump, temperature, pressure and/or radiation levels will increase if reactor coolant mass is leaking into the containment. If these parameters have not increased, then the reactor coolant mass may be leaking outside of containment (i.e., a containment bypass sequence). Increases 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 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.

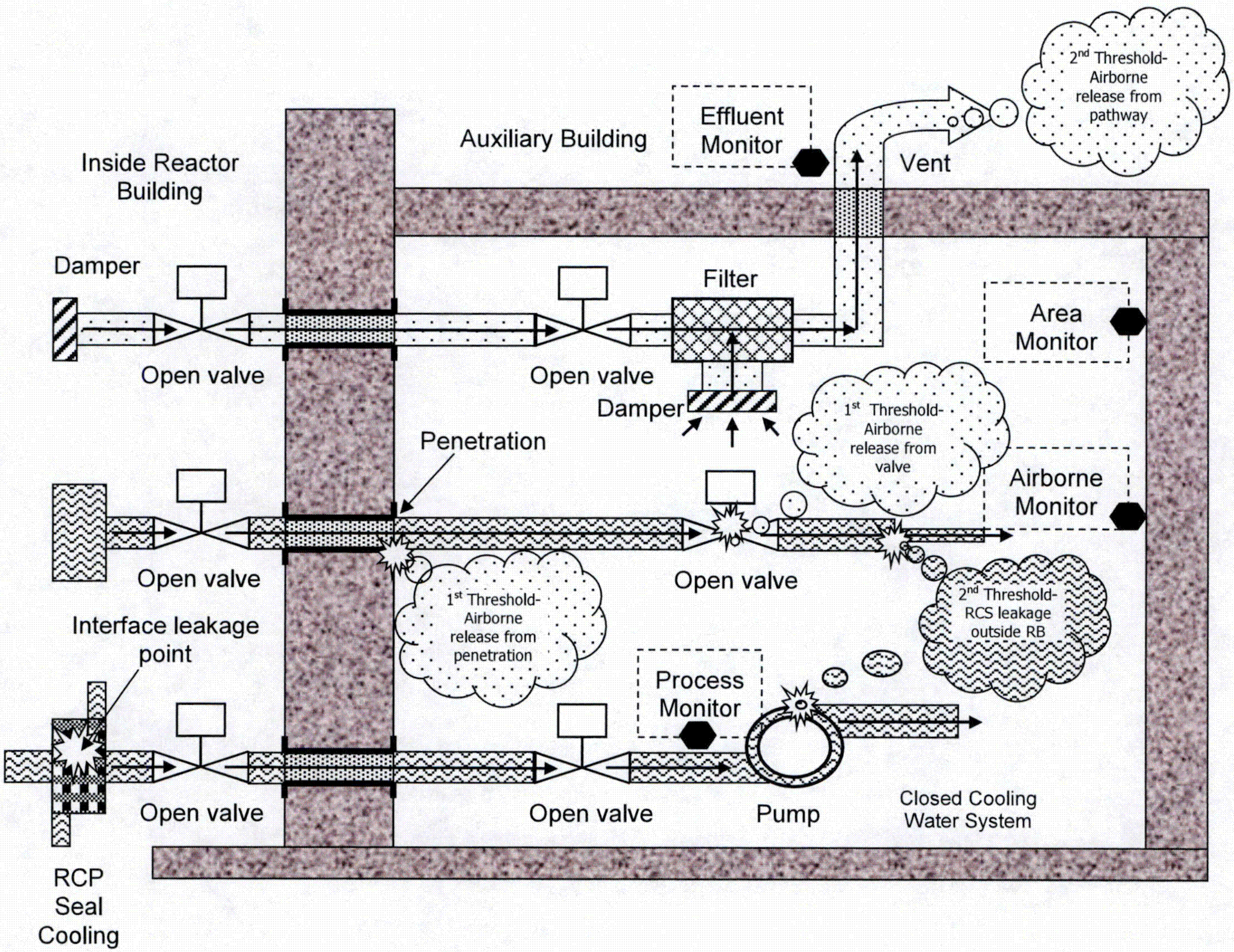
Refer to the middle piping run of Figure ~~9-F-~~41. In this simplified example, a leak has occurred at a reducer on a pipe carrying reactor coolant in the Auxiliary Building. Depending upon radiation monitor locations and sensitivities, the leakage could be detected by any of the four monitors depicted in the figure and cause threshold ~~4.A~~D.1 to be met as well.

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 and/or Potential Loss threshold ~~1.~~A.1 to be met.

ONS Basis Reference(s):

1. NEI 99-01 CMT Integrity or Bypass Containment Loss

Figure 1: Containment Integrity or Bypass Examples



Barrier: Containment

Category: D. CMT Integrity or Bypass

Degradation Threat: Potential Loss

Threshold:

1. Containment pressure > 59 psig

Definition(s):

None

ONS Basis:

The Reactor Building is designed for an internal pressure of 59 psig (ref. 1).

NEI 99-01 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.

ONS Basis Reference(s):

1. UFSAR Section 6.2.1 Containment Functional Design
2. NEI 99-01 CMT Integrity or Bypass Containment Potential Loss 4.A

Barrier: Containment

Category: D. CMT Integrity or Bypass

Degradation Threat: Potential Loss

Threshold:

2. Containment hydrogen concentration ≥ 4%

Definition(s):

None

ONS Basis:

Following a design basis accident, hydrogen gas may be generated inside the containment by reactions such as zirconium metal with water, corrosion of materials of construction and radiolysis of aqueous solution in the core and sump.

The 4% hydrogen concentration threshold is generally considered the lower limit for hydrogen deflagrations. ONS is equipped with a Containment Hydrogen Monitoring System (CHMS) that provides continuous indication of hydrogen concentration in the containment atmosphere. The measurement capability is provided over the range of 0% to 10%. A continuous indication of the hydrogen concentration is not required in the control room at all times during normal operation. If continuous indication of the hydrogen concentration is not available at all times, continuous indication and recording shall be functioning within 90 minutes of the initiation of the safety injection. (ref. 1, 2)

NEI 99-01 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). 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.

ONS Basis Reference(s):

1. UFSAR Section 9.3.7 Containment Hydrogen Monitoring System
2. UFSAR Section 15.16.3 Evaluation of Hydrogen Concentrations
3. NEI 99-01 CMT Integrity or Bypass Containment Potential Loss 4.B

Barrier: Containment

Category: D. CMT Integrity or Bypass

Degradation Threat: Potential Loss

Threshold:

3.	Containment pressure > 10 psig with < one full train of containment heat removal system (1 RBS with > 700 gpm spray flow **OR** 2 RBCUs) operating per design for ≥ 15 min. (Note 1)

Note 1: The Emergency Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.

Definition(s):

None

ONS Basis:

Two engineered safeguards systems, the Reactor Building Spray System and the Reactor Building Cooling System, are provided to remove heat from the containment atmosphere following an accident. Both the Reactor Building Spray System and the Reactor Building Cooling System, with either at full capacity, are individually capable of maintaining the containment pressure below the design limit following a LOCA or MSLB. (ref. 1, 3)

- The Reactor Building Spray (RBS) System consists of two separate trains of equal capacity. Spray flow greater or equal to 700 gpm satisfies the spray flow design requirement. The Reactor Building pressure setpoint (10 psig) is the pressure at which the Reactor Building Spray equipment should actuate and begin performing its function (ref. 1, 2, 3, 4).

- Each of three Reactor Building Cooling Units (RBCUs) consists of a fan, cooling coils, and the required distribution duct work. The Reactor Building atmosphere is circulated past cooling coils by fans and returned to the building. Cooling water for the cooling units is supplied by the Low Pressure Service Water System. The Reactor Building Cooling System provides the design heat removal capacity with two of three coolers operating (ref. 1).

NEI 99-01 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.

ONS Basis Reference(s):

1. UFSAR Section 6.2.2 Containment Heat Removal Systems
2. UFSAR Table 7-2 Engineered Safeguards Actuation Conditions
3. UFSAR Table 6-25 Minimum Acceptable Combinations of Containment Heat Removal Equipment Performance
4. OSC-02820 Emergency Procedure Setpoints, Setpoint No. 7.4.1.2
5. NEI 99-01 CMT Integrity or Bypass Containment Potential Loss 4.C

Barrier: Containment

Category: E. Emergency Coordinator Judgment

Degradation Threat: Loss

Threshold:

1. **Any** condition in the judgment of the Emergency Coordinator that indicates loss of the Containment Barrier

Definition(s):

None

ONS Basis:

The Emergency Coordinator judgment threshold addresses any other factors relevant to determining if the Containment Barrier is lost. Such a determination should include imminent barrier degradation, barrier monitoring capability and dominant accident sequences.

- Imminent barrier degradation exists if the degradation will likely occur within relatively short period of time based on a projection of current safety system performance. The term "imminent" refers to recognition of the inability to reach safety function acceptance criteria before completion of all checks.
- Barrier monitoring capability is decreased if there is a loss or lack of reliable indicators. This assessment should include instrumentation operability concerns, readings from portable instrumentation and consideration of offsite monitoring results.
- Dominant accident sequences lead to degradation of all fission product barriers and likely entry to the EOPs. The Emergency Coordinator should be mindful of the Loss of AC power (Station Blackout) and ATWS EALs to assure timely emergency classification declarations.

NEI 99-01 Basis:

This threshold addresses any other factors that may be used by the Emergency ~~Director~~ Coordinator in determining whether the Containment Barrier is lost.

ONS Basis Reference(s):

1. NEI 99-01 Emergency Director Judgment PC Loss 6.A

Barrier: Containment

Category: E. Emergency Coordinator Judgment

Degradation Threat: Potential Loss

Threshold:

1. **Any** condition in the judgment of the Emergency Coordinator that indicates potential loss of the Containment Barrier

Definition(s):

None

ONS Basis:

The Emergency Coordinator judgment threshold addresses any other factors relevant to determining if the Containment Barrier is potentially lost. Such a determination should include imminent barrier degradation, barrier monitoring capability and dominant accident sequences.

- Imminent barrier degradation exists if the degradation will likely occur within relatively short period of time based on a projection of current safety system performance. The term "imminent" refers to recognition of the inability to reach safety function acceptance criteria before completion of all checks.
- Barrier monitoring capability is decreased if there is a loss or lack of reliable indicators. This assessment should include instrumentation operability concerns, readings from portable instrumentation and consideration of offsite monitoring results.
- Dominant accident sequences lead to degradation of all fission product barriers and likely entry to the EOPs. The Emergency Coordinator should be mindful of the Loss of AC power (Station Blackout) and ATWS EALs to assure timely emergency classification declarations.

NEI 99-01 Basis:

This threshold addresses any other factors that may be used by the Emergency ~~Director~~ Coordinator in determining whether the Containment Barrier is lost.

ONS Basis Reference(s):

1. NEI 99-01 Emergency Director Judgment PC Potential Loss 6.A

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.

ONS Table R-2 and H-2 Bases

NEI 99-01 Rev 06 addresses elevated radiation levels and hazardous gases 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 shutdown and cool down.

Power Operation was reviewed to determine if any actions are "necessary" to maintain power operations. Over reasonable periods (several days), there are some actions outside the Control Room that are required to be performed to maintain normal operations. The following table lists the locations into which an operator may be dispatched in order perform a normal plant operation, shutdown and cool down.

The review was completed using the following procedures as the controlling documents:

- OP/*/A/1102/010 (Controlling Procedure for Unit Shutdown)
- OP/*/A/1106/001 (Turbine Generator)
- OP/*/A/1106/015 (EHC System)
- OP/*/A/1103/004A (RCS Boration)
- OP/*/A/1104/027 (Bleed Transfer Pump Recirculation)
- PT/*/A/0600/001 B (Surveillance to go to Mode 3)
- OP/*/A/1102/010 (Unit SD Mode 1 to Mode 3)
- IP/*/A/0200/047 (LTOP Calibration)
- OP/*/A/1103/006 (RCP Operations)
- OP/*/A/1104/012 (CCW Pump Operations)
- CP/1/A/2002/014 (RCS Sampling)
- OP/*/A/1104/049 (LTOP Operation)
- OP/1/A/1104/001 (Core Flood Operations)
- OP/0/A/1104/048 (TBS Operations)
- OP/*/A/1104/004 (Low Pressure Injection System)
- OP/*/A/1103/008 (RCS Crud Burst)

Travel paths to the locations where the equipment is operated were considered as part of the determination of affected rooms. ONS Reactor and Auxiliary Building design consist of mostly single entry rooms located off of a common hallway, therefore access to the hallway is required to access a given room. Some equipment is located within the hallway itself.

Room	Mode	Procedure	Enclosure	Steps
TB	1	OP/1/A/1102/010	4.1	Unit SD
TB	1	OP/1/A/1106/001	4.2	TG
TB	1	OP/1/A/1106/014	4.3	MSRH
TB	1	OP/1/A/1106/015	4.2	EHC
A-2 LDST Hatch area	1,2,3	OP/1/A/1103/004 A	4.1	RCS Boration
A-1 hallway 8' S/ col 65	1,2,3	OP/1/A/1103/004 A	4.2	RCS Boration
A-1 hallway 8' S/ col 65	1,2,3	OP/1/A/1103/004 A	4.3	RCS Boration
Unit 1 BTP Rm	1,2,3	OP/1/A/1103/004 A	4.3	RCS Boration

Unit 1 BTP Rm	1,2,3	OP/1/A/1103/004 A	4.4	RCS Boration
A-1 hallway 8' S/ col 65	1,2,3	OP/1/A/1103/004 A	4.4	RCS Boration
A-2-Unit 2 LDST Hatch area	1,2,3	OP/1/A/1103/004 A	4.4	RCS Boration
Unit 2 BTP Rm	1,2,3	OP/1/A/1103/004 A	4.4	RCS Boration
A-1-hallway N of Col 82	1,2,3	OP/1/A/1103/004 A	4.4	RCS Boration
A-1 hallway 5' S/ col 67	1,2,3	OP/1/A/1103/004 A	4.4	RCS Boration
A-1 hallway col 82	1,2,3	OP/1/A/1103/004 A	4.4	RCS Boration
A-2 Unit 3 LDST Hatch area	1,2,3	OP/1/A/1103/004 A	4.5	RCS Boration
Unit 3 BTP Rm	1,2,3	OP/1/A/1103/004 A	4.5	RCS Boration
A-1 hallway 10' S/col 96)	1,2,3	OP/1/A/1103/004 A	4.5	RCS Boration
A-1 hallway 5' S/ col 67	1,2,3	OP/1/A/1103/004 A	4.5	RCS Boration
LPI Cooler Rm 1' W/ North door	1,2,3	OP/1/A/1103/004 A	4.5	RCS Boration
A-1- BAMT Rm	1	OP/1/A/1103/004 A	4.6	RCS Boration
A-1 Unit 1 & 2 BAMT Rm	1	OP/1/A/1103/004 A	4.6	RCS Boration
Rm 111	1	OP/1/A/1103/004 A	4.6	RCS Boration
A-2 LDST Hatch area	1	OP/1/A/1103/004 A	4.6	RCS Boration
CTT Rm	1	OP/1/A/1103/004 A	4.6	RCS Boration
A-2-1&2 Chem. Add Panel	1	OP/1/A/1103/004 A	4.6	RCS Boration
A-1-Col Q70	1	OP/1/A/1103/004 A	4.7	RCS Boration
A-2-LDST Hatch area	1	OP/1/A/1103/004 A	4.7	RCS Boration
A-1-Unit 1 CBAST Rm	1	OP/1/A/1103/004 A	4.7	RCS Boration
Unit 1 BTP Rm	1	OP/1/A/1104/027	4.19	BTP Recirc
Unit 1 BTP Rm	1	OP/1/A/1104/027	4.20.	BTP Recirc
	1	OP/1/A/1102/010	4.2	Unit SD
	1	PT/1/A/0600/001 B	13.2	Surv. Mode3
Unit 1-BTP Rm	1,2	OP/1/A/1103/004	4.5	Makeup
Unit 1-BTP Rm	1,2	OP/1/A/1103/004	4.6	Makeup
	1,2,3	OP/1/A/1102/010	4.3	SD Mode 1 to 3
	3	OP/1/A/1102/010	4.4	
RB 779', Cable Room, 1UB2	3	IP/1/A/0200/047		LTOP Calibration
RB 779'	3	IP/1/A/0200/047		LTOP Calibration
1UB2	3	IP/1/A/0200/047		LTOP Calibration
1AT7	3	IP/1/A/0200/047		LTOP Calibration
1MTC-4	3	IP/1/A/0200/047		LTOP Calibration
1AT5	3	IP/1/A/0200/047		LTOP Calibration
LPI Cooler Room	3	OP/1/A/1103/006	4.12	
	3	OP/1/A/1102/010	4.7	
		OP/1/A/1104/012 A	4.2	CCW Pump
	3	OP/1/A/1102/010	4.7	
Unit 1 Primary Sample Hood		CP/1/A/2002/014	4.2	
AB SAMPLE RM.308		CP/1/A/2002/014	4.2	
A-4-402 PZR Heaters	3	OP/1/A/1102/010	4.7	

ATTACHMENT 3

Safe Operation & Shutdown Rooms/Areas Tables R-2 & H-2 Bases

Equip Rm XO/XP	3	OP/1/A/1102/010	4.7	
Equip Rm XO/XP	3	OP/1/A/1104/049	4.2	
A-4-402 PZR Heaters	3	OP/1/A/1104/049	4.2	
	3	OP/1/A/1104/001	4.14	
A-4-409	3	OP/1/A/1104/001	4.4	
A-3-308	3	OP/1/A/1104/001	4.4	
A-2 Hallway	3	OP/1/A/1104/001	4.4	
R-1G-W	3	OP/1/A/1104/001	4.4	
R-1-around "A" CFT	3	OP/1/A/1104/001	4.4	
R-B above Emer Sump	3	OP/1/A/1104/001	4.4	
R-B above RBNS	3	OP/1/A/1104/001	4.4	
R-1-around "B" CFT	3	OP/1/A/1104/001	4.4	
R-B-20' above LD Clr RM	3	OP/1/A/1104/001	4.4	
Equip Rm XO/XP	3	OP/1/A/1104/001	4.14	
A-4-W Pent Rm	3	OP/1/A/1104/001	4.14	
A-4-E Pent	3	OP/1/A/1104/049	4.2	
R-3G East Side	3	OP/1/A/1104/049	4.2	
A-4-402	3	OP/1/A/1104/049	4.2	LTOP Alignment
A-2-Col. P-63)	3	OP/1/A/1104/049	4.2	LTOP Alignment
T-3-Equip Rm)	3	OP/1/A/1104/049	4.2	LTOP Alignment
	3	OP/1/A/1102/010	4.7	
	3	OP/1/A/1102/010	4.15	
A-2-Unit 1 BAMT, in hallway	3	OP/1/A/1104/002	4.17	
Turbine Building	3	OP/1/A/1106/002 A	4.14	
Turbine Building	3	OP/0/A/1104/048	4.4	Step 3.7
		OP/1/A/1102/010	4.7	
		Next actions---LPI		
LPI System Start-up (CR & SSF-CR)	3	OP/1/A/1104/004	4.2	LPI Fill & S/U
AB 1st Floor	3	OP/1/A/1104/004	4.5	Valve lineup for LPI
AB Pent. Rooms	3	OP/1/A/1102/010	4.1	Breaker line up S/D
TB-3 & CR	3	OP/1/A/1102/010		Secondary Steam SD
TB All Levels	3	OP/1/A/1102/010	4.1	Align FDW clean-up
AB-2	4 & 5	OP/1/A/1102/010	4.11	RCS H2 Sampling
RB, AB-1, 2 & 3rd	5	OP/1/A/1103/008		RCS Crud Burst

ATTACHMENT 3

Safe Operation & Shutdown Rooms/Areas Tables R-2 & H-2 Bases

Unit Shutdown Room List	Mode
Turbine Building	1,2,3
A-1 hallway 8' S/ col 65	1,2,3
A-1-hallway N of Col 82	1,2,3
A-1 hallway 5' S/ col 67	1,2,3
A-1 hallway col 82	1,2,3
A-1 hallway 10' S/col 96)	1,2,3
A-1- BAMT Rm	1
A-1 Unit 1 & 2 BAMT Rm	1
A-1-Col Q70	1
A-2 LDST Hatch area	1,2,3
A-2-Unit 2 LDST Hatch area	1,2,3
A-2 Unit 3 LDST Hatch area	1,2,3
A-2-1&2 Chem. Add Panel	1
A-2-Col. P-63	3
A-2-Unit 1 BAMT, in hallway	3
A-2 Hallway	3
A-3-308	3
A-4-402	3
A-4-409	3
A-4-W Pent Rm	3
A-4-E Pent	3
Unit 1 BTP Rm	1,2,3
Unit 2 BTP Rm	1,2,3
Unit 3 BTP Rm	1,2,3
U1 LPI Cooler Rm	1,2,3
RB 779', Cable Room, 1UB2	3
RB 779'	3
R-1G-W	3
R-1-around "A" CFT	3
R-1-around "B" CFT	3
R-B above Emer. Sump	3
R-B above RBNS	3
R-B-20' above LD Cooler RM	3
R-3G East Side	3
1UB2	3
1AT7	3
1MTC-4	3
1AT5	3
Unit 1 Primary Sample Hood	3
AB SAMPLE RM.308	3
RB, AB	4 & 5

Table R-2 & H-2 Results

Table R-2 & H-2 Safe Operation & Shutdown Rooms/Areas	
Room/Area	**Mode Applicability**
Turbine Building	1, 2, 3
Equipment and Cable Rooms	1, 2, 3
Auxiliary Building	1, 2, 3, 4, 5
Reactor Buildings	3, 4, 5

ENCLOSURE 5

Oconee Nuclear Station (ONS) Radiological Effluent EAL Values

27 Pages Follow

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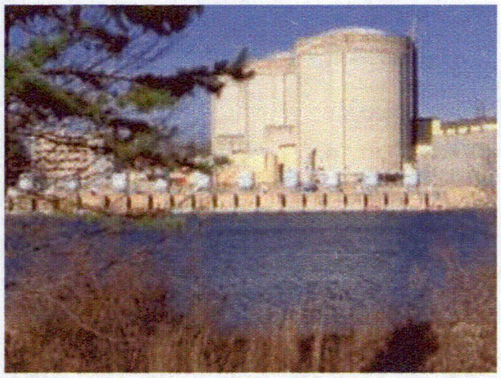

Oconee Nuclear Station (ONS)

Radiological Effluent EAL Values

EP-EALCALC-ONS-1401
Revision 0

Document Author: Scott McCain

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EPM Approval: Pat Street

Document Author: 02/26/15

Technical Reviewer: 02/26/15

EPM Approval: 03/05/15

Table of Contents

1. Purpose

The Oconee Nuclear Station (ONS) 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 Rev. 6 EAL guidance methodology. This calculation document provides additional technical detail specific to the derivation of the gaseous and liquid radiological effluent EAL values developed in accordance with the guidance in NEI 99-01 Rev. 6.

Documentation of the assumptions, calculations and results are provided for the ONS Rx1 series EAL effluent monitor values associated the NEI 99-01 Rev 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. RU1.1 Liquid Threshold Limits

Guidance Criteria

The RU1 Initiating Condition (IC) addresses a release of gaseous or liquid radioactivity greater than 2 times the Offsite Dose Calculation Manual (ODCM) limits for 60 minutes or longer.

ONS Bases

The ODCM Executive Summary section (which references to TS 5.5.5(b) and SLC 16.11.1(a)) limits for the concentration of radioactive liquid effluents released from the site to the unrestricted area are as follows:

- 10 times the effluent concentration (EC) levels of 10CFR20, Appendix B, Table 2
- 2.0E-04 µCi/ml for dissolved and entrained noble gases

The RU1.1 liquid effluent EAL threshold values will equate to 2 times the ODCM limit.

2.1.2. RU1.1 Gaseous Threshold Limits

Guidance Criteria

The RU1 Initiating Condition (IC) addresses a release of gaseous or liquid radioactivity greater than 2 times the Offsite Dose Calculation Manual (ODCM) limits for 60 minutes or longer.

ONS Bases

The ODCM Executive Summary section (with references to TS 5.5.5(g) and SLC 16.11.2(a)) 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 whole 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)

  Inhalation (internal organ) limits are not applicable for EAL threshold determination since the specified surveillance involves collection and analysis of composite samples. This after-the-fact assessment (individual uptake) could not be made in a timely manner conducive to accident classification.

The RU1.1 gaseous effluent EAL threshold values will equate to 2 times the ODCM limit for the lesser of the whole body or skin exposure pathways.

2.1.3. RA1.1 Liquid Threshold Limits

Guidance Criteria

The RA1 Initiating Condition (IC) 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.

ONS Bases

The liquid effluent limits are based on the 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). The 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.

Additionally, significant dilution assumptions are incorporated in determining ODCM ingestion limits for liquid releases such that obtaining a dose of 10 mrem in one hour would require a discharge concentration above the effluent monitor threshold (ingestion of radioactivity from a liquid release at the site boundary is not practical).

Thus, the site specific EALs will not contain the RA1.1 liquid effluent monitor threshold value that equates to 1% of the EPA PAG. However, EALs RA1.3 and RA1.4 will remain applicable for liquid effluent releases that exceed the threshold based upon sample and field survey results.

2.1.4. RA1.1 Gaseous Threshold Limits

Guidance Criteria

The RA1 IC 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.

ONS Bases

The gaseous effluent limits for RA1.1 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. RS1.1 Gaseous Threshold Limits

Guidance Criteria

The RS1 IC 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.

ONS Bases

The gaseous effluent limits for RS1.1 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. RG1.1 Gaseous Threshold Limits

Guidance Criteria

The RG1 IC 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.

ONS 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 RU1 IC addresses normally occurring continuous radioactivity releases from monitored gaseous or liquid effluent pathways (EAL #1) and planned batch releases from non-continuous release pathways (EAL #2).

Per NEI 99-01, the RA1 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.

ONS Bases

There are two liquid radwaste discharge points to the environment at ONS (ODCM 2.0.1):

1. The liquid radwaste effluent line to the Keowee Hydroelectric Unit Tailrace – RIA-33

   Normal dilution flow for this pathway is 3.41E+04 gpm, which is based on;

   - a total leak rate of 1.71E+04 gpm from Keowee Hydro units (8.53E+03 gpm per unit), and
   - the Keowee Hydro Fire Protection liquid waste release mixing line flow of 1.71E+04 gpm.

   When Keowee Hydro enters an outage one of the two units is taken offline, which reduces the amount of leakage by half. Thus Minimum dilution flow for this release pathway is 2.56E+04 gpm (ODCM 2.0.1.1).

2. The #3 Chemical Treatment Pond (CTP) effluent line to the Keowee River – No installed downstream radiation monitor.

   The #3 CTP effluent line is the release point for station effluents that are normally considered to be non-radioactive. Inputs to this pond include the station's yard drain system, #1 CTP discharge, #2 CTP discharge, recovery well water, the decant water from the Powdex system, and the discharge from the Turbine Building Sump/TBSMT system. It is assumed that no activity is present in the effluent until indicated by radiation monitoring measurements on the pond's inputs and/or by periodic analyses of the composite sample collected at the pond's discharge point, thus the CPT does not meet the NEI 99-01 criteria for use as an EAL threshold.

2.2.2. Gaseous Release Points

Guidance Criteria

Per NEI 99-01, the RU1 IC addresses normally occurring continuous radioactivity releases from monitored gaseous or liquid effluent pathways (EAL #1) and planned batch releases from non-continuous release pathways (EAL #2).

Per NEI 99-01, the RA1 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 RS1 and RG1 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.

ONS Bases

There are six gaseous effluent release points to the environment at ONS (ODCM 2.0.2 and Figure 1.0-2):

1. The three unit vents are the release points for waste gas decay tanks, containment building purges, auxiliary building ventilation, spent fuel pool ventilation, and the condenser air ejector – 1/2/3RIAs 45 (normal/low range) and 46 (high range).
2. The Hot Machine Shop (normally considered nonradioactive) – No installed monitor.
3. The Interim Radwaste Building (normally considered non-radioactive) – RIA-53.
4. The Radwaste Facility (normally considered non-radioactive) – 4RIA-45.

The Hot Machine Shop, Interim Radwaste Building and Radwaste Facility pathways are not sources for normally occurring continuous radioactivity releases or for planned batch releases from non-continuous release pathways, and available activity is extremely low. Thus these pathways do not meet the NEI 99-01 criteria for use as an EAL threshold.

2.3. Source Term

2.3.1. RU1.1 Liquid Source Term

Guidance Criteria

NEI 99-01 does not provide specific guidance for AU1 liquid source term assumptions.

ONS Bases

The source term used for liquid effluent releases is Cs-134. Cs-134 has been selected based on it being the lowest effluent concentration value for any detectable radionuclide not known to be absent from the liquid effluent (ODCM 3.0.1).

2.3.2. RU1.1 Gaseous Source Term

Guidance Criteria

NEI 99-01 does not provide specific guidance for AU1 gaseous source term assumptions.

ONS Bases

The gaseous source term is based upon the NUREG-1940 Table 1-6 noble gas fraction of activity available at shutdown.

2.3.3. RA1.1, RS1.1 and RG1.1 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.

ONS Bases

DEC utilizes a common RCS source term basis for fleet standardization. The source term utilized in the URI dose model provides the relative fractions and is taken from NUREG-1940 (referenced from URI Requirements Specification Appendix A Section A.1) with the release path 'E' selected to model a LOCA type event with fuel clad damage.

RCS	**Containment** HUT < 2 hrs Sprays Off	**Pen Room** HUT < 2 hrs	**Filter** Working	**Unit Vent**	**Env**

No credit is taken for source term decay. The start of release time entered into URI is coincident with the time of reactor trip.

2.4. Release Duration

Guidance Criteria

Per NEI 99-01, the effluent monitor readings for RA1.1, RS1.1 and RG1.1 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.

ONS Bases

The effluent monitor readings for RA1.1, RS1.1 and RG1.1 gaseous EAL threshold values are calculated for a release duration of one hour.

2.5. 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.

ONS Bases

The site specific meteorology used for the calculation of monitor readings is based on selections and inputs for the URI dose assessment model as documented below.

2.5.1. Wind Speed and Stability Class (Median WS and stability memo – see Attachment 1)

Median Wind Speed .... 3.7 mph

Stability Class (A-G) .... D

2.5.2. Wind Direction (ODCM 2.0.2.1 and Figure 6.0-1; UFSAR Section 2.1.1.3)

The boundary for establishing gaseous effluent release limits is the exclusion area boundary (EAB), which is considered the site boundary.

The EAB is defined as a 1 mile radius from the station center. The highest ODCM calculated semi-elevated annual average dispersion parameter for any area at or beyond the site boundary is the SW (wind direction from 045°) sector at 1 mile.

2.5.3. 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 Range

RIA-33 (UFSAR Table 11-7) .... 10^1-10^7 cpm

3.2.2. Liquid Effluent Dilution Flow (F)

Liquid Effluent Dilution Flow (ODCM 2.0.1.1) .... 2.56E+04 gpm

3.2.3. Liquid Effluent Source Flow (f)

DMT/WMT/RMT Batch Releases (OP/0/A/1104/068 Section 2.8) .... 200 gpm

3.2.4. Recirculation Factor (σ)

The recirculation factor accounts for the fraction of discharged water reused by the station. The recirculation factor equals 1.0 since discharged liquid effluent is not reused by the station (ODCM 2.0.1.1).

3.2.5. 10CFR20 Source Term Limit (EC_i)

The 10CFR20 Appendix B, Table 2, Column 2 limit is as follows:

Cs-134 .... 9.0E-07 µCi/ml

3.2.6. Cs-137 to Cs-134 Equivalency Factor (Eq_i)

Liquid radiation monitors are calibrated to Cs-137. The Cs-137 equivalence factor accounts for the different gamma energies and abundance of isotopes other than Cs-137.The equivalency factor is applied to the Cs-134 source term isotope as follows:

RIA 33 (ODCM Table 3.0-1) 2.5804

3.2.7. Cs-137 Correlation Factor (CFi)

The liquid effluent monitor Cs-137 correlation factor converts the release concentration in µCi/ml to effluent monitor to cpm. The Cs-137 correlation factor is as follows:

RIA 33 (ODCM 3.0.1) .... 8.00E+07 cpm/µCi/ml

3.3. Gaseous Effluent

3.3.1. Gaseous Effluent Monitor Ranges (UFSAR Table 11-7)

Unit Vent – RIA-45 .... 10^1-10^7 cpm

Unit Vent – RIA-46 .... 10^1-10^7 cpm

3.3.2. Gaseous Effluent Source Flow (*f*)

Unit Vent (ODCM 3.0.2.1) .... 6.5E+04 cfm

3.3.3. RU1.1 Dispersion Factor (X/Q)

Dispersion Factor (ODCM 3.0.2) .... 1.672E-06 sec/m^3

3.3.4. RU1.1 Source Term Fraction (S_i)

NUREG-1940 Table 1-6 noble gas fraction of activity available at shutdown.

	Isotopic Fraction S_i (unitless)
Kr-83m	1.83E-02
Kr-85	1.70E-03
Kr-85m	3.71E-02
Kr-87	7.40E-02
Kr-88	1.02E-01
Xe-131m	2.20E-03
Xe-133	3.26E-01
Xe-133m	1.03E-02
Xe-135	8.54E-02
Xe-135m	6.90E-02
Xe-138	2.74E-01
	1.00E+00

3.3.5. ODCM Dose Factors (Regulatory Guide 1.109 Table B-1)

Note – RG1.109 values converted from mRem/yr per pCi/m³ to mRem/yr per µCi/m³.

	Total Body Dose Factor Ki (mRem/yr per uCi/m3)	Skin Beta Dose Factor Li (mRem/yr per uCi/m3)	Gamma Air Dose Factor Mi (mRad/yr per uCi/m3)
Kr-83m	7.56E-02	0.00E+00	1.93E+01
Kr-85	1.61E+01	1.34E+03	1.72E+01
Kr-85m	1.17E+03	1.46E+03	1.23E+03
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-133	2.94E+02	3.06E+02	3.53E+02
Xe-133m	2.51E+02	9.94E+02	3.27E+02
Xe-135	1.81E+03	1.86E+03	1.92E+03
Xe-135m	3.12E+03	7.11E+02	3.36E+03
Xe-138	8.83E+03	4.13E+03	9.21E+03

3.3.6. Xe-133 Equivalency Factor (*Eqi*)

Gaseous radiation monitors are calibrated to Xe-133. The Xe-133 equivalence factor accounts for the different gamma energies and abundance of isotopes other than Xe-133.The equivalency factors are applied to the source term isotopes as follows:

	ODCM Table 3.0-2 RIA-45
Kr-83m	0.00
Kr-85	2.56
Kr-85m	2.48
Kr-87	2.93
Kr-88	2.78
Xe-131m	1.69
Xe-133	1.00
Xe-133m	1.99
Xe-135	2.63
Xe-135m	0.83
Xe-138	2.93

3.3.7. Xe-133 Correlation Factor (*CFi*)

The gaseous effluent monitor Xe-133 correlation factor converts the release concentration in µCi/ml to effluent monitor to cpm.

RIA-45 Xe-133 Correlation Factor (ODCM 3.0.2.1)...........................7.09E-08 µCi/ml/cpm

4. Calculations

4.1. RU1.1 Liquid Release

4.1.1. ODCM Liquid Release Limit

$$C_i \leq \frac{(F+f)\times(10\times EC_i)}{\sigma\times f} \qquad SP \leq \sum_i (C_i \times Eq_i \times CF_{Cs-137}) + bkg$$

Where:	
C_i	concentration of radionuclide 'i' in the liquid effluent (µCi/ml) – this is considered the ODCM limit for EAL purposes
F	dilution flow (gpm)
f	undiluted flow from the source of the release (gpm)
10	TS multiplier – component of ODCM Limit (see definition)
EC_i	concentration of radionuclide 'i' from 10CFR20, Appendix B, Table 2, Column 2 (µCi/ml)
σ	most restrictive recirculation factor at equilibrium (unitless)
SP	radiation monitor setpoint equivalent to the ODCM limit (cpm)
Eq_i	Cs-137 equivalence factor for radionuclide 'i' (unitless)
CF_{Cs-137}	radiation monitor correlation factor for Cs-137 (cpm per µCi/ml)
bkg	background reading for the radiation monitor (cpm)

4.1.2. RU1.1 Liquid Release EAL Threshold

$$RU1.1 = 2\left(\sum_i (C_i \times Eq_i \times CF_{Cs-137})\right) + bkg$$

See Attachment 2 for the spreadsheet calculations that develop the RU1.1 liquid effluent EAL threshold values for each applicable monitor.

4.2. RU1.1 Gaseous Release

4.2.1. ODCM Gaseous Release Limit

$$SP_{\text{total body}}\ (\text{cpm}) = \left(\frac{500}{472 \times f \times \frac{\chi}{Q} \times \sum_i (S_i \times K_i) \times \frac{CF_{Xe-133}}{Eq_i}} \right) + bkg$$

$$SP_{\text{Skin}}\ (\text{cpm}) = \left(\frac{3000}{472 \times f \times \frac{\chi}{Q} \times \sum_i (S_i \times (L_i + 1.1M_i)) \times \frac{CF_{Xe-133}}{Eq_i}} \right) + bkg$$

Where:	
500/3000	ODCM Limit – 500 total body or 3000 skin (mrem/yr)
472	conversion factor (cc/ft^3 per sec/min)
f	vent flow (cfm)
X/Q	annual average meteorological dispersion to the controlling site boundary location (sec/m^3)
S_i	isotopic fraction of the mix activity released (unitless)
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)
Eq_i	Xe-133 equivalence factor for radionuclide 'i' (unitless)
CF_{Xe-133}	radiation monitor correlation factor for Xe-133 (µCi/ml per cpm)
bkg	background reading for the radiation monitor (cpm)

4.2.2. RU1.1 Gaseous Release EAL Threshold

RU1.1 is two times the lesser of the calculated total body or skin value plus background.

See Attachment 3 for the spreadsheet calculations that develop the RU1.1 gaseous effluent EAL threshold values for each applicable monitor.

4.3. RA1.1, RS1.1 and RG1.1 Gaseous Release

The RA1.1, RS1.1 and RG1.1 gaseous release EAL threshold are developed using the URI site specific dose assessment models with the inputs described in Section 2 above.

Note – URI calculations were performed for each unit. There was no difference in results between units.

Refer to Attachment 4 for the results of the URI gaseous effluent EAL threshold calculations.

5. Conclusions

	Release Point	Monitor	GE	SAE	Alert	UE
Gas	U1/2/3 Plant Vent	RIA-46	3.00E+5 (cpm)	3.00E+4 (cpm)	3.00E+3 (cpm)	N/A
Gas	U1/2/3 Plant Vent	RIA-45	N/A	N/A	N/A	1.41E+5 (cpm)
Liquid	Liquid Radwaste Discharge	RIA-33	N/A	N/A	N/A	4.79E+5 (cpm)

6. References

6.1. NEI 99-01 R6, Methodology for Development of Emergency Action Levels, November 2012

6.2. NUREG-1940, RASCAL 4: Description of Models and Methods, December 2012

6.3. Oconee Nuclear Station Offsite Dose Calculation Manual (ODCM), Revision 55

6.4. Unified RASCAL Interface Requirements Specification, Oconee, Version 2

6.5. OP/0/A/1104/068, Waste/Recycle Monitor Tank Release from Radwaste Facility, Revision 1

6.6. Memo: Median Wind Speed and Stability Values at Duke Energy Nuclear Sites, 06/19/14

Date: June 19, 2014
To: Caryl Ingram, NGO-EP

From: Stanton Lanham, Meteorology - Environmental Services
Marsha Kinley, Meteorology - Environmental Services

Subject: Median Wind Speed and Stability Values at Duke Energy Nuclear Sites

1.0 Overview
Data from the most recent full five years (2009-2013) was used to calculate the median wind speed (WS), vertical temperature gradient (Delta-T), and stability class at each of the Duke Energy nuclear sites in the Carolinas. Upper level winds were used at Brunswick. All other sites use the lower level. Singular median values for WS, Delta-T, and stability class from all wind direction sectors are given in Table 1. NEI 99-01 Rev. 6 does not provide any guidance on selection of default meteorological conditions.

- These median values are irrespective of season or time of day, so the difference between the median values and actual meteorological conditions could be large.

- Also note that the median Delta-T values are in normalized units of (deg C/100m), and would need to be converted to reflect actual sensor separation distance on a tower, if needed.

Table 2.1 through Table 2.6 contains sector-specific median values of Wind Speed, Delta-T and Stability Class for each of the 16 directional sectors. This information provides more site-specific characteristics, similar to what would have been evaluated for the previous Rev. 4 of NEI-99-01 guidance. In addition, the most frequent sector from which the wind is blowing at each site for the five year period is also indicated in these tables.

Table 1 Median Values from Years 2009-2013

	Median WS (mph)	Median Delta-T (C/100m) **	Stability Class
DEC Sites			
CNS	4.8	-0.7	D
MNS	6	-0.9	D
ONS	3.7	-0.78	D
DEP Sites			
BNP*	13.4	-0.71	D
HNP	3.5	-0.51	D
RNP	4.4	-0.84	D

* Upper level winds are used at BNP. All other sites use lower level winds.
**Note: Delta-T values listed are in degs C/100 m. The units may need to be converted if actual delta-T based on tower-specific separation distances are required.

1

2.0 Data

The data presented represents the median of the entire five-year span at each site (**Table 1**), as well as the overall medians broken down by directional sector (Tables 2.1 - 2.6). Each value represents the middle of the dataset, with 50% of values above the median, and 50% of values below the median.

Data for the Legacy Duke Energy sites was obtained from the Duke's Environmental Monitoring "Ambient Administration" archive, which contains validated hourly meteorological data. Data for the Legacy Progress sites was obtained from hourly meteorological data files provided by the vendor (Murray and Trettel), and has undergone their data review/QA process. The five-year analysis results presented here were determined independently of previous studies, however comparison to the Annual Effluent reports (2013 MET) for all sites showed good agreement with the values presented in Table **1**. The sector-specific median values (Tables **2.1** through 2.6) had not been investigated previously.

<u>Legacy Duke Sites (DEC):</u>

Table 2.1 Catawba Nuclear: 5-year Lower Level Medians by Sector

Sector	Median WS (mph)	Median Delta-T (C/100m)	Stability Class
N	7.4	-1.08	D
NNE	8.7	-1.3	D
NE	9	-1.2	D
ENE	6.1	-1.06	D
E	4.6	-0.94	D
ESE	4.4	-0.9	D
SE	4.8	-0.8	D
SSE	4.4	-0.76	D
S*	3.9	-0.36	E
SSW	4.1	-0.66	D
SW	3.8	-0.7	D
WSW	3.4	-0.4	E
W	3.6	0	E
WNW	4	0	E
NW	4.4	0	E
NNW	5.1	0	E

* Most frequent CNS wind direction (2009-2013): from South

2

Table 2.2 McGuire Nuclear: 5-year Lower Level Medians by Sector

Sector	Median WS (mph)	Median Delta-T (C/100m)	Stability Class
N	6.9	-1.18	D
NNE	7	-1.16	D
NE	7.8	-1.06	D
ENE	6.6	-1.02	D
E	6.2	-0.88	D
ESE	5.5	-0.88	D
SE	5.1	-0.68	D
SSE	4.2	-0.42	E
S	4.6	-0.12	E
SSW	5	-0.14	E
SW*	6.3	-0.72	D
WSW	5.2	-0.74	D
W	4.9	-0.76	D
WNW	6.3	-0.92	D
NW	8.5	-1.06	D
NNW	9.1	-1.16	D

* Most frequent MNS wind direction (2009-2013): from SW

Table 2.3 Oconee Nuclear: 5-year Lower Level Medians by Sector

Sector	Median WS (mph)	Median Delta-T (C/100m)	Stability Class
N	2.5	-0.44	E
NNE	2.8	-0.58	D
NE	3.9	-0.84	D
ENE	4.6	-0.88	D
E	3.7	-0.72	D
ESE	3.2	-0.4	E
SE	3.3	-0.42	E
SSE	3.3	-0.5	D
S	3.4	-0.68	D
SSW	4.6	-1.2	D
SW*	5	-1.32	D
WSW	4.8	-1.06	D
W	3.6	-0.8	D
WNW	2.8	-0.46	E
NW	2.7	-0.2	E
NNW	2.5	-0.42	E

* Most frequent ONS wind direction (2009-2013): from SW

3

Legacy Progress Sites (DEP):

Table 2.4 Brunswick Nuclear: 5-year Upper Level Medians by Sector

Sector	Median WS (mph)	Median Delta-T (C/100m)	Stability Class
N	14	-0.71	D
NNE	14.7	-0.68	D
NE	14.2	-0.69	D
ENE	13.6	-0.81	D
E	11.2	-0.79	D
ESE	9.5	-0.635	D
SE	9	-0.67	D
SSE	9.5	-0.46	E
S	11.4	-0.34	E
SSW	13.6	-0.79	D
SW*	16.2	-0.95	D
WSW	14.2	-0.74	D
W	9.6	-0.24	E
WNW	14.3	-0.28	E
NW	14.4	-0.44	E
NNW	15	-0.7	D

* Most frequent BNP wind direction (2009-2013): from SW

Table 2.5 Harris Nuclear: 5-year Lower Level Medians by Sector

Sector	Median WS (mph)	Median Delta-T (C/100m)	Stability Class
N	3.3	-0.35	E
NNE*	3.1	-0.26	E
NE	1.6	0.92	E
ENE	2.1	0.26	E
E	2.2	-0.07	E
ESE	2.6	-0.39	E
SE	2.9	-0.49	E
SSE	3.4	-0.59	D
S	4.2	-0.64	D
SSW	4.7	-0.58	D
SW	4.7	-0.64	D
WSW	4.6	-0.86	D
W	3.7	-0.68	D
WNW	4.2	-0.74	D
NW	4.1	-0.805	D
NNW	3.5	-0.55	D

* Most frequent HNP wind direction (2009-2013): from NNE

4

Table 2.6 Robinson Nuclear: 5-year Lower Level Medians by Sector

Sector	Median WS (mph)	Median Delta-T (C/100m)	Stability Class
N*	5.8	-1.03	D
NNE	5.2	-1.09	D
NE	4	-1.11	D
ENE	3.8	-1.14	D
E	3.6	-1.2	D
ESE	3.3	-1.28	D
SE	3.5	-1.12	D
SSE	4.2	-0.69	D
S	4.7	-0.6	D
SSW	4.6	-0.68	D
SW	4.6	-0.83	D
WSW	4	-0.71	D
W	3.9	-0.59	D
WNW	3.9	-0.47	E
NW	4.1	0.28	E
NNW	4.7	0.31	E

* Most frequent RNP wind direction (2009-2013): from North

3.0 Discussion and Conclusion

The median wind speed data presented in **Table 1** compared to **Tables 2.1 through 2.6** indicates typically varying conditions, depending on the directional sectors at each site. The overall median wind speed at a site (3-6 mph) is in the middle of the wider range of the sector-specific medians (1-9 mph). The singular median values sometime match well with the sector-specific median conditions of the most frequent directional sector, but can also be entirely different from the median of the most frequent wind direction sector. These differences span from potentially lower wind speeds which would be conservative for dose (i.e. Brunswick), to potentially higher wind speeds which would be non-conservative for dose (i.e Catawba).

- Thus, the median values of wind speed should only be used for dose assessment as a last resort, when actual meteorological data is not available, or dose calculation is for some reason impaired.

The median Stability Class is generally neutral (class D), but varies between D and E (slightly more stable) in the sector-specific tables (Tables 2.1 through 2.6). These median values are typical of daytime conditions, with a thermally mixed boundary layer.

- Thus, the median stability class should only be used when there is no concern about actual time of day, seasonal variances, or extreme weather events.

5

Monitor	Dilution Flow (F)	Undiluted Flow (f)	Recirculation Factor (σ)	Cs-137 Equivalence Factor (Eqi)	Correlation Factor (CFi)	Maximum Allowable Concentration - Ci (µCi/ml)	Radiation Monitor Setpoint - SP (cpm)	RU1.1 EAL Threshold Value (cpm)
RIA-33	2.56E+04	200	1	2.5804	8.00E+07	1.16E-03	2.40E+05	4.79E+05

Cs-134 10CFR20 Limit - ECi (µCi/ml):	9.00E-07
TS Multiplier:	1.00E+01
Background (cpm):	0

	Source Term Fraction - Si	Total Body Dose Factor - Ki (mRem/yr per µCi/m3)	Skin Beta Dose Factor - Li (mRem/yr per µCi/m3)	Gamma Air Dose Factor - Mi (mRad/yr per µCi/m3)	Xe-133 Equivalence Factor - Eqi	Correlation Factor - CFi (µCi/ml/cpm)	Si x Ki x CFi (mRem/yr/cpm)	Si x (Li + 1.1Mi) x CFi (mRem/yr/cpm)
Kr-83m	1.83E-02	7.56E-02	0.00E+00	1.93E+01	0.00	0.00E+00	0.00E+00	0.00E+00
Kr-85	1.70E-03	1.61E+01	1.34E+03	1.72E+01	2.56	2.77E-08	7.58E-10	6.40E-08
Kr-85m	3.71E-02	1.17E+03	1.46E+03	1.23E+03	2.48	2.86E-08	1.24E-06	2.98E-06
Kr-87	7.40E-02	5.92E+03	9.73E+03	6.17E+03	2.93	2.42E-08	1.06E-05	2.96E-05
Kr-88	1.02E-01	1.47E+04	2.37E+03	1.52E+04	2.78	2.55E-08	3.83E-05	4.98E-05
Xe-131m	2.20E-03	9.15E+01	4.76E+02	1.56E+02	1.69	4.20E-08	8.45E-09	5.98E-08
Xe-133	3.26E-01	2.94E+02	3.06E+02	3.53E+02	1.00	7.09E-08	6.80E-06	1.61E-05
Xe-133m	1.03E-02	2.51E+02	9.94E+02	3.27E+02	1.99	3.56E-08	9.21E-08	4.97E-07
Xe-135	8.54E-02	1.81E+03	1.86E+03	1.92E+03	2.63	2.70E-08	4.17E-06	9.14E-06
Xe-135m	6.90E-02	3.12E+03	7.11E+02	3.36E+03	0.83	8.54E-08	1.84E-05	2.60E-05
Xe-138	2.74E-01	8.83E+03	4.13E+03	9.21E+03	2.93	2.42E-08	5.85E-05	9.45E-05
	1.00E+00						1.38E-04	2.29E-04

Xe-133 Correlation Factor (µCi/ml/cpm):	7.09E-08	Vent Flow (cfm):	6.50E+04
Unit Conversion Factor (cc/ft3 per sec/min):	472	X/Q (sec/m3):	1.67E-06
Total Body Dose Rate Limit (mRem/yr):	500	ODCM Limit for Total Body (cpm):	7.06E+04
Skin Dose Rate Limit (mRem/yr):	3000	ODCM Limit for Skin (cpm):	2.56E+05
Background (cpm):	0	2x ODCM Limit (cpm):	1.41E+05

Dose Assessment

Oconee **Wednesday, December 10, 2014 16:58**

Method: Detailed Assessment - Monitored Release

Release Pathway: (E) <RCS> <Containment> <Pen Room> <Filter> <Unit Vent> <Env> PRF: 1.60E-03

Containment HUT: = < 2 Hours Cont Sprays: = OFF Purge Filter: = N/A Aux/Fuel Bldg HUT: = < 2 Hours

Pen Rm/Fuel Filter: = Working Steam Gen: = N/A Turb Bldg HUT: = N/A

Source Term: Reactor Core Accident - Clad

Time After S/D (hh:mm): 0:00

Release Duration (hh:mm): 1:00 ETE (hh:mm): [N/A]

Upper

Wind: From 45° @ 3.7 mph

Stability Class: D

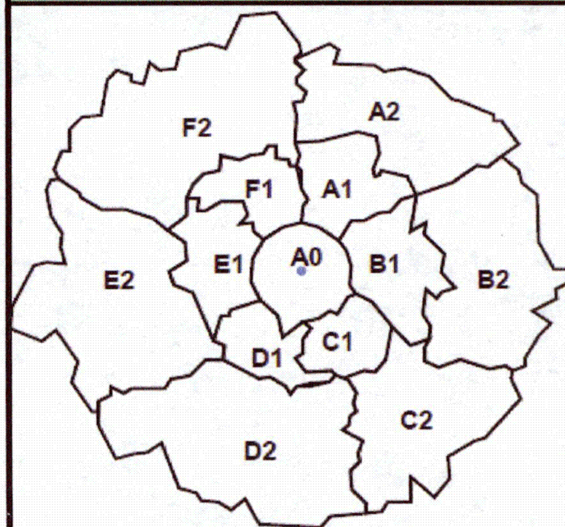
Precipitation: None

Monitor: RIA46 mid Readings: 3.00E+03 CPM Flowrate: 65000 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.	1.20E+01	7.84E+00	1.21E+00	9.57E-01	1.00E+01	1.76E+01
1.5	8.24E+00	5.44E+00	7.60E-01	5.49E-01	6.75E+00	1.10E+01
2.0	5.56E+00	3.70E+00	5.52E-01	3.21E-01	4.58E+00	8.60E+00
3.0	5.60E+00	3.87E+00	4.56E-01	3.26E-01	4.66E+00	6.60E+00
4.0	4.24E+00	2.84E+00	3.83E-01	2.33E-01	3.46E+00	5.76E+00
5.0	3.43E+00	2.29E+00	3.26E-01	1.82E-01	2.79E+00	5.08E+00
7.0	1.88E+00	1.24E+00	2.03E-01	0.00E+00	1.44E+00	3.44E+00
10.0	9.56E-01	6.48E-01	1.22E-01	0.00E+00	7.70E-01	2.26E+00

Assessment Data Results Saved to File:
Oconee 10Miles Monitored Release 12102014 165841.URI7

Evacuation Areas From 0 to 10 Miles



No PAGs Exceeded

*** * * Classification: Validate against Emergency Action Levels * * ***

Release Rates (Ci / sec)	
Particulate	1.01E-03 (0.0%)
Iodine	2.46E-02 (0.2%)
Noble Gas	1.01E+01 (99.7%)

Reviewed By: ______________________________

Dose Assessment

Oconee **Wednesday, December 10, 2014 16:58**

Method: Detailed Assessment - Monitored Release

Release Pathway: (E) <RCS> <Containment> <Pen Room> <Filter> <Unit Vent> <Env>

PRF: 1.60E-03

Containment HUT: = < 2 Hours
Cont Sprays: = OFF
Purge Filter: = N/A
Aux/Fuel Bldg HUT: = < 2 Hours
Pen Rm/Fuel Filter: = Working
Steam Gen: = N/A
Turb Bldg HUT: = N/A

Source Term: Reactor Core Accident - Clad
Time After S/D (hh:mm): 0:00
Release Duration (hh:mm): 1:00 ETE (hh:mm): [N/A]

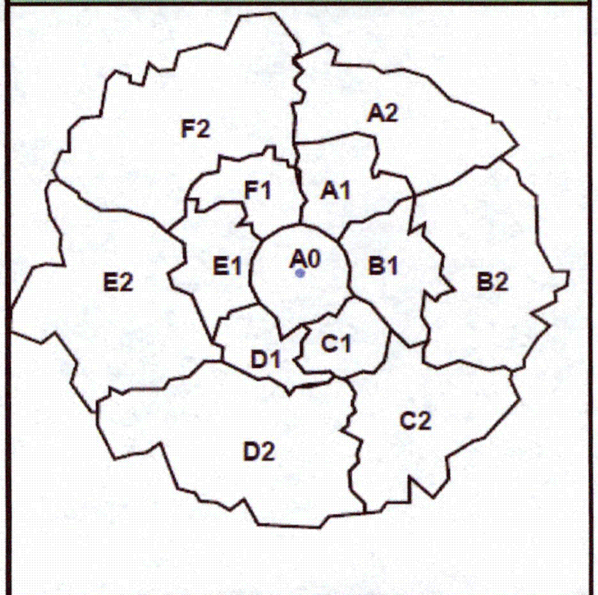
Upper
Wind: From 45° @ 3.7 mph
Stability Class: D
Precipitation: None

Monitor: RIA46 mid Readings: 3.00E+04 CPM Flowrate: 65000 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.	1.20E+02	7.84E+01	1.21E+01	9.57E+00	1.00E+02	1.76E+02
1.5	8.24E+01	5.44E+01	7.60E+00	5.49E+00	6.75E+01	1.10E+02
2.0	5.56E+01	3.70E+01	5.52E+00	3.21E+00	4.58E+01	8.60E+01
3.0	5.60E+01	3.87E+01	4.56E+00	3.26E+00	4.66E+01	6.60E+01
4.0	4.24E+01	2.84E+01	3.83E+00	2.33E+00	3.46E+01	5.76E+01
5.0	3.43E+01	2.29E+01	3.26E+00	1.82E+00	2.79E+01	5.08E+01
7.0	1.88E+01	1.24E+01	2.03E+00	8.73E-01	1.53E+01	3.44E+01
10.0	9.56E+00	6.48E+00	1.22E+00	4.04E-01	8.11E+00	2.26E+01

Assessment Data Results Saved to File:
Oconee 10Miles Monitored Release 12102014 165809.URI7

Evacuation Areas From 0 to 10 Miles



No PAGs Exceeded

*** * * Classification: Site Area Emergency * * ***

Release Rates (Ci / sec)	
Particulate	1.01E-02 (0.0%)
Iodine	2.46E-01 (0.2%)
Noble Gas	1.01E+02 (99.7%)

Reviewed By: ______________________

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Dose Assessment

Oconee **Wednesday, December 10, 2014 16:57**

Method: Detailed Assessment - Monitored Release

Release Pathway: (E) <RCS> <Containment> <Pen Room> <Filter> <Unit Vent> <Env> PRF: 1.60E-03

Containment HUT: = < 2 Hours Cont Sprays: = OFF Purge Filter: = N/A Aux/Fuel Bldg HUT: = < 2 Hours

Pen Rm/Fuel Filter: = Working Steam Gen: = N/A Turb Bldg HUT: = N/A

Source Term: Reactor Core Accident - Clad

Time After S/D (hh:mm): 0:00

Release Duration (hh:mm): 1:00 ETE (hh:mm): [N/A]

Upper

Wind: From 45° @ 3.7 mph

Stability Class: D

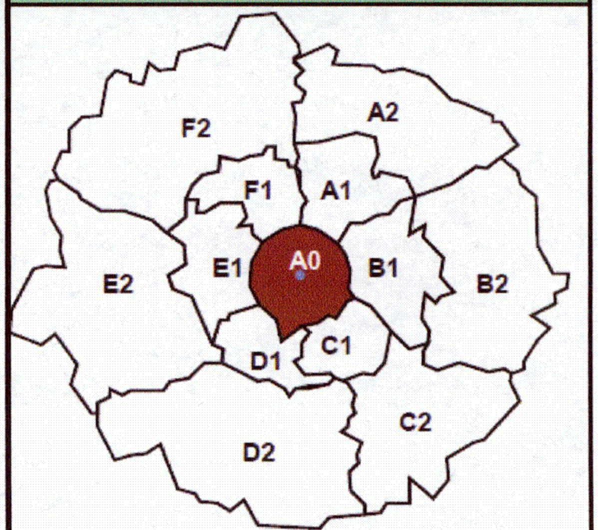
Precipitation: None

Monitor: RIA46 mid Readings: 3.00E+05 CPM Flowrate: 65000 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.	1.20E+03	7.84E+02	1.21E+02	9.57E+01	1.00E+03	1.76E+03
1.5	8.24E+02	5.44E+02	7.60E+01	5.49E+01	6.75E+02	1.10E+03
2.0	5.56E+02	3.70E+02	5.52E+01	3.21E+01	4.58E+02	8.60E+02
3.0	5.60E+02	3.87E+02	4.56E+01	3.26E+01	4.66E+02	6.60E+02
4.0	4.24E+02	2.84E+02	3.83E+01	2.33E+01	3.46E+02	5.76E+02
5.0	3.43E+02	2.29E+02	3.26E+01	1.82E+01	2.79E+02	5.08E+02
7.0	1.88E+02	1.24E+02	2.03E+01	8.73E+00	1.53E+02	3.44E+02
10.0	9.56E+01	6.48E+01	1.22E+01	4.04E+00	8.11E+01	2.26E+02

Assessment Data Results Saved to File:
Oconee 10Miles Monitored Release 12102014 165728.URI7

Evacuation Areas From 0 to 10 Miles



PAGs Exceeded in Designated Areas

*** * * Classification: General Emergency * * ***

Release Rates (Ci / sec)	
Particulate	1.01E-01 (0.0%)
Iodine	2.46E+00 (0.2%)
Noble Gas	1.01E+03 (99.7%)

Reviewed By: ______________________________

Page 1 of 3 Oconee / 2.0.0.1

ENCLOSURE 6

ONS EMERGENCY ACTION LEVEL WALLCHARTS

2 Pages Follow

GENERAL EMERGENCY | SITE AREA EMERGENCY | ALERT | UNUSUAL EVENT

R — Abnorm. Rad Levels / Rad Effluent

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 | NM

RG1.1
Reading on **any** Table R-1 effluent radiation monitor > column "GE" for ≥ 15 min. (Notes 1, 2, 3, 4)

RG1.2
Dose assessment using actual meteorology indicates doses > 1000 mrem TEDE or 5000 mrem thyroid CDE at or beyond the SITE BOUNDARY (Notes 3, 4)

RG1.3
Field survey results indicate **EITHER** of the following at or beyond the SITE BOUNDARY:
- Closed window dose rates > 1000 mR/hr expected to continue for ≥ 60 min.
- Analyses of field survey samples indicate thyroid CDE > 5000 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 | NM

RS1.1
Reading on **any** Table R-1 effluent radiation monitor > column "SAE" for ≥ 15 min. (Notes 1, 2, 3, 4)

RS1.2
Dose assessment using actual meteorology indicates doses > 100 mrem TEDE or 500 mrem thyroid CDE at or beyond the SITE BOUNDARY (Notes 3, 4)

RS1.3
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 | NM

RA1.1
Reading on **any** Table R-1 effluent radiation monitor > column "ALERT" for ≥ 15 min. (Notes 1, 2, 3, 4)

RA1.2
Dose assessment using actual meteorology indicates doses > 10 mrem TEDE or 50 mrem thyroid CDE at or beyond the SITE BOUNDARY (Notes 3, 4)

RA1.3
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)

RA1.4
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 SLC/TS limits for 60 minutes or longer

1 | 2 | 3 | 4 | 5 | 6 | NM

RU1.1
Reading on **any** Table R-1 effluent radiation monitor > column "UE" for ≥ 60 min. (Notes 1, 2, 3)

RU1.2
Sample analysis for a gaseous or liquid release indicates a concentration or release rate > 2 x SLC/TS limits for ≥ 60 min. (Notes 1, 2)

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 | NM

RG2.1
Spent fuel pool level **cannot** be restored to at least -23.5 ft. for ≥ 60 min. (Note 1)

SITE AREA EMERGENCY — Spent fuel pool level at the top of the fuel racks

1 | 2 | 3 | 4 | 5 | 6 | NM

RS2.1
Lowering of spent fuel pool level to -23.5 ft.

ALERT — Significant lowering of water level above, or damage to, irradiated fuel

1 | 2 | 3 | 4 | 5 | 6 | NM

RA2.1
Uncovery of irradiated fuel in the REFUELING PATHWAY

RA2.2
Damage to irradiated fuel resulting in a release of radioactivity
AND
HIGH alarm on **any** of the following radiation monitors:
- RIA-3 RB Refueling Deck Shield Wall
- RIA-6 Spent Fuel Building Wall
- RIA-41 Spent Fuel Pool Gas
- RIA-49 RB Gas
- Portable area monitors on the main bridge or SFP bridge

RA2.3
Lowering of spent fuel pool level to -13.5 ft.

UNUSUAL EVENT — Unplanned loss of water level above irradiated fuel

1 | 2 | 3 | 4 | 5 | 6 | NM

RU2.1
UNPLANNED water level drop in the REFUELING PATHWAY as indicated by low water level alarm or indication
AND
UNPLANNED rise in corresponding area radiation levels as indicated by **any** of the following radiation monitors:
- RIA-3 RB Refueling Deck Shield Wall
- RIA-6 Spent Fuel Building Wall
- Portable area monitors on the main bridge or SFP bridge

Table R-1 Effluent Monitor Classification Thresholds

	Release Point	Monitor	GE	SAE	Alert	UE
Gaseous	Unit 1/2/3 Plant Vent	RIA-45	——	——	——	1.41E+5 cpm
Gaseous	Unit 1/2/3 Plant Vent	RIA-46	3.00E+5 cpm	3.00E+4 cpm	3.00E+3 cpm	——
Liquid	Liquid Radwaste Discharge	RIA-33	——	——	——	4.79E+5 cpm

3 — Area Rad Levels

GENERAL EMERGENCY: None

SITE AREA EMERGENCY:

Table R-2 Safe Operation & Shutdown Rooms/Areas

Room / Area	Mode(s)
- Turbine Building	1, 2, 3
- Equipment and Cable Rooms	1, 2, 3
- Auxiliary Building	1, 2, 3, 4, 5
- Reactor Buildings	3, 4, 5

ALERT — Radiation levels that IMPEDE access to equipment necessary for normal plant operations, cooldown or shutdown

1 | 2 | 3 | 4 | 5 | 6 | NM

RA3.1
Dose rates > 15 mR/hr in **EITHER** of the following areas:
- Control Room (RIA-1)
- Central Alarm Station (by survey)

RA3.2
An UNPLANNED event results in radiation levels that prohibit or IMPEDE access to **any** Table R-2 rooms or areas (Note 5)

UNUSUAL EVENT: None

H — Hazards

1 — Security

GENERAL EMERGENCY — Hostile Action resulting in loss of physical control of the facility

1 | 2 | 3 | 4 | 5 | 6 | NM

HG1.1
A HOSTILE ACTION is occurring or has occurred within the PROTECTED AREA as reported by the Security Shift Supervision
AND EITHER of the following has occurred:
Any of the following safety functions **cannot** be controlled or maintained
- Reactivity
- Core cooling
- RCS heat removal

OR
Damage to spent fuel has occurred or is IMMINENT

SITE AREA EMERGENCY — Hostile Action within the PROTECTED AREA

1 | 2 | 3 | 4 | 5 | 6 | NM

HS1.1
A HOSTILE ACTION is occurring or has occurred within the PROTECTED AREA as reported by the Security Shift Supervision

ALERT — Hostile action within the OWNER CONTROLLED AREA or airborne attack threat within 30 minutes

1 | 2 | 3 | 4 | 5 | 6 | NM

HA1.1
A HOSTILE ACTION is occurring or has occurred within the OWNER CONTROLLED AREA as reported by the Security Shift Supervision
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 | NM

HU1.1
A SECURITY CONDITION that does not involve a HOSTILE ACTION as reported by the Security Shift Supervision
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

GENERAL EMERGENCY: None

SITE AREA EMERGENCY: None

ALERT: None

[Refer to EAL HA6.1 OR SA9.1 for escalation due to seismic event]

UNUSUAL EVENT — Seismic event greater than DBE levels

1 | 2 | 3 | 4 | 5 | 6 | NM

HU2.1
Seismic event > DBE as indicated by **EITHER** of the following:
- 1SA-9/E-1 (SEISMIC TRIGGER) alarm
- 3SA-9/E-1 (SEISMIC TRIGGER) alarm

3 — Natural or Tech. Hazard

GENERAL EMERGENCY: None

SITE AREA EMERGENCY — Dam Failure

1 | 2 | 3 | 4 | 5 | 6 | NM

HS3.1
IMMINENT/actual dam failure exists involving any of the following:
- Keowee Hydro Dam
- Little River Dam
- Dikes A,B,C,D
- Intake Canal Dike
- Jocassee Dam - Condition A

ALERT: None

[Refer to EAL HA6.1 OR SA9.1 for escalation due to natural or technological hazard]

UNUSUAL EVENT — Hazardous event

1 | 2 | 3 | 4 | 5 | 6 | NM

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 needed for the current operating mode

HU3.3
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)

HU3.4
A hazardous event that results in on-site conditions sufficient to prohibit the plant staff from accessing the site via personal vehicles (Note 7)

HU3.5
Condition B has been declared for the Jocassee Dam

NOTES

Note 1: The Emergency Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be 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, indicating that the release path is isolated, the effluent monitor reading is no longer VALID for classification purposes.

Note 4: The pre-calculated effluent monitor values presented in EALs RA1.1, RS1.1 and RG1.1 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 trip 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: RVLS is not valid if **EITHER** of the following exists:
- One or more RCPs are running

OR
- LPI pump(s) are running **AND** taking suction from the LPI drop line

4 — Fire

GENERAL EMERGENCY: None

SITE AREA EMERGENCY: None

ALERT: [Refer to EAL HA6.1 OR SA9.1 for escalation due to FIRE]

Table H-1 Fire Areas
- Reactor Building
- Auxiliary Building
- Turbine Building
- Standby Shutdown Facility
- Intake Structure
- Electrical Blockhouse
- Keowee Hydro & associated transformers
- Transformer Yard
- Protected Service Water Building
- Essential Siphon Vacuum Building

UNUSUAL EVENT — FIRE potentially degrading the level of safety of the plant

1 | 2 | 3 | 4 | 5 | 6 | NM

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
- 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)
AND
The fire alarm is indicating a FIRE within **any** Table H-1 area
AND
The existence of a FIRE is **not** verified 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

5 — Hazardous Gases

GENERAL EMERGENCY: None

SITE AREA EMERGENCY:

Table H-2 Safe Operation & Shutdown Rooms/Areas

Room / Area	Mode(s)
- Turbine Building	1, 2, 3
- Equipment and Cable Rooms	1, 2, 3
- Auxiliary Building	1, 2, 3, 4, 5
- Reactor Buildings	3, 4, 5

ALERT — Gaseous release IMPEDING access to equipment necessary for normal plant operations, cooldown or shutdown

1 | 2 | 3 | 4 | 5 | 6 | NM

HA5.1
Release of a toxic, corrosive, asphyxiant or flammable gas into **any** Table H-2 rooms or areas
AND
Entry into the room or area is prohibited or IMPEDED (Note 5)

UNUSUAL EVENT: None

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 | NM

HS6.1
An event has resulted in plant control being transferred from the Control Room to the Auxiliary Shutdown Panel or Standby Shutdown Facility
AND
Control of **any** of the following key safety functions is **not** reestablished within 15 min. (Note 1):
- Reactivity
- Core Cooling
- RCS heat removal

ALERT — Control Room evacuation resulting in transfer of plant control to alternate locations

1 | 2 | 3 | 4 | 5 | 6 | NM

HA6.1
An event has resulted in plant control being transferred from the Control Room to the Auxiliary Shutdown Panel or Standby Shutdown Facility

UNUSUAL EVENT: None

7 — EC Judgment

GENERAL EMERGENCY — Other conditions exist which in the judgment of the Site Emergency Coordinator warrant declaration of a General Emergency

1 | 2 | 3 | 4 | 5 | 6 | NM

HG7.1
Other conditions exist which in the judgment of the Emergency Coordinator 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 existing that in the judgment of the Site Emergency Coordinator warrant declaration of a Site Area Emergency

1 | 2 | 3 | 4 | 5 | 6 | NM

HS7.1
Other conditions exist which in the judgment of the Emergency Coordinator 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 Site Emergency Coordinator warrant declaration of an Alert

1 | 2 | 3 | 4 | 5 | 6 | NM

HA7.1
Other conditions exist which, in the judgment of the Emergency Coordinator, 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 Site Emergency Coordinator warrant declaration of a UE

1 | 2 | 3 | 4 | 5 | 6 | NM

HU7.1
Other conditions exist which in the judgment of the Emergency Coordinator 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

GENERAL EMERGENCY: None

SITE AREA EMERGENCY: None

Table E-1 ISFSI Dose Limits

Location	24PHB	37PTH	69BTH
HSM front bird screen	1,050 mrem/hr	1,050 mrem/hr	500 mrem/hr
Outside HSM door	40 mrem/hr	4 mrem/hr	4 mrem/hr
End shield wall exterior	550 mrem/hr	8 mrem/hr	8 mrem/hr

UNUSUAL EVENT — Damage to a loaded cask CONFINEMENT BOUNDARY

1 | 2 | 3 | 4 | 5 | NM

EU1.1
Damage to a loaded canister CONFINEMENT BOUNDARY as indicated by an on-contact radiation reading on the surface of a loaded spent fuel cask > **any** Table E-1 dose limit

Modes: 1 Power Operations | 2 Startup | 3 Hot Standby | 4 Hot Shutdown | 5 Cold Shutdown | 6 Refuel | NM No Mode

DUKE ENERGY.

Oconee Nuclear Station
Emergency Classification
RP/0/A/1000/001 Revision 0

GENERAL EMERGENCY | SITE AREA EMERGENCY | ALERT | UNUSUAL EVENT

C — Cold SD/ Refuel System Malfunct.

1 — RCS Level

GENERAL EMERGENCY — Loss of RCS inventory affecting fuel clad integrity with containment challenged

5 | 6

CG1.1
RCS water level **cannot** be monitored for ≥ 30 min. (Note 1)
AND
Core uncovery is indicated by **any** of the following:
- UNPLANNED increase in **any** Table C-1 Sump / Tank level due to a loss of RCS inventory
- Visual observation of UNISOLABLE RCS leakage
- High alarm on RIA-3 RB Refueling Deck Shield Wall
- Erratic Source Range Monitor Indication

AND
Any Containment Challenge indication, Table C-2

SITE AREA EMERGENCY — Loss of RCS inventory affecting core decay heat removal capability

5 | 6

CS1.1
RCS water level **cannot** be monitored for ≥ 30 min. (Note 1)
AND
Core uncovery is indicated by **any** of the following:
- UNPLANNED increase in **any** Table C-1 Sump / Tank level due to a loss of RCS inventory
- Visual observation of UNISOLABLE RCS leakage
- High alarm on RIA-3 RB Refueling Deck Shield Wall
- Erratic Source Range Monitor Indication

ALERT — Loss of RCS inventory

5 | 6

CA1.1
Loss of RCS inventory as indicated by RCS water level < 10" (LT-5)

CA1.2
RCS water level **cannot** be monitored for ≥ 15 min. (Note 1)
AND EITHER
- UNPLANNED increase in **any** Table C-1 Sump / Tank level due to a loss of RCS inventory
- Visual observation of UNISOLABLE RCS leakage

UNUSUAL EVENT — UNPLANNED loss of RCS inventory for 15 minutes or longer

5 | 6

CU1.1
UNPLANNED loss of reactor coolant results in RCS water level less than a required lower limit for ≥ 15 min. (Note 1)

CU1.2
RCS water level **cannot** be monitored
AND EITHER
- UNPLANNED increase in **any** Table C-1 sump/tank level due to a loss of RCS inventory
- Visual observation of UNISOLABLE RCS leakage

2 — Loss of Essential AC Power

GENERAL EMERGENCY: None

SITE AREA EMERGENCY: None

ALERT — Loss of **all** offsite and **all** emergency AC power to essential buses for 15 minutes or longer

5 | 6 | NM

CA2.1
Loss of **all** offsite and **all** emergency AC power capability, Table C-3, to essential 4160V buses MFB-1 and MFB-2 for ≥ 15 min. (Note 1)

UNUSUAL EVENT — Loss of all but one AC power source to essential buses for 15 minutes or longer

5 | 6 | NM

CU2.1
AC power capability, Table C-3, to essential 4160V buses MFB-1 and MFB-2 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

3 — RCS Temp.

GENERAL EMERGENCY: None

SITE AREA EMERGENCY: None

ALERT — Inability to maintain plant in cold shutdown

5 | 6

CA3.1
UNPLANNED increase in RCS temperature to > 200°F for > Table C-4 duration (Note 1)
OR
UNPLANNED RCS pressure increase > 10 psig due to a loss of RCS cooling (this EAL does **not** apply during water-solid plant conditions)

UNUSUAL EVENT — UNPLANNED increase in RCS temperature

5 | 6

CU3.1
UNPLANNED increase in RCS temperature to > 200°F due to loss of decay heat removal capability

CU3.2
Loss of **all** RCS temperature and RCS level indication for ≥ 15 min. (Note 1)

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 < 105 VDC on vital DC buses **required** by Technical Specifications for ≥ 15 min. (Note 1)

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 | NM

CU5.1
Loss of **all** Table C-5 onsite communication methods
OR
Loss of **all** Table C-5 offsite communication methods
OR
Loss of **all** Table C-5 NRC communication methods

6 — Hazardous Event Affecting Safety Systems

GENERAL EMERGENCY: None

SITE AREA EMERGENCY: None

ALERT — Hazardous event affecting a SAFETY SYSTEM needed for the current operating mode

5 | 6

CA6.1
The occurrence of **any** Table C-6 hazardous event
AND EITHER:
- Event damage has caused indications of degraded performance in at least one train of a SAFETY SYSTEM needed for the current operating mode
- The event has caused VISIBLE DAMAGE to a SAFETY SYSTEM component or structure needed for the current operating mode

UNUSUAL EVENT: None

Table C-1 Sumps / Tanks
- RB Normal Sumps
- RB Emergency Sumps
- Core Flood Tank
- Quench Tank
- Low Activity Waste Tank
- High Activity Waste Tank
- Miscellaneous Waste Holdup Tank
- LPI Room Sumps

Table C-2 Containment Challenge Indications
- CONTAINMENT CLOSURE **not** established (Note 6)
- Containment hydrogen concentration > 4%
- Unplanned rise in containment pressure

Table C-3 AC Power Sources

Offsite
- Unit Normal Transformer (backcharged)
- Unit Startup Transformer (SWYD)
- Another Unit Startup Transformer (aligned) (SWYD)
- CT5 (Central/energizing Standby Bus)

Emergency
- Unit Startup Transformer (Keowee)
- Another Unit Startup Transformer (aligned) (Keowee)
- CT4
- CT5 (dedicated line/energizing Standby Bus)

Table C-4 RCS Heat-up Duration Thresholds

RCS Status	CONTAINMENT CLOSURE Status	Heat-up Duration
Intact (but **not** REDUCED INVENTORY)	N/A	60 min.*
Not intact **OR** at REDUCED INVENTORY	established	20 min.*
	not established	0 min.

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

Table C-5 Communication Methods

System	Onsite	Offsite	NRC
Commercial phone service	X	X	X
ONS site phone system	X	X	X
EOF phone system	X	X	X
Public address system	X		
Onsite radio system	X		
DEMNET		X	
Offsite radio system		X	
NRC Emergency Telephone System			X
Satellite Phone	X	X	X

Table C-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

EAL - COLD   MODES 5, 6 & No Mode

GENERAL EMERGENCY | SITE AREA EMERGENCY | ALERT | UNUSUAL EVENT

R — Abnorm. Rad Levels / Rad Effluent

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 NM

RG1.1
Reading on **any** Table R-1 effluent radiation monitor > column "GE" for ≥ 15 min. (Notes 1, 2, 3, 4)

RG1.2
Dose assessment using actual meteorology indicates doses > 1000 mrem TEDE or 5000 mrem thyroid CDE at or beyond the SITE BOUNDARY (Notes 3, 4)

RG1.3
Field survey results indicate **EITHER** of the following at or beyond the SITE BOUNDARY:
- Closed window dose rates > 1000 mR/hr expected to continue for ≥ 60 min.
- Analyses of field survey samples indicate thyroid CDE > 5000 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 NM

RS1.1
Reading on **any** Table R-1 effluent radiation monitor > column "SAE" for ≥ 15 min. (Notes 1, 2, 3, 4)

RS1.2
Dose assessment using actual meteorology indicates doses > 100 mrem TEDE or 500 mrem thyroid CDE at or beyond the SITE BOUNDARY (Notes 3, 4)

RS1.3
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 NM

RA1.1
Reading on **any** Table R-1 effluent radiation monitor > column "ALERT" for ≥ 15 min. (Notes 1, 2, 3, 4)

RA1.2
Dose assessment using actual meteorology indicates doses > 10 mrem TEDE or 50 mrem thyroid CDE at or beyond the SITE BOUNDARY (Notes 3, 4)

RA1.3
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)

RA1.4
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 SLC/TS limits for 60 minutes or longer

1 2 3 4 5 6 NM

RU1.1
Reading on **any** Table R-1 effluent radiation monitor > column "UE" for ≥ 60 min. (Notes 1, 2, 3)

RU1.2
Sample analysis for a gaseous or liquid release indicates a concentration or release rate > 2 x SLC/TS limits for ≥ 60 min. (Notes 1, 2)

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 NM

RG2.1
Spent fuel pool level **cannot** be restored to at least -23.5 ft. for ≥ 60 min. (Note 1)

Site Area Emergency — Spent fuel pool level at the top of the fuel racks

1 2 3 4 5 6 NM

RS2.1
Lowering of spent fuel pool level to -23.5 ft.

Alert — Significant lowering of water level above, or damage to, irradiated fuel

1 2 3 4 5 6 NM

RA2.1
Uncovery of irradiated fuel in the REFUELING PATHWAY

RA2.2
Damage to irradiated fuel resulting in a release of radioactivity
AND
HIGH alarm on **any** of the following radiation monitors:
- RIA-3 RB Refueling Deck Shield Wall
- RIA-6 Spent Fuel Building Wall
- RIA-41 Spent Fuel Pool Gas
- RIA-49 RB Gas
- Portable area monitors on the main bridge or SFP bridge

RA2.3
Lowering of spent fuel pool level to -13.5 ft.

Unusual Event — Unplanned loss of water level above irradiated fuel

1 2 3 4 5 6 NM

RU2.1
UNPLANNED water level drop in the REFUELING PATHWAY as indicated by low water level alarm or indication
AND
UNPLANNED rise in corresponding area radiation levels as indicated by **any** of the following radiation monitors:
- RIA-3 RB Refueling Deck Shield Wall
- RIA-6 Spent Fuel Building Wall
- Portable area monitors on the main bridge or SFP bridge

Table R-1 Effluent Monitor Classification Thresholds

	Release Point	Monitor	GE	SAE	Alert	UE
Gaseous	Unit 1/2/3 Plant Vent	RIA-45	——	——	——	1.41E+5 cpm
Gaseous	Unit 1/2/3 Plant Vent	RIA-46	3.00E+5 cpm	3.00E+4 cpm	3.00E+3 cpm	——
Liquid	Liquid Radwaste Discharge	RIA-33	——	——	——	4.79E+5 cpm

3 — Area Rad Levels

General Emergency: None

Site Area Emergency:

Table R-2 Safe Operation & Shutdown Rooms/Areas

Room / Area	Mode(s)
- Turbine Building	1, 2, 3
- Equipment and Cable Rooms	1, 2, 3
- Auxiliary Building	1, 2, 3, 4, 5
- Reactor Buildings	3, 4, 5

Alert — Radiation levels that IMPEDE access to equipment necessary for normal plant operations, cooldown or shutdown

1 2 3 4 5 6 NM

RA3.1
Dose rates > 15 mR/hr in **EITHER** of the following areas:
- Control Room (RIA-1)
- Central Alarm Station (by survey)

RA3.2
An UNPLANNED event results in radiation levels that prohibit or IMPEDE access to **any** Table R-2 rooms or areas (Note 5)

Unusual Event: None

H — Hazards

1 — Security

General Emergency — Hostile Action resulting in loss of physical control of the facility

1 2 3 4 5 6 NM

HG1.1
A HOSTILE ACTION is occurring or has occurred within the PROTECTED AREA as reported by the Security Shift Supervision
AND EITHER of the following has occurred:
Any of the following safety functions **cannot** be controlled or maintained
- Reactivity
- Core cooling
- RCS heat removal

OR
Damage to spent fuel has occurred or is IMMINENT

Site Area Emergency — Hostile Action within the PROTECTED AREA

1 2 3 4 5 6 NM

HS1.1
A HOSTILE ACTION is occurring or has occurred within the PROTECTED AREA as reported by the Security Shift Supervision

Alert — Hostile action within the OWNER CONTROLLED AREA or airborne attack threat within 30 minutes

1 2 3 4 5 6 NM

HA1.1
A HOSTILE ACTION is occurring or has occurred within the OWNER CONTROLLED AREA as reported by the Security Shift Supervision
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 NM

HU1.1
A SECURITY CONDITION that does not involve a HOSTILE ACTION as reported by the Security Shift Supervision
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

General Emergency: None

Site Area Emergency: None

Alert: None

[Refer to EAL HA6.1 OR SA9.1 for escalation due to seismic event]

Unusual Event — Seismic event greater than DBE levels

1 2 3 4 5 6 NM

HU2.1
Seismic event > DBE as indicated by **EITHER** of the following:
- 1SA-9/E-1 (SEISMIC TRIGGER) alarm
- 3SA-9/E-1 (SEISMIC TRIGGER) alarm

3 — Natural or Tech. Hazard

General Emergency: None

Site Area Emergency — Dam Failure

1 2 3 4 5 6 NM

HS3.1
IMMINENT/actual dam failure exists involving any of the following:
- Keowee Hydro Dam
- Little River Dam
- Dikes A,B,C,D
- Intake Canal Dike
- Jocassee Dam - Condition A

Alert: None

[Refer to EAL HA6.1 OR SA9.1 for escalation due to natural or technological hazard]

Unusual Event — Hazardous event

1 2 3 4 5 6 NM

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 needed for the current operating mode

HU3.3
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)

HU3.4
A hazardous event that results in on-site conditions sufficient to prohibit the plant staff from accessing the site via personal vehicles (Note 7)

HU3.5
Condition B has been declared for the Jocassee Dam

NOTES

Note 1: The Emergency Coordinator should declare the event promptly upon determining that time limit has been exceeded, or will likely be 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, indicating that the release path is isolated, the effluent monitor reading is no longer VALID for classification purposes.

Note 4: The pre-calculated effluent monitor values presented in EALs RA1.1, RS1.1 and RG1.1 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 trip 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: RVLS is not valid if **EITHER** of the following exists:
- One or more RCPs are running

OR
- LPI pump(s) are running **AND** taking suction from the LPI drop line

4 — Fire

General Emergency: None

Site Area Emergency: None

Alert:

[Refer to EAL HA6.1 OR SA9.1 for escalation due to FIRE]

Table H-1 Fire Areas
- Reactor Building
- Auxiliary Building
- Turbine Building
- Standby Shutdown Facility
- Intake Structure
- Electrical Blockhouse
- Keowee Hydro & associated transformers
- Transformer Yard
- Protected Service Water Building
- Essential Siphon Vacuum Building

Unusual Event — FIRE potentially degrading the level of safety of the plant

1 2 3 4 5 6 NM

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
- 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)
AND
The fire alarm is indicating a FIRE within **any** Table H-1 area
AND
The existence of a FIRE is **not** verified 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

5 — Hazardous Gases

General Emergency: None

Site Area Emergency:

Table H-2 Safe Operation & Shutdown Rooms/Areas

Room / Area	Mode(s)
- Turbine Building	1, 2, 3
- Equipment and Cable Rooms	1, 2, 3
- Auxiliary Building	1, 2, 3, 4, 5
- Reactor Buildings	3, 4, 5

Alert — Gaseous release IMPEDING access to equipment necessary for normal plant operations, cooldown or shutdown

1 2 3 4 5 6 NM

HA5.1
Release of a toxic, corrosive, asphyxiant or flammable gas into **any** Table H-2 rooms or areas
AND
Entry into the room or area is prohibited or IMPEDED (Note 5)

Unusual Event: None

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 NM

HS6.1
An event has resulted in plant control being transferred from the Control Room to the Auxiliary Shutdown Panel or Standby Shutdown Facility
AND
Control of **any** of the following key safety functions is **not** reestablished within 15 min. (Note 1)
- Reactivity
- Core Cooling
- RCS heat removal

Alert — Control Room evacuation resulting in transfer of plant control to alternate locations

1 2 3 4 5 6 NM

HA6.1
An event has resulted in plant control being transferred from the Control Room to the Auxiliary Shutdown Panel or Standby Shutdown Facility

Unusual Event: None

7 — EC Judgment

General Emergency — Other conditions exist which in the judgment of the Site Emergency Coordinator warrant declaration of a General Emergency

1 2 3 4 5 6 NM

HG7.1
Other conditions exist which in the judgment of the Emergency Coordinator 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 existing that in the judgment of the Site Emergency Coordinator warrant declaration of a Site Area Emergency

1 2 3 4 5 6 NM

HS7.1
Other conditions exist which in the judgment of the Emergency Coordinator 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 Site Emergency Coordinator warrant declaration of an Alert

1 2 3 4 5 6 NM

HA7.1
Other conditions exist which, in the judgment of the Emergency Coordinator, 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 Site Emergency Coordinator warrant declaration of a UE

1 2 3 4 5 6 NM

HU7.1
Other conditions exist which in the judgment of the Emergency Coordinator 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

General Emergency: None

Site Area Emergency: None

Table E-1 ISFSI Dose Limits

Location	24PHB	37PTH	69BTH
HSM front bird screen	1,050 mrem/hr	1,050 mrem/hr	500 mrem/hr
Outside HSM door	40 mrem/hr	4 mrem/hr	4 mrem/hr
End shield wall exterior	550 mrem/hr	8 mrem/hr	8 mrem/hr

Unusual Event — Damage to a loaded cask CONFINEMENT BOUNDARY

1 2 3 4 5 NM

EU1.1
Damage to a loaded canister CONFINEMENT BOUNDARY as indicated by an on-contact radiation reading on the surface of a loaded spent fuel cask > **any** Table E-1 dose limit

Modes: 1 Power Operations | 2 Startup | 3 Hot Standby | 4 Hot Shutdown | 5 Cold Shutdown | 6 Refuel | NM No Mode

DUKE ENERGY.

Oconee Nuclear Station
Emergency Classification
RP/0/A/1000/001 Revision 0

GENERAL EMERGENCY | SITE AREA EMERGENCY | ALERT | UNUSUAL EVENT

S — System Malfunct.

1 — Loss of Essential AC Power

General Emergency — Prolonged loss of all offsite and all emergency AC power to essential buses

1 2 3 4

SG1.1
Loss of **all** offsite and **all** emergency AC power capability to essential 4160V buses MFB-1 and MFB-2
AND
Failure to power SSF equipment and PSW unavailable
AND EITHER
- Restoration of at least one essential bus in < 4 hours is **not** likely (Note 1)
- CETC reading > 1200°F

Site Area Emergency — Loss of all offsite and all emergency AC power to essential buses for 15 minutes or longer

1 2 3 4

SS1.1
Loss of **all** offsite and **all** emergency AC power capability, Table S-1, to essential 4160V buses MFB-1 and MFB-2 for ≥ 15 min. (Note 1)

Alert — Loss of all but one AC power source to essential buses for 15 minutes or longer

1 2 3 4

SA1.1
AC power capability, Table S-1, to essential 4160V buses MFB-1 and MFB-2 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

Unusual Event — Loss of all offsite AC power capability to essential buses for 15 minutes or longer

1 2 3 4

SU1.1
Loss of **all** offsite AC power capability, Table S-1, to essential 4160V buses MFB-1 and MFB-2 for ≥ 15 min. (Note 1)

Table S-1 AC Power Sources

Offsite
- Unit Normal Transformer (backcharged)
- Unit Startup Transformer (SWYD)
- Another Unit Startup Transformer (aligned) (SWYD)
- CT5 (Central/energizing Standby Bus)

Emergency
- Unit Startup Transformer (Keowee)
- Another Unit Startup Transformer (aligned) (Keowee)
- CT4
- CT5 (dedicated line/energizing Standby Bus)

2 — Loss of Vital DC Power

General Emergency — Loss of all essential AC and vital DC power sources for 15 minutes or longer

1 2 3 4

SG1.2
Loss of **all** offsite and **all** emergency AC power capability, Table S-1, to essential 4160V buses MFB-1 and MFB-2 for ≥ 15 min.
AND
Failure to power SSF equipment and PSW unavailable
AND
Loss of 125 VDC power based on battery bus voltage indications < 105 VDC on **both** vital DC Distribution Centers DCA and DCB for ≥ 15 min.
(Note 1)

Site Area Emergency — Loss of all vital DC power for 15 minutes or longer

1 2 3 4

SS2.1
Loss of 125 VDC power based on battery bus voltage indications < 105 VDC on **both** vital DC Distribution Centers DCA and DCB for ≥ 15 min. (Note 1)

Alert: None

3 — Loss of CR Indications

General Emergency: None

Site Area Emergency:

Table S-3 Significant Transients
- Reactor trip
- Runback > 25% thermal power
- Electrical load rejection > 25% electrical load
- ECCS actuation

Alert — 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

Unusual Event — 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

General Emergency: None

Site Area Emergency: None

Table S-2 Safety System Parameters
- Reactor power
- RCS level
- RCS pressure
- CETC temperature
- Level in at least one S/G
- EFW flow to at least one S/G

Unusual Event — RCS activity greater than Technical Specification allowable limits

1 2 3 4

SU4.1
RCS activity > 50 μCi/gm Dose Equivalent I-131 for > 48 hr continuous period
OR
RCS activity > 280 μCi/gm Dose Equivalent Xe-133 for > 48 hr continuous period

5 — RCS Leakage

General Emergency: None

Site Area Emergency: None

Alert: None

Unusual Event — RCS leakage for 15 minutes or longer

1 2 3 4

SU5.1
RCS unidentified or pressure boundary leakage > 10 gpm for ≥ 15 min.
OR
RCS identified leakage > 25 gpm for ≥ 15 min.
OR
Leakage from the RCS to a location outside containment > 25 gpm for ≥ 15 min.
(Note 1)

6 — RPS Failure

General Emergency: None

Site Area Emergency — 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:
- CETCs >1200°F on ICCM
- RCS subcooling < 0°F

Alert — 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 pushbutton is **not** successful in shutting down the reactor as indicated by reactor power ≥ 5% (Note 8)

Unusual Event — 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 the manual trip pushbutton 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 the manual trip pushbutton is successful in shutting down the reactor as indicated by reactor power < 5% (Note 8)

7 — Loss of Comm.

General Emergency: None

Site Area Emergency: None

Table S-4 Communication Methods

System	Onsite	Offsite	NRC
Commercial phone service	X	X	X
ONS site phone system	X	X	X
EOF phone system	X	X	X
Public address system	X		
Onsite radio system	X		
DEMNET		X	
Offsite radio system		X	
NRC Emergency Telephone System			X
Satellite Phone	X	X	X

Unusual Event — 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 offsite communication methods
OR
Loss of **all** Table S-4 NRC communication methods

8 — CMT Failure

General Emergency: None

Site Area Emergency: None

Alert: None

Unusual Event — Failure to isolate containment or loss of containment pressure control

1 2 3 4

SU8.1
Any penetration is **not** isolated within 15 min. of a VALID ES actuation signal
OR
Containment pressure > 10 psig with < one full train of containment heat removal system (1 RBS with > 700 gpm spray flow **OR** 2 RBCUs) operating per design for ≥ 15 min. (Note 1)

9 — Hazardous Event Affecting Safety Systems

General Emergency: None

Site Area Emergency:

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

Alert — Hazardous event affecting a SAFETY SYSTEM needed for the current operating mode

1 2 3 4

SA9.1
The occurrence of **any** Table S-5 hazardous event
AND EITHER:
- Event damage has caused indications of degraded performance in at least one train of a SAFETY SYSTEM needed for the current operating mode
- The event has caused VISIBLE DAMAGE to a SAFETY SYSTEM component or structure needed for the current operating mode

Unusual Event: None

F — Fission Product Barriers

FG1.1 1 2 3 4
Loss of **any** two barriers
AND
Loss or potential loss of third barrier (Table F-1)

FS1.1 1 2 3 4
Loss or potential loss of **any** two barriers (Table F-1)

FA1.1 1 2 3 4
Any loss or **any** potential loss of either Fuel Clad or RCS barrier (Table F-1)

Table F-2 Containment Radiation - R/hr (1/2/3RIA 57/58)

Time After S/D (Hrs)	FC Loss RIA 57	FC Loss RIA 58	CMT Potential Loss RIA 57	CMT Potential Loss RIA 58
0 - < 0.5	300	140	1500	700
0.5 - < 2.0	80	40	400	195
2.0 - < 8.0	32	15	160	75
≥ 8.0	10	5	50	25

Table F-1 Fission Product Barrier Threshold Matrix

	Fuel Clad (FC) Barrier: Loss	Fuel Clad (FC) Barrier: Potential Loss	Reactor Coolant System (RCS) Barrier: Loss	Reactor Coolant System (RCS) Barrier: Potential Loss	Containment (CMT) Barrier: Loss	Containment (CMT) Barrier: Potential Loss
A. RCS or SG Tube Leakage	None	1. RVLS ≤ 0" (Note 9)	1. An automatic or manual ES actuation required by **EITHER**: • UNISOLABLE RCS leakage • SG tube RUPTURE	1. RCS leakage > normal makeup capacity due to **EITHER**: • UNISOLABLE RCS leakage • SG tube leakage 2. RCS cooldown to < 400°F at > 100°F/hr **OR** HPI has operated in the injection mode with **no** RCPs operating	1. A leaking SG is FAULTED outside of containment	None
B. Inadequate Heat Removal	1. CETCs > 1200°F	1. CETCs > 700°F 2. RCS heat removal **cannot** be established **AND** RCS subcooling < 0°F	None	1. RCS heat removal **cannot** be established **AND** RCS subcooling < 0°F 2. HPI forced cooling initiated	None	1. CETCs >1200°F **AND** Restoration procedures **not** effective within 15 min. (Note 1)
C. CMT Radiation / RCS Activity	1. 1/2/3RIA 57/58 > Table F-2 column "FC Loss" 2. Coolant activity > 300 μCi/ml DEI	None	1. Containment radiation: - 1,3 RIA 57/58 > 1.0 R/hr - 2 RIA 57 > 1.6 R/hr - 2 RIA 58 > 1.0 R/hr	None	None	1. 1/2/3RIA 57/58 > Table F-2 column "CMT Potential Loss"
D. CMT Integrity or Bypass	None	None	None	None	1. Containment isolation is required **AND EITHER** - Containment integrity has been lost based on Emergency Coordinator judgment - UNISOLABLE pathway from Containment to the environment exists 2. Indications of RCS leakage outside of containment	1. Containment pressure > 59 psig 2. Containment hydrogen concentration > 4% 3. Containment pressure > 10 psig with < one full train of containment heat removal system (1 RBS with > 700 gpm spray flow **OR** 2 RBCUs) operating per design for ≥ 15 min. (Note 1)
E. EC Judgment	1. **Any** condition in the judgment of the Emergency Coordinator that indicates loss of the Fuel Clad barrier	1. **Any** condition in the judgment of the Emergency Coordinator that indicates potential loss of the Fuel Clad barrier	1. **Any** condition in the judgment of the Emergency Coordinator that indicates loss of the RCS barrier	1. **Any** condition in the judgment of the Emergency Coordinator that indicates potential loss of the RCS barrier	1. **Any** condition in the judgment of the Emergency Coordinator that indicates loss of the Containment barrier	1. **Any** condition in the judgment of the Emergency Coordinator that indicates potential loss of the Containment barrier

EAL- HOT MODES 1, 2, 3 & 4