

Southern Nuclear Operating Company
Joseph M. Farley Nuclear Plant Units 1 and 2;
Edwin I. Hatch Nuclear Plant Units 1 and 2;
Vogtle Electric Generating Plant Units 1 and 2;
License Amendment Request for Changes to
Emergency Action Level Schemes to Adopt NEI 99-01 Rev. 6
and to Modify Radiation Monitors at Farley Nuclear Plant
Responses to Requests for Additional Information

ENCLOSURE 3

EAL SCHEMES

MARKED-UP PAGES

Southern Nuclear Operating Company
License Amendment Request for Changes to
Emergency Action Level Schemes to Adopt NEI 99-01 Rev. 6
and to Modify Radiation Monitors at Farley Nuclear Plant
Responses to Requests for Additional Information

JOSEPH M. FARLEY NUCLEAR PLANT

EAL SCHEME

MARKED-UP PAGES

FARLEY NUCLEAR PLANT

EMERGENCY ACTION LEVELS

**INITIATING CONDITIONS,
THRESHOLD VALUES,
AND BASIS**

TABLE OF CONTENTS

1	REGULATORY BACKGROUND.....	1
1.1	OPERATING REACTORS.....	1
1.2	INDEPENDENT SPENT FUEL STORAGE INSTALLATION (ISFSI).....	1
1.3	NRC ORDER EA-12-051	2
1.4	ORGANIZATION AND PRESENTATION OF GENERIC INFORMATION.....	3
1.5	IC AND EAL MODE APPLICABILITY.....	3
2	GUIDANCE ON MAKING EMERGENCY CLASSIFICATIONS.....	5
2.1	GENERAL CONSIDERATIONS	5
2.2	CLASSIFICATION METHODOLOGY	6
2.3	CLASSIFICATION OF MULTIPLE EVENTS AND CONDITIONS.....	6
2.4	CONSIDERATION OF MODE CHANGES DURING CLASSIFICATION	6
2.5	CLASSIFICATION OF IMMINENT CONDITIONS	7
2.6	EMERGENCY CLASSIFICATION LEVEL UPGRADING AND DOWNGRADING	7
2.7	CLASSIFICATION OF SHORT-LIVED EVENTS	7
2.8	CLASSIFICATION OF TRANSIENT CONDITIONS	7
2.9	AFTER-THE-FACT DISCOVERY OF AN EMERGENCY EVENT OR CONDITION.....	8
3	ABNORMAL RAD LEVELS / RADIOLOGICAL EFFLUENT ICS/EALS	9
4	COLD SHUTDOWN / REFUELING SYSTEM MALFUNCTION ICS/EALS	26
5	INDEPENDENT SPENT FUEL STORAGE INSTALLATION (ISFSI) ICS/EALS	46
6	FISSION PRODUCT BARRIER ICS/EALS	49
7	HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY ICS/EALS	65
8	SYSTEM MALFUNCTION ICS/EALS.....	88
	APPENDIX A – ACRONYMS AND ABBREVIATIONS.....	A-1
	APPENDIX B – DEFINITIONS.....	B-1

EMERGENCY ACTION LEVELS

1 REGULATORY BACKGROUND

1.1 OPERATING REACTORS

Title 10, Code of Federal Regulations (CFR), Energy, contains the U.S. Nuclear Regulatory Commission (NRC) regulations that apply to nuclear power facilities. Several of these regulations govern various aspects of an emergency classification scheme. The relevant sections for this document are:

- 10 CFR § 50.47(a)(1)(i)
- 10 CFR § 50.47(b)(4)
- 10 CFR § 50.54(q)
- 10 CFR § 50.72(a)
- 10 CFR § 50, Appendix E, IV.B, Assessment Actions
- 10 CFR § 50, Appendix E, IV.C, Activation of Emergency Organization

These regulations are supplemented by regulatory guidance documents. Documents of particular relevance to NEI 99-01 include:

NUREG-0654/FEMA-REP-1, *Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants*, October 1980. [Refer to Appendix 1, *Emergency Action Level Guidelines for Nuclear Power Plants*]
NUREG-1022, *Event Reporting Guidelines 10 CFR § 50.72 and § 50.73*
Regulatory Guide 1.101, *Emergency Response Planning and Preparedness for Nuclear Power Reactors*

This list is not all-inclusive. It is strongly recommended that scheme developers consult with licensing and regulatory compliance personnel to identify and understand all applicable requirements and guidance. Questions also may be directed to the NEI Emergency Preparedness staff.

1.2 INDEPENDENT SPENT FUEL STORAGE INSTALLATION (ISFSI)

Selected guidance in NEI 99-01 is applicable to licensees electing to use their 10 CFR 50 emergency plan to fulfill the requirements of 10 CFR 72.32 for a stand-alone ISFSI. The emergency classification levels applicable to an ISFSI are consistent with the requirements of 10 CFR § 50 and the guidance in NUREG 0654/FEMA-REP-1. The initiating conditions germane to a 10 CFR § 72.32 emergency plan (as described in NUREG-1567) are contained within the classification scheme for a 10 CFR § 50.47 emergency plan.

The generic ICs and EALs for an ISFSI are presented in Section 5, ISFSI ICs/EALs. IC E-HU1 covers credible natural and man-made events included within the scope of an ISFSI design. This IC is not applicable to installations or facilities that process and/or repackage spent fuel. . Additionally, appropriate aspects of IC HU1 and IC HA1 should also be included to address a HOSTILE ACTION directed against an ISFSI.

The analysis of potential onsite and offsite consequences of accidental releases associated with the operation of an ISFSI is contained in NUREG-1140, *A Regulatory Analysis on Emergency Preparedness for Fuel Cycle and Other Radioactive Material Licensees*. NUREG-1140 concluded that the postulated worst-case accident involving an ISFSI has insignificant consequences to public health and safety. This evaluation shows that the maximum offsite dose to a member of the public due to an accidental release of radioactive materials would not exceed 1 rem Effective Dose Equivalent.

1.3 NRC ORDER EA-12-051

The Fukushima Daiichi accident of March 11, 2011, was the result of a tsunami that exceeded the plant's design basis and flooded the site's emergency electrical power supplies and distribution systems. This caused an extended loss of power that severely compromised the key safety functions of core cooling and containment integrity, ultimately leading to core damage in three reactors. Although the loss of power also impaired the spent fuel pool cooling function, sufficient water inventory was maintained in the pools to prevent fuel damage from the loss of cooling.

Following a review of the Fukushima Daiichi accident, the NRC concluded that several measures were necessary to ensure adequate protection of public health and safety under the provisions of the backfit rule, 10 CFR 50.109(a)(4)(ii). One such measure was that each spent fuel pool be provided with reliable level instrumentation to significantly enhance the ability of key decision makers to effectively allocate resources following a beyond design basis event. To this end, the NRC issued Order EA-12-051, *Issuance of Order to Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation*, on March 12, 2012, to all U.S. nuclear plants with an operating license, construction permit, or combined construction and operating license.

NRC Order EA-12-051 states, in part, "All licensees ... shall have a reliable indication of the water level in associated spent fuel storage pools capable of supporting identification of the following pool water level conditions by trained personnel: (1) level that is adequate to support operation of the normal fuel pool cooling system, (2) level that is adequate to provide substantial radiation shielding for a person standing on the spent fuel pool operating deck, and (3) level where fuel remains covered and actions to implement make-up water addition should no longer be deferred." All licensees must therefore provide:

- A primary and back-up level instrument that will monitor water level from the normal level to the top of the used fuel rack in the pool;
- A display in an area accessible following a severe event; and
- Independent electrical power to each instrument channel and an alternate remote power connection capability.

NEI 12-02, *Industry Guidance for Compliance with NRC Order EA-12-051, "To Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation"*, provides guidance for complying with NRC Order EA-12-051.

NEI 99-01, Revision 6, includes three EALs that reflect the availability of the enhanced spent fuel pool level instrumentation associated with NRC Order EA-12-051. These

EALs are included within existing IC RA2, and new ICs RS2 and RG2. Associated EAL notes, bases and developer notes are also provided.

It is recommended that these EALs be implemented when the enhanced spent fuel pool level instrumentation is available for use.

The regulatory process that licensees follow to make changes to their emergency plan, including non-scheme changes to EALs, is 10 CFR 50.54(q). Licensees are responsible for evaluating a proposed change and determining whether or not it results in a reduction in the effectiveness of the plan. Based on this determination, the licensee will either make the change or submit it to the NRC for prior review and approval in accordance with 10 CFR 50.90.

1.4 ORGANIZATION AND PRESENTATION OF INFORMATION

The scheme's information is organized by Recognition Category in the following order.

- R - Abnormal Radiation Levels / Radiological Effluent
- C - Cold Shutdown / Refueling System Malfunction
- E - Independent Spent Fuel Storage Installation (ISFSI)
- F - Fission Product Barrier
- H - Hazards and Other Conditions Affecting Plant Safety
- S - System Malfunction

1.5 IC AND EAL MODE APPLICABILITY

The following table shows Recognition Categories applicable in each plant mode. The ICs and EALs for a given Recognition Category are applicable in the indicated modes.

MODE APPLICABILITY MATRIX

Mode	Category					
	R	C	E	F	H	S
Power Operations	X		X	X	X	X
Startup	X		X	X	X	X
Hot Standby	X		X	X	X	X
Hot Shutdown	X		X	X	X	X
Cold Shutdown	X	X	X		X	
Refueling	X	X	X		X	
Defueled	X	X	X		X	

Farley Units 1 and 2 Technical Specifications Table 1.1-1 provides the following operating mode definitions:

Mode	Title	Reactivity Condition (K_{eff})	% Rated Thermal Power ^(a)	Average RCS Temperature (°F)
1	Power Operation	≥ 0.99	> 5	NA
2	Startup	≥ 0.99	≤ 5	NA
3	Hot Standby	< 0.99	NA	≥ 350
4	Hot Shutdown ^(b)	< 0.99	NA	$350 > T_{avg} > 200$
5	Cold Shutdown ^(b)	< 0.99	NA	≤ 200
6	Refueling ^(c)	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 defined modes, "Defueled" is also applicable to the Farley EAL scheme, consistent with NEI 99-01. Defueled is a 'No Mode' condition where all of the fuel has been removed from the reactor vessel (i.e., full core offload during refueling or extended outages).

These modes are used throughout the Farley EALs with no modifications from NEI 99-01. When a unit is defueled, the Initiating Conditions designated as Mode Condition "ALL" or "Defueled" are applicable.

2 GUIDANCE ON MAKING EMERGENCY CLASSIFICATIONS

2.1 GENERAL CONSIDERATIONS

For any emergency classification, the emergency director must consider all information having a bearing on the proper assessment of an initiating condition (IC). This includes the emergency action level (EAL), the associated operating mode applicability, notes and the informing basis information. In the Recognition Category F matrices, EALs are referred to as Fission Product Barrier Thresholds; the thresholds serve the same function as an EAL.

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 provides guidance on implementing this requirement in *NSIR/DPR-ISG-01*, Interim Staff Guidance, *Emergency Planning for Nuclear Power Plants*.

All emergency classification assessments will be based on valid indications, reports or conditions. A valid indication, report, or condition, has been verified using appropriate means, leaving no doubt regarding the indicator's operability, the condition's existence, or the report's accuracy. For example, validation could be an instrument channel check, response on related or redundant indicators, or direct observation by plant personnel. Indication will be validated in a manner that supports timely emergency declaration.

For ICs and EALs that have a stipulated time duration, the emergency director will not wait until the applicable time has elapsed, but will 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 will be assumed that the release duration specified in the IC/EAL has been exceeded, absent data to the contrary.

A planned work activity resulting in an expected event or condition that 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 such cases, the controls associated with the planning, preparation and execution of the work will ensure compliance with 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.

Some EALs are assessed based on the results of analyses necessary to ascertain whether a specific EAL threshold has been exceeded. The EAL and/or the associated basis discussion will identify the necessary analysis. 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.

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

2.2 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. An EAL(s) evaluation must be consistent with the related operating mode applicability and notes. If an EAL has been met or exceeded, the IC is met and the associated ECL is declared in accordance with plant procedures.

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.

2.3 CLASSIFICATION OF MULTIPLE EVENTS AND CONDITIONS

In the event of multiple emergencies or conditions, the user will identify all met or exceeded EALs. The highest applicable ECL identified during this review is declared. For example:

If an Alert EAL and a Site Area Emergency EAL are met, a Site Area Emergency should be declared.

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

If two Alert EALs are met, an Alert will be declared.

Related guidance for 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*.

2.4 CONSIDERATION OF MODE CHANGES DURING CLASSIFICATION

The mode in effect at the time an event or condition occurred, and prior to any plant or operator response, determines whether 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.

Commented [JRB1]: RAI 1 revision

2.5 CLASSIFICATION OF IMMINENT CONDITIONS

Although EALs provide specific thresholds, the emergency director must remain alert to events or conditions that could lead to meeting or exceeding an EAL within a relatively short period of time (i.e., a change in the ECL is IMMINENT). If, in the judgment of the emergency director, meeting an EAL is IMMINENT, the emergency classification will be made as though 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.

2.6 EMERGENCY CLASSIFICATION LEVEL UPGRADING AND DOWNGRADING

SNC policy is that once an emergency classification is made, it cannot be downgraded to a lower classification. Termination criteria contained in procedure *NMP-EP-110, Emergency Classification and Initial Actions* shall be completed for an event to be terminated. At termination, on an event specific basis, the site will enter either normal operating conditions or a recovery condition with a recovery organization established for turnover from the ERO.

2.7 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 end 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.~~ For example, an earthquake, or failure of the reactor protection system to automatically scram/trip the reactor followed by a successful manual scram/trip.

Commented [JRB2]: RAI 2 revision

2.8 CLASSIFICATION OF TRANSIENT CONDITIONS

Many of the ICs and EALs in this document employ time-based criteria that require 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, some transient conditions may cause an EAL to be met for a brief period of time. The following guidance will be applied to the classification of these conditions.

EAL momentarily met during expected plant response - When 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. This example presents an illustration:

An ATWS occurs and the auxiliary feedwater system fails to automatically start. Steam generator levels rapidly decrease and the plant enters an inadequate RCS

heat removal condition (a potential loss of both the fuel clad and RCS barriers). If an operator manually starts the auxiliary feedwater system in accordance with an EOP step and clears the inadequate RCS heat removal condition prior to an emergency declaration, then the classification will be based on the ATWS only.

It is important to note that the 15-minute emergency classification assessment period is not a "grace period" to delay a classification in order to perform 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 rapidly evolving situations in which an operator is able to take corrective action before the emergency director completes the review and necessary steps to make the emergency declaration. This provision ensures any public protective actions resulting from the emergency classification are truly warranted by the plant conditions.

2.9 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. Personnel could discover that an event or condition existed that met an EAL, but no emergency was declared, and the event or condition no longer exists at the time of discovery. It may be the event or condition was not recognized at the time, or there was an error in the emergency classification process.

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

3 ABNORMAL RAD LEVELS / RADIOLOGICAL EFFLUENT ICS/EALS

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
RG1 Release of gaseous radioactivity resulting in offsite dose greater than 1,000 mrem TEDE or 5,000 mrem thyroid CDE. <i>Op. Modes: All</i>	RS1 Release of gaseous radioactivity resulting in offsite dose greater than 100 mrem TEDE or 500 mrem thyroid CDE. <i>Op. Modes: All</i>	RA1 Release of gaseous or liquid radioactivity resulting in offsite dose greater than 10 mrem TEDE or 50 mrem thyroid CDE. <i>Op. Modes: All</i>	RU1 Release of gaseous or liquid radioactivity greater than 2 times the ODCM limits for 60 minutes or longer. <i>Op. Modes: All</i>
RG2 Spent fuel pool level cannot be restored to at least 130 131 feet (Level 3) for 60 minutes or longer. <i>Op. Modes: All</i>	RS2 Spent fuel pool level at 130-131 feet (Level 3). <i>Op. Modes: All</i>	RA2 Significant lowering of water level above, or damage to, irradiated fuel. <i>Op. Modes: All</i>	RU2 UNPLANNED loss of water level above irradiated fuel. <i>Op. Modes: All</i>
		RA3 Radiation levels that impede access to equipment necessary for normal plant operations, cooldown or shutdown. <i>Op. Modes: All</i>	

Commented [JRB4]: RAI 3 d revision

Commented [JRB3]: RAI 3 d revision

RG1

ECL: General Emergency

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

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2 or 3)

Notes:

- The emergency director will declare the General 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 will be used for emergency classification assessments until the results from a dose assessment using actual meteorology are available.

- (1) Readings on ANY of the following radiation monitors greater than the reading shown below for 15 minutes or longer:

Steam Jet Air Ejector RE-15C	130 $\mu\text{Ci/cc}$ (130 R/hr)
Plant Vent Stack RE-29B (NG)	0.8 $\mu\text{Ci/cc}$

- (2) Dose assessment using actual meteorology indicates doses greater than 1,000 mrem TEDE or 5,000 mrem thyroid CDE at or beyond the site boundary.
- (3) Field survey results indicate **EITHER** of the following at or beyond the site boundary:
- Closed window dose rates greater than 1,000 mR/hr expected to continue for 60 minutes or longer.
 - Analyses of field survey samples indicate thyroid CDE greater than 5,000 mrem for one hour of inhalation.

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 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 monitor reading threshold values are determined using a dose assessment method that back calculates from the dose values specified

in the IC. The meteorology and source term (noble gases, particulates, and halogens) used are the same as those used to determine the monitor reading threshold values in ICs RS1 and RA1. This protocol will maintain intervals between the threshold values for the three classifications. Since doses are generally not monitored in real-time, a release duration of one hour is assumed, and the threshold values are based on a site boundary (or beyond) dose of 1000 mR/hour whole body or 5000 mR/hour thyroid, whichever is more limiting.

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.

RG2

ECL: General Emergency

Initiating Condition: Spent fuel pool level cannot be restored to at least ~~130-131 feet (Level 3)~~ for 60 minutes or longer.

Commented [JRB5]: RAI 3 d revision

Operating Mode Applicability: All

Emergency Action Levels:

Note: The emergency director will declare the General Emergency promptly upon determining that 60 minutes has been exceeded, or will likely be exceeded.

- (1) Spent fuel pool level cannot be restored to at least ~~130-131 feet (Level 3)~~ for 60 minutes or longer.

Commented [JRB6]: RAI 3 d revision

Basis:

This IC addresses a significant loss of spent fuel pool inventory control and makeup capability leading to a prolonged uncover of spent fuel. The spent fuel level instrument is located outside the Control Room but in close proximity. 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.

RS1

ECL: Site Area Emergency

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

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2 or 3)

Notes:

- The emergency director will 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 will be used for emergency classification assessments until the results from a dose assessment using actual meteorology are available.

- (1) Reading on ANY of the following radiation monitors greater than the reading shown for 15 minutes or longer:

Steam Jet Air Ejector RE-15C	13 $\mu\text{Ci/cc}$ (13 R/hr)
Plant Vent Stack RE-29B (NG)	0.08 $\mu\text{Ci/cc}$

- (2) Dose assessment using actual meteorology indicates doses greater than 100 mrem TEDE or 500 mrem thyroid CDE at or beyond the site boundary.
- (3) Field survey results indicate **EITHER** of the following at or beyond the site boundary:
- Closed window dose rates greater than 100 mR/hr expected to continue for 60 minutes or longer.
 - Analyses of field survey samples indicate thyroid CDE greater than 500 mrem for one hour of inhalation.

Basis:

This IC addresses a release of gaseous radioactivity that results in projected or actual offsite doses greater than or equal to 10 percent 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 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 monitor reading threshold values are

determined using a dose assessment method that back calculates from the dose values specified in the IC. The meteorology and source term (noble gases, particulates, and halogens) used is the same as those used to determine the monitor reading threshold values in ICs RG1 and RA1. This protocol maintains intervals between the threshold values for the three classifications. Since doses are generally not monitored in real-time, a release duration of one hour is assumed, and the threshold values are based on a site boundary (or beyond) dose of 100 mR/hour whole body or 500 mR/hour thyroid, whichever is more limiting.

The TEDE dose is set at 10 percent 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 uses IC RG1.

RS2

ECL: Site Area Emergency

Initiating Condition: Spent fuel pool level at ~~130-131 feet (Level 3)~~.

Commented [JRB7]: RAI 3 d revision

Operating Mode Applicability: All

Emergency Action Levels:

- (1) Lowering of spent fuel pool level to ~~130-131 feet (Level 3)~~.

Commented [JRB8]: RAI 3 d revision

Basis:

This IC addresses a significant loss of spent fuel pool inventory control and makeup capability leading to IMMINENT fuel damage. This condition stems from major failures of plant functions needed to protect the public that warrant a Site Area Emergency declaration. The spent fuel pool level instrument is located outside the Control Room but in close proximity.

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 uses via IC RG1 or RG2.

RA1

ECL: Alert

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

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2 or 3 or 4)

Notes:

- The emergency director will 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 will be used for emergency classification assessments until the results from a dose assessment using actual meteorology are available.

- (1) Reading on ANY of the following radiation monitors greater than the reading shown for 15 minutes or longer:

Steam Jet Air Ejector RE-15C	1.3 $\mu\text{Ci/cc}$ (1.3 R/hr)
Plant Vent Stack RE-29B (NG)	0.008 $\mu\text{Ci/cc}$

- (2) Dose assessment using actual meteorology indicates doses greater than 10 mrem TEDE or 50 mrem thyroid CDE at or beyond the site boundary.
- (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 the site boundary for one hour of exposure.
- (4) Field survey results indicate **EITHER** of the following at or beyond the site boundary:
- 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.

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 percent 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 plant safety as indicated by a radiological release that significantly exceeds regulatory limits (e.g., a significant uncontrolled release).

Radiological effluent EALs are 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 monitor reading threshold values are determined using a dose assessment method that back calculates from the dose values specified in the IC. The meteorology and source term (noble gases, particulates, and halogens) used is the same as those used to determine the monitor reading threshold values in ICs RG1 and RS1. This protocol maintains intervals between the threshold values for the three classifications. Since doses are generally not monitored in real-time, a release duration of one hour is assumed, and the threshold values are based on a site boundary (or beyond) dose of 10 mR/hour whole body or 50 mR/hour thyroid, whichever is more limiting.

The TEDE dose is set at 1 percent 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 uses IC RS1.

RA2

ECL: Alert

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

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2 or 3)

- (1) Uncovery of irradiated fuel in the REFUELING PATHWAY.
- (2) Damage to irradiated fuel resulting in a release of radioactivity from the fuel as indicated by alarms on **ANY** of the following radiation monitors:

Spent Fuel Pool Ventilation Monitor RE-25A OR B
Spent Fuel Pool Area Radiation Monitor RE-5
Containment Purge Ventilation Monitor RE-24A OR B

- (3) Lowering of spent fuel pool level to 140 feet (Level 2).

Basis:

REFUELING PATHWAY: This includes the reactor refuel cavity the fuel transfer canal, and the spent fuel pool, canals and pools through which irradiated fuel may be moved, but not including the reactor vessel.

This IC addresses events that have caused IMMINENT or actual damage to an irradiated fuel assembly. These events present radiological safety challenges to plant personnel and are precursors to a release of radioactivity to the environment. As such, they represent an actual or potential substantial degradation of the level of plant safety.

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 is based on either Recognition Category R or C ICs.

EAL #1

This EAL escalates from RU2. 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), 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 will 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 the fuel is actually uncovered. To the degree possible, readings will be considered in combination with other available indications of inventory loss.

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

EAL #2

This EAL addresses a release of radioactive material caused by mechanical damage to irradiated fuel. Damaging events may include the dropping, bumping or binding of an assembly, or dropping a heavy load onto an assembly. A rise in readings on radiation monitors will be considered in conjunction with in-plant reports or observations of a potential fuel damaging event (e.g., a fuel handling accident). Containment Purge Ventilation Monitors are not available during all modes.

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. The spent fuel pool level instrument is located outside the Control Room but in close proximity. This condition reflects a significant loss of spent fuel pool water inventory and is a precursor to a loss of the ability to adequately cool the irradiated fuel assemblies stored in the pool.

Escalation of the emergency classification level uses ICs RS1 or RS2.

RA3

ECL: Alert

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

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2)

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.

- (1) Dose rate greater than 15 mR/hr on RE-1A, Control Room Radiation Monitor.
- (2) An UNPLANNED event results in radiation levels that prohibit or impede access to any Table H1 plant rooms or areas:

Table H1		
Mode	Room Name	Room Number
3	Electrical Penetration Room	334, 333, 347 / 2334, 2333, 2347
	Hallway Outside Filter Room	312, 332/
	1A / 2A MCC areas	2312, 2332
	Sample Room and Primary CHM labs	323, 324 / 2323, 2324
4	Sample Room and Primary CHM labs	323, 324 / 2323, 2324
	RHR Hx Room.	128/ 2128

Basis:

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.

This IC addresses elevated radiation levels in certain plant rooms or 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 plant safety. The emergency director should consider the cause of the increased radiation levels and determine if another IC may be applicable.

For EAL #1, the area requiring continuous occupancy is the control room and the central alarm station. The central alarm station is in the control room envelope. The value of 15mR/hr is derived from the GDC 19 value of 5 Rem in 30 days with adjustment for expected occupancy times.

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 will 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 to 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 uses Recognition Category R, C or F ICs.

RU1

ECL: Notification of Unusual Event

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

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2 or 3)

Notes:

- The emergency director will declare the Unusual Event promptly upon determining that 60 minutes has been exceeded, or will likely be exceeded.
- If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded 60 minutes.
- If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is no longer valid for classification purposes.

- (1) Reading on **ANY** effluent radiation monitor greater than 2 times the ODCM limits for 60 minutes or longer:

Liquid Effluents	
Steam Generator Blowdown Effluent Line RE-23B	2.80×10^3 cpm
Gaseous Effluents	
Steam Jet Air Ejector RE-15	3.5×10^2 cpm
Plant Vent Gas	
R-14	3.2×10^4 cpm
RE-22	4.0×10^2 cpm
RE-29B (NG)	8.9×10^{-4} μ Ci/cc

- (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.

Liquid Radwaste Effluent Line RE-18	2 x release permit setpoint (planned release)
Plant Vent Gas R-14	2 x release permit setpoint (planned release)

- (3) Sample analysis for a gaseous or liquid release indicates a concentration or release rate greater than 2 times the ODCM limits for 60 minutes or longer.

Basis:

This IC addresses a potential decrease in the level of plant safety 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 unmonitored, 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. Administrative controls are established to prevent unintentional releases, and to control and monitor intentional releases. The occurrence of an extended, uncontrolled radioactive release to the environment indicates degradation in these features and/or controls.

Radiological effluent EALs are 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 will 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 uses IC RA1.

RU2

ECL: Notification of Unusual Event

Initiating Condition: UNPLANNED loss of water level above irradiated fuel.

Operating Mode Applicability: All

Emergency Action Levels:

- (1) a. UNPLANNED water level drop in the REFUELING PATHWAY as indicated by ANY of the following:

Personnel report of low water level
Annunciator EH2 "SFP LVL HI/LO"

AND

- b. UNPLANNED rise in area radiation levels as indicated by **ANY** of the following radiation monitors.

RE-5 in the spent fuel pool building
RE-2 in containment
RE-27A OR B in containment

Basis:

REFUELING PATHWAY: This includes the reactor refuel cavity the fuel transfer canal, the spent fuel pool, canals and pools through which irradiated fuel may be moved, but not including the reactor vessel.

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.

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

A water level decrease will be primarily determined by indications from available level instrumentation. Other sources of level indications 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 will 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 with Recognition Category C during the Cold Shutdown and Refueling modes.

Escalation of the emergency classification level uses IC RA2.

4 COLD SHUTDOWN / REFUELING SYSTEM MALFUNCTION ICS/EALS

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
CG1 Loss of RPV inventory affecting fuel clad integrity with containment challenged. <i>Op. Modes: Cold Shutdown, Refueling</i>	CS1 Loss of RPV inventory affecting core decay heat removal capability. <i>Op. Modes: Cold Shutdown, Refueling</i>	CA1 Loss of RPV inventory. <i>Op. Modes: Cold Shutdown, Refueling</i>	CU1 UNPLANNED loss of RPV inventory for 15 minutes or longer. <i>Op. Modes: Cold Shutdown, Refueling</i>
		CA2 Loss of all offsite and all onsite AC power to emergency buses for 15 minutes or longer. <i>Op. Modes: Cold Shutdown, Refueling, Defueled</i>	CU2 Loss of all but one AC power source to emergency buses for 15 minutes or longer. <i>Op. Modes: Cold Shutdown, Refueling, Defueled</i>
		CA3 Inability to maintain the plant in cold shutdown. <i>Op. Modes: Cold Shutdown, Refueling</i>	CU3 UNPLANNED rise in RCS temperature. <i>Op. Modes: Cold Shutdown, Refueling</i>
			CU4 Loss of Vital DC power for 15 minutes or longer. <i>Op. Modes: Cold Shutdown, Refueling</i>
			CU5 Loss of all onsite or offsite communications capabilities. <i>Op. Modes: Cold Shutdown, Refueling, Defueled</i>
		CA6 Hazardous event affecting a SAFETY SYSTEM needed for the current operating mode. <i>Op. Modes: Cold Shutdown, Refueling</i>	

CG1

ECL: General Emergency

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

Operating Mode Applicability: Cold Shutdown, Refueling

Emergency Action Levels: (1 or 2)

Commented [JRB9]: RAI 10 revision

Note: The emergency director will declare the General Emergency promptly upon determining that 30 minutes has been exceeded, or will likely be exceeded.

- (1) a. RPV level less than ANY of the following for 30 minutes or longer:
- 0% RVLIS (Mode 5)
 - 119' Temporary Level Indicator (Mode 6)

AND

- b. ANY indication from the Containment Challenge Table C1.

- (H)(2) a. Reactor vessel level cannot be monitored for 30 minutes or longer.

Commented [JRB10]: RAI 10 revision

AND

- b. Core uncover is indicated by ANY of the following:
- Containment High Range Radiation Monitor RE27A or 27B reading greater than or equal to 100 R/hr.
 - Erratic source range monitor indication
 - UNPLANNED rise in Containment Sump, or Reactor Coolant Drain Tank (RCDT), or Waste Holdup Tank (WHT) levels of sufficient magnitude to indicate core uncover

AND

- c. ANY indication from the Containment Challenge Table C1.

Containment Challenge Table C1
■ CONTAINMENT CLOSURE not established*
■ Greater than or equal to 6 % H ₂ exists inside containment
■ UNPLANNED increase in containment pressure
* If CONTAINMENT CLOSURE is re-established prior to exceeding the 30-minute time limit, then declaration of a General Emergency is not required.

Basis:

CONTAINMENT CLOSURE: Per FNP-1(2)-STP-18.4, "Containment Integrity Verification and Closure".

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.

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 RPV 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 uncover event, it is unlikely that hydrogen buildup due to a core uncover 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 containment is challenged.

In EAL 42.b, the 30-minute criterion is tied to a readily recognizable event start time (i.e., the total loss of ability to monitor level), and allows sufficient time to monitor, assess and correlate reactor and plant conditions to determine if core uncover has actually occurred (i.e., to account for various accident progression and instrumentation uncertainties). It also allows sufficient time for actions to terminate leakage, recover inventory control or makeup equipment, and/or restore level monitoring.

The inability to monitor RPV 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 indicate leakage from the RPV.

These EALs address 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*.

Commented [JRB11]: RAI 10 revision

CS1

ECL: Site Area Emergency

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

Operating Mode Applicability: Cold Shutdown, Refueling

Emergency Action Levels: (1 or 2 or 3)

Commented [JRB12]: RAI 10 revision

Note: The emergency director will declare the Site Area Emergency promptly upon determining that 30 minutes has been exceeded, or will likely be exceeded.

- (1) a. CONTAINMENT CLOSURE not established.

AND

- b. RVLIS (Mode 5) level less than 16% (121" (6" below bottom ID of RCS loop)).

Commented [JRB13]: Editorial change - RVLIS reads in %

- (2) a. CONTAINMENT CLOSURE established.

AND

- b. RPV level less than ANY of the following:
- 0% RVLIS (Mode 5)
 - 119' Temporary Level Indicator (Mode 6)

Commented [JRB14]: RAI 10 revision

- (2)(3) a. RPV level cannot be monitored for 30 minutes or longer.

AND

- b. Core uncover is indicated by ANY of the following:
- Containment High Range Radiation Monitor RE27A or 27B reading greater than or equal to 100 R/hr
 - Erratic source range monitor indication
 - UNPLANNED rise in Containment Sump, or Reactor Coolant Drain Tank (RCDT), or Waste Holdup Tank (WHT) levels of sufficient magnitude to indicate core uncover

Basis:

CONTAINMENT CLOSURE: Per FNP-1(2)-STP-18.4, "Containment Integrity Verification and Closure".

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.

This IC addresses a significant and prolonged loss of RPV 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 to protect the public and 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 RPV level cannot be restored, fuel damage is probable.

The level specified in EAL 1.b represents a level in the RPV that is 6 inches below the bottom ID of the reactor vessel penetration. This level is lower than the RPV monitoring capability of RCS level instrumentation and therefore must be monitored using RVLIS. This level will only be observable in Mode 5 with RVLIS operable. In Mode 6, when RVLIS is not operable, this IC should be evaluated using EAL #2 **b or 3**.

Commented [JRB15]: RAI 10 revision

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 specified RCS/reactor vessel levels of EAL 1.b **and 2.b** reflect that without CONTAINMENT CLOSURE established, there is a higher probability of a fission product release to the environment.

Commented [JRB16]: RAI 10 revision

In EAL **23.a**, the 30-minute criterion is tied to a readily recognizable event start time (i.e., the total loss of ability to monitor level), and allows sufficient time to monitor, assess and correlate reactor and plant conditions to determine if core uncover has actually occurred (i.e., to account for various accident progression and instrumentation uncertainties). It also allows sufficient time for actions to terminate leakage, recover inventory control or makeup equipment, and/or restore level monitoring.

Commented [JRB17]: RAI 10 revision

The inability to monitor RPV 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 indicate leakage from the RPV.

These EALs address 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 uses IC CG1 or RG1.

CA1

ECL: Alert

Initiating Condition: Loss of RPV inventory.

Operating Mode Applicability: Cold Shutdown, Refueling

Emergency Action Levels: (1 or 2)

Note: The emergency director will declare the Alert promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

(1) Loss of RPV inventory as indicated by level less than 122' 11".

(2) a. RPV level cannot be monitored for 15 minutes or longer

AND

b. UNPLANNED increase in Containment sump, Reactor Coolant Drain Tank (RCDDT) or Waste Holdup Tank (WHT) levels due to a loss of RPV inventory.

Basis:

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.

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 122' 11" indicates that operator actions have not been successful in restoring and maintaining RPV water level. The 122' 11" level specified in EAL #1 is the minimum RCS level for RHR operation provided in procedure for mid loop operations. Below this level, loss of RHR pump net positive suction head (NPSH) may occur resulting in a loss of decay heat removal capability. 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 uncover.

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 EAL #2, the inability to monitor RPV 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 indicate leakage from the RPV.

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 RPV inventory level continues to lower, then escalation to Site Area Emergency uses IC CS1.

CA2

ECL: Alert

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

Operating Mode Applicability: Cold Shutdown, Refueling, Defueled

Emergency Action Levels:

Note: The emergency director will declare the Alert promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) Loss of **ALL** offsite and **ALL** onsite AC Power (Table S1) to **BOTH** 4160V ESF busses 1(2)F **AND** 1(2)G for 15 minutes or longer.

Commented [JRB18]: RAI 12 revision

Table S1	
Unit 1	Unit 2
Start-up Aux XFMR 1A	Start-up Aux XFMR 2A
Start-up Aux XFMR 1B	Start-up Aux XFMR 2B
Diesel Generator 1-2A	Diesel Generator 1-2A
Diesel Generator 1B	Diesel Generator 2B
Diesel Generator 1C	Diesel Generator 1C
Diesel Generator 2C	Diesel Generator 2C

Basis:

This IC addresses a total loss of AC power (see Table S1 above) 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 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. When in these modes, this condition represents an actual or potential substantial degradation of the level of plant safety.

Fifteen minutes is the threshold to exclude transient or momentary power losses.

Escalation of the emergency classification level uses IC CS1 or RS1.

CA3

ECL: Alert

Initiating Condition: Inability to maintain the plant in cold shutdown.

Operating Mode Applicability: Cold Shutdown, Refueling

Emergency Action Levels: (1 or 2)

Note: The emergency director will declare the Alert promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.

- (1) UNPLANNED increase in RCS temperature to greater than 200 °F for greater than the duration specified in Table C2.

Table C2: RCS Heat-up Duration Thresholds		
RCS Status	Containment Closure Status	Heat-up Duration
Not Intact (or at reduced inventory)	Not Established	0 minutes
	Established	20 minutes*
Intact (but not at reduced inventory)	Not applicable	60 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.		

- (2) UNPLANNED RCS pressure increase greater than 10 psig. (This EAL does not apply during water-solid plant conditions).

Basis:

CONTAINMENT CLOSURE: Per FNP-1(2)-STP-18.4, "Containment Integrity Verification and Closure".

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.

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 plant safety.

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 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. In this case, 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 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.

Finally, 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 will allow sufficient time to address the temperature increase without a substantial degradation in plant safety.

EAL #2 provides a pressure-based indication of RCS heat-up.

Escalation of the emergency classification level uses IC CS1 or RS1.

CA6

ECL: Alert

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

Operating Mode Applicability: Cold Shutdown, Refueling

Emergency Action Levels:

(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
- Other events with similar hazard characteristics as determined by the Shift Manager

AND

b. **EITHER** of the following:

- 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.

Basis:

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.

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 may require a post-event inspection to determine if the attributes of an explosion are present.

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.

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.

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 plant safety.

The first threshold for EAL 1.b 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 will be significant enough to cause concern regarding the operability or reliability of the SAFETY SYSTEM train.

The second threshold for EAL 1.b 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 all 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 uses IC CS1 or RS1.

CU1

ECL: Notification of Unusual Event

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

Operating Mode Applicability: Cold Shutdown, Refueling

Emergency Action Levels: (1 or 2)

Note: The emergency director will declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) UNPLANNED loss of reactor coolant results in RPV level less than a required lower limit for 15 minutes or longer.
- (2) a. RPV level cannot be monitored.

AND

- b. UNPLANNED rise in Containment sump, Reactor Coolant Drain Tank, or Waste Holdup Tank levels.

Basis:

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.

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 RPV level concurrent with indications of coolant leakage. Either of these conditions is considered to be a potential degradation of the level of plant safety.

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 RPV 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 RPV 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 indicate leakage from the RPV.

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

CU2

ECL: Notification of Unusual Event

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

Operating Mode Applicability: Cold Shutdown, Refueling, Defueled

Emergency Action Levels:

Note: The emergency director will declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) a. AC power capability to **BOTH** 4160V ESF busses 1(2)F **AND** 1(2)G is reduced to a single power source (Table S1) for 15 minutes or longer.

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AND

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

Table S1	
Unit 1	Unit 2
Start-up Aux XFMR 1A	Start-up Aux XFMR 2A
Start-up Aux XFMR 1B	Start-up Aux XFMR 2B
Diesel Generator 1-2A	Diesel Generator 1-2A
Diesel Generator 1B	Diesel Generator 2B
Diesel Generator 1C	Diesel Generator 1C
Diesel Generator 2C	Diesel Generator 2C

Basis:

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.

This IC describes a significant degradation of offsite and onsite AC power sources where any additional single failure would result in a loss of all AC power to SAFETY SYSTEMS. In this condition, the sole AC power source may be powering one, or more than one, train of safety-related equipment.

When in the cold shutdown, refueling, or defueled mode, this condition is not classified as an Alert because of the increased 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. When in these modes, this condition is considered to be a potential degradation of the level of plant safety.

An "AC power source" is a source recognized in AOPs and EOPs, and capable of supplying required power to an emergency bus (see Table S1 above). Examples of this condition include:

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

Fifteen minutes is the 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.

CU3

ECL: Notification of Unusual Event

Initiating Condition: UNPLANNED increase in RCS temperature.

Operating Mode Applicability: Cold Shutdown, Refueling

Emergency Action Levels: (1 or 2)

Note: The emergency director will declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) UNPLANNED increase in RCS temperature to greater than 200 °F.
- (2) Loss of **ALL** RCS temperature **AND** RPV level indication for 15 minutes or longer.

Basis:

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.

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. It represents a potential degradation of the level of plant safety. If the RCS is not intact and CONTAINMENT CLOSURE is not established during this event, the emergency director will 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, where 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 reflects a condition where there has been a significant loss of instrumentation capability necessary to monitor RCS conditions and operators are 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 is the threshold to exclude transient or momentary losses of indication.

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

CU4

ECL: Notification of Unusual Event

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

Operating Mode Applicability: Cold Shutdown, Refueling

Emergency Action Levels:

Note: The emergency director will declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) Indicated voltage is less than 105 VDC on Technical Specification required 125 VDC vital busses for 15 minutes or longer.

Basis:

This IC addresses a loss of vital DC power that 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. This condition is considered to be a potential degradation of the level of plant safety.

As used in this EAL, "required" means the vital DC busses 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 is the threshold to exclude transient or momentary power losses.

Depending upon the event, escalation of the emergency classification level uses IC CA1 or CA3, or an IC in Recognition Category R.

CU5

ECL: Notification of Unusual Event

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

Operating Mode Applicability: Cold Shutdown, Refueling, Defueled

Emergency Action Levels: (1 or 2 or 3)

- (1) Loss of **ALL** of the following onsite communication methods:

In plant telephones
Public address system
Plant radio systems

- (2) Loss of **ALL** of the following ORO communications methods:

ENN (Emergency Notification Network)
Commercial phones

- (3) Loss of **ALL** of the following NRC communications methods:

ENS on Federal Telecommunications System (FTS)
Commercial phones

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 will be assessed only when extraordinary means are used 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).

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

EAL #2 addresses a total loss of the communications methods used to notify all OROs of an emergency declaration. The OROs referred to here are the states of Alabama, Georgia, and Florida; Houston and Henry Counties, Alabama; and Early County, Georgia.

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

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5 INDEPENDENT SPENT FUEL STORAGE INSTALLATION (ISFSI) ICS/EALS

UNUSUAL EVENT

**E-HU1 Damage to a loaded cask
CONFINEMENT BOUNDARY.**

Op. Modes: All

E-HU1

ECL: Notification of Unusual Event

Initiating Condition: Damage to a loaded cask CONFINEMENT BOUNDARY.

Operating Mode Applicability: All

Emergency Action Levels:

- (1) Damage to a loaded cask CONFINEMENT BOUNDARY as indicated by an on-contact radiation reading greater than ANY of the values listed in Table E1.

Table E1	
Location of Dose Rate	Total Dose Rate (Neutron + Gamma mR/hr)
HI-TRAC 125	
Side-Mid-height	1360
Top	260
HI-STORM 100	
Side – 60 inches below mid-height	340
Side – Mid- height	350
Side – 60 inches above mid-height	170
Center of lid	50
Middle of top lid	60
Top (outlet) duct	160
Bottom (inlet) duct	460

Basis:

CONFINEMENT BOUNDARY: The barrier(s) between areas containing radioactive substances and the environment.

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 that could cause challenges in removing the cask or fuel from storage.

The existence of “damage” is determined by radiological survey. The radiation reading values listed in the table represent 2 times the site-specific cask specific technical specification allowable radiation level on the designated surface of the spent fuel cask. The technical specification multiple of “2 times” 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

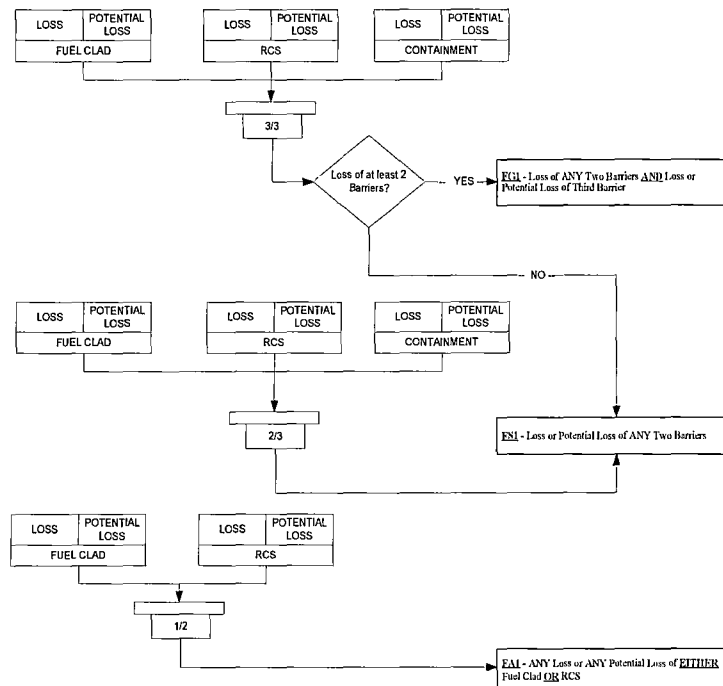
recognized that in the case of extreme damage to a loaded cask, determining if the “on-contact” dose rate limit is exceeded may be based on measurement of a dose rate at some distance from the cask.

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

6 FISSION PRODUCT BARRIER ICS/EALS

Recognition Category "F" Initiating Condition Matrix

GENERAL EMERGENCY	
FG1	Loss of any two barriers and Loss or Potential Loss of the third barrier. <i>Op. Modes: Power Operation, Hot Standby, Startup, Hot Shutdown</i>
SITE AREA EMERGENCY	
FS1	Loss or Potential Loss of any two barriers. <i>Op. Modes: Power Operation, Hot Standby, Startup, Hot Shutdown</i>
ALERT	
FA1	Any Loss or any Potential Loss of either the Fuel Clad or RCS barrier. <i>Op. Modes: Power Operation, Hot Standby, Startup, Hot Shutdown</i>



Fission Product Barrier Table

Thresholds for LOSS or POTENTIAL LOSS of Barriers

FG1 GENERAL EMERGENCY	FS1 SITE AREA EMERGENCY	FA1 ALERT
Loss of any two barriers and Loss or Potential Loss of the third barrier.	Loss or Potential Loss of any two barriers.	Any Loss or any Potential Loss of either the Fuel Clad or RCS barrier.

Fuel Clad Barrier		RCS Barrier		Containment Barrier	
LOSS	POTENTIAL LOSS	LOSS	POTENTIAL LOSS	LOSS	POTENTIAL LOSS
1. RCS or SG Tube Leakage		1. RCS or SG Tube Leakage		1. RCS or SG Tube Leakage	
Not Applicable	A. CORE COOLING CSF - ORANGE entry conditions met.	A. An automatic or manual ECCS actuation is required by EITHER of the following: <ul style="list-style-type: none"> • UNISOLABLE RCS leakage • SG tube RUPTURE. 	A. Operation of a standby charging pump is required by EITHER of the following: <ul style="list-style-type: none"> • UNISOLABLE RCS leakage • SG tube leakage. OR B. RCS INTEGRITY CSF - RED entry conditions met	A. A leaking or RUPTURED SG is FAULTED outside of containment.	Not Applicable

Fuel Clad Barrier		RCS Barrier		Containment Barrier	
LOSS	POTENTIAL LOSS	LOSS	POTENTIAL LOSS	LOSS	POTENTIAL LOSS
2. Inadequate Heat Removal		2. Inadequate Heat Removal		2. Inadequate Heat Removal	
A. CORE COOLING CSF - RED entry conditions met	A. CORE COOLING CSF - ORANGE entry conditions met OR B. HEAT SINK CSF - RED entry conditions met NOTE: Heat Sink CSF should not be considered RED if total AFW flow is less than 395 gpm due to operator action.	Not Applicable	A. HEAT SINK CSF - RED entry conditions met. NOTE: Heat Sink CSF should not be considered RED if total AFW flow is less than 395 gpm due to operator action.	Not Applicable	A. CORE COOLING CSF - RED entry conditions met for 15 minutes or longer
3. RCS Activity / Containment Radiation		3. RCS Activity / Containment Radiation		3. RCS Activity / Containment Radiation	
A. Containment radiation monitor RE-27 A or B greater than 600 R/Hr. OR B. Indications that reactor coolant activity is greater than 300 μ Ci/gm dose equivalent I-131.	Not Applicable	A. Containment radiation monitor RE-2 greater than 1 R/Hr OR Containment radiation monitor RE-7 greater than 500 mR/Hr.	Not Applicable	Not Applicable	A. Containment radiation monitor RE-27 A or B greater than 8000 R/Hr.

Fuel Clad Barrier		RCS Barrier		Containment Barrier	
LOSS	POTENTIAL LOSS	LOSS	POTENTIAL LOSS	LOSS	POTENTIAL LOSS
4. Containment Integrity or Bypass		4. Containment Integrity or Bypass		4. Containment Integrity or Bypass	
Not Applicable	Not Applicable	Not Applicable	Not Applicable	<p>A. Containment isolation is required AND EITHER of the following:</p> <ul style="list-style-type: none"> Containment integrity has been lost based on Emergency Director judgment. UNISOLABLE pathway from the containment to the environment exists. <p>OR</p> <p>B. Indications of RCS leakage outside of containment as indicated by alarms on any of the following instruments:</p> <ul style="list-style-type: none"> RE-10 RE-14 RE-21 RE-22 <p>Note: Increases in sump levels, temperatures, pressures, flow rates and/or radiation level readings outside of the containment may indicate that the RCS mass is being lost outside of containment.</p>	<p>A. CONTAINMENT CSF RED entry conditions met. OR</p> <p>B. Containment Hydrogen concentration greater than 5.56%</p> <p>OR</p> <p>C. 1. CONTAINMENT CSF ORANGE conditions met Containment pressure greater than 27 psig. AND</p> <p>2. Less than one CTMT fan coolers and one full train of CTMT Spray is operating per design for 15 minutes or longer.</p>
5. Other Indications		5. Other Indications		5. Other Indications	
Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable

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Fuel Clad Barrier		RCS Barrier		Containment Barrier	
LOSS	POTENTIAL LOSS	LOSS	POTENTIAL LOSS	LOSS	POTENTIAL LOSS
6. Emergency Director Judgment		6. Emergency Director Judgment		6. Emergency Director Judgment	
A. ANY condition in the opinion of the emergency director that indicates loss of the fuel clad barrier.	A. ANY condition in the opinion of the emergency director that indicates potential loss of the fuel clad barrier.	A. ANY condition in the opinion of the emergency director that indicates loss of the RCS barrier.	A. ANY condition in the opinion of the emergency director that indicates potential loss of the RCS barrier.	A. ANY condition in the opinion of the emergency director that indicates loss of the containment barrier.	A. ANY condition in the opinion of the emergency director that indicates potential loss of the containment barrier.

Basis Information For Fission Product Barrier EALs

FUEL CLAD BARRIER THRESHOLDS:

The fuel clad barrier consists of the cladding material that contains the fuel pellets.

1. RCS or SG Tube Leakage

There is no Loss threshold associated with RCS or SG Tube Leakage.

Potential Loss 1.A

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

2. Inadequate Heat Removal

Loss 2.A

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

Potential Loss 2.A

This condition indicates temperatures within the core are sufficient to allow the onset of heat-induced cladding damage.

Potential Loss 2.B

NOTE: Heat Sink CSF should not be considered RED if total AFW flow is less than 395 gpm due to operator action.

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.

Meeting this threshold results in a Site Area Emergency because this threshold is identical to RCS barrier potential loss threshold 2.A; 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.

3. RCS Activity/Containment Radiation

Loss 3.A

The radiation monitor reading corresponds to an instantaneous release of all reactor coolant mass into the containment, assuming that reactor coolant activity equals 300 μ Ci/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 percent to 5 percent 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 3.A 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 emergency classification level to a Site Area Emergency.

Loss 3.B

This threshold indicates that RCS radioactivity concentration is greater than 300 μ Ci/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 percent to 5 percent 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.

4. Containment Integrity or Bypass

Not applicable (included for numbering consistency)

5. Other Indications

Not applicable (included for numbering consistency)

6. Emergency Director Judgment

Loss 6.A

This threshold addresses any other factors used by the emergency director in determining whether the fuel clad barrier is lost.

Potential Loss 6.A

This threshold addresses any other factors used by the emergency director in determining whether the fuel clad barrier is potentially lost. The emergency director will also consider whether or not to declare the barrier potentially lost in the event that barrier status cannot be monitored.

RCS BARRIER THRESHOLDS:

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.

1. RCS or SG Tube Leakage

Loss 1.A

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.

Potential Loss 1.A

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) actuation has not occurred. The threshold is met when an operating procedure, or operating crew supervision, directs that a standby charging (makeup) pump be placed in service to restore and maintain pressurizer level.

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.

Potential Loss 1.B

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).

2. Inadequate Heat Removal

There is no loss threshold associated with inadequate heat removal.

Potential Loss 2.A

NOTE: Heat Sink CSF should not be considered RED if total AFW flow is less than 395 gpm due to operator action.

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; 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.

3. RCS Activity/Containment Radiation

Loss 3.A

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.A since it indicates a loss of the RCS barrier only.

There is no potential loss threshold associated with RCS activity/containment radiation.

4. Containment Integrity or Bypass

Not applicable (included for numbering consistency)

5. Other Indications

Not applicable (included for numbering consistency)

6. Emergency Director Judgment

Loss 6.A

This threshold addresses any other factors used by the emergency director in determining whether the RCS Barrier is lost.

Potential Loss 6.A

This threshold addresses any other factors used by the emergency director in determining whether the RCS Barrier is potentially lost. The emergency director will also consider whether or not to declare the barrier potentially lost in the event that barrier status cannot be monitored.

CONTAINMENT BARRIER THRESHOLDS:

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

1. RCS or SG Tube Leakage

Loss 1.A

This threshold addresses a leaking or RUPTURED Steam Generator (SG) that is also FAULTED outside of containment. The condition of the SG, whether leaking or RUPTURED, is determined in accordance with the thresholds for RCS Barrier Potential Loss 1.A and Loss 1.A, 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 on 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 SU3 for the fuel clad barrier (i.e., RCS activity values) and IC SU4 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 (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 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, 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 emergency classification levels resulting from primary-to-secondary leakage, with or without a steam release from the FAULTED SG, are summarized below.

P-to-S Leak Rate	Affected SG is FAULTED Outside of Containment?	
	Yes	No
Less than or equal to 25 gpm	No classification	No classification
Greater than 25 gpm	Unusual Event per SU4	Unusual Event per SU4
Requires operation of a standby charging (makeup) pump (<i>RCS barrier potential loss</i>)	Site Area Emergency per FS1	Alert per FA1
Requires an automatic or manual ECCS (SI) actuation (<i>RCS barrier loss</i>)	Site Area Emergency per FS1	Alert per FA1

There is no potential loss threshold associated with RCS or SG Tube Leakage.

2. **Inadequate Heat Removal**

There is no loss threshold associated with inadequate heat removal.

Potential Loss 2.A

This condition represents an IMMINENT core melt sequence that, if not corrected, could lead to vessel failure and an increased potential for containment failure. For this condition to occur, there must already have been a loss of the RCS barrier and the fuel clad barrier. If implementation of a procedure(s) to restore adequate core cooling is not effective (successful) within 15 minutes, it is assumed that the event trajectory will likely lead to core melting and a subsequent challenge of the containment barrier.

The restoration procedure is considered "effective" if core exit thermocouple readings are decreasing or if reactor vessel level is increasing. Whether the procedure(s) will be effective should be apparent within 15 minutes. The emergency director should escalate the emergency classification level as soon as it is determined that the procedure(s) will not be effective.

Severe accident analyses (e.g., NUREG-1150) have concluded that function restoration procedures can arrest core degradation in a significant fraction of core damage scenarios, and that the likelihood of containment failure is very small in these events. Given this, it

is appropriate to provide 15 minutes beyond the required entry point to determine if procedural actions can reverse the core melt sequence.

3. RCS Activity/Containment Radiation

There is no loss threshold associated with RCS activity/containment radiation.

Potential Loss 3.A

The radiation monitor reading corresponds to an instantaneous release of all reactor coolant mass into the containment, assuming that 20 percent 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 percent 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 that would then escalate the emergency classification level to a General Emergency.

4. Containment Integrity or Bypass

Loss 4.A

These thresholds address a situation where containment isolation is required and one of two conditions exists as discussed below. There may be accident and release conditions that simultaneously meet both thresholds 4.A.1 and 4.A.2.

4.A.1 – Containment integrity has been lost, i.e., the actual containment atmospheric leak rate likely exceeds that associated with allowable leakage (sometimes referred to as design leakage). Following the release of RCS mass into containment, containment pressure will fluctuate based on a variety of factors; a loss of containment integrity condition may (or may not) be accompanied by a noticeable drop in containment pressure. Recognizing the inherent difficulties in determining a containment leak rate during accident conditions, it is expected that the emergency director will assess this threshold using judgment, and with due consideration given to current plant conditions, and available operational and radiological data (e.g., containment pressure, readings on radiation monitors outside containment, operating status of containment pressure control equipment).

Two simplified examples are provided in the middle piping run of Figure 6-F-1. 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 is 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.

4.A.2 – 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.

See a simplified example in the top piping run of Figure 6-F-1. 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.

A simplified example is shown in the bottom piping run of Figure 6-F-1. 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 or system piping developed a leak that allowed steam/water to enter the Auxiliary Building, then 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 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 (design) 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 a closed 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 1.A.

Loss 4.B

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 will 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.

In the simplified example in the middle piping run of Figure 6-F-1, a leak has occurred at a reducer on a pipe carrying reactor coolant in the Auxiliary Building. Depending upon radiation monitor locations and sensitivities, the leakage could be detected by any of the four monitors depicted in the figure and cause threshold 4.A.1 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 to be met.

Potential Loss 4.A

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. This threshold is a discriminator between a Site Area Emergency and General Emergency since there is now a potential to lose the third barrier.

Potential Loss 4.B

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.

Potential Loss 4.C

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 because 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.

5. Other Indications

Not applicable (included for numbering consistency)

6. Emergency Director Judgment

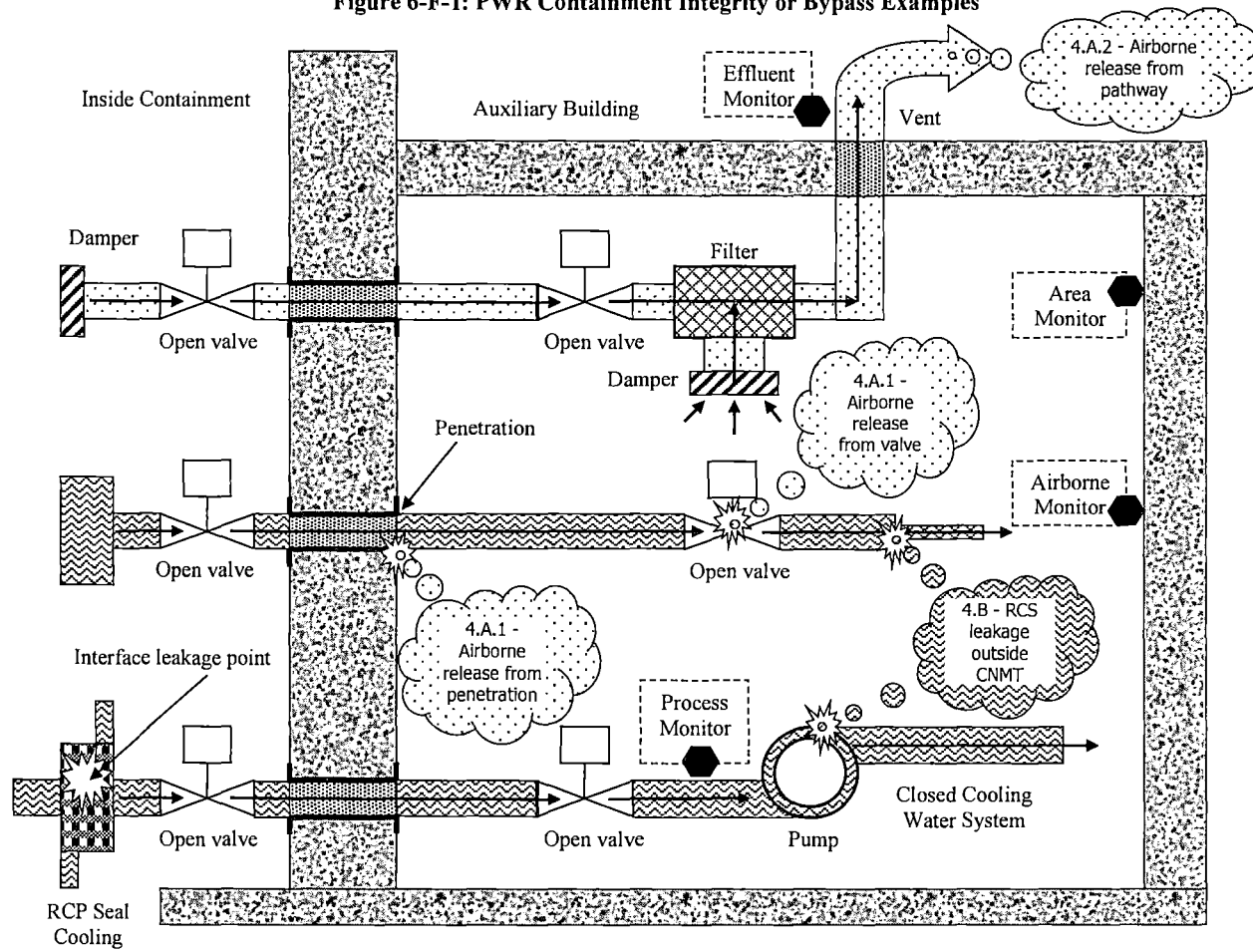
Loss 6.A

This threshold addresses any other factors used by the emergency director in determining whether the Containment Barrier is lost.

Potential Loss 6.A

This threshold addresses any other factors used by the emergency director in determining whether the containment barrier is potentially lost. The emergency director will also consider whether or not to declare the barrier potentially lost in the event that barrier status cannot be monitored.

Figure 6-F-1: PWR Containment Integrity or Bypass Examples



7 HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY ICS/EALS

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
HG1 HOSTILE ACTION resulting in loss of physical control of the facility. <i>Op. Modes: All</i>	HS1 HOSTILE ACTION within the PROTECTED AREA. <i>Op. Modes: All</i>	HA1 HOSTILE ACTION within the OWNER CONTROLLED AREA or airborne attack threat within 30 minutes. <i>Op. Modes: All</i>	HU1 Confirmed SECURITY CONDITION or threat. <i>Op. Modes: All</i>
			HU2 Seismic event greater than OBE levels. <i>Op. Modes: All</i>
			HU3 Hazardous event. <i>Op. Modes: All</i>
			HU4 FIRE potentially degrading the level of safety of the plant. <i>Op. Modes: All</i>
		HA5 Gaseous release impeding access to equipment necessary for normal plant operations, cooldown, or shutdown. <i>Op. Modes: All</i>	
	HS6 Inability to control a key safety function from outside the Control Room. <i>Op. Modes: All</i>	HA6 Control Room evacuation resulting in transfer of plant control to alternate locations. <i>Op. Modes: All</i>	
HG7 Other conditions exist which in the judgment of the emergency director warrant declaration of a General Emergency. <i>Op. Modes: All</i>	HS7 Other conditions exist which in the judgment of the emergency director warrant declaration of a Site Area Emergency. <i>Op. Modes: All</i>	HA7 Other conditions exist which in the judgment of the emergency director warrant declaration of an Alert. <i>Op. Modes: All</i>	HU7 Other conditions exist which in the judgment of the emergency director warrant declaration of a NOUE. <i>Op. Modes: All</i>

HG1

ECL: General Emergency

Initiating Condition: HOSTILE ACTION resulting in loss of physical control of the facility.

Operating Mode Applicability: All

Emergency Action Levels:

- (1) a. A HOSTILE ACTION is occurring or has occurred within the PROTECTED AREA as reported by the ~~site security force~~ on shift Security Captain or designee.
- AND**
- b. **EITHER** of the following has occurred:
1. **ANY** of the following safety functions cannot be controlled or maintained.
 - Reactivity control
 - Core cooling
 - RCS heat removal
 - OR**
 2. Damage to spent fuel has occurred or is IMMINENT.

Commented [JRB23]: RAI 21 b revision

Basis:

HOSTILE ACTION: An act toward a nuclear power plant (NPP) or its personnel that includes the use of violent force to destroy equipment, take HOSTAGES, and/or intimidate the licensee to achieve an end. This includes attack by air, land, or water using guns, explosives, PROJECTILES, vehicles, or other devices used to deliver destructive force. Other acts that satisfy the overall intent may be included. HOSTILE ACTION should not be construed to include acts of civil disobedience or felonious acts that are not part of a concerted attack on the NPP. 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 (OCA)).

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 (PA): The area that encompasses all controlled areas within the security protected area fence.

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 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]*.

Emergency plans and implementing procedures are public documents; therefore, EALs should not incorporate security-sensitive information. This includes information that may be advantageous to a potential adversary, such as the particulars concerning a specific threat or threat location. Security-sensitive information should be contained in non-public documents such as the Security Plan.

HG7

ECL: General Emergency

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

Operating Mode Applicability: All

Emergency Action Levels:

- (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.

Basis:

HOSTILE ACTION: An act toward a nuclear power plant (NPP) or its personnel that includes the use of violent force to destroy equipment, take HOSTAGES, and/or intimidate the licensee to achieve an end. This includes attack by air, land, or water using guns, explosives, PROJECTILES, vehicles, or other devices used to deliver destructive force. Other acts that satisfy the overall intent may be included. HOSTILE ACTION should not be construed to include acts of civil disobedience or felonious acts that are not part of a concerted attack on the NPP. 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 (OCA)).

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.

This IC addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist that are believed by the emergency director to fall under the emergency classification level description for a General Emergency.

HS1

ECL: Site Area Emergency

Initiating Condition: HOSTILE ACTION within the PROTECTED AREA.

Operating Mode Applicability: All

Emergency Action Levels:

- (1) A HOSTILE ACTION is occurring or has occurred within the PROTECTED AREA as reported by the ~~site security force~~ on shift Security Captain or designee.

Commented [JRB24]: RAI 21 b revision

Basis:

HOSTILE ACTION: An act toward a nuclear power plant (NPP) or its personnel that includes the use of violent force to destroy equipment, take HOSTAGES, and/or intimidate the licensee to achieve an end. This includes attack by air, land, or water using guns, explosives, PROJECTILES, vehicles, or other devices used to deliver destructive force. Other acts that satisfy the overall intent may be included. HOSTILE ACTION should not be construed to include acts of civil disobedience or felonious acts that are not part of a concerted attack on the NPP. 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 (OCA)).

PROTECTED AREA (PA): The area that encompasses all controlled areas within the security protected area fence.

This IC addresses the occurrence of a HOSTILE ACTION within the PROTECTED AREA (PA). This event will require rapid response and assistance due to the possibility for damage to plant equipment.

Timely and accurate communications between Security shift supervision and the control room is essential for proper classification of a security-related event.

Security plans and terminology are based on the guidance provided by NEI 03-12, *Template for the Security Plan, Training and Qualification Plan, Safeguards Contingency Plan [and Independent Spent Fuel Storage Installation Security Program]*.

As time and conditions allow, these events require a heightened state of readiness by the plant staff and implementation of onsite protective measures (e.g., evacuation, dispersal, or sheltering). The Site Area Emergency declaration will mobilize 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 plant PROTECTED AREA (PA); such an attack should be assessed using IC HAI. 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.

Commented [JRB25]: RAI 22 revision

Emergency plans and implementing procedures are public documents; therefore, EALs should not incorporate security-sensitive information. This includes information that may be advantageous to a potential adversary, such as the particulars concerning a specific threat or threat location. Security-sensitive information should be contained in non-public documents such as the Security Plan.

Escalation of the emergency classification level uses IC HG1.

HS6

ECL: Site Area Emergency

Initiating Condition: Inability to control a key safety function from outside the Control Room.

Operating Mode Applicability: All

Emergency Action Levels:

Note: The emergency director will declare the Site Area Emergency promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) a. An event has resulted in plant control being transferred from the control room to the remote shutdown panel.

AND

- b. Control of **ANY** of the following key safety functions is not reestablished within 15 minutes.
- Reactivity control
 - Core cooling
 - RCS heat removal

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 "control" is established at the remote safe shutdown location(s) is based on emergency director judgment. The emergency director is expected to make a reasonable, informed judgment within 15 minutes as to whether the operating staff has control of key safety functions from the remote safe shutdown location(s).

Escalation of the emergency classification level uses IC FG1 or CG1.

HS7

ECL: Site Area Emergency

Initiating Condition: Other conditions exist which in the judgment of the emergency director warrant declaration of a Site Area Emergency.

Operating Mode Applicability: All

Emergency Action Levels:

- (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.

Basis:

HOSTILE ACTION: An act toward a nuclear power plant (NPP) or its personnel that includes the use of violent force to destroy equipment, take HOSTAGES, and/or intimidate the licensee to achieve an end. This includes attack by air, land, or water using guns, explosives, PROJECTILES, vehicles, or other devices used to deliver destructive force. Other acts that satisfy the overall intent may be included. HOSTILE ACTION should not be construed to include acts of civil disobedience or felonious acts that are not part of a concerted attack on the NPP. 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 (OCA)).

This IC addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist that are believed by the emergency director to fall under the emergency classification level description for a Site Area Emergency.

HA1

ECL: Alert

Initiating Condition: HOSTILE ACTION within the OWNER CONTROLLED AREA or airborne attack threat within 30 minutes.

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2)

- (1) A HOSTILE ACTION is occurring or has occurred within the OWNER CONTROLLED AREA as reported by the ~~site security force~~ on shift Security Captain or designee.
- (2) A validated notification from NRC of an aircraft attack threat within 30 minutes of the site.

Commented [JRB26]: RAI 21 b revision

Basis:

HOSTILE ACTION: An act toward a nuclear power plant (NPP) or its personnel that includes the use of violent force to destroy equipment, take HOSTAGES, and/or intimidate the licensee to achieve an end. This includes attack by air, land, or water using guns, explosives, PROJECTILES, vehicles, or other devices used to deliver destructive force. Other acts that satisfy the overall intent may be included. HOSTILE ACTION should not be construed to include acts of civil disobedience or felonious acts that are not part of a concerted attack on the NPP. 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 (OCA)).

OWNER CONTROLLED AREA (OCA): The site property owned by or otherwise under the control of FNP security.

This IC addresses the occurrence of a HOSTILE ACTION within the OWNER CONTROLLED AREA (OCA) 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 (PA), 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, 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 is applicable for any HOSTILE ACTION occurring, or that has occurred, in the OWNER CONTROLLED AREA (OCA). ~~This includes any action directed against an ISFSI that is located outside the plant PROTECTED AREA (PA).~~

Commented [JRB27]: RAI 22 revision

EAL #2 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 station procedures.

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 (OCA) 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, will not be unduly delayed while awaiting notification by a Federal agency.

Emergency plans and implementing procedures are public documents; therefore, EALs should not incorporate security-sensitive information. This includes information that may be advantageous to a potential adversary, such as the particulars concerning a specific threat or threat location. Security-sensitive information should be contained in non-public documents such as the Security Plan.

Escalation of the emergency classification level uses IC HS1.

HA5

ECL: Alert

Initiating Condition: Gaseous release impeding access to equipment necessary for normal plant operations, cooldown or shutdown.

Operating Mode Applicability: All

Emergency Action Levels:

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.

- (1) a. Release of a toxic, corrosive, asphyxiant or flammable gas into any Table H1 plant rooms or areas:

Table H1		
Mode	Room Name	Room Number
3	Electrical Penetration Room	334, 333, 347 / 2334, 2333, 2347
	Hallway Outside Filter Room	312, 332/ 2312, 2332
	1A / 2A MCC areas	
	Sample Room and Primary CHM labs	323, 324 / 2323, 2324
4	Sample Room and Primary CHM labs	323, 324 / 2323, 2324
	RHR Hx Room.	128/ 2128

AND

- b. Entry into the room or area is prohibited or impeded.

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 plant safety.

An Alert declaration is warranted if entry into the affected room/area is, or may be, procedurally required during the plant operating mode in effect at the time of the gaseous release. The emergency classification is not contingent upon whether entry is actually necessary at the time of the release.

Evaluation of the IC and EAL do not require atmospheric sampling; it only requires the emergency director's judgment that the gas concentration in the affected room/area is sufficient to preclude or significantly impede procedurally required access. This judgment may be based on a variety of factors including an existing job hazard analysis, report of ill effects on personnel, advice from a subject matter expert or operating experience with the same or similar hazards.

Access should be considered as impeded if extraordinary measures are necessary to facilitate entry of personnel into the affected room/area (e.g., requiring use of protective equipment, such as SCBAs, that is not routinely employed).

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

- The plant is in an operating mode different than the mode specified for the affected room/area (i.e., entry is not required during the operating mode in effect at the time of the gaseous release). For example, the plant is in Mode 1 when the gaseous release occurs, and the procedures used for normal operation, cooldown and shutdown do not require entry into the affected room until Mode 4.
- The gas release is a planned activity that includes compensatory measures to 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.

An asphyxiant is a gas capable of reducing the level of oxygen in the body to dangerous levels. Most commonly, asphyxiants work by displacing air in an enclosed environment. This reduces the concentration of oxygen below the normal level of around 19 percent, 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 uses Recognition Category R, C or F ICs.

HA6

ECL: Alert

Initiating Condition: Control Room evacuation resulting in transfer of plant control to alternate locations.

Operating Mode Applicability: All

Emergency Action Levels:

- (1) An event has resulted in plant control being transferred from the control room to the remote shutdown panel.

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 uses IC HS6.

HA7

ECL: Alert

Initiating Condition: Other conditions exist which in the judgment of the emergency director warrant declaration of an Alert.

Operating Mode Applicability: All

Emergency Action Levels:

- (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.

Basis:

HOSTILE ACTION: An act toward a nuclear power plant (NPP) or its personnel that includes the use of violent force to destroy equipment, take HOSTAGES, and/or intimidate the licensee to achieve an end. This includes attack by air, land, or water using guns, explosives, PROJECTILES, vehicles, or other devices used to deliver destructive force. Other acts that satisfy the overall intent may be included. HOSTILE ACTION should not be construed to include acts of civil disobedience or felonious acts that are not part of a concerted attack on the NPP. 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 (OCA)).

This IC addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist that are believed by the emergency director to fall under the emergency classification level description for an Alert.

HU1

ECL: Notification of Unusual Event

Initiating Condition: Confirmed SECURITY CONDITION or threat.

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2 or 3)

- (1) A SECURITY CONDITION that does not involve a HOSTILE ACTION as reported by the ~~site security force~~ on shift Security Captain or designee.
- (2) Notification of a credible security threat directed at FNP.
- (3) A validated notification from the NRC providing information of an aircraft threat.

Commented [JRB28]: RAI 21 b revision

Basis:

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 a nuclear power plant (NPP) or its personnel that includes the use of violent force to destroy equipment, take HOSTAGES, and/or intimidate the licensee to achieve an end. This includes attack by air, land, or water using guns, explosives, PROJECTILES, vehicles, or other devices used to deliver destructive force. Other acts that satisfy the overall intent may be included. HOSTILE ACTION should not be construed to include acts of civil disobedience or felonious acts that are not part of a concerted attack on the NPP. 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 (OCA)).

This IC addresses events that pose a threat to plant personnel or SAFETY SYSTEM equipment, and 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 OROs.

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 references site security force 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 addresses the receipt of a credible security threat. The credibility of the threat is

assessed in accordance with station procedures.

EAL #3 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 station procedures.

Emergency plans and implementing procedures are public documents; therefore, EALs should not incorporate security-sensitive information. This includes information that may be advantageous to a potential adversary, such as the particulars concerning a specific threat or threat location. Security-sensitive information should be contained in non-public documents such as the Security Plan.

Escalation of the emergency classification level uses IC HA1.

HU2

ECL: Notification of Unusual Event

Initiating Condition: Seismic event greater than OBE levels.

Operating Mode Applicability: All

Emergency Action Levels:

- (1) Seismic event greater than Operating Basis Earthquake (OBE) as indicated by seismic switch activation with the seismic system computer indicating **EITHER** of the following:
 - Cumulative Absolute Velocity (CAV) greater than 0.160 g-sec AND Spectral Acceleration greater than 0.200 g.
 - Cumulative Absolute Velocity (CAV) greater than 0.160 g-sec AND Spectral Velocity greater than 15.240 cm/sec.

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 plant safety.

Event verification with external sources should not be necessary during or following an OBE. Earthquakes of this magnitude should readily be felt by on-site personnel and recognized as a seismic event (e.g., typical lateral accelerations are in excess of 0.08g). The shift manager or emergency director may seek external verification if deemed appropriate (e.g., a call to the USGS or check of 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 uses IC CA6 or SA9.

HU3

ECL: Notification of Unusual Event

Initiating Condition: Hazardous event.

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2 or 3 or 4 or 5)

Note: EAL #4 does not apply to routine traffic impediments such as fog, snow, ice, or vehicle breakdowns or accidents.

- (1) A tornado strike within the PROTECTED AREA.
- (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.
- (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).
- (4) A hazardous event that results in on-site conditions sufficient to prohibit the plant staff from accessing the site via personal vehicles.
- (5) Sustained hurricane force winds greater than 74 mph forecast to be at the plant site in the next four hours.

Basis:

PROTECTED AREA (PA): The area that encompasses all controlled areas within the security protected area fence.

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.

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

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

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 (PA).

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, or dam failure, etc., or an on-site train derailment blocking the access road.

This EAL is not intended to apply to routine impediments such as fog, snow, ice, or vehicle breakdowns or accidents, but rather to more significant conditions such as the Hurricane Andrew strike on Turkey Point in 1992, the flooding around the Cooper Station during the Midwest floods of 1993, or the flooding around Ft. Calhoun Station in 2011.

EAL #5 addresses phenomena of the hurricane based on the severe weather mitigation procedure.

Escalation of the emergency classification level is based on ICs in Recognition Categories A, F, S or C.

HU4

ECL: Notification of Unusual Event

Initiating Condition: FIRE potentially degrading the level of safety of the plant.

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2 or 3 or 4)

Note: The emergency director will declare the Unusual Event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.

- (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** Table H2 rooms or areas.
- (2) a. Receipt of a single fire alarm (i.e., no other indications of a FIRE).

AND

- b. The FIRE is located within **ANY** Table H2 rooms or areas
- AND**
- c. The existence of a FIRE is not verified within 30-minutes of alarm receipt.
- (3) A FIRE within the plant PROTECTED AREA ~~or ISFSI PROTECTED AREA~~ not extinguished within 60-minutes of the initial report, alarm or indication.
- (4) A FIRE within the plant PROTECTED AREA ~~or ISFSI PROTECTED AREA~~ that requires firefighting support by an offsite fire response agency to extinguish.

Commented [JRB29]: RAI 22 revision

Commented [JRB30]: RAI 22 revision

Table H2
Auxiliary Building
Diesel Generator Building
Service Water Intake Structure (SWIS)
Containment
RWST
CST

Commented [JRB31]: RAI 24 revision

Commented [JRB32]: RAI 24 revision

Basis:

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 (PA): The area that encompasses all controlled areas within the security protected area fence.

This IC addresses the magnitude and extent of FIRES that may be indicative of a potential degradation of the level of plant safety.

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 include a drop in fire main pressure, automatic activation of a suppression system.

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 (PA) 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 (PA) of an ISFSI located outside the plant PROTECTED AREA (PA).~~

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EAL #4

If a FIRE within the plant ~~or ISFSI~~ 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.

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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.

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 uses IC CA6 or SA9.

HU7

ECL: Notification of Unusual Event

Initiating Condition: Other conditions exist which in the judgment of the emergency director warrant declaration of a NOUE.

Operating Mode Applicability: All

Emergency Action Levels:

- (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.

Basis:

This IC addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist that are believed by the emergency director to fall under the emergency classification level description for a NOUE.

8 SYSTEM MALFUNCTION ICS/EALS

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
SG1 Prolonged loss of all offsite and all onsite AC power to emergency buses. <i>Op. Modes: Power Operation, Startup, Hot Standby, Hot Shutdown</i>	SS1 Loss of all offsite and all onsite AC power to emergency buses for 15 minutes or longer. <i>Op. Modes: Power Operation, Startup, Hot Standby, Hot Shutdown</i>	SA1 Loss of all but one AC power source to emergency buses for 15 minutes or longer. <i>Op. Modes: Power Operation, Startup, Hot Standby, Hot Shutdown</i>	SU1 Loss of all offsite AC power capability to emergency buses for 15 minutes or longer. <i>Op. Modes: Power Operation, Startup, Hot Standby, Hot Shutdown</i>
		SA2 UNPLANNED loss of Control Room indications for 15 minutes or longer with a significant transient in progress. <i>Op. Modes: Power Operation, Startup, Hot Standby, Hot Shutdown</i>	SU2 UNPLANNED loss of Control Room indications for 15 minutes or longer. <i>Op. Modes: Power Operation, Startup, Hot Standby, Hot Shutdown</i>
			SU3 Reactor coolant activity greater than Technical Specification allowable limits. <i>Op. Modes: Power Operation, Startup, Hot Standby, Hot Shutdown</i>
			SU4 RCS leakage for 15 minutes or longer. <i>Op. Modes: Power Operation, Startup, Hot Standby, Hot Shutdown</i>
	SS5 Inability to shutdown the reactor causing a challenge to core cooling or RCS heat removal. <i>Op. Modes: Power Operation</i>	SA5 Automatic or manual trip fails to shutdown the reactor, and subsequent manual actions taken at the reactor control consoles are not successful in shutting down the reactor. <i>Op. Modes: Power Operation</i>	SU5 Automatic or manual trip fails to shutdown the reactor. <i>Op. Modes: Power Operation</i>

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
			SU6 Loss of all onsite or offsite communications capabilities. <i>Op. Modes: Power Operation, Startup, Hot Standby, Hot Shutdown</i>
			SU7 Failure to isolate containment or loss of containment pressure control. <i>Op. Modes: Power Operation, Startup, Hot Standby, Hot Shutdown</i>
SG8 Loss of all AC and vital DC power sources for 15 minutes or longer. <i>Op. Modes: Power Operation, Startup, Hot Standby, Hot Shutdown</i>	SS8 Loss of all vital DC power for 15 minutes or longer. <i>Op. Modes: Power Operation, Startup, Hot Standby, Hot Shutdown</i>		
		SA9 Hazardous event affecting a SAFETY SYSTEM needed for the current operating mode. <i>Op. Modes: Power Operation, Startup, Hot Standby, Hot Shutdown</i>	

SG1

ECL: General Emergency

Initiating Condition: Prolonged loss of all offsite and all onsite AC power to emergency buses.

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels:

Note: The emergency director will declare the General Emergency promptly upon determining that 4 hours has been exceeded, or will likely be exceeded.

- (1) a. Loss of **ALL** offsite and **ALL** onsite AC power to **BOTH** 4160V ESF busses 1(2)F **AND** 1(2)G.

AND

- b. **EITHER** of the following:

- Restoration of at least one AC emergency bus in less than 4 hours is not likely.
- CORE COOLING CSF - RED conditions met.

Basis:

This IC addresses a prolonged loss of all power sources to AC emergency busses. 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 will 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 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 bus will be based on a realistic appraisal of the situation. Mitigation actions with a low probability of success will 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.

SG8

ECL: General Emergency

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

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels:

Note: The emergency director will declare the General Emergency promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) a. Loss of **ALL** offsite and **ALL** onsite AC power to **BOTH** 4160V ESF busses 1(2)F **AND** 1(2)G for 15 minutes or longer.

AND

- b. Indicated voltage is less than 105 VDC on **ALL** 125 VDC vital busses for 15 minutes or longer.

Basis:

This IC addresses a concurrent and prolonged loss of both AC and vital DC power. 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 loss of vital DC power compromises the ability to monitor and control SAFETY SYSTEMS. A sustained loss of both AC and DC power will lead to multiple challenges to fission product barriers.

Fifteen minutes is the threshold to exclude transient or momentary power losses. The 15-minute emergency declaration clock begins at the point when both EAL thresholds are met.

SS1

ECL: Site Area Emergency

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

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels:

Note: The emergency director will declare the Site Area Emergency promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) Loss of **ALL** offsite and **ALL** onsite AC power to **BOTH** 4160V ESF busses 1(2)F **AND** 1(2)G for 15 minutes or longer.

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 is the threshold to exclude transient or momentary power losses.

Escalation of the emergency classification level uses ICs RG1, FG1 or SG1.

SS5

ECL: Site Area Emergency

Initiating Condition: Inability to shutdown the reactor causing a challenge to core cooling or RCS heat removal.

Operating Mode Applicability: Power Operation

Emergency Action Levels:

Note: Heat Sink CSF should not be considered RED if total AFW flow is less than 395 gpm due to operator action.

- (1) a. An automatic or manual trip 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:
- Core Cooling CSF - RED conditions met
 - Heat Sink CSF – Red conditions met

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 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 because the Recognition Category F ICs/EALs do not address the additional threat posed by a failure to shutdown the reactor. The inclusion of this IC and EAL ensures the timely declaration of a Site Area Emergency in response to prolonged failure to shutdown the reactor.

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

Escalation of the emergency classification level uses IC RG1 or FG1.

SS8

ECL: Site Area Emergency

Initiating Condition: Loss of all vital DC power for 15 minutes or longer.

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels:

Note: The emergency director will declare the Site Area Emergency promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) Indicated voltage is less than 105 VDC on **ALL** 125 VDC vital busses for 15 minutes or longer.

Basis:

This IC addresses a loss of vital DC power that 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 uses ICs RG1, FG1 or SG8.

SA1

ECL: Alert

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

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels:

Note: The emergency director will declare the Alert promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) a. AC power capability to **BOTH** 4160V ESF busses 1(2)F **AND** 1(2)G is reduced to a single power source (Table S1) 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.

Commented [JRB35]: RAI 13 b revision

Table S1	
Unit 1	Unit 2
Start-up Aux XFMR 1A	Start-up Aux XFMR 2A
Start-up Aux XFMR 1B	Start-up Aux XFMR 2B
Diesel Generator 1-2A	Diesel Generator 1-2A
Diesel Generator 1B	Diesel Generator 2B
Diesel Generator 1C	Diesel Generator 1C
Diesel Generator 2C	Diesel Generator 2C

Basis:

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.

This IC describes a significant degradation of offsite and onsite AC power sources where 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 bus (see Table S1 above). Some examples of this condition are presented below.

- A loss of all offsite power with a concurrent failure of all but one emergency power source (e.g., an onsite diesel generator).

- A loss of all offsite power and loss of all emergency power sources (e.g., onsite diesel generators) with a single train of emergency busses being back-fed from the unit main generator.
- A loss of emergency power sources (e.g., onsite diesel generators) with a single train of emergency busses being back-fed from an offsite power source.

Fifteen minutes is the threshold to exclude transient or momentary losses of power.

Escalation of the emergency classification level uses IC SS1.

SA2

ECL: Alert

Initiating Condition: UNPLANNED loss of Control Room indications for 15 minutes or longer with a significant transient in progress.

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels:

Note: The emergency director will declare the Alert promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) a. 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.

Reactor Power
RCS Level
RCS Pressure
In-Core/Core Exit Temperature
Wide Range Levels in at least one steam generator
Steam Generator Auxiliary or Emergency Feed Water Flow

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AND

- b. 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 trip
 - ECCS actuation

Basis:

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.

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 represents a potential substantial degradation in the level of plant safety.

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. Various instrumentation is also used to determine RCS Level – RVLIS, pressurizer level, digital or recorders. A loss of all Control Room sources for this parameter would also apply.

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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 is 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, then the availability of other parameter values may be compromised as well.

Fifteen minutes is the threshold to exclude transient or momentary losses of indication.

Escalation of the emergency classification level uses ICs FS1 or IC RS1.

SA5

ECL: Alert

Initiating Condition: Automatic or manual trip fails to shutdown the reactor, and subsequent manual actions taken at the reactor control consoles are not successful in shutting down the reactor.

Operating Mode Applicability: Power Operation

Emergency Action Level:

- (1) a. An automatic or manual trip did not shutdown the reactor.

AND

- b. Manual actions taken at the reactor control consoles are not successful in shutting down the reactor.

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 plant safety. 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 consoles is any operator action, or set of actions, that 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 consoles (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".

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 shutdown 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 SS5. Depending upon plant responses and symptoms, escalation is also possible via IC FS1. Absent the plant conditions needed to meet either IC SS5 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.

SA9

ECL: Alert

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

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels:

- (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
 - Other events with similar hazard characteristics as determined by the Shift Manager
- AND**
- b. **EITHER** of the following:
- 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.

Basis:

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.

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 may require a post-event inspection to determine if the attributes of an explosion are present.

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.

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.

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 plant safety.

The first threshold for EAL 1.b 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 will be significant enough to cause concern regarding the operability or reliability of the SAFETY SYSTEM train.

The second threshold for EAL 1.b 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 all 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 uses IC FS1 or RS1.

SU1

ECL: Notification of Unusual Event

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

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels:

Note: The emergency director will declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) Loss of **ALL** offsite AC power capability (Table S2) to **BOTH** 4160V ESF busses 1(2)F **AND** 1(2)G for 15 minutes or longer.

Commented [JRB38]: RAI 13 b revision

Table S2	
Unit 1	Unit 2
Start-up Aux XFMR 1A	Start-up Aux XFMR 2A
Start-up Aux XFMR 1B	Start-up Aux XFMR 2B

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 busses. This condition represents a potential reduction in the level of plant safety.

For emergency classification purposes, "capability" means that an offsite AC power source(s) is available to the emergency busses (see Table S2 above), whether or not the busses are powered from it.

Fifteen minutes is the threshold to exclude transient or momentary losses of offsite power.

Escalation of the emergency classification level uses IC SA1.

SU2

ECL: Notification of Unusual Event

Initiating Condition: UNPLANNED loss of Control Room indications for 15 minutes or longer.

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels:

Note: The Emergency Director should declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (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.

Reactor Power
RCS Level
RCS Pressure
In-Core/Core Exit Temperature
Wide Range Level in at least one steam generator
Steam Generator Auxiliary or Emergency Feed Water Flow

Commented [JRB39]: RAI 27 revision

Basis:

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.

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 plant safety.

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. Various instrumentation is also used to determine RCS Level – RVLIS, pressurizer level, digital or recorders. A loss of all Control Room sources for this parameter would also apply.

Commented [JRB40]: RAI 26 revision

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 is 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 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, then the availability of other parameter values may be compromised as well.

Fifteen minutes is the threshold to exclude transient or momentary losses of indication.

Escalation of the emergency classification level uses IC SA2.

SU3

ECL: Notification of Unusual Event

Initiating Condition: Reactor coolant activity greater than Technical Specification allowable limits.

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels:

- (1) RCS coolant sample activity value indicating fuel clad degradation greater than Technical Specification allowable limits as indicated by **ANY** of the following:

Dose Equivalent I-131 greater than 0.5 $\mu\text{Ci/gm}$ for greater than 48 hours
Dose Equivalent I-131 greater than Technical Specification figure 3.4.16-1. IF less than 20% power, THEN use the Dose Equivalent I-131 20% power limit on Technical Specification figure 3.4.16-1
RCS gross specific activity greater than 100/ \bar{E} $\mu\text{Ci/gm}$.

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 plant safety.

Escalation of the emergency classification level uses ICs FA1 or the Recognition Category R ICs.

SU4

ECL: Notification of Unusual Event

Initiating Condition: RCS leakage for 15 minutes or longer.

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels: (1 or 2 or 3)

Note: The emergency director will declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) RCS unidentified or pressure boundary leakage greater than 10 gpm for 15 minutes or longer.
- (2) RCS identified leakage greater than 25 gpm for 15 minutes or longer.
- (3) Leakage from the RCS to a location outside containment greater than 25 gpm for 15 minutes or longer.

Basis:

This IC addresses RCS leakage that could 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 plant safety.

EAL #1 and EAL #2 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 addresses a RCS mass loss caused by an UNISOLABLE leak through an interfacing system. These EALs 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 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 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 is 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 uses ICs of Recognition Category R or F.

SU5

ECL: Notification of Unusual Event

Initiating Condition: Automatic or manual trip fails to shutdown the reactor.

Operating Mode Applicability: Power Operation

Emergency Action Levels: (1 or 2)

- (1) a. An automatic trip did not shutdown the reactor.

AND

- b. A subsequent manual action taken at the reactor control consoles is successful in shutting down the reactor.

- (2) a. A manual trip did not shutdown the reactor.

AND

- b. **EITHER** of the following:

- A subsequent manual action taken at the reactor control consoles is successful in shutting down the reactor.
- A subsequent automatic trip is successful in shutting down the reactor.

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 represents a potential degradation of the level of plant safety.

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, that 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 SA5. Depending upon the plant response, escalation is also possible via IC FA1. Absent the plant conditions needed to meet either IC SA5 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 signal be generated as a result of plant work (e.g., RPS setpoint testing), the following classification guidance will 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 will 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.

SU6

ECL: Notification of Unusual Event

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

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels: (1 or 2 or 3)

- (1) Loss of **ALL** of the following onsite communication methods:

In plant telephones
Public address system
Plant radio systems

- (2) Loss of **ALL** of the following ORO communications methods:

ENN (Emergency Notification Network)
Commercial phones

- (3) Loss of **ALL** of the following NRC communications methods:

ENS on Federal Telecommunications System (FTS)
Commercial phones

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 will be assessed only when extraordinary means are used 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).

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

EAL #2 addresses a total loss of the communications methods used to notify all OROs of an emergency declaration. The OROs referred to here are the states of Alabama, Georgia, and Florida; Houston and Henry Counties, Alabama; and Early County, Georgia.

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

SU7

ECL: Notification of Unusual Event

Initiating Condition: Failure to isolate containment or loss of containment pressure control.

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels: (1 or 2)

- (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.
- (2) a. Containment pressure greater than 27 psig.
AND
 - b. Less than one CTMT fan cooler **AND** one full train of CTMT spray is operating per design for 15 minutes or longer.

Basis:

This IC 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 plant safety.

For EAL #1, 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 – will be made in accordance with the appropriate criteria contained in the plant AOPs and EOPs. The 15-minute criterion is included to allow operators time to manually isolate the required penetrations, if possible.

EAL #2 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. At Farley, a single CTMT fan cooler along with one train of CTMT spray is required per design basis. 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 will 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.

APPENDIX A – ACRONYMS AND ABBREVIATIONS

AC.....	Alternating Current
AOP.....	Abnormal Operating Procedure
ATWS.....	Anticipated Transient Without Scram
CC.....	Cubic Centimeter
CDE.....	Committed Dose Equivalent
CFR.....	Code of Federal Regulations
CHM.....	Chemistry
CPM.....	Counts Per Minute
CTMT/CNMT.....	Containment
CSF.....	Critical Safety Function
DC.....	Direct Current
EAL.....	Emergency Action Level
ECCS.....	Emergency Core Cooling System
ECL.....	Emergency Classification Level
ENN.....	Emergency Notification Network
ENS.....	Emergency Notification System
EOP.....	Emergency Operating Procedure
EPA.....	Environmental Protection Agency
ESF.....	Engineered Safety Feature
FAA.....	Federal Aviation Administration
FBI.....	Federal Bureau of Investigation
FEMA.....	Federal Emergency Management Agency
FNP.....	Farley Nuclear Plant
FTS.....	Federal Telecommunications System
GE.....	General Emergency
HOO.....	Headquarters Operations Officer (NRC)
Hx.....	Heat Exchanger
IC.....	Initiating Condition
ID.....	Inside Diameter
ISFSI.....	Independent Spent Fuel Storage Installation
K_{eff}	Effective Neutron Multiplication Factor
MCB.....	Main Control Board
MCC.....	Motor Control Center
μ Ci.....	micro-Curie
mR, mRem, mrem, mREM.....	milli-Roentgen Equivalent Man
NEI.....	Nuclear Energy Institute
NPP.....	Nuclear Power Plant
NRC.....	Nuclear Regulatory Commission
NORAD.....	North American Aerospace Defense Command
NOUE.....	Notification Of Unusual Event
OBE.....	Operating Basis Earthquake
OCA.....	Owner Controlled Area
ODCM.....	Offsite Dose Calculation Manual
ORO.....	Off-site Response Organization
PA.....	Protected Area
PAG.....	Protective Action Guideline
PBX.....	Private Branch Exchange
PWR.....	Pressurized Water Reactor

PSIG	Pounds per Square Inch Gauge
R	Roentgen
RCDT	Reactor Coolant Drain Tank
RCS	Reactor Coolant System
Rem, rem, REM	Roentgen Equivalent Man
RHR	Residual Heat Removal
RPS	Reactor Protection System
RPV	Reactor Pressure Vessel
RVLIS	Reactor Vessel Level Instrumentation System
SAE	Site Area Emergency
SCBA	Self-Contained Breathing Apparatus
SFP	Spent Fuel Pool
SG	Steam Generator
SI	Safety Injection
SNC	Southern Nuclear Company
SPDS	Safety Parameter Display System
TEDE	Total Effective Dose Equivalent
TOAF	Top of Active Fuel
TV	Threshold Value
VDC	Volts Direct Current
VOIP	Voice Over Internet Protocol
WHT	Waste Holdup Tank

APPENDIX B – DEFINITIONS

The following definitions are taken from Title 10, Code of Federal Regulations, and related regulatory guidance documents.

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

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

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

Notification of Unusual Event (NOUE): 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.

The following are key terms necessary for overall understanding the NEI 99-01 emergency classification scheme.

Emergency Action Level (EAL): A pre-determined, site-specific, observable threshold for an Initiating Condition that, when met or exceeded, places the plant in a given emergency classification level.

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

- General Emergency (GE)
- Site Area Emergency (SAE)
- Alert
- Notification of Unusual Event (NOUE)

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

Initiating Condition (IC): An event or condition that aligns with the definition of one of the four emergency classification levels by virtue of the potential or actual effects or consequences.

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.

CONFINEMENT BOUNDARY: The barrier(s) between areas containing radioactive substances and the environment.

CONTAINMENT CLOSURE: Per FNP-1(2)-STP-18.4, "Containment Integrity Verification and Closure".

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 may 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.

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

HOSTILE ACTION: An act toward a nuclear power plant (NPP) or its personnel that includes the use of violent force to destroy equipment, take HOSTAGES, and/or intimidate the licensee to achieve an end. This includes attack by air, land, or water using guns, explosives, PROJECTILES, vehicles, or other devices used to deliver destructive force. Other acts that satisfy the overall intent may be included. HOSTILE ACTION should not be construed to include acts of civil disobedience or felonious acts that are not part of a concerted attack on the NPP. 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 (OCA)).

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.

OWNER CONTROLLED AREA (OCA): The area that encompasses all controlled areas within the FNP site boundary but outside the security protected area fence.

PROJECTILE: An object directed toward a NPP that could cause concern for its continued operability, reliability, or personnel safety.

PROTECTED AREA (PA): The area that encompasses all controlled areas within the security protected area fence.

REFUELING PATHWAY: This includes the reactor refuel cavity, the fuel transfer canal, and the spent fuel pool, canals and pools through which irradiated fuel may be moved, but not including the reactor vessel.

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

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.

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.

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.

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.

Southern Nuclear Operating Company
License Amendment Request for Changes to
Emergency Action Level Schemes to Adopt NEI 99-01 Rev. 6
Responses to Requests for Additional Information

EDWIN I. HATCH NUCLEAR PLANT

EAL SCHEME

MARKED-UP PAGES

HATCH NUCLEAR PLANT

EMERGENCY ACTION LEVELS

**INITIATING CONDITIONS,
THRESHOLD VALUES,
AND BASIS**

TABLE OF CONTENTS

1	REGULATORY BACKGROUND.....	1
1.1	OPERATING REACTORS.....	1
1.2	INDEPENDENT SPENT FUEL STORAGE INSTALLATION (ISFSI).....	1
1.3	NRC ORDER EA-12-051	2
1.4	ORGANIZATION AND PRESENTATION OF INFORMATION.....	3
1.5	IC AND EAL MODE APPLICABILITY.....	3
2	GUIDANCE ON MAKING EMERGENCY CLASSIFICATIONS.....	5
2.1	GENERAL CONSIDERATIONS.....	5
2.2	CLASSIFICATION METHODOLOGY	6
2.3	CLASSIFICATION OF MULTIPLE EVENTS AND CONDITIONS.....	6
2.4	CONSIDERATION OF MODE CHANGES DURING CLASSIFICATION	6
2.5	CLASSIFICATION OF IMMINENT CONDITIONS	7
2.6	EMERGENCY CLASSIFICATION LEVEL UPGRADING AND DOWNGRADING	7
2.7	CLASSIFICATION OF SHORT-LIVED EVENTS	7
2.8	CLASSIFICATION OF TRANSIENT CONDITIONS	7
2.9	AFTER-THE-FACT DISCOVERY OF AN EMERGENCY EVENT OR CONDITION.....	8
3	ABNORMAL RAD LEVELS / RADIOLOGICAL EFFLUENT ICS/EALS	9
4	COLD SHUTDOWN / REFUELING SYSTEM MALFUNCTION ICS/EALS	26
5	INDEPENDENT SPENT FUEL STORAGE INSTALLATION (ISFSI) ICS/EALS	47
6	FISSION PRODUCT BARRIER ICS/EALS	50
7	HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY ICS/EALS	64
8	SYSTEM MALFUNCTION ICS/EALS	88
	APPENDIX A – ACRONYMS AND ABBREVIATIONS.....	A-1
	APPENDIX B – DEFINITIONS.....	B-1

EMERGENCY ACTION LEVELS

1 REGULATORY BACKGROUND

1.1 OPERATING REACTORS

Title 10, Code of Federal Regulations (CFR), Energy, contains the U.S. Nuclear Regulatory Commission (NRC) regulations that apply to nuclear power facilities. Several of these regulations govern various aspects of an emergency classification scheme. The relevant sections of this document are:

- 10 CFR § 50.47(a)(1)(i)
- 10 CFR § 50.47(b)(4)
- 10 CFR § 50.54(q)
- 10 CFR § 50.72(a)
- 10 CFR § 50, Appendix E, IV.B, Assessment Actions
- 10 CFR § 50, Appendix E, IV.C, Activation of Emergency Organization

These regulations are supplemented by various regulatory guidance documents. Documents of particular relevance to NEI 99-01 include:

NUREG-0654/FEMA-REP-1, *Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants*, October 1980. [Refer to Appendix 1, *Emergency Action Level Guidelines for Nuclear Power Plants*]
NUREG-1022, *Event Reporting Guidelines 10 CFR § 50.72 and § 50.73*
Regulatory Guide 1.101, *Emergency Response Planning and Preparedness for Nuclear Power Reactors*

This list is not all-inclusive. It is strongly recommended that scheme developers consult with licensing and regulatory compliance personnel to identify and understand all applicable requirements and guidance. Questions may also be directed to the NEI Emergency Preparedness staff.

1.2 INDEPENDENT SPENT FUEL STORAGE INSTALLATION (ISFSI)

Selected guidance in NEI 99-01 is applicable to licensees electing to use their 10 CFR 50 emergency plan to fulfill the requirements of 10 CFR 72.32 for a stand-alone ISFSI. The emergency classification levels applicable to an ISFSI are consistent with the requirements of 10 CFR § 50 and the guidance in NUREG 0654/FEMA-REP-1. The initiating conditions germane to a 10 CFR § 72.32 emergency plan (as described in NUREG-1567) are contained within the classification scheme for a 10 CFR § 50.47 emergency plan.

The generic ICs and EALs for an ISFSI are presented in Section 5, ISFSI ICs/EALs. IC E-HU1 covers credible natural and man-made events included within the scope of an ISFSI design. This IC is not applicable to installations or facilities that process and/or repackage spent fuel. Additionally, appropriate aspects of IC HU1 and IC HA1 will also be included to address a HOSTILE ACTION directed against an ISFSI.

The analysis of potential onsite and offsite consequences of accidental releases associated with the operation of an ISFSI is contained in NUREG-1140, *A Regulatory Analysis on Emergency Preparedness for Fuel Cycle and Other Radioactive Material Licensees*. NUREG-1140 concluded that the postulated worst-case accident involving an ISFSI has insignificant consequences to public health and safety. This evaluation shows that the maximum offsite dose to a member of the public due to an accidental release of radioactive materials would not exceed 1 rem Effective Dose Equivalent.

1.3 NRC ORDER EA-12-051

The Fukushima Daiichi accident of March 11, 2011, was the result of a tsunami that exceeded the plant's design basis and flooded the site's emergency electrical power supplies and distribution systems. This caused an extended loss of power that severely compromised the key safety functions of core cooling and containment integrity, and ultimately leading to core damage in three reactors. Although the loss of power also impaired the spent fuel pool cooling function, sufficient water inventory was maintained in the pools to prevent fuel damage from the loss of cooling.

Following a review of the Fukushima Daiichi accident, the NRC concluded that measures were necessary to ensure adequate protection of public health and safety under the provisions of the backfit rule, 10 CFR 50.109(a)(4)(ii). One such measure was that each spent fuel pool be provided with reliable level instrumentation to significantly enhance the ability of key decision-makers to effectively allocate resources following a beyond design basis event. To this end, the NRC issued Order EA-12-051, *Issuance of Order to Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation*, on March 12, 2012, to all US nuclear plants with an operating license, construction permit, or combined construction and operating license.

NRC Order EA-12-051 states, in part, "All licensees ... shall have a reliable indication of the water level in associated spent fuel storage pools capable of supporting identification of the following pool water level conditions by trained personnel: (1) level that is adequate to support operation of the normal fuel pool cooling system, (2) level that is adequate to provide substantial radiation shielding for a person standing on the spent fuel pool operating deck, and (3) level where fuel remains covered and actions to implement make-up water addition should no longer be deferred." All licensees must therefore provide:

- A primary and back-up level instrument that will monitor water level from the normal level to the top of the used fuel rack in the pool.
- A display in an area accessible following a severe event.
- Independent electrical power to each instrument channel and an alternate remote power connection capability.

NEI 12-02, *Industry Guidance for Compliance with NRC Order EA-12-051, "To Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation"*, provides guidance for complying with NRC Order EA-12-051.

NEI 99-01, Revision 6, includes three EALs that reflect the availability of the enhanced spent fuel pool level instrumentation associated with NRC Order EA-12-051. These

EALs are included within existing IC RA2, and new ICs RS2 and RG2. Associated EAL notes, bases and developer notes are also provided.

It is recommended that these EALs be implemented when the enhanced spent fuel pool level instrumentation is available for use.

The regulatory process that licensees follow to make changes to their emergency plan, including non-scheme changes to EALs, is 10 CFR 50.54(q). Licensees are responsible for evaluating a proposed change and determining whether or not it results in a reduction in the plan's effectiveness. Based on this determination, the licensee will either make the change or submit it to the NRC for prior review and approval in accordance with 10 CFR 50.90.

1.4 ORGANIZATION AND PRESENTATION OF INFORMATION

The scheme's information is organized by Recognition Category in the following order.

- R - Abnormal Radiation Levels / Radiological Effluent
- C - Cold Shutdown / Refueling System Malfunction
- E - Independent Spent Fuel Storage Installation (ISFSI)
- F - Fission Product Barrier
- H - Hazards and Other Conditions Affecting Plant Safety
- S - System Malfunction

1.5 IC AND EAL MODE APPLICABILITY

The following table shows Recognition Categories applicable in each plant mode. The ICs and EALs for a given Recognition Category are applicable in the indicated modes.

MODE APPLICABILITY MATRIX

Mode	Category					
	R	C	E	F	H	S
Power Operations	X		X	X	X	X
Startup	X		X	X	X	X
Hot Shutdown	X		X	X	X	X
Cold Shutdown	X	X	X		X	
Refueling	X	X	X		X	
Defueled	X	X	X		X	

Hatch Units 1 and 2 Technical Specifications Table 1.1-1 provides the following mode definitions:

Mode	Title	Reactor Mode Switch Position	Average Reactor Coolant Temperature (°F)
1	Power Operation	Run	NA
2	Startup	Refuel ^(a) or Startup/Hot Standby	NA
3	Hot Shutdown ^(a)	Shutdown	> 212
4	Cold Shutdown ^(b)	Shutdown	≤ 212
5	Refueling ^(b)	Shutdown or Refuel	NA

(a) All reactor vessel head closure bolts fully tensioned.

(b) One or more reactor vessel head closure bolts less than fully tensioned.

In addition to these defined modes, “Defueled” is also applicable to the Hatch EAL scheme, consistent with NEI 99-01. Defueled is a ‘No Mode’ condition where all of the fuel has been removed from the reactor vessel (i.e., full core offload during refueling or extended outages).

These modes are used throughout the Hatch EALs with no modifications from NEI 99-01. When a unit is defueled, the Initiating Conditions designated as Mode Condition “ALL” or “Defueled” are applicable.

2 GUIDANCE ON MAKING EMERGENCY CLASSIFICATIONS

2.1 GENERAL CONSIDERATIONS

For any emergency classification, the emergency director must consider all information having a bearing on the proper assessment of an initiating condition (IC). This includes the emergency action level (EAL), the associated operating mode applicability, notes, and the informing basis information. In the recognition category F matrices, EALs are referred to as fission product barrier thresholds; the thresholds serve the same function as an EAL.

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*.

All emergency classification assessments will be based on valid indications, reports or conditions. A valid indication, report, or condition, has been verified using appropriate means, leaving no doubt regarding the indicator's operability, the condition's existence, or the report's accuracy. For example, validation could be an instrument channel check, response on related or redundant indicators, or direct observation by plant personnel. The indications will be validated in a manner that supports timely emergency declaration.

For ICs and EALs that have a stipulated time duration, the emergency director will not wait until the applicable time has elapsed, but will 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 will be assumed that the release duration specified in the IC/EAL has been exceeded, absent data to the contrary.

A planned work activity resulting 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 such cases, the controls associated with the planning, preparation and execution of the work will ensure compliance with the operating license is maintained, provided 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.

Some EALs are assessed based on the results of analyses necessary to ascertain whether a specific EAL threshold has been exceeded. The EAL and/or the associated basis discussion will identify the necessary analysis. 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.

Although 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 scheme provides the emergency director with the ability to classify events and conditions based upon judgment using EALs that are consistent with the emergency classification level (ECL) definitions (refer to Category H). The emergency director will need to determine if the effects or consequences of the event or condition reasonably meet or exceed a particular ECL definition. A similar provision is incorporated into the fission product barrier tables; judgment may be used to determine the status of a fission product barrier.

2.2 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. An EAL(s) evaluation must be consistent with the related operating mode applicability and notes. If an EAL has been met or exceeded, the IC is met and the associated ECL is declared in accordance with plant procedures.

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.

2.3 CLASSIFICATION OF MULTIPLE EVENTS AND CONDITIONS

In the event of multiple emergencies or conditions, the user will identify all met or exceeded EALs. The highest applicable ECL identified during this review is declared. For example:

If an Alert EAL and a Site Area Emergency EAL are met, a Site Area Emergency will be declared.

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

If two Alert EALs are met, an Alert will 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*.

2.4 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, determines whether 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.**

Commented [JRB1]: RAI 1 revision

2.5 CLASSIFICATION OF IMMINENT CONDITIONS

Although EALs provide specific thresholds, the emergency director must remain alert to events or conditions that could lead to meeting or exceeding an EAL within a relatively short period of time (i.e., a change in the ECL is IMMINENT). If, in the judgment of the emergency director, meeting an EAL is IMMINENT, the emergency classification will 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.

2.6 EMERGENCY CLASSIFICATION LEVEL UPGRADING AND DOWNGRADING

SNC policy is that once an emergency classification is made, it cannot be downgraded to a lower classification. Termination criteria contained in procedure NMP-EP-110, Emergency Classification and Initial Actions shall be completed for an event to be terminated. At termination, on an event specific basis, the site can either enter normal operating conditions or enter a recovery condition with a recovery organization established for turnover from the ERO.

2.7 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 end before the emergency classification assessment can be completed. ~~If an event occurs that meets or exceeds an EAL, the associated EAL must be declared regardless of its continued presence at the time of declaration.~~ For example, an earthquake, or failure of the reactor protection system to automatically scram/trip the reactor followed by a successful manual scram/trip.

Commented [JRB2]: RAI 2 revision

2.8 CLASSIFICATION OF TRANSIENT CONDITIONS

Many of the ICs and/or EALs in this document employ time-based criteria that require 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, some transient conditions may cause an EAL to be met for a brief period of time. The following guidance will be applied to the classification of these conditions.

EAL momentarily met during expected plant response - When 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. This example presents an illustration:

An ATWS occurs and RCIC fails to automatically start. RPV level rapidly decreases and the plant enters an inadequate RPV Water Level condition (a

potential loss of the fuel clad barrier and a loss of the RCS barrier). If an operator manually starts RCIC in accordance with an EOP step and clears the inadequate RPV Water Level condition prior to an emergency declaration, then the classification should be based on the ATWS only.

It is important to note that the 15-minute emergency classification assessment period is not a "grace period" to delay a classification in order to perform 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 where an operator is able to take corrective action before the emergency director completes the review and necessary steps to make the emergency declaration. This provision ensures any public protective actions resulting from the emergency classification are truly warranted by the plant conditions.

2.9 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. Personnel could discover 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. It may be the event or condition was not recognized at the time, or there was an error in the emergency classification process.

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

3 ABNORMAL RAD LEVELS / RADIOLOGICAL EFFLUENT ICS/EALS

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
RG1 Release of gaseous radioactivity resulting in offsite dose greater than 1,000 mrem TEDE or 5,000 mrem thyroid CDE. <i>Op. Modes: All</i>	RS1 Release of gaseous radioactivity resulting in offsite dose greater than 100 mrem TEDE or 500 mrem thyroid CDE. <i>Op. Modes: All</i>	RA1 Release of gaseous or liquid radioactivity resulting in offsite dose greater than 10 mrem TEDE or 50 mrem thyroid CDE. <i>Op. Modes: All</i>	RU1 Release of gaseous or liquid radioactivity greater than 2 times the ODCM limits for 60 minutes or longer. <i>Op. Modes: All</i>
RG2 Spent fuel pool level cannot be restored to at least Level 3 for 60 minutes or longer. <i>Op. Modes: All</i>	RS2 Spent fuel pool level at Level 3. <i>Op. Modes: All</i>	RA2 Significant lowering of water level above, or damage to, irradiated fuel. <i>Op. Modes: All</i>	RU2 UNPLANNED loss of water level above irradiated fuel. <i>Op. Modes: All</i>
		RA3 Radiation levels that impede access to equipment necessary for normal plant operations, cooldown or shutdown. <i>Op. Modes: All</i>	

RG1

ECL: General Emergency

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

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2 or 3)

Notes:

- The emergency director will declare the General 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.

- (1) Reading on ANY of the following radiation monitors greater than the reading shown for 15 minutes or longer:

Reactor Building Vent Accident Range Monitor: 1D11-P601 (feeding 1D11-R631, Rx Bldg Vent Wide Range) 2D11-P601 (feeding 2D11-R631, Rx Bldg Vent Wide Range)	2.6 $\mu\text{Ci/cc}$ 2.6 $\mu\text{Ci/cc}$
Main Stack Accident Range Monitor: 1D11-P007 (feeding 1D11-R631, Main Stack Wide Range)	$8.1 \times 10^3 \mu\text{Ci/cc}$

- (2) Dose assessment using actual meteorology indicates doses greater than 1,000 mrem TEDE or 5,000 mrem thyroid CDE at or beyond the site boundary.
- (3) Field survey results indicate **EITHER** of the following at or beyond the site boundary:
- Closed window dose rates greater than 1,000 mR/hr expected to continue for 60 minutes or longer.
 - Analyses of field survey samples indicate thyroid CDE greater than 5,000 mrem for one hour of inhalation.

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 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 monitor reading threshold values are determined using a dose assessment method that back calculates from the dose values specified in the IC. The meteorology and source term (noble gases, particulates, and halogens) used are the same as those used to determine the monitor reading threshold values in ICs RS1 and RA1. This protocol will maintain intervals between the threshold values for the three classifications. Since doses are generally not monitored in real-time, a release duration of one hour is assumed, and the threshold values are based on a site boundary (or beyond) dose of 1000 mR/hour whole body or 5000 mR/hour thyroid, whichever is more limiting.

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.

RG2

ECL: General Emergency

Initiating Condition: Spent fuel pool level cannot be restored to at least Level 3 for 60 minutes or longer.

Operating Mode Applicability: All

Emergency Action Levels:

Note: The emergency director will declare the General Emergency promptly upon determining that 60 minutes has been exceeded, or will likely be exceeded.

(1) Spent fuel pool level cannot be restored to at least Level 3 for 60 minutes or longer.

Basis:

This IC addresses a significant loss of spent fuel pool inventory control and makeup capability leading to a prolonged uncover 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.

RS1

ECL: Site Area Emergency

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

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2 or 3)

Notes:

- The emergency director will 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.

- (1) Reading on ANY of the following radiation monitors greater than the reading shown for 15 minutes or longer:

Reactor Building Vent Accident Range Monitor: 1D11-P601 (feeding 1D11-R631, Rx Bldg Vent Wide Range) 2D11-P601 (feeding 2D11-R631, Rx Bldg Vent Wide Range)	$2.6 \times 10^{-1} \mu\text{Ci/cc}$ $2.6 \times 10^{-1} \mu\text{Ci/cc}$
Main Stack Accident Range Monitor: 1D11-P007 (feeding 1D11-R631, Main Stack Wide Range)	$8.1 \times 10^2 \mu\text{Ci/cc}$

- (2) Dose assessment using actual meteorology indicates doses greater than 100 mrem TEDE or 500 mrem thyroid CDE at or beyond the site boundary.
- (3) Field survey results indicate **EITHER** of the following at or beyond the site boundary:
- Closed window dose rates greater than 100 mR/hr expected to continue for 60 minutes or longer.
 - Analyses of field survey samples indicate thyroid CDE greater than 500 mrem for one hour of inhalation.

Basis:

This IC addresses a release of gaseous radioactivity that results in projected or actual offsite doses greater than or equal to 10-percent 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 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 monitor reading threshold values are determined using a dose assessment method that back calculates from the dose values specified in the IC. The meteorology and source term (noble gases, particulates, and halogens) used is the same as those used to determine the monitor reading threshold values in ICs RG1 and RA1. This protocol maintains intervals between the threshold values for the three classifications. Since doses are generally not monitored in real-time, a release duration of one hour is assumed, and the threshold values are based on a site boundary (or beyond) dose of 100 mR/hour whole body or 500 mR/hour thyroid, whichever is more limiting.

The TEDE dose is set at 10-percent 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 uses IC RG1.

RS2

ECL: Site Area Emergency

Initiating Condition: Spent fuel pool level at Level 3.

Operating Mode Applicability: All

Emergency Action Levels:

- (1) Lowering of spent fuel pool level to Level 3.

Basis:

This IC addresses a significant loss of spent fuel pool inventory control and makeup capability leading to IMMINENT fuel damage. This condition stems from major failures of plant functions needed for protection of the public and 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 uses IC RG1 or RG2.

RA1

ECL: Alert

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

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2 or 3 or 4)

Notes:

- The emergency director will 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 assessments until the results from a dose assessment using actual meteorology are available.

- (1) Reading on ANY of the following radiation monitors greater than the reading shown for 15 minutes or longer:

Reactor Building Vent Accident Range Monitor: 1D11-P601 (feeding 1D11-R631, Rx Bldg Vent Wide Range) 2D11-P601 (feeding 2D11-R631, Rx Bldg Vent Wide Range)	$2.6 \times 10^{-2} \mu\text{Ci/cc}$ $2.6 \times 10^{-2} \mu\text{Ci/cc}$
Main Stack Accident Range Monitor: 1D11-P007 (feeding 1D11-R631, Main Stack Wide Range)	$8.1 \times 10^1 \mu\text{Ci/cc}$

- (2) Dose assessment using actual meteorology indicates doses greater than 10 mrem TEDE or 50 mrem thyroid CDE at or beyond the site boundary.
- (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.
- (4) Field survey results indicate **EITHER** of the following at or beyond the site boundary :
- 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.

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-percent 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 plant safety as indicated by a radiological release that significantly exceeds regulatory limits (e.g., a significant uncontrolled

release).

Radiological effluent EALs are 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 monitor reading threshold values are determined using a dose assessment method that back calculates from the dose values specified in the IC. The meteorology and source term (noble gases, particulates, and halogens) used is the same as those used to determine the monitor reading threshold values in ICs RG1 and RS1. This protocol maintains intervals between the threshold values for the three classifications. Since doses are generally not monitored in real-time, a release duration of one hour is assumed, and that the threshold values are based on a site boundary (or beyond) dose of 10 mR/hour whole body or 50 mR/hour thyroid, whichever is more limiting.

The TEDE dose is set at 1-percent 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 uses IC RS1.

RA2

ECL: Alert

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

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2 or 3)

- (1) Uncovery of irradiated fuel in the REFUELING PATHWAY.
- (2) Damage to irradiated fuel resulting in a release of radioactivity from the fuel as indicated by alarms on ANY Table R1 radiation monitors:

Table R1	
Refuel Floor Area Radiation Monitors	
Unit 1	Unit 2
1D21-K601 A - Rx Head Laydown Area	2D21-K601 A - Rx Head Laydown Area
1D21-K601 B - Refueling Floor Stairway	2D21-K601 M - Spent Fuel/Fuel Pool Areas
1D21-K601 D - Refuel Floor	2D21-K601 E - Dryer/Separator Pool
1D21-K601 E - Drywell Shield Plug	2D21-K611 K - RPV Refuel Floor 228'
1D21-K601 M - Spent Fuel Pool and New Fuel Storage area	2D21-K611 L - RPV Refuel Floor 228'
Refuel Floor Ventilation Monitors	
Unit 1	Unit 2
1D11-K609 A-D - Rx Bldg. Potential Contaminated Area Vent Exhaust Rad Monitor	2D11-K609 A-D - Rx Bldg. Potential Contaminated Area Vent Exhaust Rad Monitor
1D11-K611 A-D - Refuel Floor Vent Exhaust	2D11-K611 A-D - Refuel Floor Vent Exhaust
	2D11-K634 A-D - Refuel Floor Rx Well Vent. Exhaust
	2D11-K635 A-D - Refuel Floor DW/Sep. Vent. Exhaust

- (3) Lowering of spent fuel pool level to Level 2.

Basis:

REFUELING PATHWAY: This includes the reactor cavity, the transfer canal, and the spent fuel pool.

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 plant safety.

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 is based on either Recognition Category R or C ICs.

EAL #1

This EAL escalates from RU2. The loss of level, in the affected portion of the REFUELING PATHWAY is of sufficient magnitude to have resulted in uncover of irradiated fuel. Indications of irradiated fuel uncover may include direct or indirect visual observation (e.g., reports from personnel or camera images), 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 will 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 will 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 is a precursor to a loss of the ability to adequately cool the irradiated fuel assemblies stored in the pool.

Escalation of the emergency classification level uses ICs RS1 or RS2

RA3

ECL: Alert

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

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2)

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.

- (1) Dose rate greater than 15 mR/hr in ANY of the following areas:

Control Room area radiation monitor 1D21-K600 B or C
Central Alarm Station (by survey)

- (2) An UNPLANNED event results in radiation levels that prohibit or impede access to any Table H1 plant rooms or areas:

Table H1		
Building	Rooms	Applicable Modes
Diesel generator building	All	All
	Unit 1/2 130'	All
Reactor building	Unit 1/2 SE Diagonals (RHR)	All
	Unit 1/2 NE Diagonals (RHR)	All

Basis:

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.

This IC addresses elevated radiation levels in certain plant rooms or 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. It represents an actual or potential substantial degradation of the level of plant safety. The emergency director 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 uses Recognition Category R, C or F ICs.

RU1

ECL: Notification of Unusual Event

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

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2 or 3)

Notes:

- The emergency director will declare the Unusual Event promptly upon determining that 60 minutes has been exceeded, or will likely be exceeded.
- If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded 60 minutes.
- If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is no longer valid for classification purposes.

- (1) Reading on **ANY** effluent radiation monitor greater than 2 times the ODCM limits for 60 minutes or longer:

Reactor Building Vent Normal Range Monitor: 1D11-K619 A(B) 2D11-K636 A(B)
Main Stack Normal Range Monitor: 1D11-K600 A(B)
Liquid Radwaste Effluent Line Monitor: 1D11-K604 2D11-K604
Service Water System Effluent Line Monitor: 1D11-K605 2D11-K605

- (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 ODCM limits for 60 minutes or longer.

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. Administrative controls are established to prevent unintentional releases, and to control and monitor intentional releases. The occurrence of an extended, uncontrolled radioactive release to the environment indicates 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 uses IC RA 1.

RU2

ECL: Notification of Unusual Event

Initiating Condition: UNPLANNED loss of water level above irradiated fuel.

Operating Mode Applicability: All

Emergency Action Levels:

- (1) a. UNPLANNED water level drop in the REFUELING PATHWAY as indicated by ANY of the following:

Personnel report of low water level
SFP low level alarm annunciator - Spent Fuel Storage Pool Level Low 654-022-1/2

AND

- b. UNPLANNED rise in area radiation levels as indicated by ANY of the following radiation monitors.

1D21-K601 A - Rx Head Laydown Area
1D21-K601 D - Refuel Floor
1D21-K601 E - Drywell Shield Plug
1D21-K601 M - Spent Fuel Pool and New Fuel Storage area
2D21-K601 A - Rx Head Laydown Area
2D21-K601 M - Spent Fuel/Fuel Pool Areas
2D21-K601 E - Dryer/Separator Pool
2D21-K611 K - RPV Refuel Floor 228'
2D21-K611 L - RPV Refuel Floor 228'

Basis:

REFUELING PATHWAY: This includes the reactor cavity, the transfer canal, and the spent fuel pool

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.

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 plant safety.

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 with Recognition Category C during the Cold Shutdown and Refueling modes.

Escalation of the emergency classification level uses IC RA2.

4 COLD SHUTDOWN / REFUELING SYSTEM MALFUNCTION ICS/EALS

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
CG1 Loss of RPV inventory affecting fuel clad integrity with containment challenged. <i>Op. Modes: Cold Shutdown, Refueling</i>	CS1 Loss of RPV inventory affecting core decay heat removal capability. <i>Op. Modes: Cold Shutdown, Refueling</i>	CA1 Loss of RPV inventory. <i>Op. Modes: Cold Shutdown, Refueling</i>	CU1 UNPLANNED loss of RPV inventory for 15 minutes or longer. <i>Op. Modes: Cold Shutdown, Refueling</i>
		CA2 Loss of all offsite and all onsite AC power to essential emergency buses for 15 minutes or longer. <i>Op. Modes: Cold Shutdown, Refueling, Defueled</i>	CU2 Loss of all but one AC power source to essential emergency buses for 15 minutes or longer. <i>Op. Modes: Cold Shutdown, Refueling, Defueled</i>
		CA3 Inability to maintain the plant in cold shutdown. <i>Op. Modes: Cold Shutdown, Refueling</i>	CU3 UNPLANNED increase in RCS temperature. <i>Op. Modes: Cold Shutdown, Refueling</i>
			CU4 Loss of Vital DC power for 15 minutes or longer. <i>Op. Modes: Cold Shutdown, Refueling</i>
			CU5 Loss of all onsite or offsite communications capabilities. <i>Op. Modes: Cold Shutdown, Refueling, Defueled</i>
		CA6 Hazardous event affecting a SAFETY SYSTEM needed for the current operating mode. <i>Op. Modes: Cold Shutdown, Refueling</i>	

CG1

ECL: General Emergency

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

Operating Mode Applicability: Cold Shutdown, Refueling

Emergency Action Levels: (1 or 2)

Note: The emergency director will declare the General Emergency promptly upon determining that 30 minutes has been exceeded, or will likely be exceeded.

- (1) a. RPV level less than -155" (TAF) for 30 minutes or longer.

AND

- b. **ANY** indication from the Containment Challenge Table C1.

- (2) a. RPV level cannot be monitored for 30 minutes or longer.

AND

- b. Core uncover is indicated by **ANY** of the following:

- A reading greater than 9.5×10^3 mR/hr on **ANY** of the following radiation monitors:

Unit 1	Unit 2
1D21-K601 A – Rx Head Laydown Area	2D21-K601 A – Rx Head Laydown Area
1D11-K601 D – Refuel Floor	2D21-K601 M – Spent Fuel/Fuel Pool Areas
1D21-K601 E – Drywell Shield Plug	2D21-K601 E – Dryer/Separator Pool
1D21-K601 M – Spent Fuel Pool and New Fuel Storage Area	2D21-K611 K – RPV Refuel Floor 228*
	2D21-K611 L – RPV Refuel Floor 228*

- UNPLANNED level increase in any of the following of sufficient magnitude to indicate core uncover:

Drywell Floor Drain Sumps	Reactor Building Floor Drain Sumps
Drywell Equipment Drain Sumps	Turbine Building Floor Drain Sumps
Torus	Rad Waste Tanks
Torus Room Sumps	

AND

- c. **ANY** indication from the Containment Challenge Table C1.

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Containment Challenge Table C1
Containment H ₂ greater than or equal to 6% AND O ₂ greater than or equal to 5%
UNPLANNED increase in Primary Containment Pressure greater than 56 psig
Secondary CONTAINMENT INTEGRITY NOT established*
Secondary Containment radiation monitors greater than Max Safe values (SC EOP - Table 6)

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* If Secondary CONTAINMENT INTEGRITY is re-established prior to exceeding the 30-minute time limit, then declaration of a General Emergency is not required.

Basis:

CONTAINMENT INTEGRITY: Primary Containment OPERABLE per Technical Specification 3.6.1.1. Secondary Containment OPERABLE per Technical Specification 3.6.4.1

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.

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.

Water level for top of active fuel is calculated at -158.44". Although slightly more conservative, the -155" EOP value for top of active fuel is provided for this EAL to aid in operator recognition of the event.

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 reactor vessel level cannot be restored, fuel damage is probable.

With Secondary CONTAINMENT INTEGRITY not established, there is a high potential for a direct and unmonitored release of radioactivity to the environment. If Secondary CONTAINMENT INTEGRITY 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 uncover event, it is unlikely that hydrogen buildup due to a core uncover could result in an explosive gas mixture in containment. If all installed hydrogen gas monitors are out-of-service during an event leading to fuel cladding damage, it may not be possible to obtain a containment hydrogen gas concentration reading as ambient conditions within the containment will preclude personnel access. During periods when installed containment hydrogen gas monitors are out-of-service, operators may use the other listed indications to assess whether or not containment is challenged.

In EAL 2.b, the 30-minute criterion is tied to a readily recognizable event start time (i.e., the total

loss of ability to monitor level), and allows sufficient time to monitor, assess and correlate reactor and plant conditions to determine if core uncover has actually occurred (i.e., to account for various accident progression and instrumentation uncertainties). It also allows sufficient time for actions to terminate leakage, recover inventory control or makeup equipment, and/or restore level monitoring.

The inability to monitor RPV 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 RPV.

These EALs address 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*.

CS1

ECL: Site Area Emergency

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

Operating Mode Applicability: Cold Shutdown, Refueling

Emergency Action Levels: (1 or 2 or 3)

Note: The emergency director will declare the Site Area Emergency promptly upon determining that 30 minutes has been exceeded, or will likely be exceeded.

- (1) a. Secondary CONTAINMENT INTEGRITY not established.

AND

- b. RPV level less than -41" (6" below the Level 2 actuation setpoint).

- (2) a. Secondary CONTAINMENT INTEGRITY established.

AND

- b. RPV level less than -155" (TAF).

- (3) a. RPV level cannot be monitored for 30 minutes or longer.

AND

- b. Core uncover is indicated by **ANY** of the following:

- A reading greater than 9.5×10^3 mR/hr on **ANY** of the following radiation monitors:

Unit 1	Unit 2
1D21-K601 A – Rx Head Laydown Area	2D21-K601 A – Rx Head Laydown Area
1D11-K601 D – Refuel Floor	2D21-K601 M – Spent Fuel/Fuel Pool Areas
1D21-K601 E – Drywell Shield Plug	2D21-K601 E – Dryer/Separator Pool
1D21-K601 M – Spent Fuel Pool and New Fuel Storage Area	2D21-K611 K – RPV Refuel Floor 228'
	2D21-K611 L – RPV Refuel Floor 228'

- UNPLANNED level increase in any of the following of sufficient magnitude to indicate core uncover:

Drywell Floor Drain Sumps	Reactor Building Floor Drain Sumps
Drywell Equipment Drain Sumps	Turbine Building Floor Drain Sumps
Torus	Rad Waste Tanks
Torus Room Sumps	

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Basis:

CONTAINMENT INTEGRITY: Primary Containment OPERABLE per Technical Specification 3.6.1.1. Secondary Containment OPERABLE per Technical Specification 3.6.4.1.

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.

This IC addresses a significant and prolonged loss of RPV 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 warrant a Site Area Emergency declaration.

Water level for top of active fuel is calculated at -158.44". Although slightly more conservative, the -155" EOP value for top of active fuel is provided for this EAL to aid in operator recognition of the event.

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 reactor vessel level cannot be restored, fuel damage is probable.

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

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

The inability to monitor RPV 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 RPV.

These EALs address 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 uses IC CG1 or RG1.

CA1

ECL: Alert

Initiating Condition: Loss of RPV inventory.

Operating Mode Applicability: Cold Shutdown, Refueling

Emergency Action Levels: (1 or 2)

Note: The emergency director will declare the Alert promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) Loss of RPV inventory as indicated by level less than -35" (Level 2 actuation setpoint).
- (2) a. RPV level cannot be monitored for 15 minutes or longer

AND

- b. UNPLANNED level increase in any of the following due to a loss of RPV inventory:

Drywell Floor Drain Sumps	Reactor Building Floor Drain Sumps
Drywell Equipment Drain Sumps	Turbine Building Floor Drain Sumps
Torus	Rad Waste Tanks
Torus Room Sumps	

Basis:

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.

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 -35" (Level 2 actuation setpoint) indicates that operator actions have not been successful in restoring and maintaining RPV 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 uncover.

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 EAL #2, the inability to monitor RPV 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 RPV.

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 RPV inventory level continues to lower, then escalation to Site Area Emergency uses IC CS1.

CA2

ECL: Alert

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

Operating Mode Applicability: Cold Shutdown, Refueling, Defueled

Emergency Action Levels:

Note: The emergency director will declare the Alert promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) Loss of **ALL** offsite and **ALL** onsite AC Power (Table S1) to 4160 VAC ~~Essential~~Emergency Buses 1/2E, 1/2F, **AND** 1/2G for 15 minutes or longer.

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Table S1	
Unit 1	Unit 2
Start-up Aux XFMR 1C	Start-up Aux XFMR 2C
Start-up Aux XFMR 1D	Start-up Aux XFMR 2D
Diesel Generator 1A	Diesel Generator 2A
Diesel Generator 1B	Diesel Generator 1B
Diesel Generator 1C	Diesel Generator 2C

Basis:

This IC addresses a total loss of AC power (see Table S1 above) that compromises the performance of all SAFETY SYSTEMS requiring electric power, including those necessary for essential core cooling, containment heat removal/pressure control, spent fuel heat removal, and the ultimate heat sink.

When in the cold shutdown, refueling, or defueled mode, this condition is not classified as a Site Area Emergency because of the increased time available to restore an ~~essential~~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. When in these modes, this condition represents an actual or potential substantial degradation of the level of plant safety.

Fifteen minutes is the threshold to exclude transient or momentary power losses.

Escalation of the emergency classification level uses IC CS1 or RS1.

CA3

ECL: Alert

Initiating Condition: Inability to maintain the plant in cold shutdown.

Operating Mode Applicability: Cold Shutdown, Refueling

Emergency Action Levels: (1 or 2)

Note: The emergency director will declare the Alert promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.

- (1) UNPLANNED increase in RCS temperature to greater than 212 °F for greater than the duration specified in Table C2.

Table C2: RCS Heat-up Duration Thresholds		
RCS Status	Secondary CONTAINMENT INTEGRITY Status	Heat-up Duration
Not Intact	Not Established	0 minutes*
	Established	20 minutes
Intact	Not applicable	60 minutes*
* If RHR is in operation within this time frame and RCS temperature is being reduced, the EAL is not applicable.		

- (2) UNPLANNED RCS pressure increase greater than 10 psig.

Basis:

CONTAINMENT INTEGRITY: Primary Containment OPERABLE per Technical Specification 3.6.1.1. Secondary Containment OPERABLE per Technical Specification 3.6.4.1.

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.

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 plant safety.

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 the case where there is an increase in RCS temperature, the RCS is not intact, and Secondary CONTAINMENT INTEGRITY is not established. In this case, 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 Heat-up Duration Thresholds table addresses an increase in RCS temperature when Secondary CONTAINMENT INTEGRITY 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.

Finally, the RCS Heat-up Duration Thresholds table also addresses an increase in RCS temperature with the RCS intact. The status of Secondary CONTAINMENT INTEGRITY 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.

EAL #2 provides a pressure-based indication of RCS heat-up.

Escalation of the emergency classification level uses IC CS1 or RS1.

CA6

ECL: Alert

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

Operating Mode Applicability: Cold Shutdown, Refueling

Emergency Action Levels:

- (1) a. The occurrence of **ANY** of the following hazardous events:
- Seismic event (earthquake)
 - Internal or external flooding event
 - High winds (> 35 mph sustained) or tornado strike
 - FIRE
 - EXPLOSION
 - Other events with similar hazard characteristics as determined by the Shift Manager

AND

- b. **EITHER** of the following:
- 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.

Basis:

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 may 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.

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.

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.

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

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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 plant safety.

EAL 1.a identifies hazardous events that could result in damage to plant systems. A seismic event is indicated by entry into IC HU2. Flooding is indicated by a significant increase in water levels (external or internal). High winds are indicated by sustained winds at the site meteorological tower exceeding 35 mph.

The first threshold for EAL 1.b 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 threshold for EAL 1.b 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 all 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 uses IC CS1 or RS1.

CU1

ECL: Notification of Unusual Event

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

Operating Mode Applicability: Cold Shutdown, Refueling

Emergency Action Levels: (1 or 2)

Note: The emergency director will declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) UNPLANNED loss of reactor coolant results in RPV level less than the lower limit of the controlling level band for 15 minutes or longer.
- (2) a. RPV level cannot be monitored.

AND

- b. UNPLANNED level increase in any of the following:

Drywell Floor Drain Sumps	Reactor Building Floor Drain Sumps
Drywell Equipment Drain Sumps	Turbine Building Floor Drain Sumps
Torus	Rad Waste Tanks
Torus Room Sumps	

Basis:

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.

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 RPV level concurrent with indications of coolant leakage. Either of these conditions is considered to be a potential degradation of the level of plant safety.

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 RPV 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 RPV 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 RPV.

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

CU2

ECL: Notification of Unusual Event

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

Operating Mode Applicability: Cold Shutdown, Refueling, Defueled

Emergency Action Levels:

Note: The emergency director will declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) a. AC power capability to 4160 VAC ~~Essential~~Emergency Buses 1/2E, 1/2F, **AND** 1/2G is reduced to a single power source (Table S1) for 15 minutes or longer.

AND

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

Table S1	
Unit 1	Unit 2
Start-up Aux XFMR 1C	Start-up Aux XFMR 2C
Start-up Aux XFMR 1D	Start-up Aux XFMR 2D
Diesel Generator 1A	Diesel Generator 2A
Diesel Generator 1B	Diesel Generator 1B
Diesel Generator 1C	Diesel Generator 2C

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Basis:

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.

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 (see Table S1 above) may be powering one, or more than one, train of safety-related equipment.

When in the cold shutdown, refueling, or defueled mode, this condition is not classified as an Alert because of the increased 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. When in these modes, this condition is considered to be a potential degradation of the level of plant safety.

An "AC power source" is a source recognized in AOPs and EOPs, and capable of supplying required power to an ~~essential~~emergency bus. Examples of this condition include:

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

- source (e.g., an onsite diesel generator).
- A loss of all offsite power and loss of all ~~essential~~emergency power sources (e.g., onsite diesel generators) with a single train of ~~essential~~emergency buses being back-fed from the unit main generator.
 - A loss of ~~essential~~emergency power sources (e.g., onsite diesel generators) with a single train of ~~essential~~emergency buses being back-fed from an offsite power source.

Fifteen minutes is the 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.

CU3

ECL: Notification of Unusual Event

Initiating Condition: UNPLANNED increase in RCS temperature.

Operating Mode Applicability: Cold Shutdown, Refueling

Emergency Action Levels: (1 or 2)

Note: The emergency director will declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) UNPLANNED increase in RCS temperature to greater than 212 °F.
- (2) Loss of ALL RCS temperature and RPV level indication for 15 minutes or longer.

Basis:

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.

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, represents a potential degradation of the level of plant safety. If the RCS is not intact and secondary CONTAINMENT INTEGRITY is not established during this event, the emergency director will 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, where 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 reflects a condition where there has been a significant loss of instrumentation capability necessary to monitor RCS conditions, and operators are 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 is a threshold to exclude transient or momentary losses of indication.

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

CU4

ECL: Notification of Unusual Event

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

Operating Mode Applicability: Cold Shutdown, Refueling

Emergency Action Levels:

Note: The emergency director will declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) Indicated voltage is less than 105/210 VDC on Technical Specification required 125/250 VDC buses 1/2R22-S016 **AND** 1/2R22-S017 for 15 minutes or longer.

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. This condition is considered to be a potential degradation of the level of plant safety.

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 is the threshold to exclude transient or momentary power losses.

Depending upon the event, escalation of the emergency classification level uses IC CA1 or CA3, or an IC in Recognition Category R.

CU5

ECL: Notification of Unusual Event

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

Operating Mode Applicability: Cold Shutdown, Refueling, Defueled

Emergency Action Levels: (1 or 2 or 3)

- (1) Loss of **ALL** of the following onsite communication methods:

Plant telephones (Includes hardwired and wireless)
Plant page
Plant radio systems

- (2) Loss of **ALL** of the following ORO communications methods:

ENN (Emergency Notification Network)
Commercial phones

- (3) Loss of **ALL** of the following NRC communications methods:

ENS on Federal Telecommunications System (FTS)
Commercial phones

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 will 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).

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

EAL #2 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 of Georgia, Appling County, Jeff Davis County, Tattnall County and Toombs County.

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

5 INDEPENDENT SPENT FUEL STORAGE INSTALLATION (ISFSI) ICS/EALS

UNUSUAL EVENT

**E-HU1 Damage to a loaded cask
CONFINEMENT BOUNDARY.**

Op. Modes: All

E-HU1

ECL: Notification of Unusual Event

Initiating Condition: Damage to a loaded cask CONFINEMENT BOUNDARY.

Operating Mode Applicability: All

Emergency Action Levels:

- (1) Damage to a loaded cask CONFINEMENT BOUNDARY as indicated by an on-contact radiation reading greater than ANY value listed on Table E1.

Table E1	
Location of Dose Rate	Total Dose Rate (Neutron + Gamma mR/hr)
HI-TRAC 125	
Side – Mid- height	450
Top	110
HI-STAR 100 or HI-STORM 100	
Side – 60 inches below mid- height	80
Side – Mid- height	80
Side – 60 inches above mid- height	30
Center of lid	10
Middle of top lid	20
Top (outlet) duct	40
Bottom (inlet) duct	140

Basis:

CONFINEMENT BOUNDARY: The barrier(s) between areas containing radioactive substances and the environment.

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 that could cause challenges in removing the cask or fuel from storage.

The existence of “damage” is determined by radiological survey. The radiation reading values listed in the table represent 2 times the site-specific cask-specific technical specification allowable radiation level on the designated surface of the spent fuel cask. The technical

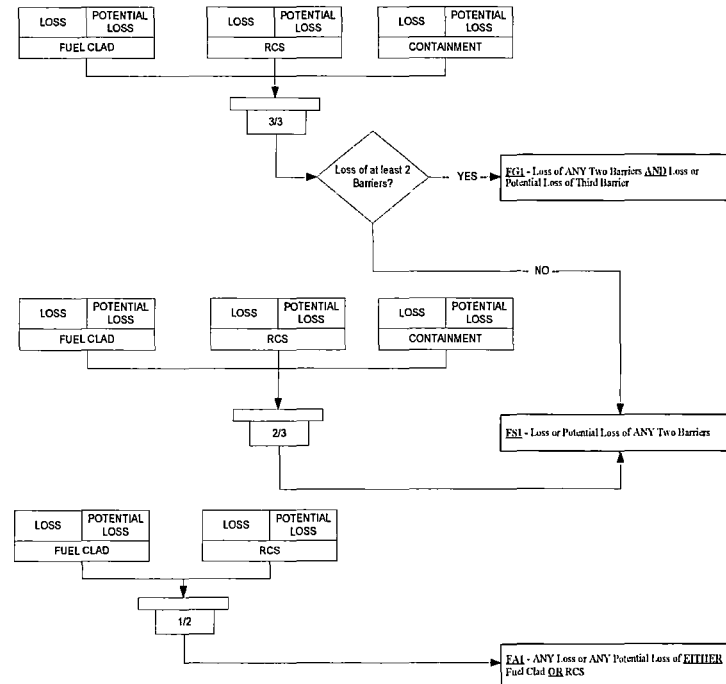
specification multiple of “2 times” is used here to distinguish between non-emergency and emergency conditions. The emphasis for this classification is the degradation in the level of safety of the spent fuel cask, and not the magnitude of the associated dose or dose rate. It is recognized that in the case of extreme damage to a loaded cask, determining if the “on-contact” dose rate limit is exceeded may be 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.

6 FISSION PRODUCT BARRIER ICS/EALS

Recognition Category "F" Initiating Condition Matrix

GENERAL EMERGENCY	
FG1	Loss of any two barriers and Loss or Potential Loss of the third barrier. <i>Op. Modes: Power Operation, Hot Standby, Startup, Hot Shutdown</i>
SITE AREA EMERGENCY	
FS1	Loss or Potential Loss of any two barriers. <i>Op. Modes: Power Operation, Hot Standby, Startup, Hot Shutdown</i>
ALERT	
FA1	Any Loss or any Potential Loss of either the Fuel Clad or RCS barrier. <i>Op. Modes: Power Operation, Hot Standby, Startup, Hot Shutdown</i>



Fission Product Barrier Table

Thresholds for LOSS or POTENTIAL LOSS of Barriers

FGI GENERAL EMERGENCY	FSI SITE AREA EMERGENCY	FAI ALERT
Loss of any two barriers and Loss or Potential Loss of the third barrier.	Loss or Potential Loss of any two barriers.	Any Loss or any Potential Loss of either the Fuel Clad or RCS barrier.

Fuel Clad Barrier		RCS Barrier		Containment Barrier	
LOSS	POTENTIAL LOSS	LOSS	POTENTIAL LOSS	LOSS	POTENTIAL LOSS
1. RCS Activity		1. Primary Containment Pressure		1. Primary Containment Conditions	
A. Activity of 300 $\mu\text{Ci/gm DEI}_{131}$	Not Applicable	A. Primary containment pressure greater than 1.85 psig due to RCS leakage.	Not Applicable	A. UNPLANNED rapid drop in primary containment pressure following primary containment pressure rise OR B. Primary containment pressure response not consistent with LOCA conditions.	A. Primary containment pressure greater than 56 psig OR B. Greater than or equal to 6% H_2 AND 5% O_2 exists inside primary containment OR C. HCTL exceeded.
2. RPV Water Level		2. RPV Water Level		2. RPV Water Level	
A. SAG entry is required.	A. RPV water level cannot be restored and maintained above -155 inches or cannot be determined.	A. RPV water level cannot be restored and maintained above -155 inches or cannot be determined.	Not Applicable	Not Applicable	A. SAG entry is required.

Fuel Clad Barrier		RCS Barrier		Containment Barrier	
LOSS	POTENTIAL LOSS	LOSS	POTENTIAL LOSS	LOSS	POTENTIAL LOSS
3. Not Applicable		3. RCS Leak Rate		3. Primary Containment Isolation Failure	
Not Applicable	Not Applicable	A. UNISOLABLE break in Main Steamline, HPCI, Feedwater, RWCU, or RCIC OR B. Emergency RPV Depressurization.	A. UNISOLABLE primary system leakage that results in exceeding EITHER of the following: 1. Max Normal Operating Temperature OR 2. Max Normal Operating Area Radiation Level.	A. UNISOLABLE direct downstream pathway to the environment exists after primary containment isolation signal OR B. Intentional primary containment venting per EOPs OR C. UNISOLABLE primary system leakage that results in exceeding EITHER of the following: 1. Max Safe Operating Temperature. OR 2. Max Safe Operating Area Radiation Level.	Not Applicable
4. Primary Containment Radiation		4. Primary Containment Radiation		4. Primary Containment Radiation	
A. DWRRM greater than 1,400 R/h.	Not Applicable	A. DWRRM greater than 40 R/hr.	Not Applicable	Not Applicable	A. DWRRM greater than 26,000 R/hr.

Fuel Clad Barrier		RCS Barrier		Containment Barrier	
LOSS	POTENTIAL LOSS	LOSS	POTENTIAL LOSS	LOSS	POTENTIAL LOSS
5. Other Indications		5. Other Indications		5. Other Indications	
A. Offgas Pre and Post Treatment Monitors Offscale High Not Applicable.	Not Applicable.	A. Drywell Fission Product Monitor reading 5.0×10^5 cpm.	Not Applicable.	Not Applicable.	Not Applicable.
6. Emergency Director Judgment		6. Emergency Director Judgment		6. Emergency Director Judgment	
A. ANY condition in the opinion of the emergency director that indicates loss of the fuel clad barrier.	A. ANY condition in the opinion of the emergency director that indicates potential loss of the fuel clad barrier.	A. ANY condition in the opinion of the emergency director that indicates loss of the RCS Barrier.	A. ANY condition in the opinion of the emergency director that indicates potential loss of the RCS Barrier.	A. ANY condition in the opinion of the emergency director that indicates loss of the Containment Barrier.	A. ANY condition in the opinion of the emergency director that indicates potential loss of the Containment Barrier.

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Basis Information For Fission Product Barrier EALs

FUEL CLAD BARRIER THRESHOLDS:

The fuel clad barrier consists of the zircalloy or stainless steel fuel bundle tubes that contain the fuel pellets.

1. RCS Activity

Loss 1.A

This threshold indicates that RCS radioactivity concentration is greater than 300 $\mu\text{Ci/gm}$ 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 percent 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.

2. RPV Water Level

Loss 2.A

The Loss threshold represents any EOP requirement for entry into the Severe Accident Guidelines. This is identified in the BWROG EPGs/SAGs when adequate core cooling cannot be assured.

Potential Loss 2.A

This water level corresponds to the top of the active fuel and is used in the EOPs to indicate a challenge to core cooling.

The RPV water level threshold is the same as RCS barrier Loss threshold 2.A. This threshold indicates a potential loss of the fuel clad barrier and a loss of the RCS barrier that appropriately escalates the emergency classification level to a Site Area Emergency.

This threshold is considered exceeded when, as specified in the site-specific EOPs, RPV water cannot be restored and maintained above the specified level following depressurization of the RPV (either manually, automatically or by failure of the RCS barrier) or when procedural guidance or a lack of low pressure RPV injection sources preclude Emergency RPV depressurization. EOPs allow the operator a wide choice of RPV injection sources to consider when restoring RPV water level to within prescribed limits. EOPs also specify depressurization of the RPV in order to facilitate RPV water level control with low-pressure injection sources. In some events, elevated RPV pressure may prevent restoration of RPV water level until pressure drops below the shutoff heads of available injection sources. Therefore, this fuel clad barrier potential loss is met only after either: 1) the RPV has been depressurized, or required emergency RPV

depressurization has been attempted, giving the operator an opportunity to assess the capability of low-pressure injection sources to restore RPV water level or 2) no low pressure RPV injection systems are available, precluding RPV depressurization in an attempt to minimize loss of RPV inventory.

The term "cannot be restored and maintained above" means the value of RPV water level is not able to be brought above the specified limit (top of active fuel). The determination requires an evaluation of system performance and availability in relation to the RPV water level value and trend. A threshold prescribing declaration when a threshold value *cannot* be restored and maintained above a specified limit does not require immediate action simply because the current value is below the top of active fuel, but does not permit extended operation below the limit. The threshold must be considered reached as soon as it is apparent that the top of active fuel cannot be attained.

In high-power ATWS/failure to scram events, EOPs may direct the operator to deliberately lower RPV water level to the top of active fuel in order to reduce reactor power. RPV water level is then controlled between the top of active fuel and the Minimum Steam Cooling RPV Water Level (MSCRWL). Although such action is a challenge to core cooling and the fuel clad barrier, the immediate need to reduce reactor power is the higher priority. For such events, ICs SA5 or SS5 will dictate the need for emergency classification.

Since the loss of ability to determine if adequate core cooling is being provided presents a significant challenge to the fuel clad barrier, a potential loss of the fuel clad barrier is specified.

3. **Not Applicable** (included for numbering consistency between barrier tables)

4. **Primary Containment Radiation**

Loss 4.A

The radiation monitor reading corresponds to an instantaneous release of all reactor coolant mass into the primary containment, assuming that reactor coolant activity equals 300 $\mu\text{Ci/gm}$ 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 percent 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 4.A 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 emergency classification level to a Site Area Emergency.

There is no potential loss threshold associated with primary containment radiation.

5. **Other Indications**

Loss 5A

Readings from Offgas pre- and post-treatment monitors that indicate Offscale High are used to detect the effluent of the Offgas system and therefore indicate fission products escaping the clad. Calculated readings for 300 $\mu\text{Ci/gm}$ are 4.82×10^8 cps and the instruments to of scale is 1×10^6 cps. These instruments going high offscale provide an indication that there is clad damage to aid in classification of an event. Sample results are still needed to establish that the 300 $\mu\text{Ci/gm}$ threshold is being exceeded. There is no potential loss threshold associated with Other Indications. Not Applicable (included for numbering consistency between barrier tables)

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6. Emergency Director Judgment

Loss 6.A

This threshold addresses any other factors that used by the emergency director in determining whether the fuel clad barrier is lost.

Potential Loss 6.A

This threshold addresses any other factors that may be used by the emergency director in determining whether the Fuel Clad Barrier is potentially lost. The emergency director will also consider whether or not to declare the barrier potentially lost in the event that barrier status cannot be monitored.

RCS BARRIER THRESHOLDS:

The RCS Barrier is the reactor coolant system pressure boundary and includes the RPV and all reactor coolant system piping up to and including the isolation valves.

1. Primary Containment Pressure

Loss 1.A

The greater than 1.85 psig primary containment pressure is the drywell high pressure setpoint which indicates a LOCA by automatically initiating the ECCS or equivalent makeup system.

There is no potential loss threshold associated with primary containment pressure.

2. RPV Water Level

Loss 2.A

This water level corresponds to the top of active fuel and is used in the EOPs to indicate challenge to core cooling.

The RPV water level threshold is the same as fuel clad barrier potential loss threshold 2.A. This threshold indicates a loss of the RCS barrier and potential loss of the fuel clad barrier, and that appropriately escalates the emergency classification level to a Site Area Emergency.

This threshold is considered exceeded when, as specified in the site-specific EOPs, RPV water cannot be restored and maintained above the specified level following depressurization of the RPV (either manually, automatically or by failure of the RCS barrier) or when procedural guidance or a lack of low pressure RPV injection sources preclude Emergency RPV depressurization. EOPs allow the operator a wide choice of RPV injection sources to consider when restoring RPV water level to within prescribed limits. EOPs also specify depressurization of the RPV in order to facilitate RPV water level control with low-pressure injection sources. In some events, elevated RPV pressure may prevent restoration of RPV water level until pressure drops below the shutoff heads of available injection sources. Therefore, this RCS barrier loss is met only after either: 1) the RPV has been depressurized, or required emergency RPV depressurization has been attempted, giving the operator an opportunity to assess the capability of low-pressure injection sources to restore RPV water level or 2) no low pressure RPV injection systems are available, precluding RPV depressurization in an attempt to minimize loss of RPV inventory.

The term, "cannot be restored and maintained above," means the value of RPV water level is not able to be brought above the specified limit (top of active fuel). The determination requires an evaluation of system performance and availability in relation to the RPV water level value and trend. A threshold prescribing declaration when a threshold value *cannot* be restored and maintained above a specified limit does not require immediate action simply because the current value is below the top of active fuel, but does not permit extended operation beyond the limit. The threshold must be considered reached as soon as it is apparent that the top of active fuel cannot be attained.

In high-power ATWS/failure to scram events, EOPs may direct the operator to deliberately lower RPV water level to the top of active fuel in order to reduce reactor power. RPV water level is then controlled between the top of active fuel and the Minimum Steam Cooling RPV Water Level (MSCRWL). Although such action is a challenge to core cooling and the Fuel Clad barrier, the immediate need to reduce reactor power is the higher priority. For such events, ICs SA5 or SS5 will dictate the need for emergency classification.

There is no RCS potential loss threshold associated with RPV water level.

3. RCS Leak Rate

Loss Threshold 3.A

Large high-energy lines that rupture outside primary containment can discharge significant amounts of inventory and jeopardize the pressure-retaining capability of the RCS until they are isolated. If it is determined that the ruptured line cannot be promptly isolated from the control room, the RCS barrier loss threshold is met.

Loss Threshold 3.B

Emergency RPV Depressurization in accordance with the EOPs is indicative of a loss of the RCS barrier. If emergency RPV depressurization is performed, the plant operators are directed to open safety relief valves (SRVs). Even though the RCS is being vented into the suppression pool, a loss of the RCS barrier exists due to the diminished effectiveness of the RCS to retain fission products within its boundary.

Potential Loss Threshold 3.A

Potential loss of RCS based on primary system leakage outside the primary containment is determined from EOP temperature or radiation Max Normal Operating values in areas such as main steam line tunnel, RCIC, HPCI, etc., which indicate a direct path from the RCS to areas outside primary containment.

A Max Normal Operating value is the highest value of the identified parameter expected to occur during normal plant operating conditions with all directly associated support and control systems functioning properly.

The indicators reaching the threshold barriers and confirmed to be caused by RCS leakage from a primary system warrant an Alert classification. A primary system is defined to be the pipes, valves, and other equipment that connect directly to the RPV such that a reduction in RPV pressure will effect a decrease in the steam or water being discharged through an unisolated break in the system.

An UNISOLABLE leak which is indicated by Max Normal Operating values escalates to a Site Area Emergency when combined with containment barrier loss threshold 3.A (after a containment isolation) and a General Emergency when the fuel clad barrier criteria is also exceeded.

4. Primary Containment Radiation

Loss 4.A

The radiation monitor reading corresponds to an instantaneous release of all reactor coolant mass into the primary containment, assuming that reactor coolant activity equals Technical Specification allowable limits. This value is lower than that specified for fuel clad barrier loss threshold 4.A since it indicates a loss of the RCS barrier only.

There is no potential loss threshold associated with primary containment radiation.

5. Other Indications

Loss 5A

A Drywell Fission Products Monitor reading 5.0×10^5 cpm indicates a breach of the RCS as an effluent. The monitor value calculated in Calculation SMNH-13-021, Rev 1, was 1.008×10^6 cpm; however, the top of the scale for the monitor is 1×10^6 cpm. Therefore, the EAL threshold value has been established at one half decade below top of scale to aid the operator in distinguishing between a loss of RCS event and an instrument failure resulting in the monitor reading high off scale. No radiation monitors capable of indicating a potential loss of the RCS barrier were identified.

There is no Potential Loss Threshold associated with Other Indications.

6. Emergency Director Judgment

Loss 6.A

This threshold addresses any other factors used by the emergency director in determining whether the RCS barrier is lost.

Potential Loss 6.A

This threshold addresses any other factors used by the emergency director in determining whether the RCS Barrier is potentially lost. The emergency director will also consider whether or not to declare the barrier potentially lost in the event that barrier status cannot be monitored.

CONTAINMENT BARRIER THRESHOLDS:

The primary containment barrier includes the drywell, the wetwell, their respective interconnecting paths, and other connections up to and including the outermost containment isolation valves. Containment barrier thresholds are used as criteria for escalation of the ECL from Alert to a Site Area Emergency or a General Emergency.

1. Primary Containment Conditions

Loss 1.A and 1.B

Rapid UNPLANNED loss of primary containment pressure (i.e., not attributable to drywell spray or condensation effects) following an initial pressure increase indicates a loss of primary containment integrity. Primary containment pressure should increase as a result of mass and energy release into the primary containment from a LOCA. Primary containment pressure not increasing under these conditions indicates a loss of primary containment integrity.

These thresholds rely on operator recognition of an unexpected response for the condition and therefore a specific value is not assigned. The unexpected (UNPLANNED) response is important because it is the indicator for a containment bypass condition.

Potential Loss 1.A

The threshold pressure is the primary containment internal design pressure. Structural acceptance testing demonstrates the capability of the primary containment to resist pressures greater than the internal design pressure. A pressure of this magnitude is greater than those expected to result from any design basis accident and represents a potential loss of the containment barrier.

Potential Loss 1.B

If hydrogen concentration reaches or exceeds the lower flammability limit, as defined in plant EOPs, in an oxygen rich environment, a potentially explosive mixture exists. If the combustible mixture ignites inside the primary containment, loss of the containment barrier could occur.

Potential Loss 1.C

The heat capacity temperature limit (HCTL) is the highest suppression pool temperature from which emergency RPV depressurization will not raise:

Suppression chamber temperature above the maximum temperature capability of the suppression chamber and equipment within the suppression chamber which may be required to operate when the RPV is pressurized,

OR

Suppression chamber pressure above Primary Containment Pressure Limit A, while the rate of energy transfer from the RPV to the containment is greater than the capacity of the containment vent.

The HCTL is a function of RPV pressure, suppression pool temperature and suppression pool water level. It is used to preclude failure of the containment and equipment in the containment necessary for the safe shutdown of the plant and therefore, the inability to maintain plant parameters below the limit constitutes a potential loss of containment.

2. RPV Water Level

There is no loss threshold associated with RPV water level.

Potential Loss 2.A

The potential loss threshold is identical to the Fuel Clad Loss RPV Water Level threshold 2.A. The potential loss requirement for entry into the Severe Accident Guidelines indicates adequate core cooling cannot be assured and that core damage is possible. BWR EPGs/SAGs specify the conditions when the EPGs are exited and SAGs are entered. Entry into SAGs is a logical escalation in response to the inability to assure adequate core cooling.

PRA studies indicate that the condition of this potential loss threshold is a core melt sequence that, if not corrected, could lead to RPV failure and increased potential for primary containment failure. In conjunction with the RPV water level loss thresholds in the fuel clad and RCS barrier columns, this threshold results in the declaration of a General Emergency.

3. Primary Containment Isolation Failure

These thresholds address incomplete containment isolation (automatic or manual) that allows an UNISOLABLE direct release to the environment. A release path is 'direct' if it allows for the migration of radioactive material from the containment to the environment in a generally uninterrupted manner (e.g., little or no holdup time); therefore, within the context of a containment barrier loss or potential loss threshold, a release path ~~to~~ through the wetwell is a direct release path.

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Loss 3.A

The use of the modifier "direct" in defining the release path discriminates against release paths through interfacing liquid systems or minor release pathways, such as instrument lines, not protected by the Primary Containment Isolation System (PCIS).

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.

Following the leakage of RCS mass into primary containment and a rise in primary containment pressure, there may be minor radiological releases associated with allowable primary containment leakage through various penetrations or system components. Minor releases may also occur if a primary containment isolation valve(s) fails to close but the primary containment atmosphere escapes to an enclosed system. These releases do not constitute a loss or potential loss of primary containment but should be evaluated using the Recognition Category R ICs.

Loss 3.B

EOPs may direct primary containment isolation valve logic(s) to be intentionally bypassed, even if offsite radioactivity release rate limits will be exceeded. Under these conditions with a valid primary containment isolation signal, the containment will also be considered lost if primary containment venting is actually performed.

Intentional venting of primary containment for primary containment pressure or combustible gas control to the secondary containment and/or the environment is a loss of the containment. Venting for primary containment pressure control when not in an accident situation (e.g., to control pressure below the drywell high pressure scram setpoint) does not meet the threshold condition.

Loss 3.C

The Max Safe Operating Temperature and the Max Safe Operating Radiation Level are each the highest value of these parameters at which neither: 1) equipment necessary for the safe shutdown of the plant will fail, nor 2) personnel access necessary for the safe shutdown of the plant will be precluded. EOPs use these temperatures and radiation levels to establish conditions under which RPV depressurization is required.

The temperatures and radiation levels will be confirmed to be caused by RCS leakage from a primary system. A primary system is defined to be the pipes, valves, and other equipment that connect directly to the RPV ensuring a reduction in RPV pressure will effect a decrease in the steam or water being discharged through an unisolated break in the system.

In combination with RCS potential loss 3.A this threshold would result in a Site Area Emergency.

There is no potential loss threshold associated with Primary Containment Isolation Failure.

4. Primary Containment Radiation

There is no loss threshold associated with primary containment radiation.

Potential Loss 4.A

The radiation monitor reading corresponds to an instantaneous release of all reactor coolant mass into the primary containment, assuming that 20-percent 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-percent 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 that would then escalate the emergency classification level to a General Emergency.

5. Other Indications

Not Applicable (included for numbering consistency between barrier tables)

6. Emergency Director Judgment

Loss 6.A

This threshold addresses any other factors that are to be used by the emergency director in determining whether the containment barrier is lost.

Potential Loss 6.A

This threshold addresses any other factors that may be used by the emergency director in determining whether the containment barrier is potentially lost. The emergency director will also consider whether or not to declare the barrier potentially lost in the event that barrier status cannot be monitored.

7 HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY ICS/EALS

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
HG1 HOSTILE ACTION resulting in loss of physical control of the facility. <i>Op. Modes: All</i>	HS1 HOSTILE ACTION within the PROTECTED AREA. <i>Op. Modes: All</i>	HA1 HOSTILE ACTION within the OWNER CONTROLLED AREA or airborne attack threat within 30 minutes. <i>Op. Modes: All</i>	HU1 Confirmed SECURITY CONDITION or threat. <i>Op. Modes: All</i>
			HU2 Seismic event greater than OBE levels. <i>Op. Modes: All</i>
			HU3 Hazardous event. <i>Op. Modes: All</i>
			HU4 FIRE potentially degrading the level of safety of the plant. <i>Op. Modes: All</i>
		HA5 Gaseous release impeding access to equipment necessary for normal plant operations, cooldown or shutdown. <i>Op. Modes: All</i>	
	HS6 Inability to control a key safety function from outside the Control Room. <i>Op. Modes: All</i>	HA6 Control Room evacuation resulting in transfer of plant control to alternate locations. <i>Op. Modes: All</i>	

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
HG7 Other conditions exist which in the judgment of the emergency director warrant declaration of a General Emergency. <i>Op. Modes: All</i>	HS7 Other conditions exist which in the judgment of the emergency director warrant declaration of a Site Area Emergency. <i>Op. Modes: All</i>	HA7 Other conditions exist which in the judgment of the emergency director warrant declaration of an Alert. <i>Op. Modes: All</i>	HU7 Other conditions exist which in the judgment of the emergency director warrant declaration of a (NO)UE. <i>Op. Modes: All</i>

HG1

ECL: General Emergency

Initiating Condition: HOSTILE ACTION resulting in loss of physical control of the facility.

Operating Mode Applicability: All

Emergency Action Levels:

- (1) a. A HOSTILE ACTION is occurring or has occurred within the PROTECTED AREA (PA) as reported by the on shift Security Shift Captain or designee.
AND
- b. **EITHER** of the following has occurred:
 1. **ANY** of the following safety functions cannot be controlled or maintained.
 - Reactivity control
 - RPV water level
 - RCS heat removal
 - OR**
 2. Damage to spent fuel has occurred or is IMMINENT.

Commented [JRB13]: RAI 21 a revision

Basis:

HOSTILE ACTION: An act toward a nuclear power plant (NPP) or its personnel that includes the use of violent force to destroy equipment, take HOSTAGES, and/or intimidate the licensee to achieve an end. This includes attack by air, land, or water using guns, explosives, PROJECTILES, vehicles, or other devices used to deliver destructive force. Other acts that satisfy the overall intent may be included. HOSTILE ACTION should not be construed to include acts of civil disobedience or felonious acts that are not part of a concerted attack on the NPP. 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 (OCA)).

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 (PA): The area that encompasses all controlled areas within the security protected area fence.

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) or 2) loss of spent fuel pool integrity so that sufficient water level cannot be maintained.

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]*.

Emergency plans and implementing procedures are public documents; therefore, EALs should not incorporate security-sensitive information. This includes information that may be advantageous to a potential adversary, such as the particulars concerning a specific threat or threat location. Security-sensitive information should be contained in non-public documents such as the Security Plan.

ECL: General Emergency

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

Operating Mode Applicability: All

Emergency Action Levels:

- (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.

Basis:

HOSTILE ACTION: An act toward a nuclear power plant (NPP) or its personnel that includes the use of violent force to destroy equipment, take HOSTAGES, and/or intimidate the licensee to achieve an end. This includes attack by air, land, or water using guns, explosives, PROJECTILES, vehicles, or other devices used to deliver destructive force. Other acts that satisfy the overall intent may be included. HOSTILE ACTION should not be construed to include acts of civil disobedience or felonious acts that are not part of a concerted attack on the NPP. 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 (OCA)).

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.

This IC addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist that are believed by the emergency director to fall under the emergency classification level description for a General Emergency.

HS1

ECL: Site Area Emergency

Initiating Condition: HOSTILE ACTION within the PROTECTED AREA.

Operating Mode Applicability: All

Emergency Action Levels:

- (1) A HOSTILE ACTION is occurring or has occurred within the PROTECTED AREA (PA) as reported by the on shift Security Shift Captain or designee.

Commented [JRB14]: RAI 21 a revision

Basis:

HOSTILE ACTION: An act toward a nuclear power plant (NPP) or its personnel that includes the use of violent force to destroy equipment, take HOSTAGES, and/or intimidate the licensee to achieve an end. This includes attack by air, land, or water using guns, explosives, PROJECTILES, vehicles, or other devices used to deliver destructive force. Other acts that satisfy the overall intent may be included. HOSTILE ACTION should not be construed to include acts of civil disobedience or felonious acts that are not part of a concerted attack on the NPP. 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 (OCA)).

PROTECTED AREA (PA): The area that encompasses all controlled areas within the security protected area fence.

This IC addresses the occurrence of a HOSTILE ACTION within the PROTECTED AREA. This event will require rapid response and assistance due to the possibility for damage to plant equipment.

Timely and accurate communications between Security shift supervision and the control room is essential for proper classification of a security-related event.

Security plans and terminology are based on the guidance provided by NEI 03-12, *Template for the Security Plan, Training and Qualification Plan, Safeguards Contingency Plan [and Independent Spent Fuel Storage Installation Security Program]*.

As time and conditions allow, these events require a heightened state of readiness by the plant staff and implementation of onsite protective measures (e.g., evacuation, dispersal, or sheltering). The Site Area Emergency declaration will mobilize 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 plant 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, or physical disputes between employees. Reporting of these types of events is adequately addressed by other EALs, or the requirements of 10 CFR § 73.71 or 10 CFR § 50.72.

Emergency plans and implementing procedures are public documents; therefore, EALs should not incorporate security-sensitive information. This includes information that may be advantageous to a potential adversary, such as the particulars concerning a specific threat or threat location. Security-sensitive information should be contained in non-public documents such as the Security Plan.

Escalation of the emergency classification level uses IC HG1.

HS6

ECL: Site Area Emergency

Initiating Condition: Inability to control a key safety function from outside the Control Room.

Operating Mode Applicability: All

Emergency Action Levels:

Note: The emergency director will declare the Site Area Emergency promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) a. An event has resulted in plant control being transferred from the control room to remote shutdown panels.

AND

- b. Control of **ANY** of the following key safety functions is not reestablished within 15 minutes.
- Reactivity control
 - RPV water level
 - RCS heat removal

Basis:

This IC addresses an evacuation of the control room that results in transfer of plant control to alternate locations, and the control of a key safety function cannot be reestablished in a timely manner. The failure to gain control of a key safety function following a transfer of plant control to alternate locations is a precursor to a challenge to one or more fission product barriers within a relatively short period of time.

The determination of whether or not "control" is established at the remote safe shutdown location(s) is based on emergency director judgment. The emergency director is expected to make a reasonable, informed judgment within 15 minutes as to whether the operating staff has control of key safety functions from the remote safe shutdown location.

Escalation of the emergency classification level uses IC FG1 or CG1.

HS7

ECL: Site Area Emergency

Initiating Condition: Other conditions exist which in the judgment of the emergency director warrant declaration of a Site Area Emergency.

Operating Mode Applicability: All

Emergency Action Levels:

- (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.

Basis:

HOSTILE ACTION: An act toward a nuclear power plant (NPP) or its personnel that includes the use of violent force to destroy equipment, take HOSTAGES, and/or intimidate the licensee to achieve an end. This includes attack by air, land, or water using guns, explosives, PROJECTILES, vehicles, or other devices used to deliver destructive force. Other acts that satisfy the overall intent may be included. HOSTILE ACTION should not be construed to include acts of civil disobedience or felonious acts that are not part of a concerted attack on the NPP. 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 (OCA)).

This IC addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist that are believed by the emergency director to fall under the emergency classification level description for a Site Area Emergency.

HA1

ECL: Alert

Initiating Condition: HOSTILE ACTION within the OWNER CONTROLLED AREA or airborne attack threat within 30 minutes.

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2)

- (1) A HOSTILE ACTION is occurring or has occurred within the OWNER CONTROLLED AREA (OCA) as reported by the on shift Security Shift Captain or designee.
- (2) A validated notification from NRC of an aircraft attack threat within 30 minutes of the site.

Commented [JRB15]: RAI 21 a revision

Basis:

HOSTILE ACTION: An act toward a nuclear power plant (NPP) or its personnel that includes the use of violent force to destroy equipment, take HOSTAGES, and/or intimidate the licensee to achieve an end. This includes attack by air, land, or water using guns, explosives, PROJECTILES, vehicles, or other devices used to deliver destructive force. Other acts that satisfy the overall intent may be included. HOSTILE ACTION should not be construed to include acts of civil disobedience or felonious acts that are not part of a concerted attack on the NPP. 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 (OCA)).

OWNER CONTROLLED AREA (OCA): The site property owned by or otherwise under the control of HNP Security

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 (PA), 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, 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, or physical disputes between employees.

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 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 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 station procedures.

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 Security Plan.

Escalation of the emergency classification level uses IC HS1.

HA5

ECL: Alert

Initiating Condition: Gaseous release impeding access to equipment necessary for normal plant operations, cooldown or shutdown.

Operating Mode Applicability: All

Emergency Action Levels:

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.

- (1) a. Release of a toxic, corrosive, asphyxiant or flammable gas into any Table H1 plant rooms or areas:

Table H1		
Building	Rooms	Applicable Modes
Diesel generator building	All	All
	Unit 1/2 130'	All
Reactor building	Unit 1/2 SE Diagonals (RHR)	All
	Unit 1/2 NE Diagonals (RHR)	All

AND

- b. Entry into the room or area is prohibited or impeded.

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 plant safety.

An Alert declaration is warranted if entry into the affected room/area is, or may be, procedurally required during the plant operating mode in effect at the time of the gaseous release. The emergency classification is not contingent upon whether entry is actually necessary at the time of the release.

Evaluation of the IC and EAL do not require atmospheric sampling; it only requires the emergency director's judgment that the gas concentration in the affected room/area is sufficient to preclude or significantly impede procedurally required access. This judgment may be based on a variety of factors including an existing job hazard analysis, report of ill effects on personnel, advice from a subject matter expert, or operating experience with the same or similar hazards. Access should be considered as impeded if extraordinary measures are necessary to facilitate entry of personnel into the affected room/area (e.g., requiring use of protective equipment, such as SCBAs, that is not routinely employed).

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

- The plant is in an operating mode different than the mode specified for the affected room/area (i.e., entry is not required during the operating mode in effect at the time of the gaseous release). For example, the plant is in Mode 1 when the gaseous release occurs, and the procedures used for normal operation, cooldown and shutdown do not require entry into the affected room until Mode 4.
- The gas release is a planned activity that includes compensatory measures which address the temporary inaccessibility of a room or area (e.g., fire suppression system testing).
- The action for which room/area entry is required is of an administrative or record keeping nature (e.g., normal rounds or routine inspections).
- The access control measures are of a conservative or precautionary nature, and would not actually prevent or impede a required action.

An asphyxiant is a gas capable of reducing the level of oxygen in the body to dangerous levels. Most commonly, asphyxiants work by displacing air in an enclosed environment. This reduces the concentration of oxygen below the normal level of around 19-percent, 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.

Escalation of the emergency classification level uses Recognition Category R, C or F ICs.

HA6

ECL: Alert

Initiating Condition: Control Room evacuation resulting in transfer of plant control to alternate locations.

Operating Mode Applicability: All

Emergency Action Levels:

- (1) An event has resulted in plant control being transferred from the control room to remote shutdown panels.

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 uses IC HS6.

HA7

ECL: Alert

Initiating Condition: Other conditions exist which in the judgment of the emergency director warrant declaration of an Alert.

Operating Mode Applicability: All

Emergency Action Levels:

- (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.

Basis:

HOSTILE ACTION: An act toward a nuclear power plant (NPP) or its personnel that includes the use of violent force to destroy equipment, take HOSTAGES, and/or intimidate the licensee to achieve an end. This includes attack by air, land, or water using guns, explosives, PROJECTILES, vehicles, or other devices used to deliver destructive force. Other acts that satisfy the overall intent may be included. HOSTILE ACTION should not be construed to include acts of civil disobedience or felonious acts that are not part of a concerted attack on the NPP. 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 (OCA)).

This IC addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist that are believed by the emergency director to fall under the emergency classification level description for an Alert.

HU1

ECL: Notification of Unusual Event

Initiating Condition: Confirmed SECURITY CONDITION or threat.

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2 or 3)

- (1) A SECURITY CONDITION that does not involve a HOSTILE ACTION as reported by the ~~on shift Security Shift~~ Captain or designee.
- (2) Notification of a credible security threat directed at HNP.
- (3) A validated notification from the NRC providing information of an aircraft threat.

Commented [JRB16]: RAI 21 a revision

Basis:

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 a nuclear power plant (NPP) or its personnel that includes the use of violent force to destroy equipment, take HOSTAGES, and/or intimidate the licensee to achieve an end. This includes attack by air, land, or water using guns, explosives, PROJECTILES, vehicles, or other devices used to deliver destructive force. Other acts that satisfy the overall intent may be included. HOSTILE ACTION should not be construed to include acts of civil disobedience or felonious acts that are not part of a concerted attack on the NPP. 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 (OCA)).

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 that 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 OROs.

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 references the Security Shift Captain or designee 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 addresses the receipt of a credible security threat. The credibility of the threat is assessed in accordance with station procedures.

EAL #3 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 station procedures.

Emergency plans and implementing procedures are public documents; therefore, EALs should not incorporate security-sensitive information. This includes information that may be advantageous to a potential adversary, such as the particulars concerning a specific threat or threat location. Security-sensitive information should be contained in non-public documents such as the Security Plan.

Escalation of the emergency classification level uses IC HA1.

HU2

ECL: Notification of Unusual Event

Initiating Condition: Seismic event greater than OBE levels

Operating Mode Applicability: All

Emergency Action Levels:

- (1) Seismic event greater than Operating Basis Earthquake (OBE) as indicated by **ANY** of the following
 - Unit One “Seismic Peak Shock Recorder High G Level” (657-066) alarm
 - Unit Two “Seismic Instrumentation Triggered” (657-048) alarm
 - A 12.7 Hz amber light illuminated in the N/S OR E/W column on panel 1H11-P701
 - A 12.7 Hz red light illuminated in the N/S OR E/W column on panel 1H11-P701

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 plant safety.

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., typical lateral accelerations are in excess of 0.08g). The Shift Manager or emergency director may seek external verification if deemed appropriate (e.g., a call to the USGS or check internet news sources); 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 uses IC CA6 or SA9.

HU3

ECL: Notification of Unusual Event

Initiating Condition: Hazardous event.

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2 or 3 or 4 or 5)

Note: EAL #4 does not apply to routine traffic impediments such as fog, snow, ice, or vehicle breakdowns or accidents.

- (1) A tornado strike within the PROTECTED AREA (PA).
- (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.
- (3) Movement of personnel within the PROTECTED AREA (PA) is impeded due to an offsite event involving hazardous materials (e.g., an offsite chemical spill or toxic gas release).
- (4) A hazardous event that results in on-site conditions sufficient to prohibit the plant staff from accessing the site in personal vehicles.
- (5) Sustained hurricane force winds greater than 74 mph forecast to be at the plant site in the next four hours.

Basis:

PROTECTED AREA (PA): The area which encompasses all controlled areas within the security protected area fence.

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.

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

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

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 (PA).

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, or an on-site train derailment blocking the access road.

This EAL is not intended to apply to routine impediments such as fog, snow, ice, or vehicle breakdowns or accidents, but rather to more significant conditions such as the Hurricane Andrew strike on Turkey Point in 1992, the flooding around the Cooper Station during the Midwest floods of 1993, or the flooding around Ft. Calhoun Station in 2011.

EAL #5 addresses the phenomena of the hurricane based on the severe weather mitigation procedure.

Escalation of the emergency classification level is based on ICs in Recognition Categories A, F, S or C.

HU4

ECL: Notification of Unusual Event

Initiating Condition: FIRE potentially degrading the level of safety of the plant.

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2 or 3 or 4)

Note: The emergency director will declare the Unusual Event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.

- (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** Table H2 rooms or areas

- (2) a. Receipt of a single fire alarm (i.e., no other indications of a FIRE)

AND

- b. The FIRE is located within **ANY** Table H2 rooms or areas

AND

- c. The existence of a FIRE is not verified within 30-minutes of alarm receipt.

- (3) A FIRE within the plant PROTECTED AREA (PA) or ISFSI PROTECTED AREA not extinguished within 60-minutes of the initial report, alarm or indication.

- (4) A FIRE within the plant PROTECTED AREA (PA) or ISFSI PROTECTED AREA that requires firefighting support by an offsite fire response agency to extinguish.

Table H2	
Building	Rooms
Control Building	CB 147' Cable Spreading Room
	U 1/2 CB 112' Station Battery Rooms A,B
Diesel generator building	All
Primary containment	All
Reactor building	Unit 1/2 130'
	Unit 1/2 SE Diagonals (RHR)
	Unit 1/2 NE Diagonals (RHR)
	Unit 1 SW Diagonals (RCIC)
	Unit 2 NW Diagonals (RCIC)
	Unit 1/2 HPCI Rooms
Intake structure	All

Basis:

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 (PA): The area that encompasses all controlled areas within the security protected area fence.

This IC addresses the magnitude and extent of FIRES that may be indicative of a potential degradation of the level of plant safety.

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 or automatic activation of a suppression system.

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 (PA) 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 (PA).

EAL #4

If a FIRE within the plant PROTECTED AREA (PA) or ISFSI PROTECTED AREA is of sufficient size to require a response by an offsite firefighting agency, 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.

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 uses IC CA6 or SA9.

HU7

ECL: Notification of Unusual Event

Initiating Condition: Other conditions exist which in the judgment of the emergency director warrant declaration of a Notification of Unusual Event (NOUE).

Operating Mode Applicability: All

Emergency Action Levels:

- (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.

Basis:

This IC addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist which are believed by the emergency director to fall under the emergency classification level description for a NOUE.

8 SYSTEM MALFUNCTION ICS/EALS

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
SG1 Prolonged loss of all offsite and all onsite AC power to essential emergency buses. <i>Op. Modes: Power Operation, Startup, Hot Standby, Hot Shutdown</i>	SS1 Loss of all offsite and all onsite AC power to essential emergency buses for 15 minutes or longer. <i>Op. Modes: Power Operation, Startup, Hot Standby, Hot Shutdown</i>	SA1 Loss of all but one AC power source to essential emergency buses for 15 minutes or longer. <i>Op. Modes: Power Operation, Startup, Hot Standby, Hot Shutdown</i>	SU1 Loss of all offsite AC power capability to essential emergency buses for 15 minutes or longer. <i>Op. Modes: Power Operation, Startup, Hot Standby, Hot Shutdown</i>
		SA2 UNPLANNED loss of Control Room indications for 15 minutes or longer with a significant transient in progress. <i>Op. Modes: Power Operation, Startup, Hot Standby, Hot Shutdown</i>	SU2 UNPLANNED loss of Control Room indications for 15 minutes or longer. <i>Op. Modes: Power Operation, Startup, Hot Standby, Hot Shutdown</i>
			SU3 Reactor coolant activity greater than Technical Specification allowable limits. <i>Op. Modes: Power Operation, Startup, Hot Standby, Hot Shutdown</i>
			SU4 RCS leakage for 15 minutes or longer. <i>Op. Modes: Power Operation, Startup, Hot Standby, Hot Shutdown</i>
	SS5 Inability to shutdown the reactor causing a challenge to RPV water level or RCS heat removal. <i>Op. Modes: Power Operation</i>	SA5 Automatic or manual scram fails to shutdown the reactor, and subsequent manual actions taken at the reactor control consoles are not successful in shutting down the reactor. <i>Op. Modes: Power Operation</i>	SU5 Automatic or manual scram fails to shutdown the reactor. <i>Op. Modes: Power Operation</i>

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
			SU6 Loss of all onsite or offsite communications capabilities. <i>Op. Modes: Power Operation, Startup, Hot Standby, Hot Shutdown</i>
SG8 Loss of all AC and vital DC power sources for 15 minutes or longer. <i>Op. Modes: Power Operation, Startup, Hot Standby, Hot Shutdown</i>	SS8 Loss of all vital DC power for 15 minutes or longer. <i>Op. Modes: Power Operation, Startup, Hot Standby, Hot Shutdown</i>		
		SA9 Hazardous event affecting a SAFETY SYSTEM needed for the current operating mode. <i>Op. Modes: Power Operation, Startup, Hot Standby, Hot Shutdown</i>	

SG1

ECL: General Emergency

Initiating Condition: Prolonged loss of all offsite and all onsite AC power to ~~essential~~emergency buses.

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels:

Note: The emergency director will declare the General Emergency promptly upon determining that 4 hours has been exceeded, or will likely be exceeded.

- (1) a. Loss of **ALL** offsite and **ALL** onsite AC power to 4160 VAC
~~Essential~~Emergency Buses 1/2E, 1/2F, **AND** 1/2G.
- AND**
- b. **EITHER** of the following:
- Restoration of at least one AC ~~essential~~emergency bus in less than 4 hours is not likely.
 - Reactor vessel water level cannot be restored and maintained above Minimum Steam Cooling RPV Water Level.

Basis:

This IC addresses a prolonged loss of all power sources to AC ~~essential~~emergency 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 will 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~~emergency 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~~emergency 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.

SG8

ECL: General Emergency

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

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels:

Note: The emergency director will declare the General Emergency promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) a. Loss of **ALL** offsite and **ALL** onsite AC power to 4160 VAC
~~Essential~~Emergency Buses 1/2E, 1/2F, **AND** 1/2G for 15 minutes or longer.

AND

- b. Indicated voltage is less than 105/210 VDC on **ALL** 125/250 VDC Bus
1/2R22-S016 **AND** 1/2R22-S017 for 15 minutes or longer.

Basis:

This IC addresses a concurrent and prolonged loss of both AC and vital DC power. 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 loss of vital DC power compromises the ability to monitor and control SAFETY SYSTEMS. A sustained loss of both AC and DC power will lead to multiple challenges to fission product barriers.

Fifteen minutes is the threshold to exclude transient or momentary power losses. The 15-minute emergency declaration clock begins at the point when both EAL thresholds are met.

SS1

ECL: Site Area Emergency

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

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels:

Note: The emergency director will declare the Site Area Emergency promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) Loss of **ALL** offsite and **ALL** onsite AC power to 4160 VAC ~~Essential~~Emergency Buses 1/2E, 1/2F, AND 1/2G for 15 minutes or longer.

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 is a threshold to exclude transient or momentary power losses.

Escalation of the emergency classification level uses ICs RG1, FG1 or SG1.

ECL: Site Area Emergency

Initiating Condition: Inability to shutdown the reactor causing a challenge to RPV water level or RCS heat removal.

Operating Mode Applicability: Power Operation

Emergency Action Levels:

- (1) a. An automatic or manual scram 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:
 - Reactor vessel water level cannot be restored and maintained above Minimum Steam Cooling RPV Water Level
 - Exceeding the Heat Capacity Temperature Limit (HCTL) Curve (EOP Graph 2)

Basis:

This IC addresses a failure of the RPS to initiate or complete an automatic or manual reactor scram 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 warrants the declaration of a Site Area Emergency.

In some instances, the emergency classification resulting from this IC/EAL may be higher than that resulting from an assessment of the plant responses and symptoms against the Recognition Category F ICs/EALs. This is appropriate in that the Recognition Category F ICs/EALs do not address the additional threat posed by a failure to shutdown the reactor. The inclusion of this IC and EAL ensures the timely declaration of a Site Area Emergency in response to prolonged failure to shutdown the reactor.

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

Escalation of the emergency classification level uses IC RG1 or FG1.

SS8

ECL: Site Area Emergency

Initiating Condition: Loss of all vital DC power for 15 minutes or longer.

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels:

Note: The emergency director will declare the Site Area Emergency promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) Indicated voltage is less than 105/210 VDC on **ALL** 125/250 VDC Bus 1/2R22-S016 **AND** 1/2R22-S017 for 15 minutes or longer.

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 is a threshold to exclude transient or momentary power losses.

Escalation of the emergency classification level uses ICs RG1, FG1 or SG8.

SA1

ECL: Alert

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

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels:

Note: The emergency director will declare the Alert promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) a. AC power capability to 4160 VAC ~~Essential~~Emergency Buses 1/2E, 1/2F, **AND** 1/2G is reduced to a single power source (Table S1) 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.

Table S1	
Unit 1	Unit 2
Start-up Aux XFMR 1C	Start-up Aux XFMR 2C
Start-up Aux XFMR 1D	Start-up Aux XFMR 2D
Diesel Generator 1A	Diesel Generator 2A
Diesel Generator 1B	Diesel Generator 1B
Diesel Generator 1C	Diesel Generator 2C

Commented [JRB17]: RAI 13 b revision

Basis:

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.

This IC describes a significant degradation of offsite and onsite AC power sources (see Table S1) 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 ~~essential~~emergency bus. Some examples of this condition are presented below.

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

- A loss of ~~essential~~emergency power sources (e.g., onsite diesel generators) with a single train of ~~essential~~emergency buses being back-fed from an offsite power source.

Fifteen minutes is a threshold to exclude transient or momentary losses of power.

Escalation of the emergency classification level uses IC SS1.

SA2

ECL: Alert

Initiating Condition: UNPLANNED loss of Control Room indications for 15 minutes or longer with a significant transient in progress.

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels:

Note: The emergency director will declare the Alert promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) a. 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.

Reactor Power
RPV Water Level
RPV Pressure
Primary Containment Pressure
Suppression Pool Level
Suppression Pool Temperature

AND

- b. **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
 - ECCS actuation
 - Thermal power oscillations greater than 10%

Basis:

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.

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 plant safety.

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, RPV level 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 RPV water 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 is the threshold to exclude transient or momentary losses of indication.

Escalation of the emergency classification level uses ICs FS1 or IC RS1.

SA5

ECL: Alert

Initiating Condition: Automatic or manual scram fails to shutdown the reactor, and subsequent manual actions taken at the reactor control consoles are not successful in shutting down the reactor.

Operating Mode Applicability: Power Operation

Emergency Action Levels:

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.

- (1) a. An automatic or manual scram did not shutdown the reactor.

AND

- b. Manual actions taken at the reactor control consoles are not successful in shutting down the reactor.

Basis:

This IC addresses a failure of the RPS to initiate or complete an automatic or manual reactor scram 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 plant safety. 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 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 scram). 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 consoles (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.

The plant response to the failure of an automatic or manual reactor scram 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 shutdown the reactor is prolonged enough to cause a challenge to the RPV water level or RCS heat removal safety functions, the emergency classification level will escalate to a Site Area Emergency via IC SS5. Depending upon plant responses and symptoms, escalation is also possible via IC FS1. Absent the plant conditions needed to meet either IC SS5 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.

SA9

ECL: Alert

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

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels:

- (1) a. The occurrence of **ANY** of the following hazardous events:
- Seismic event (earthquake)
 - Internal or external flooding event
 - High winds (≥ 35 mph sustained) or tornado strike
 - FIRE
 - EXPLOSION
 - Other events with similar hazard characteristics as determined by the Shift Manager
- AND**
- b. **EITHER** of the following:
- 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.

Commented [JRB18]: RAI 13.a revision

Basis:

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.

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 may require a post-event inspection to determine if the attributes of an explosion are present.

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.

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.

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 plant safety.

EAL 1.a identifies hazardous events that could result in damage to plant systems. A seismic event is indicated by entry into IC HU2. Flooding is indicated by a significant increase in water levels (external or internal). High winds are indicated by sustained winds at the site meteorological tower exceeding 35 mph.

The first threshold for EAL 1.b 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 threshold for EAL 1.b 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 uses IC FS1 or RS1.

SU1

ECL: Notification of Unusual Event

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

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels:

Note: The emergency director will declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) Loss of **ALL** offsite AC power capability (Table S2) to 4160 VAC ~~Essential~~Emergency Buses 1/2E, 1/2F, **AND** 1/2G for 15 minutes or longer.

Commented [JRB19]: RAI 13 b revision

Table S2	
Unit 1	Unit 2
Start-up Aux XFMR 1C	Start-up Aux XFMR 2C
Start-up Aux XFMR 1D	Start-up Aux XFMR 2D

Basis:

This IC addresses a prolonged loss of offsite power (see Table S2 above). The loss of offsite power sources renders the plant more vulnerable to a complete loss of power to AC ~~essential~~emergency buses. This condition represents a potential reduction in the level of plant safety.

For emergency classification purposes, “capability” means that an offsite AC power source(s) is available to the ~~essential~~emergency buses, whether or not the buses are powered from it.

Fifteen minutes is the threshold to exclude transient or momentary losses of offsite power.

Escalation of the emergency classification level uses IC SA1.

SU2

ECL: Notification of Unusual Event

Initiating Condition: UNPLANNED loss of Control Room indications for 15 minutes or longer.

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels:

Note: The emergency director will declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) a. 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.

Reactor Power
RPV Water Level
RPV Pressure
Primary Containment Pressure
Suppression Pool Level
Suppression Pool Temperature

Basis:

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.

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 plant safety.

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 is reported if it significantly impairs the capability to perform emergency assessments, particularly those 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, RPV level 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 RPV water level cannot be determined from the indications and recorders on a main control board, the SPDS, or the plant computer, then the availability of other parameter values may be compromised as well.

Fifteen minutes is a threshold to exclude transient or momentary losses of indication.

Escalation of the emergency classification level uses IC SA2.

SU3

ECL: Notification of Unusual Event

Initiating Condition: Reactor coolant activity greater than Technical Specification allowable limits.

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels: (1 or 2)

Note: Use the Unit 1 or Unit 2 Pretreatment (Flow vs. mR/hr) Graphs to determine if the Pretreatment Radiation Monitor exceeds the TV of 240,000 $\mu\text{Ci/sec}$.

- (1) Pretreatment Radiation Monitor
1(2)D11K601
1(2)D11K602
reading greater than 240,000 $\mu\text{Ci/sec}$ for greater than 60 minutes.
- (2) Sample analysis indicates that the reactor coolant specific activity is **EITHER:**
 - Greater than 0.2 $\mu\text{Ci/gm}$ and less than or equal to 2.0 $\mu\text{Ci/gm}$ dose equivalent I_{131} for greater than 48 hours
 - Greater than 2.0 $\mu\text{Ci/gm}$ dose equivalent I_{131} .

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 plant safety.

Escalation of the emergency classification level uses ICs FA1 or the Recognition Category R ICs.

SU4

ECL: Notification of Unusual Event

Initiating Condition: RCS leakage for 15 minutes or longer.

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels: (1 or 2 or 3)

Note: The emergency director will declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) RCS unidentified or pressure boundary leakage greater than 10 gpm for 15 minutes or longer.
- (2) RCS identified leakage greater than 25 gpm for 15 minutes or longer.
- (3) Leakage from the RCS to a location outside containment greater than 25 gpm for 15 minutes or longer.

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 plant safety.

EAL #1 and EAL #2 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 addresses a RCS mass loss caused by an UNISOLABLE leak through an interfacing system. These EALs 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 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 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. 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 uses ICs of Recognition Category R or F.

SU5

ECL: Notification of Unusual Event

Initiating Condition: Automatic or manual scram fails to shutdown the reactor.

Operating Mode Applicability: Power Operation

Emergency Action Levels: (1 or 2)

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.

- (1) a. An automatic scram did not shutdown the reactor.

AND

- b. A subsequent manual action taken at the reactor control consoles is successful in shutting down the reactor.

- (2) a. A manual scram did not shutdown the reactor.

AND

- b. **EITHER** of the following:

- A subsequent manual action taken at the reactor control consoles is successful in shutting down the reactor.
- A subsequent automatic scram is successful in shutting down the reactor.

Basis:

This IC addresses a failure of the RPS to initiate or complete an automatic or manual reactor scram that results in a reactor shutdown, and either a subsequent operator manual action taken at the reactor control consoles or an automatic scram 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 plant safety.

Following the failure on an automatic reactor scram, operators will promptly initiate manual actions at the reactor control consoles to shutdown the reactor (e.g., initiate a manual reactor scram). 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 scram 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 scram using a different switch). Depending upon several factors, the initial or subsequent effort to manually scram the reactor, or a concurrent plant condition, may lead to the generation of an automatic reactor scram signal. If a subsequent manual or automatic scram 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 scram). 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.

The plant response to the failure of an automatic or manual reactor scram 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, and other concurrent plant conditions. 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. Depending upon the plant response, escalation is also possible via IC FA1. Absent the plant conditions needed to meet either IC SA5 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 scram signal be generated as a result of plant work (e.g., RPS setpoint testing), the following classification guidance will be applied.

- If the signal causes a plant transient that should have included an automatic reactor scram and the RPS fails to automatically shutdown the reactor, then this IC and the EALs are applicable, and will be evaluated.
- If the signal does not cause a plant transient and the scram 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.

SU6

ECL: Notification of Unusual Event

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

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels: (1 or 2 or 3)

- (1) Loss of **ALL** of the following onsite communication methods:

In plant telephones (includes hardwired and wireless)
Plant Page
Plant radio systems

- (2) Loss of **ALL** of the following ORO communications methods:

ENN (Emergency Notification Network)
Commercial phones

- (3) Loss of **ALL** of the following NRC communications methods:

ENS on Federal Telephone System (FTS) Lines
Commercial phones

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).

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

EAL #2 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 of Georgia, Appling County, Jeff Davis County, Tattnall County and Toombs County.

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

APPENDIX A – ACRONYMS AND ABBREVIATIONS

AC.....	Alternating Current
AOP.....	Abnormal Operating Procedure
ATWS.....	Anticipated Transient Without Scram
BLDG.....	Building
BWR.....	Boiling Water Reactor
CB.....	Control Building
CC.....	Cubic Centimeter
CDE.....	Committed Dose Equivalent
CFR.....	Code of Federal Regulations
CPM.....	Counts Per Minute
CPS.....	Counts Per Second
DC.....	Direct Current
DEI.....	Dose Equivalent Iodine
DW.....	Drywell
DWRRM.....	Drywell Wide Range Rad Monitor
EAL.....	Emergency Action Level
ECCS.....	Emergency Core Cooling System
ECL.....	Emergency Classification Level
ENN.....	Emergency Notification Network
ENS.....	Emergency Notification System
EPA.....	Environmental Protection Agency
EPG.....	Emergency Procedure Guideline
FAA.....	Federal Aviation Administration
FBI.....	Federal Bureau of Investigation
FEMA.....	Federal Emergency Management Agency
FSAR.....	Final Safety Analysis Report
FTS.....	Federal Telecommunications System
GE.....	General Emergency
GM.....	Gram
HCTL.....	Heat Capacity Temperature Limit
HNP.....	Hatch Nuclear Plant
HOO.....	Headquarters Operations Officer (NRC)
HPCI.....	High Pressure Coolant Injection
IC.....	Initiating Condition
ISFSI.....	Independent Spent Fuel Storage Installation
LOCA.....	Loss of Coolant Accident
MSL.....	Main Steam Line
μCi.....	micro-Curie
mR, mRem, mrem, mREM.....	milli-Roentgen Equivalent Man
NE.....	Northeast
NEI.....	Nuclear Energy Institute
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.....	Offsite Dose Calculation Manual

ORO	Off-site Response Organization
PA	Protected Area
PAG	Protective Action Guideline
PBX	Private Branch Exchange
PCIS	Primary Containment Isolation System
PRA/PSA	Probabilistic Risk Assessment / Probabilistic Safety Assessment
PSIG	Pounds per Square Inch Gauge
R	Roentgen
RCIC	Reactor Core Isolation Cooling
RCS	Reactor Coolant System
Rem, rem, REM	Roentgen Equivalent Man
RHR	Residual Heat Removal
RPS	Reactor Protection System
RPV	Reactor Pressure Vessel
RWCU	Reactor Water Cleanup
Rx	Reactor
SAG	Severe Accident Guideline
SAR	Safety Analysis Report
SC	Secondary Containment
SCBA	Self-Contained Breathing Apparatus
SE	Southeast
SEP	Separator
SFP	Spent Fuel Pool
SNC	Southern Nuclear Company
SPDS	Safety Parameter Display System
SW	Southwest
TEDE	Total Effective Dose Equivalent
TOAF	Top of Active Fuel
TV	Threshold Value
VAC	Volts Alternating Current
VDC	Volts Direct Current
VOIP	Voice Over Internet Protocol

APPENDIX B – DEFINITIONS

The following definitions are taken from Title 10, Code of Federal Regulations, and related regulatory guidance documents.

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

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

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

Notification of Unusual Event (NOUE): 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.

The following are key terms necessary for overall understanding the NEI 99-01 emergency classification scheme.

Emergency Action Level (EAL): A pre-determined, site-specific, observable threshold for an Initiating Condition that, when met or exceeded, places the plant in a given emergency classification level.

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

- General Emergency (GE)
- Site Area Emergency (SAE)
- Alert
- Notification of Unusual Event (NOUE)

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

Initiating Condition (IC): An event or condition that aligns with the definition of one of the four emergency classification levels by virtue of the potential or actual effects or consequences.

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.

CONFINEMENT BOUNDARY: The barrier(s) between areas containing radioactive substances and the environment.

CONTAINMENT INTEGRITY: Primary Containment OPERABLE per Technical Specification 3.6.1.1. Secondary Containment OPERABLE per Technical Specification 3.6.4.1

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 may 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.

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

HOSTILE ACTION: An act toward a nuclear power plant (NPP) or its personnel that includes the use of violent force to destroy equipment, take HOSTAGES, and/or intimidate the licensee to achieve an end. This includes attack by air, land, or water using guns, explosives, PROJECTILES, vehicles, or other devices used to deliver destructive force. Other acts that satisfy the overall intent may be included. HOSTILE ACTION should not be construed to include acts of civil disobedience or felonious acts that are not part of a concerted attack on the NPP. 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 (OCA)).

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.

OWNER CONTROLLED AREA (OCA): The site property owned by or otherwise under the control of HNP Security.

PROJECTILE: An object directed toward a NPP that could cause concern for its continued operability, reliability, or personnel safety.

PROTECTED AREA (PA): The area that encompasses all controlled areas within the security protected area fence.

REFUELING PATHWAY: This includes the reactor cavity, the transfer canal, and the spent fuel pool.

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.

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.

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.

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.

Southern Nuclear Operating Company
License Amendment Request for Changes to
Emergency Action Level Schemes to Adopt NEI 99-01 Rev. 6
Responses to Requests for Additional Information

VOGTLE ELECTRIC GENERATING PLANT UNITS 1 AND 2

EAL SCHEME

MARKED-UP PAGES

**VOGTLE ELECTRIC
GENERATING PLANT**

EMERGENCY ACTION LEVELS

**INITIATING CONDITIONS,
THRESHOLD VALUES,
AND BASIS**

TABLE OF CONTENTS

1	REGULATORY BACKGROUND.....	1
1.1	OPERATING REACTORS.....	1
1.2	INDEPENDENT SPENT FUEL STORAGE INSTALLATION (ISFSI).....	1
1.3	NRC ORDER EA-12-051	2
1.4	ORGANIZATION AND PRESENTATION OF INFORMATION.....	3
1.5	IC AND EAL MODE APPLICABILITY.....	3
2	GUIDANCE ON MAKING EMERGENCY CLASSIFICATIONS.....	5
2.1	GENERAL CONSIDERATIONS	5
2.2	CLASSIFICATION METHODOLOGY	6
2.3	CLASSIFICATION OF MULTIPLE EVENTS AND CONDITIONS.....	6
2.4	CONSIDERATION OF MODE CHANGES DURING CLASSIFICATION	6
2.5	CLASSIFICATION OF IMMINENT CONDITIONS	7
2.6	EMERGENCY CLASSIFICATION LEVEL UPGRADING AND DOWNGRADING	7
2.7	CLASSIFICATION OF SHORT-LIVED EVENTS	7
2.8	CLASSIFICATION OF TRANSIENT CONDITIONS.....	7
2.9	AFTER-THE-FACT DISCOVERY OF AN EMERGENCY EVENT OR CONDITION.....	8
3	ABNORMAL RAD LEVELS / RADIOLOGICAL EFFLUENT ICS/EALS	9
4	COLD SHUTDOWN / REFUELING SYSTEM MALFUNCTION ICS/EALS	26
5	INDEPENDENT SPENT FUEL STORAGE INSTALLATION (ISFSI) ICS/EALS	46
6	FISSION PRODUCT BARRIER ICS/EALS	49
7	HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY ICS/EALS	65
8	SYSTEM MALFUNCTION ICS/EALS.....	88
	APPENDIX A – ACRONYMS AND ABBREVIATIONS.....	A-1
	APPENDIX B – DEFINITIONS.....	B-1

EMERGENCY ACTION LEVELS

1 REGULATORY BACKGROUND

1.1 OPERATING REACTORS

Title 10, Code of Federal Regulations (CFR), Energy, contains the U.S. Nuclear Regulatory Commission (NRC) regulations that apply to nuclear power facilities. Several of these regulations govern various aspects of an emergency classification scheme. The relevant sections for this document are:

- 10 CFR § 50.47(a)(1)(i)
- 10 CFR § 50.47(b)(4)
- 10 CFR § 50.54(q)
- 10 CFR § 50.72(a)
- 10 CFR § 50, Appendix E, IV.B, Assessment Actions
- 10 CFR § 50, Appendix E, IV.C, Activation of Emergency Organization

These regulations are supplemented by regulatory guidance documents. Documents of particular relevance to NEI 99-01 include:

NUREG-0654/FEMA-REP-1, *Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants*, October 1980. [Refer to Appendix 1, *Emergency Action Level Guidelines for Nuclear Power Plants*]
NUREG-1022, *Event Reporting Guidelines 10 CFR § 50.72 and § 50.73*
Regulatory Guide 1.101, *Emergency Response Planning and Preparedness for Nuclear Power Reactors*

This list is not all-inclusive. It is strongly recommended that scheme developers consult with licensing and regulatory compliance personnel to identify and understand all applicable requirements and guidance. Questions also may be directed to the NEI Emergency Preparedness staff.

1.2 INDEPENDENT SPENT FUEL STORAGE INSTALLATION (ISFSI)

Selected guidance in NEI 99-01 is applicable to licensees electing to use their 10 CFR 50 emergency plan to fulfill the requirements of 10 CFR 72.32 for a stand-alone ISFSI. The emergency classification levels applicable to an ISFSI are consistent with the requirements of 10 CFR § 50 and the guidance in NUREG 0654/FEMA-REP-1. The initiating conditions germane to a 10 CFR § 72.32 emergency plan (as described in NUREG-1567) are contained within the classification scheme for a 10 CFR § 50.47 emergency plan.

The generic ICs and EALs for an ISFSI are presented in Section 5, ISFSI ICs/EALs. IC E-HU1 covers credible natural and man-made events included within the scope of an ISFSI design. This IC is not applicable to installations or facilities that process and/or repackage spent fuel. Additionally, appropriate aspects of IC HU1 and IC HA1 will also be included to address a HOSTILE ACTION directed against an ISFSI.

The analysis of potential onsite and offsite consequences of accidental releases associated with the operation of an ISFSI is contained in NUREG-1140, *A Regulatory Analysis on Emergency Preparedness for Fuel Cycle and Other Radioactive Material Licensees*. NUREG-1140 concluded that the postulated worst-case accident involving an ISFSI has insignificant consequences to public health and safety. This evaluation shows that the maximum offsite dose to a member of the public due to an accidental release of radioactive materials would not exceed 1 rem Effective Dose Equivalent.

1.3 NRC ORDER EA-12-051

The Fukushima Daiichi accident of March 11, 2011, was the result of a tsunami that exceeded the plant's design basis and flooded the site's emergency electrical power supplies and distribution systems. This caused an extended loss of power that severely compromised the key safety functions of core cooling and containment integrity, ultimately leading to core damage in three reactors. Although the loss of power also impaired the spent fuel pool cooling function, sufficient water inventory was maintained in the pools to prevent fuel damage from the loss of cooling.

Following a review of the Fukushima Daiichi accident, the NRC concluded that measures were necessary to ensure adequate protection of public health and safety under the provisions of the backfit rule, 10 CFR 50.109(a)(4)(ii). One such measure was that each spent fuel pool be provided with reliable level instrumentation to significantly enhance the ability of key decision-makers to effectively allocate resources following a beyond design basis event. To this end, the NRC issued Order EA-12-051, *Issuance of Order to Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation*, on March 12, 2012, to all US nuclear plants with an operating license, construction permit, or combined construction and operating license.

NRC Order EA-12-051 states, in part, "All licensees ... shall have a reliable indication of the water level in associated spent fuel storage pools capable of supporting identification of the following pool water level conditions by trained personnel: (1) level that is adequate to support operation of the normal fuel pool cooling system, (2) level that is adequate to provide substantial radiation shielding for a person standing on the spent fuel pool operating deck, and (3) level where fuel remains covered and actions to implement make-up water addition should no longer be deferred." All licensees must therefore provide:

- A primary and back-up level instrument that will monitor water level from the normal level to the top of the used fuel rack in the pool.
- A display in an area accessible following a severe event.
- Independent electrical power to each instrument channel and an alternate remote power connection capability.

NEI 12-02, *Industry Guidance for Compliance with NRC Order EA-12-051, "To Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation"*, provides guidance for complying with NRC Order EA-12-051.

NEI 99-01, Revision 6, includes three EALs that reflect the availability of the enhanced spent fuel pool level instrumentation associated with NRC Order EA-12-051. These

EALs are included within existing IC RA2, and new ICs RS2 and RG2. Associated EAL notes, bases and developer notes are also provided.

It is recommended that these EALs be implemented when the enhanced spent fuel pool level instrumentation is available for use.

The regulatory process that licensees follow to make changes to their emergency plan, including non-scheme changes to EALs, is 10 CFR 50.54(q). Licensees are responsible for evaluating a proposed change and determining whether or not it results in a reduction in the plan's effectiveness. Based on this determination, the licensee will either make the change or submit it to the NRC for prior review and approval in accordance with 10 CFR 50.90.

1.4 ORGANIZATION AND PRESENTATION OF INFORMATION

The scheme's information is organized by Recognition Category in the following order.

- R - Abnormal Radiation Levels / Radiological Effluent
- C - Cold Shutdown / Refueling System Malfunction
- E - Independent Spent Fuel Storage Installation (ISFSI)
- F - Fission Product Barrier
- H - Hazards and Other Conditions Affecting Plant Safety
- S - System Malfunction

1.5 IC AND EAL MODE APPLICABILITY

The following table shows Recognition Categories applicable in each plant mode. The ICs and EALs for a given Recognition Category are applicable in the indicated modes.

MODE APPLICABILITY MATRIX

Mode	Category					
	R	C	E	F	H	S
Power Operations	X		X	X	X	X
Startup	X		X	X	X	X
Hot Standby	X		X	X	X	X
Hot Shutdown	X		X	X	X	X
Cold Shutdown	X	X	X		X	
Refueling	X	X	X		X	
Defueled	X	X	X		X	

Vogtle Units 1 and 2 Technical Specifications Table 1.1-1 provides the following operating mode definitions:

Mode	Title	Reactivity Condition (K_{eff})	% Rated Thermal Power ^(a)	Average RCS Temperature (°F)
1	Power Operation	≥ 0.99	> 5	NA
2	Startup	≥ 0.99	≤ 5	NA
3	Hot Standby	< 0.99	NA	≥ 350
4	Hot Shutdown ^(b)	< 0.99	NA	$350 > T_{avg} > 200$
5	Cold Shutdown ^(b)	< 0.99	NA	≤ 200
6	Refueling ^(c)	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 identified modes, "Defueled" is also applicable to the Vogtle EAL scheme, consistent with NEI 99-01 guidance. Defueled is a 'No Mode' condition where all of the fuel has been removed from the reactor vessel (i.e., full core offload during refueling or extended outages).

These modes are used throughout the Vogtle EALs with no modifications from NEI 99-01. When a unit is defueled, the Initiating Conditions designated as Mode Condition "ALL" or "Defueled" are applicable.

2 GUIDANCE ON MAKING EMERGENCY CLASSIFICATIONS

2.1 GENERAL CONSIDERATIONS

For any emergency classification, the emergency director must consider all information having a bearing on the proper assessment of an Initiating Condition (IC). This includes the emergency action level (EAL), the associated operating mode applicability, notes and the informing basis information. In the recognition category F matrices, EALs are referred to as fission product barrier thresholds; the thresholds serve the same function as an EAL.

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*.

All emergency classification assessments will be based on valid indications, reports or conditions. A valid indication, report, or condition, has been verified using appropriate means, leaving no doubt regarding the indicator's operability, the condition's existence, or the report's accuracy. For example, validation could be an instrument channel check, response on related or redundant indicators, or direct observation by plant personnel. Indications will be validated in a manner that supports timely emergency declaration.

For ICs and EALs that have a stipulated time duration, the emergency director will not wait until the applicable time has elapsed, but will 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 will be assumed that the release duration specified in the IC/EAL has been exceeded, absent data to the contrary.

A planned work activity resulting in an expected event or condition that 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 such cases, the controls associated with the planning, preparation and execution of the work will ensure compliance with the operating license is maintained, provided 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.

Some EALs are assessed based on the results of analyses necessary to ascertain whether a specific EAL threshold has been exceeded. The EAL and/or the associated basis discussion will identify the necessary analysis. 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.

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

2.2 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. An EAL(s) evaluation must be consistent with the related Operating Mode Applicability and Notes. If an EAL has been met or exceeded, the IC is met and the associated ECL is declared in accordance with plant procedures.

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.

2.3 CLASSIFICATION OF MULTIPLE EVENTS AND CONDITIONS

In the event of multiple emergencies or conditions, the user will identify all EALs met or exceeded. The highest applicable ECL identified during this review is declared. For example:

If an Alert EAL and a Site Area Emergency EAL are met, a Site Area Emergency should be declared.

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

If two Alert EALs are met, an Alert will be declared.

Related guidance for 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*.

2.4 CONSIDERATION OF MODE CHANGES DURING CLASSIFICATION

The mode in effect at the time an event or condition occurred, and prior to any plant or operator response, determines whether 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.*

Commented [JRB1]: RAI 1 revision

2.5 CLASSIFICATION OF IMMINENT CONDITIONS

Although EALs provide specific thresholds, the emergency director must remain alert to events or conditions that could lead to meeting or exceeding an EAL within a relatively short period of time (i.e., a change in the ECL is IMMINENT). If, in the judgment of the emergency director, meeting an EAL is IMMINENT, the emergency classification will be made as though 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.

2.6 EMERGENCY CLASSIFICATION LEVEL UPGRADING AND DOWNGRADING

SNC policy is that once an emergency classification is made, it cannot be downgraded to a lower classification. Termination criteria contained in procedure NMP-EP-110, Emergency Classification and Initial Actions shall be completed for an event to be terminated. At termination, on an event specific basis, the site enter either normal operating conditions or a recovery condition with a recovery organization established for turnover from the ERO. Guidance concerning classification of rapidly escalating events or conditions is provided in RIS 2007-02.

2.7 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 end 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. For example an earthquake, or failure of the reactor protection system to automatically scram/trip the reactor followed by a successful manual scram/trip.

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2.8 CLASSIFICATION OF TRANSIENT CONDITIONS

Many of the ICs and EALs in this document employ time-based criteria that require 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, some transient conditions may cause an EAL to be met for a brief period of time. The following guidance should be applied to the classification of these conditions.

EAL momentarily met during expected plant response - When 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. This example presents an illustration:

An ATWS occurs and the auxiliary feedwater system fails to automatically start. Steam generator levels rapidly decrease and the plant enters an inadequate RCS heat removal condition (a potential loss of both the fuel clad and RCS barriers). If an operator manually starts the auxiliary feedwater system in accordance with an EOP step and clears the inadequate RCS heat removal condition prior to an emergency declaration, then the classification will be based on the ATWS only.

It is important to stress that the 15-minute emergency classification assessment period 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 where an operator is able to take a successful corrective action prior to the emergency director completing the review and steps necessary to make the emergency declaration. This provision is included to ensure that any public protective actions resulting from the emergency classification are truly warranted by the plant conditions.

2.9 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. Personnel could discover an event or condition existed that met an EAL, but no emergency was declared, and the event or condition no longer exists at the time of discovery. It may be the event or condition was not recognized at the time, or there was an error in the emergency classification process.

In these cases, no emergency declaration is warranted, but the guidance in NUREG-1022 is applicable. Specifically, the event will be reported to the NRC in accordance with 10 CFR § 50.72 within one hour of the discovery of the undeclared event or condition. The licensee will also notify appropriate state and local agencies in accordance with the agreed upon arrangements.

3 ABNORMAL RAD LEVELS / RADIOLOGICAL EFFLUENT ICS/EALS

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
RG1 Release of gaseous radioactivity resulting in offsite dose greater than 1,000 mrem TEDE or 5,000 mrem thyroid CDE. <i>Op. Modes: All</i>	RS1 Release of gaseous radioactivity resulting in offsite dose greater than 100 mrem TEDE or 500 mrem thyroid CDE. <i>Op. Modes: All</i>	RA1 Release of gaseous or liquid radioactivity resulting in offsite dose greater than 10 mrem TEDE or 50 mrem thyroid CDE. <i>Op. Modes: All</i>	RU1 Release of gaseous or liquid radioactivity greater than 2 times the ODCM limits for 60 minutes or longer. <i>Op. Modes: All</i>
RG2 Spent fuel pool level cannot be restored to at least 194 195 foot level (Level 3) for 60 minutes or longer. <i>Op. Modes: All</i>	RS2 Spent fuel pool level at 194-195 foot level (Level 3). <i>Op. Modes: All</i>	RA2 Significant lowering of water level above, or damage to, irradiated fuel. <i>Op. Modes: All</i>	RU2 UNPLANNED loss of water level above irradiated fuel. <i>Op. Modes: All</i>
		RA3 Radiation levels that impede access to equipment necessary for normal plant operations, cooldown or shutdown. <i>Op. Modes: All</i>	

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RG1

ECL: General Emergency

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

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2 or 3)

Notes:

- The emergency director will declare the General 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 will be used for emergency classification assessments until the results from a dose assessment using actual meteorology are available.

- (1) Reading on ANY of the following radiation monitors greater than the reading shown for 15 minutes or longer:

Plant Vent RE-12444E	50 $\mu\text{Ci/cc}$
Turbine Building Vent (SJAE) RE-12839E	$2.1 \times 10^3 \mu\text{Ci/cc}$

- (2) Dose assessment using actual meteorology indicates doses greater than 1,000 mrem TEDE or 5,000 mrem thyroid CDE at or beyond the site boundary.
- (3) Field survey results indicate **EITHER** of the following at or beyond the site boundary:
- Closed window dose rates greater than 1,000 mR/hr expected to continue for 60 minutes or longer.
 - Analyses of field survey samples indicate thyroid CDE greater than 5,000 mrem for one hour of inhalation.

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 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 monitor reading threshold values are

determined using a dose assessment method that back calculates from the dose values specified in the IC. The meteorology and source term (noble gases, particulates, and halogens) used are the same as those used to determine the monitor reading threshold values in ICs RS1 and RA1. This protocol will maintain intervals between the threshold values for the three classifications. Since doses are generally not monitored in real-time, a release duration of one hour is assumed, and the threshold values are based on a site boundary (or beyond) dose of 1000 mR/hour whole body or 5000 mR/hour thyroid, whichever is more limiting.

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.

RG2

ECL: General Emergency

Initiating Condition: Spent fuel pool level cannot be restored to at least ~~194-195~~ foot level ~~(Level 3)~~ for 60 minutes or longer.

Operating Mode Applicability: All

Emergency Action Levels:

Note: The emergency director will declare the General Emergency promptly upon determining that 60 minutes has been exceeded, or will likely be exceeded.

- (1) Spent fuel pool level cannot be restored to at least ~~194-195~~ foot level ~~(Level 3)~~ for 60 minutes or longer.

Basis:

This IC addresses a significant loss of spent fuel pool inventory control and makeup capability leading to a prolonged uncover of spent fuel. The spent fuel pool level instrument is located outside the control room but in close proximity. 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.

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RS1

ECL: Site Area Emergency

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

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2 or 3)

Notes:

- The emergency director will 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 will be used for emergency classification assessments until the results from a dose assessment using actual meteorology are available.

- (1) Reading on ANY of the following radiation monitors greater than the reading shown for 15 minutes or longer:

Plant Vent RE-12444E	5.0 $\mu\text{Ci/cc}$
Turbine Building Vent (SJAE) RE-12839E	2.1 x 10 ² $\mu\text{Ci/cc}$

- (2) Dose assessment using actual meteorology indicates doses greater than 100 mrem TEDE or 500 mrem thyroid CDE at or beyond the site boundary.
- (3) Field survey results indicate **EITHER** of the following at or beyond the site boundary:
- Closed window dose rates greater than 100 mR/hr expected to continue for 60 minutes or longer.
 - Analyses of field survey samples indicate thyroid CDE greater than 500 mrem for one hour of inhalation.

Basis:

This IC addresses a release of gaseous radioactivity that results in projected or actual offsite doses greater than or equal to 10 percent 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 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 monitor reading threshold values are

determined using a dose assessment method that back calculates from the dose values specified in the IC. The meteorology and source term (noble gases, particulates, and halogens) used is the same as those used to determine the monitor reading threshold values in ICs RG1 and RA1. This protocol maintains intervals between the threshold values for the three classifications. Since doses are generally not monitored in real-time, a release duration of one hour is assumed, and the threshold values are based on a site boundary (or beyond) dose of 100 mR/hour whole body or 500 mR/hour thyroid, whichever is more limiting.

The TEDE dose is set at 10 percent 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 uses IC RG1.

RS2

ECL: Site Area Emergency

Initiating Condition: Spent fuel pool level at ~~194-195~~ foot level ~~(Level 3)~~.

Operating Mode Applicability: All

Emergency Action Levels:

- (1) Lowering of spent fuel pool level to ~~194-195~~ foot level ~~(Level 3)~~.

Basis:

This IC addresses a significant loss of spent fuel pool inventory control and makeup capability leading to IMMINENT fuel damage. The spent fuel pool level instrument is located outside the control room but in close proximity. This condition stems from major failures of plant functions needed to protect the public that 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 uses IC RG1 or RG2.

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RA1

ECL: Alert

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

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2 or 3 or 4)

Notes:

- The emergency director will 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 will be used for emergency classification assessments until the results from a dose assessment using actual meteorology are available.

- (1) Reading on ANY of the following radiation monitors greater than the reading shown for 15 minutes or longer:

Plant Vent RE-12444E	0.50 $\mu\text{Ci/cc}$
Turbine Building Vent (SJAE) RE-12839D	$2.1 \times 10^4 \mu\text{Ci/cc}$

- (2) Dose assessment using actual meteorology indicates doses greater than 10 mrem TEDE or 50 mrem thyroid CDE at or beyond the site boundary.
- (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 the site boundary for one hour of exposure.
- (4) Field survey results indicate **EITHER** of the following at or beyond the site boundary:
- 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.

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 percent 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 plant safety as indicated by a radiological release that significantly exceeds regulatory limits (e.g., a significant uncontrolled release).

Radiological effluent EALs are 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 monitor reading threshold values are determined using a dose assessment method that back calculates from the dose values specified in the IC. The meteorology and source term (noble gases, particulates, and halogens) used is the same as those used to determine the monitor reading threshold values in ICs RG1 and RS1. This protocol maintains intervals between the threshold values for the three classifications. Since doses are generally not monitored in real-time, a release duration of one hour is assumed, and the threshold values are based on a site boundary (or beyond) dose of 10 mR/hour whole body or 50 mR/hour thyroid, whichever is more limiting.

The TEDE dose is set at 1 percent 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 uses IC RS1.

RA2

ECL: Alert

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

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2 or 3)

- (1) Uncovery of irradiated fuel in the REFUELING PATHWAY.
- (2) Damage to irradiated fuel resulting in a release of radioactivity from the fuel as indicated by a **HIGH Alarm** on **ANY** of the following radiation monitors:

Fuel Handling Building RE-008
CNMT BLDG Low Range** RE-002/003 **Mode 6 only during fuel movement
Fuel Handling BLDG EFFL. ARE-2532 A/B
Fuel Handling BLDG EFFL. ARE-2533 A/B

- (3) Lowering of spent fuel pool level to 204 feet (Level 2).

Basis:

REFUELING PATHWAY: This includes the reactor refuel cavity the fuel transfer canal, and the spent fuel pool, canals and pools through which irradiated fuel may be moved, but not including the reactor vessel.

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 plant safety. The spent fuel pool level instrument is located outside the control room but in close proximity.

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 is based on either Recognition Category R or C ICs.

EAL #1

This EAL escalates from RU2. 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), 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 will be based on the totality of available indications, reports and observations.

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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 the fuel is actually uncovered. To the degree possible, readings will be considered in combination with other available indications of inventory loss.

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

EAL #2

This EAL addresses a release of radioactive material caused by mechanical damage to irradiated fuel. Damaging events may include the dropping, bumping or binding of an assembly, or dropping a heavy load onto an assembly. A rise in readings on radiation monitors will 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 is a precursor to a loss of the ability to adequately cool the irradiated fuel assemblies stored in the pool.

Escalation of the emergency classification level uses ICs RS1 or RS2.

RA3

ECL: Alert

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

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2)

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.

- (1) Dose rate greater than 15 mR/hr in **ANY** of the following areas:
 - Control Room (RE-001)
 - Central Alarm Station (Survey Only)
- (2) An UNPLANNED event results in radiation levels that prohibit or impede access to any Table H1 plant rooms or areas:

Table H1		
Building	Room Number	Applicable Mode
Control Building	1CB-226, 1CB-A45, 2CB-223, 2CB-A22	3
	1CB-A77, 1CB-B61, 1CB-B76, 1CB-B79 2CB-A79, 2CB-B01 2CB-B04, 2CB-B18	3
	1CB-226, 1CB-A45 1CB-B84, 2CB-B85 2CB-223, 2CB-A22	4
	1CB-A48, 1CB-A50 2CB-A15, 2CB-A16	4
	AFW Pump Operation and standby Readiness	1, 2, 3
Auxiliary Building	1AB-A28, 2AB-A72 A-level demin vessel valve galleries	1, 2, 3
	1AB-A24, 2AB-A77	3
	1AB-A08, 2AB-A101	3
	1AB-C85, 1AB-C89 2AB-C38, 2AB-C44	4
	1AB-B15 MEZZ 1AB-B19 MEZZ 2AB-B117 MEZZ 2AB-B119 MEZZ	4

Basis:

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.

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 plant safety. The emergency director 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 will 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 uses Recognition Category R, C or F ICs.

RU1

ECL: Notification of Unusual Event

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

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2 or 3)

Notes:

- The emergency director will declare the Unusual Event promptly upon determining that 60 minutes has been exceeded, or will likely be exceeded.
- If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded 60 minutes.
- If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is no longer valid for classification purposes.

- (1) Reading on **ANY** of the following effluent radiation monitor greater than 2 times the ODCM limits for 60 minutes or longer:

SG Blowdown Effluent Line (RE-0021)	2 x release permit setpoint
Turbine Building Drain Effluent Line (RE-0848)	2 x release permit setpoint
Turbine Building Vent, SJA (RE-12839)	2 x release permit setpoint
Plant Vent (RE-12442C)	2 x release permit setpoint
Plant Vent (RE-12444C)	2 x release permit setpoint
Turbine Building Vent, SJA (RE-12839C)	
No Confirmed Primary-Secondary Leakage	$1.6 \times 10^{-3} \mu\text{Ci/cc}$
Confirmed Primary-Secondary Leakage	2 x release permit setpoint

- (2) Reading on **ANY** of the following effluent radiation monitor greater than 2 times the alarm setpoint established by a current radioactivity discharge permit for 60 minutes or longer.

Liquid Radwaste Effluent Line (RE-0018)	2 x release permit setpoint
Waste Gas Process Effluent Line (ARE-0014)	2 x release permit setpoint

- (3) Sample analysis for a gaseous or liquid release indicates a concentration or release rate greater than 2 times the ODCM limits for 60 minutes or longer.

Basis:

This IC addresses a potential decrease in the level of plant safety 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 unmonitored, including those for which a radioactivity discharge permit is normally prepared.

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

Radiological effluent EALs are 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 will 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 uses IC RA1.

RU2

ECL: Notification of Unusual Event

Initiating Condition: UNPLANNED loss of water level above irradiated fuel.

Operating Mode Applicability: All

Emergency Action Levels:

- (1) a. UNPLANNED water level drop in the REFUELING PATHWAY as indicated by ANY of the following:

Personnel report of low water level
LSHL-0625 off-scale SFP low level Alarm (ALB05 E02)

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AND

- b. UNPLANNED rise in area radiation levels as indicated by ANY of the following radiation monitors.

RE-0008 in the spent fuel pool building
RE-0002, -0003, -0004 in containment *
RE-0011 at the seal table *
RE-0005, -0006 in containment *
* Not applicable in Modes 1-4

Basis:

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: This includes the reactor refuel cavity the fuel transfer canal, and the spent fuel pool, canals and pools through which irradiated fuel may be moved, but not including the reactor vessel.

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

A water level decrease will be primarily determined by indications from available level instrumentation. Other sources of level indications 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 will 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 uses IC RA2.

4 COLD SHUTDOWN / REFUELING SYSTEM MALFUNCTION ICS/EALS

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
CG1 Loss of RPV inventory affecting fuel clad integrity with containment challenged. <i>Op. Modes: Cold Shutdown, Refueling</i>	CS1 Loss of RPV inventory affecting core decay heat removal capability. <i>Op. Modes: Cold Shutdown, Refueling</i>	CA1 Loss of RPV inventory. <i>Op. Modes: Cold Shutdown, Refueling</i>	CU1 UNPLANNED loss of RPV inventory for 15 minutes or longer. <i>Op. Modes: Cold Shutdown, Refueling</i>
		CA2 Loss of all offsite and all onsite AC power to emergency buses for 15 minutes or longer. <i>Op. Modes: Cold Shutdown, Refueling, Defueled</i>	CU2 Loss of all but one AC power source to emergency buses for 15 minutes or longer. <i>Op. Modes: Cold Shutdown, Refueling, Defueled</i>
		CA3 Inability to maintain the plant in cold shutdown. <i>Op. Modes: Cold Shutdown, Refueling</i>	CU3 UNPLANNED increase in RCS temperature. <i>Op. Modes: Cold Shutdown, Refueling</i>
			CU4 Loss of Vital DC power for 15 minutes or longer. <i>Op. Modes: Cold Shutdown, Refueling</i>
			CU5 Loss of all onsite or offsite communications capabilities. <i>Op. Modes: Cold Shutdown, Refueling, Defueled</i>
		CA6 Hazardous event affecting a SAFETY SYSTEM needed for the current operating mode. <i>Op. Modes: Cold Shutdown, Refueling</i>	

CG1

ECL: General Emergency

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

Operating Mode Applicability: Cold Shutdown, Refueling

Emergency Action Levels: (1 or 2)

Note: The emergency director will declare the General Emergency promptly upon determining that 30 minutes has been exceeded, or will likely be exceeded.

- (1) a. RPV level less than 181'-10" [TOAF] (63% on RVLIS full range) for 30 minutes or longer.

AND

- b. **ANY** indication from the Containment Challenge Table C1.

- (2) a. RPV level cannot be monitored for 30 minutes or longer.

AND

- b. Core uncover is indicated by **ANY** of the following:

RE-005 OR 006	≥ 40 REM/hr
Erratic Source Range monitor indication	
UNPLANNED increase in Containment Sump, Reactor Coolant Drain Tank (RCDT) or Waste Holdup Tanks (WHT) levels of sufficient magnitude to indicate core uncover	

AND

- c. **ANY** indication from the Containment Challenge Table C1.

Containment Challenge Table C1
CONTAINMENT CLOSURE NOT established*
Explosive mixture inside containment - greater than OR equal to 6% H ₂
UNPLANNED increase in containment pressure
* If CONTAINMENT CLOSURE is re-established prior to exceeding the 30 minute time limit, then declaration of a General Emergency is not required.

Commented [JRB14]: RAI 11 revision

Basis:

CONTAINMENT CLOSURE: Per Operating Procedure 14210-1/2, Containment Building Penetrations Verification – Refueling

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.

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

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

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

~~The site specific pressure at which CONTAINMENT is considered challenged may change based on the condition of the CONTAINMENT. If the Unit is in the cold shutdown mode and the CONTAINMENT is fully intact then the site specific set point is the CONTAINMENT design pressure (52 psig). This is consistent with typical owner's groups Emergency Response Procedures. With CONTAINMENT CLOSURE established intentionally by the plant staff in preparations for inspection, maintenance, or refueling the set point is based on the penetration seals design of 13 psig.~~

Commented [JRB15]: RAI 11 revision

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 uncover event, it is unlikely that hydrogen buildup due to a core uncover 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 containment is challenged.

In EAL 1.a, RVLIS is used to determine when reactor water level is less than TOAF. RVLIS indication is only available during Mode 5 up to the point of reactor head disassembly prior to Mode 6 entry. Once RVLIS becomes unavailable classification of IC CGI is accomplished in accordance with EAL 2.

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

The inability to monitor RPV 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 indicate leakage from the RPV.

These EALs address 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*.

CS1

ECL: Site Area Emergency

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

Operating Mode Applicability: Cold Shutdown, Refueling

Emergency Action Levels: (1 or 2 or 3)

Note: The emergency director will declare the Site Area Emergency promptly upon determining that 30 minutes has been exceeded, or will likely be exceeded.

- (1) a. CONTAINMENT CLOSURE not established.
- AND**
- b. RPV level less than 185'-4" [6" below Bottom ID of loop] (72% on Full Range RVLIS).

- (2) a. CONTAINMENT CLOSURE established.
- AND**
- b. RPV level less than 181'-10" [TOAF] (63% on RVLIS full range).

- (3) a. RPV level cannot be monitored for 30 minutes or longer.
- AND**
- b. Core uncover is indicated by **ANY** of the following:

RE-005 OR 006	≥ 40 REM/hr
Erratic Source Range monitor indication	
UNPLANNED increase in Containment Sump, Reactor Coolant Drain Tank (RCDT) or Waste Holdup Tanks (WHT) levels of sufficient magnitude to indicate core uncover	

Basis:

CONTAINMENT CLOSURE: Per Operating Procedure 14210-1/2, Containment Building Penetrations Verification – Refueling

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.

This IC addresses a significant and prolonged loss of RPV 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 to protect the public and warrant a Site Area Emergency declaration.

Following an extended loss of core decay heat removal and inventory makeup, decay heat will cause

reactor coolant boiling and a further reduction in reactor vessel level. If RCS/reactor vessel level cannot be restored, fuel damage is probable.

In EALs 1.a and 2.a the specified levels represent reactor vessel levels that are lower than the monitoring capability of RCS level instrumentation and therefore must be monitored using RVLIS. This level will only be observable in Mode 5 with RVLIS in operation. In Mode 6 or when RVLIS is not in operation the IC should be evaluated using EAL 3.

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 reflects that with CONTAINMENT CLOSURE established, there is a lower probability of a fission product release to the environment.

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

The inability to monitor RPV 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 indicate leakage from the RPV.

These EALs address 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 uses IC CG1 or RG1.

CA1

ECL: Alert

Initiating Condition: Loss of RPV inventory.

Operating Mode Applicability: Cold Shutdown, Refueling

Emergency Action Levels: (1 or 2)

Note: The emergency director will declare the Alert promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

(1) Loss of RPV inventory as indicated by level less than elevation 185'-10" (73% on Full Range RVLIS).

(2) a. RPV level cannot be monitored for 15 minutes or longer

AND

b. UNPLANNED increase in Containment sump, Reactor Coolant Drain Tank (RCDT) or Waste Holdup Tank (WHT) levels due to a loss of RPV inventory.

Basis:

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.

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 the bottom ID of the RCS Loop setpoint (187' 6") indicates that operator actions have not been successful in restoring and maintaining RPV water level. The 187' 6" level specified in the EAL is the minimum RCS level for RHR operation as outlined in the procedure for mid-loop operations. Below this level, loss of RHR pump net positive suction head (NPSH) may occur resulting in a loss of decay heat removal capability. 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 uncover.

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 EAL #2, the inability to monitor RPV 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 indicate leakage from the RPV.

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 RPV inventory level continues to lower, then escalation to Site Area Emergency uses IC CS1.

CA2

ECL: Alert

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

Operating Mode Applicability: Cold Shutdown, Refueling, Defueled

Emergency Action Levels:

Note: The emergency director will declare the Alert promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) Loss of **ALL** offsite and **ALL** onsite AC Power (Table S1) to **BOTH** 1(2)AA02 **AND** 1(2)BA03 for 15 minutes or longer.

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Table S1	
Unit 1	Unit 2
Unit Auxiliary Transformer 1NXAA	Unit Auxiliary Transformer 2NXAA
Unit Auxiliary Transformer 1NXAB	Unit Auxiliary Transformer 2NXAB
Reserve Auxiliary Transformer 1NXRA	Reserve Auxiliary Transformer 2NXRA
Reserve Auxiliary Transformer 1NXRB	Reserve Auxiliary Transformer 2NXRB
Diesel Generator 1A	Diesel Generator 2A
Diesel Generator 1B	Diesel Generator 2B
Standby Auxiliary Transformer ANXRA	Standby Auxiliary Transformer ANXRA

Basis:

This IC addresses a total loss of AC power (see Table S1 above) 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 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. When in these modes, this condition represents an actual or potential substantial degradation of the level of plant safety.

Fifteen minutes is the threshold to exclude transient or momentary power losses.

Escalation of the emergency classification level uses IC CS1 or RS1.

CA3

ECL: Alert

Initiating Condition: Inability to maintain the plant in cold shutdown.

Operating Mode Applicability: Cold Shutdown, Refueling

Emergency Action Levels: (1 or 2)

Note: The emergency director will declare the Alert promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.

- (1) UNPLANNED increase in RCS temperature to greater than 200 °F for greater than the duration specified in the following table.

Table C2: RCS Heat-up Duration Thresholds		
RCS Status	Containment Closure Status	Heat-up Duration
Not Intact (or at reduced inventory)	Not Established	0 minutes
	Established	20 minutes*
Intact (but not at reduced inventory)	Not applicable	60 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.		

- (2) UNPLANNED RCS pressure increase greater than 10 psig. (This EAL does not apply during water-solid plant conditions.)

Basis:

CONTAINMENT CLOSURE: Per Operating Procedure 14210-1/2, Containment Building Penetrations Verification – Refueling

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.

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 plant safety.

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 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. In this case, 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 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.

Finally, 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 will allow sufficient time to address the temperature increase without a substantial degradation in plant safety.

EAL #2 provides a pressure-based indication of RCS heat-up.

Escalation of the emergency classification level uses IC CS1 or RS1.

CA6

ECL: Alert

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

Operating Mode Applicability: Cold Shutdown, Refueling

Emergency Action Levels:

- (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
 - Other events with similar hazard characteristics as determined by the Shift Manager
- AND**
- b. **EITHER** of the following:
- 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.

Basis:

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 may 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.

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.

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.

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 plant safety.

The first threshold for EAL 1.b 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 will be significant enough to cause concern regarding the operability or reliability of the SAFETY SYSTEM train.

The second threshold for EAL 1.b 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 all 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 uses IC CS1 or RS1.

CU1

ECL: Notification of Unusual Event

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

Operating Mode Applicability: Cold Shutdown, Refueling

Emergency Action Levels: (1 or 2)

Note: The emergency director will declare the Alert promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

(1) UNPLANNED loss of reactor coolant results in RPV level less than a required lower limit for 15 minutes or longer.

(2) a. RPV level cannot be monitored.

AND

b. UNPLANNED increase in Containment sump, Reactor Coolant Drain Tank (RCDT), or Waste Holdup Tank (WHT) levels.

Basis:

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.

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 RPV level concurrent with indications of coolant leakage. Either of these conditions is considered to be a potential degradation of the level of plant safety.

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 RPV 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 RPV 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 indicate leakage from the RPV.

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

CU2

ECL: Notification of Unusual Event

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

Operating Mode Applicability: Cold Shutdown, Refueling, Defueled

Emergency Action Levels:

Note: The emergency director will declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) a. AC power capability to **BOTH** 1(2)AA02 **AND** 1(2)BA03 is reduced to a single power source (Table S1) for 15 minutes or longer.

AND

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

Table S1	
Unit 1	Unit 2
Unit Auxiliary Transformer 1NXAA	Unit Auxiliary Transformer 2NXAA
Unit Auxiliary Transformer 1NXAB	Unit Auxiliary Transformer 2NXAB
Reserve Auxiliary Transformer 1NXRA	Reserve Auxiliary Transformer 2NXRA
Reserve Auxiliary Transformer 1NXRB	Reserve Auxiliary Transformer 2NXRB
Diesel Generator 1A	Diesel Generator 2A
Diesel Generator 1B	Diesel Generator 2B
Standby Auxiliary Transformer ANXRA	Standby Auxiliary Transformer ANXRA

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Basis:

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.

This IC describes a significant degradation of offsite and onsite AC power sources (see Table S1 above) where any additional single failure would result in a loss of all AC power to SAFETY SYSTEMS. In this condition, the sole AC power source may be powering one, or more than one, train of safety-related equipment.

When in the cold shutdown, refueling, or defueled mode, this condition is not classified as an Alert because of the increased 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. When in these modes, this condition is considered to be a potential degradation of the level of plant safety.

An "AC power source" is a source recognized in AOPs and EOPs, and capable of supplying required power to an emergency bus. Examples of this condition include:

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

Fifteen minutes is the 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.

CU3

ECL: Notification of Unusual Event

Initiating Condition: UNPLANNED increase in RCS temperature.

Operating Mode Applicability: Cold Shutdown, Refueling

Emergency Action Levels: (1 or 2)

Note: The emergency director will declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) UNPLANNED increase in RCS temperature to greater than 200 °F.
- (2) Loss of ALL RCS temperature and RPV level indication for 15 minutes or longer.

Basis:

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.

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, represents a potential degradation of the level of plant safety. If the RCS is not intact and CONTAINMENT CLOSURE is not established during this event, the emergency director will 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, where 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 reflects a condition where there has been a significant loss of instrumentation capability necessary to monitor RCS conditions and operators are 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 is the threshold to exclude transient or momentary losses of indication.

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

CU4

ECL: Notification of Unusual Event

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

Operating Mode Applicability: Cold Shutdown, Refueling

Emergency Action Levels:

Note: The emergency director will declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) Indicated voltage is less than 105 VDC on required 125 VDC buses 1(2)AD1, 1(2)BD1, 1(2)CD1, 1(2)DD1 for 15 minutes or longer.

Basis:

This IC addresses a loss of vital DC power that 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. This condition is considered to be a potential degradation of the level of plant safety.

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 is the threshold to exclude transient or momentary power losses.

Depending upon the event, escalation of the emergency classification level uses IC CA1 or CA3, or an IC in Recognition Category R.

CU5

ECL: Notification of Unusual Event

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

Operating Mode Applicability: Cold Shutdown, Refueling, Defueled

Emergency Action Levels: (1 or 2 or 3)

- (1) Loss of **ALL** of the following onsite communication methods:

In plant telephones
Public address system
Plant radio systems

- (2) Loss of **ALL** of the following ORO communications methods:

ENN (Emergency Notification Network)
Commercial phones

- (3) Loss of **ALL** of the following NRC communications methods:

ENS on Federal Telecommunications System (FTS)
Commercial phones

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 will be assessed only when extraordinary means are being used 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 addresses a total loss of the communications methods used in support of routine plant operations.

EAL #2 addresses a total loss of the communications methods used to notify all OROs of an emergency declaration. The OROs referred to here are the states of Georgia and South Carolina; Burke County, Georgia; Aiken County, South Carolina; Barnwell and Allendale, South Carolina; and the Savannah River Site in South Carolina.

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

5 INDEPENDENT SPENT FUEL STORAGE INSTALLATION (ISFSI) ICS/EALS

UNUSUAL EVENT

**E-HU1 Damage to a loaded cask
CONFINEMENT BOUNDARY.**

Op. Modes: All

E-HU1

ECL: Notification of Unusual Event

Initiating Condition: Damage to a loaded cask CONFINEMENT BOUNDARY.

Operating Mode Applicability: All

Emergency Action Levels:

- (1) Damage to a loaded cask CONFINEMENT BOUNDARY as indicated by an on-contact radiation reading greater than ANY of the values listed in Table E1.

Table E1	
Location of Dose Rate	Total Dose Rate (Neutron + Gamma mR/hr)
HI-TRAC 125	
Side – Mid-height	950
Top	200
HI-STORM 100	
Side - 60 inches below mid-height	170
Side - Mid-height	180
Side - 60 inches above mid-height	110
Center of lid*	50
Middle of top lid**	60
Top (outlet) duct	130
Bottom (inlet) duct	360
* The center of the top lid represents a 6 in. radius.	
** The middle of the top lid represents an approximately 4 in. wide cylindrical “strip” located about mid-distance of the lid.	

Basis:

CONFINEMENT BOUNDARY: The barrier(s) between areas containing radioactive substances and the environment.

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 radiation reading values listed in the table represent 2 times the site-specific cask specific technical specification allowable radiation level on the designated surface of the spent fuel cask. The technical specification multiple of “2 times” is used here to distinguish between non-emergency and emergency conditions. The emphasis for this classification is the degradation in the level of

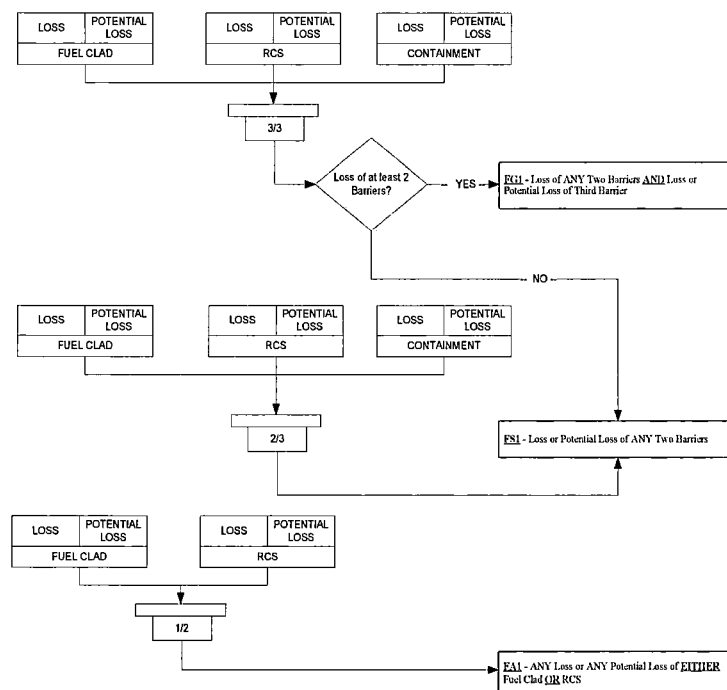
safety of the spent fuel cask and not the magnitude of the associated dose or dose rate. It is recognized that in the case of extreme damage to a loaded cask, determining if the “on-contact” dose rate limit is exceeded may be based on measurement of a dose rate at some distance from the cask.

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

6 FISSION PRODUCT BARRIER ICS/EALS

Recognition Category "F" Initiating Condition Matrix

GENERAL EMERGENCY	
FG1	Loss of any two barriers and Loss or Potential Loss of the third barrier. <i>Op. Modes: Power Operation, Hot Standby, Startup, Hot Shutdown</i>
SITE AREA EMERGENCY	
FS1	Loss or Potential Loss of any two barriers. <i>Op. Modes: Power Operation, Hot Standby, Startup, Hot Shutdown</i>
ALERT	
FA1	Any Loss or any Potential Loss of either the Fuel Clad or RCS barrier. <i>Op. Modes: Power Operation, Hot Standby, Startup, Hot Shutdown</i>



Fission Product Barrier Table

Thresholds for LOSS or POTENTIAL LOSS of Barriers

FG1 GENERAL EMERGENCY	FS1 SITE AREA EMERGENCY	FA1 ALERT
Loss of any two barriers and Loss or Potential Loss of the third barrier.	Loss or Potential Loss of any two barriers.	Any Loss or any Potential Loss of either the Fuel Clad or RCS barrier.

Fuel Clad Barrier		RCS Barrier		Containment Barrier	
LOSS	POTENTIAL LOSS	LOSS	POTENTIAL LOSS	LOSS	POTENTIAL LOSS
1. RCS or SG Tube Leakage		1. RCS or SG Tube Leakage		1. RCS or SG Tube Leakage	
Not Applicable	A. CORE COOLING CSF - ORANGE entry conditions met.	A. An automatic or manual ECCS actuation is required by EITHER of the following: 1. UNISOLABLE RCS leakage OR 2. SG tube RUPTURE.	A. Operation of a standby charging pump is required by EITHER of the following: 1. UNISOLABLE RCS leakage OR 2. SG tube leakage. OR B. RCS INTEGRITY CSF - RED entry conditions met	A. A leaking or RUPTURED SG is FAULTED outside of containment.	Not Applicable

Fuel Clad Barrier		RCS Barrier		Containment Barrier	
LOSS	POTENTIAL LOSS	LOSS	POTENTIAL LOSS	LOSS	POTENTIAL LOSS
2. Inadequate Heat Removal		2. Inadequate Heat Removal		2. Inadequate Heat Removal	
A. CORE COOLING CSF - RED entry conditions met	A. CORE COOLING CSF - ORANGE entry conditions met OR B. HEAT SINK CSF - RED entry conditions met Note: Heat Sink CSF should not be considered RED if total available feedwater flow is less than 535 gpm due to operator action.	Not Applicable	A. HEAT SINK CSF - RED entry conditions met. Note: Heat Sink CSF should not be considered RED if total available feedwater flow is less than 535 gpm due to operator action.	Not Applicable	A. CORE COOLING CSF - RED entry conditions met for 15 minutes or longer

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Fuel Clad Barrier		RCS Barrier		Containment Barrier	
LOSS	POTENTIAL LOSS	LOSS	POTENTIAL LOSS	LOSS	POTENTIAL LOSS
3. RCS Activity / Containment Radiation		3. RCS Activity / Containment Radiation		3. RCS Activity / Containment Radiation	
A. Containment radiation monitor RE-005 OR 006 $\geq 2.6E+5$ mR/hr. OR B. Indications that reactor coolant activity is greater than 300 μ Ci/gm dose equivalent I-131.	Not Applicable	A. Containment radiation monitor RE-005 OR 006 $\geq 8.7 E+2$ mR/hr.	Not Applicable	Not Applicable	A. Containment radiation monitor RE-005 OR 006 $\geq 1.3E+7$ mR/hr.

Fuel Clad Barrier		RCS Barrier		Containment Barrier	
LOSS	POTENTIAL LOSS	LOSS	POTENTIAL LOSS	LOSS	POTENTIAL LOSS
4. Containment Integrity or Bypass		4. Containment Integrity or Bypass		4. Containment Integrity or Bypass	
Not Applicable	Not Applicable	Not Applicable	Not Applicable	<p>A. Containment isolation is required AND EITHER of the following:</p> <ol style="list-style-type: none"> 1. Containment integrity has been lost based on Emergency Director judgment. <p>OR</p> <ol style="list-style-type: none"> 2. UNISOLABLE pathway from the containment to the environment exists. <p>OR</p> <p>B. Indications of RCS leakage outside of containment.</p>	<p>A. CONTAINMENT CSF RED entry conditions met. OR</p> <p>B. CTMT hydrogen concentration greater than 6% OR</p> <p>C. 1. CONTAINMENT CSF ORANGE conditions met Containment pressure greater than 21.5 psig. AND</p> <ol style="list-style-type: none"> 2. Less than Four CTMT fan coolers and one full train of CTMT Spray are operating per design for 15 minutes or longer.
5. Other Indications		5. Other Indications		5. Other Indications	
Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
6. Emergency Director Judgment		6. Emergency Director Judgment		6. Emergency Director Judgment	
A. ANY condition in the opinion of the emergency director that indicates loss of the fuel clad barrier.	A. ANY condition in the opinion of the emergency director that indicates potential loss of the fuel clad barrier.	A. ANY condition in the opinion of the emergency director that indicates loss of the RCS Barrier.	A. ANY condition in the opinion of the emergency director that indicates potential loss of the RCS Barrier.	A. ANY condition in the opinion of the emergency director that indicates loss of the containment barrier.	A. ANY condition in the opinion of the emergency director that indicates potential loss of the containment barrier.

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Basis Information For Fission Product Barrier EALs

FUEL CLAD BARRIER THRESHOLDS:

The Fuel Clad Barrier consists of the cladding material that contains the fuel pellets.

1. RCS or SG Tube Leakage

There is no Loss threshold associated with RCS or SG Tube Leakage.

Potential Loss 1.A

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

2. Inadequate Heat Removal

Loss 2.A

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

Potential Loss 2.A

This condition indicates temperatures within the core are sufficient to allow the onset of heat-induced cladding damage.

Potential Loss 2.B

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.

Meeting this threshold results in a Site Area Emergency because this threshold is identical to RCS Barrier Potential Loss threshold 2.A; 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.

3. RCS Activity / Containment Radiation

Loss 3.A

The radiation monitor reading corresponds to an instantaneous release of all reactor coolant mass into the containment, assuming that reactor coolant activity equals 300 μ Ci/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 percent to 5 percent 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 3.A 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 emergency classification level to a Site Area Emergency.

Loss 3.B

This threshold indicates that RCS radioactivity concentration is greater than 300 $\mu\text{Ci/gm}$ 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 percent to 5 percent 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.

4. Containment Integrity or Bypass

Not Applicable (included for numbering consistency)

5. Other Indications

Not Applicable (included for numbering consistency)

6. Emergency Director Judgment

Loss 6.A

This threshold addresses any other factors used by the emergency director in determining whether the fuel clad barrier is lost.

Potential Loss 6.A

This threshold addresses any other factors used by the emergency director in determining whether the fuel clad barrier is potentially lost. The emergency director should also consider whether to declare the barrier potentially lost in the event that barrier status cannot be monitored.

RCS BARRIER THRESHOLDS:

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.

1. RCS or SG Tube Leakage

Loss 1.A

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.

Potential Loss 1.A

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 actuation has not occurred. The threshold is met when an operating procedure, or operating crew supervision, directs that a standby charging (makeup) pump be placed in service to restore and maintain pressurizer level.

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.

Potential Loss 1.B

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).

2. Inadequate Heat Removal

There is no Loss threshold associated with Inadequate Heat Removal.

Potential Loss 2.A

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; 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.

3. RCS Activity / Containment Radiation

Loss 3.A

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.A since it indicates a loss of the RCS Barrier only.

There is no Potential Loss threshold associated with RCS Activity / Containment Radiation.

4. Containment Integrity or Bypass

Not Applicable (included for numbering consistency)

5. Other Indications

Not Applicable (included for numbering consistency)

6. Emergency Director Judgment

Loss 6.A

This threshold addresses any other factors used by the emergency director in determining whether the RCS Barrier is lost.

Potential Loss 6.A

This threshold addresses any other factors used by the emergency director in determining whether the RCS Barrier is potentially lost. The emergency director should also consider whether to declare the barrier potentially lost in the event that barrier status cannot be monitored.

CONTAINMENT BARRIER THRESHOLDS:

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

1. RCS or SG Tube Leakage

Loss 1.A

This threshold addresses a leaking or RUPTURED Steam Generator (SG) that is also FAULTED outside of containment. The condition of the SG, whether leaking or RUPTURED, is determined in accordance with the thresholds for RCS Barrier Potential Loss 1.A and Loss 1.A, 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 SU3 for the fuel clad barrier (i.e., RCS activity values) and IC SU4 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 (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 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, 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 emergency classification levels resulting from primary-to-secondary leakage, with or without a steam release from the FAULTED SG, are summarized below.

P-to-S Leak Rate	Affected SG is FAULTED Outside of Containment?	
	Yes	No
Less than or equal to 25 gpm	No classification	No classification
Greater than 25 gpm	Unusual Event per SU4	Unusual Event per SU4
Requires operation of a standby charging (makeup) pump (<i>RCS Barrier Potential Loss</i>)	Site Area Emergency per FS1	Alert per FA1
Requires an automatic or manual ECCS (SI) actuation (<i>RCS Barrier Loss</i>)	Site Area Emergency per FS1	Alert per FA1

There is no Potential Loss threshold associated with RCS or SG Tube Leakage.

2. Inadequate Heat Removal

There is no Loss threshold associated with Inadequate Heat Removal.

Potential Loss 2.A

This condition represents an IMMINENT core melt sequence that, if not corrected, could lead to vessel failure and an increased potential for containment failure. For this condition to occur, there must already have been a loss of the RCS Barrier and the Fuel Clad Barrier. If implementation of a procedure(s) to restore adequate core cooling is not effective (successful) within 15 minutes, it is assumed that the event trajectory will likely lead to core melting and a subsequent challenge of the Containment Barrier.

The restoration procedure is considered "effective" if core exit thermocouple readings are decreasing or if reactor vessel level is increasing. Whether the procedure(s) will be effective should be apparent within 15 minutes. The emergency director should escalate the emergency classification level as soon as it is determined that the procedure(s) will not be effective.

Severe accident analyses (e.g., NUREG-1150) have concluded that function restoration procedures can arrest core degradation in a significant fraction of core damage scenarios, and that the likelihood of containment failure is very small in these events. Given this, it

is appropriate to provide 15 minutes beyond the required entry point to determine if procedural actions can reverse the core melt sequence.

3. RCS Activity / Containment Radiation

There is no Loss threshold associated with RCS Activity / Containment Radiation.

Potential Loss 3.A

The radiation monitor reading corresponds to an instantaneous release of all reactor coolant mass into the containment, assuming that 20 percent 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 percent 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 that would then escalate the emergency classification level to a General Emergency.

4. Containment Integrity or Bypass

Loss 4.A

These thresholds address a situation where containment isolation is required and one of two conditions exists as discussed below. There may be accident and release conditions that simultaneously meet both thresholds 4.A.1 and 4.A.2.

4.A.1 – Containment integrity has been lost, i.e., the actual containment atmospheric leak rate likely exceeds that associated with allowable leakage (sometimes referred to as design leakage). Following the release of RCS mass into containment, containment pressure will fluctuate based on a variety of factors; a loss of containment integrity condition may (or may not) be accompanied by a noticeable drop in containment pressure. Recognizing the inherent difficulties in determining a containment leak rate during accident conditions, it is expected that the emergency director will assess this threshold using judgment, and with due consideration given to current plant conditions, and available operational and radiological data (e.g., containment pressure, readings on radiation monitors outside containment, operating status of containment pressure control equipment, etc.).

Two simplified examples are provided in the middle piping run of Figure 6-F-1. 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 is 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.

4.A.2 – 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.

See the simplified example in the top piping run of Figure 6-F-1. 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.

A simplified example is shown in the bottom piping run of Figure 6-F-1. 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 or system piping developed a leak that allowed steam/water to enter the Auxiliary Building, then 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 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 (design) 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 a closed 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 1.A.

Loss 4.B

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 will 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.

In the simplified example in the middle piping run of Figure 6-F-1, a leak has occurred at a reducer on a pipe carrying reactor coolant in the Auxiliary Building. Depending upon radiation monitor locations and sensitivities, the leakage could be detected by any of the four monitors depicted in the figure and cause threshold 4.A.1 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 to be met.

Potential Loss 4.A

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. This threshold is a discriminator between a Site Area Emergency and General Emergency since there is now a potential to lose the third barrier.

Potential Loss 4.B

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.

Potential Loss 4.C

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 because 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.

5. Other Indications

Not Applicable (included for numbering consistency)

6. Emergency Director Judgment

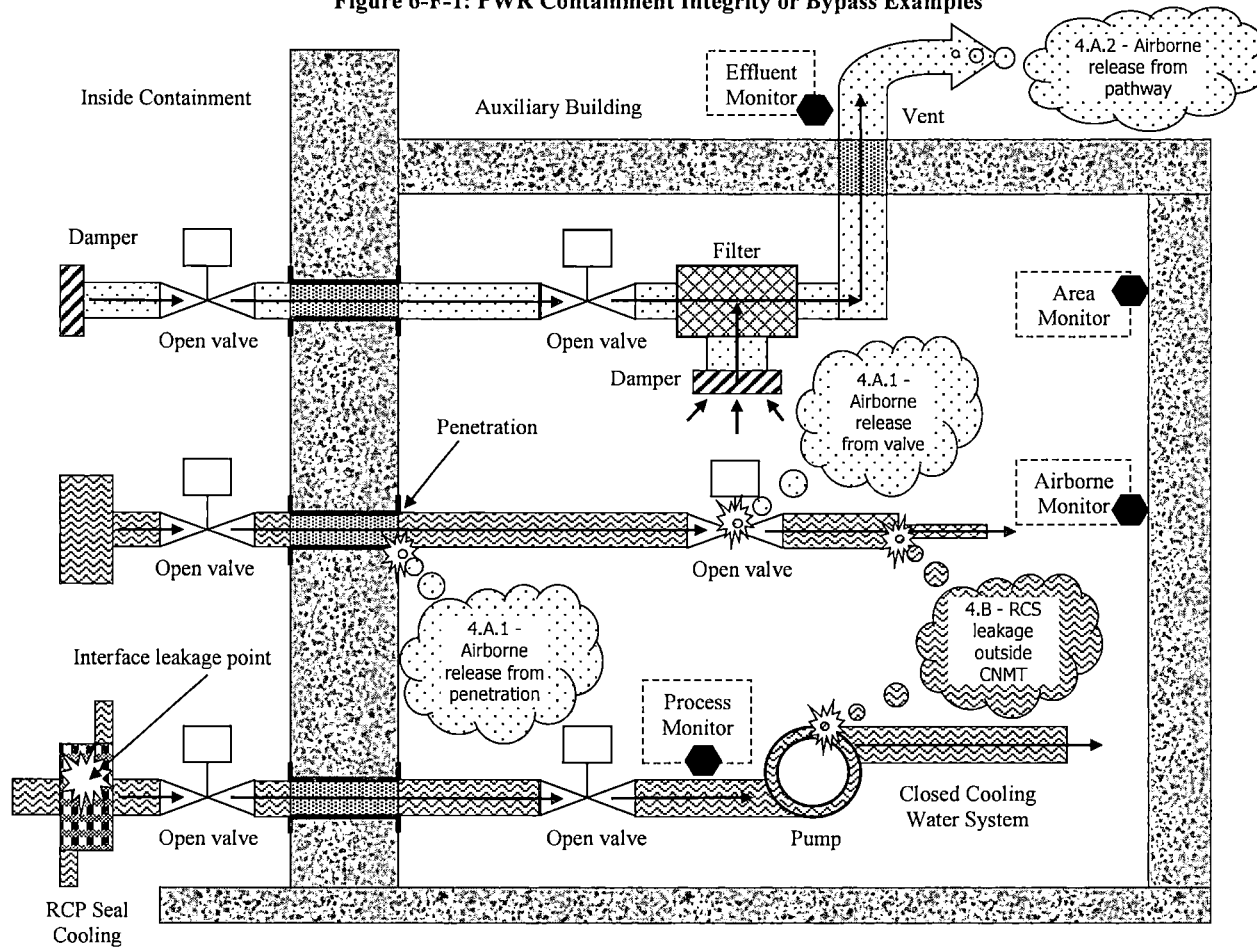
Loss 6.A

This threshold addresses any other factors used by the emergency director in determining whether the Containment Barrier is lost.

Potential Loss 6.A

This threshold addresses any other factors used by the emergency director in determining whether the Containment Barrier is potentially lost. The emergency director should also consider whether to declare the barrier potentially lost in the event that barrier status cannot be monitored.

Figure 6-F-1: PWR Containment Integrity or Bypass Examples



7 HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY ICS/EALS

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
HG1 HOSTILE ACTION resulting in loss of physical control of the facility. <i>Op. Modes: All</i>	HS1 HOSTILE ACTION within the PROTECTED AREA. <i>Op. Modes: All</i>	HA1 HOSTILE ACTION within the OWNER CONTROLLED AREA or airborne attack threat within 30 minutes. <i>Op. Modes: All</i>	HU1 Confirmed SECURITY CONDITION or threat. <i>Op. Modes: All</i>
			HU2 Seismic event greater than OBE levels. <i>Op. Modes: All</i>
			HU3 Hazardous event. <i>Op. Modes: All</i>
			HU4 FIRE potentially degrading the level of safety of the plant. <i>Op. Modes: All</i>
		HA5 Gaseous release impeding access to equipment necessary for normal plant operations, cooldown or shutdown. <i>Op. Modes: All</i>	
	HS6 Inability to control a key safety function from outside the Control Room. <i>Op. Modes: All</i>	HA6 Control Room evacuation resulting in transfer of plant control to alternate locations. <i>Op. Modes: All</i>	
HG7 Other conditions exist which in the judgment of the emergency director warrant declaration of a General Emergency. <i>Op. Modes: All</i>	HS7 Other conditions exist which in the judgment of the emergency director warrant declaration of a Site Area Emergency. <i>Op. Modes: All</i>	HA7 Other conditions exist which in the judgment of the emergency director warrant declaration of an Alert. <i>Op. Modes: All</i>	HU7 Other conditions exist which in the judgment of the emergency director warrant declaration of a (NO)UE. <i>Op. Modes: All</i>

HG1

ECL: General Emergency

Initiating Condition: HOSTILE ACTION resulting in loss of physical control of the facility.

Operating Mode Applicability: All

Emergency Action Levels:

- (1) a. A HOSTILE ACTION is occurring or has occurred within the PROTECTED AREA as reported by 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
 - RCS heat removal

 - OR**
 2. Damage to spent fuel has occurred or is IMMINENT.

Basis:

HOSTILE ACTION: An act toward a nuclear power plant (NPP) or its personnel that includes the use of violent force to destroy equipment, take HOSTAGES, and/or intimidate the licensee to achieve an end. This includes attack by air, land, or water using guns, explosives, PROJECTILES, vehicles, or other devices used to deliver destructive force. Other acts that satisfy the overall intent may be included. HOSTILE ACTION should not be construed to include acts of civil disobedience or felonious acts that are not part of a concerted attack on the NPP. 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 (OCA)).

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 (PA): The area that encompasses all controlled areas within the security protected area fence.

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 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]*.

Emergency plans and implementing procedures are public documents; therefore, EALs should not incorporate security-sensitive information. This includes information that may be advantageous to a potential adversary, such as the particulars concerning a specific threat or threat location. Security-sensitive information should be contained in non-public documents such as the Security Plan.

HG7

ECL: General Emergency

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

Operating Mode Applicability: All

Emergency Action Levels:

- (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.

Basis:

HOSTILE ACTION: An act toward a nuclear power plant (NPP) or its personnel that includes the use of violent force to destroy equipment, take HOSTAGES, and/or intimidate the licensee to achieve an end. This includes attack by air, land, or water using guns, explosives, PROJECTILES, vehicles, or other devices used to deliver destructive force. Other acts that satisfy the overall intent may be included. HOSTILE ACTION should not be construed to include acts of civil disobedience or felonious acts that are not part of a concerted attack on the NPP. 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 (OCA)).

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.

This IC addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist that are believed by the emergency director to fall under the emergency classification level description for a General Emergency.

HS1

ECL: Site Area Emergency

Initiating Condition: HOSTILE ACTION within the PROTECTED AREA.

Operating Mode Applicability: All

Emergency Action Levels:

- (1) A HOSTILE ACTION is occurring or has occurred within the PROTECTED AREA as reported by security shift supervision.

Basis:

HOSTILE ACTION: An act toward a nuclear power plant (NPP) or its personnel that includes the use of violent force to destroy equipment, take HOSTAGES, and/or intimidate the licensee to achieve an end. This includes attack by air, land, or water using guns, explosives, PROJECTILES, vehicles, or other devices used to deliver destructive force. Other acts that satisfy the overall intent may be included. HOSTILE ACTION should not be construed to include acts of civil disobedience or felonious acts that are not part of a concerted attack on the NPP. 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 (OCA)).

PROTECTED AREA (PA): The area that encompasses all controlled areas within the security protected area fence.

This IC addresses the occurrence of a HOSTILE ACTION within the PROTECTED AREA (PA). This event will require rapid response and assistance due to the possibility for damage to plant equipment.

Timely and accurate communications between security shift supervision and the control room is essential for proper classification of a security-related event.

Security plans and terminology are based on the guidance provided by NEI 03-12, *Template for the Security Plan, Training and Qualification Plan, Safeguards Contingency Plan [and Independent Spent Fuel Storage Installation Security Program]*.

As time and conditions allow, these events require a heightened state of readiness by the plant staff and implementation of onsite protective measures (e.g., evacuation, dispersal or sheltering). The Site Area Emergency declaration will mobilize 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 plant PROTECTED AREA (PA); such an attack should be assessed using IC HAI1. 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.

Commented [JRB21]: RAI 22 revision

Emergency plans and implementing procedures are public documents; therefore, EALs should not incorporate security-sensitive information. This includes information that may be advantageous to a potential adversary, such as the particulars concerning a specific threat or threat location. Security-sensitive information should be contained in non-public documents such as the Security Plan.

Escalation of the emergency classification level uses IC HG1.

HS6

ECL: Site Area Emergency

Initiating Condition: Inability to control a key safety function from outside the Control Room.

Operating Mode Applicability: All

Emergency Action Levels:

Note: The emergency director will declare the Site Area Emergency promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) a. An event has resulted in plant control being transferred from the control room to the remote shutdown panels due to a control room evacuation.

AND

- b. Control of **ANY** of the following key safety functions is not reestablished within 15 minutes.
- Reactivity control
 - Core cooling
 - RCS heat removal

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 “control” is established at the remote safe shutdown location(s) is based on emergency director judgment. The emergency director is expected to make a reasonable, informed judgment within 15 minutes as to whether the operating staff has control of key safety functions from the remote safe shutdown location(s).

Escalation of the emergency classification level uses IC FG1 or CG1.

HS7

ECL: Site Area Emergency

Initiating Condition: Other conditions exist which in the judgment of the emergency director warrant declaration of a Site Area Emergency.

Operating Mode Applicability: All

Emergency Action Levels:

- (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.

Basis:

HOSTILE ACTION: An act toward a nuclear power plant (NPP) or its personnel that includes the use of violent force to destroy equipment, take HOSTAGES, and/or intimidate the licensee to achieve an end. This includes attack by air, land, or water using guns, explosives, PROJECTILES, vehicles, or other devices used to deliver destructive force. Other acts that satisfy the overall intent may be included. HOSTILE ACTION should not be construed to include acts of civil disobedience or felonious acts that are not part of a concerted attack on the NPP. 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 (OCA)).

This IC addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist that are believed by the emergency director to fall under the emergency classification level description for a Site Area Emergency.

HA1

ECL: Alert

Initiating Condition: HOSTILE ACTION within the OWNER CONTROLLED AREA or airborne attack threat within 30 minutes.

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2)

- (1) A HOSTILE ACTION is occurring or has occurred within the OWNER CONTROLLED AREA as reported by security shift supervision.
- (2) A validated notification from NRC of an aircraft attack threat within 30 minutes of the site.

Basis:

HOSTILE ACTION: An act toward a nuclear power plant (NPP) or its personnel that includes the use of violent force to destroy equipment, take HOSTAGES, and/or intimidate the licensee to achieve an end. This includes attack by air, land, or water using guns, explosives, PROJECTILES, vehicles, or other devices used to deliver destructive force. Other acts that satisfy the overall intent may be included. HOSTILE ACTION should not be construed to include acts of civil disobedience or felonious acts that are not part of a concerted attack on the NPP. 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 (OCA)).

OWNER CONTROLLED AREA (OCA): The site property owned by or otherwise under the control of VEGP security.

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 (PA), 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, 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 is applicable for any HOSTILE ACTION occurring, or that has occurred, in the OWNER CONTROLLED AREA (OCA). ~~This includes any action directed against an ISFSI that is located outside the plant PROTECTED AREA (PA).~~

Commented [JRB22]: RAI 22 revision

EAL #2 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 station procedures.

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 (OCA) was intentional (i.e., a HOSTILE ACTION). It is expected, although not certain, that notification by an appropriate Federal agency to the site would clarify this point. In this case, the appropriate federal agency is intended to be NORAD, FBI, FAA or NRC. The emergency declaration, including one based on other ICs/EALs, should not be unduly delayed while awaiting notification by a Federal agency.

Emergency plans and implementing procedures are public documents; therefore, EALs should not incorporate security-sensitive information. This includes information that may be advantageous to a potential adversary, such as the particulars concerning a specific threat or threat location. Security-sensitive information should be contained in non-public documents such as the Security Plan.

Escalation of the emergency classification level uses IC HS1.

HA5

ECL: Alert

Initiating Condition: Gaseous release impeding access to equipment necessary for normal plant operations, cooldown or shutdown.

Operating Mode Applicability: All

Emergency Action Levels:

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.

- (1) a. Release of a toxic, corrosive, asphyxiant or flammable gas into any Table H1 plant rooms or areas:

AND

- b. Entry into the room or area is prohibited or impeded.

Table H1		
Building	Room Number	Applicable Mode
Control Building	1CB-226, 1CB-A45, 2CB-223, 2CB-A22	3
	1CB-A77, 1CB-B61, 1CB-B76, 1CB-B79 2CB-A79, 2CB-B01 2CB-B04, 2CB-B18	3
	1CB-226, 1CB-A45 1CB-B84, 2CB-B85 2CB-223, 2CB-A22	4
	1CB-A48, 1CB-A50 2CB-A15, 2CB-A16	4
AFW Pump House	AFW Pump Operation and standby Readiness	1, 2, 3
Auxiliary Building	1AB-A28, 2AB-A72 A-level demin vessel valve galleries	1, 2, 3
	1AB-A24, 2AB-A77	3
	1AB-A08, 2AB-A101	3
	1AB-C85, 1AB-C89 2AB-C38, 2AB-C44	4
	1AB-B15 MEZZ 1AB-B19 MEZZ 2AB-B117 MEZZ 2AB-B119 MEZZ	4

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 plant safety.

An Alert declaration is warranted if entry into the affected room/area is, or may be, procedurally required during the plant operating mode in effect at the time of the gaseous release. The emergency classification is not contingent upon whether entry is actually necessary at the time of the release.

Evaluation of the IC and EAL do not require atmospheric sampling; it only requires the emergency director's judgment that the gas concentration in the affected room/area is sufficient to preclude or significantly impede procedurally required access. This judgment may be based on a variety of factors including an existing job hazard analysis, report of ill effects on personnel, advice from a subject matter expert or operating experience with the same or similar hazards. Access should be considered as impeded if extraordinary measures are necessary to facilitate entry of personnel into the affected room/area (e.g., requiring use of protective equipment, such as SCBAs, that is not routinely employed).

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

- The plant is in an operating mode different than the mode specified for the affected room/area (i.e., entry is not required during the operating mode in effect at the time of the gaseous release). For example, the plant is in Mode 1 when the gaseous release occurs, and the procedures used for normal operation, cooldown and shutdown do not require entry into the affected room until Mode 4.
- The gas release is a planned activity that includes compensatory measures to address the temporary inaccessibility of a room or area (e.g., fire suppression system testing).
- The action that 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.

An asphyxiant is a gas capable of reducing the level of oxygen in the body to dangerous levels. Most commonly, asphyxiants work by displacing air in an enclosed environment. This reduces the concentration of oxygen below the normal level of around 19 percent, 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 uses Recognition Category R, C or F ICs.

HA6

ECL: Alert

Initiating Condition: Control Room evacuation resulting in transfer of plant control to alternate locations.

Operating Mode Applicability: All

Emergency Action Levels:

- (1) An event has resulted in plant control being transferred from the control room to the remote shutdown panels due to a control room evacuation.

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 uses IC HS6.

HA7

ECL: Alert

Initiating Condition: Other conditions exist which in the judgment of the emergency director warrant declaration of an Alert.

Operating Mode Applicability: All

Emergency Action Levels:

- (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.

Basis:

HOSTILE ACTION: An act toward a nuclear power plant (NPP) or its personnel that includes the use of violent force to destroy equipment, take HOSTAGES, and/or intimidate the licensee to achieve an end. This includes attack by air, land, or water using guns, explosives, PROJECTILES, vehicles, or other devices used to deliver destructive force. Other acts that satisfy the overall intent may be included. HOSTILE ACTION should not be construed to include acts of civil disobedience or felonious acts that are not part of a concerted attack on the NPP. 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 (OCA)).

This IC addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist which are believed by the emergency director to fall under the emergency classification level description for an Alert.

ECL: Notification of Unusual Event

Initiating Condition: Confirmed SECURITY CONDITION or threat.

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2 or 3)

- (1) A SECURITY CONDITION that does not involve a HOSTILE ACTION as reported by security shift supervision.
- (2) Notification of a credible security threat directed at VEGP.
- (3) A validated notification from the NRC providing information of an aircraft threat.

Basis:

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 a nuclear power plant (NPP) or its personnel that includes the use of violent force to destroy equipment, take HOSTAGES, and/or intimidate the licensee to achieve an end. This includes attack by air, land, or water using guns, explosives, PROJECTILES, vehicles, or other devices used to deliver destructive force. Other acts that satisfy the overall intent may be included. HOSTILE ACTION should not be construed to include acts of civil disobedience or felonious acts that are not part of a concerted attack on the NPP. 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 (OCA)).

This IC addresses events that pose a threat to plant personnel or SAFETY SYSTEM equipment, and represent a potential degradation in the level of plant safety. Security events that 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 OROs.

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 references 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 addresses the receipt of a credible security threat. The credibility of the threat is

assessed in accordance with station procedures.

EAL #3 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 station procedures.

Emergency plans and implementing procedures are public documents; therefore, EALs should not incorporate security-sensitive information. This includes information that may be advantageous to a potential adversary, such as the particulars concerning a specific threat or threat location. Security-sensitive information should be contained in non-public documents such as the Security Plan.

Escalation of the emergency classification level uses IC HA1.

HU2

ECL: Notification of Unusual Event

Initiating Condition: Seismic event greater than OBE levels.

Operating Mode Applicability: All

Emergency Action Levels:

- (1) Seismic event greater than Operating Basis Earthquake (OBE) as indicated by the Seismic Monitoring System (Red OBE Exceedance Indicator) indicating greater than 0.12 g acceleration.

Commented [JRB23]: RAI 23 revision

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 plant safety.

If a seismic event occurs that exceeds the OBE, an audible alarm will be sounded and the OBE Exceedance Indicator on the Seismic Monitoring System Panel will change from Green to Red.

Commented [JRB24]: RAI 23 revision

Event verification with external sources should not be necessary during or following an OBE. Earthquakes of this magnitude should readily be felt by on-site personnel and recognized as a seismic event (e.g., typical lateral accelerations are in excess of 0.08g). The Shift Manager or emergency director may seek external verification if deemed appropriate (e.g., a call to the USGS or check of internet news sources); 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 uses IC CA6 or SA9.

HU3

ECL: Notification of Unusual Event

Initiating Condition: Hazardous event.

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2 or 3 or 4 or 5)

Note: EAL #4 does not apply to routine traffic impediments such as fog, snow, ice, or vehicle breakdowns or accidents.

- (1) A tornado strike within the PROTECTED AREA.
- (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.
- (3) Movement of personnel within the PROTECTED AREA (PA) is impeded due to an offsite event involving hazardous materials (e.g., an offsite chemical spill or toxic gas release).
- (4) A hazardous event that results in on-site conditions sufficient to prohibit the plant staff from accessing the site via personal vehicles.
- (5) Sustained hurricane force winds greater than 74 mph forecast to be at the plant site in the next four hours.

Basis:

PROTECTED AREA (PA): The area that encompasses all controlled areas within the security protected area fence.

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.

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

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

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 (PA).

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, or dam failure, or an on-site train derailment blocking the access road.

This EAL is not intended to apply to routine impediments such as fog, snow, ice, or vehicle breakdowns or accidents, but rather to more significant conditions such as the Hurricane Andrew strike on Turkey Point in 1992, the flooding around the Cooper Station during the Midwest floods of 1993, or the flooding around Ft. Calhoun Station in 2011.

EAL #5 addresses the phenomena of the hurricane based on the severe weather mitigation procedure.

Escalation of the emergency classification level is based on ICs in Recognition Categories A, F, S or C.

HU4

ECL: Notification of Unusual Event

Initiating Condition: FIRE potentially degrading the level of safety of the plant.

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2 or 3 or 4)

Note: The emergency director will declare the Unusual Event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.

- (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 Table H2 plant rooms or areas.

- (2) a. Receipt of a single fire alarm (i.e., no other indications of a FIRE).

AND

- b. The FIRE is located within **ANY** of the Table H2 plant rooms or areas.

AND

- c. The existence of a FIRE is not verified within 30-minutes of alarm receipt.

- (3) A FIRE within the plant PROTECTED AREA (PA) ~~or ISFSI PROTECTED AREA~~ not extinguished within 60-minutes of the initial report, alarm or indication.

Commented [JRB25]: RAI 22 revision

- (4) A FIRE within the plant PROTECTED AREA (PA) ~~or ISFSI PROTECTED AREA~~ that requires firefighting support by an offsite fire response agency to extinguish.

Commented [JRB26]: RAI 22 revision

Table H2
Containment Building
NSCW Cooling Towers
Diesel Generator Building
Auxiliary Building
Fuel Handling Building
Control Building
Diesel Fuel Oil Storage Tank Pumphouse
Auxiliary Feedwater Pumphouse

Basis:

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 (PA): The area that encompasses all controlled areas within the security protected area fence.

This IC addresses the magnitude and extent of FIRES that may be indicative of a potential degradation of the level of plant safety.

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 include 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, 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 (PA) 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 (PA).~~

Commented [JRB27]: RAI 22 revision

EAL #4

If a FIRE within the plant ~~or ISFSI~~ 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.

Commented [JRB28]: RAI 22 revision

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.

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 uses IC CA6 or SA9.

HU7

ECL: Notification of Unusual Event

Initiating Condition: Other conditions exist which in the judgment of the emergency director warrant declaration of a (NO)UE.

Operating Mode Applicability: All

Emergency Action Levels:

- (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.

Basis:

This IC addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist that are believed by the emergency director to fall under the emergency classification level description for a NOUE.

8 SYSTEM MALFUNCTION ICS/EALS

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
SG1 Prolonged loss of all offsite and all onsite AC power to emergency buses. <i>Op. Modes: Power Operation, Startup, Hot Standby, Hot Shutdown</i>	SS1 Loss of all offsite and all onsite AC power to emergency buses for 15 minutes or longer. <i>Op. Modes: Power Operation, Startup, Hot Standby, Hot Shutdown</i>	SA1 Loss of all but one AC power source to emergency buses for 15 minutes or longer. <i>Op. Modes: Power Operation, Startup, Hot Standby, Hot Shutdown</i>	SU1 Loss of all offsite AC power capability to emergency buses for 15 minutes or longer. <i>Op. Modes: Power Operation, Startup, Hot Standby, Hot Shutdown</i>
		SA2 UNPLANNED loss of Control Room indications for 15 minutes or longer with a significant transient in progress. <i>Op. Modes: Power Operation, Startup, Hot Standby, Hot Shutdown</i>	SU2 UNPLANNED loss of Control Room indications for 15 minutes or longer. <i>Op. Modes: Power Operation, Startup, Hot Standby, Hot Shutdown</i>
			SU3 Reactor coolant activity greater than Technical Specification allowable limits. <i>Op. Modes: Power Operation, Startup, Hot Standby, Hot Shutdown</i>
			SU4 RCS leakage for 15 minutes or longer. <i>Op. Modes: Power Operation, Startup, Hot Standby, Hot Shutdown</i>
	SS5 Inability to shutdown the reactor causing a challenge to core cooling or RCS heat removal. <i>Op. Modes: Power Operation</i>	SA5 Automatic or manual trip fails to shutdown the reactor, and subsequent manual actions taken at the reactor control consoles are not successful in shutting down the reactor. <i>Op. Modes: Power Operation</i>	SU5 Automatic or manual trip fails to shutdown the reactor. <i>Op. Modes: Power Operation</i>

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
			SU6 Loss of all onsite or offsite communications capabilities. <i>Op. Modes: Power Operation, Startup, Hot Standby, Hot Shutdown</i>
			SU7 Failure to isolate containment or loss of containment pressure control. <i>Op. Modes: Power Operation, Startup, Hot Standby, Hot Shutdown</i>
SG8 Loss of all AC and Vital DC power sources for 15 minutes or longer. <i>Op. Modes: Power Operation, Startup, Hot Standby, Hot Shutdown</i>	SS8 Loss of all Vital DC power for 15 minutes or longer. <i>Op. Modes: Power Operation, Startup, Hot Standby, Hot Shutdown</i>		
		SA9 Hazardous event affecting a SAFETY SYSTEM needed for the current operating mode. <i>Op. Modes: Power Operation, Startup, Hot Standby, Hot Shutdown</i>	

SG1

ECL: General Emergency

Initiating Condition: Prolonged loss of all offsite and all onsite AC power to emergency buses.

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels:

Note: The emergency director will declare the General Emergency promptly upon determining that 4 hours has been exceeded, or will likely be exceeded.

- (1) a. Loss of **ALL** offsite and **ALL** onsite AC power to **BOTH** 1(2)AA02 **AND** 1(2)BA03.
- AND**
- b. **EITHER** of the following:
- Restoration of at least one AC emergency bus in less than 4 hours is not likely.
 - CORE COOLING CSF - RED conditions met.

Basis:

This IC addresses a prolonged loss of all power sources to AC emergency 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 will 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 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 bus will be based on a realistic appraisal of the situation. Mitigation actions with a low probability of success will 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.

SG8

ECL: General Emergency

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

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels:

Note: The emergency director will declare the General Emergency promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) a. Loss of **ALL** offsite and **ALL** onsite AC power to **BOTH** 1(2)AA02 **AND** 1(2)BA03 for 15 minutes or longer.

AND
- b. Indicated voltage is less than 105 VDC on ALL 125 VDC busses 1(2)AD1, 1(2)BD1, 1(2)CD1, 1(2)DD1 for 15 minutes or longer.

Basis:

This IC addresses a concurrent and prolonged loss of both AC and vital DC power. 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 loss of vital DC power compromises the ability to monitor and control SAFETY SYSTEMS. A sustained loss of both AC and DC power will lead to multiple challenges to fission product barriers.

Fifteen minutes is the threshold to exclude transient or momentary power losses. The 15-minute emergency declaration clock begins at the point when both EAL thresholds are met.

SS1

ECL: Site Area Emergency

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

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels:

Note: The emergency director will declare the Site Area Emergency promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) Loss of **ALL** offsite and **ALL** onsite AC power to **BOTH** 1(2)AA02 **AND** 1(2)BA03 for 15 minutes or longer.

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 is the threshold to exclude transient or momentary power losses.

Escalation of the emergency classification level uses ICs RG1, FG1 or SG1.

SS5

ECL: Site Area Emergency

Initiating Condition: Inability to shutdown the reactor causing a challenge to core cooling or RCS heat removal.

Operating Mode Applicability: Power Operation

Emergency Action Levels:

Note: Heat Sink CSF should not be considered RED if total available feedwater flow is less than 535 gpm due to operator action.

Commented [JRB29]: RAI 25 revision

- (1) a. An automatic or manual trip 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:
- Core Cooling CSF - RED conditions met
 - Heat Sink CSF - RED conditions met

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 because the Recognition Category F ICs/EALs do not address the additional threat posed by a failure to shutdown the reactor. The inclusion of this IC and EAL ensures the timely declaration of a Site Area Emergency in response to prolonged failure to shutdown the reactor.

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

Escalation of the emergency classification level uses IC RG1 or FG1.

SS8

ECL: Site Area Emergency

Initiating Condition: Loss of all vital DC power for 15 minutes or longer.

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels:

Note: The emergency director will declare the Site Area Emergency promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) Indicated voltage is less than 105 VDC on **ALL** 125 VDC busses 1(2)AD1, 1(2)BD1, 1(2)CD1, 1(2)DD1 for 15 minutes or longer.

Basis:

This IC addresses a loss of vital DC power that 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 is the threshold to exclude transient or momentary power losses.

Escalation of the emergency classification level uses ICs RG1, FG1 or SG8.

SA1

ECL: Alert

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

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels:

Note: The emergency director will declare the Alert promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) a. AC power capability to **BOTH** 1(2)AA02 **AND** 1(2)BA03 is reduced to a single power source (Table S1) 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.

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Table S1	
Unit 1	Unit 2
Unit Auxiliary Transformer 1NXAA	Unit Auxiliary Transformer 2NXAA
Unit Auxiliary Transformer 1NXAB	Unit Auxiliary Transformer 2NXAB
Reserve Auxiliary Transformer 1NXRA	Reserve Auxiliary Transformer 2NXRA
Reserve Auxiliary Transformer 1NXRB	Reserve Auxiliary Transformer 2NXRB
Diesel Generator 1A	Diesel Generator 2A
Diesel Generator 1B	Diesel Generator 2B
Standby Auxiliary Transformer ANXRA	Standby Auxiliary Transformer ANXRA

Basis:

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.

This IC describes a significant degradation of offsite and onsite AC power sources (see Table S1 above) where 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 bus. Some examples of this condition are presented below.

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

- A loss of emergency power sources (e.g., onsite diesel generators) with a single train of emergency buses being back-fed from an offsite power source.

Fifteen minutes is the threshold to exclude transient or momentary losses of power.

Escalation of the emergency classification level uses IC SS1.

SA2

ECL: Alert

Initiating Condition: UNPLANNED loss of Control Room indications for 15 minutes or longer with a significant transient in progress.

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels:

Note: The emergency director will declare the Alert promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) a. 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.

Reactor Power
RCS Level
RCS Pressure
In-Core/Core Exit Temperature
Wide Range Level in at least one steam generator
Steam Generator Main or Auxiliary Feed Water Flow

AND

- b. **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 trip
 - ECCS actuation

Basis:

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.

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 represents a potential substantial degradation in the level of plant safety.

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. Various instrumentation is also used to determine RCS Level – RVLIS, pressurizer level, digital or recorders. A loss of all control room sources for this parameter would also apply.

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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 is 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, then the availability of other parameter values may be compromised as well.

Fifteen minutes is the threshold to exclude transient or momentary losses of indication.

Escalation of the emergency classification level uses ICs FS1 or IC RS1.

SA5

ECL: Alert

Initiating Condition: Automatic or manual trip fails to shutdown the reactor, and subsequent manual actions taken at the reactor control consoles are not successful in shutting down the reactor.

Operating Mode Applicability: Power Operation

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.

Emergency Action Levels:

- (1) a. An automatic or manual trip did not shutdown the reactor.

AND

- b. Manual actions taken at the reactor control consoles are not successful in shutting down the reactor.

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 plant safety. 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 consoles is any operator action, or set of actions, that 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 consoles (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".

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 shutdown 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 SS5. Depending upon plant responses and symptoms, escalation is also possible via IC FS1. Absent the plant conditions needed to meet either IC SS5 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.

SA9

ECL: Alert

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

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels:

- (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
 - Other events with similar hazard characteristics as determined by the Shift Manager
- AND**
- b. **EITHER** of the following:
- 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.

Basis:

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.

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 may require a post-event inspection to determine if the attributes of an explosion are present.

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.

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.

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 plant safety.

The first threshold for EAL 1.b 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 will be significant enough to cause concern regarding the operability or reliability of the SAFETY SYSTEM train.

The second threshold for EAL 1.b 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 all 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 uses IC FS1 or RS1.

SU1

ECL: Notification of Unusual Event

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

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels:

Note: The emergency director will declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) Loss of **ALL** offsite AC power capability (Table S2) to **BOTH** 1(2)AA02 **AND** 1(2)BA03 for 15 minutes or longer.

Commented [JRB32]: RAI 13.b revision

Table S2	
Unit 1	Unit 2
Reserve Auxiliary Transformer 1NXRA	Reserve Auxiliary Transformer 2NXRA
Reserve Auxiliary Transformer 1NXRB	Reserve Auxiliary Transformer 2NXRB
Standby Auxiliary Transformer ANXRA	Standby Auxiliary Transformer ANXRA

Basis:

This IC addresses a prolonged loss of offsite power. The loss of offsite power sources (see Table S2 above) renders the plant more vulnerable to a complete loss of power to AC emergency buses. This condition represents a potential reduction in the level of plant safety.

For emergency classification purposes, "capability" means that an offsite AC power source(s) is available to the emergency buses, whether or not the buses are powered from it.

Fifteen minutes is the threshold to exclude transient or momentary losses of offsite power.

Escalation of the emergency classification level uses IC SA1.

SU2

ECL: Notification of Unusual Event

Initiating Condition: UNPLANNED loss of Control Room indications for 15 minutes or longer.

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels:

Note: The emergency director will declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) a. 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.

Reactor Power
RCS Level
RCS Pressure
In-Core/Core Exit Temperature
Wide Range Level in at least one steam generator
Steam Generator Main or Auxiliary Feed Water Flow

Basis:

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.

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 plant safety.

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. Various instrumentation is also used to determine RCS Level – RVLIS, pressurizer level, digital or recorders. A loss of all control room sources for this parameter would also apply.

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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 is reported if it significantly impairs the capability to perform emergency assessments, particularly those 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, then the availability of other parameter values may be compromised as well.

Fifteen minutes is the threshold to exclude transient or momentary losses of indication.

Escalation of the emergency classification level uses IC SA2.

SU3

ECL: Notification of Unusual Event

Initiating Condition: Reactor coolant activity greater than Technical Specification allowable limits.

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels: (1 or 2)

- (1) RE-48000 reading greater than 5.0 $\mu\text{Ci/cc}$.
- (2) RCS coolant sample activity value indicating fuel clad degradation greater than Technical Specification allowable limits as indicated by **ANY** of the following:

Dose Equivalent I-131 greater than 1 $\mu\text{Ci/gm}$ for greater than 48 hours
Dose Equivalent I-131 greater than Technical Specification figure 3.4.16-1 limits
RCS specific activity greater than $100/\bar{E}$ $\mu\text{Ci/gm}$ gross radioactivity

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 plant safety.

Escalation of the emergency classification level uses ICs FA1 or the Recognition Category R ICs.

SU4

ECL: Notification of Unusual Event

Initiating Condition: RCS leakage for 15 minutes or longer.

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels: (1 or 2 or 3)

Note: The emergency director will declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) RCS unidentified or pressure boundary leakage greater than 10 gpm for 15 minutes or longer.
- (2) RCS identified leakage greater than 25 gpm for 15 minutes or longer.
- (3) Leakage from the RCS to a location outside containment greater than 25 gpm for 15 minutes or longer.

Basis:

This IC addresses RCS leakage that could 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 plant safety.

EAL #1 and EAL #2 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 addresses a RCS mass loss caused by an UNISOLABLE leak through an interfacing system. These EALs 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 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 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 is 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 uses ICs of Recognition Category R or F.

SU5

ECL: Notification of Unusual Event

Initiating Condition: Automatic or manual trip fails to shutdown the reactor.

Operating Mode Applicability: Power Operation

Emergency Action Levels: (1 or 2)

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.

- (1) a. An automatic trip did not shutdown the reactor.

AND

- b. A subsequent manual action taken at the reactor control consoles is successful in shutting down the reactor.

- (2) a. A manual trip did not shutdown the reactor.

AND

- b. **EITHER** of the following:

- A subsequent manual action taken at the reactor control consoles is successful in shutting down the reactor.
- A subsequent automatic trip is successful in shutting down the reactor.

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 plant safety.

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 SA5. Depending upon the plant response, escalation is also possible via IC FA1. Absent the plant conditions needed to meet either IC SA5 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 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 will 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.

SU6

ECL: Notification of Unusual Event

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

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels: (1 or 2 or 3)

- (1) Loss of **ALL** of the following onsite communication methods:

In plant telephones
Public address system
Plant radio systems

- (2) Loss of **ALL** of the following ORO communications methods:

ENN (Emergency Notification Network)
Commercial phones

- (3) Loss of **ALL** of the following NRC communications methods:

ENS on Federal Telecommunications System (FTS)
Commercial phones

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 will be assessed only when extraordinary means are being used 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).

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

EAL #2 addresses a total loss of the communications methods used to notify all OROs of an emergency declaration. The OROs referred to here are the states of Georgia and South Carolina; Burke County, Georgia; Aiken County, South Carolina; Barnwell and Allendale, South Carolina; and the Savannah River Site in South Carolina.

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

SU7

ECL: Notification of Unusual Event

Initiating Condition: Failure to isolate containment or loss of containment pressure control.

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels: (1 or 2)

- (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.

- (2) a. Containment pressure greater than ~~52~~21.5 psig.

AND

- b. Less than 4 CTMT fan coolers and one full train of CTMT spray is operating per design for 15 minutes or longer.

Commented [JRB34]: RAI 28 revision

Basis:

This IC 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 plant safety.

For EAL #1, 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 – will be made in accordance with the appropriate criteria contained in the plant AOPs and EOPs. The 15-minute criterion is included to allow operators time to manually isolate the required penetrations, if possible.

EAL #2 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 will escalate to a Site Area Emergency in accordance with IC FS1 if there is a concurrent loss or potential loss of either the Fuel Clad or RCS fission product barriers.

APPENDIX A – ACRONYMS AND ABBREVIATIONS

AC	Alternating Current
AOP	Abnormal Operating Procedure
ATWS	Anticipated Transient Without Scram
BLDG	Building
CDE	Committed Dose Equivalent
CFR	Code of Federal Regulations
CTMT/CNMT	Containment
CSF	Critical Safety Function
CSFST	Critical Safety Function Status Tree
DBA	Design Basis Accident
DC	Direct Current
EAL	Emergency Action Level
ECCS	Emergency Core Cooling System
ECL	Emergency Classification Level
EFFL	Effluent
ENN	Emergency Notification Network
ENS	Emergency Notification System
EOF	Emergency Operations Facility
EOP	Emergency Operating Procedure
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FBI	Federal Bureau of Investigation
FEMA	Federal Emergency Management Agency
FTS	Federal Telecommunications System
GA	Georgia
GE	General Emergency
HOO	Headquarters Operations Officer (NRC)
IC	Initiating Condition
ID	Inside Diameter
ISFSI	Independent Spent Fuel Storage Installation
Keff	Effective Neutron Multiplication Factor
mR, mRem, mrem, mREM	milli-Roentgen Equivalent Man
NEI	Nuclear Energy Institute
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	Offsite Dose Calculation Manual
PX	Off Premise Exchange
ORO	Off-site Response Organization
PA	Protected Area
PAG	Protective Action Guideline
BX	Private Branch Exchange

PWR.....	Pressurized Water Reactor
PSIG.....	Pounds per Square Inch Gauge
R.....	Roentgen
RCDT.....	Reactor Coolant Drain Tank
RCS.....	Reactor Coolant System
Rem, rem, REM	Roentgen Equivalent Man
RPS.....	Reactor Protection System
RPV.....	Reactor Pressure Vessel
RVLIS.....	Reactor Vessel Level Instrumentation System
SAE.....	Site Area Emergency
SC.....	South Carolina
SCBA.....	Self-Contained Breathing Apparatus
SG.....	Steam Generator
SI.....	Safety Injection
SJAE.....	Steam Jet Air Ejector
SNC.....	Southern Nuclear Company
SPDS.....	Safety Parameter Display System
TEDE.....	Total Effective Dose Equivalent
TOAF.....	Top of Active Fuel
VDC.....	Volts Direct Current
VEGP.....	Vogtle Electric Generating Plant
VOIP.....	Voice Over Internet Protocol
WHT.....	Waste Holdup Tank

APPENDIX B – DEFINITIONS

The following definitions are taken from Title 10, Code of Federal Regulations, and related regulatory guidance documents.

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

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

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

Notification of Unusual Event (NOUE): 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.

The following are key terms necessary for overall understanding the NEI 99-01 emergency classification scheme.

Emergency Action Level (EAL): A pre-determined, site-specific, observable threshold for an Initiating Condition that, when met or exceeded, places the plant in a given emergency classification level.

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

- General Emergency (GE)
- Site Area Emergency (SAE)
- Alert
- Notification of Unusual Event (NOUE)

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

Initiating Condition (IC): An event or condition that aligns with the definition of one of the four emergency classification levels by virtue of the potential or actual effects or consequences.

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.

CONFINEMENT BOUNDARY: The barrier(s) between areas containing radioactive substances and the environment.

CONTAINMENT CLOSURE: Per Operating Procedure 14210-1/2, Containment Building Penetrations Verification – Refueling.

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 may 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.

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

HOSTILE ACTION: An act toward a nuclear power plant (NPP) or its personnel that includes the use of violent force to destroy equipment, take HOSTAGES, and/or intimidate the licensee to achieve an end. This includes attack by air, land, or water using guns, explosives, PROJECTILES, vehicles, or other devices used to deliver destructive force. Other acts that satisfy the overall intent may be included. HOSTILE ACTION should not be construed to include acts of civil disobedience or felonious acts that are not part of a concerted attack on the NPP. 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 (OCA)).

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.

OWNER CONTROLLED AREA (OCA): The site property owned by or otherwise under the control of VEGP security.

PROJECTILE: An object directed toward an NPP that could cause concern for its continued operability, reliability, or personnel safety.

PROTECTED AREA (PA): The area that encompasses all controlled areas within the security protected area fence.

REFUELING PATHWAY: This includes the reactor refuel cavity the fuel transfer canal, and the spent fuel pool, canals and pools through which irradiated fuel may be moved, but not including the reactor vessel.

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

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.

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.

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.

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.

Southern Nuclear Operating Company
Joseph M. Farley Nuclear Plant Units 1 and 2;
Edwin I. Hatch Nuclear Plant Units 1 and 2;
Vogtle Electric Generating Plant Units 1 and 2;
License Amendment Request for Changes to
Emergency Action Level Schemes to Adopt NEI 99-01 Rev. 6
and to Modify Radiation Monitors at Farley Nuclear Plant
Responses to Requests for Additional Information

ENCLOSURE 4

EAL SCHEMES

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and to Modify Radiation Monitors at Farley Nuclear Plant
Responses to Requests for Additional Information

JOSEPH M. FARLEY NUCLEAR PLANT

EAL SCHEME

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FARLEY NUCLEAR PLANT

EMERGENCY ACTION LEVELS

**INITIATING CONDITIONS,
THRESHOLD VALUES,
AND BASIS**

TABLE OF CONTENTS

1	REGULATORY BACKGROUND	1
1.1	OPERATING REACTORS.....	1
1.2	INDEPENDENT SPENT FUEL STORAGE INSTALLATION (ISFSI).....	1
1.3	NRC ORDER EA-12-051	2
1.4	ORGANIZATION AND PRESENTATION OF GENERIC INFORMATION.....	3
1.5	IC AND EAL MODE APPLICABILITY.....	3
2	GUIDANCE ON MAKING EMERGENCY CLASSIFICATIONS	5
2.1	GENERAL CONSIDERATIONS	5
2.2	CLASSIFICATION METHODOLOGY	6
2.3	CLASSIFICATION OF MULTIPLE EVENTS AND CONDITIONS.....	6
2.4	CONSIDERATION OF MODE CHANGES DURING CLASSIFICATION	6
2.5	CLASSIFICATION OF IMMINENT CONDITIONS	7
2.6	EMERGENCY CLASSIFICATION LEVEL UPGRADING AND DOWNGRADING	7
2.7	CLASSIFICATION OF SHORT-LIVED EVENTS	7
2.8	CLASSIFICATION OF TRANSIENT CONDITIONS	7
2.9	AFTER-THE-FACT DISCOVERY OF AN EMERGENCY EVENT OR CONDITION.....	8
3	ABNORMAL RAD LEVELS / RADIOLOGICAL EFFLUENT ICS/EALS	9
4	COLD SHUTDOWN / REFUELING SYSTEM MALFUNCTION ICS/EALS	26
5	INDEPENDENT SPENT FUEL STORAGE INSTALLATION (ISFSI) ICS/EALS.....	46
6	FISSION PRODUCT BARRIER ICS/EALS	49
7	HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY ICS/EALS	65
8	SYSTEM MALFUNCTION ICS/EALS.....	88
	APPENDIX A – ACRONYMS AND ABBREVIATIONS.....	A-1
	APPENDIX B – DEFINITIONS	B-1

EMERGENCY ACTION LEVELS

1 REGULATORY BACKGROUND

1.1 OPERATING REACTORS

Title 10, Code of Federal Regulations (CFR), Energy, contains the U.S. Nuclear Regulatory Commission (NRC) regulations that apply to nuclear power facilities. Several of these regulations govern various aspects of an emergency classification scheme. The relevant sections for this document are:

- 10 CFR § 50.47(a)(1)(i)
- 10 CFR § 50.47(b)(4)
- 10 CFR § 50.54(q)
- 10 CFR § 50.72(a)
- 10 CFR § 50, Appendix E, IV.B, Assessment Actions
- 10 CFR § 50, Appendix E, IV.C, Activation of Emergency Organization

These regulations are supplemented by regulatory guidance documents. Documents of particular relevance to NEI 99-01 include:

NUREG-0654/FEMA-REP-1, *Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants*, October 1980. [Refer to Appendix 1, *Emergency Action Level Guidelines for Nuclear Power Plants*]
NUREG-1022, *Event Reporting Guidelines 10 CFR § 50.72 and § 50.73*
Regulatory Guide 1.101, *Emergency Response Planning and Preparedness for Nuclear Power Reactors*

This list is not all-inclusive. It is strongly recommended that scheme developers consult with licensing and regulatory compliance personnel to identify and understand all applicable requirements and guidance. Questions also may be directed to the NEI Emergency Preparedness staff.

1.2 INDEPENDENT SPENT FUEL STORAGE INSTALLATION (ISFSI)

Selected guidance in NEI 99-01 is applicable to licensees electing to use their 10 CFR 50 emergency plan to fulfill the requirements of 10 CFR 72.32 for a stand-alone ISFSI. The emergency classification levels applicable to an ISFSI are consistent with the requirements of 10 CFR § 50 and the guidance in NUREG 0654/FEMA-REP-1. The initiating conditions germane to a 10 CFR § 72.32 emergency plan (as described in NUREG-1567) are contained within the classification scheme for a 10 CFR § 50.47 emergency plan.

The generic ICs and EALs for an ISFSI are presented in Section 5, ISFSI ICs/EALs. IC E-HU1 covers credible natural and man-made events included within the scope of an ISFSI design. This IC is not applicable to installations or facilities that process and/or repackage spent fuel. . Additionally, appropriate aspects of IC HU1 and IC HA1 should also be included to address a HOSTILE ACTION directed against an ISFSI.

The analysis of potential onsite and offsite consequences of accidental releases associated with the operation of an ISFSI is contained in NUREG-1140, *A Regulatory Analysis on Emergency Preparedness for Fuel Cycle and Other Radioactive Material Licensees*. NUREG-1140 concluded that the postulated worst-case accident involving an ISFSI has insignificant consequences to public health and safety. This evaluation shows that the maximum offsite dose to a member of the public due to an accidental release of radioactive materials would not exceed 1 rem Effective Dose Equivalent.

1.3 NRC ORDER EA-12-051

The Fukushima Daiichi accident of March 11, 2011, was the result of a tsunami that exceeded the plant's design basis and flooded the site's emergency electrical power supplies and distribution systems. This caused an extended loss of power that severely compromised the key safety functions of core cooling and containment integrity, ultimately leading to core damage in three reactors. Although the loss of power also impaired the spent fuel pool cooling function, sufficient water inventory was maintained in the pools to prevent fuel damage from the loss of cooling.

Following a review of the Fukushima Daiichi accident, the NRC concluded that several measures were necessary to ensure adequate protection of public health and safety under the provisions of the backfit rule, 10 CFR 50.109(a)(4)(ii). One such measure was that each spent fuel pool be provided with reliable level instrumentation to significantly enhance the ability of key decision makers to effectively allocate resources following a beyond design basis event. To this end, the NRC issued Order EA-12-051, *Issuance of Order to Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation*, on March 12, 2012, to all U.S. nuclear plants with an operating license, construction permit, or combined construction and operating license.

NRC Order EA-12-051 states, in part, "All licensees ... shall have a reliable indication of the water level in associated spent fuel storage pools capable of supporting identification of the following pool water level conditions by trained personnel: (1) level that is adequate to support operation of the normal fuel pool cooling system, (2) level that is adequate to provide substantial radiation shielding for a person standing on the spent fuel pool operating deck, and (3) level where fuel remains covered and actions to implement make-up water addition should no longer be deferred." All licensees must therefore provide:

- A primary and back-up level instrument that will monitor water level from the normal level to the top of the used fuel rack in the pool;
- A display in an area accessible following a severe event; and
- Independent electrical power to each instrument channel and an alternate remote power connection capability.

NEI 12-02, *Industry Guidance for Compliance with NRC Order EA-12-051, "To Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation"*, provides guidance for complying with NRC Order EA-12-051.

NEI 99-01, Revision 6, includes three EALs that reflect the availability of the enhanced spent fuel pool level instrumentation associated with NRC Order EA-12-051. These

EALs are included within existing IC RA2, and new ICs RS2 and RG2. Associated EAL notes, bases and developer notes are also provided.

It is recommended that these EALs be implemented when the enhanced spent fuel pool level instrumentation is available for use.

The regulatory process that licensees follow to make changes to their emergency plan, including non-scheme changes to EALs, is 10 CFR 50.54(q). Licensees are responsible for evaluating a proposed change and determining whether or not it results in a reduction in the effectiveness of the plan. Based on this determination, the licensee will either make the change or submit it to the NRC for prior review and approval in accordance with 10 CFR 50.90.

1.4 ORGANIZATION AND PRESENTATION OF INFORMATION

The scheme's information is organized by Recognition Category in the following order.

- R - Abnormal Radiation Levels / Radiological Effluent
- C - Cold Shutdown / Refueling System Malfunction
- E - Independent Spent Fuel Storage Installation (ISFSI)
- F - Fission Product Barrier
- H - Hazards and Other Conditions Affecting Plant Safety
- S - System Malfunction

1.5 IC AND EAL MODE APPLICABILITY

The following table shows Recognition Categories applicable in each plant mode. The ICs and EALs for a given Recognition Category are applicable in the indicated modes.

MODE APPLICABILITY MATRIX

Mode	Category					
	R	C	E	F	H	S
Power Operations	X		X	X	X	X
Startup	X		X	X	X	X
Hot Standby	X		X	X	X	X
Hot Shutdown	X		X	X	X	X
Cold Shutdown	X	X	X		X	
Refueling	X	X	X		X	
Defueled	X	X	X		X	

Farley Units 1 and 2 Technical Specifications Table 1.1-1 provides the following operating mode definitions:

Mode	Title	Reactivity Condition (K_{eff})	% Rated Thermal Power ^(a)	Average RCS Temperature (°F)
1	Power Operation	≥ 0.99	> 5	NA
2	Startup	≥ 0.99	≤ 5	NA
3	Hot Standby	< 0.99	NA	≥ 350
4	Hot Shutdown ^(b)	< 0.99	NA	$350 > T_{avg} > 200$
5	Cold Shutdown ^(b)	< 0.99	NA	≤ 200
6	Refueling ^(c)	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 defined modes, “Defueled” is also applicable to the Farley EAL scheme, consistent with NEI 99-01. Defueled is a ‘No Mode’ condition where all of the fuel has been removed from the reactor vessel (i.e., full core offload during refueling or extended outages).

These modes are used throughout the Farley EALs with no modifications from NEI 99-01. When a unit is defueled, the Initiating Conditions designated as Mode Condition “ALL” or “Defueled” are applicable.

2 GUIDANCE ON MAKING EMERGENCY CLASSIFICATIONS

2.1 GENERAL CONSIDERATIONS

For any emergency classification, the emergency director must consider all information having a bearing on the proper assessment of an initiating condition (IC). This includes the emergency action level (EAL), the associated operating mode applicability, notes and the informing basis information. In the Recognition Category F matrices, EALs are referred to as Fission Product Barrier Thresholds; the thresholds serve the same function as an EAL.

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 provides guidance on implementing this requirement in *NSIR/DPR-ISG-01*, Interim Staff Guidance, *Emergency Planning for Nuclear Power Plants*.

All emergency classification assessments will be based on valid indications, reports or conditions. A valid indication, report, or condition, has been verified using appropriate means, leaving no doubt regarding the indicator's operability, the condition's existence, or the report's accuracy. For example, validation could be an instrument channel check, response on related or redundant indicators, or direct observation by plant personnel. Indication will be validated in a manner that supports timely emergency declaration.

For ICs and EALs that have a stipulated time duration, the emergency director will not wait until the applicable time has elapsed, but will 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 will be assumed that the release duration specified in the IC/EAL has been exceeded, absent data to the contrary.

A planned work activity resulting in an expected event or condition that 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 such cases, the controls associated with the planning, preparation and execution of the work will ensure compliance with 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.

Some EALs are assessed based on the results of analyses necessary to ascertain whether a specific EAL threshold has been exceeded. The EAL and/or the associated basis discussion will identify the necessary analysis. 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.

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

2.2 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. An EAL(s) evaluation must be consistent with the related operating mode applicability and notes. If an EAL has been met or exceeded, the IC is met and the associated ECL is declared in accordance with plant procedures.

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.

2.3 CLASSIFICATION OF MULTIPLE EVENTS AND CONDITIONS

In the event of multiple emergencies or conditions, the user will identify all met or exceeded EALs. The highest applicable ECL identified during this review is declared. For example:

If an Alert EAL and a Site Area Emergency EAL are met, a Site Area Emergency should be declared.

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

If two Alert EALs are met, an Alert will be declared.

Related guidance for 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*.

2.4 CONSIDERATION OF MODE CHANGES DURING CLASSIFICATION

The mode in effect at the time an event or condition occurred, and prior to any plant or operator response, determines whether 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.

2.5 CLASSIFICATION OF IMMINENT CONDITIONS

Although EALs provide specific thresholds, the emergency director must remain alert to events or conditions that could lead to meeting or exceeding an EAL within a relatively short period of time (i.e., a change in the ECL is IMMINENT). If, in the judgment of the emergency director, meeting an EAL is IMMINENT, the emergency classification will be made as though 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.

2.6 EMERGENCY CLASSIFICATION LEVEL UPGRADING AND DOWNGRADING

SNC policy is that once an emergency classification is made, it cannot be downgraded to a lower classification. Termination criteria contained in procedure *NMP-EP-110, Emergency Classification and Initial Actions* shall be completed for an event to be terminated. At termination, on an event specific basis, the site will enter either normal operating conditions or a recovery condition with a recovery organization established for turnover from the ERO.

2.7 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 end 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. For example, an earthquake, or failure of the reactor protection system to automatically scram/trip the reactor followed by a successful manual scram/trip.

2.8 CLASSIFICATION OF TRANSIENT CONDITIONS

Many of the ICs and EALs in this document employ time-based criteria that require 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, some transient conditions may cause an EAL to be met for a brief period of time. The following guidance will be applied to the classification of these conditions.

EAL momentarily met during expected plant response - When 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. This example presents an illustration:

An ATWS occurs and the auxiliary feedwater system fails to automatically start. Steam generator levels rapidly decrease and the plant enters an inadequate RCS

heat removal condition (a potential loss of both the fuel clad and RCS barriers). If an operator manually starts the auxiliary feedwater system in accordance with an EOP step and clears the inadequate RCS heat removal condition prior to an emergency declaration, then the classification will be based on the ATWS only.

It is important to note that the 15-minute emergency classification assessment period is not a "grace period" to delay a classification in order to perform 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 rapidly evolving situations in which an operator is able to take corrective action before the emergency director completes the review and necessary steps to make the emergency declaration. This provision ensures any public protective actions resulting from the emergency classification are truly warranted by the plant conditions.

2.9 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. Personnel could discover that an event or condition existed that met an EAL, but no emergency was declared, and the event or condition no longer exists at the time of discovery. It may be the event or condition was not recognized at the time, or there was an error in the emergency classification process.

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

3 ABNORMAL RAD LEVELS / RADIOLOGICAL EFFLUENT ICS/EALS

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
RG1 Release of gaseous radioactivity resulting in offsite dose greater than 1,000 mrem TEDE or 5,000 mrem thyroid CDE. <i>Op. Modes: All</i>	RS1 Release of gaseous radioactivity resulting in offsite dose greater than 100 mrem TEDE or 500 mrem thyroid CDE. <i>Op. Modes: All</i>	RA1 Release of gaseous or liquid radioactivity resulting in offsite dose greater than 10 mrem TEDE or 50 mrem thyroid CDE. <i>Op. Modes: All</i>	RU1 Release of gaseous or liquid radioactivity greater than 2 times the ODCM limits for 60 minutes or longer. <i>Op. Modes: All</i>
RG2 Spent fuel pool level cannot be restored to at least 131 feet for 60 minutes or longer. <i>Op. Modes: All</i>	RS2 Spent fuel pool level at 131 feet. <i>Op. Modes: All</i>	RA2 Significant lowering of water level above, or damage to, irradiated fuel. <i>Op. Modes: All</i>	RU2 UNPLANNED loss of water level above irradiated fuel. <i>Op. Modes: All</i>
		RA3 Radiation levels that impede access to equipment necessary for normal plant operations, cooldown or shutdown. <i>Op. Modes: All</i>	

ECL: General Emergency

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

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2 or 3)

Notes:

- The emergency director will declare the General 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 will be used for emergency classification assessments until the results from a dose assessment using actual meteorology are available.

- (1) Readings on ANY of the following radiation monitors greater than the reading shown below for 15 minutes or longer:

Steam Jet Air Ejector RE-15C	130 $\mu\text{Ci/cc}$ (130 R/hr)
Plant Vent Stack RE-29B (NG)	0.8 $\mu\text{Ci/cc}$

- (2) Dose assessment using actual meteorology indicates doses greater than 1,000 mrem TEDE or 5,000 mrem thyroid CDE at or beyond the site boundary.
- (3) Field survey results indicate **EITHER** of the following at or beyond the site boundary:
- Closed window dose rates greater than 1,000 mR/hr expected to continue for 60 minutes or longer.
 - Analyses of field survey samples indicate thyroid CDE greater than 5,000 mrem for one hour of inhalation.

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 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 monitor reading threshold values are determined using a dose assessment method that back calculates from the dose values specified

in the IC. The meteorology and source term (noble gases, particulates, and halogens) used are the same as those used to determine the monitor reading threshold values in ICs RS1 and RA1. This protocol will maintain intervals between the threshold values for the three classifications. Since doses are generally not monitored in real-time, a release duration of one hour is assumed, and the threshold values are based on a site boundary (or beyond) dose of 1000 mR/hour whole body or 5000 mR/hour thyroid, whichever is more limiting.

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.

ECL: General Emergency

Initiating Condition: Spent fuel pool level cannot be restored to at least 131 feet for 60 minutes or longer.

Operating Mode Applicability: All

Emergency Action Levels:

Note: The emergency director will declare the General Emergency promptly upon determining that 60 minutes has been exceeded, or will likely be exceeded.

- (1) Spent fuel pool level cannot be restored to at least 131 feet for 60 minutes or longer.

Basis:

This IC addresses a significant loss of spent fuel pool inventory control and makeup capability leading to a prolonged uncover of spent fuel. The spent fuel level instrument is located outside the Control Room but in close proximity. 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.

ECL: Site Area Emergency

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

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2 or 3)

Notes:

- The emergency director will 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 will be used for emergency classification assessments until the results from a dose assessment using actual meteorology are available.

- (1) Reading on ANY of the following radiation monitors greater than the reading shown for 15 minutes or longer:

Steam Jet Air Ejector RE-15C	13 $\mu\text{Ci/cc}$ (13 R/hr)
Plant Vent Stack RE-29B (NG)	0.08 $\mu\text{Ci/cc}$

- (2) Dose assessment using actual meteorology indicates doses greater than 100 mrem TEDE or 500 mrem thyroid CDE at or beyond the site boundary.
- (3) Field survey results indicate **EITHER** of the following at or beyond the site boundary:
- Closed window dose rates greater than 100 mR/hr expected to continue for 60 minutes or longer.
 - Analyses of field survey samples indicate thyroid CDE greater than 500 mrem for one hour of inhalation.

Basis:

This IC addresses a release of gaseous radioactivity that results in projected or actual offsite doses greater than or equal to 10 percent 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 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 monitor reading threshold values are

determined using a dose assessment method that back calculates from the dose values specified in the IC. The meteorology and source term (noble gases, particulates, and halogens) used is the same as those used to determine the monitor reading threshold values in ICs RG1 and RA1. This protocol maintains intervals between the threshold values for the three classifications. Since doses are generally not monitored in real-time, a release duration of one hour is assumed, and the threshold values are based on a site boundary (or beyond) dose of 100 mR/hour whole body or 500 mR/hour thyroid, whichever is more limiting.

The TEDE dose is set at 10 percent 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 uses IC RG1.

ECL: Site Area Emergency

Initiating Condition: Spent fuel pool level at 131 feet.

Operating Mode Applicability: All

Emergency Action Levels:

- (1) Lowering of spent fuel pool level to 131 feet.

Basis:

This IC addresses a significant loss of spent fuel pool inventory control and makeup capability leading to IMMINENT fuel damage. This condition stems from major failures of plant functions needed to protect the public that warrant a Site Area Emergency declaration. The spent fuel pool level instrument is located outside the Control Room but in close proximity.

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 uses via IC RG1 or RG2.

ECL: Alert

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

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2 or 3 or 4)

Notes:

- The emergency director will 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 will be used for emergency classification assessments until the results from a dose assessment using actual meteorology are available.

- (1) Reading on ANY of the following radiation monitors greater than the reading shown for 15 minutes or longer:

Steam Jet Air Ejector RE-15C	1.3 $\mu\text{Ci/cc}$ (1.3 R/hr)
Plant Vent Stack RE-29B (NG)	0.008 $\mu\text{Ci/cc}$

- (2) Dose assessment using actual meteorology indicates doses greater than 10 mrem TEDE or 50 mrem thyroid CDE at or beyond the site boundary.
- (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 the site boundary for one hour of exposure.
- (4) Field survey results indicate **EITHER** of the following at or beyond the site boundary:
- 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.

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 percent 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 plant safety as indicated by a radiological release that significantly exceeds regulatory limits (e.g., a significant uncontrolled release).

Radiological effluent EALs are 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 monitor reading threshold values are determined using a dose assessment method that back calculates from the dose values specified in the IC. The meteorology and source term (noble gases, particulates, and halogens) used is the same as those used to determine the monitor reading threshold values in ICs RG1 and RS1. This protocol maintains intervals between the threshold values for the three classifications. Since doses are generally not monitored in real-time, a release duration of one hour is assumed, and the threshold values are based on a site boundary (or beyond) dose of 10 mR/hour whole body or 50 mR/hour thyroid, whichever is more limiting.

The TEDE dose is set at 1 percent 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 uses IC RS1.

ECL: Alert

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

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2 or 3)

- (1) Uncovery of irradiated fuel in the REFUELING PATHWAY.
- (2) Damage to irradiated fuel resulting in a release of radioactivity from the fuel as indicated by alarms on **ANY** of the following radiation monitors:

Spent Fuel Pool Ventilation Monitor RE-25A OR B
Spent Fuel Pool Area Radiation Monitor RE-5
Containment Purge Ventilation Monitor RE-24A OR B

- (3) Lowering of spent fuel pool level to 140 feet (Level 2).

Basis:

REFUELING PATHWAY: This includes the reactor refuel cavity the fuel transfer canal, and the spent fuel pool, canals and pools through which irradiated fuel may be moved, but not including the reactor vessel.

This IC addresses events that have caused IMMINENT or actual damage to an irradiated fuel assembly. These events present radiological safety challenges to plant personnel and are precursors to a release of radioactivity to the environment. As such, they represent an actual or potential substantial degradation of the level of plant safety.

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 is based on either Recognition Category R or C ICs.

EAL #1

This EAL escalates from RU2. 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), 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 will 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 the fuel is actually uncovered. To the degree possible, readings will be considered in combination with other available indications of inventory loss.

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

EAL #2

This EAL addresses a release of radioactive material caused by mechanical damage to irradiated fuel. Damaging events may include the dropping, bumping or binding of an assembly, or dropping a heavy load onto an assembly. A rise in readings on radiation monitors will be considered in conjunction with in-plant reports or observations of a potential fuel damaging event (e.g., a fuel handling accident). Containment Purge Ventilation Monitors are not available during all modes.

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. The spent fuel pool level instrument is located outside the Control Room but in close proximity. This condition reflects a significant loss of spent fuel pool water inventory and is a precursor to a loss of the ability to adequately cool the irradiated fuel assemblies stored in the pool.

Escalation of the emergency classification level uses ICs RS1 or RS2.

ECL: Alert

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

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2)

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.

- (1) Dose rate greater than 15 mR/hr on RE-1A, Control Room Radiation Monitor.
- (2) An UNPLANNED event results in radiation levels that prohibit or impede access to any Table H1 plant rooms or areas:

Table H1		
Mode	Room Name	Room Number
3	Electrical Penetration Room	334, 333, 347 / 2334, 2333, 2347
	Hallway Outside Filter Room	312, 332/
	1A / 2A MCC areas	2312, 2332
	Sample Room and Primary CHM labs	323, 324 / 2323, 2324
4	Sample Room and Primary CHM labs	323, 324 / 2323, 2324
	RHR Hx Room.	128/ 2128

Basis:

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.

This IC addresses elevated radiation levels in certain plant rooms or 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 plant safety. The emergency director should consider the cause of the increased radiation levels and determine if another IC may be applicable.

For EAL #1, the area requiring continuous occupancy is the control room and the central alarm station. The central alarm station is in the control room envelope. The value of 15mR/hr is derived from the GDC 19 value of 5 Rem in 30 days with adjustment for expected occupancy times.

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 will 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 to 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 uses Recognition Category R, C or F ICs.

ECL: Notification of Unusual Event

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

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2 or 3)

Notes:

- The emergency director will declare the Unusual Event promptly upon determining that 60 minutes has been exceeded, or will likely be exceeded.
- If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded 60 minutes.
- If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is no longer valid for classification purposes.

- (1) Reading on **ANY** effluent radiation monitor greater than 2 times the ODCM limits for 60 minutes or longer:

Liquid Effluents	
Steam Generator Blowdown Effluent Line RE-23B	2.80×10^3 cpm
Gaseous Effluents	
Steam Jet Air Ejector RE-15	3.5×10^2 cpm
Plant Vent Gas	
R-14	3.2×10^4 cpm
RE-22	4.0×10^2 cpm
RE-29B (NG)	8.9×10^{-4} μ Ci/cc

- (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.

Liquid Radwaste Effluent Line RE-18	2 x release permit setpoint (planned release)
Plant Vent Gas R-14	2 x release permit setpoint (planned release)

- (3) Sample analysis for a gaseous or liquid release indicates a concentration or release rate greater than 2 times the ODCM limits for 60 minutes or longer.

Basis:

This IC addresses a potential decrease in the level of plant safety 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 unmonitored, 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. Administrative controls are established to prevent unintentional releases, and to control and monitor intentional releases. The occurrence of an extended, uncontrolled radioactive release to the environment indicates degradation in these features and/or controls.

Radiological effluent EALs are 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 will 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 uses IC RA1.

ECL: Notification of Unusual Event

Initiating Condition: UNPLANNED loss of water level above irradiated fuel.

Operating Mode Applicability: All

Emergency Action Levels:

- (1) a. UNPLANNED water level drop in the REFUELING PATHWAY as indicated by ANY of the following:

Personnel report of low water level
Annunciator EH2 "SFP LVL HI/LO"

AND

- b. UNPLANNED rise in area radiation levels as indicated by ANY of the following radiation monitors.

RE-5 in the spent fuel pool building
RE-2 in containment
RE-27A OR B in containment

Basis:

REFUELING PATHWAY: This includes the reactor refuel cavity the fuel transfer canal, the spent fuel pool, canals and pools through which irradiated fuel may be moved, but not including the reactor vessel.

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.

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

A water level decrease will be primarily determined by indications from available level instrumentation. Other sources of level indications 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 will 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 with Recognition Category C during the Cold Shutdown and Refueling modes.

Escalation of the emergency classification level uses IC RA2.

4 COLD SHUTDOWN / REFUELING SYSTEM MALFUNCTION ICS/EALS

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
CG1 Loss of RPV inventory affecting fuel clad integrity with containment challenged. <i>Op. Modes: Cold Shutdown, Refueling</i>	CS1 Loss of RPV inventory affecting core decay heat removal capability. <i>Op. Modes: Cold Shutdown, Refueling</i>	CA1 Loss of RPV inventory. <i>Op. Modes: Cold Shutdown, Refueling</i>	CU1 UNPLANNED loss of RPV inventory for 15 minutes or longer. <i>Op. Modes: Cold Shutdown, Refueling</i>
		CA2 Loss of all offsite and all onsite AC power to emergency buses for 15 minutes or longer. <i>Op. Modes: Cold Shutdown, Refueling, Defueled</i>	CU2 Loss of all but one AC power source to emergency buses for 15 minutes or longer. <i>Op. Modes: Cold Shutdown, Refueling, Defueled</i>
		CA3 Inability to maintain the plant in cold shutdown. <i>Op. Modes: Cold Shutdown, Refueling</i>	CU3 UNPLANNED rise in RCS temperature. <i>Op. Modes: Cold Shutdown, Refueling</i>
			CU4 Loss of Vital DC power for 15 minutes or longer. <i>Op. Modes: Cold Shutdown, Refueling</i>
			CU5 Loss of all onsite or offsite communications capabilities. <i>Op. Modes: Cold Shutdown, Refueling, Defueled</i>
		CA6 Hazardous event affecting a SAFETY SYSTEM needed for the current operating mode. <i>Op. Modes: Cold Shutdown, Refueling</i>	

ECL: General Emergency

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

Operating Mode Applicability: Cold Shutdown, Refueling

Emergency Action Levels: (1 or 2)

Note: The emergency director will declare the General Emergency promptly upon determining that 30 minutes has been exceeded, or will likely be exceeded.

- (1) a. RPV level less than ANY of the following for 30 minutes or longer:
- 0% RVLIS (Mode 5)
 - 119' Temporary Level Indicator (Mode 6)

AND

- b. ANY indication from the Containment Challenge Table C1.

- (2) a. Reactor vessel level cannot be monitored for 30 minutes or longer.

AND

- b. Core uncover is indicated by ANY of the following:
- Containment High Range Radiation Monitor RE27A or 27B reading greater than or equal to 100 R/hr.
 - Erratic source range monitor indication
 - UNPLANNED rise in Containment Sump, or Reactor Coolant Drain Tank (RCDT), or Waste Holdup Tank (WHT) levels of sufficient magnitude to indicate core uncover

AND

- c. ANY indication from the Containment Challenge Table C1.

Containment Challenge Table C1	
■	CONTAINMENT CLOSURE not established*
■	Greater than or equal to 6 % H ₂ exists inside containment
■	UNPLANNED increase in containment pressure
* If CONTAINMENT CLOSURE is re-established prior to exceeding the 30-minute time limit, then declaration of a General Emergency is not required.	

Basis:

CONTAINMENT CLOSURE: Per FNP-1(2)-STP-18.4, "Containment Integrity Verification and Closure".

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.

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 RPV 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 uncover event, it is unlikely that hydrogen buildup due to a core uncover 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 containment is challenged.

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

The inability to monitor RPV 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 indicate leakage from the RPV.

These EALs address 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*.

ECL: Site Area Emergency

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

Operating Mode Applicability: Cold Shutdown, Refueling

Emergency Action Levels: (1 or 2 or 3)

Note: The emergency director will declare the Site Area Emergency promptly upon determining that 30 minutes has been exceeded, or will likely be exceeded.

- (1) a. CONTAINMENT CLOSURE not established.

AND
 - b. RVLIS (Mode 5) level less than 16% (121'0").
- (2) a. CONTAINMENT CLOSURE established.

AND
 - b. RPV level less than ANY of the following:
 - 0% RVLIS (Mode 5)
 - 119' Temporary Level Indicator (Mode 6)
- (3) a. RPV level cannot be monitored for 30 minutes or longer.

AND
 - b. Core uncover is indicated by ANY of the following:
 - Containment High Range Radiation Monitor RE27A or 27B reading greater than or equal to 100 R/hr
 - Erratic source range monitor indication
 - UNPLANNED rise in Containment Sump, or Reactor Coolant Drain Tank (RCDT), or Waste Holdup Tank (WHT) levels of sufficient magnitude to indicate core uncover

Basis:

CONTAINMENT CLOSURE: Per FNP-1(2)-STP-18.4, "Containment Integrity Verification and Closure".

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.

This IC addresses a significant and prolonged loss of RPV 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 to protect the public and 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 RPV level cannot be restored, fuel damage is probable.

The level specified in EAL 1.b represents a level in the RPV that is 6 inches below the bottom ID of the reactor vessel penetration. This level is lower than the RPV monitoring capability of RCS level instrumentation and therefore must be monitored using RVLIS. This level will only be observable in Mode 5 with RVLIS operable. In Mode 6, when RVLIS is not operable, this IC should be evaluated using EAL #2.b or 3.

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 specified RCS/reactor vessel levels of EAL 1.b and 2.b reflect that without CONTAINMENT CLOSURE established, there is a higher probability of a fission product release to the environment.

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

The inability to monitor RPV 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 indicate leakage from the RPV.

These EALs address 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 uses IC CG1 or RG1.

ECL: Alert

Initiating Condition: Loss of RPV inventory.

Operating Mode Applicability: Cold Shutdown, Refueling

Emergency Action Levels: (1 or 2)

Note: The emergency director will declare the Alert promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) Loss of RPV inventory as indicated by level less than 122' 11".
- (2) a. RPV level cannot be monitored for 15 minutes or longer
- AND**
- b. UNPLANNED increase in Containment sump, Reactor Coolant Drain Tank (RCDT) or Waste Holdup Tank (WHT) levels due to a loss of RPV inventory.

Basis:

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.

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 122' 11" indicates that operator actions have not been successful in restoring and maintaining RPV water level. The 122' 11" level specified in EAL #1 is the minimum RCS level for RHR operation provided in procedure for mid loop operations. Below this level, loss of RHR pump net positive suction head (NPSH) may occur resulting in a loss of decay heat removal capability. 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 uncover.

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 EAL #2, the inability to monitor RPV 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 indicate leakage from the RPV.

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 RPV inventory level continues to lower, then escalation to Site Area Emergency uses IC CS1.

ECL: Alert

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

Operating Mode Applicability: Cold Shutdown, Refueling, Defueled

Emergency Action Levels:

Note: The emergency director will declare the Alert promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) Loss of **ALL** offsite and **ALL** onsite AC Power (Table S1) to **BOTH** 4160V ESF busses 1(2)F **AND** 1(2)G for 15 minutes or longer.

Table S1	
Unit 1	Unit 2
Start-up Aux XFMR 1A	Start-up Aux XFMR 2A
Start-up Aux XFMR 1B	Start-up Aux XFMR 2B
Diesel Generator 1-2A	Diesel Generator 1-2A
Diesel Generator 1B	Diesel Generator 2B
Diesel Generator 1C	Diesel Generator 1C
Diesel Generator 2C	Diesel Generator 2C

Basis:

This IC addresses a total loss of AC power (see Table S1 above) 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 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. When in these modes, this condition represents an actual or potential substantial degradation of the level of plant safety.

Fifteen minutes is the threshold to exclude transient or momentary power losses.

Escalation of the emergency classification level uses IC CS1 or RS1.

ECL: Alert

Initiating Condition: Inability to maintain the plant in cold shutdown.

Operating Mode Applicability: Cold Shutdown, Refueling

Emergency Action Levels: (1 or 2)

Note: The emergency director will declare the Alert promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.

- (1) UNPLANNED increase in RCS temperature to greater than 200 °F for greater than the duration specified in Table C2.

Table C2: RCS Heat-up Duration Thresholds		
RCS Status	Containment Closure Status	Heat-up Duration
Not Intact (or at reduced inventory)	Not Established	0 minutes
	Established	20 minutes*
Intact (but not at reduced inventory)	Not applicable	60 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.		

- (2) UNPLANNED RCS pressure increase greater than 10 psig. (This EAL does not apply during water-solid plant conditions).

Basis:

CONTAINMENT CLOSURE: Per FNP-1(2)-STP-18.4, "Containment Integrity Verification and Closure".

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.

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 plant safety.

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 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. In this case, 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 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.

Finally, 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 will allow sufficient time to address the temperature increase without a substantial degradation in plant safety.

EAL #2 provides a pressure-based indication of RCS heat-up.

Escalation of the emergency classification level uses IC CS1 or RS1.

ECL: Alert

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

Operating Mode Applicability: Cold Shutdown, Refueling

Emergency Action Levels:

- (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
 - Other events with similar hazard characteristics as determined by the Shift Manager

AND

- b. **EITHER** of the following:
 - 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.

Basis:

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.

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 may require a post-event inspection to determine if the attributes of an explosion are present.

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.

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.

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 plant safety.

The first threshold for EAL 1.b 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 will be significant enough to cause concern regarding the operability or reliability of the SAFETY SYSTEM train.

The second threshold for EAL 1.b 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 all 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 uses IC CS1 or RS1.

ECL: Notification of Unusual Event

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

Operating Mode Applicability: Cold Shutdown, Refueling

Emergency Action Levels: (1 or 2)

Note: The emergency director will declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) UNPLANNED loss of reactor coolant results in RPV level less than a required lower limit for 15 minutes or longer.
- (2) a. RPV level cannot be monitored.

AND

- b. UNPLANNED rise in Containment sump, Reactor Coolant Drain Tank, or Waste Holdup Tank levels.

Basis:

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.

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 RPV level concurrent with indications of coolant leakage. Either of these conditions is considered to be a potential degradation of the level of plant safety.

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 RPV 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 RPV 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 indicate leakage from the RPV.

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

ECL: Notification of Unusual Event

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

Operating Mode Applicability: Cold Shutdown, Refueling, Defueled

Emergency Action Levels:

Note: The emergency director will declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) a. AC power capability to **BOTH** 4160V ESF busses 1(2)F **AND** 1(2)G is reduced to a single power source (Table S1) for 15 minutes or longer.

AND

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

Table S1	
Unit 1	Unit 2
Start-up Aux XFMR 1A	Start-up Aux XFMR 2A
Start-up Aux XFMR 1B	Start-up Aux XFMR 2B
Diesel Generator 1-2A	Diesel Generator 1-2A
Diesel Generator 1B	Diesel Generator 2B
Diesel Generator 1C	Diesel Generator 1C
Diesel Generator 2C	Diesel Generator 2C

Basis:

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.

This IC describes a significant degradation of offsite and onsite AC power sources where any additional single failure would result in a loss of all AC power to SAFETY SYSTEMS. In this condition, the sole AC power source may be powering one, or more than one, train of safety-related equipment.

When in the cold shutdown, refueling, or defueled mode, this condition is not classified as an Alert because of the increased 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. When in these modes, this condition is considered to be a potential degradation of the level of plant safety.

An "AC power source" is a source recognized in AOPs and EOPs, and capable of supplying required power to an emergency bus (see Table S1 above). Examples of this condition include:

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

Fifteen minutes is the 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.

ECL: Notification of Unusual Event

Initiating Condition: UNPLANNED increase in RCS temperature.

Operating Mode Applicability: Cold Shutdown, Refueling

Emergency Action Levels: (1 or 2)

Note: The emergency director will declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) UNPLANNED increase in RCS temperature to greater than 200 °F.
- (2) Loss of **ALL** RCS temperature **AND** RPV level indication for 15 minutes or longer.

Basis:

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.

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. It represents a potential degradation of the level of plant safety. If the RCS is not intact and CONTAINMENT CLOSURE is not established during this event, the emergency director will 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, where 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 reflects a condition where there has been a significant loss of instrumentation capability necessary to monitor RCS conditions and operators are 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 is the threshold to exclude transient or momentary losses of indication.

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

ECL: Notification of Unusual Event

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

Operating Mode Applicability: Cold Shutdown, Refueling

Emergency Action Levels:

Note: The emergency director will declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) Indicated voltage is less than 105 VDC on Technical Specification required 125 VDC vital busses for 15 minutes or longer.

Basis:

This IC addresses a loss of vital DC power that 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. This condition is considered to be a potential degradation of the level of plant safety.

As used in this EAL, “required” means the vital DC busses 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 is the threshold to exclude transient or momentary power losses.

Depending upon the event, escalation of the emergency classification level uses IC CA1 or CA3, or an IC in Recognition Category R.

ECL: Notification of Unusual Event

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

Operating Mode Applicability: Cold Shutdown, Refueling, Defueled

Emergency Action Levels: (1 or 2 or 3)

- (1) Loss of **ALL** of the following onsite communication methods:

In plant telephones
Public address system
Plant radio systems

- (2) Loss of **ALL** of the following ORO communications methods:

ENN (Emergency Notification Network)
Commercial phones

- (3) Loss of **ALL** of the following NRC communications methods:

ENS on Federal Telecommunications System (FTS)
Commercial phones

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 will be assessed only when extraordinary means are used 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).

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

EAL #2 addresses a total loss of the communications methods used to notify all OROs of an emergency declaration. The OROs referred to here are the states of Alabama, Georgia, and Florida; Houston and Henry Counties, Alabama; and Early County, Georgia.

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

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5 INDEPENDENT SPENT FUEL STORAGE INSTALLATION (ISFSI) ICS/EALS

UNUSUAL EVENT

E-HU1 Damage to a loaded cask
CONFINEMENT BOUNDARY.

Op. Modes: All

ECL: Notification of Unusual Event

Initiating Condition: Damage to a loaded cask CONFINEMENT BOUNDARY.

Operating Mode Applicability: All

Emergency Action Levels:

- (1) Damage to a loaded cask CONFINEMENT BOUNDARY as indicated by an on-contact radiation reading greater than ANY of the values listed in Table E1.

Table E1	
Location of Dose Rate	Total Dose Rate (Neutron + Gamma mR/hr)
HI-TRAC 125	
Side-Mid-height	1360
Top	260
HI-STORM 100	
Side – 60 inches below mid-height	340
Side – Mid- height	350
Side – 60 inches above mid-height	170
Center of lid	50
Middle of top lid	60
Top (outlet) duct	160
Bottom (inlet) duct	460

Basis:

CONFINEMENT BOUNDARY: The barrier(s) between areas containing radioactive substances and the environment.

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 that could cause challenges in removing the cask or fuel from storage.

The existence of “damage” is determined by radiological survey. The radiation reading values listed in the table represent 2 times the site-specific cask specific technical specification allowable radiation level on the designated surface of the spent fuel cask. The technical specification multiple of “2 times” 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

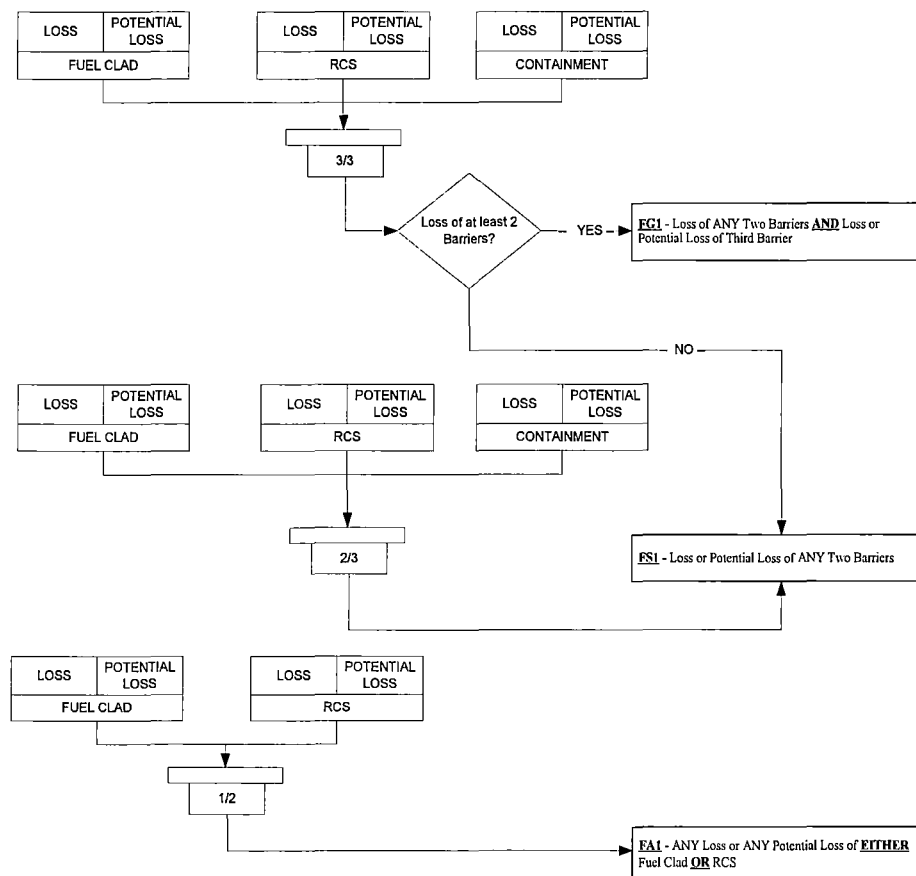
recognized that in the case of extreme damage to a loaded cask, determining if the “on-contact” dose rate limit is exceeded may be based on measurement of a dose rate at some distance from the cask.

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

6 FISSION PRODUCT BARRIER ICS/EALS

Recognition Category "F" Initiating Condition Matrix

GENERAL EMERGENCY	
FG1	Loss of any two barriers and Loss or Potential Loss of the third barrier. <i>Op. Modes: Power Operation, Hot Standby, Startup, Hot Shutdown</i>
SITE AREA EMERGENCY	
FS1	Loss or Potential Loss of any two barriers. <i>Op. Modes: Power Operation, Hot Standby, Startup, Hot Shutdown</i>
ALERT	
FA1	Any Loss or any Potential Loss of either the Fuel Clad or RCS barrier. <i>Op. Modes: Power Operation, Hot Standby, Startup, Hot Shutdown</i>



Fission Product Barrier Table

Thresholds for LOSS or POTENTIAL LOSS of Barriers

FG1 GENERAL EMERGENCY	FS1 SITE AREA EMERGENCY	FA1 ALERT
Loss of any two barriers and Loss or Potential Loss of the third barrier.	Loss or Potential Loss of any two barriers.	Any Loss or any Potential Loss of either the Fuel Clad or RCS barrier.

Fuel Clad Barrier		RCS Barrier		Containment Barrier	
LOSS	POTENTIAL LOSS	LOSS	POTENTIAL LOSS	LOSS	POTENTIAL LOSS
1. RCS or SG Tube Leakage		1. RCS or SG Tube Leakage		1. RCS or SG Tube Leakage	
Not Applicable	A. CORE COOLING CSF - ORANGE entry conditions met.	A. An automatic or manual ECCS actuation is required by EITHER of the following: <ul style="list-style-type: none"> • UNISOLABLE RCS leakage • SG tube RUPTURE. 	A. Operation of a standby charging pump is required by EITHER of the following: <ul style="list-style-type: none"> • UNISOLABLE RCS leakage • SG tube leakage. OR B. RCS INTEGRITY CSF - RED entry conditions met	A. A leaking or RUPTURED SG is FAULTED outside of containment.	Not Applicable

Fuel Clad Barrier		RCS Barrier		Containment Barrier	
LOSS	POTENTIAL LOSS	LOSS	POTENTIAL LOSS	LOSS	POTENTIAL LOSS
2. Inadequate Heat Removal		2. Inadequate Heat Removal		2. Inadequate Heat Removal	
A. CORE COOLING CSF - RED entry conditions met	A. CORE COOLING CSF - ORANGE entry conditions met OR B. HEAT SINK CSF - RED entry conditions met NOTE: Heat Sink CSF should not be considered RED if total AFW flow is less than 395 gpm due to operator action.	Not Applicable	A. HEAT SINK CSF - RED entry conditions met. NOTE: Heat Sink CSF should not be considered RED if total AFW flow is less than 395 gpm due to operator action.	Not Applicable	A. CORE COOLING CSF - RED entry conditions met for 15 minutes or longer
3. RCS Activity / Containment Radiation		3. RCS Activity / Containment Radiation		3. RCS Activity / Containment Radiation	
A. Containment radiation monitor RE-27 A or B greater than 600 R/Hr. OR B. Indications that reactor coolant activity is greater than 300 μ Ci/gm dose equivalent I-131.	Not Applicable	A. Containment radiation monitor RE-2 greater than 1 R/Hr OR Containment radiation monitor RE-7 greater than 500 mR/Hr.	Not Applicable	Not Applicable	A. Containment radiation monitor RE-27 A or B greater than 8000 R/Hr.

Fuel Clad Barrier		RCS Barrier		Containment Barrier	
LOSS	POTENTIAL LOSS	LOSS	POTENTIAL LOSS	LOSS	POTENTIAL LOSS
4. Containment Integrity or Bypass		4. Containment Integrity or Bypass		4. Containment Integrity or Bypass	
Not Applicable	Not Applicable	Not Applicable	Not Applicable	<p>A. Containment isolation is required AND EITHER of the following:</p> <ul style="list-style-type: none"> Containment integrity has been lost based on Emergency Director judgment. UNISOLABLE pathway from the containment to the environment exists. <p>OR</p> <p>B. Indications of RCS leakage outside of containment as indicated by alarms on any of the following instruments:</p> <ul style="list-style-type: none"> RE-10 RE-14 RE-21 RE-22 <p>Note: Increases in sump levels, temperatures, pressures, flow rates and/or radiation level readings outside of the containment may indicate that the RCS mass is being lost outside of containment.</p>	<p>A. CONTAINMENT CSF RED entry conditions met. OR</p> <p>B. Containment Hydrogen concentration greater than 6% OR</p> <p>C. 1. Containment pressure greater than 27 psig. AND</p> <p>2. Less than one CTMT fan coolers and one full train of CTMT Spray is operating per design for 15 minutes or longer.</p>
5. Other Indications		5. Other Indications		5. Other Indications	
Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable

Fuel Clad Barrier		RCS Barrier		Containment Barrier	
LOSS	POTENTIAL LOSS	LOSS	POTENTIAL LOSS	LOSS	POTENTIAL LOSS
6. Emergency Director Judgment		6. Emergency Director Judgment		6. Emergency Director Judgment	
A. ANY condition in the opinion of the emergency director that indicates loss of the fuel clad barrier.	A. ANY condition in the opinion of the emergency director that indicates potential loss of the fuel clad barrier.	A. ANY condition in the opinion of the emergency director that indicates loss of the RCS barrier.	A. ANY condition in the opinion of the emergency director that indicates potential loss of the RCS barrier.	A. ANY condition in the opinion of the emergency director that indicates loss of the containment barrier.	A. ANY condition in the opinion of the emergency director that indicates potential loss of the containment barrier.

Basis Information For Fission Product Barrier EALs

FUEL CLAD BARRIER THRESHOLDS:

The fuel clad barrier consists of the cladding material that contains the fuel pellets.

1. RCS or SG Tube Leakage

There is no Loss threshold associated with RCS or SG Tube Leakage.

Potential Loss 1.A

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

2. Inadequate Heat Removal

Loss 2.A

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

Potential Loss 2.A

This condition indicates temperatures within the core are sufficient to allow the onset of heat-induced cladding damage.

Potential Loss 2.B

NOTE: Heat Sink CSF should not be considered RED if total AFW flow is less than 395 gpm due to operator action.

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.

Meeting this threshold results in a Site Area Emergency because this threshold is identical to RCS barrier potential loss threshold 2.A; 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.

3. RCS Activity/Containment Radiation

Loss 3.A

The radiation monitor reading corresponds to an instantaneous release of all reactor coolant mass into the containment, assuming that reactor coolant activity equals 300 μ Ci/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 percent to 5 percent 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 3.A 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 emergency classification level to a Site Area Emergency.

Loss 3.B

This threshold indicates that RCS radioactivity concentration is greater than 300 $\mu\text{Ci/gm}$ 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 percent to 5 percent 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.

4. Containment Integrity or Bypass

Not applicable (included for numbering consistency)

5. Other Indications

Not applicable (included for numbering consistency)

6. Emergency Director Judgment

Loss 6.A

This threshold addresses any other factors used by the emergency director in determining whether the fuel clad barrier is lost.

Potential Loss 6.A

This threshold addresses any other factors used by the emergency director in determining whether the fuel clad barrier is potentially lost. The emergency director will also consider whether or not to declare the barrier potentially lost in the event that barrier status cannot be monitored.

RCS BARRIER THRESHOLDS:

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.

1. RCS or SG Tube Leakage

Loss 1.A

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.

Potential Loss 1.A

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) actuation has not occurred. The threshold is met when an operating procedure, or operating crew supervision, directs that a standby charging (makeup) pump be placed in service to restore and maintain pressurizer level.

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.

Potential Loss 1.B

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).

2. Inadequate Heat Removal

There is no loss threshold associated with inadequate heat removal.

Potential Loss 2.A

NOTE: Heat Sink CSF should not be considered RED if total AFW flow is less than 395 gpm due to operator action.

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; 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.

3. RCS Activity/Containment Radiation

Loss 3.A

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.A since it indicates a loss of the RCS barrier only.

There is no potential loss threshold associated with RCS activity/containment radiation.

4. Containment Integrity or Bypass

Not applicable (included for numbering consistency)

5. Other Indications

Not applicable (included for numbering consistency)

6. Emergency Director Judgment

Loss 6.A

This threshold addresses any other factors used by the emergency director in determining whether the RCS Barrier is lost.

Potential Loss 6.A

This threshold addresses any other factors used by the emergency director in determining whether the RCS Barrier is potentially lost. The emergency director will also consider whether or not to declare the barrier potentially lost in the event that barrier status cannot be monitored.

CONTAINMENT BARRIER THRESHOLDS:

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

1. RCS or SG Tube Leakage

Loss 1.A

This threshold addresses a leaking or RUPTURED Steam Generator (SG) that is also FAULTED outside of containment. The condition of the SG, whether leaking or RUPTURED, is determined in accordance with the thresholds for RCS Barrier Potential Loss 1.A and Loss 1.A, 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 on 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 SU3 for the fuel clad barrier (i.e., RCS activity values) and IC SU4 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 (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 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, 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 emergency classification levels resulting from primary-to-secondary leakage, with or without a steam release from the FAULTED SG, are summarized below.

P-to-S Leak Rate	Affected SG is FAULTED Outside of Containment?	
	Yes	No
Less than or equal to 25 gpm	No classification	No classification
Greater than 25 gpm	Unusual Event per SU4	Unusual Event per SU4
Requires operation of a standby charging (makeup) pump (<i>RCS barrier potential loss</i>)	Site Area Emergency per FS1	Alert per FA1
Requires an automatic or manual ECCS (SI) actuation (<i>RCS barrier loss</i>)	Site Area Emergency per FS1	Alert per FA1

There is no potential loss threshold associated with RCS or SG Tube Leakage.

2. Inadequate Heat Removal

There is no loss threshold associated with inadequate heat removal.

Potential Loss 2.A

This condition represents an IMMINENT core melt sequence that, if not corrected, could lead to vessel failure and an increased potential for containment failure. For this condition to occur, there must already have been a loss of the RCS barrier and the fuel clad barrier. If implementation of a procedure(s) to restore adequate core cooling is not effective (successful) within 15 minutes, it is assumed that the event trajectory will likely lead to core melting and a subsequent challenge of the containment barrier.

The restoration procedure is considered “effective” if core exit thermocouple readings are decreasing or if reactor vessel level is increasing. Whether the procedure(s) will be effective should be apparent within 15 minutes. The emergency director should escalate the emergency classification level as soon as it is determined that the procedure(s) will not be effective.

Severe accident analyses (e.g., NUREG-1150) have concluded that function restoration procedures can arrest core degradation in a significant fraction of core damage scenarios, and that the likelihood of containment failure is very small in these events. Given this, it

is appropriate to provide 15 minutes beyond the required entry point to determine if procedural actions can reverse the core melt sequence.

3. RCS Activity/Containment Radiation

There is no loss threshold associated with RCS activity/containment radiation.

Potential Loss 3.A

The radiation monitor reading corresponds to an instantaneous release of all reactor coolant mass into the containment, assuming that 20 percent 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 percent 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 that would then escalate the emergency classification level to a General Emergency.

4. Containment Integrity or Bypass

Loss 4.A

These thresholds address a situation where containment isolation is required and one of two conditions exists as discussed below. There may be accident and release conditions that simultaneously meet both thresholds 4.A.1 and 4.A.2.

4.A.1 – Containment integrity has been lost, i.e., the actual containment atmospheric leak rate likely exceeds that associated with allowable leakage (sometimes referred to as design leakage). Following the release of RCS mass into containment, containment pressure will fluctuate based on a variety of factors; a loss of containment integrity condition may (or may not) be accompanied by a noticeable drop in containment pressure. Recognizing the inherent difficulties in determining a containment leak rate during accident conditions, it is expected that the emergency director will assess this threshold using judgment, and with due consideration given to current plant conditions, and available operational and radiological data (e.g., containment pressure, readings on radiation monitors outside containment, operating status of containment pressure control equipment).

Two simplified examples are provided in the middle piping run of Figure 6-F-1. 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 is 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.

4.A.2 – 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.

See a simplified example in the top piping run of Figure 6-F-1. 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.

A simplified example is shown in the bottom piping run of Figure 6-F-1. 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 or system piping developed a leak that allowed steam/water to enter the Auxiliary Building, then 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 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 (design) 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 a closed 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 1.A.

Loss 4.B

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 will 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.

In the simplified example in the middle piping run of Figure 6-F-1, a leak has occurred at a reducer on a pipe carrying reactor coolant in the Auxiliary Building. Depending upon radiation monitor locations and sensitivities, the leakage could be detected by any of the four monitors depicted in the figure and cause threshold 4.A.1 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 to be met.

Potential Loss 4.A

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. This threshold is a discriminator between a Site Area Emergency and General Emergency since there is now a potential to lose the third barrier.

Potential Loss 4.B

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.

Potential Loss 4.C

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 because 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.

5. Other Indications

Not applicable (included for numbering consistency)

6. Emergency Director Judgment

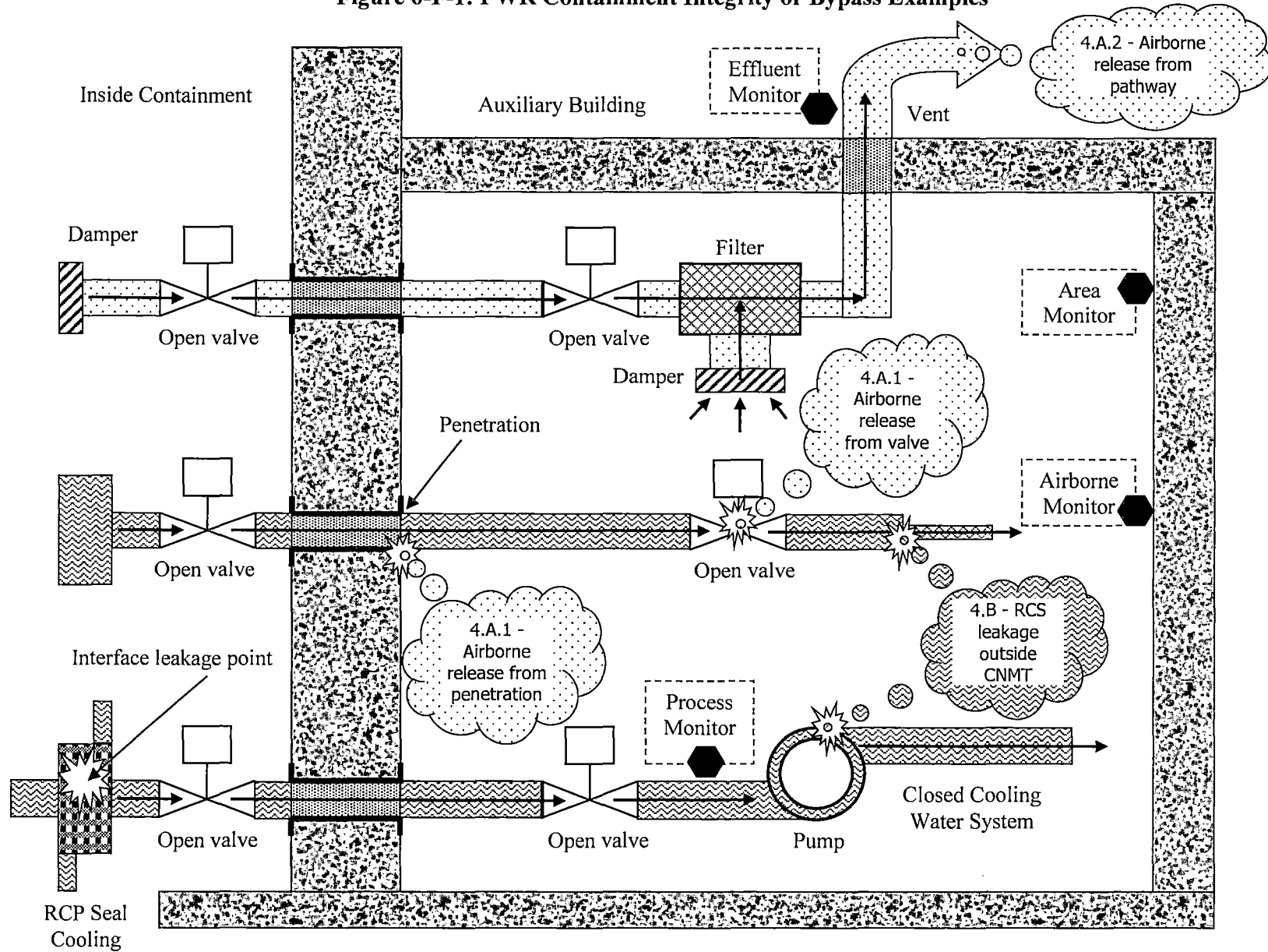
Loss 6.A

This threshold addresses any other factors used by the emergency director in determining whether the Containment Barrier is lost.

Potential Loss 6.A

This threshold addresses any other factors used by the emergency director in determining whether the containment barrier is potentially lost. The emergency director will also consider whether or not to declare the barrier potentially lost in the event that barrier status cannot be monitored.

Figure 6-F-1: PWR Containment Integrity or Bypass Examples



7 HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY ICS/EALS

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
HG1 HOSTILE ACTION resulting in loss of physical control of the facility. <i>Op. Modes: All</i>	HS1 HOSTILE ACTION within the PROTECTED AREA. <i>Op. Modes: All</i>	HA1 HOSTILE ACTION within the OWNER CONTROLLED AREA or airborne attack threat within 30 minutes. <i>Op. Modes: All</i>	HU1 Confirmed SECURITY CONDITION or threat. <i>Op. Modes: All</i>
			HU2 Seismic event greater than OBE levels. <i>Op. Modes: All</i>
			HU3 Hazardous event. <i>Op. Modes: All</i>
			HU4 FIRE potentially degrading the level of safety of the plant. <i>Op. Modes: All</i>
		HA5 Gaseous release impeding access to equipment necessary for normal plant operations, cooldown, or shutdown. <i>Op. Modes: All</i>	
	HS6 Inability to control a key safety function from outside the Control Room. <i>Op. Modes: All</i>	HA6 Control Room evacuation resulting in transfer of plant control to alternate locations. <i>Op. Modes: All</i>	
HG7 Other conditions exist which in the judgment of the emergency director warrant declaration of a General Emergency. <i>Op. Modes: All</i>	HS7 Other conditions exist which in the judgment of the emergency director warrant declaration of a Site Area Emergency. <i>Op. Modes: All</i>	HA7 Other conditions exist which in the judgment of the emergency director warrant declaration of an Alert. <i>Op. Modes: All</i>	HU7 Other conditions exist which in the judgment of the emergency director warrant declaration of a NOUE. <i>Op. Modes: All</i>

ECL: General Emergency

Initiating Condition: HOSTILE ACTION resulting in loss of physical control of the facility.

Operating Mode Applicability: All

Emergency Action Levels:

- (1) a. A HOSTILE ACTION is occurring or has occurred within the PROTECTED AREA as reported by the on shift Security Captain or designee.
- AND**
- b. **EITHER** of the following has occurred:
1. **ANY** of the following safety functions cannot be controlled or maintained.
 - Reactivity control
 - Core cooling
 - RCS heat removal
 - OR**
 2. Damage to spent fuel has occurred or is IMMINENT.

Basis:

HOSTILE ACTION: An act toward a nuclear power plant (NPP) or its personnel that includes the use of violent force to destroy equipment, take HOSTAGES, and/or intimidate the licensee to achieve an end. This includes attack by air, land, or water using guns, explosives, PROJECTILES, vehicles, or other devices used to deliver destructive force. Other acts that satisfy the overall intent may be included. HOSTILE ACTION should not be construed to include acts of civil disobedience or felonious acts that are not part of a concerted attack on the NPP. 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 (OCA)).

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 (PA): The area that encompasses all controlled areas within the security protected area fence.

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 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]*.

Emergency plans and implementing procedures are public documents; therefore, EALs should not incorporate security-sensitive information. This includes information that may be advantageous to a potential adversary, such as the particulars concerning a specific threat or threat location. Security-sensitive information should be contained in non-public documents such as the Security Plan.

ECL: General Emergency

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

Operating Mode Applicability: All

Emergency Action Levels:

- (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.

Basis:

HOSTILE ACTION: An act toward a nuclear power plant (NPP) or its personnel that includes the use of violent force to destroy equipment, take HOSTAGES, and/or intimidate the licensee to achieve an end. This includes attack by air, land, or water using guns, explosives, PROJECTILES, vehicles, or other devices used to deliver destructive force. Other acts that satisfy the overall intent may be included. HOSTILE ACTION should not be construed to include acts of civil disobedience or felonious acts that are not part of a concerted attack on the NPP. 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 (OCA)).

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.

This IC addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist that are believed by the emergency director to fall under the emergency classification level description for a General Emergency.

ECL: Site Area Emergency

Initiating Condition: HOSTILE ACTION within the PROTECTED AREA.

Operating Mode Applicability: All

Emergency Action Levels:

- (1) A HOSTILE ACTION is occurring or has occurred within the PROTECTED AREA as reported by the on shift Security Captain or designee.

Basis:

HOSTILE ACTION: An act toward a nuclear power plant (NPP) or its personnel that includes the use of violent force to destroy equipment, take HOSTAGES, and/or intimidate the licensee to achieve an end. This includes attack by air, land, or water using guns, explosives, PROJECTILES, vehicles, or other devices used to deliver destructive force. Other acts that satisfy the overall intent may be included. HOSTILE ACTION should not be construed to include acts of civil disobedience or felonious acts that are not part of a concerted attack on the NPP. 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 (OCA)).

PROTECTED AREA (PA): The area that encompasses all controlled areas within the security protected area fence.

This IC addresses the occurrence of a HOSTILE ACTION within the PROTECTED AREA (PA). This event will require rapid response and assistance due to the possibility for damage to plant equipment.

Timely and accurate communications between Security shift supervision and the control room is essential for proper classification of a security-related event.

Security plans and terminology are based on the guidance provided by NEI 03-12, *Template for the Security Plan, Training and Qualification Plan, Safeguards Contingency Plan [and Independent Spent Fuel Storage Installation Security Program]*.

As time and conditions allow, these events require a heightened state of readiness by the plant staff and implementation of onsite protective measures (e.g., evacuation, dispersal, or sheltering). The Site Area Emergency declaration will mobilize 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 incidents that are accidental events, acts of civil disobedience, or otherwise are not a HOSTILE ACTION perpetrated by a HOSTILE FORCE. Examples include the crash of a small aircraft, shots from hunters, physical disputes between employees, etc. Reporting of these types of events is adequately addressed by other EALs, or the requirements of 10 CFR § 73.71 or 10 CFR § 50.72.

Emergency plans and implementing procedures are public documents; therefore, EALs should not incorporate security-sensitive information. This includes information that may be

advantageous to a potential adversary, such as the particulars concerning a specific threat or threat location. Security-sensitive information should be contained in non-public documents such as the Security Plan.

Escalation of the emergency classification level uses IC HG1.

ECL: Site Area Emergency

Initiating Condition: Inability to control a key safety function from outside the Control Room.

Operating Mode Applicability: All

Emergency Action Levels:

Note: The emergency director will declare the Site Area Emergency promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) a. An event has resulted in plant control being transferred from the control room to the remote shutdown panel.

AND

- b. Control of **ANY** of the following key safety functions is not reestablished within 15 minutes.

- Reactivity control
- Core cooling
- RCS heat removal

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 “control” is established at the remote safe shutdown location(s) is based on emergency director judgment. The emergency director is expected to make a reasonable, informed judgment within 15 minutes as to whether the operating staff has control of key safety functions from the remote safe shutdown location(s).

Escalation of the emergency classification level uses IC FG1 or CG1.

ECL: Site Area Emergency

Initiating Condition: Other conditions exist which in the judgment of the emergency director warrant declaration of a Site Area Emergency.

Operating Mode Applicability: All

Emergency Action Levels:

- (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.

Basis:

HOSTILE ACTION: An act toward a nuclear power plant (NPP) or its personnel that includes the use of violent force to destroy equipment, take HOSTAGES, and/or intimidate the licensee to achieve an end. This includes attack by air, land, or water using guns, explosives, PROJECTILES, vehicles, or other devices used to deliver destructive force. Other acts that satisfy the overall intent may be included. HOSTILE ACTION should not be construed to include acts of civil disobedience or felonious acts that are not part of a concerted attack on the NPP. 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 (OCA)).

This IC addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist that are believed by the emergency director to fall under the emergency classification level description for a Site Area Emergency.

ECL: Alert

Initiating Condition: HOSTILE ACTION within the OWNER CONTROLLED AREA or airborne attack threat within 30 minutes.

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2)

- (1) A HOSTILE ACTION is occurring or has occurred within the OWNER CONTROLLED AREA as reported by the on shift Security Captain or designee.
- (2) A validated notification from NRC of an aircraft attack threat within 30 minutes of the site.

Basis:

HOSTILE ACTION: An act toward a nuclear power plant (NPP) or its personnel that includes the use of violent force to destroy equipment, take HOSTAGES, and/or intimidate the licensee to achieve an end. This includes attack by air, land, or water using guns, explosives, PROJECTILES, vehicles, or other devices used to deliver destructive force. Other acts that satisfy the overall intent may be included. HOSTILE ACTION should not be construed to include acts of civil disobedience or felonious acts that are not part of a concerted attack on the NPP. 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 (OCA)).

OWNER CONTROLLED AREA (OCA): The site property owned by or otherwise under the control of FNP security.

This IC addresses the occurrence of a HOSTILE ACTION within the OWNER CONTROLLED AREA (OCA) 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 (PA), 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, 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 is applicable for any HOSTILE ACTION occurring, or that has occurred, in the OWNER CONTROLLED AREA (OCA).

EAL #2 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 station procedures.

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 (OCA) 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, will not be unduly delayed while awaiting notification by a Federal agency.

Emergency plans and implementing procedures are public documents; therefore, EALs should not incorporate security-sensitive information. This includes information that may be advantageous to a potential adversary, such as the particulars concerning a specific threat or threat location. Security-sensitive information should be contained in non-public documents such as the Security Plan.

Escalation of the emergency classification level uses IC HS1.

ECL: Alert

Initiating Condition: Gaseous release impeding access to equipment necessary for normal plant operations, cooldown or shutdown.

Operating Mode Applicability: All

Emergency Action Levels:

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.

- (1) a. Release of a toxic, corrosive, asphyxiant or flammable gas into any Table H1 plant rooms or areas:

Table H1		
Mode	Room Name	Room Number
3	Electrical Penetration Room	334, 333, 347 / 2334, 2333, 2347
	Hallway Outside Filter Room	312, 332/ 2312, 2332
	1A / 2A MCC areas	
	Sample Room and Primary CHM labs	323, 324 / 2323, 2324
4	Sample Room and Primary CHM labs	323, 324 / 2323, 2324
	RHR Hx Room.	128/ 2128

AND

- b. Entry into the room or area is prohibited or impeded.

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 plant safety.

An Alert declaration is warranted if entry into the affected room/area is, or may be, procedurally required during the plant operating mode in effect at the time of the gaseous release. The emergency classification is not contingent upon whether entry is actually necessary at the time of the release.

Evaluation of the IC and EAL do not require atmospheric sampling; it only requires the emergency director's judgment that the gas concentration in the affected room/area is sufficient to preclude or significantly impede procedurally required access. This judgment may be based on a variety of factors including an existing job hazard analysis, report of ill effects on personnel, advice from a subject matter expert or operating experience with the same or similar hazards.

Access should be considered as impeded if extraordinary measures are necessary to facilitate entry of personnel into the affected room/area (e.g., requiring use of protective equipment, such as SCBAs, that is not routinely employed).

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

- The plant is in an operating mode different than the mode specified for the affected room/area (i.e., entry is not required during the operating mode in effect at the time of the gaseous release). For example, the plant is in Mode 1 when the gaseous release occurs, and the procedures used for normal operation, cooldown and shutdown do not require entry into the affected room until Mode 4.
- The gas release is a planned activity that includes compensatory measures to 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.

An asphyxiant is a gas capable of reducing the level of oxygen in the body to dangerous levels. Most commonly, asphyxiants work by displacing air in an enclosed environment. This reduces the concentration of oxygen below the normal level of around 19 percent, 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 uses Recognition Category R, C or F ICs.

ECL: Alert

Initiating Condition: Control Room evacuation resulting in transfer of plant control to alternate locations.

Operating Mode Applicability: All

Emergency Action Levels:

- (1) An event has resulted in plant control being transferred from the control room to the remote shutdown panel.

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 uses IC HS6.

ECL: Alert

Initiating Condition: Other conditions exist which in the judgment of the emergency director warrant declaration of an Alert.

Operating Mode Applicability: All

Emergency Action Levels:

- (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.

Basis:

HOSTILE ACTION: An act toward a nuclear power plant (NPP) or its personnel that includes the use of violent force to destroy equipment, take HOSTAGES, and/or intimidate the licensee to achieve an end. This includes attack by air, land, or water using guns, explosives, PROJECTILES, vehicles, or other devices used to deliver destructive force. Other acts that satisfy the overall intent may be included. HOSTILE ACTION should not be construed to include acts of civil disobedience or felonious acts that are not part of a concerted attack on the NPP. 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 (OCA)).

This IC addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist that are believed by the emergency director to fall under the emergency classification level description for an Alert.

ECL: Notification of Unusual Event

Initiating Condition: Confirmed SECURITY CONDITION or threat.

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2 or 3)

- (1) A SECURITY CONDITION that does not involve a HOSTILE ACTION as reported by the on shift Security Captain or designee.
- (2) Notification of a credible security threat directed at FNP.
- (3) A validated notification from the NRC providing information of an aircraft threat.

Basis:

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 a nuclear power plant (NPP) or its personnel that includes the use of violent force to destroy equipment, take HOSTAGES, and/or intimidate the licensee to achieve an end. This includes attack by air, land, or water using guns, explosives, PROJECTILES, vehicles, or other devices used to deliver destructive force. Other acts that satisfy the overall intent may be included. HOSTILE ACTION should not be construed to include acts of civil disobedience or felonious acts that are not part of a concerted attack on the NPP. 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 (OCA)).

This IC addresses events that pose a threat to plant personnel or SAFETY SYSTEM equipment, and 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 OROs.

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 references site security force 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 addresses the receipt of a credible security threat. The credibility of the threat is

assessed in accordance with station procedures.

EAL #3 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 station procedures.

Emergency plans and implementing procedures are public documents; therefore, EALs should not incorporate security-sensitive information. This includes information that may be advantageous to a potential adversary, such as the particulars concerning a specific threat or threat location. Security-sensitive information should be contained in non-public documents such as the Security Plan.

Escalation of the emergency classification level uses IC HA1.

ECL: Notification of Unusual Event

Initiating Condition: Seismic event greater than OBE levels.

Operating Mode Applicability: All

Emergency Action Levels:

- (1) Seismic event greater than Operating Basis Earthquake (OBE) as indicated by seismic switch activation with the seismic system computer indicating **EITHER** of the following:
 - Cumulative Absolute Velocity (CAV) greater than 0.160 g-sec AND Spectral Acceleration greater than 0.200 g.
 - Cumulative Absolute Velocity (CAV) greater than 0.160 g-sec AND Spectral Velocity greater than 15.240 cm/sec.

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 plant safety.

Event verification with external sources should not be necessary during or following an OBE. Earthquakes of this magnitude should readily be felt by on-site personnel and recognized as a seismic event (e.g., typical lateral accelerations are in excess of 0.08g). The shift manager or emergency director may seek external verification if deemed appropriate (e.g., a call to the USGS or check of 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 uses IC CA6 or SA9.

ECL: Notification of Unusual Event

Initiating Condition: Hazardous event.

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2 or 3 or 4 or 5)

Note: EAL #4 does not apply to routine traffic impediments such as fog, snow, ice, or vehicle breakdowns or accidents.

- (1) A tornado strike within the PROTECTED AREA.
- (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.
- (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).
- (4) A hazardous event that results in on-site conditions sufficient to prohibit the plant staff from accessing the site via personal vehicles.
- (5) Sustained hurricane force winds greater than 74 mph forecast to be at the plant site in the next four hours.

Basis:

PROTECTED AREA (PA): The area that encompasses all controlled areas within the security protected area fence.

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.

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

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

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 (PA).

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, or dam failure, etc., or an on-site train derailment blocking the access road.

This EAL is not intended to apply to routine impediments such as fog, snow, ice, or vehicle breakdowns or accidents, but rather to more significant conditions such as the Hurricane Andrew strike on Turkey Point in 1992, the flooding around the Cooper Station during the Midwest floods of 1993, or the flooding around Ft. Calhoun Station in 2011.

EAL #5 addresses phenomena of the hurricane based on the severe weather mitigation procedure.

Escalation of the emergency classification level is based on ICs in Recognition Categories A, F, S or C.

ECL: Notification of Unusual Event

Initiating Condition: FIRE potentially degrading the level of safety of the plant.

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2 or 3 or 4)

Note: The emergency director will declare the Unusual Event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.

- (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** Table H2 rooms or areas.

- (2) a. Receipt of a single fire alarm (i.e., no other indications of a FIRE).

AND

- b. The FIRE is located within **ANY** Table H2 rooms or areas

AND

- c. The existence of a FIRE is not verified within 30-minutes of alarm receipt.

- (3) A FIRE within the plant PROTECTED AREA not extinguished within 60-minutes of the initial report, alarm or indication.

- (4) A FIRE within the plant PROTECTED AREA that requires firefighting support by an offsite fire response agency to extinguish.

Table H2
Auxiliary Building
Diesel Generator Building
Service Water Intake Structure (SWIS)
Containment
RWST
CST

Basis:

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 (PA): The area that encompasses all controlled areas within the security protected area fence.

This IC addresses the magnitude and extent of FIRES that may be indicative of a potential degradation of the level of plant safety.

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 include a drop in fire main pressure, automatic activation of a suppression system.

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 (PA) not extinguished within 60-minutes may also potentially degrade the level of plant safety.

EAL #4

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.

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.

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 uses IC CA6 or SA9.

ECL: Notification of Unusual Event

Initiating Condition: Other conditions exist which in the judgment of the emergency director warrant declaration of a NOUE.

Operating Mode Applicability: All

Emergency Action Levels:

- (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.

Basis:

This IC addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist that are believed by the emergency director to fall under the emergency classification level description for a NOUE.

8 SYSTEM MALFUNCTION ICS/EALS

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
SG1 Prolonged loss of all offsite and all onsite AC power to emergency buses. <i>Op. Modes: Power Operation, Startup, Hot Standby, Hot Shutdown</i>	SS1 Loss of all offsite and all onsite AC power to emergency buses for 15 minutes or longer. <i>Op. Modes: Power Operation, Startup, Hot Standby, Hot Shutdown</i>	SA1 Loss of all but one AC power source to emergency buses for 15 minutes or longer. <i>Op. Modes: Power Operation, Startup, Hot Standby, Hot Shutdown</i>	SU1 Loss of all offsite AC power capability to emergency buses for 15 minutes or longer. <i>Op. Modes: Power Operation, Startup, Hot Standby, Hot Shutdown</i>
		SA2 UNPLANNED loss of Control Room indications for 15 minutes or longer with a significant transient in progress. <i>Op. Modes: Power Operation, Startup, Hot Standby, Hot Shutdown</i>	SU2 UNPLANNED loss of Control Room indications for 15 minutes or longer. <i>Op. Modes: Power Operation, Startup, Hot Standby, Hot Shutdown</i>
			SU3 Reactor coolant activity greater than Technical Specification allowable limits. <i>Op. Modes: Power Operation, Startup, Hot Standby, Hot Shutdown</i>
			SU4 RCS leakage for 15 minutes or longer. <i>Op. Modes: Power Operation, Startup, Hot Standby, Hot Shutdown</i>
	SS5 Inability to shutdown the reactor causing a challenge to core cooling or RCS heat removal. <i>Op. Modes: Power Operation</i>	SA5 Automatic or manual trip fails to shutdown the reactor, and subsequent manual actions taken at the reactor control consoles are not successful in shutting down the reactor. <i>Op. Modes: Power Operation</i>	SU5 Automatic or manual trip fails to shutdown the reactor. <i>Op. Modes: Power Operation</i>

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
			SU6 Loss of all onsite or offsite communications capabilities. <i>Op. Modes: Power Operation, Startup, Hot Standby, Hot Shutdown</i>
			SU7 Failure to isolate containment or loss of containment pressure control. <i>Op. Modes: Power Operation, Startup, Hot Standby, Hot Shutdown</i>
SG8 Loss of all AC and vital DC power sources for 15 minutes or longer. <i>Op. Modes: Power Operation, Startup, Hot Standby, Hot Shutdown</i>	SS8 Loss of all vital DC power for 15 minutes or longer. <i>Op. Modes: Power Operation, Startup, Hot Standby, Hot Shutdown</i>		
		SA9 Hazardous event affecting a SAFETY SYSTEM needed for the current operating mode. <i>Op. Modes: Power Operation, Startup, Hot Standby, Hot Shutdown</i>	

ECL: General Emergency

Initiating Condition: Prolonged loss of all offsite and all onsite AC power to emergency buses.

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels:

Note: The emergency director will declare the General Emergency promptly upon determining that 4 hours has been exceeded, or will likely be exceeded.

- (1) a. Loss of **ALL** offsite and **ALL** onsite AC power to **BOTH** 4160V ESF busses 1(2)F **AND** 1(2)G.

AND

- b. **EITHER** of the following:

- Restoration of at least one AC emergency bus in less than 4 hours is not likely.
- CORE COOLING CSF - RED conditions met.

Basis:

This IC addresses a prolonged loss of all power sources to AC emergency busses. 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 will 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 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 bus will be based on a realistic appraisal of the situation. Mitigation actions with a low probability of success will 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.

ECL: General Emergency

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

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels:

Note: The emergency director will declare the General Emergency promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) a. Loss of **ALL** offsite and **ALL** onsite AC power to **BOTH** 4160V ESF busses 1(2)F **AND** 1(2)G for 15 minutes or longer.

AND

- b. Indicated voltage is less than 105 VDC on **ALL** 125 VDC vital busses for 15 minutes or longer.

Basis:

This IC addresses a concurrent and prolonged loss of both AC and vital DC power. 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 loss of vital DC power compromises the ability to monitor and control SAFETY SYSTEMS. A sustained loss of both AC and DC power will lead to multiple challenges to fission product barriers.

Fifteen minutes is the threshold to exclude transient or momentary power losses. The 15-minute emergency declaration clock begins at the point when both EAL thresholds are met.

ECL: Site Area Emergency

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

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels:

Note: The emergency director will declare the Site Area Emergency promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) Loss of **ALL** offsite and **ALL** onsite AC power to **BOTH** 4160V ESF busses 1(2)F **AND** 1(2)G for 15 minutes or longer.

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 is the threshold to exclude transient or momentary power losses.

Escalation of the emergency classification level uses ICs RG1, FG1 or SG1.

ECL: Site Area Emergency

Initiating Condition: Inability to shutdown the reactor causing a challenge to core cooling or RCS heat removal.

Operating Mode Applicability: Power Operation

Emergency Action Levels:

Note: Heat Sink CSF should not be considered RED if total AFW flow is less than 395 gpm due to operator action.

- (1) a. An automatic or manual trip 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:
- Core Cooling CSF - RED conditions met
 - Heat Sink CSF – Red conditions met

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 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 because the Recognition Category F ICs/EALs do not address the additional threat posed by a failure to shutdown the reactor. The inclusion of this IC and EAL ensures the timely declaration of a Site Area Emergency in response to prolonged failure to shutdown the reactor.

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

Escalation of the emergency classification level uses IC RG1 or FG1.

ECL: Site Area Emergency

Initiating Condition: Loss of all vital DC power for 15 minutes or longer.

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels:

Note: The emergency director will declare the Site Area Emergency promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) Indicated voltage is less than 105 VDC on **ALL** 125 VDC vital busses for 15 minutes or longer.

Basis:

This IC addresses a loss of vital DC power that 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 uses ICs RG1, FG1 or SG8.

ECL: Alert

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

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels:

Note: The emergency director will declare the Alert promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) a. AC power capability to **BOTH** 4160V ESF busses 1(2)F **AND** 1(2)G is reduced to a single power source (Table S1) 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.

Table S1	
Unit 1	Unit 2
Start-up Aux XFMR 1A	Start-up Aux XFMR 2A
Start-up Aux XFMR 1B	Start-up Aux XFMR 2B
Diesel Generator 1-2A	Diesel Generator 1-2A
Diesel Generator 1B	Diesel Generator 2B
Diesel Generator 1C	Diesel Generator 1C
Diesel Generator 2C	Diesel Generator 2C

Basis:

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.

This IC describes a significant degradation of offsite and onsite AC power sources where 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 bus (see Table S1 above). Some examples of this condition are presented below.

- A loss of all offsite power with a concurrent failure of all but one emergency power source (e.g., an onsite diesel generator).

- A loss of all offsite power and loss of all emergency power sources (e.g., onsite diesel generators) with a single train of emergency busses being back-fed from the unit main generator.
- A loss of emergency power sources (e.g., onsite diesel generators) with a single train of emergency busses being back-fed from an offsite power source.

Fifteen minutes is the threshold to exclude transient or momentary losses of power.

Escalation of the emergency classification level uses IC SS1.

ECL: Alert

Initiating Condition: UNPLANNED loss of Control Room indications for 15 minutes or longer with a significant transient in progress.

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels:

Note: The emergency director will declare the Alert promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) a. 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.

Reactor Power
RCS Level
RCS Pressure
In-Core/Core Exit Temperature
Wide Range Levels in at least one steam generator
Steam Generator Auxiliary Feed Water Flow

AND

- b. 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 trip
 - ECCS actuation

Basis:

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.

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 represents a potential substantial degradation in the level of plant safety.

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. Various instrumentation is also used to determine RCS Level – RVLIS, pressurizer level, digital or recorders. A loss of all Control Room sources for this parameter would also apply.

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 is 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, then the availability of other parameter values may be compromised as well.

Fifteen minutes is the threshold to exclude transient or momentary losses of indication.

Escalation of the emergency classification level uses ICs FS1 or IC RS1.

ECL: Alert

Initiating Condition: Automatic or manual trip fails to shutdown the reactor, and subsequent manual actions taken at the reactor control consoles are not successful in shutting down the reactor.

Operating Mode Applicability: Power Operation

Emergency Action Level:

- (1) a. An automatic or manual trip did not shutdown the reactor.

AND

- b. Manual actions taken at the reactor control consoles are not successful in shutting down the reactor.

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 plant safety. 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 consoles is any operator action, or set of actions, that 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 consoles (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".

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 shutdown 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 SS5. Depending upon plant responses and symptoms, escalation is also possible via IC FS1. Absent the plant conditions needed to meet either IC SS5 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.

ECL: Alert

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

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels:

- (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
 - Other events with similar hazard characteristics as determined by the Shift Manager
- AND**
- b. **EITHER** of the following:
- 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.

Basis:

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.

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 may require a post-event inspection to determine if the attributes of an explosion are present.

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.

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.

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 plant safety.

The first threshold for EAL 1.b 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 will be significant enough to cause concern regarding the operability or reliability of the SAFETY SYSTEM train.

The second threshold for EAL 1.b 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 all 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 uses IC FS1 or RS1.

ECL: Notification of Unusual Event

Initiating Condition: Loss of all offsite AC power capability to emergency busses for 15 minutes or longer.

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels:

Note: The emergency director will declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) Loss of **ALL** offsite AC power capability (Table S2) to **BOTH** 4160V ESF busses 1(2)F **AND** 1(2)G for 15 minutes or longer.

Table S2	
Unit 1	Unit 2
Start-up Aux XFMR 1A	Start-up Aux XFMR 2A
Start-up Aux XFMR 1B	Start-up Aux XFMR 2B

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 busses. This condition represents a potential reduction in the level of plant safety.

For emergency classification purposes, “capability” means that an offsite AC power source(s) is available to the emergency busses (see Table S2 above), whether or not the busses are powered from it.

Fifteen minutes is the threshold to exclude transient or momentary losses of offsite power.

Escalation of the emergency classification level uses IC SA1.

ECL: Notification of Unusual Event

Initiating Condition: UNPLANNED loss of Control Room indications for 15 minutes or longer.

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels:

Note: The Emergency Director should declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (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.

Reactor Power
RCS Level
RCS Pressure
In-Core/Core Exit Temperature
Wide Range Level in at least one steam generator
Steam Generator Auxiliary Feed Water Flow

Basis:

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.

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 plant safety.

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. Various instrumentation is also used to determine RCS Level – RVLIS, pressurizer level, digital or recorders. A loss of all Control Room sources for this parameter would also apply.

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 is 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 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, then the availability of other parameter values may be compromised as well.

Fifteen minutes is the threshold to exclude transient or momentary losses of indication.

Escalation of the emergency classification level uses IC SA2.

ECL: Notification of Unusual Event

Initiating Condition: Reactor coolant activity greater than Technical Specification allowable limits.

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels:

- (1) RCS coolant sample activity value indicating fuel clad degradation greater than Technical Specification allowable limits as indicated by **ANY** of the following:

Dose Equivalent I-131 greater than 0.5 $\mu\text{Ci/gm}$ for greater than 48 hours
Dose Equivalent I-131 greater than Technical Specification figure 3.4.16-1. IF less than 20% power, THEN use the Dose Equivalent I-131 20% power limit on Technical Specification figure 3.4.16-1
RCS gross specific activity greater than $100/\bar{E}$ $\mu\text{Ci/gm}$.

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 plant safety.

Escalation of the emergency classification level uses ICs FA1 or the Recognition Category R ICs.

ECL: Notification of Unusual Event

Initiating Condition: RCS leakage for 15 minutes or longer.

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels: (1 or 2 or 3)

Note: The emergency director will declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) RCS unidentified or pressure boundary leakage greater than 10 gpm for 15 minutes or longer.
- (2) RCS identified leakage greater than 25 gpm for 15 minutes or longer.
- (3) Leakage from the RCS to a location outside containment greater than 25 gpm for 15 minutes or longer.

Basis:

This IC addresses RCS leakage that could 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 plant safety.

EAL #1 and EAL #2 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 addresses a RCS mass loss caused by an UNISOLABLE leak through an interfacing system. These EALs 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 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 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 is 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 uses ICs of Recognition Category R or F.

ECL: Notification of Unusual Event

Initiating Condition: Automatic or manual trip fails to shutdown the reactor.

Operating Mode Applicability: Power Operation

Emergency Action Levels: (1 or 2)

- (1) a. An automatic trip did not shutdown the reactor.

AND

b. A subsequent manual action taken at the reactor control consoles is successful in shutting down the reactor.
- (2) a. A manual trip did not shutdown the reactor.

AND

b. **EITHER** of the following:
 - A subsequent manual action taken at the reactor control consoles is successful in shutting down the reactor.
 - A subsequent automatic trip is successful in shutting down the reactor.

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 represents a potential degradation of the level of plant safety.

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, that 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 SA5. Depending upon the plant response, escalation is also possible via IC FA1. Absent the plant conditions needed to meet either IC SA5 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 signal be generated as a result of plant work (e.g., RPS setpoint testing), the following classification guidance will 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 will 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.

ECL: Notification of Unusual Event

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

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels: (1 or 2 or 3)

- (1) Loss of **ALL** of the following onsite communication methods:

In plant telephones
Public address system
Plant radio systems

- (2) Loss of **ALL** of the following ORO communications methods:

ENN (Emergency Notification Network)
Commercial phones

- (3) Loss of **ALL** of the following NRC communications methods:

ENS on Federal Telecommunications System (FTS)
Commercial phones

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 will be assessed only when extraordinary means are used 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).

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

EAL #2 addresses a total loss of the communications methods used to notify all OROs of an emergency declaration. The OROs referred to here are the states of Alabama, Georgia, and Florida; Houston and Henry Counties, Alabama; and Early County, Georgia.

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

ECL: Notification of Unusual Event

Initiating Condition: Failure to isolate containment or loss of containment pressure control.

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels: (1 or 2)

- (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.
- (2) a. Containment pressure greater than 27 psig.

AND
 - b. Less than one CTMT fan cooler **AND** one full train of CTMT spray is operating per design for 15 minutes or longer.

Basis:

This IC 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 plant safety.

For EAL #1, 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 – will be made in accordance with the appropriate criteria contained in the plant AOPs and EOPs. The 15-minute criterion is included to allow operators time to manually isolate the required penetrations, if possible.

EAL #2 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. At Farley, a single CTMT fan cooler along with one train of CTMT spray is required per design basis. 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 will 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.

APPENDIX A – ACRONYMS AND ABBREVIATIONS

AC	.....	Alternating Current
AOP	.....	Abnormal Operating Procedure
ATWS	.....	Anticipated Transient Without Scram
CC	.....	Cubic Centimeter
CDE	.....	Committed Dose Equivalent
CFR	.....	Code of Federal Regulations
CHM	.....	Chemistry
CPM	.....	Counts Per Minute
CTMT/CNMT	.....	Containment
CSF	.....	Critical Safety Function
DC	.....	Direct Current
EAL	.....	Emergency Action Level
ECCS	.....	Emergency Core Cooling System
ECL	.....	Emergency Classification Level
ENN	.....	Emergency Notification Network
ENS	.....	Emergency Notification System
EOP	.....	Emergency Operating Procedure
EPA	.....	Environmental Protection Agency
ESF	.....	Engineered Safety Feature
FAA	.....	Federal Aviation Administration
FBI	.....	Federal Bureau of Investigation
FEMA	.....	Federal Emergency Management Agency
FNP	.....	Farley Nuclear Plant
FTS	.....	Federal Telecommunications System
GE	.....	General Emergency
HOO	.....	Headquarters Operations Officer (NRC)
Hx	.....	Heat Exchanger
IC	.....	Initiating Condition
ID	.....	Inside Diameter
ISFSI	.....	Independent Spent Fuel Storage Installation
K_{eff}	.....	Effective Neutron Multiplication Factor
MCB	.....	Main Control Board
MCC	.....	Motor Control Center
μ Ci	.....	micro-Curie
mR, mRem, mrem, mREM	.....	milli-Roentgen Equivalent Man
NEI	.....	Nuclear Energy Institute
NPP	.....	Nuclear Power Plant
NRC	.....	Nuclear Regulatory Commission
NORAD	.....	North American Aerospace Defense Command
NOUE	.....	Notification Of Unusual Event
OBE	.....	Operating Basis Earthquake
OCA	.....	Owner Controlled Area
ODCM	.....	Offsite Dose Calculation Manual
ORO	.....	Off-site Response Organization
PA	.....	Protected Area
PAG	.....	Protective Action Guideline
PBX	.....	Private Branch Exchange
PWR	.....	Pressurized Water Reactor

PSIG	Pounds per Square Inch Gauge
R	Roentgen
RCDT	Reactor Coolant Drain Tank
RCS	Reactor Coolant System
Rem, rem, REM	Roentgen Equivalent Man
RHR	Residual Heat Removal
RPS	Reactor Protection System
RPV	Reactor Pressure Vessel
RVLIS	Reactor Vessel Level Instrumentation System
SAE	Site Area Emergency
SCBA	Self-Contained Breathing Apparatus
SFP	Spent Fuel Pool
SG	Steam Generator
SI	Safety Injection
SNC	Southern Nuclear Company
SPDS	Safety Parameter Display System
TEDE	Total Effective Dose Equivalent
TOAF	Top of Active Fuel
TV	Threshold Value
VDC	Volts Direct Current
VOIP	Voice Over Internet Protocol
WHT	Waste Holdup Tank

APPENDIX B – DEFINITIONS

The following definitions are taken from Title 10, Code of Federal Regulations, and related regulatory guidance documents.

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

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

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

Notification of Unusual Event (NOUE): 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.

The following are key terms necessary for overall understanding the NEI 99-01 emergency classification scheme.

Emergency Action Level (EAL): A pre-determined, site-specific, observable threshold for an Initiating Condition that, when met or exceeded, places the plant in a given emergency classification level.

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

- General Emergency (GE)
- Site Area Emergency (SAE)
- Alert
- Notification of Unusual Event (NOUE)

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

Initiating Condition (IC): An event or condition that aligns with the definition of one of the four emergency classification levels by virtue of the potential or actual effects or consequences.

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.

CONFINEMENT BOUNDARY: The barrier(s) between areas containing radioactive substances and the environment.

CONTAINMENT CLOSURE: Per FNP-1(2)-STP-18.4, "Containment Integrity Verification and Closure".

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 may 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.

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

HOSTILE ACTION: An act toward a nuclear power plant (NPP) or its personnel that includes the use of violent force to destroy equipment, take HOSTAGES, and/or intimidate the licensee to achieve an end. This includes attack by air, land, or water using guns, explosives, PROJECTILES, vehicles, or other devices used to deliver destructive force. Other acts that satisfy the overall intent may be included. HOSTILE ACTION should not be construed to include acts of civil disobedience or felonious acts that are not part of a concerted attack on the NPP. 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 (OCA)).

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.

OWNER CONTROLLED AREA (OCA): The area that encompasses all controlled areas within the FNP site boundary but outside the security protected area fence.

PROJECTILE: An object directed toward a NPP that could cause concern for its continued operability, reliability, or personnel safety.

PROTECTED AREA (PA): The area that encompasses all controlled areas within the security protected area fence.

REFUELING PATHWAY: This includes the reactor refuel cavity, the fuel transfer canal, and the spent fuel pool, canals and pools through which irradiated fuel may be moved, but not including the reactor vessel.

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

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.

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.

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.

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.

Southern Nuclear Operating Company
License Amendment Request for Changes to
Emergency Action Level Schemes to Adopt NEI 99-01 Rev. 6
Responses to Requests for Additional Information

EDWIN I. HATCH NUCLEAR PLANT

EAL SCHEME

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HATCH NUCLEAR PLANT

EMERGENCY ACTION LEVELS

**INITIATING CONDITIONS,
THRESHOLD VALUES,
AND BASIS**

TABLE OF CONTENTS

1	REGULATORY BACKGROUND	1
1.1	OPERATING REACTORS.....	1
1.2	INDEPENDENT SPENT FUEL STORAGE INSTALLATION (ISFSI).....	1
1.3	NRC ORDER EA-12-051	2
1.4	ORGANIZATION AND PRESENTATION OF INFORMATION.....	3
1.5	IC AND EAL MODE APPLICABILITY	3
2	GUIDANCE ON MAKING EMERGENCY CLASSIFICATIONS	5
2.1	GENERAL CONSIDERATIONS	5
2.2	CLASSIFICATION METHODOLOGY	6
2.3	CLASSIFICATION OF MULTIPLE EVENTS AND CONDITIONS.....	6
2.4	CONSIDERATION OF MODE CHANGES DURING CLASSIFICATION	6
2.5	CLASSIFICATION OF IMMINENT CONDITIONS	7
2.6	EMERGENCY CLASSIFICATION LEVEL UPGRADING AND DOWNGRADING	7
2.7	CLASSIFICATION OF SHORT-LIVED EVENTS	7
2.8	CLASSIFICATION OF TRANSIENT CONDITIONS	7
2.9	AFTER-THE-FACT DISCOVERY OF AN EMERGENCY EVENT OR CONDITION	8
3	ABNORMAL RAD LEVELS / RADIOLOGICAL EFFLUENT ICS/EALS	9
4	COLD SHUTDOWN / REFUELING SYSTEM MALFUNCTION ICS/EALS	26
5	INDEPENDENT SPENT FUEL STORAGE INSTALLATION (ISFSI) ICS/EALS	47
6	FISSION PRODUCT BARRIER ICS/EALS	50
7	HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY ICS/EALS	64
8	SYSTEM MALFUNCTION ICS/EALS.....	88
	APPENDIX A – ACRONYMS AND ABBREVIATIONS.....	A-1
	APPENDIX B – DEFINITIONS	B-1

EMERGENCY ACTION LEVELS

1 REGULATORY BACKGROUND

1.1 OPERATING REACTORS

Title 10, Code of Federal Regulations (CFR), Energy, contains the U.S. Nuclear Regulatory Commission (NRC) regulations that apply to nuclear power facilities. Several of these regulations govern various aspects of an emergency classification scheme. The relevant sections of this document are:

- 10 CFR § 50.47(a)(1)(i)
- 10 CFR § 50.47(b)(4)
- 10 CFR § 50.54(q)
- 10 CFR § 50.72(a)
- 10 CFR § 50, Appendix E, IV.B, Assessment Actions
- 10 CFR § 50, Appendix E, IV.C, Activation of Emergency Organization

These regulations are supplemented by various regulatory guidance documents. Documents of particular relevance to NEI 99-01 include:

NUREG-0654/FEMA-REP-1, *Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants*, October 1980. [Refer to Appendix 1, *Emergency Action Level Guidelines for Nuclear Power Plants*]

NUREG-1022, *Event Reporting Guidelines 10 CFR § 50.72 and § 50.73*
Regulatory Guide 1.101, *Emergency Response Planning and Preparedness for Nuclear Power Reactors*

This list is not all-inclusive. It is strongly recommended that scheme developers consult with licensing and regulatory compliance personnel to identify and understand all applicable requirements and guidance. Questions may also be directed to the NEI Emergency Preparedness staff.

1.2 INDEPENDENT SPENT FUEL STORAGE INSTALLATION (ISFSI)

Selected guidance in NEI 99-01 is applicable to licensees electing to use their 10 CFR 50 emergency plan to fulfill the requirements of 10 CFR 72.32 for a stand-alone ISFSI. The emergency classification levels applicable to an ISFSI are consistent with the requirements of 10 CFR § 50 and the guidance in NUREG 0654/FEMA-REP-1. The initiating conditions germane to a 10 CFR § 72.32 emergency plan (as described in NUREG-1567) are contained within the classification scheme for a 10 CFR § 50.47 emergency plan.

The generic ICs and EALs for an ISFSI are presented in Section 5, ISFSI ICs/EALs. IC E-HU1 covers credible natural and man-made events included within the scope of an ISFSI design. This IC is not applicable to installations or facilities that process and/or repackage spent fuel. Additionally, appropriate aspects of IC HU1 and IC HA1 will also be included to address a HOSTILE ACTION directed against an ISFSI.

The analysis of potential onsite and offsite consequences of accidental releases associated with the operation of an ISFSI is contained in NUREG-1140, *A Regulatory Analysis on Emergency Preparedness for Fuel Cycle and Other Radioactive Material Licensees*. NUREG-1140 concluded that the postulated worst-case accident involving an ISFSI has insignificant consequences to public health and safety. This evaluation shows that the maximum offsite dose to a member of the public due to an accidental release of radioactive materials would not exceed 1 rem Effective Dose Equivalent.

1.3 NRC ORDER EA-12-051

The Fukushima Daiichi accident of March 11, 2011, was the result of a tsunami that exceeded the plant's design basis and flooded the site's emergency electrical power supplies and distribution systems. This caused an extended loss of power that severely compromised the key safety functions of core cooling and containment integrity, and ultimately leading to core damage in three reactors. Although the loss of power also impaired the spent fuel pool cooling function, sufficient water inventory was maintained in the pools to prevent fuel damage from the loss of cooling.

Following a review of the Fukushima Daiichi accident, the NRC concluded that measures were necessary to ensure adequate protection of public health and safety under the provisions of the backfit rule, 10 CFR 50.109(a)(4)(ii). One such measure was that each spent fuel pool be provided with reliable level instrumentation to significantly enhance the ability of key decision-makers to effectively allocate resources following a beyond design basis event. To this end, the NRC issued Order EA-12-051, *Issuance of Order to Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation*, on March 12, 2012, to all US nuclear plants with an operating license, construction permit, or combined construction and operating license.

NRC Order EA-12-051 states, in part, "All licensees ... shall have a reliable indication of the water level in associated spent fuel storage pools capable of supporting identification of the following pool water level conditions by trained personnel: (1) level that is adequate to support operation of the normal fuel pool cooling system, (2) level that is adequate to provide substantial radiation shielding for a person standing on the spent fuel pool operating deck, and (3) level where fuel remains covered and actions to implement make-up water addition should no longer be deferred." All licensees must therefore provide:

- A primary and back-up level instrument that will monitor water level from the normal level to the top of the used fuel rack in the pool.
- A display in an area accessible following a severe event.
- Independent electrical power to each instrument channel and an alternate remote power connection capability.

NEI 12-02, *Industry Guidance for Compliance with NRC Order EA-12-051, "To Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation"*, provides guidance for complying with NRC Order EA-12-051.

NEI 99-01, Revision 6, includes three EALs that reflect the availability of the enhanced spent fuel pool level instrumentation associated with NRC Order EA-12-051. These

EALs are included within existing IC RA2, and new ICs RS2 and RG2. Associated EAL notes, bases and developer notes are also provided.

It is recommended that these EALs be implemented when the enhanced spent fuel pool level instrumentation is available for use.

The regulatory process that licensees follow to make changes to their emergency plan, including non-scheme changes to EALs, is 10 CFR 50.54(q). Licensees are responsible for evaluating a proposed change and determining whether or not it results in a reduction in the plan's effectiveness. Based on this determination, the licensee will either make the change or submit it to the NRC for prior review and approval in accordance with 10 CFR 50.90.

1.4 ORGANIZATION AND PRESENTATION OF INFORMATION

The scheme's information is organized by Recognition Category in the following order.

- R - Abnormal Radiation Levels / Radiological Effluent
- C - Cold Shutdown / Refueling System Malfunction
- E - Independent Spent Fuel Storage Installation (ISFSI)
- F - Fission Product Barrier
- H - Hazards and Other Conditions Affecting Plant Safety
- S - System Malfunction

1.5 IC AND EAL MODE APPLICABILITY

The following table shows Recognition Categories applicable in each plant mode. The ICs and EALs for a given Recognition Category are applicable in the indicated modes.

MODE APPLICABILITY MATRIX

Mode	Category					
	R	C	E	F	H	S
Power Operations	X		X	X	X	X
Startup	X		X	X	X	X
Hot Shutdown	X		X	X	X	X
Cold Shutdown	X	X	X		X	
Refueling	X	X	X		X	
Defueled	X	X	X		X	

Hatch Units 1 and 2 Technical Specifications Table 1.1-1 provides the following mode definitions:

Mode	Title	Reactor Mode Switch Position	Average Reactor Coolant Temperature (°F)
1	Power Operation	Run	NA
2	Startup	Refuel ^(a) or Startup/Hot Standby	NA
3	Hot Shutdown ^(a)	Shutdown	> 212
4	Cold Shutdown ^(b)	Shutdown	≤ 212
5	Refueling ^(b)	Shutdown or Refuel	NA

(a) All reactor vessel head closure bolts fully tensioned.

(b) One or more reactor vessel head closure bolts less than fully tensioned.

In addition to these defined modes, “Defueled” is also applicable to the Hatch EAL scheme, consistent with NEI 99-01. Defueled is a ‘No Mode’ condition where all of the fuel has been removed from the reactor vessel (i.e., full core offload during refueling or extended outages).

These modes are used throughout the Hatch EALs with no modifications from NEI 99-01. When a unit is defueled, the Initiating Conditions designated as Mode Condition “ALL” or “Defueled” are applicable.

2 GUIDANCE ON MAKING EMERGENCY CLASSIFICATIONS

2.1 GENERAL CONSIDERATIONS

For any emergency classification, the emergency director must consider all information having a bearing on the proper assessment of an initiating condition (IC). This includes the emergency action level (EAL), the associated operating mode applicability, notes, and the informing basis information. In the recognition category F matrices, EALs are referred to as fission product barrier thresholds; the thresholds serve the same function as an EAL.

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*.

All emergency classification assessments will be based on valid indications, reports or conditions. A valid indication, report, or condition, has been verified using appropriate means, leaving no doubt regarding the indicator's operability, the condition's existence, or the report's accuracy. For example, validation could be an instrument channel check, response on related or redundant indicators, or direct observation by plant personnel. The indications will be validated in a manner that supports timely emergency declaration.

For ICs and EALs that have a stipulated time duration, the emergency director will not wait until the applicable time has elapsed, but will 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 will be assumed that the release duration specified in the IC/EAL has been exceeded, absent data to the contrary.

A planned work activity resulting 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 such cases, the controls associated with the planning, preparation and execution of the work will ensure compliance with the operating license is maintained, provided 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.

Some EALs are assessed based on the results of analyses necessary to ascertain whether a specific EAL threshold has been exceeded. The EAL and/or the associated basis discussion will identify the necessary analysis. 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.

Although 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 scheme provides the emergency director with the ability to classify events and conditions based upon judgment using EALs that are consistent with the emergency classification level (ECL) definitions (refer to Category H). The emergency director will need to determine if the effects or consequences of the event or condition reasonably meet or exceed a particular ECL definition. A similar provision is incorporated into the fission product barrier tables; judgment may be used to determine the status of a fission product barrier.

2.2 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. An EAL(s) evaluation must be consistent with the related operating mode applicability and notes. If an EAL has been met or exceeded, the IC is met and the associated ECL is declared in accordance with plant procedures.

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.

2.3 CLASSIFICATION OF MULTIPLE EVENTS AND CONDITIONS

In the event of multiple emergencies or conditions, the user will identify all met or exceeded EALs. The highest applicable ECL identified during this review is declared. For example:

If an Alert EAL and a Site Area Emergency EAL are met, a Site Area Emergency will be declared.

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

If two Alert EALs are met, an Alert will 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*.

2.4 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, determines whether 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.

2.5 CLASSIFICATION OF IMMINENT CONDITIONS

Although EALs provide specific thresholds, the emergency director must remain alert to events or conditions that could lead to meeting or exceeding an EAL within a relatively short period of time (i.e., a change in the ECL is IMMINENT). If, in the judgment of the emergency director, meeting an EAL is IMMINENT, the emergency classification will 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.

2.6 EMERGENCY CLASSIFICATION LEVEL UPGRADING AND DOWNGRADING

SNC policy is that once an emergency classification is made, it cannot be downgraded to a lower classification. Termination criteria contained in procedure NMP-EP-110, Emergency Classification and Initial Actions shall be completed for an event to be terminated. At termination, on an event specific basis, the site can either enter normal operating conditions or enter a recovery condition with a recovery organization established for turnover from the ERO.

2.7 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 end before the emergency classification assessment can be completed. If an event occurs that meets or exceeds an EAL, the associated EAL must be declared regardless of its continued presence at the time of declaration. For example, an earthquake, or failure of the reactor protection system to automatically scram/trip the reactor followed by a successful manual scram/trip.

2.8 CLASSIFICATION OF TRANSIENT CONDITIONS

Many of the ICs and/or EALs in this document employ time-based criteria that require 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, some transient conditions may cause an EAL to be met for a brief period of time. The following guidance will be applied to the classification of these conditions.

EAL momentarily met during expected plant response - When 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. This example presents an illustration:

An ATWS occurs and RCIC fails to automatically start. RPV level rapidly decreases and the plant enters an inadequate RPV Water Level condition (a potential loss of the fuel clad barrier and a loss of the RCS barrier). If an operator

manually starts RCIC in accordance with an EOP step and clears the inadequate RPV Water Level condition prior to an emergency declaration, then the classification should be based on the ATWS only.

It is important to note that the 15-minute emergency classification assessment period is not a "grace period" to delay a classification in order to perform 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 where an operator is able to take corrective action before the emergency director completes the review and necessary steps to make the emergency declaration. This provision ensures any public protective actions resulting from the emergency classification are truly warranted by the plant conditions.

2.9 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. Personnel could discover 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. It may be the event or condition was not recognized at the time, or there was an error in the emergency classification process.

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

3 ABNORMAL RAD LEVELS / RADIOLOGICAL EFFLUENT ICS/EALS

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
RG1 Release of gaseous radioactivity resulting in offsite dose greater than 1,000 mrem TEDE or 5,000 mrem thyroid CDE. <i>Op. Modes: All</i>	RS1 Release of gaseous radioactivity resulting in offsite dose greater than 100 mrem TEDE or 500 mrem thyroid CDE. <i>Op. Modes: All</i>	RA1 Release of gaseous or liquid radioactivity resulting in offsite dose greater than 10 mrem TEDE or 50 mrem thyroid CDE. <i>Op. Modes: All</i>	RU1 Release of gaseous or liquid radioactivity greater than 2 times the ODCM limits for 60 minutes or longer. <i>Op. Modes: All</i>
RG2 Spent fuel pool level cannot be restored to at least Level 3 for 60 minutes or longer. <i>Op. Modes: All</i>	RS2 Spent fuel pool level at Level 3. <i>Op. Modes: All</i>	RA2 Significant lowering of water level above, or damage to, irradiated fuel. <i>Op. Modes: All</i>	RU2 UNPLANNED loss of water level above irradiated fuel. <i>Op. Modes: All</i>
		RA3 Radiation levels that impede access to equipment necessary for normal plant operations, cooldown or shutdown. <i>Op. Modes: All</i>	

ECL: General Emergency

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

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2 or 3)

Notes:

- The emergency director will declare the General 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.

- (1) Reading on ANY of the following radiation monitors greater than the reading shown for 15 minutes or longer:

Reactor Building Vent Accident Range Monitor:	
1D11-P601 (feeding 1D11-R631, Rx Bldg Vent Wide Range)	2.6 $\mu\text{Ci/cc}$
2D11-P601 (feeding 2D11-R631, Rx Bldg Vent Wide Range)	2.6 $\mu\text{Ci/cc}$
Main Stack Accident Range Monitor:	
1D11-P007 (feeding 1D11-R631, Main Stack Wide Range)	$8.1 \times 10^3 \mu\text{Ci/cc}$

- (2) Dose assessment using actual meteorology indicates doses greater than 1,000 mrem TEDE or 5,000 mrem thyroid CDE at or beyond the site boundary.
- (3) Field survey results indicate **EITHER** of the following at or beyond the site boundary:
- Closed window dose rates greater than 1,000 mR/hr expected to continue for 60 minutes or longer.
 - Analyses of field survey samples indicate thyroid CDE greater than 5,000 mrem for one hour of inhalation.

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 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 monitor reading threshold values are determined using a dose assessment method that back calculates from the dose values specified in the IC. The meteorology and source term (noble gases, particulates, and halogens) used are the same as those used to determine the monitor reading threshold values in ICs RS1 and RA1. This protocol will maintain intervals between the threshold values for the three classifications. Since doses are generally not monitored in real-time, a release duration of one hour is assumed, and the threshold values are based on a site boundary (or beyond) dose of 1000 mR/hour whole body or 5000 mR/hour thyroid, whichever is more limiting.

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.

ECL: General Emergency

Initiating Condition: Spent fuel pool level cannot be restored to at least Level 3 for 60 minutes or longer.

Operating Mode Applicability: All

Emergency Action Levels:

Note: The emergency director will declare the General Emergency promptly upon determining that 60 minutes has been exceeded, or will likely be exceeded.

(1) Spent fuel pool level cannot be restored to at least Level 3 for 60 minutes or longer.

Basis:

This IC addresses a significant loss of spent fuel pool inventory control and makeup capability leading to a prolonged uncover 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.

ECL: Site Area Emergency

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

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2 or 3)

Notes:

- The emergency director will 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.

- (1) Reading on ANY of the following radiation monitors greater than the reading shown for 15 minutes or longer:

Reactor Building Vent Accident Range Monitor:	
1D11-P601 (feeding 1D11-R631, Rx Bldg Vent Wide Range)	$2.6 \times 10^{-1} \mu\text{Ci/cc}$
2D11-P601 (feeding 2D11-R631, Rx Bldg Vent Wide Range)	$2.6 \times 10^{-1} \mu\text{Ci/cc}$
Main Stack Accident Range Monitor:	
1D11-P007 (feeding 1D11-R631, Main Stack Wide Range)	$8.1 \times 10^2 \mu\text{Ci/cc}$

- (2) Dose assessment using actual meteorology indicates doses greater than 100 mrem TEDE or 500 mrem thyroid CDE at or beyond the site boundary.
- (3) Field survey results indicate **EITHER** of the following at or beyond the site boundary:
- Closed window dose rates greater than 100 mR/hr expected to continue for 60 minutes or longer.
 - Analyses of field survey samples indicate thyroid CDE greater than 500 mrem for one hour of inhalation.

Basis:

This IC addresses a release of gaseous radioactivity that results in projected or actual offsite doses greater than or equal to 10-percent 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 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 monitor reading threshold values are determined using a dose assessment method that back calculates from the dose values specified in the IC. The meteorology and source term (noble gases, particulates, and halogens) used is the same as those used to determine the monitor reading threshold values in ICs RG1 and RA1. This protocol maintains intervals between the threshold values for the three classifications. Since doses are generally not monitored in real-time, a release duration of one hour is assumed, and the threshold values are based on a site boundary (or beyond) dose of 100 mR/hour whole body or 500 mR/hour thyroid, whichever is more limiting.

The TEDE dose is set at 10-percent 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 uses IC RG1.

ECL: Site Area Emergency

Initiating Condition: Spent fuel pool level at Level 3.

Operating Mode Applicability: All

Emergency Action Levels:

(1) Lowering of spent fuel pool level to Level 3.

Basis:

This IC addresses a significant loss of spent fuel pool inventory control and makeup capability leading to IMMEDIATE fuel damage. This condition stems from major failures of plant functions needed for protection of the public and 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 uses IC RG1 or RG2.

ECL: Alert

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

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2 or 3 or 4)

Notes:

- The emergency director will 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 assessments until the results from a dose assessment using actual meteorology are available.

- (1) Reading on ANY of the following radiation monitors greater than the reading shown for 15 minutes or longer:

Reactor Building Vent Accident Range Monitor:	
1D11-P601 (feeding 1D11-R631, Rx Bldg Vent Wide Range)	$2.6 \times 10^{-2} \mu\text{Ci/cc}$
2D11-P601 (feeding 2D11-R631, Rx Bldg Vent Wide Range)	$2.6 \times 10^{-2} \mu\text{Ci/cc}$
Main Stack Accident Range Monitor:	
1D11-P007 (feeding 1D11-R631, Main Stack Wide Range)	$8.1 \times 10^1 \mu\text{Ci/cc}$

- (2) Dose assessment using actual meteorology indicates doses greater than 10 mrem TEDE or 50 mrem thyroid CDE at or beyond the site boundary.
- (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.
- (4) Field survey results indicate **EITHER** of the following at or beyond the site boundary :
- 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.

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-percent 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 plant safety as indicated by a radiological release that significantly exceeds regulatory limits (e.g., a significant uncontrolled

release).

Radiological effluent EALs are 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 monitor reading threshold values are determined using a dose assessment method that back calculates from the dose values specified in the IC. The meteorology and source term (noble gases, particulates, and halogens) used is the same as those used to determine the monitor reading threshold values in ICs RG1 and RS1. This protocol maintains intervals between the threshold values for the three classifications. Since doses are generally not monitored in real-time, a release duration of one hour is assumed, and that the threshold values are based on a site boundary (or beyond) dose of 10 mR/hour whole body or 50 mR/hour thyroid, whichever is more limiting.

The TEDE dose is set at 1-percent 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 uses IC RS1.

ECL: Alert

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

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2 or 3)

- (1) Uncovery of irradiated fuel in the REFUELING PATHWAY.
- (2) Damage to irradiated fuel resulting in a release of radioactivity from the fuel as indicated by alarms on **ANY** Table R1 radiation monitors:

Table R1	
Refuel Floor Area Radiation Monitors	
Unit 1	Unit 2
1D21-K601 A - Rx Head Laydown Area	2D21-K601 A - Rx Head Laydown Area
1D21-K601 B - Refueling Floor Stairway	2D21-K601 M - Spent Fuel/Fuel Pool Areas
1D21-K601 D - Refuel Floor	2D21-K601 E - Dryer/Separator Pool
1D21-K601 E - Drywell Shield Plug	2D21-K611 K - RPV Refuel Floor 228'
1D21-K601 M - Spent Fuel Pool and New Fuel Storage area	2D21-K611 L - RPV Refuel Floor 228'
Refuel Floor Ventilation Monitors	
Unit 1	Unit 2
1D11-K609 A-D - Rx Bldg. Potential Contaminated Area Vent Exhaust Rad Monitor	2D11-K609 A-D - Rx Bldg. Potential Contaminated Area Vent Exhaust Rad Monitor
1D11-K611 A-D - Refuel Floor Vent Exhaust	2D11-K611 A-D - Refuel Floor Vent Exhaust
	2D11-K634 A-D - Refuel Floor Rx Well Vent. Exhaust
	2D11-K635 A-D - Refuel Floor DW/Sep. Vent. Exhaust

- (3) Lowering of spent fuel pool level to Level 2.

Basis:

REFUELING PATHWAY: This includes the reactor cavity, the transfer canal, and the spent fuel pool.

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 plant safety.

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 is based on either Recognition Category R or C ICs.

EAL #1

This EAL escalates from RU2. The loss of level, in the affected portion of the REFUELING PATHWAY is of sufficient magnitude to have resulted in uncover of irradiated fuel. Indications of irradiated fuel uncover may include direct or indirect visual observation (e.g., reports from personnel or camera images), 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 will 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 will 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 is a precursor to a loss of the ability to adequately cool the irradiated fuel assemblies stored in the pool.

Escalation of the emergency classification level uses ICs RS1 or RS2

ECL: Alert

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

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2)

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.

- (1) Dose rate greater than 15 mR/hr in **ANY** of the following areas:

Control Room area radiation monitor 1D21-K600 B or C
Central Alarm Station (by survey)

- (2) An UNPLANNED event results in radiation levels that prohibit or impede access to any Table H1 plant rooms or areas:

Table H1		
Building	Rooms	Applicable Modes
Diesel generator building	All	All
Reactor building	Unit 1/2 130'	All
	Unit 1/2 SE Diagonals (RHR)	All
	Unit 1/2 NE Diagonals (RHR)	All

Basis:

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.

This IC addresses elevated radiation levels in certain plant rooms or 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. It represents an actual or potential substantial degradation of the level of plant safety. The emergency director 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 uses Recognition Category R, C or F ICs.

ECL: Notification of Unusual Event

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

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2 or 3)

Notes:

- The emergency director will declare the Unusual Event promptly upon determining that 60 minutes has been exceeded, or will likely be exceeded.
- If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded 60 minutes.
- If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is no longer valid for classification purposes.

- (1) Reading on **ANY** effluent radiation monitor greater than 2 times the ODCM limits for 60 minutes or longer:

Reactor Building Vent Normal Range Monitor: 1D11-K619 A(B) 2D11-K636 A(B)
Main Stack Normal Range Monitor: 1D11-K600 A(B)
Liquid Radwaste Effluent Line Monitor: 1D11-K604 2D11-K604
Service Water System Effluent Line Monitor: 1D11-K605 2D11-K605

- (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 ODCM limits for 60 minutes or longer.

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. Administrative controls are established to prevent unintentional releases, and to control and monitor intentional releases. The occurrence of an extended, uncontrolled radioactive release to the environment indicates 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 uses IC RA1.

ECL: Notification of Unusual Event

Initiating Condition: UNPLANNED loss of water level above irradiated fuel.

Operating Mode Applicability: All

Emergency Action Levels:

- (1) a. UNPLANNED water level drop in the REFUELING PATHWAY as indicated by ANY of the following:

Personnel report of low water level
SFP low level alarm annunciator - Spent Fuel Storage Pool Level Low 654-022-1/2

AND

- b. UNPLANNED rise in area radiation levels as indicated by ANY of the following radiation monitors.

1D21-K601 A - Rx Head Laydown Area
1D21-K601 D - Refuel Floor
1D21-K601 E - Drywell Shield Plug
1D21-K601 M - Spent Fuel Pool and New Fuel Storage area
2D21-K601 A - Rx Head Laydown Area
2D21-K601 M - Spent Fuel/Fuel Pool Areas
2D21-K601 E - Dryer/Separator Pool
2D21-K611 K - RPV Refuel Floor 228'
2D21-K611 L - RPV Refuel Floor 228'

Basis:

REFUELING PATHWAY: This includes the reactor cavity, the transfer canal, and the spent fuel pool

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.

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 plant safety.

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 with Recognition Category C during the Cold Shutdown and Refueling modes.

Escalation of the emergency classification level uses IC RA2.

4 COLD SHUTDOWN / REFUELING SYSTEM MALFUNCTION ICS/EALS

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
CG1 Loss of RPV inventory affecting fuel clad integrity with containment challenged. <i>Op. Modes: Cold Shutdown, Refueling</i>	CS1 Loss of RPV inventory affecting core decay heat removal capability. <i>Op. Modes: Cold Shutdown, Refueling</i>	CA1 Loss of RPV inventory. <i>Op. Modes: Cold Shutdown, Refueling</i>	CU1 UNPLANNED loss of RPV inventory for 15 minutes or longer. <i>Op. Modes: Cold Shutdown, Refueling</i>
		CA2 Loss of all offsite and all onsite AC power to emergency buses for 15 minutes or longer. <i>Op. Modes: Cold Shutdown, Refueling, Defueled</i>	CU2 Loss of all but one AC power source to emergency buses for 15 minutes or longer. <i>Op. Modes: Cold Shutdown, Refueling, Defueled</i>
		CA3 Inability to maintain the plant in cold shutdown. <i>Op. Modes: Cold Shutdown, Refueling</i>	CU3 UNPLANNED increase in RCS temperature. <i>Op. Modes: Cold Shutdown, Refueling</i>
			CU4 Loss of Vital DC power for 15 minutes or longer. <i>Op. Modes: Cold Shutdown, Refueling</i>
			CU5 Loss of all onsite or offsite communications capabilities. <i>Op. Modes: Cold Shutdown, Refueling, Defueled</i>
		CA6 Hazardous event affecting a SAFETY SYSTEM needed for the current operating mode. <i>Op. Modes: Cold Shutdown, Refueling</i>	

ECL: General Emergency

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

Operating Mode Applicability: Cold Shutdown, Refueling

Emergency Action Levels: (1 or 2)

Note: The emergency director will declare the General Emergency promptly upon determining that 30 minutes has been exceeded, or will likely be exceeded.

- (1) a. RPV level less than -155" (TAF) for 30 minutes or longer.

AND

- b. **ANY** indication from the Containment Challenge Table C1.

- (2) a. RPV level cannot be monitored for 30 minutes or longer.

AND

- b. Core uncover is indicated by **ANY** of the following:

- A reading greater than 9.5×10^3 mR/hr on **ANY** of the following radiation monitors:

Unit 1	Unit 2
1D21-K601 A – Rx Head Laydown Area	2D21-K601 A – Rx Head Laydown Area
1D11-K601 D – Refuel Floor	2D21-K601 M – Spent Fuel/Fuel Pool Areas
1D21-K601 E – Drywell Shield Plug	2D21-K601 E – Dryer/Separator Pool
1D21-K601 M – Spent Fuel Pool and New Fuel Storage Area	2D21-K611 K – RPV Refuel Floor 228'
	2D21-K611 L – RPV Refuel Floor 228'

- **UNPLANNED** level increase in any of the following of sufficient magnitude to indicate core uncover:

Drywell Floor Drain Sumps	Reactor Building Floor Drain Sumps
Drywell Equipment Drain Sumps	Turbine Building Floor Drain Sumps
Torus	Rad Waste Tanks
Torus Room Sumps	

AND

- c. **ANY** indication from the Containment Challenge Table C1.

Containment Challenge Table C1
Containment H ₂ greater than or equal to 6% AND O ₂ greater than or equal to 5%
UNPLANNED increase in Primary Containment Pressure
Secondary CONTAINMENT INTEGRITY NOT established*
Secondary Containment radiation monitors greater than Max Safe values (SC EOP - Table 6)

* If Secondary CONTAINMENT INTEGRITY is re-established prior to exceeding the 30-minute time limit, then declaration of a General Emergency is not required.

Basis:

CONTAINMENT INTEGRITY: Primary Containment OPERABLE per Technical Specification 3.6.1.1. Secondary Containment OPERABLE per Technical Specification 3.6.4.1

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.

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.

Water level for top of active fuel is calculated at -158.44". Although slightly more conservative, the -155" EOP value for top of active fuel is provided for this EAL to aid in operator recognition of the event.

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 reactor vessel level cannot be restored, fuel damage is probable.

With Secondary CONTAINMENT INTEGRITY not established, there is a high potential for a direct and unmonitored release of radioactivity to the environment. If Secondary CONTAINMENT INTEGRITY 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 uncover event, it is unlikely that hydrogen buildup due to a core uncover could result in an explosive gas mixture in containment. If all installed hydrogen gas monitors are out-of-service during an event leading to fuel cladding damage, it may not be possible to obtain a containment hydrogen gas concentration reading as ambient conditions within the containment will preclude personnel access. During periods when installed containment hydrogen gas monitors are out-of-service, operators may use the other listed indications to assess whether or not containment is challenged.

In EAL 2.b, the 30-minute criterion is tied to a readily recognizable event start time (i.e., the total

loss of ability to monitor level), and allows sufficient time to monitor, assess and correlate reactor and plant conditions to determine if core uncover has actually occurred (i.e., to account for various accident progression and instrumentation uncertainties). It also allows sufficient time for actions to terminate leakage, recover inventory control or makeup equipment, and/or restore level monitoring.

The inability to monitor RPV 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 RPV.

These EALs address 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*.

ECL: Site Area Emergency

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

Operating Mode Applicability: Cold Shutdown, Refueling

Emergency Action Levels: (1 or 2 or 3)

Note: The emergency director will declare the Site Area Emergency promptly upon determining that 30 minutes has been exceeded, or will likely be exceeded.

- (1) a. Secondary CONTAINMENT INTEGRITY not established.

AND

- b. RPV level less than - 41" (6" below the Level 2 actuation setpoint).

- (2) a. Secondary CONTAINMENT INTEGRITY established.

AND

- b. RPV level less than -155" (TAF).

- (3) a. RPV level cannot be monitored for 30 minutes or longer.

AND

- b. Core uncover is indicated by **ANY** of the following:

- A reading greater than 9.5×10^3 mR/hr on **ANY** of the following radiation monitors:

Unit 1	Unit 2
1D21-K601 A – Rx Head Laydown Area	2D21-K601 A – Rx Head Laydown Area
1D11-K601 D – Refuel Floor	2D21-K601 M – Spent Fuel/Fuel Pool Areas
1D21-K601 E – Drywell Shield Plug	2D21-K601 E – Dryer/Separator Pool
1D21-K601 M – Spent Fuel Pool and New Fuel Storage Area	2D21-K611 K – RPV Refuel Floor 228'
	2D21-K611 L – RPV Refuel Floor 228'

- UNPLANNED level increase in any of the following of sufficient magnitude to indicate core uncover:

Drywell Floor Drain Sumps	Reactor Building Floor Drain Sumps
Drywell Equipment Drain Sumps	Turbine Building Floor Drain Sumps
Torus	Rad Waste Tanks
Torus Room Sumps	

Basis:

CONTAINMENT INTEGRITY: Primary Containment OPERABLE per Technical Specification 3.6.1.1. Secondary Containment OPERABLE per Technical Specification 3.6.4.1.

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.

This IC addresses a significant and prolonged loss of RPV 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 warrant a Site Area Emergency declaration.

Water level for top of active fuel is calculated at -158.44". Although slightly more conservative, the -155" EOP value for top of active fuel is provided for this EAL to aid in operator recognition of the event.

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 reactor vessel level cannot be restored, fuel damage is probable.

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

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

The inability to monitor RPV 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 RPV.

These EALs address 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 uses IC CG1 or RG1.

ECL: Alert

Initiating Condition: Loss of RPV inventory.

Operating Mode Applicability: Cold Shutdown, Refueling

Emergency Action Levels: (1 or 2)

Note: The emergency director will declare the Alert promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) Loss of RPV inventory as indicated by level less than -35" (Level 2 actuation setpoint).
- (2) a. RPV level cannot be monitored for 15 minutes or longer

AND

- b. UNPLANNED level increase in any of the following due to a loss of RPV inventory:

Drywell Floor Drain Sumps	Reactor Building Floor Drain Sumps
Drywell Equipment Drain Sumps	Turbine Building Floor Drain Sumps
Torus	Rad Waste Tanks
Torus Room Sumps	

Basis:

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.

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 -35" (Level 2 actuation setpoint) indicates that operator actions have not been successful in restoring and maintaining RPV 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 uncover.

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 EAL #2, the inability to monitor RPV 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 RPV.

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 RPV inventory level continues to lower, then escalation to Site Area Emergency uses IC CS1.

ECL: Alert

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

Operating Mode Applicability: Cold Shutdown, Refueling, Defueled

Emergency Action Levels:

Note: The emergency director will declare the Alert promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) Loss of **ALL** offsite and **ALL** onsite AC Power (Table S1) to 4160 VAC Emergency Buses 1/2E, 1/2F, **AND** 1/2G for 15 minutes or longer.

Table S1	
Unit 1	Unit 2
Start-up Aux XFMR 1C	Start-up Aux XFMR 2C
Start-up Aux XFMR 1D	Start-up Aux XFMR 2D
Diesel Generator 1A	Diesel Generator 2A
Diesel Generator 1B	Diesel Generator 1B
Diesel Generator 1C	Diesel Generator 2C

Basis:

This IC addresses a total loss of AC power (see Table S1 above) that compromises the performance of all SAFETY SYSTEMS requiring electric power, including those necessary for essential core cooling, containment heat removal/pressure control, spent fuel heat removal, and the ultimate heat sink.

When in the cold shutdown, refueling, or defueled 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. When in these modes, this condition represents an actual or potential substantial degradation of the level of plant safety.

Fifteen minutes is the threshold to exclude transient or momentary power losses.

Escalation of the emergency classification level uses IC CS1 or RS1.

ECL: Alert

Initiating Condition: Inability to maintain the plant in cold shutdown.

Operating Mode Applicability: Cold Shutdown, Refueling

Emergency Action Levels: (1 or 2)

Note: The emergency director will declare the Alert promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.

- (1) UNPLANNED increase in RCS temperature to greater than 212 °F for greater than the duration specified in Table C2.

Table C2: RCS Heat-up Duration Thresholds		
RCS Status	Secondary CONTAINMENT INTEGRITY Status	Heat-up Duration
Not Intact	Not Established	0 minutes*
	Established	20 minutes
Intact	Not applicable	60 minutes*
* If RHR is in operation within this time frame and RCS temperature is being reduced, the EAL is not applicable.		

- (2) UNPLANNED RCS pressure increase greater than 10 psig.

Basis:

CONTAINMENT INTEGRITY: Primary Containment OPERABLE per Technical Specification 3.6.1.1. Secondary Containment OPERABLE per Technical Specification 3.6.4.1.

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.

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 plant safety.

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 the case where there is an increase in RCS temperature, the RCS is not intact, and Secondary CONTAINMENT INTEGRITY is not established. In this case, 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 Heat-up Duration Thresholds table addresses an increase in RCS temperature when Secondary CONTAINMENT INTEGRITY 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.

Finally, the RCS Heat-up Duration Thresholds table also addresses an increase in RCS temperature with the RCS intact. The status of Secondary CONTAINMENT INTEGRITY 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.

EAL #2 provides a pressure-based indication of RCS heat-up.

Escalation of the emergency classification level uses IC CS1 or RS1.

ECL: Alert

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

Operating Mode Applicability: Cold Shutdown, Refueling

Emergency Action Levels:

- (1) a. The occurrence of **ANY** of the following hazardous events:
 - Seismic event (earthquake)
 - Internal or external flooding event
 - High winds (> 35 mph sustained) or tornado strike
 - FIRE
 - EXPLOSION
 - Other events with similar hazard characteristics as determined by the Shift Manager

AND

- b. **EITHER** of the following:
 - 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.

Basis:

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 may 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.

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.

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.

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 plant safety.

EAL 1.a identifies hazardous events that could result in damage to plant systems. A seismic event is indicated by entry into IC HU2. Flooding is indicated by a significant increase in water levels (external or internal). High winds are indicated by sustained winds at the site meteorological tower exceeding 35 mph.

The first threshold for EAL 1.b 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 threshold for EAL 1.b 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 all 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 uses IC CS1 or RS1.

ECL: Notification of Unusual Event

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

Operating Mode Applicability: Cold Shutdown, Refueling

Emergency Action Levels: (1 or 2)

Note: The emergency director will declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) UNPLANNED loss of reactor coolant results in RPV level less than the lower limit of the controlling level band for 15 minutes or longer.
- (2) a. RPV level cannot be monitored.

AND

- b. UNPLANNED level increase in any of the following:

Drywell Floor Drain Sumps	Reactor Building Floor Drain Sumps
Drywell Equipment Drain Sumps	Turbine Building Floor Drain Sumps
Torus	Rad Waste Tanks
Torus Room Sumps	

Basis:

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.

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 RPV level concurrent with indications of coolant leakage. Either of these conditions is considered to be a potential degradation of the level of plant safety.

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 RPV 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 RPV 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 RPV.

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

ECL: Notification of Unusual Event

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

Operating Mode Applicability: Cold Shutdown, Refueling, Defueled

Emergency Action Levels:

Note: The emergency director will declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) a. AC power capability to 4160 VAC Emergency Buses 1/2E, 1/2F, **AND** 1/2G is reduced to a single power source (Table S1) for 15 minutes or longer.

AND

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

Table S1	
Unit 1	Unit 2
Start-up Aux XFMR 1C	Start-up Aux XFMR 2C
Start-up Aux XFMR 1D	Start-up Aux XFMR 2D
Diesel Generator 1A	Diesel Generator 2A
Diesel Generator 1B	Diesel Generator 1B
Diesel Generator 1C	Diesel Generator 2C

Basis:

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.

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 (see Table S1 above) may be powering one, or more than one, train of safety-related equipment.

When in the cold shutdown, refueling, or defueled mode, this condition is not classified as an Alert because of the increased 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. When in these modes, this condition is considered to be a potential degradation of the level of plant safety.

An "AC power source" is a source recognized in AOPs and EOPs, and capable of supplying required power to an emergency bus. Examples of this condition include:

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

- (e.g., an onsite diesel generator).
- A loss of all offsite power and loss of all emergency power sources (e.g., onsite diesel generators) with a single train of emergency buses being back-fed from the unit main generator.
 - A loss of emergency power sources (e.g., onsite diesel generators) with a single train of emergency buses being back-fed from an offsite power source.

Fifteen minutes is the 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.

ECL: Notification of Unusual Event

Initiating Condition: UNPLANNED increase in RCS temperature.

Operating Mode Applicability: Cold Shutdown, Refueling

Emergency Action Levels: (1 or 2)

Note: The emergency director will declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) UNPLANNED increase in RCS temperature to greater than 212 °F.
- (2) Loss of **ALL** RCS temperature and RPV level indication for 15 minutes or longer.

Basis:

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.

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, represents a potential degradation of the level of plant safety. If the RCS is not intact and secondary CONTAINMENT INTEGRITY is not established during this event, the emergency director will 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, where 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 reflects a condition where there has been a significant loss of instrumentation capability necessary to monitor RCS conditions, and operators are 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 is a threshold to exclude transient or momentary losses of indication.

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

ECL: Notification of Unusual Event

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

Operating Mode Applicability: Cold Shutdown, Refueling

Emergency Action Levels:

Note: The emergency director will declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) Indicated voltage is less than 105/210 VDC on Technical Specification required 125/250 VDC buses 1/2R22-S016 **AND** 1/2R22-S017 for 15 minutes or longer.

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. This condition is considered to be a potential degradation of the level of plant safety.

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 is the threshold to exclude transient or momentary power losses.

Depending upon the event, escalation of the emergency classification level uses IC CA1 or CA3, or an IC in Recognition Category R.

ECL: Notification of Unusual Event

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

Operating Mode Applicability: Cold Shutdown, Refueling, Defueled

Emergency Action Levels: (1 or 2 or 3)

- (1) Loss of **ALL** of the following onsite communication methods:

Plant telephones (Includes hardwired and wireless)
Plant page
Plant radio systems

- (2) Loss of **ALL** of the following ORO communications methods:

ENN (Emergency Notification Network)
Commercial phones

- (3) Loss of **ALL** of the following NRC communications methods:

ENS on Federal Telecommunications System (FTS)
Commercial phones

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 will 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).

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

EAL #2 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 of Georgia, Appling County, Jeff Davis County, Tattnall County and Toombs County.

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

5 INDEPENDENT SPENT FUEL STORAGE INSTALLATION (ISFSI) ICS/EALS

UNUSUAL EVENT

**E-HU1 Damage to a loaded cask
CONFINEMENT BOUNDARY.**

Op. Modes: All

ECL: Notification of Unusual Event

Initiating Condition: Damage to a loaded cask CONFINEMENT BOUNDARY.

Operating Mode Applicability: All

Emergency Action Levels:

- (1) Damage to a loaded cask CONFINEMENT BOUNDARY as indicated by an on-contact radiation reading greater than ANY value listed on Table E1.

Table E1	
Location of Dose Rate	Total Dose Rate (Neutron + Gamma mR/hr)
HI-TRAC 125	
Side – Mid- height	450
Top	110
HI-STAR 100 or HI-STORM 100	
Side – 60 inches below mid- height	80
Side – Mid- height	80
Side – 60 inches above mid- height	30
Center of lid	10
Middle of top lid	20
Top (outlet) duct	40
Bottom (inlet) duct	140

Basis:

CONFINEMENT BOUNDARY: The barrier(s) between areas containing radioactive substances and the environment.

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 that could cause challenges in removing the cask or fuel from storage.

The existence of “damage” is determined by radiological survey. The radiation reading values listed in the table represent 2 times the site-specific cask-specific technical specification allowable radiation level on the designated surface of the spent fuel cask. The technical

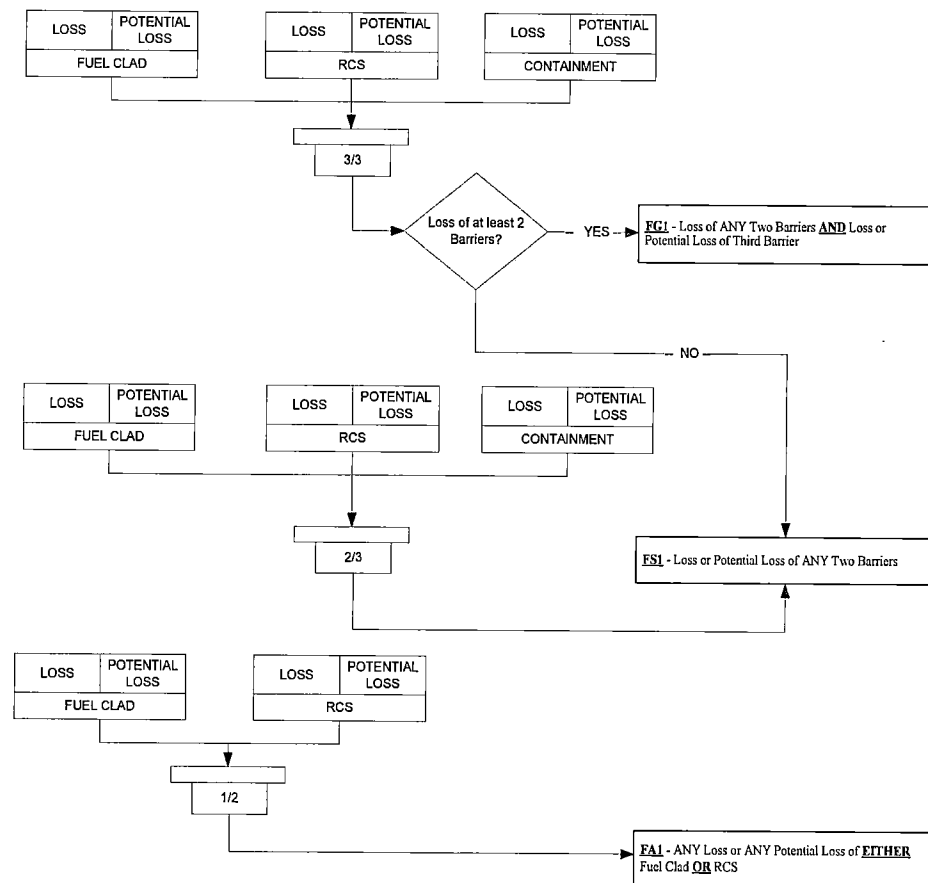
specification multiple of “2 times” is used here to distinguish between non-emergency and emergency conditions. The emphasis for this classification is the degradation in the level of safety of the spent fuel cask, and not the magnitude of the associated dose or dose rate. It is recognized that in the case of extreme damage to a loaded cask, determining if the “on-contact” dose rate limit is exceeded may be 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.

6 FISSION PRODUCT BARRIER ICS/EALS

Recognition Category "F" Initiating Condition Matrix

GENERAL EMERGENCY	
FG1	Loss of any two barriers and Loss or Potential Loss of the third barrier. <i>Op. Modes: Power Operation, Hot Standby, Startup, Hot Shutdown</i>
SITE AREA EMERGENCY	
FS1	Loss or Potential Loss of any two barriers. <i>Op. Modes: Power Operation, Hot Standby, Startup, Hot Shutdown</i>
ALERT	
FA1	Any Loss or any Potential Loss of either the Fuel Clad or RCS barrier. <i>Op. Modes: Power Operation, Hot Standby, Startup, Hot Shutdown</i>



Fission Product Barrier Table

Thresholds for LOSS or POTENTIAL LOSS of Barriers

FG1 GENERAL EMERGENCY	FS1 SITE AREA EMERGENCY	FA1 ALERT
Loss of any two barriers and Loss or Potential Loss of the third barrier.	Loss or Potential Loss of any two barriers.	Any Loss or any Potential Loss of either the Fuel Clad or RCS barrier.

Fuel Clad Barrier		RCS Barrier		Containment Barrier	
LOSS	POTENTIAL LOSS	LOSS	POTENTIAL LOSS	LOSS	POTENTIAL LOSS
1. RCS Activity		1. Primary Containment Pressure		1. Primary Containment Conditions	
A. Activity of 300 $\mu\text{Ci/gm DEI}_{131}$	Not Applicable	A. Primary containment pressure greater than 1.85 psig due to RCS leakage.	Not Applicable	A. UNPLANNED rapid drop in primary containment pressure following primary containment pressure rise OR B. Primary containment pressure response not consistent with LOCA conditions.	A. Primary containment pressure greater than 56 psig OR B. Greater than or equal to 6% H_2 <u>AND</u> 5% O_2 exists inside primary containment OR C. HCTL exceeded.
2. RPV Water Level		2. RPV Water Level		2. RPV Water Level	
A. SAG entry is required.	A. RPV water level cannot be restored and maintained above -155 inches or cannot be determined.	A. RPV water level cannot be restored and maintained above -155 inches or cannot be determined.	Not Applicable	Not Applicable	A. SAG entry is required.

Fuel Clad Barrier		RCS Barrier		Containment Barrier	
LOSS	POTENTIAL LOSS	LOSS	POTENTIAL LOSS	LOSS	POTENTIAL LOSS
3. Not Applicable		3. RCS Leak Rate		3. Primary Containment Isolation Failure	
Not Applicable	Not Applicable	A. UNISOLABLE break in Main Steamline, HPCI, Feedwater, RWCU, or RCIC OR B. Emergency RPV Depressurization.	A. UNISOLABLE primary system leakage that results in exceeding EITHER of the following: 1. Max Normal Operating Temperature OR 2. Max Normal Operating Area Radiation Level.	A. UNISOLABLE direct downstream pathway to the environment exists after primary containment isolation signal OR B. Intentional primary containment venting per EOPs OR C. UNISOLABLE primary system leakage that results in exceeding EITHER of the following: 1. Max Safe Operating Temperature. OR 2. Max Safe Operating Area Radiation Level.	Not Applicable
4. Primary Containment Radiation		4. Primary Containment Radiation		4. Primary Containment Radiation	
A. DWRRM greater than 1,400 R/h.	Not Applicable	A. DWRRM greater than 40 R/hr.	Not Applicable	Not Applicable	A. DWRRM greater than 26,000 R/hr.

Fuel Clad Barrier		RCS Barrier		Containment Barrier	
LOSS	POTENTIAL LOSS	LOSS	POTENTIAL LOSS	LOSS	POTENTIAL LOSS
5. Other Indications		5. Other Indications		5. Other Indications	
A. Not Applicable.	Not Applicable.	A. Drywell Fission Product Monitor reading 5.0×10^5 cpm.	Not Applicable.	Not Applicable.	Not Applicable.
6. Emergency Director Judgment		6. Emergency Director Judgment		6. Emergency Director Judgment	
A. ANY condition in the opinion of the emergency director that indicates loss of the fuel clad barrier.	A. ANY condition in the opinion of the emergency director that indicates potential loss of the fuel clad barrier.	A. ANY condition in the opinion of the emergency director that indicates loss of the RCS Barrier.	A. ANY condition in the opinion of the emergency director that indicates potential loss of the RCS Barrier.	A. ANY condition in the opinion of the emergency director that indicates loss of the Containment Barrier.	A. ANY condition in the opinion of the emergency director that indicates potential loss of the Containment Barrier.

Basis Information For Fission Product Barrier EALs

FUEL CLAD BARRIER THRESHOLDS:

The fuel clad barrier consists of the zircalloy or stainless steel fuel bundle tubes that contain the fuel pellets.

1. RCS Activity

Loss 1.A

This threshold indicates that RCS radioactivity concentration is greater than 300 $\mu\text{Ci/gm}$ 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 percent 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.

2. RPV Water Level

Loss 2.A

The Loss threshold represents any EOP requirement for entry into the Severe Accident Guidelines. This is identified in the BWROG EPGs/SAGs when adequate core cooling cannot be assured.

Potential Loss 2.A

This water level corresponds to the top of the active fuel and is used in the EOPs to indicate a challenge to core cooling.

The RPV water level threshold is the same as RCS barrier Loss threshold 2.A. This threshold indicates a potential loss of the fuel clad barrier and a loss of the RCS barrier that appropriately escalates the emergency classification level to a Site Area Emergency.

This threshold is considered exceeded when, as specified in the site-specific EOPs, RPV water cannot be restored and maintained above the specified level following depressurization of the RPV (either manually, automatically or by failure of the RCS barrier) or when procedural guidance or a lack of low pressure RPV injection sources preclude Emergency RPV depressurization. EOPs allow the operator a wide choice of RPV injection sources to consider when restoring RPV water level to within prescribed limits. EOPs also specify depressurization of the RPV in order to facilitate RPV water level control with low-pressure injection sources. In some events, elevated RPV pressure may prevent restoration of RPV water level until pressure drops below the shutoff heads of available injection sources. Therefore, this fuel clad barrier potential loss is met only after either: 1) the RPV has been depressurized, or required emergency RPV

depressurization has been attempted, giving the operator an opportunity to assess the capability of low-pressure injection sources to restore RPV water level or 2) no low pressure RPV injection systems are available, precluding RPV depressurization in an attempt to minimize loss of RPV inventory.

The term “cannot be restored and maintained above” means the value of RPV water level is not able to be brought above the specified limit (top of active fuel). The determination requires an evaluation of system performance and availability in relation to the RPV water level value and trend. A threshold prescribing declaration when a threshold value *cannot* be restored and maintained above a specified limit does not require immediate action simply because the current value is below the top of active fuel, but does not permit extended operation below the limit. The threshold must be considered reached as soon as it is apparent that the top of active fuel cannot be attained.

In high-power ATWS/failure to scram events, EOPs may direct the operator to deliberately lower RPV water level to the top of active fuel in order to reduce reactor power. RPV water level is then controlled between the top of active fuel and the Minimum Steam Cooling RPV Water Level (MSCRWL). Although such action is a challenge to core cooling and the fuel clad barrier, the immediate need to reduce reactor power is the higher priority. For such events, ICs SA5 or SS5 will dictate the need for emergency classification.

Since the loss of ability to determine if adequate core cooling is being provided presents a significant challenge to the fuel clad barrier, a potential loss of the fuel clad barrier is specified.

3. **Not Applicable** (included for numbering consistency between barrier tables)
4. **Primary Containment Radiation**

Loss 4.A

The radiation monitor reading corresponds to an instantaneous release of all reactor coolant mass into the primary containment, assuming that reactor coolant activity equals 300 $\mu\text{Ci/gm}$ 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 percent 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 4.A 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 emergency classification level to a Site Area Emergency.

There is no potential loss threshold associated with primary containment radiation.

5. **Other Indications**

Not Applicable (included for numbering consistency between barrier tables)

6. **Emergency Director Judgment**

Loss 6.A

This threshold addresses any other factors that used by the emergency director in determining whether the fuel clad barrier is lost.

Potential Loss 6.A

This threshold addresses any other factors that may be used by the emergency director in determining whether the Fuel Clad Barrier is potentially lost. The emergency director will also consider whether or not to declare the barrier potentially lost in the event that barrier status cannot be monitored.

RCS BARRIER THRESHOLDS:

The RCS Barrier is the reactor coolant system pressure boundary and includes the RPV and all reactor coolant system piping up to and including the isolation valves.

1. Primary Containment Pressure

Loss 1.A

The greater than 1.85 psig primary containment pressure is the drywell high pressure setpoint which indicates a LOCA by automatically initiating the ECCS or equivalent makeup system.

There is no potential loss threshold associated with primary containment pressure.

2. RPV Water Level

Loss 2.A

This water level corresponds to the top of active fuel and is used in the EOPs to indicate challenge to core cooling.

The RPV water level threshold is the same as fuel clad barrier potential loss threshold 2.A. This threshold indicates a loss of the RCS barrier and potential loss of the fuel clad barrier, and that appropriately escalates the emergency classification level to a Site Area Emergency.

This threshold is considered exceeded when, as specified in the site-specific EOPs, RPV water cannot be restored and maintained above the specified level following depressurization of the RPV (either manually, automatically or by failure of the RCS barrier) or when procedural guidance or a lack of low pressure RPV injection sources preclude Emergency RPV depressurization. EOPs allow the operator a wide choice of RPV injection sources to consider when restoring RPV water level to within prescribed limits. EOPs also specify depressurization of the RPV in order to facilitate RPV water level control with low-pressure injection sources. In some events, elevated RPV pressure may prevent restoration of RPV water level until pressure drops below the shutoff heads of available injection sources. Therefore, this RCS barrier loss is met only after either: 1) the RPV has been depressurized, or required emergency RPV depressurization has been attempted, giving the operator an opportunity to assess the capability of low-pressure injection sources to restore RPV water level or 2) no low pressure RPV injection systems are available, precluding RPV depressurization in an attempt to minimize loss of RPV inventory.

The term, "cannot be restored and maintained above," means the value of RPV water level is not able to be brought above the specified limit (top of active fuel). The determination requires an evaluation of system performance and availability in relation to the RPV water level value and trend. A threshold prescribing declaration when a threshold value *cannot* be restored and maintained above a specified limit does not require immediate action simply because the current value is below the top of active fuel, but does not permit extended operation beyond the limit. The threshold must be considered reached as soon as it is apparent that the top of active fuel cannot be attained.

In high-power ATWS/failure to scram events, EOPs may direct the operator to deliberately lower RPV water level to the top of active fuel in order to reduce reactor power. RPV water level is then controlled between the top of active fuel and the Minimum Steam Cooling RPV Water Level (MSCRWL). Although such action is a challenge to core cooling and the Fuel Clad barrier, the immediate need to reduce reactor power is the higher priority. For such events, ICs SA5 or SS5 will dictate the need for emergency classification.

There is no RCS potential loss threshold associated with RPV water level.

3. RCS Leak Rate

Loss Threshold 3.A

Large high-energy lines that rupture outside primary containment can discharge significant amounts of inventory and jeopardize the pressure-retaining capability of the RCS until they are isolated. If it is determined that the ruptured line cannot be promptly isolated from the control room, the RCS barrier loss threshold is met.

Loss Threshold 3.B

Emergency RPV Depressurization in accordance with the EOPs is indicative of a loss of the RCS barrier. If emergency RPV depressurization is performed, the plant operators are directed to open safety relief valves (SRVs). Even though the RCS is being vented into the suppression pool, a loss of the RCS barrier exists due to the diminished effectiveness of the RCS to retain fission products within its boundary.

Potential Loss Threshold 3.A

Potential loss of RCS based on primary system leakage outside the primary containment is determined from EOP temperature or radiation Max Normal Operating values in areas such as main steam line tunnel, RCIC, HPCI, etc., which indicate a direct path from the RCS to areas outside primary containment.

A Max Normal Operating value is the highest value of the identified parameter expected to occur during normal plant operating conditions with all directly associated support and control systems functioning properly.

The indicators reaching the threshold barriers and confirmed to be caused by RCS leakage from a primary system warrant an Alert classification. A primary system is defined to be the pipes, valves, and other equipment that connect directly to the RPV such that a reduction in RPV pressure will effect a decrease in the steam or water being discharged through an unisolated break in the system.

An UNISOLABLE leak which is indicated by Max Normal Operating values escalates to a Site Area Emergency when combined with containment barrier loss threshold 3.A (after a containment isolation) and a General Emergency when the fuel clad barrier criteria is also exceeded.

4. Primary Containment Radiation

Loss 4.A

The radiation monitor reading corresponds to an instantaneous release of all reactor coolant mass into the primary containment, assuming that reactor coolant activity equals Technical Specification allowable limits. This value is lower than that specified for fuel clad barrier loss threshold 4.A since it indicates a loss of the RCS barrier only.

There is no potential loss threshold associated with primary containment radiation.

5. Other Indications

Loss 5A

A Drywell Fission Products Monitor reading 5.0×10^5 cpm indicates a breach of the RCS as an effluent. The monitor value calculated in Calculation SMNH-13-021, Rev 1, was 1.008×10^6 cpm; however, the top of the scale for the monitor is 1×10^6 cpm. Therefore, the EAL threshold value has been established at one half decade below top of scale to aid the operator in distinguishing between a loss of RCS event and an instrument failure resulting in the monitor reading high off scale. No radiation monitors capable of indicating a potential loss of the RCS barrier were identified.

There is no Potential Loss Threshold associated with Other Indications.

6. Emergency Director Judgment

Loss 6.A

This threshold addresses any other factors used by the emergency director in determining whether the RCS barrier is lost.

Potential Loss 6.A

This threshold addresses any other factors used by the emergency director in determining whether the RCS Barrier is potentially lost. The emergency director will also consider whether or not to declare the barrier potentially lost in the event that barrier status cannot be monitored.

CONTAINMENT BARRIER THRESHOLDS:

The primary containment barrier includes the drywell, the wetwell, their respective interconnecting paths, and other connections up to and including the outermost containment isolation valves. Containment barrier thresholds are used as criteria for escalation of the ECL from Alert to a Site Area Emergency or a General Emergency.

1. Primary Containment Conditions

Loss 1.A and 1.B

Rapid UNPLANNED loss of primary containment pressure (i.e., not attributable to drywell spray or condensation effects) following an initial pressure increase indicates a loss of primary containment integrity. Primary containment pressure should increase as a result of mass and energy release into the primary containment from a LOCA. Primary containment pressure not increasing under these conditions indicates a loss of primary containment integrity.

These thresholds rely on operator recognition of an unexpected response for the condition and therefore a specific value is not assigned. The unexpected (UNPLANNED) response is important because it is the indicator for a containment bypass condition.

Potential Loss 1.A

The threshold pressure is the primary containment internal design pressure. Structural acceptance testing demonstrates the capability of the primary containment to resist pressures greater than the internal design pressure. A pressure of this magnitude is greater than those expected to result from any design basis accident and represents a potential loss of the containment barrier.

Potential Loss 1.B

If hydrogen concentration reaches or exceeds the lower flammability limit, as defined in plant EOPs, in an oxygen rich environment, a potentially explosive mixture exists. If the combustible mixture ignites inside the primary containment, loss of the containment barrier could occur.

Potential Loss 1.C

The heat capacity temperature limit (HCTL) is the highest suppression pool temperature from which emergency RPV depressurization will not raise:

Suppression chamber temperature above the maximum temperature capability of the suppression chamber and equipment within the suppression chamber which may be required to operate when the RPV is pressurized,

OR

Suppression chamber pressure above Primary Containment Pressure Limit A, while the rate of energy transfer from the RPV to the containment is greater than the capacity of the containment vent.

The HCTL is a function of RPV pressure, suppression pool temperature and suppression pool water level. It is used to preclude failure of the containment and equipment in the containment necessary for the safe shutdown of the plant and therefore, the inability to maintain plant parameters below the limit constitutes a potential loss of containment.

2. RPV Water Level

There is no loss threshold associated with RPV water level.

Potential Loss 2.A

The potential loss threshold is identical to the Fuel Clad Loss RPV Water Level threshold 2.A. The potential loss requirement for entry into the Severe Accident Guidelines indicates adequate core cooling cannot be assured and that core damage is possible. BWR EPGs/SAGs specify the conditions when the EPGs are exited and SAGs are entered. Entry into SAGs is a logical escalation in response to the inability to assure adequate core cooling.

PRA studies indicate that the condition of this potential loss threshold is a core melt sequence that, if not corrected, could lead to RPV failure and increased potential for primary containment failure. In conjunction with the RPV water level loss thresholds in the fuel clad and RCS barrier columns, this threshold results in the declaration of a General Emergency.

3. Primary Containment Isolation Failure

These thresholds address incomplete containment isolation (automatic or manual) that allows an UNISOLABLE direct release to the environment. A release path is 'direct' if it allows for the migration of radioactive material from the containment to the environment in a generally uninterrupted manner (e.g., little or no holdup time); therefore, within the context of a containment barrier loss or potential loss threshold, a release path through the wetwell is a direct release path.

Loss 3.A

The use of the modifier "direct" in defining the release path discriminates against release paths through interfacing liquid systems or minor release pathways, such as instrument lines, not protected by the Primary Containment Isolation System (PCIS).

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.

Following the leakage of RCS mass into primary containment and a rise in primary containment pressure, there may be minor radiological releases associated with allowable primary containment leakage through various penetrations or system components. Minor releases may also occur if a primary containment isolation valve(s) fails to close but the primary containment atmosphere escapes to an enclosed system. These releases do not constitute a loss or potential loss of primary containment but should be evaluated using the Recognition Category R ICs.

Loss 3.B

EOPs may direct primary containment isolation valve logic(s) to be intentionally bypassed, even if offsite radioactivity release rate limits will be exceeded. Under these conditions with a valid primary containment isolation signal, the containment will also be considered lost if primary containment venting is actually performed.

Intentional venting of primary containment for primary containment pressure or combustible gas control to the secondary containment and/or the environment is a loss of the containment. Venting for primary containment pressure control when not in an accident situation (e.g., to control pressure below the drywell high pressure scram setpoint) does not meet the threshold condition.

Loss 3.C

The Max Safe Operating Temperature and the Max Safe Operating Radiation Level are each the highest value of these parameters at which neither: 1) equipment necessary for the safe shutdown of the plant will fail, nor 2) personnel access necessary for the safe shutdown of the plant will be precluded. EOPs use these temperatures and radiation levels to establish conditions under which RPV depressurization is required.

The temperatures and radiation levels will be confirmed to be caused by RCS leakage from a primary system. A primary system is defined to be the pipes, valves, and other equipment that connect directly to the RPV ensuring a reduction in RPV pressure will effect a decrease in the steam or water being discharged through an unisolated break in the system.

In combination with RCS potential loss 3.A this threshold would result in a Site Area Emergency.

There is no potential loss threshold associated with Primary Containment Isolation Failure.

4. Primary Containment Radiation

There is no loss threshold associated with primary containment radiation.

Potential Loss 4.A

The radiation monitor reading corresponds to an instantaneous release of all reactor coolant mass into the primary containment, assuming that 20-percent 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-percent 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 that would then escalate the emergency classification level to a General Emergency.

5. Other Indications

Not Applicable (included for numbering consistency between barrier tables)

6. Emergency Director Judgment

Loss 6.A

This threshold addresses any other factors that are to be used by the emergency director in determining whether the containment barrier is lost.

Potential Loss 6.A

This threshold addresses any other factors that may be used by the emergency director in determining whether the containment barrier is potentially lost. The emergency director will also consider whether or not to declare the barrier potentially lost in the event that barrier status cannot be monitored.

7 HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY ICS/EALS

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
HG1 HOSTILE ACTION resulting in loss of physical control of the facility. <i>Op. Modes: All</i>	HS1 HOSTILE ACTION within the PROTECTED AREA. <i>Op. Modes: All</i>	HA1 HOSTILE ACTION within the OWNER CONTROLLED AREA or airborne attack threat within 30 minutes. <i>Op. Modes: All</i>	HU1 Confirmed SECURITY CONDITION or threat. <i>Op. Modes: All</i>
			HU2 Seismic event greater than OBE levels. <i>Op. Modes: All</i>
			HU3 Hazardous event. <i>Op. Modes: All</i>
			HU4 FIRE potentially degrading the level of safety of the plant. <i>Op. Modes: All</i>
		HA5 Gaseous release impeding access to equipment necessary for normal plant operations, cooldown or shutdown. <i>Op. Modes: All</i>	
	HS6 Inability to control a key safety function from outside the Control Room. <i>Op. Modes: All</i>	HA6 Control Room evacuation resulting in transfer of plant control to alternate locations. <i>Op. Modes: All</i>	

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
HG7 Other conditions exist which in the judgment of the emergency director warrant declaration of a General Emergency. <i>Op. Modes: All</i>	HS7 Other conditions exist which in the judgment of the emergency director warrant declaration of a Site Area Emergency. <i>Op. Modes: All</i>	HA7 Other conditions exist which in the judgment of the emergency director warrant declaration of an Alert. <i>Op. Modes: All</i>	HU7 Other conditions exist which in the judgment of the emergency director warrant declaration of a (NO)UE. <i>Op. Modes: All</i>

ECL: General Emergency

Initiating Condition: HOSTILE ACTION resulting in loss of physical control of the facility.

Operating Mode Applicability: All

Emergency Action Levels:

- (1) a. A HOSTILE ACTION is occurring or has occurred within the PROTECTED AREA (PA) as reported by the on shift Security Captain or designee.
- AND**
- b. **EITHER** of the following has occurred:
1. **ANY** of the following safety functions cannot be controlled or maintained.
 - Reactivity control
 - RPV water level
 - RCS heat removal
 - OR**
 2. Damage to spent fuel has occurred or is IMMINENT.

Basis:

HOSTILE ACTION: An act toward a nuclear power plant (NPP) or its personnel that includes the use of violent force to destroy equipment, take HOSTAGES, and/or intimidate the licensee to achieve an end. This includes attack by air, land, or water using guns, explosives, PROJECTILES, vehicles, or other devices used to deliver destructive force. Other acts that satisfy the overall intent may be included. HOSTILE ACTION should not be construed to include acts of civil disobedience or felonious acts that are not part of a concerted attack on the NPP. 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 (OCA)).

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 (PA): The area that encompasses all controlled areas within the security protected area fence.

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) or 2) loss of spent fuel pool integrity so that sufficient water level cannot be maintained.

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]*.

Emergency plans and implementing procedures are public documents; therefore, EALs should not incorporate security-sensitive information. This includes information that may be advantageous to a potential adversary, such as the particulars concerning a specific threat or threat location. Security-sensitive information should be contained in non-public documents such as the Security Plan.

ECL: General Emergency

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

Operating Mode Applicability: All

Emergency Action Levels:

- (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.

Basis:

HOSTILE ACTION: An act toward a nuclear power plant (NPP) or its personnel that includes the use of violent force to destroy equipment, take HOSTAGES, and/or intimidate the licensee to achieve an end. This includes attack by air, land, or water using guns, explosives, PROJECTILES, vehicles, or other devices used to deliver destructive force. Other acts that satisfy the overall intent may be included. HOSTILE ACTION should not be construed to include acts of civil disobedience or felonious acts that are not part of a concerted attack on the NPP. 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 (OCA)).

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.

This IC addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist that are believed by the emergency director to fall under the emergency classification level description for a General Emergency.

ECL: Site Area Emergency

Initiating Condition: HOSTILE ACTION within the PROTECTED AREA.

Operating Mode Applicability: All

Emergency Action Levels:

- (1) A HOSTILE ACTION is occurring or has occurred within the PROTECTED AREA (PA) as reported by the on shift Security Captain or designee.

Basis:

HOSTILE ACTION: An act toward a nuclear power plant (NPP) or its personnel that includes the use of violent force to destroy equipment, take HOSTAGES, and/or intimidate the licensee to achieve an end. This includes attack by air, land, or water using guns, explosives, PROJECTILES, vehicles, or other devices used to deliver destructive force. Other acts that satisfy the overall intent may be included. HOSTILE ACTION should not be construed to include acts of civil disobedience or felonious acts that are not part of a concerted attack on the NPP. 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 (OCA)).

PROTECTED AREA (PA): The area that encompasses all controlled areas within the security protected area fence.

This IC addresses the occurrence of a HOSTILE ACTION within the PROTECTED AREA. This event will require rapid response and assistance due to the possibility for damage to plant equipment.

Timely and accurate communications between Security shift supervision and the control room is essential for proper classification of a security-related event.

Security plans and terminology are based on the guidance provided by NEI 03-12, *Template for the Security Plan, Training and Qualification Plan, Safeguards Contingency Plan [and Independent Spent Fuel Storage Installation Security Program]*.

As time and conditions allow, these events require a heightened state of readiness by the plant staff and implementation of onsite protective measures (e.g., evacuation, dispersal, or sheltering). The Site Area Emergency declaration will mobilize 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 plant 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, or physical disputes between employees. Reporting of these types of events is adequately addressed by other EALs, or the requirements of 10 CFR § 73.71 or 10 CFR § 50.72.

Emergency plans and implementing procedures are public documents; therefore, EALs should not incorporate security-sensitive information. This includes information that may be advantageous to a potential adversary, such as the particulars concerning a specific threat or threat location. Security-sensitive information should be contained in non-public documents such as the Security Plan.

Escalation of the emergency classification level uses IC HG1.

ECL: Site Area Emergency

Initiating Condition: Inability to control a key safety function from outside the Control Room.

Operating Mode Applicability: All

Emergency Action Levels:

Note: The emergency director will declare the Site Area Emergency promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) a. An event has resulted in plant control being transferred from the control room to remote shutdown panels.

AND

- b. Control of **ANY** of the following key safety functions is not reestablished within 15 minutes.
- Reactivity control
 - RPV water level
 - RCS heat removal

Basis:

This IC addresses an evacuation of the control room that results in transfer of plant control to alternate locations, and the control of a key safety function cannot be reestablished in a timely manner. The failure to gain control of a key safety function following a transfer of plant control to alternate locations is a precursor to a challenge to one or more fission product barriers within a relatively short period of time.

The determination of whether or not “control” is established at the remote safe shutdown location(s) is based on emergency director judgment. The emergency director is expected to make a reasonable, informed judgment within 15 minutes as to whether the operating staff has control of key safety functions from the remote safe shutdown location.

Escalation of the emergency classification level uses IC FG1 or CG1.

ECL: Site Area Emergency

Initiating Condition: Other conditions exist which in the judgment of the emergency director warrant declaration of a Site Area Emergency.

Operating Mode Applicability: All

Emergency Action Levels:

- (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.

Basis:

HOSTILE ACTION: An act toward a nuclear power plant (NPP) or its personnel that includes the use of violent force to destroy equipment, take HOSTAGES, and/or intimidate the licensee to achieve an end. This includes attack by air, land, or water using guns, explosives, PROJECTILES, vehicles, or other devices used to deliver destructive force. Other acts that satisfy the overall intent may be included. HOSTILE ACTION should not be construed to include acts of civil disobedience or felonious acts that are not part of a concerted attack on the NPP. 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 (OCA)).

This IC addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist that are believed by the emergency director to fall under the emergency classification level description for a Site Area Emergency.

ECL: Alert

Initiating Condition: HOSTILE ACTION within the OWNER CONTROLLED AREA or airborne attack threat within 30 minutes.

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2)

- (1) A HOSTILE ACTION is occurring or has occurred within the OWNER CONTROLLED AREA (OCA) as reported by the on shift Security Captain or designee.
- (2) A validated notification from NRC of an aircraft attack threat within 30 minutes of the site.

Basis:

HOSTILE ACTION: An act toward a nuclear power plant (NPP) or its personnel that includes the use of violent force to destroy equipment, take HOSTAGES, and/or intimidate the licensee to achieve an end. This includes attack by air, land, or water using guns, explosives, PROJECTILES, vehicles, or other devices used to deliver destructive force. Other acts that satisfy the overall intent may be included. HOSTILE ACTION should not be construed to include acts of civil disobedience or felonious acts that are not part of a concerted attack on the NPP. 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 (OCA)).

OWNER CONTROLLED AREA (OCA): The site property owned by or otherwise under the control of HNP Security

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 (PA), 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, 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, or physical disputes between employees.

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 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 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 station procedures.

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 Security Plan.

Escalation of the emergency classification level uses IC HS1.

ECL: Alert

Initiating Condition: Gaseous release impeding access to equipment necessary for normal plant operations, cooldown or shutdown.

Operating Mode Applicability: All

Emergency Action Levels:

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.

- (1) a. Release of a toxic, corrosive, asphyxiant or flammable gas into any Table H1 plant rooms or areas:

Table H1		
Building	Rooms	Applicable Modes
Diesel generator building	All	All
Reactor building	Unit 1/2 130'	All
	Unit 1/2 SE Diagonals (RHR)	All
	Unit 1/2 NE Diagonals (RHR)	All

AND

- b. Entry into the room or area is prohibited or impeded.

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 plant safety.

An Alert declaration is warranted if entry into the affected room/area is, or may be, procedurally required during the plant operating mode in effect at the time of the gaseous release. The emergency classification is not contingent upon whether entry is actually necessary at the time of the release.

Evaluation of the IC and EAL do not require atmospheric sampling; it only requires the emergency director's judgment that the gas concentration in the affected room/area is sufficient to preclude or significantly impede procedurally required access. This judgment may be based on a variety of factors including an existing job hazard analysis, report of ill effects on personnel, advice from a subject matter expert, or operating experience with the same or similar hazards. Access should be considered as impeded if extraordinary measures are necessary to facilitate entry of personnel into the affected room/area (e.g., requiring use of protective equipment, such as SCBAs, that is not routinely employed).

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

- The plant is in an operating mode different than the mode specified for the affected room/area (i.e., entry is not required during the operating mode in effect at the time of the gaseous release). For example, the plant is in Mode 1 when the gaseous release occurs, and the procedures used for normal operation, cooldown and shutdown do not require entry into the affected room until Mode 4.
- The gas release is a planned activity that includes compensatory measures which address the temporary inaccessibility of a room or area (e.g., fire suppression system testing).
- The action for which room/area entry is required is of an administrative or record keeping nature (e.g., normal rounds or routine inspections).
- The access control measures are of a conservative or precautionary nature, and would not actually prevent or impede a required action.

An asphyxiant is a gas capable of reducing the level of oxygen in the body to dangerous levels. Most commonly, asphyxiants work by displacing air in an enclosed environment. This reduces the concentration of oxygen below the normal level of around 19-percent, 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.

Escalation of the emergency classification level uses Recognition Category R, C or F ICs.

ECL: Alert

Initiating Condition: Control Room evacuation resulting in transfer of plant control to alternate locations.

Operating Mode Applicability: All

Emergency Action Levels:

- (1) An event has resulted in plant control being transferred from the control room to remote shutdown panels.

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 uses IC HS6.

ECL: Alert

Initiating Condition: Other conditions exist which in the judgment of the emergency director warrant declaration of an Alert.

Operating Mode Applicability: All

Emergency Action Levels:

- (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.

Basis:

HOSTILE ACTION: An act toward a nuclear power plant (NPP) or its personnel that includes the use of violent force to destroy equipment, take HOSTAGES, and/or intimidate the licensee to achieve an end. This includes attack by air, land, or water using guns, explosives, PROJECTILES, vehicles, or other devices used to deliver destructive force. Other acts that satisfy the overall intent may be included. HOSTILE ACTION should not be construed to include acts of civil disobedience or felonious acts that are not part of a concerted attack on the NPP. 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 (OCA)).

This IC addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist that are believed by the emergency director to fall under the emergency classification level description for an Alert.

ECL: Notification of Unusual Event

Initiating Condition: Confirmed SECURITY CONDITION or threat.

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2 or 3)

- (1) A SECURITY CONDITION that does not involve a HOSTILE ACTION as reported by the on shift Security Captain or designee.
- (2) Notification of a credible security threat directed at HNP.
- (3) A validated notification from the NRC providing information of an aircraft threat.

Basis:

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 a nuclear power plant (NPP) or its personnel that includes the use of violent force to destroy equipment, take HOSTAGES, and/or intimidate the licensee to achieve an end. This includes attack by air, land, or water using guns, explosives, PROJECTILES, vehicles, or other devices used to deliver destructive force. Other acts that satisfy the overall intent may be included. HOSTILE ACTION should not be construed to include acts of civil disobedience or felonious acts that are not part of a concerted attack on the NPP. 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 (OCA)).

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 that 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 OROs.

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 references the Security Shift Captain or designee 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 addresses the receipt of a credible security threat. The credibility of the threat is assessed in accordance with station procedures.

EAL #3 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 station procedures.

Emergency plans and implementing procedures are public documents; therefore, EALs should not incorporate security-sensitive information. This includes information that may be advantageous to a potential adversary, such as the particulars concerning a specific threat or threat location. Security-sensitive information should be contained in non-public documents such as the Security Plan.

Escalation of the emergency classification level uses IC HA1.

ECL: Notification of Unusual Event

Initiating Condition: Seismic event greater than OBE levels

Operating Mode Applicability: All

Emergency Action Levels:

- (1) Seismic event greater than Operating Basis Earthquake (OBE) as indicated by **ANY** of the following
 - Unit One “Seismic Peak Shock Recorder High G Level” (657-066) alarm
 - Unit Two “Seismic Instrumentation Triggered” (657-048) alarm
 - A 12.7 Hz amber light illuminated in the N/S OR E/W column on panel 1H11-P701
 - A 12.7 Hz red light illuminated in the N/S OR E/W column on panel 1H11-P701

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 plant safety.

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., typical lateral accelerations are in excess of 0.08g). The Shift Manager or emergency director may seek external verification if deemed appropriate (e.g., a call to the USGS or check internet news sources); 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 uses IC CA6 or SA9.

ECL: Notification of Unusual Event

Initiating Condition: Hazardous event.

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2 or 3 or 4 or 5)

Note: EAL #4 does not apply to routine traffic impediments such as fog, snow, ice, or vehicle breakdowns or accidents.

- (1) A tornado strike within the PROTECTED AREA (PA).
- (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.
- (3) Movement of personnel within the PROTECTED AREA (PA) is impeded due to an offsite event involving hazardous materials (e.g., an offsite chemical spill or toxic gas release).
- (4) A hazardous event that results in on-site conditions sufficient to prohibit the plant staff from accessing the site in personal vehicles.
- (5) Sustained hurricane force winds greater than 74 mph forecast to be at the plant site in the next four hours.

Basis:

PROTECTED AREA (PA): The area which encompasses all controlled areas within the security protected area fence.

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.

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

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

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 (PA).

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, or an on-site train derailment blocking the access road.

This EAL is not intended to apply to routine impediments such as fog, snow, ice, or vehicle breakdowns or accidents, but rather to more significant conditions such as the Hurricane Andrew strike on Turkey Point in 1992, the flooding around the Cooper Station during the Midwest floods of 1993, or the flooding around Ft. Calhoun Station in 2011.

EAL #5 addresses the phenomena of the hurricane based on the severe weather mitigation procedure.

Escalation of the emergency classification level is based on ICs in Recognition Categories A, F, S or C.

ECL: Notification of Unusual Event

Initiating Condition: FIRE potentially degrading the level of safety of the plant.

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2 or 3 or 4)

Note: The emergency director will declare the Unusual Event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.

- (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** Table H2 rooms or areas

- (2) a. Receipt of a single fire alarm (i.e., no other indications of a FIRE)

AND

- b. The FIRE is located within **ANY** Table H2 rooms or areas

AND

- c. The existence of a FIRE is not verified within 30-minutes of alarm receipt.

- (3) A FIRE within the plant PROTECTED AREA (PA) or ISFSI PROTECTED AREA not extinguished within 60-minutes of the initial report, alarm or indication.

- (4) A FIRE within the plant PROTECTED AREA (PA) or ISFSI PROTECTED AREA that requires firefighting support by an offsite fire response agency to extinguish.

Table H2	
Building	Rooms
Control Building	CB 147' Cable Spreading Room
	U 1/2 CB 112' Station Battery Rooms A,B
Diesel generator building	All
Primary containment	All
Reactor building	Unit 1/2 130'
	Unit 1/2 SE Diagonals (RHR)
	Unit 1/2 NE Diagonals (RHR)
	Unit 1 SW Diagonals (RCIC)
	Unit 2 NW Diagonals (RCIC)
	Unit 1/2 HPCI Rooms
Intake structure	All

Basis:

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 (PA): The area that encompasses all controlled areas within the security protected area fence.

This IC addresses the magnitude and extent of FIRES that may be indicative of a potential degradation of the level of plant safety.

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 or automatic activation of a suppression system.

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 (PA) 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 (PA).

EAL #4

If a FIRE within the plant PROTECTED AREA (PA) or ISFSI PROTECTED AREA is of sufficient size to require a response by an offsite firefighting agency, 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.

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 uses IC CA6 or SA9.

ECL: Notification of Unusual Event

Initiating Condition: Other conditions exist which in the judgment of the emergency director warrant declaration of a Notification of Unusual Event (NOUE).

Operating Mode Applicability: All

Emergency Action Levels:

- (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.

Basis:

This IC addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist which are believed by the emergency director to fall under the emergency classification level description for a NOUE.

8 SYSTEM MALFUNCTION ICS/EALS

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
SG1 Prolonged loss of all offsite and all onsite AC power to emergency buses. <i>Op. Modes: Power Operation, Startup, Hot Standby, Hot Shutdown</i>	SS1 Loss of all offsite and all onsite AC power to emergency buses for 15 minutes or longer. <i>Op. Modes: Power Operation, Startup, Hot Standby, Hot Shutdown</i>	SA1 Loss of all but one AC power source to emergency buses for 15 minutes or longer. <i>Op. Modes: Power Operation, Startup, Hot Standby, Hot Shutdown</i>	SU1 Loss of all offsite AC power capability to emergency buses for 15 minutes or longer. <i>Op. Modes: Power Operation, Startup, Hot Standby, Hot Shutdown</i>
		SA2 UNPLANNED loss of Control Room indications for 15 minutes or longer with a significant transient in progress. <i>Op. Modes: Power Operation, Startup, Hot Standby, Hot Shutdown</i>	SU2 UNPLANNED loss of Control Room indications for 15 minutes or longer. <i>Op. Modes: Power Operation, Startup, Hot Standby, Hot Shutdown</i>
			SU3 Reactor coolant activity greater than Technical Specification allowable limits. <i>Op. Modes: Power Operation, Startup, Hot Standby, Hot Shutdown</i>
			SU4 RCS leakage for 15 minutes or longer. <i>Op. Modes: Power Operation, Startup, Hot Standby, Hot Shutdown</i>
	SS5 Inability to shutdown the reactor causing a challenge to RPV water level or RCS heat removal. <i>Op. Modes: Power Operation</i>	SA5 Automatic or manual scram fails to shutdown the reactor, and subsequent manual actions taken at the reactor control consoles are not successful in shutting down the reactor. <i>Op. Modes: Power Operation</i>	SU5 Automatic or manual scram fails to shutdown the reactor. <i>Op. Modes: Power Operation</i>

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
			SU6 Loss of all onsite or offsite communications capabilities. <i>Op. Modes: Power Operation, Startup, Hot Standby, Hot Shutdown</i>
SG8 Loss of all AC and vital DC power sources for 15 minutes or longer. <i>Op. Modes: Power Operation, Startup, Hot Standby, Hot Shutdown</i>	SS8 Loss of all vital DC power for 15 minutes or longer. <i>Op. Modes: Power Operation, Startup, Hot Standby, Hot Shutdown</i>		
		SA9 Hazardous event affecting a SAFETY SYSTEM needed for the current operating mode. <i>Op. Modes: Power Operation, Startup, Hot Standby, Hot Shutdown</i>	

ECL: General Emergency

Initiating Condition: Prolonged loss of all offsite and all onsite AC power to emergency buses.

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels:

Note: The emergency director will declare the General Emergency promptly upon determining that 4 hours has been exceeded, or will likely be exceeded.

- (1) a. Loss of **ALL** offsite and **ALL** onsite AC power to 4160 VAC Emergency Buses 1/2E, 1/2F, **AND** 1/2G.

AND
- b. **EITHER** of the following:
 - Restoration of at least one AC emergency bus in less than 4 hours is not likely.
 - Reactor vessel water level cannot be restored and maintained above Minimum Steam Cooling RPV Water Level.

Basis:

This IC addresses a prolonged loss of all power sources to AC emergency 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 will 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 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 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.

ECL: General Emergency

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

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels:

Note: The emergency director will declare the General Emergency promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) a. Loss of **ALL** offsite and **ALL** onsite AC power to 4160 VAC Emergency Buses 1/2E, 1/2F, **AND** 1/2G for 15 minutes or longer.

AND

- b. Indicated voltage is less than 105/210 VDC on **ALL** 125/250 VDC Bus 1/2R22-S016 **AND** 1/2R22-S017 for 15 minutes or longer.

Basis:

This IC addresses a concurrent and prolonged loss of both AC and vital DC power. 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 loss of vital DC power compromises the ability to monitor and control SAFETY SYSTEMS. A sustained loss of both AC and DC power will lead to multiple challenges to fission product barriers.

Fifteen minutes is the threshold to exclude transient or momentary power losses. The 15-minute emergency declaration clock begins at the point when both EAL thresholds are met.

ECL: Site Area Emergency

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

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels:

Note: The emergency director will declare the Site Area Emergency promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) Loss of **ALL** offsite and **ALL** onsite AC power to 4160 VAC Emergency Buses 1/2E, 1/2F, **AND** 1/2G for 15 minutes or longer.

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 is a threshold to exclude transient or momentary power losses.

Escalation of the emergency classification level uses ICs RG1, FG1 or SG1.

ECL: Site Area Emergency

Initiating Condition: Inability to shutdown the reactor causing a challenge to RPV water level or RCS heat removal.

Operating Mode Applicability: Power Operation

Emergency Action Levels:

- (1) a. An automatic or manual scram 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:
- Reactor vessel water level cannot be restored and maintained above Minimum Steam Cooling RPV Water Level
 - Exceeding the Heat Capacity Temperature Limit (HCTL) Curve (EOP Graph 2)

Basis:

This IC addresses a failure of the RPS to initiate or complete an automatic or manual reactor scram 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 warrants the declaration of a Site Area Emergency.

In some instances, the emergency classification resulting from this IC/EAL may be higher than that resulting from an assessment of the plant responses and symptoms against the Recognition Category F ICs/EALs. This is appropriate in that the Recognition Category F ICs/EALs do not address the additional threat posed by a failure to shutdown the reactor. The inclusion of this IC and EAL ensures the timely declaration of a Site Area Emergency in response to prolonged failure to shutdown the reactor.

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

Escalation of the emergency classification level uses IC RG1 or FG1.

ECL: Site Area Emergency

Initiating Condition: Loss of all vital DC power for 15 minutes or longer.

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels:

Note: The emergency director will declare the Site Area Emergency promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) Indicated voltage is less than 105/210 VDC on **ALL** 125/250 VDC Bus 1/2R22-S016 **AND** 1/2R22-S017 for 15 minutes or longer.

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 is a threshold to exclude transient or momentary power losses.

Escalation of the emergency classification level uses ICs RG1, FG1 or SG8.

ECL: Alert

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

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels:

Note: The emergency director will declare the Alert promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) a. AC power capability to 4160 VAC Emergency Buses 1/2E, 1/2F, AND 1/2G is reduced to a single power source (Table S1) 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.

Table S1	
Unit 1	Unit 2
Start-up Aux XFMR 1C	Start-up Aux XFMR 2C
Start-up Aux XFMR 1D	Start-up Aux XFMR 2D
Diesel Generator 1A	Diesel Generator 2A
Diesel Generator 1B	Diesel Generator 1B
Diesel Generator 1C	Diesel Generator 2C

Basis:

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.

This IC describes a significant degradation of offsite and onsite AC power sources (see Table S1) 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 bus. Some examples of this condition are presented below.

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

Fifteen minutes is a threshold to exclude transient or momentary losses of power.

Escalation of the emergency classification level uses IC SS1.

ECL: Alert

Initiating Condition: UNPLANNED loss of Control Room indications for 15 minutes or longer with a significant transient in progress.

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels:

Note: The emergency director will declare the Alert promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) a. 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.

Reactor Power
RPV Water Level
RPV Pressure
Primary Containment Pressure
Suppression Pool Level
Suppression Pool Temperature

AND

- b. 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
 - ECCS actuation
 - Thermal power oscillations greater than 10%

Basis:

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.

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 plant safety.

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, RPV level 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 RPV water 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 is the threshold to exclude transient or momentary losses of indication.

Escalation of the emergency classification level uses ICs FS1 or IC RS1.

ECL: Alert

Initiating Condition: Automatic or manual scram fails to shutdown the reactor, and subsequent manual actions taken at the reactor control consoles are not successful in shutting down the reactor.

Operating Mode Applicability: Power Operation

Emergency Action Levels:

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.

- (1) a. An automatic or manual scram did not shutdown the reactor.

AND

- b. Manual actions taken at the reactor control consoles are not successful in shutting down the reactor.

Basis:

This IC addresses a failure of the RPS to initiate or complete an automatic or manual reactor scram 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 plant safety. 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 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 scram). 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 consoles (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.

The plant response to the failure of an automatic or manual reactor scram 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 shutdown the reactor is prolonged enough to cause a challenge to the RPV water level or RCS heat removal safety functions, the emergency classification level will escalate to a Site Area Emergency via IC SS5. Depending upon plant responses and symptoms, escalation is also possible via IC FS1. Absent the plant conditions needed to meet either IC SS5 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.

ECL: Alert

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

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels:

- (1) a. The occurrence of **ANY** of the following hazardous events:
- Seismic event (earthquake)
 - Internal or external flooding event
 - High winds (> 35 mph sustained) or tornado strike
 - FIRE
 - EXPLOSION
 - Other events with similar hazard characteristics as determined by the Shift Manager
- AND**
- b. **EITHER** of the following:
- 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.

Basis:

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.

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 may require a post-event inspection to determine if the attributes of an explosion are present.

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.

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.

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 plant safety.

EAL 1.a identifies hazardous events that could result in damage to plant systems. A seismic event is indicated by entry into IC HU2. Flooding is indicated by a significant increase in water levels (external or internal). High winds are indicated by sustained winds at the site meteorological tower exceeding 35 mph.

The first threshold for EAL 1.b 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 threshold for EAL 1.b 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 uses IC FS1 or RS1.

ECL: Notification of Unusual Event

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

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels:

Note: The emergency director will declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) Loss of **ALL** offsite AC power capability (Table S2) to 4160 VAC Emergency Buses 1/2E, 1/2F, **AND** 1/2G for 15 minutes or longer.

Table S2	
Unit 1	Unit 2
Start-up Aux XFMR 1C	Start-up Aux XFMR 2C
Start-up Aux XFMR 1D	Start-up Aux XFMR 2D

Basis:

This IC addresses a prolonged loss of offsite power (see Table S2 above). The loss of offsite power sources renders the plant more vulnerable to a complete loss of power to AC emergency buses. This condition represents a potential reduction in the level of plant safety.

For emergency classification purposes, “capability” means that an offsite AC power source(s) is available to the emergency buses, whether or not the buses are powered from it.

Fifteen minutes is the threshold to exclude transient or momentary losses of offsite power.

Escalation of the emergency classification level uses IC SA1.

ECL: Notification of Unusual Event

Initiating Condition: UNPLANNED loss of Control Room indications for 15 minutes or longer.

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels:

Note: The emergency director will declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) a. 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.

Reactor Power
RPV Water Level
RPV Pressure
Primary Containment Pressure
Suppression Pool Level
Suppression Pool Temperature

Basis:

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.

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 plant safety.

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 is reported if it significantly impairs the capability to perform emergency assessments, particularly those 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, RPV level 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 RPV water level cannot be determined from the indications and recorders on a main control board, the SPDS, or the plant computer, then the availability of other parameter values may be compromised as well.

Fifteen minutes is a threshold to exclude transient or momentary losses of indication.

Escalation of the emergency classification level uses IC SA2.

ECL: Notification of Unusual Event

Initiating Condition: Reactor coolant activity greater than Technical Specification allowable limits.

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels: (1 or 2)

Note: Use the Unit 1 or Unit 2 Pretreatment (Flow vs. mR/hr) Graphs to determine if the Pretreatment Radiation Monitor exceeds the TV of 240,000 $\mu\text{Ci/sec}$.

- (1) Pretreatment Radiation Monitor
1(2)D11K601
1(2)D11K602
reading greater than 240,000 $\mu\text{Ci/sec}$ for greater than 60 minutes.
- (2) Sample analysis indicates that the reactor coolant specific activity is **EITHER:**
 - Greater than 0.2 $\mu\text{Ci/gm}$ and less than or equal to 2.0 $\mu\text{Ci/gm}$ dose equivalent I_{131} for greater than 48 hours
 - Greater than 2.0 $\mu\text{Ci/gm}$ dose equivalent I_{131} .

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 plant safety.

Escalation of the emergency classification level uses ICs FA1 or the Recognition Category R ICs.

ECL: Notification of Unusual Event

Initiating Condition: RCS leakage for 15 minutes or longer.

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels: (1 or 2 or 3)

Note: The emergency director will declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) RCS unidentified or pressure boundary leakage greater than 10 gpm for 15 minutes or longer.
- (2) RCS identified leakage greater than 25 gpm for 15 minutes or longer.
- (3) Leakage from the RCS to a location outside containment greater than 25 gpm for 15 minutes or longer.

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 plant safety.

EAL #1 and EAL #2 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 addresses a RCS mass loss caused by an UNISOLABLE leak through an interfacing system. These EALs 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 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 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. 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 uses ICs of Recognition Category R or F.

ECL: Notification of Unusual Event

Initiating Condition: Automatic or manual scram fails to shutdown the reactor.

Operating Mode Applicability: Power Operation

Emergency Action Levels: (1 or 2)

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.

- (1) a. An automatic scram did not shutdown the reactor.

AND

- b. A subsequent manual action taken at the reactor control consoles is successful in shutting down the reactor.

- (2) a. A manual scram did not shutdown the reactor.

AND

- b. **EITHER** of the following:

- A subsequent manual action taken at the reactor control consoles is successful in shutting down the reactor.
- A subsequent automatic scram is successful in shutting down the reactor.

Basis:

This IC addresses a failure of the RPS to initiate or complete an automatic or manual reactor scram that results in a reactor shutdown, and either a subsequent operator manual action taken at the reactor control consoles or an automatic scram 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 plant safety.

Following the failure on an automatic reactor scram, operators will promptly initiate manual actions at the reactor control consoles to shutdown the reactor (e.g., initiate a manual reactor scram). 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 scram 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 scram using a different switch). Depending upon several factors, the initial or subsequent effort to manually scram the reactor, or a concurrent plant condition, may lead to the generation of an automatic reactor scram signal. If a subsequent manual or automatic scram 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 scram). 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.

The plant response to the failure of an automatic or manual reactor scram 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, and other concurrent plant conditions. 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. Depending upon the plant response, escalation is also possible via IC FA1. Absent the plant conditions needed to meet either IC SA5 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 scram signal be generated as a result of plant work (e.g., RPS setpoint testing), the following classification guidance will be applied.

- If the signal causes a plant transient that should have included an automatic reactor scram and the RPS fails to automatically shutdown the reactor, then this IC and the EALs are applicable, and will be evaluated.
- If the signal does not cause a plant transient and the scram 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.

ECL: Notification of Unusual Event

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

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels: (1 or 2 or 3)

- (1) Loss of **ALL** of the following onsite communication methods:

In plant telephones (includes hardwired and wireless)
Plant Page
Plant radio systems

- (2) Loss of **ALL** of the following ORO communications methods:

ENN (Emergency Notification Network)
Commercial phones

- (3) Loss of **ALL** of the following NRC communications methods:

ENS on Federal Telephone System (FTS) Lines
Commercial phones

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).

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

EAL #2 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 of Georgia, Appling County, Jeff Davis County, Tattnall County and Toombs County.

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

APPENDIX A – ACRONYMS AND ABBREVIATIONS

AC	Alternating Current
AOP	Abnormal Operating Procedure
ATWS	Anticipated Transient Without Scram
BLDG	Building
BWR	Boiling Water Reactor
CB	Control Building
CC	Cubic Centimeter
CDE	Committed Dose Equivalent
CFR	Code of Federal Regulations
CPM	Counts Per Minute
CPS	Counts Per Second
DC	Direct Current
DEI	Dose Equivalent Iodine
DW	Drywell
DWRRM	Drywell Wide Range Rad Monitor
EAL	Emergency Action Level
ECCS	Emergency Core Cooling System
ECL	Emergency Classification Level
ENN	Emergency Notification Network
ENS	Emergency Notification System
EPA	Environmental Protection Agency
EPG	Emergency Procedure Guideline
FAA	Federal Aviation Administration
FBI	Federal Bureau of Investigation
FEMA	Federal Emergency Management Agency
FSAR	Final Safety Analysis Report
FTS	Federal Telecommunications System
GE	General Emergency
GM	Gram
HCTL	Heat Capacity Temperature Limit
HNP	Hatch Nuclear Plant
HOO	Headquarters Operations Officer (NRC)
HPCI	High Pressure Coolant Injection
IC	Initiating Condition
ISFSI	Independent Spent Fuel Storage Installation
LOCA	Loss of Coolant Accident
MSL	Main Steam Line
μCi	micro-Curie
mR, mRem, mrem, mREM	milli-Roentgen Equivalent Man
NE	Northeast
NEI	Nuclear Energy Institute
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	Offsite Dose Calculation Manual

ORO	Off-site Response Organization
PA	Protected Area
PAG	Protective Action Guideline
PBX	Private Branch Exchange
PCIS	Primary Containment Isolation System
PRA/PSA	Probabilistic Risk Assessment / Probabilistic Safety Assessment
PSIG	Pounds per Square Inch Gauge
R	Roentgen
RCIC	Reactor Core Isolation Cooling
RCS	Reactor Coolant System
Rem, rem, REM	Roentgen Equivalent Man
RHR	Residual Heat Removal
RPS	Reactor Protection System
RPV	Reactor Pressure Vessel
RWCU	Reactor Water Cleanup
Rx	Reactor
SAG	Severe Accident Guideline
SAR	Safety Analysis Report
SC	Secondary Containment
SCBA	Self-Contained Breathing Apparatus
SE	Southeast
SEP	Separator
SFP	Spent Fuel Pool
SNC	Southern Nuclear Company
SPDS	Safety Parameter Display System
SW	Southwest
TEDE	Total Effective Dose Equivalent
TOAF	Top of Active Fuel
TV	Threshold Value
VAC	Volts Alternating Current
VDC	Volts Direct Current
VOIP	Voice Over Internet Protocol

APPENDIX B – DEFINITIONS

The following definitions are taken from Title 10, Code of Federal Regulations, and related regulatory guidance documents.

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

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

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

Notification of Unusual Event (NOUE): 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.

The following are key terms necessary for overall understanding the NEI 99-01 emergency classification scheme.

Emergency Action Level (EAL): A pre-determined, site-specific, observable threshold for an Initiating Condition that, when met or exceeded, places the plant in a given emergency classification level.

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

- General Emergency (GE)
- Site Area Emergency (SAE)
- Alert
- Notification of Unusual Event (NOUE)

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

Initiating Condition (IC): An event or condition that aligns with the definition of one of the four emergency classification levels by virtue of the potential or actual effects or consequences.

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.

CONFINEMENT BOUNDARY: The barrier(s) between areas containing radioactive substances and the environment.

CONTAINMENT INTEGRITY: Primary Containment OPERABLE per Technical Specification 3.6.1.1. Secondary Containment OPERABLE per Technical Specification 3.6.4.1

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 may 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.

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

HOSTILE ACTION: An act toward a nuclear power plant (NPP) or its personnel that includes the use of violent force to destroy equipment, take HOSTAGES, and/or intimidate the licensee to achieve an end. This includes attack by air, land, or water using guns, explosives, PROJECTILES, vehicles, or other devices used to deliver destructive force. Other acts that satisfy the overall intent may be included. HOSTILE ACTION should not be construed to include acts of civil disobedience or felonious acts that are not part of a concerted attack on the NPP. 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 (OCA)).

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.

OWNER CONTROLLED AREA (OCA): The site property owned by or otherwise under the control of HNP Security.

PROJECTILE: An object directed toward a NPP that could cause concern for its continued operability, reliability, or personnel safety.

PROTECTED AREA (PA): The area that encompasses all controlled areas within the security protected area fence.

REFUELING PATHWAY: This includes the reactor cavity, the transfer canal, and the spent fuel pool.

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.

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.

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.

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.

Southern Nuclear Operating Company
License Amendment Request for Changes to
Emergency Action Level Schemes to Adopt NEI 99-01 Rev. 6
Responses to Requests for Additional Information

VOGTLE ELECTRIC GENERATING PLANT UNITS 1 AND 2

EAL SCHEME

CLEAN COPIES

**VOGTLE ELECTRIC
GENERATING PLANT**

EMERGENCY ACTION LEVELS

**INITIATING CONDITIONS,
THRESHOLD VALUES,
AND BASIS**

TABLE OF CONTENTS

1	REGULATORY BACKGROUND	1
1.1	OPERATING REACTORS	1
1.2	INDEPENDENT SPENT FUEL STORAGE INSTALLATION (ISFSI).....	1
1.3	NRC ORDER EA-12-051	2
1.4	ORGANIZATION AND PRESENTATION OF INFORMATION.....	3
1.5	IC AND EAL MODE APPLICABILITY.....	3
2	GUIDANCE ON MAKING EMERGENCY CLASSIFICATIONS	5
2.1	GENERAL CONSIDERATIONS	5
2.2	CLASSIFICATION METHODOLOGY	6
2.3	CLASSIFICATION OF MULTIPLE EVENTS AND CONDITIONS.....	6
2.4	CONSIDERATION OF MODE CHANGES DURING CLASSIFICATION	6
2.5	CLASSIFICATION OF IMMINENT CONDITIONS	7
2.6	EMERGENCY CLASSIFICATION LEVEL UPGRADING AND DOWNGRADING	7
2.7	CLASSIFICATION OF SHORT-LIVED EVENTS	7
2.8	CLASSIFICATION OF TRANSIENT CONDITIONS	7
2.9	AFTER-THE-FACT DISCOVERY OF AN EMERGENCY EVENT OR CONDITION.....	8
3	ABNORMAL RAD LEVELS / RADIOLOGICAL EFFLUENT ICS/EALS	9
4	COLD SHUTDOWN / REFUELING SYSTEM MALFUNCTION ICS/EALS	26
5	INDEPENDENT SPENT FUEL STORAGE INSTALLATION (ISFSI) ICS/EALS.....	45
6	FISSION PRODUCT BARRIER ICS/EALS	48
7	HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY ICS/EALS	64
8	SYSTEM MALFUNCTION ICS/EALS.....	87
	APPENDIX A – ACRONYMS AND ABBREVIATIONS.....	A-1
	APPENDIX B – DEFINITIONS	B-1

EMERGENCY ACTION LEVELS

1 REGULATORY BACKGROUND

1.1 OPERATING REACTORS

Title 10, Code of Federal Regulations (CFR), Energy, contains the U.S. Nuclear Regulatory Commission (NRC) regulations that apply to nuclear power facilities. Several of these regulations govern various aspects of an emergency classification scheme. The relevant sections for this document are:

- 10 CFR § 50.47(a)(1)(i)
- 10 CFR § 50.47(b)(4)
- 10 CFR § 50.54(q)
- 10 CFR § 50.72(a)
- 10 CFR § 50, Appendix E, IV.B, Assessment Actions
- 10 CFR § 50, Appendix E, IV.C, Activation of Emergency Organization

These regulations are supplemented by regulatory guidance documents. Documents of particular relevance to NEI 99-01 include:

NUREG-0654/FEMA-REP-1, *Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants*, October 1980. [Refer to Appendix 1, *Emergency Action Level Guidelines for Nuclear Power Plants*]

NUREG-1022, *Event Reporting Guidelines 10 CFR § 50.72 and § 50.73*
Regulatory Guide 1.101, *Emergency Response Planning and Preparedness for Nuclear Power Reactors*

This list is not all-inclusive. It is strongly recommended that scheme developers consult with licensing and regulatory compliance personnel to identify and understand all applicable requirements and guidance. Questions also may be directed to the NEI Emergency Preparedness staff.

1.2 INDEPENDENT SPENT FUEL STORAGE INSTALLATION (ISFSI)

Selected guidance in NEI 99-01 is applicable to licensees electing to use their 10 CFR 50 emergency plan to fulfill the requirements of 10 CFR 72.32 for a stand-alone ISFSI. The emergency classification levels applicable to an ISFSI are consistent with the requirements of 10 CFR § 50 and the guidance in NUREG 0654/FEMA-REP-1. The initiating conditions germane to a 10 CFR § 72.32 emergency plan (as described in NUREG-1567) are contained within the classification scheme for a 10 CFR § 50.47 emergency plan.

The generic ICs and EALs for an ISFSI are presented in Section 5, ISFSI ICs/EALs. IC E-HU1 covers credible natural and man-made events included within the scope of an ISFSI design. This IC is not applicable to installations or facilities that process and/or repackage spent fuel. Additionally, appropriate aspects of IC HU1 and IC HA1 will also be included to address a HOSTILE ACTION directed against an ISFSI.

The analysis of potential onsite and offsite consequences of accidental releases associated with the operation of an ISFSI is contained in NUREG-1140, *A Regulatory Analysis on Emergency Preparedness for Fuel Cycle and Other Radioactive Material Licensees*. NUREG-1140 concluded that the postulated worst-case accident involving an ISFSI has insignificant consequences to public health and safety. This evaluation shows that the maximum offsite dose to a member of the public due to an accidental release of radioactive materials would not exceed 1 rem Effective Dose Equivalent.

1.3 NRC ORDER EA-12-051

The Fukushima Daiichi accident of March 11, 2011, was the result of a tsunami that exceeded the plant's design basis and flooded the site's emergency electrical power supplies and distribution systems. This caused an extended loss of power that severely compromised the key safety functions of core cooling and containment integrity, ultimately leading to core damage in three reactors. Although the loss of power also impaired the spent fuel pool cooling function, sufficient water inventory was maintained in the pools to prevent fuel damage from the loss of cooling.

Following a review of the Fukushima Daiichi accident, the NRC concluded that measures were necessary to ensure adequate protection of public health and safety under the provisions of the backfit rule, 10 CFR 50.109(a)(4)(ii). One such measure was that each spent fuel pool be provided with reliable level instrumentation to significantly enhance the ability of key decision-makers to effectively allocate resources following a beyond design basis event. To this end, the NRC issued Order EA-12-051, *Issuance of Order to Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation*, on March 12, 2012, to all US nuclear plants with an operating license, construction permit, or combined construction and operating license.

NRC Order EA-12-051 states, in part, "All licensees ... shall have a reliable indication of the water level in associated spent fuel storage pools capable of supporting identification of the following pool water level conditions by trained personnel: (1) level that is adequate to support operation of the normal fuel pool cooling system, (2) level that is adequate to provide substantial radiation shielding for a person standing on the spent fuel pool operating deck, and (3) level where fuel remains covered and actions to implement make-up water addition should no longer be deferred." All licensees must therefore provide:

- A primary and back-up level instrument that will monitor water level from the normal level to the top of the used fuel rack in the pool.
- A display in an area accessible following a severe event.
- Independent electrical power to each instrument channel and an alternate remote power connection capability.

NEI 12-02, *Industry Guidance for Compliance with NRC Order EA-12-051, "To Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation"*, provides guidance for complying with NRC Order EA-12-051.

NEI 99-01, Revision 6, includes three EALs that reflect the availability of the enhanced spent fuel pool level instrumentation associated with NRC Order EA-12-051. These

EALs are included within existing IC RA2, and new ICs RS2 and RG2. Associated EAL notes, bases and developer notes are also provided.

It is recommended that these EALs be implemented when the enhanced spent fuel pool level instrumentation is available for use.

The regulatory process that licensees follow to make changes to their emergency plan, including non-scheme changes to EALs, is 10 CFR 50.54(q). Licensees are responsible for evaluating a proposed change and determining whether or not it results in a reduction in the plan's effectiveness. Based on this determination, the licensee will either make the change or submit it to the NRC for prior review and approval in accordance with 10 CFR 50.90.

1.4 ORGANIZATION AND PRESENTATION OF INFORMATION

The scheme's information is organized by Recognition Category in the following order.

- R - Abnormal Radiation Levels / Radiological Effluent
- C - Cold Shutdown / Refueling System Malfunction
- E - Independent Spent Fuel Storage Installation (ISFSI)
- F - Fission Product Barrier
- H - Hazards and Other Conditions Affecting Plant Safety
- S - System Malfunction

1.5 IC AND EAL MODE APPLICABILITY

The following table shows Recognition Categories applicable in each plant mode. The ICs and EALs for a given Recognition Category are applicable in the indicated modes.

MODE APPLICABILITY MATRIX

Mode	Category					
	R	C	E	F	H	S
Power Operations	X		X	X	X	X
Startup	X		X	X	X	X
Hot Standby	X		X	X	X	X
Hot Shutdown	X		X	X	X	X
Cold Shutdown	X	X	X		X	
Refueling	X	X	X		X	
Defueled	X	X	X		X	

Vogtle Units 1 and 2 Technical Specifications Table 1.1-1 provides the following operating mode definitions:

Mode	Title	Reactivity Condition (K_{eff})	% Rated Thermal Power ^(a)	Average RCS Temperature (°F)
1	Power Operation	≥ 0.99	> 5	NA
2	Startup	≥ 0.99	≤ 5	NA
3	Hot Standby	< 0.99	NA	≥ 350
4	Hot Shutdown ^(b)	< 0.99	NA	$350 > T_{avg} > 200$
5	Cold Shutdown ^(b)	< 0.99	NA	≤ 200
6	Refueling ^(c)	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 identified modes, "Defueled" is also applicable to the Vogtle EAL scheme, consistent with NEI 99-01 guidance. Defueled is a 'No Mode' condition where all of the fuel has been removed from the reactor vessel (i.e., full core offload during refueling or extended outages).

These modes are used throughout the Vogtle EALs with no modifications from NEI 99-01. When a unit is defueled, the Initiating Conditions designated as Mode Condition "ALL" or "Defueled" are applicable.

2 GUIDANCE ON MAKING EMERGENCY CLASSIFICATIONS

2.1 GENERAL CONSIDERATIONS

For any emergency classification, the emergency director must consider all information having a bearing on the proper assessment of an Initiating Condition (IC). This includes the emergency action level (EAL), the associated operating mode applicability, notes and the informing basis information. In the recognition category F matrices, EALs are referred to as fission product barrier thresholds; the thresholds serve the same function as an EAL.

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*.

All emergency classification assessments will be based on valid indications, reports or conditions. A valid indication, report, or condition, has been verified using appropriate means, leaving no doubt regarding the indicator's operability, the condition's existence, or the report's accuracy. For example, validation could be an instrument channel check, response on related or redundant indicators, or direct observation by plant personnel. Indications will be validated in a manner that supports timely emergency declaration.

For ICs and EALs that have a stipulated time duration, the emergency director will not wait until the applicable time has elapsed, but will 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 will be assumed that the release duration specified in the IC/EAL has been exceeded, absent data to the contrary.

A planned work activity resulting in an expected event or condition that 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 such cases, the controls associated with the planning, preparation and execution of the work will ensure compliance with the operating license is maintained, provided 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.

Some EALs are assessed based on the results of analyses necessary to ascertain whether a specific EAL threshold has been exceeded. The EAL and/or the associated basis discussion will identify the necessary analysis. 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.

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

2.2 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. An EAL(s) evaluation must be consistent with the related Operating Mode Applicability and Notes. If an EAL has been met or exceeded, the IC is met and the associated ECL is declared in accordance with plant procedures.

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.

2.3 CLASSIFICATION OF MULTIPLE EVENTS AND CONDITIONS

In the event of multiple emergencies or conditions, the user will identify all EALs met or exceeded. The highest applicable ECL identified during this review is declared. For example:

If an Alert EAL and a Site Area Emergency EAL are met, a Site Area Emergency should be declared.

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

If two Alert EALs are met, an Alert will be declared.

Related guidance for 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*.

2.4 CONSIDERATION OF MODE CHANGES DURING CLASSIFICATION

The mode in effect at the time an event or condition occurred, and prior to any plant or operator response, determines whether 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.

2.5 CLASSIFICATION OF IMMINENT CONDITIONS

Although EALs provide specific thresholds, the emergency director must remain alert to events or conditions that could lead to meeting or exceeding an EAL within a relatively short period of time (i.e., a change in the ECL is IMMINENT). If, in the judgment of the emergency director, meeting an EAL is IMMINENT, the emergency classification will be made as though 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.

2.6 EMERGENCY CLASSIFICATION LEVEL UPGRADING AND DOWNGRADING

SNC policy is that once an emergency classification is made, it cannot be downgraded to a lower classification. Termination criteria contained in procedure NMP-EP-110, Emergency Classification and Initial Actions shall be completed for an event to be terminated. At termination, on an event specific basis, the site enter either normal operating conditions or a recovery condition with a recovery organization established for turnover from the ERO. Guidance concerning classification of rapidly escalating events or conditions is provided in RIS 2007-02.

2.7 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 end 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. For example an earthquake, or failure of the reactor protection system to automatically scram/trip the reactor followed by a successful manual scram/trip.

2.8 CLASSIFICATION OF TRANSIENT CONDITIONS

Many of the ICs and EALs in this document employ time-based criteria that require 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, some transient conditions may cause an EAL to be met for a brief period of time. The following guidance should be applied to the classification of these conditions.

EAL momentarily met during expected plant response - When 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. This example presents an illustration:

An ATWS occurs and the auxiliary feedwater system fails to automatically start. Steam generator levels rapidly decrease and the plant enters an inadequate RCS heat removal condition (a potential loss of both the fuel clad and RCS barriers). If an operator manually starts the auxiliary feedwater system in accordance with an EOP step and clears the inadequate RCS heat removal condition prior to an emergency declaration, then the classification will be based on the ATWS only.

It is important to stress that the 15-minute emergency classification assessment period 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 where an operator is able to take a successful corrective action prior to the emergency director completing the review and steps necessary to make the emergency declaration. This provision is included to ensure that any public protective actions resulting from the emergency classification are truly warranted by the plant conditions.

2.9 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. Personnel could discover an event or condition existed that met an EAL, but no emergency was declared, and the event or condition no longer exists at the time of discovery. It may be the event or condition was not recognized at the time, or there was an error in the emergency classification process.

In these cases, no emergency declaration is warranted, but the guidance in NUREG-1022 is applicable. Specifically, the event will be reported to the NRC in accordance with 10 CFR § 50.72 within one hour of the discovery of the undeclared event or condition. The licensee will also notify appropriate state and local agencies in accordance with the agreed upon arrangements.

3 ABNORMAL RAD LEVELS / RADIOLOGICAL EFFLUENT ICS/EALS

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
RG1 Release of gaseous radioactivity resulting in offsite dose greater than 1,000 mrem TEDE or 5,000 mrem thyroid CDE. <i>Op. Modes: All</i>	RS1 Release of gaseous radioactivity resulting in offsite dose greater than 100 mrem TEDE or 500 mrem thyroid CDE. <i>Op. Modes: All</i>	RA1 Release of gaseous or liquid radioactivity resulting in offsite dose greater than 10 mrem TEDE or 50 mrem thyroid CDE. <i>Op. Modes: All</i>	RU1 Release of gaseous or liquid radioactivity greater than 2 times the ODCM limits for 60 minutes or longer. <i>Op. Modes: All</i>
RG2 Spent fuel pool level cannot be restored to at least 195 foot level for 60 minutes or longer. <i>Op. Modes: All</i>	RS2 Spent fuel pool level at 195 foot level. <i>Op. Modes: All</i>	RA2 Significant lowering of water level above, or damage to, irradiated fuel. <i>Op. Modes: All</i>	RU2 UNPLANNED loss of water level above irradiated fuel. <i>Op. Modes: All</i>
		RA3 Radiation levels that impede access to equipment necessary for normal plant operations, cooldown or shutdown. <i>Op. Modes: All</i>	

ECL: General Emergency

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

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2 or 3)

Notes:

- The emergency director will declare the General 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 will be used for emergency classification assessments until the results from a dose assessment using actual meteorology are available.

- (1) Reading on ANY of the following radiation monitors greater than the reading shown for 15 minutes or longer:

Plant Vent RE-12444E	50 $\mu\text{Ci/cc}$
Turbine Building Vent (SJA) RE-12839E	$2.1 \times 10^3 \mu\text{Ci/cc}$

- (2) Dose assessment using actual meteorology indicates doses greater than 1,000 mrem TEDE or 5,000 mrem thyroid CDE at or beyond the site boundary.
- (3) Field survey results indicate **EITHER** of the following at or beyond the site boundary:
- Closed window dose rates greater than 1,000 mR/hr expected to continue for 60 minutes or longer.
 - Analyses of field survey samples indicate thyroid CDE greater than 5,000 mrem for one hour of inhalation.

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 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 monitor reading threshold values are

determined using a dose assessment method that back calculates from the dose values specified in the IC. The meteorology and source term (noble gases, particulates, and halogens) used are the same as those used to determine the monitor reading threshold values in ICs RS1 and RA1. This protocol will maintain intervals between the threshold values for the three classifications. Since doses are generally not monitored in real-time, a release duration of one hour is assumed, and the threshold values are based on a site boundary (or beyond) dose of 1000 mR/hour whole body or 5000 mR/hour thyroid, whichever is more limiting.

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.

ECL: General Emergency

Initiating Condition: Spent fuel pool level cannot be restored to at least 195 foot level for 60 minutes or longer.

Operating Mode Applicability: All

Emergency Action Levels:

Note: The emergency director will declare the General Emergency promptly upon determining that 60 minutes has been exceeded, or will likely be exceeded.

(1) Spent fuel pool level cannot be restored to at least 195 foot level for 60 minutes or longer.

Basis:

This IC addresses a significant loss of spent fuel pool inventory control and makeup capability leading to a prolonged uncover of spent fuel. The spent fuel pool level instrument is located outside the control room but in close proximity. 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.

ECL: Site Area Emergency

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

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2 or 3)

Notes:

- The emergency director will 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 will be used for emergency classification assessments until the results from a dose assessment using actual meteorology are available.

- (1) Reading on ANY of the following radiation monitors greater than the reading shown for 15 minutes or longer:

Plant Vent RE-12444E	5.0 $\mu\text{Ci/cc}$
Turbine Building Vent (SJAЕ) RE-12839E	$2.1 \times 10^2 \mu\text{Ci/cc}$

- (2) Dose assessment using actual meteorology indicates doses greater than 100 mrem TEDE or 500 mrem thyroid CDE at or beyond the site boundary.
- (3) Field survey results indicate **EITHER** of the following at or beyond the site boundary:
- Closed window dose rates greater than 100 mR/hr expected to continue for 60 minutes or longer.
 - Analyses of field survey samples indicate thyroid CDE greater than 500 mrem for one hour of inhalation.

Basis:

This IC addresses a release of gaseous radioactivity that results in projected or actual offsite doses greater than or equal to 10 percent 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 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 monitor reading threshold values are

determined using a dose assessment method that back calculates from the dose values specified in the IC. The meteorology and source term (noble gases, particulates, and halogens) used is the same as those used to determine the monitor reading threshold values in ICs RG1 and RA1. This protocol maintains intervals between the threshold values for the three classifications. Since doses are generally not monitored in real-time, a release duration of one hour is assumed, and the threshold values are based on a site boundary (or beyond) dose of 100 mR/hour whole body or 500 mR/hour thyroid, whichever is more limiting.

The TEDE dose is set at 10 percent 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 uses IC RG1.

ECL: Site Area Emergency

Initiating Condition: Spent fuel pool level at 195 foot level.

Operating Mode Applicability: All

Emergency Action Levels:

- (1) Lowering of spent fuel pool level to 195 foot level.

Basis:

This IC addresses a significant loss of spent fuel pool inventory control and makeup capability leading to IMMINENT fuel damage. The spent fuel pool level instrument is located outside the control room but in close proximity. This condition stems from major failures of plant functions needed to protect the public that 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 uses IC RG1 or RG2.

ECL: Alert

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

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2 or 3 or 4)

Notes:

- The emergency director will 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 will be used for emergency classification assessments until the results from a dose assessment using actual meteorology are available.

- (1) Reading on ANY of the following radiation monitors greater than the reading shown for 15 minutes or longer:

Plant Vent RE-12444E	0.50 $\mu\text{Ci/cc}$
Turbine Building Vent (SJA) RE-12839D	$2.1 \times 10^1 \mu\text{Ci/cc}$

- (2) Dose assessment using actual meteorology indicates doses greater than 10 mrem TEDE or 50 mrem thyroid CDE at or beyond the site boundary.
- (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 the site boundary for one hour of exposure.
- (4) Field survey results indicate **EITHER** of the following at or beyond the site boundary:
- 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.

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 percent 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 plant safety as indicated by a radiological release that significantly exceeds regulatory limits (e.g., a significant uncontrolled release).

Radiological effluent EALs are 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 monitor reading threshold values are determined using a dose assessment method that back calculates from the dose values specified in the IC. The meteorology and source term (noble gases, particulates, and halogens) used is the same as those used to determine the monitor reading threshold values in ICs RG1 and RS1. This protocol maintains intervals between the threshold values for the three classifications. Since doses are generally not monitored in real-time, a release duration of one hour is assumed, and the threshold values are based on a site boundary (or beyond) dose of 10 mR/hour whole body or 50 mR/hour thyroid, whichever is more limiting.

The TEDE dose is set at 1 percent 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 uses IC RS1.

ECL: Alert

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

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2 or 3)

- (1) Uncovery of irradiated fuel in the REFUELING PATHWAY.
- (2) Damage to irradiated fuel resulting in a release of radioactivity from the fuel as indicated by a HIGH Alarm on ANY of the following radiation monitors:

Fuel Handling Building RE-008
CNMT BLDG Low Range** RE-002/003 **Mode 6 only during fuel movement
Fuel Handling BLDG EFFL. ARE-2532 A/B
Fuel Handling BLDG EFFL. ARE-2533 A/B

- (3) Lowering of spent fuel pool level to 204 feet (Level 2).

Basis:

REFUELING PATHWAY: This includes the reactor refuel cavity the fuel transfer canal, and the spent fuel pool, canals and pools through which irradiated fuel may be moved, but not including the reactor vessel.

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 plant safety. The spent fuel pool level instrument is located outside the control room but in close proximity.

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 is based on either Recognition Category R or C ICs.

EAL #1

This EAL escalates from RU2. 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), 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 will 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 the fuel is actually uncovered. To the degree possible, readings will be considered in combination with other available indications of inventory loss.

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

EAL #2

This EAL addresses a release of radioactive material caused by mechanical damage to irradiated fuel. Damaging events may include the dropping, bumping or binding of an assembly, or dropping a heavy load onto an assembly. A rise in readings on radiation monitors will 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 is a precursor to a loss of the ability to adequately cool the irradiated fuel assemblies stored in the pool.

Escalation of the emergency classification level uses ICs RS1 or RS2.

ECL: Alert

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

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2)

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.

- (1) Dose rate greater than 15 mR/hr in **ANY** of the following areas:
 - Control Room (RE-001)
 - Central Alarm Station (Survey Only)
- (2) An UNPLANNED event results in radiation levels that prohibit or impede access to any Table H1 plant rooms or areas:

Table H1		
Building	Room Number	Applicable Mode
Control Building	1CB-226, 1CB-A45, 2CB-223, 2CB-A22	3
	1CB-A77, 1CB-B61, 1CB-B76, 1CB-B79 2CB-A79, 2CB-B01 2CB-B04, 2CB-B18	3
	1CB-226, 1CB-A45 1CB-B84, 2CB-B85 2CB-223, 2CB-A22	4
	1CB-A48, 1CB-A50 2CB-A15, 2CB-A16	4
AFW Pump House	AFW Pump Operation and standby Readiness	1, 2, 3
Auxiliary Building	1AB-A28, 2AB-A72 A-level demin vessel valve galleries	1, 2, 3
	1AB-A24, 2AB-A77	3
	1AB-A08, 2AB-A101	3
	1AB-C85, 1AB-C89 2AB-C38, 2AB-C44	4
	1AB-B15 MEZZ 1AB-B19 MEZZ 2AB-B117 MEZZ 2AB-B119 MEZZ	4

Basis:

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.

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 plant safety. The emergency director 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 will 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 uses Recognition Category R, C or F ICs.

ECL: Notification of Unusual Event

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

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2 or 3)

Notes:

- The emergency director will declare the Unusual Event promptly upon determining that 60 minutes has been exceeded, or will likely be exceeded.
- If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded 60 minutes.
- If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is no longer valid for classification purposes.

- (1) Reading on **ANY** of the following effluent radiation monitor greater than 2 times the ODCM limits for 60 minutes or longer:

SG Blowdown Effluent Line (RE-0021)	2 x release permit setpoint
Turbine Building Drain Effluent Line (RE-0848)	2 x release permit setpoint
Plant Vent (RE-12442C)	2 x release permit setpoint
Plant Vent (RE-12444C)	2 x release permit setpoint
Turbine Building Vent, SJAЕ (RE-12839C)	
No Confirmed Primary-Secondary Leakage	$1.6 \times 10^{-3} \mu\text{Ci/cc}$
Confirmed Primary-Secondary Leakage	2 x release permit setpoint

- (2) Reading on **ANY** of the following effluent radiation monitor greater than 2 times the alarm setpoint established by a current radioactivity discharge permit for 60 minutes or longer.

Liquid Radwaste Effluent Line (RE-0018)	2 x release permit setpoint
Waste Gas Process Effluent Line (ARE-0014)	2 x release permit setpoint

- (3) Sample analysis for a gaseous or liquid release indicates a concentration or release rate greater than 2 times the ODCM limits for 60 minutes or longer.

Basis:

This IC addresses a potential decrease in the level of plant safety 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 unmonitored, 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. Administrative controls are established to prevent unintentional releases, and to control and monitor intentional releases. The occurrence of an extended, uncontrolled radioactive release to the environment indicates degradation in these features and/or controls.

Radiological effluent EALs are 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 will 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 uses IC RA1.

ECL: Notification of Unusual Event

Initiating Condition: UNPLANNED loss of water level above irradiated fuel.

Operating Mode Applicability: All

Emergency Action Levels:

- (1) a. UNPLANNED water level drop in the REFUELING PATHWAY as indicated by ANY of the following:

Personnel report of low water level
LSHL-0625 SFP low level Alarm (ALB05 E02)

AND

- b. UNPLANNED rise in area radiation levels as indicated by ANY of the following radiation monitors.

RE-0008 in the spent fuel pool building
RE-0002, -0003, -0004 in containment *
RE-0011 at the seal table *
RE-0005, -0006 in containment *
* Not applicable in Modes 1-4

Basis:

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: This includes the reactor refuel cavity the fuel transfer canal, and the spent fuel pool, canals and pools through which irradiated fuel may be moved, but not including the reactor vessel.

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

A water level decrease will be primarily determined by indications from available level instrumentation. Other sources of level indications 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 will 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 uses IC RA2.

4 COLD SHUTDOWN / REFUELING SYSTEM MALFUNCTION ICS/EALS

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
CG1 Loss of RPV inventory affecting fuel clad integrity with containment challenged. <i>Op. Modes: Cold Shutdown, Refueling</i>	CS1 Loss of RPV inventory affecting core decay heat removal capability. <i>Op. Modes: Cold Shutdown, Refueling</i>	CA1 Loss of RPV inventory. <i>Op. Modes: Cold Shutdown, Refueling</i>	CU1 UNPLANNED loss of RPV inventory for 15 minutes or longer. <i>Op. Modes: Cold Shutdown, Refueling</i>
		CA2 Loss of all offsite and all onsite AC power to emergency buses for 15 minutes or longer. <i>Op. Modes: Cold Shutdown, Refueling, Defueled</i>	CU2 Loss of all but one AC power source to emergency buses for 15 minutes or longer. <i>Op. Modes: Cold Shutdown, Refueling, Defueled</i>
		CA3 Inability to maintain the plant in cold shutdown. <i>Op. Modes: Cold Shutdown, Refueling</i>	CU3 UNPLANNED increase in RCS temperature. <i>Op. Modes: Cold Shutdown, Refueling</i>
			CU4 Loss of Vital DC power for 15 minutes or longer. <i>Op. Modes: Cold Shutdown, Refueling</i>
			CU5 Loss of all onsite or offsite communications capabilities. <i>Op. Modes: Cold Shutdown, Refueling, Defueled</i>
		CA6 Hazardous event affecting a SAFETY SYSTEM needed for the current operating mode. <i>Op. Modes: Cold Shutdown, Refueling</i>	

ECL: General Emergency

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

Operating Mode Applicability: Cold Shutdown, Refueling

Emergency Action Levels: (1 or 2)

Note: The emergency director will declare the General Emergency promptly upon determining that 30 minutes has been exceeded, or will likely be exceeded.

- (1) a. RPV level less than 181'-10" [TOAF] (63% on RVLIS full range) for 30 minutes or longer.

AND

- b. **ANY** indication from the Containment Challenge Table C1.

- (2) a. RPV level cannot be monitored for 30 minutes or longer.

AND

- b. Core uncover is indicated by **ANY** of the following:

RE-005 OR 006	≥ 40 REM/hr
Erratic Source Range monitor indication	
UNPLANNED increase in Containment Sump, Reactor Coolant Drain Tank (RCDT) or Waste Holdup Tanks (WHT) levels of sufficient magnitude to indicate core uncover	

AND

- c. **ANY** indication from the Containment Challenge Table C1.

Containment Challenge Table C1
CONTAINMENT CLOSURE NOT established*
Explosive mixture inside containment - greater than OR equal to 6% H ₂
UNPLANNED increase in containment pressure
* If CONTAINMENT CLOSURE is re-established prior to exceeding the 30 minute time limit, then declaration of a General Emergency is not required.

Basis:

CONTAINMENT CLOSURE: Per Operating Procedure 14210-1/2, Containment Building Penetrations Verification – Refueling

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.

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

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

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

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

In the early stages of a core uncover event, it is unlikely that hydrogen buildup due to a core uncover 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 containment is challenged.

In EAL 1.a, RVLIS is used to determine when reactor water level is less than TOAF. RVLIS indication is only available during Mode 5 up to the point of reactor head disassembly prior to Mode 6 entry. Once RVLIS becomes unavailable classification of IC CG1 is accomplished in accordance with EAL 2.

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

The inability to monitor RPV 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 indicate leakage from the RPV.

These EALs address 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*.

ECL: Site Area Emergency

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

Operating Mode Applicability: Cold Shutdown, Refueling

Emergency Action Levels: (1 or 2 or 3)

Note: The emergency director will declare the Site Area Emergency promptly upon determining that 30 minutes has been exceeded, or will likely be exceeded.

- (1) a. CONTAINMENT CLOSURE not established.

AND
 - b. RPV level less than 185'-4" [6" below Bottom ID of loop] (72% on Full Range RVLIS).
- (2) a. CONTAINMENT CLOSURE established.

AND
 - b. RPV level less than 181'-10" [TOAF] (63% on RVLIS full range).
- (3) a. RPV level cannot be monitored for 30 minutes or longer.

AND
 - b. Core uncover is indicated by **ANY** of the following:

RE-005 OR 006	≥ 40 REM/hr
Erratic Source Range monitor indication	
UNPLANNED increase in Containment Sump, Reactor Coolant Drain Tank (RCDT) or Waste Holdup Tanks (WHT) levels of sufficient magnitude to indicate core uncover	

Basis:

CONTAINMENT CLOSURE: Per Operating Procedure 14210-1/2, Containment Building Penetrations Verification – Refueling

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.

This IC addresses a significant and prolonged loss of RPV 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 to protect the public and warrant a Site Area Emergency declaration.

Following an extended loss of core decay heat removal and inventory makeup, decay heat will cause

reactor coolant boiling and a further reduction in reactor vessel level. If RCS/reactor vessel level cannot be restored, fuel damage is probable.

In EALs 1.a and 2.a the specified levels represent reactor vessel levels that are lower than the monitoring capability of RCS level instrumentation and therefore must be monitored using RVLIS. This level will only be observable in Mode 5 with RVLIS in operation. In Mode 6 or when RVLIS is not in operation the IC should be evaluated using EAL 3.

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 reflects that with CONTAINMENT CLOSURE established, there is a lower probability of a fission product release to the environment.

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

The inability to monitor RPV 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 indicate leakage from the RPV.

These EALs address 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 uses IC CG1 or RG1.

ECL: Alert

Initiating Condition: Loss of RPV inventory.

Operating Mode Applicability: Cold Shutdown, Refueling

Emergency Action Levels: (1 or 2)

Note: The emergency director will declare the Alert promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

(1) Loss of RPV inventory as indicated by level less than elevation 185'-10" (73% on Full Range RVLIS).

(2) a. RPV level cannot be monitored for 15 minutes or longer

AND

b. UNPLANNED increase in Containment sump, Reactor Coolant Drain Tank (RCDT) or Waste Holdup Tank (WHT) levels due to a loss of RPV inventory.

Basis:

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.

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 the bottom ID of the RCS Loop setpoint (187' 6") indicates that operator actions have not been successful in restoring and maintaining RPV water level. The 187' 6" level specified in the EAL is the minimum RCS level for RHR operation as outlined in the procedure for mid-loop operations. Below this level, loss of RHR pump net positive suction head (NPSH) may occur resulting in a loss of decay heat removal capability. 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 uncover.

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 EAL #2, the inability to monitor RPV 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 indicate leakage from the RPV.

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 RPV inventory level continues to lower, then escalation to Site Area Emergency uses IC CS1.

ECL: Alert

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

Operating Mode Applicability: Cold Shutdown, Refueling, Defueled

Emergency Action Levels:

Note: The emergency director will declare the Alert promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) Loss of **ALL** offsite and **ALL** onsite AC Power (Table S1) to **BOTH** 1(2)AA02 **AND** 1(2)BA03 for 15 minutes or longer.

Table S1	
Unit 1	Unit 2
Unit Auxiliary Transformer 1NXAA	Unit Auxiliary Transformer 2NXAA
Unit Auxiliary Transformer 1NXAB	Unit Auxiliary Transformer 2NXAB
Reserve Auxiliary Transformer 1NXRA	Reserve Auxiliary Transformer 2NXRA
Reserve Auxiliary Transformer 1NXRB	Reserve Auxiliary Transformer 2NXRB
Diesel Generator 1A	Diesel Generator 2A
Diesel Generator 1B	Diesel Generator 2B
Standby Auxiliary Transformer ANXRA	Standby Auxiliary Transformer ANXRA

Basis:

This IC addresses a total loss of AC power (see Table S1 above) 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 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. When in these modes, this condition represents an actual or potential substantial degradation of the level of plant safety.

Fifteen minutes is the threshold to exclude transient or momentary power losses.

Escalation of the emergency classification level uses IC CS1 or RS1.

ECL: Alert

Initiating Condition: Inability to maintain the plant in cold shutdown.

Operating Mode Applicability: Cold Shutdown, Refueling

Emergency Action Levels: (1 or 2)

Note: The emergency director will declare the Alert promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.

- (1) UNPLANNED increase in RCS temperature to greater than 200 °F for greater than the duration specified in the following table.

Table C2: RCS Heat-up Duration Thresholds		
RCS Status	Containment Closure Status	Heat-up Duration
Not Intact (or at reduced inventory)	Not Established	0 minutes
	Established	20 minutes*
Intact (but not at reduced inventory)	Not applicable	60 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.		

- (2) UNPLANNED RCS pressure increase greater than 10 psig. (This EAL does not apply during water-solid plant conditions.)

Basis:

CONTAINMENT CLOSURE: Per Operating Procedure 14210-1/2, Containment Building Penetrations Verification – Refueling

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.

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 plant safety.

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 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. In this case, 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 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.

Finally, 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 will allow sufficient time to address the temperature increase without a substantial degradation in plant safety.

EAL #2 provides a pressure-based indication of RCS heat-up.

Escalation of the emergency classification level uses IC CS1 or RS1.

ECL: Alert

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

Operating Mode Applicability: Cold Shutdown, Refueling

Emergency Action Levels:

- (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
 - Other events with similar hazard characteristics as determined by the Shift Manager

AND

- b. **EITHER** of the following:
 - 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.

Basis:

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 may 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.

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.

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.

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 plant safety.

The first threshold for EAL 1.b 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 will be significant enough to cause concern regarding the operability or reliability of the SAFETY SYSTEM train.

The second threshold for EAL 1.b 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 all 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 uses IC CS1 or RS1.

ECL: Notification of Unusual Event

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

Operating Mode Applicability: Cold Shutdown, Refueling

Emergency Action Levels: (1 or 2)

Note: The emergency director will declare the Alert promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

(1) UNPLANNED loss of reactor coolant results in RPV level less than a required lower limit for 15 minutes or longer.

(2) a. RPV level cannot be monitored.

AND

b. UNPLANNED increase in Containment sump, Reactor Coolant Drain Tank (RCDT), or Waste Holdup Tank (WHT) levels.

Basis:

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.

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 RPV level concurrent with indications of coolant leakage. Either of these conditions is considered to be a potential degradation of the level of plant safety.

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 RPV 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 RPV 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 indicate leakage from the RPV.

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

ECL: Notification of Unusual Event

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

Operating Mode Applicability: Cold Shutdown, Refueling, Defueled

Emergency Action Levels:

Note: The emergency director will declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) a. AC power capability to **BOTH** 1(2)AA02 **AND** 1(2)BA03 is reduced to a single power source (Table S1) for 15 minutes or longer.

AND

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

Table S1	
Unit 1	Unit 2
Unit Auxiliary Transformer 1NXAA	Unit Auxiliary Transformer 2NXAA
Unit Auxiliary Transformer 1NXAB	Unit Auxiliary Transformer 2NXAB
Reserve Auxiliary Transformer 1NXRA	Reserve Auxiliary Transformer 2NXRA
Reserve Auxiliary Transformer 1NXRB	Reserve Auxiliary Transformer 2NXRB
Diesel Generator 1A	Diesel Generator 2A
Diesel Generator 1B	Diesel Generator 2B
Standby Auxiliary Transformer ANXRA	Standby Auxiliary Transformer ANXRA

Basis:

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.

This IC describes a significant degradation of offsite and onsite AC power sources (see Table S1 above) where any additional single failure would result in a loss of all AC power to SAFETY SYSTEMS. In this condition, the sole AC power source may be powering one, or more than one, train of safety-related equipment.

When in the cold shutdown, refueling, or defueled mode, this condition is not classified as an Alert because of the increased 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. When in these modes, this condition is considered to be a potential degradation of the level of plant safety.

An "AC power source" is a source recognized in AOPs and EOPs, and capable of supplying required power to an emergency bus. Examples of this condition include:

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

Fifteen minutes is the 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.

ECL: Notification of Unusual Event

Initiating Condition: UNPLANNED increase in RCS temperature.

Operating Mode Applicability: Cold Shutdown, Refueling

Emergency Action Levels: (1 or 2)

Note: The emergency director will declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) UNPLANNED increase in RCS temperature to greater than 200 °F.
- (2) Loss of **ALL** RCS temperature and RPV level indication for 15 minutes or longer.

Basis:

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.

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, represents a potential degradation of the level of plant safety. If the RCS is not intact and CONTAINMENT CLOSURE is not established during this event, the emergency director will 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, where 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 reflects a condition where there has been a significant loss of instrumentation capability necessary to monitor RCS conditions and operators are 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 is the threshold to exclude transient or momentary losses of indication.

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

ECL: Notification of Unusual Event

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

Operating Mode Applicability: Cold Shutdown, Refueling

Emergency Action Levels:

Note: The emergency director will declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) Indicated voltage is less than 105 VDC on required 125 VDC buses 1(2)AD1, 1(2)BD1, 1(2)CD1, 1(2)DD1 for 15 minutes or longer.

Basis:

This IC addresses a loss of vital DC power that 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. This condition is considered to be a potential degradation of the level of plant safety.

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 is the threshold to exclude transient or momentary power losses.

Depending upon the event, escalation of the emergency classification level uses IC CA1 or CA3, or an IC in Recognition Category R.

ECL: Notification of Unusual Event

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

Operating Mode Applicability: Cold Shutdown, Refueling, Defueled

Emergency Action Levels: (1 or 2 or 3)

- (1) Loss of **ALL** of the following onsite communication methods:

In plant telephones
Public address system
Plant radio systems

- (2) Loss of **ALL** of the following ORO communications methods:

ENN (Emergency Notification Network)
Commercial phones

- (3) Loss of **ALL** of the following NRC communications methods:

ENS on Federal Telecommunications System (FTS)
Commercial phones

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 will be assessed only when extraordinary means are being used 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 addresses a total loss of the communications methods used in support of routine plant operations.

EAL #2 addresses a total loss of the communications methods used to notify all OROs of an emergency declaration. The OROs referred to here are the states of Georgia and South Carolina; Burke County, Georgia; Aiken County, South Carolina; Barnwell and Allendale, South Carolina; and the Savannah River Site in South Carolina.

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

5 INDEPENDENT SPENT FUEL STORAGE INSTALLATION (ISFSI) ICS/EALS

UNUSUAL EVENT

**E-HU1 Damage to a loaded cask
CONFINEMENT BOUNDARY.**

Op. Modes: All

ECL: Notification of Unusual Event

Initiating Condition: Damage to a loaded cask CONFINEMENT BOUNDARY.

Operating Mode Applicability: All

Emergency Action Levels:

- (1) Damage to a loaded cask CONFINEMENT BOUNDARY as indicated by an on-contact radiation reading greater than ANY of the values listed in Table E1.

Table E1	
Location of Dose Rate	Total Dose Rate (Neutron + Gamma mR/hr)
HI-TRAC 125	
Side – Mid-height	950
Top	200
HI-STORM 100	
Side - 60 inches below mid-height	170
Side - Mid-height	180
Side - 60 inches above mid-height	110
Center of lid*	50
Middle of top lid**	60
Top (outlet) duct	130
Bottom (inlet) duct	360
* The center of the top lid represents a 6 in. radius.	
** The middle of the top lid represents an approximately 4 in. wide cylindrical “strip” located about mid-distance of the lid.	

Basis:

CONFINEMENT BOUNDARY: The barrier(s) between areas containing radioactive substances and the environment.

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 radiation reading values listed in the table represent 2 times the site-specific cask specific technical specification allowable radiation level on the designated surface of the spent fuel cask. The technical specification multiple of “2 times” is used here to distinguish between non-emergency and emergency conditions. The emphasis for this classification is the degradation in the level of

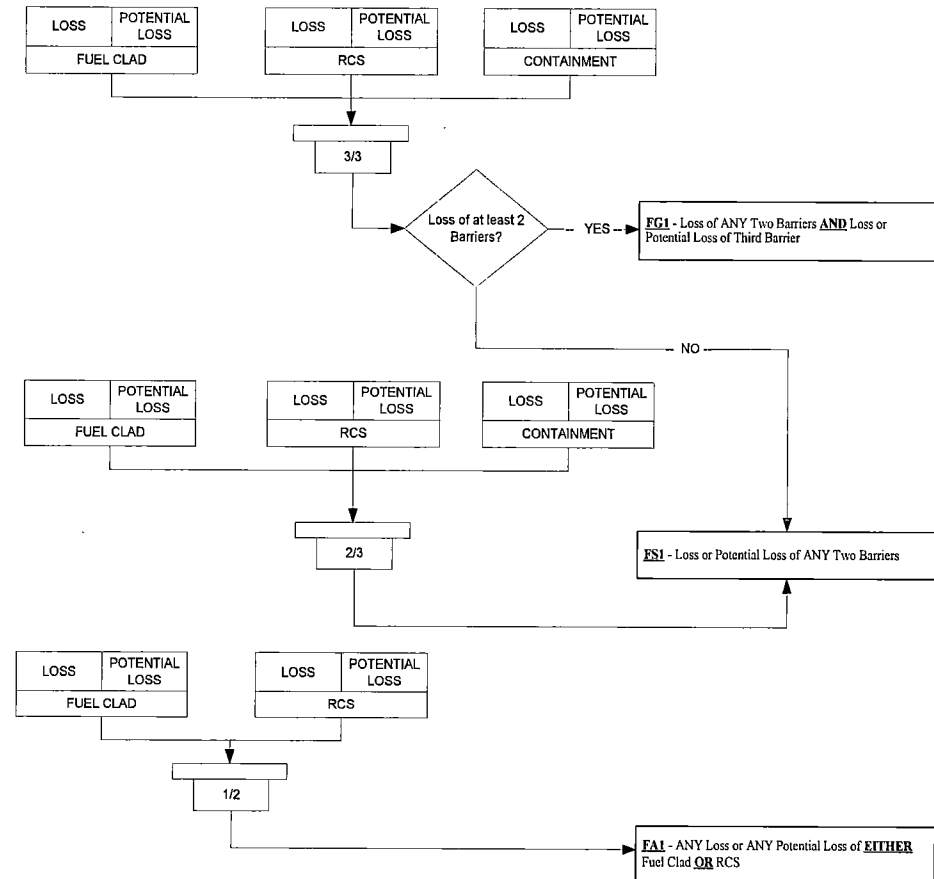
safety of the spent fuel cask and not the magnitude of the associated dose or dose rate. It is recognized that in the case of extreme damage to a loaded cask, determining if the "on-contact" dose rate limit is exceeded may be based on measurement of a dose rate at some distance from the cask.

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

6 FISSION PRODUCT BARRIER ICS/EALS

Recognition Category "F" Initiating Condition Matrix

GENERAL EMERGENCY	
FG1	Loss of any two barriers and Loss or Potential Loss of the third barrier. <i>Op. Modes: Power Operation, Hot Standby, Startup, Hot Shutdown</i>
SITE AREA EMERGENCY	
FS1	Loss or Potential Loss of any two barriers. <i>Op. Modes: Power Operation, Hot Standby, Startup, Hot Shutdown</i>
ALERT	
FA1	Any Loss or any Potential Loss of either the Fuel Clad or RCS barrier. <i>Op. Modes: Power Operation, Hot Standby, Startup, Hot Shutdown</i>



Fission Product Barrier Table

Thresholds for LOSS or POTENTIAL LOSS of Barriers

FG1 GENERAL EMERGENCY	FS1 SITE AREA EMERGENCY	FA1 ALERT
Loss of any two barriers and Loss or Potential Loss of the third barrier.	Loss or Potential Loss of any two barriers.	Any Loss or any Potential Loss of either the Fuel Clad or RCS barrier.

Fuel Clad Barrier		RCS Barrier		Containment Barrier	
LOSS	POTENTIAL LOSS	LOSS	POTENTIAL LOSS	LOSS	POTENTIAL LOSS
1. RCS or SG Tube Leakage		1. RCS or SG Tube Leakage		1. RCS or SG Tube Leakage	
Not Applicable	A. CORE COOLING CSF - ORANGE entry conditions met.	A. An automatic or manual ECCS actuation is required by EITHER of the following: 1. UNISOLABLE RCS leakage OR 2. SG tube RUPTURE.	A. Operation of a standby charging pump is required by EITHER of the following: 1. UNISOLABLE RCS leakage OR 2. SG tube leakage. OR B. RCS INTEGRITY CSF - RED entry conditions met	A. A leaking or RUPTURED SG is FAULTED outside of containment.	Not Applicable

Fuel Clad Barrier		RCS Barrier		Containment Barrier	
LOSS	POTENTIAL LOSS	LOSS	POTENTIAL LOSS	LOSS	POTENTIAL LOSS
2. Inadequate Heat Removal		2. Inadequate Heat Removal		2. Inadequate Heat Removal	
A. CORE COOLING CSF - RED entry conditions met	A. CORE COOLING CSF - ORANGE entry conditions met OR B. HEAT SINK CSF – RED entry conditions met Note: Heat Sink CSF should not be considered RED if total available feedwater flow is less than 535 gpm due to operator action.	Not Applicable	A. HEAT SINK CSF - RED entry conditions met. Note: Heat Sink CSF should not be considered RED if total available feedwater flow is less than 535 gpm due to operator action.	Not Applicable	A. CORE COOLING CSF - RED entry conditions met for 15 minutes or longer

Fuel Clad Barrier		RCS Barrier		Containment Barrier	
LOSS	POTENTIAL LOSS	LOSS	POTENTIAL LOSS	LOSS	POTENTIAL LOSS
3. RCS Activity / Containment Radiation		3. RCS Activity / Containment Radiation		3. RCS Activity / Containment Radiation	
A. Containment radiation monitor RE-005 OR 006 $\geq 2.6\text{E}+5$ mR/hr. OR B. Indications that reactor coolant activity is greater than 300 $\mu\text{Ci/gm}$ dose equivalent I-131.	Not Applicable	A. Containment radiation monitor RE-005 OR 006 $\geq 8.7 \text{ E}+2$ mR/hr.	Not Applicable	Not Applicable	A. Containment radiation monitor RE-005 OR 006 $\geq 1.3\text{E}+7$ mR/hr.

Fuel Clad Barrier		RCS Barrier		Containment Barrier	
LOSS	POTENTIAL LOSS	LOSS	POTENTIAL LOSS	LOSS	POTENTIAL LOSS
4. Containment Integrity or Bypass		4. Containment Integrity or Bypass		4. Containment Integrity or Bypass	
Not Applicable	Not Applicable	Not Applicable	Not Applicable	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.	A. CONTAINMENT CSF RED entry conditions met. OR B. CTMT hydrogen concentration greater than 6% OR C. 1. Containment pressure greater than 21.5 psig. AND 2. Less than Four CTMT fan coolers and one full train of CTMT Spray are operating per design for 15 minutes or longer.
5. Other Indications		5. Other Indications		5. Other Indications	
Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
6. Emergency Director Judgment		6. Emergency Director Judgment		6. Emergency Director Judgment	
A. ANY condition in the opinion of the emergency director that indicates loss of the fuel clad barrier.	A. ANY condition in the opinion of the emergency director that indicates potential loss of the fuel clad barrier.	A. ANY condition in the opinion of the emergency director that indicates loss of the RCS Barrier.	A. ANY condition in the opinion of the emergency director that indicates potential loss of the RCS Barrier.	A. ANY condition in the opinion of the emergency director that indicates loss of the containment barrier.	A. ANY condition in the opinion of the emergency director that indicates potential loss of the containment barrier.

Basis Information For Fission Product Barrier EALs

FUEL CLAD BARRIER THRESHOLDS:

The Fuel Clad Barrier consists of the cladding material that contains the fuel pellets.

1. RCS or SG Tube Leakage

There is no Loss threshold associated with RCS or SG Tube Leakage.

Potential Loss 1.A

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

2. Inadequate Heat Removal

Loss 2.A

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

Potential Loss 2.A

This condition indicates temperatures within the core are sufficient to allow the onset of heat-induced cladding damage.

Potential Loss 2.B

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.

Meeting this threshold results in a Site Area Emergency because this threshold is identical to RCS Barrier Potential Loss threshold 2.A; 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.

3. RCS Activity / Containment Radiation

Loss 3.A

The radiation monitor reading corresponds to an instantaneous release of all reactor coolant mass into the containment, assuming that reactor coolant activity equals 300 μ Ci/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 percent to 5 percent 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 3.A 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 emergency classification level to a Site Area Emergency.

Loss 3.B

This threshold indicates that RCS radioactivity concentration is greater than 300 $\mu\text{Ci/gm}$ 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 percent to 5 percent 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.

4. Containment Integrity or Bypass

Not Applicable (included for numbering consistency)

5. Other Indications

Not Applicable (included for numbering consistency)

6. Emergency Director Judgment

Loss 6.A

This threshold addresses any other factors used by the emergency director in determining whether the fuel clad barrier is lost.

Potential Loss 6.A

This threshold addresses any other factors used by the emergency director in determining whether the fuel clad barrier is potentially lost. The emergency director should also consider whether to declare the barrier potentially lost in the event that barrier status cannot be monitored.

RCS BARRIER THRESHOLDS:

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.

1. RCS or SG Tube Leakage

Loss 1.A

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.

Potential Loss 1.A

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 actuation has not occurred. The threshold is met when an operating procedure, or operating crew supervision, directs that a standby charging (makeup) pump be placed in service to restore and maintain pressurizer level.

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.

Potential Loss 1.B

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).

2. Inadequate Heat Removal

There is no Loss threshold associated with Inadequate Heat Removal.

Potential Loss 2.A

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; 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.

3. RCS Activity / Containment Radiation

Loss 3.A

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.A since it indicates a loss of the RCS Barrier only.

There is no Potential Loss threshold associated with RCS Activity / Containment Radiation.

4. Containment Integrity or Bypass

Not Applicable (included for numbering consistency)

5. Other Indications

Not Applicable (included for numbering consistency)

6. Emergency Director Judgment

Loss 6.A

This threshold addresses any other factors used by the emergency director in determining whether the RCS Barrier is lost.

Potential Loss 6.A

This threshold addresses any other factors used by the emergency director in determining whether the RCS Barrier is potentially lost. The emergency director should also consider whether to declare the barrier potentially lost in the event that barrier status cannot be monitored.

CONTAINMENT BARRIER THRESHOLDS:

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

1. RCS or SG Tube Leakage

Loss 1.A

This threshold addresses a leaking or RUPTURED Steam Generator (SG) that is also FAULTED outside of containment. The condition of the SG, whether leaking or RUPTURED, is determined in accordance with the thresholds for RCS Barrier Potential Loss 1.A and Loss 1.A, 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 SU3 for the fuel clad barrier (i.e., RCS activity values) and IC SU4 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 (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 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, 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 emergency classification levels resulting from primary-to-secondary leakage, with or without a steam release from the FAULTED SG, are summarized below.

P-to-S Leak Rate	Affected SG is FAULTED Outside of Containment?	
	Yes	No
Less than or equal to 25 gpm	No classification	No classification
Greater than 25 gpm	Unusual Event per SU4	Unusual Event per SU4
Requires operation of a standby charging (makeup) pump (<i>RCS Barrier Potential Loss</i>)	Site Area Emergency per FS1	Alert per FA1
Requires an automatic or manual ECCS (SI) actuation (<i>RCS Barrier Loss</i>)	Site Area Emergency per FS1	Alert per FA1

There is no Potential Loss threshold associated with RCS or SG Tube Leakage.

2. **Inadequate Heat Removal**

There is no Loss threshold associated with Inadequate Heat Removal.

Potential Loss 2.A

This condition represents an IMMINENT core melt sequence that, if not corrected, could lead to vessel failure and an increased potential for containment failure. For this condition to occur, there must already have been a loss of the RCS Barrier and the Fuel Clad Barrier. If implementation of a procedure(s) to restore adequate core cooling is not effective (successful) within 15 minutes, it is assumed that the event trajectory will likely lead to core melting and a subsequent challenge of the Containment Barrier.

The restoration procedure is considered "effective" if core exit thermocouple readings are decreasing or if reactor vessel level is increasing. Whether the procedure(s) will be effective should be apparent within 15 minutes. The emergency director should escalate the emergency classification level as soon as it is determined that the procedure(s) will not be effective.

Severe accident analyses (e.g., NUREG-1150) have concluded that function restoration procedures can arrest core degradation in a significant fraction of core damage scenarios, and that the likelihood of containment failure is very small in these events. Given this, it

is appropriate to provide 15 minutes beyond the required entry point to determine if procedural actions can reverse the core melt sequence.

3. RCS Activity / Containment Radiation

There is no Loss threshold associated with RCS Activity / Containment Radiation.

Potential Loss 3.A

The radiation monitor reading corresponds to an instantaneous release of all reactor coolant mass into the containment, assuming that 20 percent 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 percent 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 that would then escalate the emergency classification level to a General Emergency.

4. Containment Integrity or Bypass

Loss 4.A

These thresholds address a situation where containment isolation is required and one of two conditions exists as discussed below. There may be accident and release conditions that simultaneously meet both thresholds 4.A.1 and 4.A.2.

4.A.1 – Containment integrity has been lost, i.e., the actual containment atmospheric leak rate likely exceeds that associated with allowable leakage (sometimes referred to as design leakage). Following the release of RCS mass into containment, containment pressure will fluctuate based on a variety of factors; a loss of containment integrity condition may (or may not) be accompanied by a noticeable drop in containment pressure. Recognizing the inherent difficulties in determining a containment leak rate during accident conditions, it is expected that the emergency director will assess this threshold using judgment, and with due consideration given to current plant conditions, and available operational and radiological data (e.g., containment pressure, readings on radiation monitors outside containment, operating status of containment pressure control equipment, etc.).

Two simplified examples are provided in the middle piping run of Figure 6-F-1. 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 is 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.

4.A.2 – 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.

See the simplified example in the top piping run of Figure 6-F-1. 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.

A simplified example is shown in the bottom piping run of Figure 6-F-1. 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 or system piping developed a leak that allowed steam/water to enter the Auxiliary Building, then 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 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 (design) 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 a closed 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 1.A.

Loss 4.B

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 will 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.

In the simplified example in the middle piping run of Figure 6-F-1, a leak has occurred at a reducer on a pipe carrying reactor coolant in the Auxiliary Building. Depending upon radiation monitor locations and sensitivities, the leakage could be detected by any of the four monitors depicted in the figure and cause threshold 4.A.1 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 to be met.

Potential Loss 4.A

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. This threshold is a discriminator between a Site Area Emergency and General Emergency since there is now a potential to lose the third barrier.

Potential Loss 4.B

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.

Potential Loss 4.C

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 because 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.

5. Other Indications

Not Applicable (included for numbering consistency)

6. Emergency Director Judgment

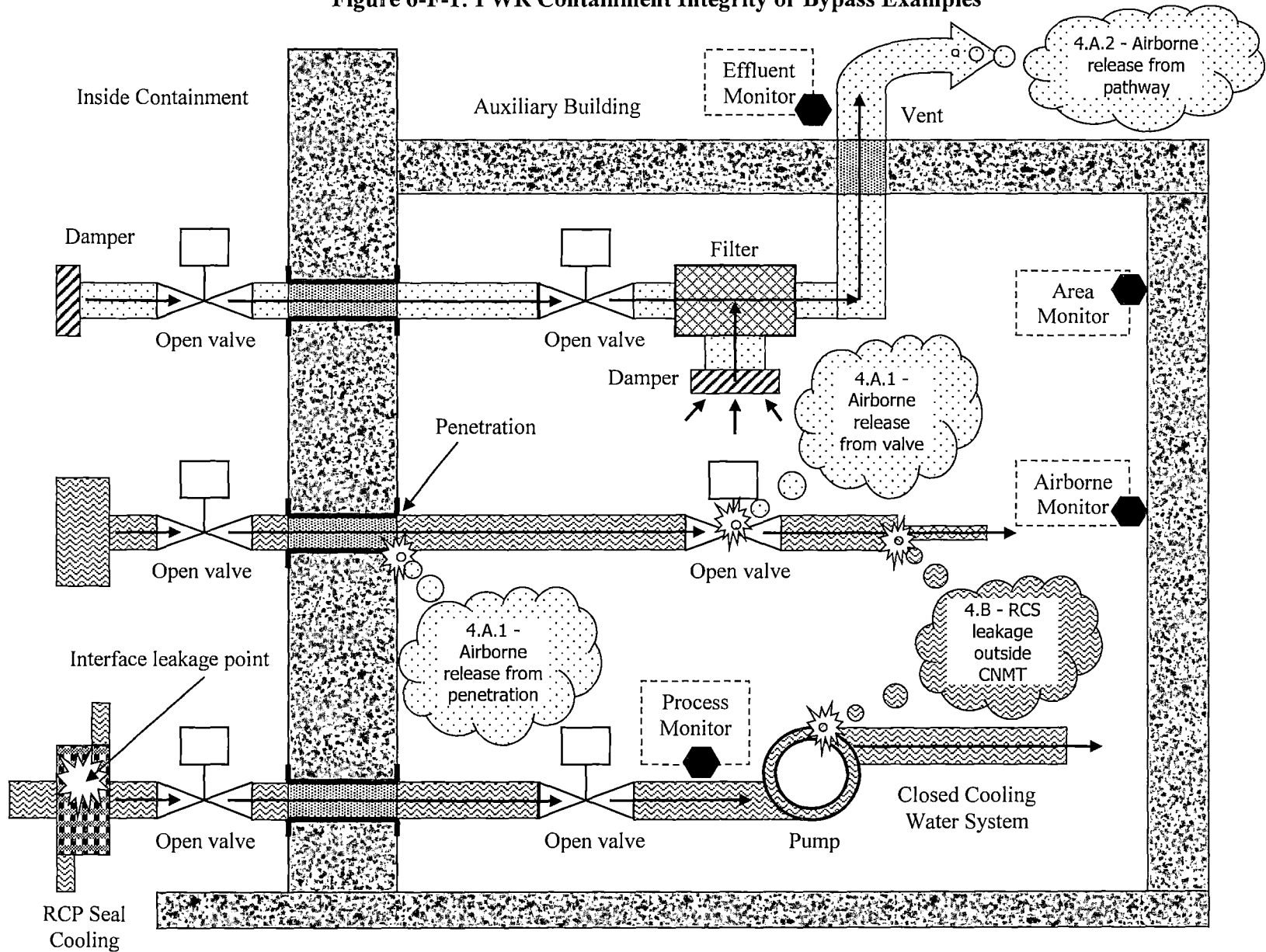
Loss 6.A

This threshold addresses any other factors used by the emergency director in determining whether the Containment Barrier is lost.

Potential Loss 6.A

This threshold addresses any other factors used by the emergency director in determining whether the Containment Barrier is potentially lost. The emergency director should also consider whether to declare the barrier potentially lost in the event that barrier status cannot be monitored.

Figure 6-F-1: PWR Containment Integrity or Bypass Examples



7 HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY ICS/EALS

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
HG1 HOSTILE ACTION resulting in loss of physical control of the facility. <i>Op. Modes: All</i>	HS1 HOSTILE ACTION within the PROTECTED AREA. <i>Op. Modes: All</i>	HA1 HOSTILE ACTION within the OWNER CONTROLLED AREA or airborne attack threat within 30 minutes. <i>Op. Modes: All</i>	HU1 Confirmed SECURITY CONDITION or threat. <i>Op. Modes: All</i>
			HU2 Seismic event greater than OBE levels. <i>Op. Modes: All</i>
			HU3 Hazardous event. <i>Op. Modes: All</i>
			HU4 FIRE potentially degrading the level of safety of the plant. <i>Op. Modes: All</i>
		HA5 Gaseous release impeding access to equipment necessary for normal plant operations, cooldown or shutdown. <i>Op. Modes: All</i>	
	HS6 Inability to control a key safety function from outside the Control Room. <i>Op. Modes: All</i>	HA6 Control Room evacuation resulting in transfer of plant control to alternate locations. <i>Op. Modes: All</i>	
HG7 Other conditions exist which in the judgment of the emergency director warrant declaration of a General Emergency. <i>Op. Modes: All</i>	HS7 Other conditions exist which in the judgment of the emergency director warrant declaration of a Site Area Emergency. <i>Op. Modes: All</i>	HA7 Other conditions exist which in the judgment of the emergency director warrant declaration of an Alert. <i>Op. Modes: All</i>	HU7 Other conditions exist which in the judgment of the emergency director warrant declaration of a (NO)UE. <i>Op. Modes: All</i>

ECL: General Emergency

Initiating Condition: HOSTILE ACTION resulting in loss of physical control of the facility.

Operating Mode Applicability: All

Emergency Action Levels:

- (1) a. A HOSTILE ACTION is occurring or has occurred within the PROTECTED AREA as reported by 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
 - RCS heat removal
 - OR**
 2. Damage to spent fuel has occurred or is IMMINENT.

Basis:

HOSTILE ACTION: An act toward a nuclear power plant (NPP) or its personnel that includes the use of violent force to destroy equipment, take HOSTAGES, and/or intimidate the licensee to achieve an end. This includes attack by air, land, or water using guns, explosives, PROJECTILES, vehicles, or other devices used to deliver destructive force. Other acts that satisfy the overall intent may be included. HOSTILE ACTION should not be construed to include acts of civil disobedience or felonious acts that are not part of a concerted attack on the NPP. 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 (OCA)).

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 (PA): The area that encompasses all controlled areas within the security protected area fence.

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 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]*.

Emergency plans and implementing procedures are public documents; therefore, EALs should not incorporate security-sensitive information. This includes information that may be advantageous to a potential adversary, such as the particulars concerning a specific threat or threat location. Security-sensitive information should be contained in non-public documents such as the Security Plan.

ECL: General Emergency

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

Operating Mode Applicability: All

Emergency Action Levels:

- (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.

Basis:

HOSTILE ACTION: An act toward a nuclear power plant (NPP) or its personnel that includes the use of violent force to destroy equipment, take HOSTAGES, and/or intimidate the licensee to achieve an end. This includes attack by air, land, or water using guns, explosives, PROJECTILES, vehicles, or other devices used to deliver destructive force. Other acts that satisfy the overall intent may be included. HOSTILE ACTION should not be construed to include acts of civil disobedience or felonious acts that are not part of a concerted attack on the NPP. 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 (OCA)).

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.

This IC addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist that are believed by the emergency director to fall under the emergency classification level description for a General Emergency.

ECL: Site Area Emergency

Initiating Condition: HOSTILE ACTION within the PROTECTED AREA.

Operating Mode Applicability: All

Emergency Action Levels:

- (1) A HOSTILE ACTION is occurring or has occurred within the PROTECTED AREA as reported by security shift supervision.

Basis:

HOSTILE ACTION: An act toward a nuclear power plant (NPP) or its personnel that includes the use of violent force to destroy equipment, take HOSTAGES, and/or intimidate the licensee to achieve an end. This includes attack by air, land, or water using guns, explosives, PROJECTILES, vehicles, or other devices used to deliver destructive force. Other acts that satisfy the overall intent may be included. HOSTILE ACTION should not be construed to include acts of civil disobedience or felonious acts that are not part of a concerted attack on the NPP. 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 (OCA)).

PROTECTED AREA (PA): The area that encompasses all controlled areas within the security protected area fence.

This IC addresses the occurrence of a HOSTILE ACTION within the PROTECTED AREA (PA). This event will require rapid response and assistance due to the possibility for damage to plant equipment.

Timely and accurate communications between security shift supervision and the control room is essential for proper classification of a security-related event.

Security plans and terminology are based on the guidance provided by NEI 03-12, *Template for the Security Plan, Training and Qualification Plan, Safeguards Contingency Plan [and Independent Spent Fuel Storage Installation Security Program]*.

As time and conditions allow, these events require a heightened state of readiness by the plant staff and implementation of onsite protective measures (e.g., evacuation, dispersal or sheltering). The Site Area Emergency declaration will mobilize 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 incidents that are accidental events, acts of civil disobedience, or otherwise are not a HOSTILE ACTION perpetrated by a HOSTILE FORCE. Examples include the crash of a small aircraft, shots from hunters, physical disputes between employees, etc. Reporting of these types of events is adequately addressed by other EALs, or the requirements of 10 CFR § 73.71 or 10 CFR § 50.72.

Emergency plans and implementing procedures are public documents; therefore, EALs should not incorporate security-sensitive information. This includes information that may be

advantageous to a potential adversary, such as the particulars concerning a specific threat or threat location. Security-sensitive information should be contained in non-public documents such as the Security Plan.

Escalation of the emergency classification level uses IC HG1.

ECL: Site Area Emergency

Initiating Condition: Inability to control a key safety function from outside the Control Room.

Operating Mode Applicability: All

Emergency Action Levels:

Note: The emergency director will declare the Site Area Emergency promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) a. An event has resulted in plant control being transferred from the control room to the remote shutdown panels due to a control room evacuation.

AND

- b. Control of **ANY** of the following key safety functions is not reestablished within 15 minutes.
- Reactivity control
 - Core cooling
 - RCS heat removal

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 “control” is established at the remote safe shutdown location(s) is based on emergency director judgment. The emergency director is expected to make a reasonable, informed judgment within 15 minutes as to whether the operating staff has control of key safety functions from the remote safe shutdown location(s).

Escalation of the emergency classification level uses IC FG1 or CG1.

ECL: Site Area Emergency

Initiating Condition: Other conditions exist which in the judgment of the emergency director warrant declaration of a Site Area Emergency.

Operating Mode Applicability: All

Emergency Action Levels:

- (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.

Basis:

HOSTILE ACTION: An act toward a nuclear power plant (NPP) or its personnel that includes the use of violent force to destroy equipment, take HOSTAGES, and/or intimidate the licensee to achieve an end. This includes attack by air, land, or water using guns, explosives, PROJECTILES, vehicles, or other devices used to deliver destructive force. Other acts that satisfy the overall intent may be included. HOSTILE ACTION should not be construed to include acts of civil disobedience or felonious acts that are not part of a concerted attack on the NPP. 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 (OCA)).

This IC addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist that are believed by the emergency director to fall under the emergency classification level description for a Site Area Emergency.

ECL: Alert

Initiating Condition: HOSTILE ACTION within the OWNER CONTROLLED AREA or airborne attack threat within 30 minutes.

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2)

- (1) A HOSTILE ACTION is occurring or has occurred within the OWNER CONTROLLED AREA as reported by security shift supervision.
- (2) A validated notification from NRC of an aircraft attack threat within 30 minutes of the site.

Basis:

HOSTILE ACTION: An act toward a nuclear power plant (NPP) or its personnel that includes the use of violent force to destroy equipment, take HOSTAGES, and/or intimidate the licensee to achieve an end. This includes attack by air, land, or water using guns, explosives, PROJECTILES, vehicles, or other devices used to deliver destructive force. Other acts that satisfy the overall intent may be included. HOSTILE ACTION should not be construed to include acts of civil disobedience or felonious acts that are not part of a concerted attack on the NPP. 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 (OCA)).

OWNER CONTROLLED AREA (OCA): The site property owned by or otherwise under the control of VEGP security.

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 (PA), 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, 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 is applicable for any HOSTILE ACTION occurring, or that has occurred, in the OWNER CONTROLLED AREA (OCA).

EAL #2 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 station procedures.

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 (OCA) was intentional (i.e., a HOSTILE ACTION). It is expected, although not certain, that notification by an appropriate Federal agency to the site would clarify this point. In this case, the appropriate federal agency is intended to be NORAD, FBI, FAA or NRC. The emergency declaration, including one based on other ICs/EALs, should not be unduly delayed while awaiting notification by a Federal agency.

Emergency plans and implementing procedures are public documents; therefore, EALs should not incorporate security-sensitive information. This includes information that may be advantageous to a potential adversary, such as the particulars concerning a specific threat or threat location. Security-sensitive information should be contained in non-public documents such as the Security Plan.

Escalation of the emergency classification level uses IC HS1.

ECL: Alert

Initiating Condition: Gaseous release impeding access to equipment necessary for normal plant operations, cooldown or shutdown.

Operating Mode Applicability: All

Emergency Action Levels:

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.

- (1) a. Release of a toxic, corrosive, asphyxiant or flammable gas into any Table H1 plant rooms or areas:

AND

- b. Entry into the room or area is prohibited or impeded.

Table H1		
Building	Room Number	Applicable Mode
Control Building	1CB-226, 1CB-A45, 2CB-223, 2CB-A22	3
	1CB-A77, 1CB-B61, 1CB-B76, 1CB-B79 2CB-A79, 2CB-B01 2CB-B04, 2CB-B18	3
	1CB-226, 1CB-A45 1CB-B84, 2CB-B85 2CB-223, 2CB-A22	4
	1CB-A48, 1CB-A50 2CB-A15, 2CB-A16	4
	AFW Pump Operation and standby Readiness	1, 2, 3
Auxiliary Building	1AB-A28, 2AB-A72 A-level demin vessel valve galleries	1, 2, 3
	1AB-A24, 2AB-A77	3
	1AB-A08, 2AB-A101	3
	1AB-C85, 1AB-C89 2AB-C38, 2AB-C44	4
	1AB-B15 MEZZ 1AB-B19 MEZZ 2AB-B117 MEZZ 2AB-B119 MEZZ	4

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 plant safety.

An Alert declaration is warranted if entry into the affected room/area is, or may be, procedurally required during the plant operating mode in effect at the time of the gaseous release. The emergency classification is not contingent upon whether entry is actually necessary at the time of the release.

Evaluation of the IC and EAL do not require atmospheric sampling; it only requires the emergency director's judgment that the gas concentration in the affected room/area is sufficient to preclude or significantly impede procedurally required access. This judgment may be based on a variety of factors including an existing job hazard analysis, report of ill effects on personnel, advice from a subject matter expert or operating experience with the same or similar hazards. Access should be considered as impeded if extraordinary measures are necessary to facilitate entry of personnel into the affected room/area (e.g., requiring use of protective equipment, such as SCBAs, that is not routinely employed).

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

- The plant is in an operating mode different than the mode specified for the affected room/area (i.e., entry is not required during the operating mode in effect at the time of the gaseous release). For example, the plant is in Mode 1 when the gaseous release occurs, and the procedures used for normal operation, cooldown and shutdown do not require entry into the affected room until Mode 4.
- The gas release is a planned activity that includes compensatory measures to address the temporary inaccessibility of a room or area (e.g., fire suppression system testing).
- The action that 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.

An asphyxiant is a gas capable of reducing the level of oxygen in the body to dangerous levels. Most commonly, asphyxiants work by displacing air in an enclosed environment. This reduces the concentration of oxygen below the normal level of around 19 percent, 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 uses Recognition Category R, C or F ICs.

ECL: Alert

Initiating Condition: Control Room evacuation resulting in transfer of plant control to alternate locations.

Operating Mode Applicability: All

Emergency Action Levels:

- (1) An event has resulted in plant control being transferred from the control room to the remote shutdown panels due to a control room evacuation.

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 uses IC HS6.

ECL: Alert

Initiating Condition: Other conditions exist which in the judgment of the emergency director warrant declaration of an Alert.

Operating Mode Applicability: All

Emergency Action Levels:

- (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.

Basis:

HOSTILE ACTION: An act toward a nuclear power plant (NPP) or its personnel that includes the use of violent force to destroy equipment, take HOSTAGES, and/or intimidate the licensee to achieve an end. This includes attack by air, land, or water using guns, explosives, PROJECTILES, vehicles, or other devices used to deliver destructive force. Other acts that satisfy the overall intent may be included. HOSTILE ACTION should not be construed to include acts of civil disobedience or felonious acts that are not part of a concerted attack on the NPP. 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 (OCA)).

This IC addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist which are believed by the emergency director to fall under the emergency classification level description for an Alert.

ECL: Notification of Unusual Event

Initiating Condition: Confirmed SECURITY CONDITION or threat.

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2 or 3)

- (1) A SECURITY CONDITION that does not involve a HOSTILE ACTION as reported by security shift supervision.
- (2) Notification of a credible security threat directed at VEGP.
- (3) A validated notification from the NRC providing information of an aircraft threat.

Basis:

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 a nuclear power plant (NPP) or its personnel that includes the use of violent force to destroy equipment, take HOSTAGES, and/or intimidate the licensee to achieve an end. This includes attack by air, land, or water using guns, explosives, PROJECTILES, vehicles, or other devices used to deliver destructive force. Other acts that satisfy the overall intent may be included. HOSTILE ACTION should not be construed to include acts of civil disobedience or felonious acts that are not part of a concerted attack on the NPP. 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 (OCA)).

This IC addresses events that pose a threat to plant personnel or SAFETY SYSTEM equipment, and represent a potential degradation in the level of plant safety. Security events that 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 OROs.

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 references 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 addresses the receipt of a credible security threat. The credibility of the threat is

assessed in accordance with station procedures.

EAL #3 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 station procedures.

Emergency plans and implementing procedures are public documents; therefore, EALs should not incorporate security-sensitive information. This includes information that may be advantageous to a potential adversary, such as the particulars concerning a specific threat or threat location. Security-sensitive information should be contained in non-public documents such as the Security Plan.

Escalation of the emergency classification level uses IC HA1.

ECL: Notification of Unusual Event

Initiating Condition: Seismic event greater than OBE levels.

Operating Mode Applicability: All

Emergency Action Levels:

- (1) Seismic event greater than Operating Basis Earthquake (OBE) as indicated by the Seismic Monitoring System (Red OBE Exceedance Indicator).

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 plant safety.

If a seismic event occurs that exceeds the OBE, an audible alarm will be sounded and the OBE Exceedance Indicator on the Seismic Monitoring System Panel will change from Green to Red.

Event verification with external sources should not be necessary during or following an OBE. Earthquakes of this magnitude should readily be felt by on-site personnel and recognized as a seismic event (e.g., typical lateral accelerations are in excess of 0.08g). The Shift Manager or emergency director may seek external verification if deemed appropriate (e.g., a call to the USGS or check of internet news sources); 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 uses IC CA6 or SA9.

ECL: Notification of Unusual Event

Initiating Condition: Hazardous event.

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2 or 3 or 4 or 5)

Note: EAL #4 does not apply to routine traffic impediments such as fog, snow, ice, or vehicle breakdowns or accidents.

- (1) A tornado strike within the PROTECTED AREA.
- (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.
- (3) Movement of personnel within the PROTECTED AREA (PA) is impeded due to an offsite event involving hazardous materials (e.g., an offsite chemical spill or toxic gas release).
- (4) A hazardous event that results in on-site conditions sufficient to prohibit the plant staff from accessing the site via personal vehicles.
- (5) Sustained hurricane force winds greater than 74 mph forecast to be at the plant site in the next four hours.

Basis:

PROTECTED AREA (PA): The area that encompasses all controlled areas within the security protected area fence.

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.

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

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

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 (PA).

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, or dam failure, or an on-site train derailment blocking the access road.

This EAL is not intended to apply to routine impediments such as fog, snow, ice, or vehicle breakdowns or accidents, but rather to more significant conditions such as the Hurricane Andrew strike on Turkey Point in 1992, the flooding around the Cooper Station during the Midwest floods of 1993, or the flooding around Ft. Calhoun Station in 2011.

EAL #5 addresses the phenomena of the hurricane based on the severe weather mitigation procedure.

Escalation of the emergency classification level is based on ICs in Recognition Categories A, F, S or C.

ECL: Notification of Unusual Event

Initiating Condition: FIRE potentially degrading the level of safety of the plant.

Operating Mode Applicability: All

Emergency Action Levels: (1 or 2 or 3 or 4)

Note: The emergency director will declare the Unusual Event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.

- (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 Table H2 plant rooms or areas.

- (2) a. Receipt of a single fire alarm (i.e., no other indications of a FIRE).

AND

- b. The FIRE is located within **ANY** of the Table H2 plant rooms or areas.

AND

- c. The existence of a FIRE is not verified within 30-minutes of alarm receipt.

- (3) A FIRE within the plant PROTECTED AREA (PA) not extinguished within 60-minutes of the initial report, alarm or indication.

- (4) A FIRE within the plant PROTECTED AREA (PA) that requires firefighting support by an offsite fire response agency to extinguish.

Table H2
Containment Building
NSCW Cooling Towers
Diesel Generator Building
Auxiliary Building
Fuel Handling Building
Control Building
Diesel Fuel Oil Storage Tank Pumphouse
Auxiliary Feedwater Pumphouse

Basis:

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 (PA): The area that encompasses all controlled areas within the security protected area fence.

This IC addresses the magnitude and extent of FIRES that may be indicative of a potential degradation of the level of plant safety.

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 include 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, 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 (PA) not extinguished within 60-minutes may also potentially degrade the level of plant safety.

EAL #4

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.

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.

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 uses IC CA6 or SA9.

ECL: Notification of Unusual Event

Initiating Condition: Other conditions exist which in the judgment of the emergency director warrant declaration of a (NO)UE.

Operating Mode Applicability: All

Emergency Action Levels:

- (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.

Basis:

This IC addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist that are believed by the emergency director to fall under the emergency classification level description for a NOUE.

8 SYSTEM MALFUNCTION ICS/EALS

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
SG1 Prolonged loss of all offsite and all onsite AC power to emergency buses. <i>Op. Modes: Power Operation, Startup, Hot Standby, Hot Shutdown</i>	SS1 Loss of all offsite and all onsite AC power to emergency buses for 15 minutes or longer. <i>Op. Modes: Power Operation, Startup, Hot Standby, Hot Shutdown</i>	SA1 Loss of all but one AC power source to emergency buses for 15 minutes or longer. <i>Op. Modes: Power Operation, Startup, Hot Standby, Hot Shutdown</i>	SU1 Loss of all offsite AC power capability to emergency buses for 15 minutes or longer. <i>Op. Modes: Power Operation, Startup, Hot Standby, Hot Shutdown</i>
		SA2 UNPLANNED loss of Control Room indications for 15 minutes or longer with a significant transient in progress. <i>Op. Modes: Power Operation, Startup, Hot Standby, Hot Shutdown</i>	SU2 UNPLANNED loss of Control Room indications for 15 minutes or longer. <i>Op. Modes: Power Operation, Startup, Hot Standby, Hot Shutdown</i>
			SU3 Reactor coolant activity greater than Technical Specification allowable limits. <i>Op. Modes: Power Operation, Startup, Hot Standby, Hot Shutdown</i>
			SU4 RCS leakage for 15 minutes or longer. <i>Op. Modes: Power Operation, Startup, Hot Standby, Hot Shutdown</i>
	SS5 Inability to shutdown the reactor causing a challenge to core cooling or RCS heat removal. <i>Op. Modes: Power Operation</i>	SA5 Automatic or manual trip fails to shutdown the reactor, and subsequent manual actions taken at the reactor control consoles are not successful in shutting down the reactor. <i>Op. Modes: Power Operation</i>	SU5 Automatic or manual trip fails to shutdown the reactor. <i>Op. Modes: Power Operation</i>

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
			SU6 Loss of all onsite or offsite communications capabilities. <i>Op. Modes: Power Operation, Startup, Hot Standby, Hot Shutdown</i>
			SU7 Failure to isolate containment or loss of containment pressure control. <i>Op. Modes: Power Operation, Startup, Hot Standby, Hot Shutdown</i>
SG8 Loss of all AC and Vital DC power sources for 15 minutes or longer. <i>Op. Modes: Power Operation, Startup, Hot Standby, Hot Shutdown</i>	SS8 Loss of all Vital DC power for 15 minutes or longer. <i>Op. Modes: Power Operation, Startup, Hot Standby, Hot Shutdown</i>		
		SA9 Hazardous event affecting a SAFETY SYSTEM needed for the current operating mode. <i>Op. Modes: Power Operation, Startup, Hot Standby, Hot Shutdown</i>	

ECL: General Emergency

Initiating Condition: Prolonged loss of all offsite and all onsite AC power to emergency buses.

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels:

Note: The emergency director will declare the General Emergency promptly upon determining that 4 hours has been exceeded, or will likely be exceeded.

- (1) a. Loss of **ALL** offsite and **ALL** onsite AC power to **BOTH** 1(2)AA02 **AND** 1(2)BA03.
- AND**
- b. **EITHER** of the following:
- Restoration of at least one AC emergency bus in less than 4 hours is not likely.
 - CORE COOLING CSF - RED conditions met.

Basis:

This IC addresses a prolonged loss of all power sources to AC emergency 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 will 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 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 bus will be based on a realistic appraisal of the situation. Mitigation actions with a low probability of success will 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.

ECL: General Emergency

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

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels:

Note: The emergency director will declare the General Emergency promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) a. Loss of **ALL** offsite and **ALL** onsite AC power to **BOTH** 1(2)AA02 **AND** 1(2)BA03 for 15 minutes or longer.

AND

- b. Indicated voltage is less than 105 VDC on ALL 125 VDC busses 1(2)AD1, 1(2)BD1, 1(2)CD1, 1(2)DD1 for 15 minutes or longer.

Basis:

This IC addresses a concurrent and prolonged loss of both AC and vital DC power. 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 loss of vital DC power compromises the ability to monitor and control SAFETY SYSTEMS. A sustained loss of both AC and DC power will lead to multiple challenges to fission product barriers.

Fifteen minutes is the threshold to exclude transient or momentary power losses. The 15-minute emergency declaration clock begins at the point when both EAL thresholds are met.

ECL: Site Area Emergency

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

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels:

Note: The emergency director will declare the Site Area Emergency promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) Loss of **ALL** offsite and **ALL** onsite AC power to **BOTH** 1(2)AA02 **AND** 1(2)BA03 for 15 minutes or longer.

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 is the threshold to exclude transient or momentary power losses.

Escalation of the emergency classification level uses ICs RG1, FG1 or SG1.

ECL: Site Area Emergency

Initiating Condition: Inability to shutdown the reactor causing a challenge to core cooling or RCS heat removal.

Operating Mode Applicability: Power Operation

Emergency Action Levels:

Note: Heat Sink CSF should not be considered RED if total available feedwater flow is less than 535 gpm due to operator action.

- (1) a. An automatic or manual trip 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:
 - Core Cooling CSF - RED conditions met
 - Heat Sink CSF - RED conditions met

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 because the Recognition Category F ICs/EALs do not address the additional threat posed by a failure to shutdown the reactor. The inclusion of this IC and EAL ensures the timely declaration of a Site Area Emergency in response to prolonged failure to shutdown the reactor.

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

Escalation of the emergency classification level uses IC RG1 or FG1.

ECL: Site Area Emergency

Initiating Condition: Loss of all vital DC power for 15 minutes or longer.

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels:

Note: The emergency director will declare the Site Area Emergency promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) Indicated voltage is less than 105 VDC on **ALL** 125 VDC busses 1(2)AD1, 1(2)BD1, 1(2)CD1, 1(2)DD1 for 15 minutes or longer.

Basis:

This IC addresses a loss of vital DC power that 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 is the threshold to exclude transient or momentary power losses.

Escalation of the emergency classification level uses ICs RG1, FG1 or SG8.

ECL: Alert

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

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels:

Note: The emergency director will declare the Alert promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) a. AC power capability to **BOTH** 1(2)AA02 **AND** 1(2)BA03 is reduced to a single power source (Table S1) 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.

Table S1	
Unit 1	Unit 2
Unit Auxiliary Transformer 1NXAA	Unit Auxiliary Transformer 2NXAA
Unit Auxiliary Transformer 1NXAB	Unit Auxiliary Transformer 2NXAB
Reserve Auxiliary Transformer 1NXRA	Reserve Auxiliary Transformer 2NXRA
Reserve Auxiliary Transformer 1NXRB	Reserve Auxiliary Transformer 2NXRB
Diesel Generator 1A	Diesel Generator 2A
Diesel Generator 1B	Diesel Generator 2B
Standby Auxiliary Transformer ANXRA	Standby Auxiliary Transformer ANXRA

Basis:

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.

This IC describes a significant degradation of offsite and onsite AC power sources (see Table S1 above) where 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 bus. Some examples of this condition are presented below.

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

- A loss of emergency power sources (e.g., onsite diesel generators) with a single train of emergency buses being back-fed from an offsite power source.

Fifteen minutes is the threshold to exclude transient or momentary losses of power.

Escalation of the emergency classification level uses IC SS1.

ECL: Alert

Initiating Condition: UNPLANNED loss of Control Room indications for 15 minutes or longer with a significant transient in progress.

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels:

Note: The emergency director will declare the Alert promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) a. 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.

Reactor Power
RCS Level
RCS Pressure
In-Core/Core Exit Temperature
Wide Range Level in at least one steam generator
Steam Generator Main or Auxiliary Feed Water Flow

AND

- b. **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 trip
 - ECCS actuation

Basis:

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.

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 represents a potential substantial degradation in the level of plant safety.

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. Various instrumentation is also used to determine RCS Level – RVLIS, pressurizer level, digital or recorders. A loss of all control room sources for this parameter would also apply.

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 is 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, then the availability of other parameter values may be compromised as well.

Fifteen minutes is the threshold to exclude transient or momentary losses of indication.

Escalation of the emergency classification level uses ICs FS1 or IC RS1.

ECL: Alert

Initiating Condition: Automatic or manual trip fails to shutdown the reactor, and subsequent manual actions taken at the reactor control consoles are not successful in shutting down the reactor.

Operating Mode Applicability: Power Operation

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.

Emergency Action Levels:

- (1) a. An automatic or manual trip did not shutdown the reactor.

AND

- b. Manual actions taken at the reactor control consoles are not successful in shutting down the reactor.

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 plant safety. 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 consoles is any operator action, or set of actions, that 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 consoles (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”.

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 shutdown 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 SS5. Depending upon plant responses and symptoms, escalation is also possible via IC FS1. Absent the plant conditions needed to meet either IC SS5 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.

ECL: Alert

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

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels:

- (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
 - Other events with similar hazard characteristics as determined by the Shift Manager

AND

- b. **EITHER** of the following:
 - 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.

Basis:

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.

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 may require a post-event inspection to determine if the attributes of an explosion are present.

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.

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.

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 plant safety.

The first threshold for EAL 1.b 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 will be significant enough to cause concern regarding the operability or reliability of the SAFETY SYSTEM train.

The second threshold for EAL 1.b 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 all 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 uses IC FS1 or RS1.

ECL: Notification of Unusual Event

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

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels:

Note: The emergency director will declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) Loss of **ALL** offsite AC power capability (Table S2) to **BOTH** 1(2)AA02 **AND** 1(2)BA03 for 15 minutes or longer.

Table S2	
Unit 1	Unit 2
Reserve Auxiliary Transformer 1NXRA	Reserve Auxiliary Transformer 2NXRA
Reserve Auxiliary Transformer 1NXRB	Reserve Auxiliary Transformer 2NXRB
Standby Auxiliary Transformer ANXRA	Standby Auxiliary Transformer ANXRA

Basis:

This IC addresses a prolonged loss of offsite power. The loss of offsite power sources (see Table S2 above) renders the plant more vulnerable to a complete loss of power to AC emergency buses. This condition represents a potential reduction in the level of plant safety.

For emergency classification purposes, “capability” means that an offsite AC power source(s) is available to the emergency buses, whether or not the buses are powered from it.

Fifteen minutes is the threshold to exclude transient or momentary losses of offsite power.

Escalation of the emergency classification level uses IC SA1.

ECL: Notification of Unusual Event

Initiating Condition: UNPLANNED loss of Control Room indications for 15 minutes or longer.

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels:

Note: The emergency director will declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) a. 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.

Reactor Power
RCS Level
RCS Pressure
In-Core/Core Exit Temperature
Wide Range Level in at least one steam generator
Steam Generator Main or Auxiliary Feed Water Flow

Basis:

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.

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 plant safety.

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. Various instrumentation is also used to determine RCS Level – RVLIS, pressurizer level, digital or recorders. A loss of all control room sources for this parameter would also apply.

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 is reported if it significantly impairs the capability to perform emergency assessments, particularly those 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, then the availability of other parameter values may be compromised as well.

Fifteen minutes is the threshold to exclude transient or momentary losses of indication.

Escalation of the emergency classification level uses IC SA2.

ECL: Notification of Unusual Event

Initiating Condition: Reactor coolant activity greater than Technical Specification allowable limits.

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels: (1 or 2)

- (1) RE-48000 reading greater than 5.0 $\mu\text{Ci/cc}$.
- (2) RCS coolant sample activity value indicating fuel clad degradation greater than Technical Specification allowable limits as indicated by **ANY** of the following:

Dose Equivalent I-131 greater than 1 $\mu\text{Ci/gm}$ for greater than 48 hours
Dose Equivalent I-131 greater than Technical Specification figure 3.4.16-1 limits
RCS specific activity greater than $100/\bar{E}$ $\mu\text{Ci/gm}$ gross radioactivity

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 plant safety.

Escalation of the emergency classification level uses ICs FA1 or the Recognition Category R ICs.

ECL: Notification of Unusual Event

Initiating Condition: RCS leakage for 15 minutes or longer.

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels: (1 or 2 or 3)

Note: The emergency director will declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.

- (1) RCS unidentified or pressure boundary leakage greater than 10 gpm for 15 minutes or longer.
- (2) RCS identified leakage greater than 25 gpm for 15 minutes or longer.
- (3) Leakage from the RCS to a location outside containment greater than 25 gpm for 15 minutes or longer.

Basis:

This IC addresses RCS leakage that could 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 plant safety.

EAL #1 and EAL #2 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 addresses a RCS mass loss caused by an UNISOLABLE leak through an interfacing system. These EALs 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 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 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 is 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 uses ICs of Recognition Category R or F.

ECL: Notification of Unusual Event

Initiating Condition: Automatic or manual trip fails to shutdown the reactor.

Operating Mode Applicability: Power Operation

Emergency Action Levels: (1 or 2)

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.

- (1) a. An automatic trip did not shutdown the reactor.

AND

 b. A subsequent manual action taken at the reactor control consoles is successful in shutting down the reactor.
- (2) a. A manual trip did not shutdown the reactor.

AND

 b. **EITHER** of the following:
 - A subsequent manual action taken at the reactor control consoles is successful in shutting down the reactor.
 - A subsequent automatic trip is successful in shutting down the reactor.

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 plant safety.

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 SA5. Depending upon the plant response, escalation is also possible via IC FA1. Absent the plant conditions needed to meet either IC SA5 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 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 will 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.

ECL: Notification of Unusual Event

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

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels: (1 or 2 or 3)

(1) Loss of **ALL** of the following onsite communication methods:

In plant telephones
Public address system
Plant radio systems

(2) Loss of **ALL** of the following ORO communications methods:

ENN (Emergency Notification Network)
Commercial phones

(3) Loss of **ALL** of the following NRC communications methods:

ENS on Federal Telecommunications System (FTS)
Commercial phones

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 will be assessed only when extraordinary means are being used 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).

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

EAL #2 addresses a total loss of the communications methods used to notify all OROs of an emergency declaration. The OROs referred to here are the states of Georgia and South Carolina; Burke County, Georgia; Aiken County, South Carolina; Barnwell and Allendale, South Carolina; and the Savannah River Site in South Carolina.

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

ECL: Notification of Unusual Event

Initiating Condition: Failure to isolate containment or loss of containment pressure control.

Operating Mode Applicability: Power Operation, Startup, Hot Standby, Hot Shutdown

Emergency Action Levels: (1 or 2)

- (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.
- (2) a. Containment pressure greater than 21.5 psig.

 AND

 b. Less than 4 CTMT fan coolers and one full train of CTMT spray is operating per design for 15 minutes or longer.

Basis:

This IC 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 plant safety.

For EAL #1, 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 – will be made in accordance with the appropriate criteria contained in the plant AOPs and EOPs. The 15-minute criterion is included to allow operators time to manually isolate the required penetrations, if possible.

EAL #2 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 will escalate to a Site Area Emergency in accordance with IC FS1 if there is a concurrent loss or potential loss of either the Fuel Clad or RCS fission product barriers.

APPENDIX A – ACRONYMS AND ABBREVIATIONS

AC.....	Alternating Current
AOP.....	Abnormal Operating Procedure
ATWS.....	Anticipated Transient Without Scram
BLDG.....	Building
CDE.....	Committed Dose Equivalent
CFR.....	Code of Federal Regulations
CTMT/CNMT.....	Containment
CSF.....	Critical Safety Function
CSFST.....	Critical Safety Function Status Tree
DBA.....	Design Basis Accident
DC.....	Direct Current
EAL.....	Emergency Action Level
ECCS.....	Emergency Core Cooling System
ECL.....	Emergency Classification Level
EFFL.....	Effluent
ENN.....	Emergency Notification Network
ENS.....	Emergency Notification System
EOF.....	Emergency Operations Facility
EOP.....	Emergency Operating Procedure
EPA.....	Environmental Protection Agency
FAA.....	Federal Aviation Administration
FBI.....	Federal Bureau of Investigation
FEMA.....	Federal Emergency Management Agency
FTS.....	Federal Telecommunications System
GA.....	Georgia
GE.....	General Emergency
HOO.....	Headquarters Operations Officer (NRC)
IC.....	Initiating Condition
ID.....	Inside Diameter
ISFSI.....	Independent Spent Fuel Storage Installation
Keff.....	Effective Neutron Multiplication Factor
mR, mRem, mrem, mREM.....	milli-Roentgen Equivalent Man
NEI.....	Nuclear Energy Institute
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.....	Offsite Dose Calculation Manual
ORO.....	Off-site Response Organization
PA.....	Protected Area
PAG.....	Protective Action Guideline
PWR.....	Pressurized Water Reactor
PSIG.....	Pounds per Square Inch Gauge
R.....	Roentgen
RCDT.....	Reactor Coolant Drain Tank

RCS	Reactor Coolant System
Rem, rem, REM	Roentgen Equivalent Man
RPS	Reactor Protection System
RPV	Reactor Pressure Vessel
RVLIS	Reactor Vessel Level Instrumentation System
SAE	Site Area Emergency
SC	South Carolina
SCBA	Self-Contained Breathing Apparatus
SG	Steam Generator
SI	Safety Injection
SJAE	Steam Jet Air Ejector
SNC	Southern Nuclear Company
SPDS	Safety Parameter Display System
TEDE	Total Effective Dose Equivalent
TOAF	Top of Active Fuel
VDC	Volts Direct Current
VEGP	Vogtle Electric Generating Plant
VOIP	Voice Over Internet Protocol
WHT	Waste Holdup Tank

APPENDIX B – DEFINITIONS

The following definitions are taken from Title 10, Code of Federal Regulations, and related regulatory guidance documents.

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

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

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

Notification of Unusual Event (NOUE): 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.

The following are key terms necessary for overall understanding the NEI 99-01 emergency classification scheme.

Emergency Action Level (EAL): A pre-determined, site-specific, observable threshold for an Initiating Condition that, when met or exceeded, places the plant in a given emergency classification level.

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

- General Emergency (GE)
- Site Area Emergency (SAE)
- Alert
- Notification of Unusual Event (NOUE)

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

Initiating Condition (IC): An event or condition that aligns with the definition of one of the four emergency classification levels by virtue of the potential or actual effects or consequences.

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.

CONFINEMENT BOUNDARY: The barrier(s) between areas containing radioactive substances and the environment.

CONTAINMENT CLOSURE: Per Operating Procedure 14210-1/2, Containment Building Penetrations Verification – Refueling.

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 may 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.

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

HOSTILE ACTION: An act toward a nuclear power plant (NPP) or its personnel that includes the use of violent force to destroy equipment, take HOSTAGES, and/or intimidate the licensee to achieve an end. This includes attack by air, land, or water using guns, explosives, PROJECTILES, vehicles, or other devices used to deliver destructive force. Other acts that satisfy the overall intent may be included. HOSTILE ACTION should not be construed to include acts of civil disobedience or felonious acts that are not part of a concerted attack on the NPP. 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 (OCA)).

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.

OWNER CONTROLLED AREA (OCA): The site property owned by or otherwise under the control of VEGP security.

PROJECTILE: An object directed toward an NPP that could cause concern for its continued operability, reliability, or personnel safety.

PROTECTED AREA (PA): The area that encompasses all controlled areas within the security protected area fence.

REFUELING PATHWAY: This includes the reactor refuel cavity the fuel transfer canal, and the spent fuel pool, canals and pools through which irradiated fuel may be moved, but not including the reactor vessel.

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

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.

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.

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.

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.

Southern Nuclear Operating Company
Joseph M. Farley Nuclear Plant Units 1 and 2;
Edwin I. Hatch Nuclear Plant Units 1 and 2;
Vogtle Electric Generating Plant Units 1 and 2;
License Amendment Request for Changes to
Emergency Action Level Schemes to Adopt NEI 99-01 Rev. 6
and to Modify Radiation Monitors at Farley Nuclear Plant
Responses to Requests for Additional Information

ENCLOSURE 5

VOGTLE ELECTRIC GENERATING PLANT UNITS 1 AND 2

EAL VERIFICATION AND VALIDATION REVISIONS

Vogtle EAL V&V Documentation Index

V&V#	Description	IC	Threshold
1	RCS Modes/Temperatures – TS Reference (Table 1.1-1)	EAL Basis Section 1.5	
	RCS Cold Shutdown Temperature reference (200 °F)	CA3	(1)
		CU3	(1)
2	Radiation Monitor Calculations: RE-12839E RE-12444E <i>Calc X6CNA15</i>	RG1	(1)
		RS1	(1)
		RA1	(1)
	Radiation Monitor Calculations: RE-0018 RE-0021 RE-0848 ARE-0014 RE-12839 RE-12442C RE-12444C <i>Calc X6CNA15</i>	RU1	(1) (2)
	Radiation Monitor Calculation: RE-005 RE-006 <i>Calc X6CNA15</i>	CG1	(2)b
		CS1	(3)b
		FCB L3A	FCB L3A
		RCSB L3A	RCSB L3A
		CB PL3A	CB PL3A
3	ODCM/TS Reference to Site Boundary	RG1	(2) (3)
		RS1	(2) (3)
		RA1	(2) (3) (4)
4	SFP Level 3 & 2 Indications	RG2	(1)
		RS2	(1)
		RA2	(3)
5	Rad Monitor Ref (ARP): RE-008 RE-002/003 ARE-2532 A/B ARE-2533 A/B	RA2	(2)
6	Annunciator Response Procedure (Control Room) Reference: RE-001	RA3	(1)
7	Annunciator Response Procedure (SFP Level) Reference Annunciator Display: ALB05 E02 (SFP Lo Level)	RU2	(1)a
8	Radiation Monitor Information: RE-008 RE-002 RE-003 RE-004 RE-005 RE-006 RE-0011	RU2	(1)b
9	RVLIS Indications/Displays (RVLIS) <i>Calc X6CNA15</i>	CG1	(1)a
		CS1	(1)b (2)b
		CA1	(1)
10	Containment Sump/Reactor Coolant Drain Tank (RCDT)/Waste Holdup Tank (WHT) references (FSAR)	CG1	(2)b
		CS1	(3)b
		CA1	(2)b
		CU1	(2)b

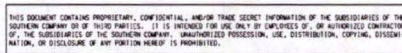
Vogtle EAL V&V Documentation Index


V&V#	Description	IC	Threshold
11	H ₂ Concentration ($\geq 6\%$) – calculation/reference <i>Calc X6CNA15</i>	CG1 CB PL4B	(1)b (2)c CB PL4B
12	Emergency Buses Drawing	CA2 CU2 SG1 SG8 SS1 SA1 SU1	(1) (1)a (1)a (1)a (1) (1)a (1)
13	DC System Information	CU4 SG8 SS8	(1) (1)b (1)
14	ISFSI TS/Dose Reading Calculation <i>Calc X6CNA15</i>	E-HU1	(1)
15	CSFST Procedure	FCB PL1A RCSB PL1B FCB L2A FCB PL2A FCB PL2B RCSB PL2A CB PL2A CB PL4A CB PL4C.1 SG1 SS5	FCB PL1A RCSB PL1B FCB L2A FCB PL2A FCB PL2B RCSB PL2A CB PL2A CB PL4A CB PL4C.1 (1)b (1)c
16	Seismic Monitoring System Panel	HU2	(1)
17	Rad Monitor Calculation: RE-48000 <i>Calc X6CNA14 V7 (pg 9)</i>	SU3	(1)
18	RCS Sample Activity TS 3.4.16	SU3	(2)
19	RCS Operational Leakage TS 3.4.13	SU4	(1) (2)
20	Containment Spray Initiation Setpoint (21.5 psig) TS Table 3.3.2-1	SU7	(2)a

Commented [JRB1]: Renumbered V&V#'s due to deletion of previous V12 – Containment Pressure Reference: ≥ 13 psig with Containment Closure established, ≥ 52 psig with TS Containment Integrity Intact *Calc X6CNA15*. Deletion was implemented in response to RAI 11.

Commented [JRB2]: RAI 23 revision

Commented [JRB3]: RAI 28 revision



 SOUTHERN COMPANY SERVICES, INC.
BIRMINGHAM, ALABAMA

GEORGIA POWER COMPANY
ALVIN W. VOGTLE NUCLEAR PLANT

VOGTLE - WILSON
MASTER ONE LINE DIAGRAM

SCALE: NONE	DRAWING NO.	VER.
JOB NO. 10604	AX30-AA-A03A	17

128 E 34844	DWG CATEGORY: CRIT
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provided to prevent explosive concentrations of hydrogen during battery charging. The ventilation system shall be adequate to maintain the hydrogen concentration below 2 % in accordance with IEEE 484.

- Each room shall be provided with a shower and an eye-wash basin in case personnel come in contact with battery acid.
- To prevent possible hydrogen explosion, switches and receptacles shall not be located inside battery rooms.

3.2 POWER GENERATION DESIGN BASES

None

3.3 MAJOR COMPONENT DESIGN BASES

- 3.3.1 The Class 1E dc 125-V dc system and all equipment are classified as Seismic Category 1 and Safety Class 1E. The system equipment shall be capable of continuous operation between 100 and 140 V dc, except vital ac bus inverters, the reactor trip switchgear control, residual heat removal (RHR) isolation valve inverters, and the turbine-driven auxiliary feedwater pump control may be allowed to operate over a dc input voltage range of 105 to 140 V dc.

The 25 kVA inverters provide power to RHR isolation valves. The breakers for these valves are located in "Trip" position during normal plant operation; they do not operate during the duty cycle time of the battery, or for any LOCA/LOOP or SBO coping scenario.

3.3.2 Requirements for Batteries

- 3.3.2.1 Battery size shall be determined in accordance with the method indicated in IEEE 485.
- 3.3.2.2 Each Class 1E battery shall have sufficient capacity to independently supply the required loads for a loss-of-coolant accident, loss of offsite power, or main steam line break for a duration of 2.75 hr. Each Class 1E battery shall have sufficient capacity to independently supply the required loads for a station blackout for a duration of 4 hr.
- 3.3.2.3 Initial battery capacity shall be 25 % greater than required according to the calculation method indicated in IEEE 485 to allow for aging and extend the time interval for battery replacement as required by the battery replacement criteria of IEEE 450.
- 3.3.2.4 Batteries shall be sized to provide their required output at 70°F.
- 3.3.2.5 A margin of 10 % load growth shall be initially included in the sizing of each battery.

- 3.3.3.7 A dc ammeter, dc voltmeter, dc overvoltage relay, ac power “on” light, and ac undervoltage relay shall be provided on each charger. The relays shall alarm in the control room.
- 3.3.3.8 The chargers shall be suitable for parallel operation so that each subsystem’s redundant charger can be manually put into operation in conjunction with the normal charger to recharge a discharged battery in a shorter amount of time (if allowed by the manufacturer).
- 3.3.3.9 The battery charger shall prevent the charger from becoming a load on the battery due to a power feedback during loss of ac power to the chargers.
- 3.3.3.10 ac breakers shall be provided to protect the charger from internal faults and to isolate the charger from the ac source.
- 3.3.3.11 dc breakers shall be provided to protect the battery and charger from internal charger faults and to isolate the charger from the dc system.
- 3.3.4 Requirements for 125-V dc Metal-Enclosed Switchgear
 - 3.3.4.1 There is one dc switchgear lineup for each subsystem. It shall be connected to the battery, the normal battery charger, and the redundant battery charger associated with that train. The switchgear shall feed MCCs, dc distribution panels, and the inverter for the vital instrumentation system (DC-1807).
 - 3.3.4.2 The switchgear air circuit breakers shall be equipped with direct-acting, dual-magnetic, overcurrent tripping devices providing adjustable overcurrent and short-circuit protection.
 - 3.3.4.3 The 125-V dc switchgear breakers shall serve as a means for energizing and deenergizing power sources and loads connected to the 125-V dc switchgear bus. The switchgear shall also provide suitable protection for the loads during overload and short-circuit conditions.
 - 3.3.4.4 Trains C and D shall each provide 125-V dc power to an associated 480-V, 3-phase inverter for RHR isolation valves.
 - 3.3.4.5 The vital ac bus inverters may be allowed to operate over a dc input voltage range of 105 to 140 V dc. The dc feeder cables shall be designed to maintain a minimum of 105 V dc during the entire battery load profile.
 - 3.3.4.6 The RHR isolation valve inverters may be allowed to operate over a range of 105 to 140 V dc. The dc feeder cables to the RHR isolation valve inverters shall be designed to maintain a minimum of 105 V dc at the RHR isolation valve inverters.
- 3.3.5 125-V dc MCCs
 - 3.3.5.1 One MCC shall be provided for each train A, B, and C subsystem. It shall be connected to the switchgear associated with that subsystem. The MCC shall feed motor-operated