OPPD NUCLEAR

PERMANENTLY DEFUELED EMERGENCY ACTION LEVEL TECHNICAL BASES

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1.0 PURPOSE

This document provides the detailed set of Emergency Action Levels (EALs) applicable to the Fort Calhoun Station (FCS) and the associated Technical Bases using the EAL development methodology found in NEI 99-01, "Development of Emergency Action Levels for Non-Passive Reactors," Revision 6 (NEI 99-01, Rev. 6). As a permanently defueled facility, FCS will use the Recognition Category "PD" (Permanently Defueled) providing a stand-alone set of Initiating Conditions (ICs)/Emergency Action Levels (EALs) for a permanently defueled facility to consider for use in developing a site-specific emergency classification scheme and Recognition Category "E" ICs for the ISFSI. Permanently defueled ICs and EALs are addressed in Appendix C of NEI 99-01, Rev. 6. All recommendations for changes to this document or associated implementing procedures are reviewed in accordance with 10 Code of Federal Regulations (CFR) 50.54(q).

This document should be used to facilitate review of the FCS Permanently Defueled EALs, provide historical documentation for future reference and serve as a resource for training. Decision-makers responsible for implementation of the Permanently Defueled Emergency Plan (PDEP) may use this document as a technical reference in support of EAL interpretation.

The expectation is that emergency classifications are to be made as soon as conditions are present and recognizable for the classification, but within 30 minutes or less in all cases of conditions present. Use of this document for assistance is not intended to delay the emergency classification.

2.0 DISCUSSION

2.1 Permanently Defueled Facility

NEI 99-01 provides guidance for an emergency classification scheme applicable to a permanently defueled facility. This is a facility that generated spent fuel under a 10 CFR Part 50 license, has permanently ceased operations, and will store the spent fuel onsite for an extended period of time. The emergency classification levels (ECLs) applicable to this type of facility are consistent with the requirements of 10 CFR Part 50 and the guidance in NUREG-0654/FEMA-REP-1, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants, Rev. 1" (NUREG-0654).

In order to relax the emergency plan requirements previously applicable to an operating facility, the licensee must demonstrate that no credible event can result in a significant radiological release beyond the site boundary. This verification confirms that the source term and motive force available in the permanently defueled condition are insufficient to warrant classifications of a Site Area Emergency or General Emergency. Therefore, the

generic ICs and EALs applicable to a permanently defueled facility may result in either a Notification of Unusual Event (Unusual Event) or an Alert classification.

2.2 Independent Spent Fuel Storage Installation

Selected guidance in NEI 99-01, Rev. 6 is applicable to licensees electing to use their 10 CFR Part 50 emergency plan to fulfill the requirements of 10 CFR 72.32 for a stand-alone Independent Spent Fuel Storage Installation (ISFSI). The ECLs applicable to an ISFSI are consistent with the requirements of 10 CFR Part 50. The ICs germane to a 10 CFR 72.32 emergency plan (as described in NUREG-1567) are subsumed within the classification scheme for a 10 CFR 50.47 emergency plan.

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). 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 one (1) rem Total Effective Dose Equivalent.

Regarding the above information, the expectations for an offsite response to an Alert classified under a 10 CFR 72.32 emergency plan are generally consistent with those for an Unusual Event in a 10 CFR 50.47 emergency plan (e.g., to provide assistance, if requested). Also, the licensee's Emergency Response Organization (ERO) required for a 10 CFR 72.32 emergency plan is different than that prescribed for a 10 CFR 50.47 emergency plan (e.g., no emergency technical support function).

3.0 KEY TERMINOLOGY USED

There are several key terms that appear throughout the NEI 99-01, Rev. 6 methodology. These terms are introduced in this section to support understanding of subsequent material. As an aid to the reader, the following table is provided as an overview to illustrate the relationship of the terms to each other.

Emergency Classification Level	
Unusual Event	**Alert**
↓	↓
Initiating Condition	**Initiating Condition**
↓	↓
Permanently Defueled Emergency Action Level[1] • Notes • Basis	**Permanently Defueled Emergency Action Level[1]** • Notes • Basis
[1] When making an emergency classification, the Shift Manager/Emergency Director must consider all information having a bearing on the proper assessment of an Initiating Condition. This includes the PD and E EALs, Notes, and the Basis information.	

3.1 Emergency Classification Levels

One of a set of names or titles established by the 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 ECLs, in ascending order of severity, are:

- Unusual Event
- Alert

3.1.1 Unusual Event

Events are in progress or have occurred which indicate a potential degradation of the level of safety of the facility 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.

Purpose: The purpose of this classification is to assure that the first step in future response has been carried out, to bring the operations staff to a state of readiness, and to provide systematic handling of unusual event information and decision-making.

3.1.2 Alert

Events are in progress or have occurred which involve an actual or potential substantial degradation of the level of safety of the facility 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 Environmental Protection Agency (EPA) Protective Action Guides (PAG) exposure levels.

Purpose: The purpose of this classification is to assure that emergency personnel are readily available to respond if the situation becomes more serious or to perform confirmatory radiation monitoring if required, and provide offsite authorities current information on facility status and parameters.

3.2 Initiating Condition

An event or condition that aligns with the definition of one of the two ECLs by virtue of the potential or actual effects or consequences.

Discussion: An Initiating Condition (IC) describes an event or condition, the severity or consequences of which meets the definition of an ECL. An IC can be expressed as a continuous, measurable parameter (e.g., radiation monitor readings) or an event (e.g., an earthquake).

Appendix 1 of NUREG-0654 does not contain example EALs for each ECL, but rather ICs (i.e., conditions that indicate that a radiological emergency, or events that could lead to a radiological emergency, have occurred). NUREG-0654 states that the ICs form the basis for establishment by a licensee of the specific facility instrumentation readings (as applicable) which, if exceeded, would initiate the emergency classification. Thus, it is the specific instrument readings that would be the EALs.

3.3 Emergency Action Level

A pre-determined, site-specific, observable threshold for an IC that, when met or exceeded, places the facility in a given ECL.

Discussion: EAL statements may utilize a variety of criteria including instrument readings and status indications, observable events, results of calculations and analyses, entry into particular procedures, and the occurrence of natural phenomena.

4.0 GUIDANCE ON MAKING EMERGENCY CLASSIFICATIONS

4.1 General Considerations

When making an emergency classification, the Emergency Director must consider all information having a bearing on the proper assessment of an IC. This includes the EAL plus Notes and the informing Basis information.

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

For ICs and EALs that have a stipulated time duration (e.g., 15 minutes, 60 minutes, etc.), the Emergency Director should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the condition has exceeded, or will likely exceed, the applicable time. If an ongoing radiological release is detected and the release start time is unknown, it should be assumed that the release duration specified in the IC/EAL has been exceeded, absent data to the contrary.

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

The assessment of some EALs is based on the results of analyses that are necessary to ascertain whether a specific EAL threshold has been exceeded (e.g., gaseous and liquid effluent sampling, etc.); the EAL and/or the associated basis discussion will identify the necessary analysis. In these cases, the 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).

While the EALs have been developed to address a full spectrum of possible events and conditions which may warrant emergency classification, a provision for classification based on operator/management experience and judgment is still necessary. The NEI 99-01 scheme provides the Emergency Director with the ability to classify events and

conditions based upon judgment using EALs that are consistent with the ECL definitions (refer to PD-HU3 and PD-HA3). 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.

4.2 Classification Methodology

To make an emergency classification, the user will compare an event or condition (i.e., the relevant facility indications and reports) to an EAL(s) and determine if the EAL has been met or exceeded. The evaluation of an EAL(s) must be consistent with the Notes. If an EAL has been met or exceeded, then the IC is considered met and the associated ECL is declared in accordance with facility procedures.

When assessing an EAL that specifies a time duration for the off-normal condition, the EAL time duration runs concurrently with the emergency notification time duration.

4.3 Classification of Multiple Events and Conditions

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

- If an Unusual Event EAL and an Alert EAL are met, an Alert should be declared.

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

- If two Unusual Event EALs are met, an Unusual Event should be declared.

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

4.4 Classification of Imminent Conditions

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

4.5 Emergency Classification Level Upgrading and Termination

An ECL may be terminated when the event or condition that meets the IC and EAL no longer exists.

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

4.6 Classification of Short-Lived Events

Event-based ICs and EALs define a variety of specific occurrences that have potential or actual safety significance. By their nature, some of these events may be short-lived and, thus, over before the emergency classification assessment can be completed. If an event occurs that meets or exceeds an EAL, the associated ECL must be declared regardless of its continued presence at the time of declaration.

4.7 Classification of Transient Conditions

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

EAL momentarily met during expected facility response - In instances where an EAL is briefly met during an expected (normal) facility 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.

It is important to stress that the 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.

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

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

In these cases, no emergency declaration is warranted; however, the guidance contained in NUREG-1022, "Event Report Guidelines 10 CFR 50.72 and 50.73," is applicable. Specifically, the event should 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 should also notify appropriate State and local agencies in accordance with the agreed upon arrangements.

4.9 Retraction of an Emergency Declaration

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

5.0 REFERENCES

5.1 Developmental

5.1.1 NEI 99-01 Revision 6, Development of Emergency Action Levels for Non-Passive Reactors, November 2012

5.1.2 10 CFR Part 50, Domestic Licensing of Production and Utilization Facilities

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

5.1.4 NUREG-1022, Event Reporting Guidelines 10 CFR 50.72 and 50.73

5.1.5 10 CFR 50.72, Immediate Notification Requirements for Operating Nuclear Power Reactors

5.1.6 NUREG-0654/FEMA-REP-1, Rev. 1, Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants

5.1.7 10 CFR 72.32, Emergency Plan

5.1.8 NUREG-1567, Spent Fuel Dry Storage Facilities

5.1.9 10 CFR 50.47, Emergency Plans

5.1.10 NUREG-1140, A Regulatory Analysis on Emergency Preparedness for Fuel Cycle and Other Radioactive Material Licensees

5.2 Implementing

5.2.1 Permanently Defueled Emergency Plan

5.2.2 EAL Comparaison Matrix

5.2.3 EAL Classification Matrix

5.3 Commitments

None

6.0 ACRONYMS & DEFINITIONS

6.1 Acronyms

AOP ..... Abnormal Operating Procedure
CDE ..... Committed Dose Equivalent
CFR ..... Code of Federal Regulations
cpm ..... Counts per Minute
EAL ..... Emergency Action Level
ECL ..... Emergency Classification Level
EPA ..... Environmental Protection Agency
FAA ..... Federal Aviation Administration
FBI ..... Federal Bureau of Investigation
FEMA ..... Federal Emergency Management Agency
HSM ..... Horizontal Storage Module
ISFSI ..... Independent Spent Fuel Storage Installation
IC ..... Initiating Condition
mRem ..... milli-Roentgen Equivalent Man
MSL ..... Mean Sea Level
NEI ..... Nuclear Energy Institute
NORAD ..... North American Aerospace Defense Command
NRC ..... Nuclear Regulatory Commission
ODCM ..... Off-site Dose Calculation Manual
ORO ..... Off-site Response Organization
PAG ..... Protective Action Guide
PD ..... Permanently Defueled
rem ..... Roentgen Equivalent Man
TEDE ..... Total Effective Dose Equivalent
USAR ..... Final Safety Analysis Report as Updated

6.2 Definitions

The following definitions are taken from Title 10 CFR, and related regulatory guidance documents.

Alert

Events are in progress or have occurred which involve an actual or potential substantial degradation of the level of safety of the facility 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.

Unusual Event

Events are in progress or have occurred which indicate a potential degradation of the level of safety of the facility 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 key terms are 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 facility in a given ECL.

Emergency Classification Level (ECL): One of a set of names or titles established by the 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 ECLs, in ascending order of severity, are:

- Unusual Event
- Alert

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

Selected terms used in IC and EAL 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 irradiated fuel dry storage cask barrier(s) between areas containing radioactive substances and the environment.

EXPLOSION: A rapid, violent and catastrophic failure of a piece of equipment due to combustion, chemical reaction or over pressurization. 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 licensee to ensure that demands will be met by the facility.

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

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

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

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

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

OWNER CONTROLLED AREA (OCA): The property associated with the facility and owned by the licensee. Access is normally limited to persons entering for official business.

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

PROTECTED AREA: The area normally within the facility security fence designated to implement the security requirements of 10 CFR 73.

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 facility. A SECURITY CONDITION does not involve a HOSTILE ACTION.

UNPLANNED: A parameter change or an event that is not: 1) the result of an intended evolution; or 2) an expected facility 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.

7.0 FCS-TO-NEI 99-01 EAL CROSS-REFERENCE

The following cross-reference table is provided to facilitate association and location of a FCS EAL within the NEI 99-01, Rev. 6 IC/EAL identification scheme. Further information regarding the development of the FCS EALs based on the NEI guidance can be found in the EAL Comparison Matrix (Reference 5.2.2).

FCS Permanently Defueled IC/EALs	NEI 99-01, Rev. 6, Appendix C – Permanently Defueled Station ICs/EALs
PD-RU1	PD-AU1
PD-RA1	PD-AA1
PD-RU2	PD-AU2
PD-RA2	PD-AA2
PD-HU1	PD-HU1
PD-HA1	PD-HA1
PD-HU2	PD-HU2
PD-HU3	PD-HU3
PD-HA3	PD-HA3
PD-SU1	PD-SU1
FCS ISFSI ICs/EAL	**NEI 99-01, Rev. 6, Section 8 – ISFSI ICs/ EALs**
E-HU1	E-HU1

8.0 ATTACHMENTS

8.1 Attachment 1, Recognition Category PD EAL Bases

8.2 Attachment 2, Recognition Category E EAL Basis

Attachment 1
Recognition Category PD EAL Bases

Recognition Category PD EAL Bases

Recognition Category PD (Permanently Defueled) provides a stand-alone set of ICs/EALs for a permanently defueled facility to consider for use in developing a site-specific emergency classification scheme. For development, it was assumed that the facility had operated under a 10 CFR Part 50 license and that the licensee has permanently ceased power operations and removed fuel from the reactor vessel. Further, the licensee intends to store the spent fuel within the permanently defueled facility for some period of time.

When in a permanently defueled condition, the licensee typically receives approval from the NRC for exemptions from specific emergency planning requirements. These exemptions reflect the reduced radiological source term and risks associated with spent fuel pool storage relative to reactor at-power operation. Source terms and accident analyses associated with plausible accidents are documented in the facilities' Final Safety Analysis Report as Updated (USAR). As a result, FCS has developed a facility-specific emergency classification scheme using the NRC-approved exemptions, revised source terms, and revised accident analyses as documented in the station's USAR.

Recognition Category PD uses the same ECLs as operating reactors; however, the source term and accident analyses typically limit the ECLs to an Unusual Event and an Alert. The Unusual Event ICs provide for an increased awareness of abnormal conditions while the Alert ICs are specific to actual or potential impacts to spent fuel. The source terms and release motive forces associated with a permanently defueled facility would not be sufficient to require declaration of a Site Area Emergency or General Emergency.

A permanently defueled station is essentially a spent fuel storage facility with the spent fuel stored in a pool of water that serves as both a cooling medium (i.e., removal of decay heat) and shield from direct radiation. These primary functions of the spent fuel storage pool are the focus of the Recognition Category PD ICs and EALs. Radiological effluent ICs and EALs were included to provide a basis for classifying events that cannot be readily classified based on an observable events or facility conditions alone.

Appropriate ICs and EALs from Recognition Categories A, C, F, H, and S of NEI 99-01 were modified and included in Recognition Category PD to address a spectrum of the events that may affect a spent fuel pool. The Recognition Category PD ICs and EALs reflect the relevant guidance in NEI 99-01, Rev. 6 (e.g., the importance of avoiding both over-classification and under-classification). Nonetheless, FCS has developed its emergency classification scheme using the NRC-approved exemptions, and the source terms and accident analyses specific to FCS. Security-related events are also considered.

The following table, Table PD-1: Recognition Category "PD" Initiating Condition Matrix, provides a summary of ICs associated with Recognition Category PD.

Table PD-1: Recognition Category "PD" Initiating Condition Matrix

UNUSUAL EVENT	ALERT
PD-RU1 Release of gaseous or liquid radioactivity greater than 2 times the ODCM limits for 60 minutes or longer.	**PD-RA1** Release of gaseous or liquid radioactivity resulting in offsite dose greater than 10 mRem TEDE or 50 mRem thyroid CDE.
PD-RU2 UNPLANNED rise in facility radiation levels.	**PD-RA2** UNPLANNED rise in facility radiation levels that impedes facility access required to maintain spent fuel integrity.
PD-HU1 Confirmed SECURITY CONDITION or threat.	**PD-HA1** HOSTILE ACTION within the OWNER CONTROLLED AREA or airborne attack threat within 30 minutes.
PD-HU2 Hazardous event affecting equipment necessary for spent fuel cooling.	
PD-HU3 Other conditions exist which in the judgment of the Emergency Director warrant declaration of an Unusual Event.	**PD-HA3** Other conditions exist which in the judgment of the Emergency Director warrant declaration of an Alert.
PD-SU1 UNPLANNED spent fuel pool temperature rise.	

Emergency Classification Level:

Unusual Event

Initiating Condition:

Release of gaseous or liquid radioactivity greater than 2 times the Offsite Dose Calculation Manual (ODCM) limits for 60 minutes or longer.

Emergency Action Level (EAL): (1 or 2)

Notes:

- The Emergency Director should declare the event 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 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 Table R1 effluent monitors greater than 2 times the alarm setpoint established by a current radioactive release discharge permit for 60 minutes or longer.

Table R1 Effluent Monitor Thresholds		
Effluent Monitor	**Description**	**Value**
RM-052 (aligned to Aux Building stack)	AB Stack (gas)	2 X High Alarm
RM-062	AB Stack (gas)	2 X High Alarm
RM-055 (if discharge not isolated)	Liquid Discharge Header	2 X High Alarm

OR

2. 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 facility 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.

Fort Calhoun Station incorporates design features intended to control the release of radioactive effluents to the environment. Further, there are administrative controls established to prevent unintentional releases, and to control and monitor intentional releases. The occurrence of an extended, uncontrolled radioactive release to the environment is indicative of degradation in these features and/or controls.
Radiological effluent EALs are also included to provide a basis for classifying events and conditions that cannot be readily or appropriately classified on the basis of facility conditions alone. The inclusion of both facility 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 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 #2 addresses uncontrolled gaseous or liquid releases that are detected by sample analyses or environmental surveys, particularly on unmonitored pathways (e.g., spills of radioactive liquids into storm drains, heat exchanger leakage in river water systems, etc.).

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

Basis Reference:

1. NEI 99-01 Rev. 6, PD-AU1

PD-RA1

Emergency Classification Level:

Alert

Initiating Condition:

Release of gaseous or liquid radioactivity resulting in offsite dose greater than 10 mRem TEDE or 50 mRem thyroid CDE.

Emergency Action Level (EAL): (1 or 2 or 3 or 4)

Notes:

- The Emergency Director should declare the event 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. A valid reading on ANY Table R2 effluent monitor greater than the value shown for 15 minutes or longer:

Table R2 - Effluent Monitor Thresholds		
Effluent Monitor	**Description**	**Value**
RM-052 (aligned to Aux Building stack)	AB Stack (gas)	9×10^6 cpm
RM-062	AB Stack (gas)	9×10^6 cpm
RM-055 (if discharge not isolated)	Liquid Discharge Header	9×10^6 cpm

OR

2. Dose assessment using actual meteorology indicates doses greater than 10 mRem TEDE or 50 mRem thyroid CDE at or beyond the site boundary.

OR

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.

OR

4. Field survey results indicate **EITHER** of the following at or beyond the site boundary:
   - Closed window dose rates greater than 10 mRem/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% of the EPA Protective Action Guides (PAGs). It includes both monitored and un-monitored releases. Releases of this magnitude represent an actual or potential substantial degradation of the level of safety of the facility as indicated by a radiological release that significantly exceeds regulatory limits (e.g., a significant uncontrolled release).

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

The TEDE dose is set at 1% of the EPA PAG of 1000 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.

The threshold value for RM-052 was determined via Calculation FC08515. The RM-052 reading that corresponds to the 10 mRem TEDE (1.1×10^8 cpm) threshold exceeds the maximum count rate for the monitor (1×10^7 cpm). Based on the guidance presented in NEI 99-01, Rev. 6 the EAL threshold value is set at 90% of the maximum monitor reading, corresponding to 9×10^6 cpm.

The threshold value for RM-062 was determined via Calculation FC08515. The RM-062 reading that corresponds to the 10 mRem TEDE (9.3×10^7 cpm) threshold exceeds the maximum count rate for the monitor (1×10^7 cpm). Based on the guidance presented in NEI 99-01, Rev. 6 the EAL threshold value is set at 90% of the maximum monitor reading,

corresponding to 9 x 10^6 cpm.

The threshold value for RM-055 was determined via Calculation FC08516. The RM-055 reading that corresponds to the 10 mRem TEDE threshold exceeds the maximum count rate for the monitor (1 x 10^7 cpm). Based on the guidance presented in NEI 99-01, Rev. 6 the EAL threshold value is set at 90% of the maximum monitor reading, corresponding to 9 x 10^6 cpm.

Basis Reference:

1. NEI 99-01 Rev. 6, PD-AA1
2. Calculation FC08515
3. Calculation FC08516

PD-RU2

Emergency Classification Level:

Unusual Event

Initiating Condition:

UNPLANNED rise in facility radiation levels.

Emergency Action Level (EAL): (1 or 2)

1. a. UNPLANNED water level drop to below the normal range in the spent fuel pool as indicated by the following:

   - LI-2846 (Spent Fuel Pool Level Indicator)
   - LI-2846-1 (Spent Fuel Pool Level Local Indicator)

   AND

   b. UNPLANNED rise in area radiation levels as indicated by a valid reading on **ANY** radiation monitor in Table R3.

Table R3 - Radiation Monitors	
RMS	**Area Monitored**
RM-80, 85, 87	Spent Fuel Storage Area Radiation Monitor
Portable Area Rad Monitor	Auxiliary Building near fuel handling areas

OR

2. Area radiation monitor reading or survey result indicated an UNPLANNED rise of 25 mRem/hr over NORMAL LEVELS.

Basis:

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

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

This IC addresses elevated radiation levels caused by a decrease in water level above irradiated (spent) fuel or other UNPLANNED events. The increased radiation levels are indicative of a minor loss in the ability to control radiation levels within the facility or radioactive materials. Either condition is a potential degradation in the level of safety of the facility.

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

The effects of planned evolutions should be considered. Note that EAL #1 is applicable only in cases where the elevated reading is due to an UNPLANNED water level drop. EAL #2 excludes radiation level increases that result from planned activities such as the use of radiographic sources and movement of radioactive waste materials.

Escalation of the emergency classification level would be via IC PD-RA1 or PD-RA2.

Basis Reference:

1. NEI 99-01 Rev. 6, PD-AU2

PD-RA2

Emergency Classification Level:

Alert

Initiating Condition:

UNPLANNED rise in facility radiation levels that impedes facility access required to maintain spent fuel integrity.

Emergency Action Level (EAL): (1 or 2)

1. UNPLANNED dose rate greater than 15 mRem/hr in **ANY** of the following areas requiring continuous occupancy to maintain control of radioactive material or operation of systems needed to maintain spent fuel integrity.

   - Main Control Room
   - Central Alarm Station

OR

2. Area Radiation Monitor readings or survey results indicate an UNPLANNED rise by 100 mRem/hr over NORMAL LEVELS that impedes access to **ANY** of the following areas needed to maintain control of radioactive material or operation of systems needed to maintain spent fuel integrity.

   - Room 4
   - Room 5
   - Room 24
   - Room 25
   - Room 26
   - Room 69

Basis:

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

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

This IC addresses increased radiation levels, as discussed in NEI 99-01, that impede necessary access to areas containing equipment that must be operated manually or that

requires local monitoring in order to maintain systems needed to maintain spent fuel integrity. As used here, "impede" includes hindering or interfering, provided that the interference or delay is sufficient to significantly threaten necessary facility access. It is this impaired access that results in the actual or potential substantial degradation of the level of safety of the facility.

This IC does not apply to anticipated temporary increases due to planned events.

Basis Reference:

1. NEI 99-01 Rev. 6, PD-AA2

PD-HU1

Emergency Classification Level:

Unusual Event

Initiating Condition:

Confirmed SECURITY CONDITION or threat.

Emergency Action Level (EAL): (1 or 2 or 3)

1. A SECURITY CONDITION that does not involve a HOSTILE ACTION as reported by the Security Shift Supervisor.

OR

2. Notification of a credible security threat directed at the site.

OR

3. A validated notification from the NRC providing information of an aircraft threat.

Basis:

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

HOSTILE ACTION: An act toward a facility 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 facility. 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).

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

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 facility. A SECURITY CONDITION does not involve a HOSTILE ACTION.

This IC addresses events that pose a threat to facility personnel or equipment necessary to maintain spent fuel integrity, and thus represent a potential degradation in the level of facility 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 IC PD-HA1.

Timely and accurate communication 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 site personnel and Off-Site Response Organizations.

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

EAL #1 references Security Shift Supervisor 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 § 2.390 information.

EAL #2 addresses the receipt of a credible security threat. The credibility of the threat is assessed in accordance with SY-FC-101-132, *Security Assessment and Response to Unusual Activities.*

EAL #3 addresses the threat from the impact of an aircraft on the facility. 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 AOP-37, *Security Events.*

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

Basis Reference:

1. NEI 99-01 Rev. 6, PD-HU1

PD-HA1

Emergency Classification Level:

Alert

Initiating Condition:

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

Emergency Action Level (EAL): (1 or 2)

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

OR

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

Basis:

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

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

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

OWNER CONTROLLED AREA (OCA): The property associated with the facility and owned by the licensee. Access is normally limited to persons entering for official business.

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

PROTECTED AREA: The area normally within the facility security fence designated to implement the security requirements of 10 CFR 73.

This IC addresses the occurrence of a HOSTILE ACTION within the OWNER CONTROLLED AREA or notification of an aircraft attack threat. This event will require rapid response and assistance due to the possibility of the attack progressing to the PROTECTED AREA, or the need to prepare the facility and staff for a potential aircraft impact.

Timely and accurate communication 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 facility staff and implementation of onsite protective measures (e.g., evacuation, dispersal or sheltering). The Alert declaration will also heighten the awareness of Offsite Response Organizations (OROs), allowing them to be better prepared should it be necessary to consider further actions.

This IC does not apply to incidents that are accidental events, acts of civil disobedience, or otherwise are not a HOSTILE ACTION perpetrated by a HOSTILE FORCE. Examples include the crash of a small aircraft, shots from hunters, physical disputes between employees, etc. Reporting of these types of events is adequately addressed by other EALs, or the requirements of 10 CFR § 73.71 or 10 CFR § 50.72.

EAL #1 is applicable for any HOSTILE ACTION occurring, or that has occurred, in the OWNER CONTROLLED AREA. This includes any action directed against the ISFSI.

EAL #2 addresses the threat from the impact of an aircraft on the facility, 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 onsite 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 AOP-37, *Security Events.*

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.

Basis Reference:

1. NEI 99-01 Rev. 6, PD-HA1

PD-HU2

Emergency Classification Level:

Unusual Event

Initiating Condition:

Hazardous event affecting equipment necessary for spent fuel cooling.

Emergency Action Level (EAL):

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
   - Low river level as indicated by less than 976 feet, 9 inches MSL elevation
   - Other events with similar hazard characteristics as determined by the Shift Manager

   AND

   b. The event has damaged at least one train of a system needed for spent fuel cooling.

   AND

   c. The damaged equipment cannot, or potentially cannot, perform its design function based on **EITHER**:

   - Indications of degraded performance
   - VISIBLE DAMAGE

Basis:

EXPLOSION: A rapid, violent and catastrophic failure of a piece of equipment due to combustion, chemical reaction or over pressurization. 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.

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 at least one train of equipment needed for spent fuel cooling. The damage must be of sufficient magnitude that the system(s) train cannot, or potentially cannot, perform its intended function. This condition reduces the margin to a loss or potential loss of the fuel clad barrier, and therefore represents a potential degradation of the level of safety of the facility.

For EAL 1.c., the first bullet addresses damage to equipment that is in service/operation since indications for it will be readily available.

For EAL 1.c., the second bullet addresses damage to equipment that is not in service/operation or readily apparent through indications alone. 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 could, depending upon the event, be based on any of the ALERT ICs: PD-RA1, PD-RA2, PD-HA1, or PD-HA3

Basis Reference:

1. NEI 99-01, Rev. 6, PD-HU2

PD-HU3

Emergency Classification Level:

Unusual Event

Initiating Condition:

Other conditions exist which in the judgment of the Emergency Director warrant declaration of an Unusual Event.

Emergency Action Level (EAL):

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 facility 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 systems needed to maintain spent fuel cooling 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 an Unusual Event.

Basis Reference:

1. NEI 99-01, Rev. 6, PD-HU3

PD-HA3

Emergency Classification Level:

Alert

Initiating Condition:

Other conditions exist which in the judgment of the Emergency Director warrant declaration of an Alert.

Emergency Action Level (EAL):

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 facility 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:

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

HOSTILE ACTION: An act toward a facility 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 facility. 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).

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

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.

Basis Reference:

1. NEI 99-01, Rev. 6, PD-HA3

PD-SU1

Emergency Classification Level:

Unusual Event

Initiating Condition:

UNPLANNED spent fuel pool temperature rise.

Emergency Action Level (EAL):

1. UNPLANNED spent fuel pool temperature rise to greater than 150 °F as indicated on **T408A/B/C** or locally by handheld instrument.

Basis:

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

This IC addresses a condition that is a precursor to a more serious event and represents a potential degradation in the level of safety of the facility. If uncorrected, boiling in the pool will occur and result in a loss of pool level and increased radiation levels.

Escalation of the emergency classification level would be via IC PD-RA1 or PD-RA2.

Basis Reference:

1. NEI 99-01 Rev. 6, PD-SU1

Attachment 2
Recognition Category E EAL Basis

Recognition Category E EAL Basis

Recognition Category E provides a set of ICs/EALs for an ISFSI. An ISFSI is a complex that is designed and constructed for the interim storage of spent nuclear fuel and other radioactive materials associated with spent fuel storage. A significant amount of the radioactive material contained within a cask must escape its packaging and enter the atmosphere for there to be a significant environmental effect resulting from an accident involving the dry storage of spent nuclear fuel. Formal offsite planning is not required because the postulated worst-case accident involving an ISFSI has insignificant consequences to the public health and safety.

An Unusual Event is declared on the basis of the occurrence of an event of sufficient magnitude that a loaded cask confinement boundary is damaged or violated. This includes classification based on a loaded fuel storage cask confinement boundary loss leading to the degradation of the fuel during storage or posing an operational safety problem with respect to its removal from storage.

Table E-1: Recognition Category "E" Initiating Condition Matrix

UNUSUAL EVENT
E-HU1 Damage to a loaded cask CONFINEMENT BOUNDARY.

E-HU1

Emergency Classification Level:

Unusual Event

Initiating Condition

Damage to a loaded cask CONFINEMENT BOUNDARY.

Emergency Action Level (EAL):

1. Damage to a loaded cask CONFINEMENT BOUNDARY as indicated by an on-contact radiation reading:

   - ≥ 1600 mRem/hr (gamma + neutron) on the Horizontal Storage Module (HSM) front surface

   OR

   - ≥ 400 mRem/hr (gamma + neutron) on the HSM door centerline

   OR

   - ≥ 16 mRem/hr (gamma + neutron) on the end shield wall exterior

Basis:

CONFINEMENT BOUNDARY: The irradiated fuel dry storage cask barrier(s) between areas containing radioactive substances and the environment.

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.

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 limits listed in the EAL reflect 2 times the cask technical specification for radiation level. 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, the fact that the "on-contact" dose rate limit is exceeded may be determined based on measurement of a dose rate at some distance from the cask.

Amendment number 9 to COC 1004 Technical Specifications for the Standardized NUHOMS® Horizontal Storage Module System contains radiation dose levels for the dry storage cask that should not be exceeded based on whether the dry storage cask is being transported inside the fuel transfer cask or it is stored in the horizontal storage module. Based on the guidance contained in NEI 99-01, Rev. 6, an Unusual Event is warranted for radiation levels of twice the Technical Specification value; the values chosen for EAL E-HU1 represent these values.

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

Basis References:

1. NEI 99-01, Rev. 6, E-HU1
2. Amendment 9 to COC 1004 Technical Specifications for the Standardized NUHOMS® Horizontal Storage Module System