

## **85 INDEPENDENT SPENT FUEL STORAGE INSTALLATION (ISFSI) ICS/EALS**

### **Recognition Category "E" Initiating Condition Matrix**

#### **UNUSUAL EVENT**

**E-HU4EU1** Damage to a loaded cask  
CONFINEMENT BOUNDARY.

*Op. Modes: All*



## EU1

**ECL:** Notification of Unusual Event

**Initiating Condition:** Damage to a loaded cask CONFINEMENT BOUNDARY.

**Operating Mode Applicability:** All

**Emergency Action Levels:**

**Note:**

The on-contact dose rate may be determined based on measurement of a dose rate at some distance from the cask

- (1) Damage to a loaded cask CONFINEMENT BOUNDARY as indicated by ANY of the following ~~an~~ on-contact surface radiation readings greater than: ~~(2 times the site specific cask specific technical specification allowable radiation level)~~
- 1600 mrem/hr at the front bird screen
  - 4 mrem/hr at the door centerline
  - 4 mrem/hr at the end shield wall exterior

**Comment [MKF43]:** V19 NUHOMS HSM Dose Rates Technical Specification

**Basis:**

CONFINEMENT BOUNDARY: The barrier(s) between spent fuel and the environment once the spent fuel is processed for dry 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 in the Horizontal Storage Module. The issues of concern are the creation of a potential or actual release path to the environment, degradation of one or more fuel assemblies due to environmental factors, and configuration changes which could cause challenges in removing the cask or fuel from storage.

The existence of "damage" is determined by radiological survey. The technical specification multiple of "2 times", which is also used in Recognition Category R IC RU1, is used here to distinguish between non-emergency and emergency conditions. The emphasis for this classification is the degradation in the level of safety of the spent fuel cask and not the magnitude of the associated dose or dose rate. It is recognized that in the case of extreme damage to a loaded cask, the fact that the "on-contact" dose rate limit is exceeded may be determined based on measurement of a dose rate at some distance from the cask.

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

**Reference:**

Appendix A to Certificate Of Compliance No. 1030 NUHOMS® HD System Generic Technical Specifications 5.4.3.



## 96 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: 1, 3, 2, 4</i>
SITE AREA EMERGENCY	
FS1	Loss or Potential Loss of any two barriers. <i>Op. Modes: 1, 3, 2, 4</i>
ALERT	
FA1	Any Loss or any Potential Loss of either the Fuel Clad or RCS barrier. <i>Op. Modes: 1, 3, 2, 4</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 (C) CSF – ORANGE entry conditions met <del>RCS/reactor vessel level less than (site-specific level).</del>	A. An automatic or manual <del>ECCS (SI)</del> actuation is required by <b>EITHER</b> of the following: 1. UNISOLABLE RCS leakage <b>OR</b> 2. SG tube RUPTURE.	A. Operation of a <del>standby-charging</del> <del>second charging</del> <del>(makeup)</del> pump in the normal charging mode is required by <b>EITHER</b> of the following: 1. UNISOLABLE RCS leakage <b>OR</b> 2. SG tube leakage. <b>OR</b> B. RCS Integrity (P) CSF – RED entry conditions met with RCS press > 300 psig <del>RCS cooldown rate greater than (site-specific pressurized thermal shock criteria/limits defined by site-specific indications).</del>	A. A leaking or RUPTURED SG is FAULTED outside of containment.	Not Applicable

Commented [DWS44]: V20 CSFST Core Cooling

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Fuel Clad Barrier		RCS Barrier		Containment Barrier	
LOSS	POTENTIAL LOSS	LOSS	POTENTIAL LOSS	LOSS	POTENTIAL LOSS
<b>2. Inadequate Heat Removal</b>		<b>2. Inadequate Heat Removal</b>		<b>2. Inadequate Heat Removal</b>	
A. Core Cooling (C) CSF – RED entry conditions met. Core exit thermocouple readings greater than (site-specific temperature value).	A. Core Cooling (C) CSF – ORANGE entry conditions met. Core exit thermocouple readings greater than (site-specific temperature value)  OR B. Heat Sink (H) CSF – RED entry conditions met. Inadequate RCS heat removal capability via steam generators as indicated by (site-specific indications).	Not Applicable	A. Heat Sink (H) CSF – RED entry conditions met. Inadequate RCS heat removal capability via steam generators as indicated by (site-specific indications).	Not Applicable	<del>A. Core Cooling (C) CSF – RED entry conditions met for 15 minutes or longer. 1. (Site-specific criteria for entry into core cooling restoration procedure) — AND</del>  <del>2. Restoration procedure not effective within 15 minutes.</del>
<b>3. RCS Activity / Containment Radiation</b>		<b>3. RCS Activity / Containment Radiation</b>		<b>3. RCS Activity / Containment Radiation</b>	
A. Post LOCA Radiation Monitors RM 6576A-1 or RM 6576B-1 ≥ 95 R/hr. Containment radiation monitor reading greater than (site-specific value).  OR B. RCS activity > 300 uCi/gm Dose Equivalent I 131 as determined per Procedure CS0925.01, Reactor Coolant Post Accident Sampling. (Site-specific indications that	Not Applicable	A. Post LOCA Radiation Monitors RM 6576A-1 or RM 6576B-1 ≥ 16 R/hr. Containment radiation monitor reading greater than (site-specific value).	Not Applicable	Not Applicable	A. Post LOCA Radiation Monitors RM 6576A-1 or RM 6576B-1 ≥ 1,305 R/hr. Containment radiation monitor reading greater than (Site-specific value).

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Commented [DWS47]: V20 CSFST Core Cooling

Commented [DWS49]: V22 CSFST Heat Sink

Commented [DWS50]: V20 CSFST Core Cooling

Commented [DWS48]: V 22 CSFST Heat Sink

Commented [DWS51]: V23 EPCALC-06-01 -Rad Values for Fission Product Barrier Matrix



Fuel Clad Barrier		RCS Barrier		Containment Barrier	
LOSS	POTENTIAL LOSS	LOSS	POTENTIAL LOSS	LOSS	POTENTIAL LOSS
reactor-coolant activity is greater than 300- $\mu$ Ci/gm dose-equivalent L-131).					
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 <del>Emergency</del> <del>Director</del> STED/SE D judgment. OR 2. UNISOLABLE pathway from the containment to the environment exists. OR B. Indications of RCS leakage outside of containment.	A. <del>Containment (Z) CSF - RED entry conditions met</del> <del>Containment pressure greater than (site-specific value)</del> OR B. Containment <del>H<sub>2</sub> concentration <math>\geq</math> 6%</del> <del>Explosive mixture exists inside containment</del> OR C. 1. Containment pressure <del>greater than 18 psig (site-specific pressure setpoint)</del> AND 2. Less than one full train of <del>Containment Building Spray (CBS) (site-specific system or equipment)</del> is operating per design for 15 minutes or longer.
<del>5. Other Indications</del>		<del>5. Other Indications</del>		<del>5. Other Indications</del>	
<del>Not Applicable</del>	<del>Not Applicable</del>	<del>Not Applicable</del>	<del>Not Applicable</del>	<del>Not Applicable</del>	<del>Not Applicable</del>
65. Emergency Director STED/SED		65. Emergency Director STED/SED		65. Emergency Director STED/SED	

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Commented [DWS54]: V25 Containment Spray Setpoint



Fuel Clad Barrier		RCS Barrier		Containment Barrier	
LOSS	POTENTIAL LOSS	LOSS	POTENTIAL LOSS	LOSS	POTENTIAL LOSS
Judgment		Judgment		Judgment	
A. ANY condition in the opinion of the <del>Emergency Director</del> STED/SED that indicates Loss of the Fuel Clad Barrier.	A. ANY condition in the opinion of the <del>Emergency Director</del> STED/SED that indicates Potential Loss of the Fuel Clad Barrier.	A. ANY condition in the opinion of the <del>Emergency Director</del> STED/SED that indicates Loss of the RCS Barrier.	A. ANY condition in the opinion of the <del>Emergency Director</del> STED/SED that indicates Potential Loss of the RCS Barrier.	A. ANY condition in the opinion of the <del>Emergency Director</del> STED/SED that indicates Loss of the Containment Barrier.	A. ANY condition in the opinion of the <del>Emergency Director</del> STED/SED that indicates Potential Loss of the Containment Barrier.



## **Basis Information For Fission Product Barrier Table**

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

##### Potential Loss 2.A

This reading 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.

As a potential loss indication, developers should consider including a threshold the same as, or similar to, "Core Cooling Orange entry conditions met" in accordance with the guidance at the front of this section.

As a potential loss indication, developers should consider including a threshold the same as, or similar to, "Heat Sink Red entry conditions met" in accordance with the guidance at the front of this section.

#### **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 $\mu$ 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% 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% to 5% fuel clad damage. Since this condition indicates that a significant amount of fuel clad damage has occurred, it represents a loss of the Fuel Clad Barrier.

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~~**

#### **~~6.5. Emergency-Director~~STED/SED Judgment**

##### Loss 6.A

This threshold addresses any other factors that may be used by the ~~Emergency-Director~~STED/SED 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~~STED/SED in determining whether the Fuel Clad Barrier is potentially lost. The ~~Emergency-Director~~STED/SED should 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

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~~

#### ~~Loss and/or Potential Loss 5.A~~

~~This subcategory addresses other site specific thresholds that may be included to indicate loss or potential loss of the RCS barrier based on plant specific design characteristics not considered in the generic guidance.~~

### 6.5. ~~Emergency Director~~STED/SED Judgment

#### Loss 6.A

This threshold addresses any other factors that may be used by the ~~Emergency Director~~STED/SED in determining whether the RCS Barrier is lost.

#### Potential Loss 6.A

This threshold addresses any other factors that may be used by the ~~Emergency Director~~STED/SED in determining whether the RCS Barrier is potentially lost. The ~~Emergency Director~~STED/SED should 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 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 MU3 for the fuel clad barrier (i.e., RCS activity values) and IC MU4 for the RCS barrier (i.e., RCS leak rate values).

This threshold also applies to prolonged steam releases necessitated by operational considerations such as the forced steaming of a leaking or RUPTURED steam generator directly to atmosphere to cooldown the plant, or to drive an auxiliary (emergency) feed water pump. These types of conditions will result in a significant and sustained release of radioactive steam to the environment (and are thus similar to a FAULTED condition). The inability to isolate the steam flow without an adverse effect on plant cooldown meets the intent of a loss of containment.

Steam releases associated with the expected operation of a SG power operated relief valve or safety relief valve 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 MU4	Unusual Event per MU4
Requires operation of a <del>standby</del> -second charging ( <del>makeup</del> ) pump (RCS Barrier Potential Loss)	Site Area Emergency per FS1	Alert per FA1
Requires an automatic or manual <del>ECCS</del> -(SI) actuation (RCS Barrier Loss)	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 which, 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 and/or if reactor vessel level is increasing. Whether or not the procedure(s) will be effective should be apparent within 15 minutes. The ~~Emergency~~ ~~Director~~ STED/SED 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% of the fuel cladding has failed. This level of fuel clad failure is well above that used to determine the analogous Fuel Clad Barrier Loss and RCS Barrier Loss thresholds.



NUREG-1228, *Source Estimations During Incident Response to Severe Nuclear Power Plant Accidents*, indicates the fuel clad failure must be greater than approximately 20% in order for there to be a major release of radioactivity requiring offsite protective actions. For this condition to exist, there must already have been a loss of the RCS Barrier and the Fuel Clad Barrier. It is therefore prudent to treat this condition as a potential loss of containment which would then escalate the emergency classification level 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. Users are reminded that 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 (or sometimes referred to as design leakage). Following the release of RCS mass into containment, containment pressure will fluctuate based on a variety of factors; a loss of containment integrity condition may (or may not) be accompanied by a noticeable drop in containment pressure. Recognizing the inherent difficulties in determining a containment leak rate during accident conditions, it is expected that the ~~Emergency Director~~ STED/SED 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.)~~.

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.

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.

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 should be corroborated with other available indications to confirm that the source is a loss of RCS mass outside of containment. If the fuel clad barrier has not been lost, radiation monitor readings outside of containment may not increase significantly; however, other unexpected changes in sump levels, area temperatures or pressures, flow rates, etc. should be sufficient to determine if RCS mass is being lost outside of the containment.

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

#### 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 in that containment heat removal/depressurization systems (e.g., containment sprays, ice condenser fans, etc., but not including containment venting strategies) are either lost or performing in a degraded manner.

### **5. — Other Indications**

### **6.5. STED/SED Judgment**



Loss 6.A

This threshold addresses any other factors that may be used by the ~~Emergency Director~~STED/SED 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~~STED/SED in determining whether the Containment Barrier is potentially lost. The ~~Emergency Director~~STED/SED should also consider whether or not to declare the barrier potentially lost in the event that barrier status cannot be monitored.



## 107 HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY ICS/EALS

**Recognition Category "H" Initiating Condition Matrix**

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
<b>HG1</b> HOSTILE ACTION resulting in loss of physical control of the facility. <i>Op. Modes: All</i>	<b>HS1</b> HOSTILE ACTION within the PROTECTED AREA. <i>Op. Modes: All</i>	<b>HA1</b> HOSTILE ACTION within the OWNER CONTROLLED AREA or airborne attack threat within 30 minutes. <i>Op. Modes: All</i>	<b>HU1</b> Confirmed SECURITY CONDITION or threat. <i>Op. Modes: All</i>
			<b>HU2</b> Seismic event greater than OBE levels. <i>Op. Modes: All</i>
			<b>HU3</b> Hazardous event. <i>Op. Modes: All</i>
			<b>HU4</b> FIRE potentially degrading the level of safety of the plant. <i>Op. Modes: All</i>
		<b>HA5</b> Gaseous release impeding access to equipment necessary for normal plant operations, shutdown or cooldown. <i>Op. Modes: All</i>	
	<b>HS6</b> Inability to control a key safety function from outside the Control Room. <i>Op. Modes: All</i>	<b>HA6</b> Control Room evacuation resulting in transfer of plant control to alternate locations. <i>Op. Modes: All</i>	
<b>HG7</b> Other conditions exist which in the judgment of the <del>Emergency</del> Director <del>STED/SED</del> warrant declaration of a General Emergency. <i>Op. Modes: All</i>	<b>HS7</b> Other conditions exist which in the judgment of the <del>Emergency</del> Director <del>STED/SED</del> warrant declaration of a Site Area Emergency. <i>Op. Modes: All</i>	<b>HA7</b> Other conditions exist which in the judgment of the <del>Emergency</del> Director <del>STED/SED</del> warrant declaration of an Alert. <i>Op. Modes: All</i>	<b>HU7</b> Other conditions exist which in the judgment of the <del>Emergency</del> Director <del>STED/SED</del> warrant declaration of an Unusual Event. <del>(NO)UE</del> . <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 specific~~ security shift supervision).
- AND
- b. **EITHER** of the following has occurred:
1. **ANY** of the following safety functions cannot be controlled or maintained.

Reactivity control
Core cooling
RCS heat removal
  - OR
  2. Damage to spent fuel due to damaged SFP cooling system or loss of SFP integrity has occurred or is IMMINENT.

**Basis:**

**HOSTILE ACTION:** An act toward a 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.

**PROTECTED AREA:** The area under continuous access monitoring and control, and armed protection as described in the site Security Plan.

**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 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~~ STED/SED 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~~ STED/SED 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:**

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~~ STED/SED 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:**

**Note:** This Initiating Condition and EAL do not apply to an attack solely on the Dry Fuel Storage Protected Area. An attack on the Dry Fuel Storage Facility Protected Area should be considered an attack within the Owner Controlled Area and classified as an Alert per Initiating Condition HA1.

- (1) A HOSTILE ACTION is occurring or has occurred within the PROTECTED AREA as reported by ~~the (site specific) security shift supervision~~

**Basis:**

**HOSTILE ACTION:** An act toward a 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.

**PROTECTED AREA:** The area under continuous access monitoring and control, and armed protection as described in the site Security Plan.

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, 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 would be via 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~~STED/SED should declare the Site Area Emergency promptly upon determining that ~~(site-specific number of~~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 ~~(site-specific remote shutdown panels and local control stations)~~the Remote Safe Shutdown components.

**AND**

- b. Control of **ANY** of the following key safety functions is not reestablished within 15 minutes~~(site-specific number of 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 or not "control" is established at the remote safe shutdown location(s) is based on ~~Emergency Director~~STED/SED judgment. The ~~Emergency Director~~STED/SED is expected to make a reasonable, informed judgment within ~~(the site-specific time for transfer)~~15 minutes whether or not the operating staff has control of key safety functions from the remote safe shutdown location(s).

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



## HS7

**ECL:** Site Area Emergency

**Initiating Condition:** Other conditions exist which in the judgment of the ~~Emergency Director~~STED/SED 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~~STED/SED 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 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.

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~~STED/SED 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 or the Dry Fuel Storage Facility as reported by ~~the (site-specific)~~ security shift supervision).

**OR**

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

**Basis:**

**HOSTILE ACTION:** An act toward a 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.

**OWNER CONTROLLED AREA:** The site property owned by, or otherwise under the control of, the licensee.

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

Timely and accurate communications between Security Shift Supervision and the Control Room is essential for proper classification of a security-related event.

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

As time and conditions allow, these events require a heightened state of readiness by the plant staff and implementation of onsite protective measures (~~e.g., evacuation, dispersal or sheltering~~). The Alert declaration will also heighten the awareness of Offsite Response Organizations, 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 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 ~~(site-specific-procedure)~~ site 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.

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



## HA5

**ECL:** Alert

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

**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 ~~of the following plant~~ **Table H1** rooms or areas:

~~(site-specific list of plant rooms or areas with entry-related mode applicability identified)~~ **AND**

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

[Table H1]	
Area	Mode
Primary Aux Building 25 ft elevation 7 ft elevation - 26 ft elevation	1, 2, 3, 4
Turbine Building	1, 2, 3
Switchgear Rooms Essential Non-essential	1, 2, 3, 4
Steam and Feedwater Pipe chases	1, 2, 3
Waste Process Building 25 ft elevation -3 ft elevation -31 ft elevation	1, 2, 3
Containment	3, 4
Equipment Vaults	3, 4

Commented [DWS55]: V7 TABLE H1 Procedure References

**Basis:**

IMPEDE: Entry into an area requires extraordinary measures to facilitate entry of personnel into the affected room/area by installing temporary shielding, requiring use of non-routine protective equipment, or requesting an extension in dose limits beyond normal administrative limits.

This IC addresses an event involving a release of a hazardous gas that precludes or impedes access to equipment necessary to maintain normal plant operation, or required for a normal plant cooldown and shutdown. This condition represents an actual or potential substantial degradation of the level of safety of the plant.



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

Evaluation of the IC and EAL do not require atmospheric sampling; it only requires the ~~Emergency Director~~ STED/SED'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 merely displacing air in an enclosed environment. This reduces the concentration of oxygen below the normal level of around 19%, which can lead to breathing difficulties, unconsciousness or even death.

This EAL does not apply to firefighting activities that automatically or manually activate a fire suppression system in an area.

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

#### References:

OS1000.03, Plant Shutdown From Minimum Load to Hot Standby  
OS1000.04, Plant Cooldown From Hot Standby to Cold Shutdown



## 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) Entry into Procedure OS1200.02 for control room evacuation ~~An event has~~ resulted in plant control being transferred from the Control Room to ~~(site-specific remote shutdown panels and local control stations)~~ Remote Safe Shutdown components.

**Basis:**

This IC addresses an evacuation of the Control Room that results in transfer of plant control to alternate locations outside the Control Room. The loss of the ability to control the plant from the Control Room is considered to be a potential substantial degradation in the level of plant safety.

Following a Control Room evacuation, control of the plant will be transferred to alternate shutdown locations. The necessity to control a plant shutdown from outside the Control Room, in addition to responding to the event that required the evacuation of the Control Room, will present challenges to plant operators and other on-shift personnel. Activation of the ERO and emergency response facilities will assist in responding to these challenges.

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



## HA7

ECL: Alert

**Initiating Condition:** Other conditions exist which in the judgment of the ~~Emergency Director~~STED/SED warrant declaration of an Alert.

**Operating Mode Applicability:** All

**Emergency Action Levels:**

- (1) Other conditions exist which, in the judgment of the ~~Emergency Director~~STED/SED, 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 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.

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~~STED/SED 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~~ A Code Yellow is reported by the ~~(site-specific security shift supervision)~~ Security Shift Supervisor.

**OR**

- (2) Notification of a credible security threat directed at ~~the site~~ Seabrook Station.

**OR**

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

**Basis:**

Code Yellow - 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 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.

This IC addresses events that pose a threat to plant personnel or SAFETY SYSTEM equipment, and thus represent a potential degradation in the level of plant safety. Security events which do not meet one of these EALs are adequately addressed by the requirements of 10 CFR § 73.71 or 10 CFR § 50.72. Security events assessed as HOSTILE ACTIONS are classifiable under ICs HA1, HS1 and HG1.

Timely and accurate communications between Security Shift Supervision and the Control Room is essential for proper classification of a security-related event. Classification of these events will initiate appropriate threat-related notifications to plant personnel and 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-specific security shift supervision)~~ 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 ~~(site-specific procedure)~~ site 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 ~~(site-specific-procedure)~~site 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 would be via IC HA1.

References:

OS1290.03, Response to a Security Event.

OS1290.04, Response to an Airborne Security Event



## 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:
- a. The red "EVENT" light is lit on seismic monitoring control panel 1-SM-CP-58.

**AND**

- b. The yellow "OBE" light is lit on seismic monitoring control panel 1-SM-CP-58.

**OR**

- (2) a. Seismic monitoring system out of service

**AND**

- b. Control Room personnel feel an actual or potential seismic event

**AND**

- c. The occurrence of a seismic event is confirmed in a manner deemed appropriate by the Shift Manager

~~(site-specific indication that a seismic event met or exceeded OBE limits)~~

**Basis:**

This IC addresses a seismic event that results in accelerations at the plant site greater than those specified for an Operating Basis Earthquake (OBE). An earthquake greater than an OBE but less than a Safe Shutdown Earthquake (SSE) should have no significant impact on safety-related systems, structures and components; however, some time may be required for the plant staff to ascertain the actual post-event condition of the plant ~~(e.g., performs walk-downs and post-event inspections)~~. Given the time necessary to perform walk-downs and inspections, and fully understand any impacts, this event represents a potential degradation of the level of safety of the plant.

Event verification with external sources should not be necessary during or following an OBE. Earthquakes of this magnitude should be readily felt by on-site personnel and recognized as a seismic event ~~(e.g., typical lateral accelerations are in excess of 0.08g)~~. The Shift Manager or ~~Emergency Director~~ STED/SED may seek external verification if deemed appropriate ~~(e.g., a call to the USGS, check internet news sources, etc.)~~; however, the verification action must not preclude a timely emergency declaration.

**Reference:**

EC 282184, Seismic Monitoring System Upgrade

Depending upon the plant mode at the time of the event, escalation of the emergency classification level would be via IC CA6 or MA9.

**Commented [DWS56]:** V27 EC282184 - Seismic Monitoring System Upgrade



## 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.

**OR**

(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.

**OR**

(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).~~

**OR**

(4) A hazardous event that results in on-site conditions sufficient to prohibit the plant staff from accessing the site via personal vehicles.

~~(5) (Site specific list of natural or technological hazard events)~~

### **Basis:**

**PROTECTED AREA:** The area under continuous access monitoring and control, and armed protection as described in the site Security Plan.

**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. Systems classified as safety-related.

**IMPEDE:** Entry into an area requires extraordinary measures to facilitate entry of personnel into the affected room/area by installing temporary shielding, requiring use of non-routine protective equipment, or requesting an extension in dose limits beyond normal administrative limits.

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

EAL #1 addresses a tornado striking (touching down) within the Protected Area.

EAL #2 addresses flooding of a building room or area that results in operators isolating power to a SAFETY SYSTEM component due to water level or other wetting concerns. Classification is also required if the water level or related wetting causes an automatic isolation of a SAFETY SYSTEM component from its power source ~~(e.g., a breaker or relay trip)~~. To warrant classification, operability of the affected component must be required by Technical Specifications for the current operating mode.



EAL #3 addresses a hazardous materials event originating at an offsite location and of sufficient magnitude to impede the movement of personnel within the PROTECTED AREA.

EAL #4 addresses a hazardous event that causes an on-site impediment to vehicle movement and significant enough to prohibit the plant staff from accessing the site using personal vehicles. Examples of such an event include site flooding caused by a hurricane, heavy rains, up-river water releases, dam failure, etc., or an on-site train derailment blocking the access road.

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

Escalation of the emergency classification level would be based on ICs in Recognition Categories A, F, M 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)

**Notes:**

- The ~~Emergency Director~~ STED/SED should declare the Unusual Event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.
- A containment fire alarm is considered valid upon receipt of an actuated alarm on CP-376, combined with any of the following:
  - CP 376 panel – Multiple Zones Actuated
  - Plant Equipment – Spuriously Operating
  - Containment Temperature – Increasing
  - Containment Particulate Radiation – Increasing

- (1) a. A FIRE is NOT extinguished within 15-minutes of **ANY** of the following FIRE detection indications:

Report from the field (i.e., visual observation)
Receipt of multiple (more than 1) fire alarms or indications
Field verification of a single fire alarm

**AND**

- b. The FIRE is located within **ANY** ~~of the following~~ Table H2 plant rooms or areas:

Table H2	
Condensate Storage Tank Enclosure	Fuel Storage Building
Containment	Primary Auxiliary Building
Control Building	Service Water Pump House
Cooling Tower	Steam and Feedwater Pipe Chases
Diesel Generator Building	North Tank Farm
Emergency Feedwater Pump House	Startup Feedwater Pump Area
Equipment Vault	

**Commented [DWS57]:** V28 Verification of Fire Areas

**OR**

- (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 ~~following~~ plant rooms or areas except Containment (see note above):

**AND**

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

**OR**

- (3) A FIRE within the plant **PROTECTED AREA** or ~~ISFSI Dry Fuel Storage Facility~~ ~~for plants with an ISFSI outside the plant Protected Area~~ **PROTECTED AREA** not extinguished within 60-minutes of the initial report, alarm or indication.

**OR**



- (4) A FIRE within the plant ~~PROTECTED AREA or ISFSI [for plants with an ISFSI outside the plant Protected Area]~~ ~~PROTECTED AREA~~ that requires firefighting support by an offsite fire response agency to extinguish.

**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: The area under continuous access monitoring and control, and armed protection as described in the site Security Plan.

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

With regard to containment fire alarms, there is constant air movement in containment due to the operation of the CAH system. The operating cooling units are drawing air to the units past the smoke detectors. It can reasonably be expected that a fire that burns for 15 minutes would produce sufficient products of combustion to cause fire detectors in multiple zones to alarm.

EAL #1

The intent of the 15-minute duration is to size the FIRE and to discriminate against small FIRES that are readily extinguished (~~e.g., smoldering waste paper basket~~). In addition to alarms, other indications of a FIRE could be a drop in fire main pressure, automatic activation of a suppression system, etc.

Upon receipt, operators will take prompt actions to confirm the validity of an initial fire alarm, indication, or report. For EAL assessment purposes, the emergency declaration clock starts at the time that the initial alarm, indication, or report was received, and not the time that a subsequent verification action was performed. Similarly, the fire duration clock also starts at the time of receipt of the initial alarm, indication or report.

EAL #2

This EAL addresses receipt of a single fire alarm, and the existence of a FIRE is not verified (i.e., proved or disproved) within 30-minutes of the alarm. Upon receipt, operators will take prompt actions to confirm the validity of a single fire alarm. For EAL assessment purposes, the 30-minute clock starts at the time that the initial alarm was received, and not the time that a subsequent verification action was performed.

A single fire alarm, absent other indication(s) of a FIRE, may be indicative of equipment failure or a spurious activation, and not an actual FIRE. For this reason, additional time is allowed to verify the validity of the alarm. The 30-minute period is a reasonable amount of time to determine if an actual FIRE exists; however, after that time, and absent information to the contrary, it is assumed that an actual FIRE is in progress.

If an actual FIRE is verified by a report from the field, then EAL #1 is immediately applicable, and the emergency must be declared if the FIRE is not extinguished within 15-minutes of the report. If the alarm is verified to be due to an equipment failure or a spurious activation, and this verification occurs within 30-minutes of the receipt of the alarm, then this EAL is not applicable and no emergency declaration is warranted.

EAL #3



In addition to a FIRE addressed by EAL #1 or EAL #2, a FIRE within the plant PROTECTED AREA not extinguished within 60-minutes may also potentially degrade the level of plant safety. This basis extends to a FIRE occurring within the PROTECTED AREA of the Dry Fuel Storage Facility.

~~{Sentence for plants with an ISFSI outside the plant Protected Area}~~

#### EAL #4

If a FIRE within the plant PROTECTED AREA or is of sufficient size to require a response by an offsite firefighting agency (~~e.g., a local town Fire Department~~), then the level of plant safety is potentially degraded. The dispatch of an offsite firefighting agency to the site requires an emergency declaration only if it is needed to actively support firefighting efforts because the fire is beyond the capability of the Fire Brigade to extinguish. Declaration is not necessary if the agency resources are placed on stand-by, or supporting post-extinguishment recovery or investigation actions.

#### Basis-Related Requirements from Appendix R

Appendix R to 10 CFR 50, states in part:

Criterion 3 of Appendix A to this part specifies that "Structures, systems, and components important to safety shall be designed and located to minimize, consistent with other safety requirements, the probability and effect of fires and explosions."

When considering the effects of fire, those systems associated with achieving and maintaining safe shutdown conditions assume major importance to safety because damage to them can lead to core damage resulting from loss of coolant through boil-off.

Because fire may affect safe shutdown systems and because the loss of function of systems used to mitigate the consequences of design basis accidents under post-fire conditions does not per se impact public safety, the need to limit fire damage to systems required to achieve and maintain safe shutdown conditions is greater than the need to limit fire damage to those systems required to mitigate the consequences of design basis accidents.

In addition, Appendix R to 10 CFR 50, requires, among other considerations, the use of 1-hour fire barriers for the enclosure of cable and equipment and associated non-safety circuits of one redundant train (G.2.c). As used in EAL #2, the 30-minutes to verify a single alarm is well within this worst-case 1-hour time period.

Depending upon the plant mode at the time of the event, escalation of the emergency classification level would be via IC CA6 or MA9.



HU7

**ECL:** Notification of Unusual Event

**Initiating Condition:** Other conditions exist which in the judgment of the ~~Emergency Director~~STED/SED warrant declaration of an Unusual Event(~~NO~~)UE.

**Operating Mode Applicability:** All

**Emergency Action Levels:**

- (1) Other conditions exist which in the judgment of the ~~Emergency Director~~STED/SED 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~~STED/SED to fall under the emergency classification level description for a NOUE.



## 118 SYSTEM MALFUNCTION ICS/EALS

### Recognition Category "M" Initiating Condition Matrix

GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT
<b>MG1</b> Prolonged loss of all offsite and all onsite AC power to emergency buses. <i>Op. Modes: 1, 2, 3, 4</i>	<b>MS1</b> Loss of all offsite and all onsite AC power to emergency buses for 15 minutes or longer. <i>Op. Modes: 1, 2, 3, 4</i>	<b>MA1</b> Loss of all but one AC power source to emergency buses for 15 minutes or longer. <i>Op. Modes: 1, 2, 3, 4</i>	<b>MU1</b> Loss of all offsite AC power capability to emergency buses for 15 minutes or longer. <i>Op. Modes: 1, 2, 3, 4</i>
		<b>MA2</b> UNPLANNED loss of Control Room indications for 15 minutes or longer with a significant transient in progress. <i>Op. Modes: 1, 2, 3, 4</i>	<b>MU2</b> UNPLANNED loss of Control Room indications for 15 minutes or longer. <i>Op. Modes: 1, 2, 3, 4</i>
			<b>MU3</b> Reactor coolant activity greater than Technical Specification allowable limits. <i>Op. Modes: 1, 2, 3, 4</i>
			<b>MU4</b> RCS leakage for 15 minutes or longer. <i>Op. Modes: 1, 2, 3, 4</i>
	<b>MS5</b> Inability to shutdown the reactor to neutron flux < 5% causing a challenge to core cooling or RCS heat removal. <i>Op. Modes: 1</i>	<b>MA5</b> Automatic or manual trip fails to shutdown the reactor to neutron flux < 5%, and subsequent manual actions taken at the Main Control Board reactor control consoles are not successful in shutting down the reactor. <i>Op. Modes: 1</i>	<b>MU5</b> Automatic or manual trip fails to shutdown the reactor to neutron flux < 5%. <i>Op. Modes: 1</i>
			<b>MU6</b> Loss of all onsite or offsite communications capabilities. <i>Op. Modes: 1, 2, 3, 4</i>
			<b>MU7</b> Failure to isolate containment or loss of containment pressure control. <i>Op. Modes: 1, 2, 3, 4</i>
<b>MG8</b> Loss of all AC and Vital DC power sources for 15 minutes or longer. <i>Op. Modes: 1, 2, 3, 4</i>	<b>MS8</b> Loss of all Vital DC power for 15 minutes or longer. <i>Op. Modes: 1, 2, 3, 4</i>		
		<b>MA9</b> Hazardous event affecting a SAFETY SYSTEM needed for the current operating mode. <i>Op. Modes: 1, 2, 3, 4</i>	

Commented [DWS58]: V29 CSFST Subcriticality



## MG1

**ECL:** General Emergency

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

**Operating Mode Applicability:** 1, 2, 3, 4

**Emergency Action Levels:**

**Notes:**

- The ~~Emergency Director~~ STED/SED should declare the General Emergency promptly upon determining that ~~4 (site-specific hours)~~ has been exceeded, or will likely be exceeded.
- For a bus to be considered energized from SEPS, both SEPS diesel generator sets must be functional.

- (1) a. Loss of **ALL** offsite and **ALL** onsite AC power to **BOTH** AC emergency buses **E5 AND E6** ~~(site-specific emergency buses)~~.

**AND**

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

Restoration of at least one AC emergency bus in less than **4** hours is not likely.  
**Core Cooling (C) CSF RED entry conditions met**

Commented [DWS59]: V26 SBO Coping

**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 should require declaration of a General Emergency prior to meeting the thresholds for IC FG1. This will allow additional time for implementation of offsite protective actions.

Escalation of the emergency classification from Site Area Emergency will occur if it is projected that power cannot be restored to at least one AC emergency 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.

This Initiating Condition is not met if either Bus E5 or E6 is energized from the Supplemental Emergency Power System (SEPS).



The SEPS primary function is to supply power to one 4.16 kV emergency bus, EDE-SWG-5 (E5) or EDE-SWG-6 (E6), in the event of a loss-of-offsite-power (LOOP) and both EDGs fail to start and load. In addition (SEPS) provides back up power to the emergency buses when one of the emergency diesel generators (EDG) is out of service for up to fourteen days. SEPS can be used when it is anticipated that one of the EDGs will be inoperable for longer than the technical specification allowable outage time (AOT) of 72 hours.

The design of the SEPS is capable of providing the required safety-related loads in the event of a loss of offsite power if both emergency diesel generators fail to start and load. During these events it is assumed that there is no seismic event or an event that requires safeguards actuation (SI, CBS, CVI, CI, etc.). In addition to providing power to the required loads, the total combined output of the SEPS system can supply either the RHR pump or the SI pump and one set of pressurizer heaters. These design conditions are based on Probabilistic Risk Evaluation (PRA) EE-03-007.

The SEPS consists of two 4.16 kV generators which use diesel fuel engines as the prime mover. The generator sets (gensets) SEPS-DG-2-A and SEPS-DG-2-B are capable of automatically starting, synchronizing together and energizing the SEPS electrical bus. The SEPS design requires a "dead bus" transfer back to an offsite power source, i.e., the emergency bus powered by SEPS must be de-energized before restoring offsite power.

For power restoration from the SEPS, both SEPS diesel generator sets must be functional.

The use of the SEPS is recognized in the Emergency Operating Procedures

Reference: UFSAR Section 8.3.1, AC Power Systems



## MG8

**ECL:** General Emergency

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

**Operating Mode Applicability:** 1, 2, 3, 4

**Emergency Action Levels:**

**Note:**

- The ~~Emergency Director~~STED/SED should declare the General Emergency promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.
- For a bus to be considered energized from SEPS, both SEPS diesel generator sets must be functional.

- (1) a. Loss of **ALL** offsite and **ALL** onsite AC power to **BOTH AC emergency buses E5 AND E6** ~~(site specific emergency buses)~~ for 15 minutes or longer.

**AND**

- b. Indicated voltage is less than ~~(site specific bus voltage value)~~105 V on ALL ~~(site specific Vital DC buses)~~ 11A, 11B, 11C and 11D 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 was selected as a threshold to exclude transient or momentary power losses. The 15-minute emergency declaration clock begins at the point when both EAL thresholds are met.

This Initiating Condition is not met if either Bus E5 or E6 is energized from the Supplemental Emergency Power System (SEPS).

The SEPS primary function is to supply power to one 4.16 kV emergency bus, EDE-SWG-5 (E5) or EDE-SWG-6 (E6), in the event of a loss-of-offsite-power (LOOP) and both EDGs fail to start and load. In addition (SEPS) provides back up power to the emergency buses when one of the emergency diesel generators (EDG) is out of service for up to fourteen days. SEPS can be used when it is anticipated that one of the EDGs will be inoperable for longer than the technical specification allowable outage time (AOT) of 72 hours.

The design of the SEPS is capable of providing the required safety-related loads in the event of a loss of offsite power if both emergency diesel generators fail to start and load. During these events it is assumed that there is no seismic event or an event that requires safeguards actuation (SI, CBS, CVI, CI, etc.). In addition to providing power to the required loads, the total combined output of the SEPS system can supply either the RHR pump or the SI pump and one set of pressurizer heaters. These design conditions are based on Probabilistic Risk Evaluation (PRA) EE-03-007.

The SEPS consists of two 4.16 kV generators which use diesel fuel engines as the prime mover. The generator sets (gensets) SEPS-DG-2-A and SEPS-DG-2-B are capable of automatically



starting, synchronizing together and energizing the SEPS electrical bus. The SEPS design requires a "dead bus" transfer back to an offsite power source, i.e., the emergency bus powered by SEPS must be de-energized before restoring offsite power.

For power restoration from the SEPS, both SEPS diesel generator sets must be functional.

The use of the SEPS is recognized in the Emergency Operating Procedures

Reference: UFSAR Section 8.3.1, AC Power Systems



## MS1

**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:** 1, 2, 3, 4

**Emergency Action Levels:**

**Note:**

- The ~~Emergency Director~~ STED/SED should declare the Site Area Emergency promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.
- For a bus to be considered energized from SEPS, both SEPS diesel generator sets must be functional.

- (1) Loss of **ALL** offsite and **ALL** onsite AC power to **BOTH AC** emergency buses E5 AND E6(~~site-specific-emergency-buses~~) 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 was selected as a threshold to exclude transient or momentary power losses.

Escalation of the emergency classification level would be via ICs RG1, FG1 or MG1.

This Initiating Condition is not met if either Bus E5 or E6 is energized from the Supplemental Emergency Power System (SEPS).

The SEPS primary function is to supply power to one 4.16 kV emergency bus, EDE-SWG-5 (E5) or EDE-SWG-6 (E6), in the event of a loss-of-offsite-power (LOOP) and both EDGs fail to start and load. In addition (SEPS) provides back up power to the emergency buses when one of the emergency diesel generators (EDG) is out of service for up to fourteen days. SEPS can be used when it is anticipated that one of the EDGs will be inoperable for longer than the technical specification allowable outage time (AOT) of 72 hours.

The design of the SEPS is capable of providing the required safety-related loads in the event of a loss of offsite power if both emergency diesel generators fail to start and load. During these events it is assumed that there is no seismic event or an event that requires safeguards actuation (SI, CBS, CVI, CI, etc.). In addition to providing power to the required loads, the total combined output of the SEPS system can supply either the RHR pump or the SI pump and one set of pressurizer heaters. These design conditions are based on Probabilistic Risk Evaluation (PRA) EE-03-007.

The SEPS consists of two 4.16 kV generators which use diesel fuel engines as the prime mover. The generator sets (gensets) SEPS-DG-2-A and SEPS-DG-2-B are capable of automatically starting, synchronizing together and energizing the SEPS electrical bus. The SEPS design



requires a "dead bus" transfer back to an offsite power source, i.e., the emergency bus powered by SEPS must be de-energized before restoring offsite power.

For power restoration from the SEPS, both SEPS diesel generator sets must be functional.

The use of the SEPS is recognized in the Emergency Operating Procedures

Reference: UFSAR Section 8.3.1, AC Power Systems



## MS5

**ECL:** Site Area Emergency

**Initiating Condition:** Inability to shutdown the reactor to neutron flux < 5% causing a challenge to core cooling or RCS heat removal.

**Operating Mode Applicability:** 1

**Emergency Action Levels:**

- (1) a. An automatic or manual trip did not shutdown the reactor to neutron flux < 5%.

AND

- b. All manual actions to shutdown the reactor have been unsuccessful.

AND

- c. **EITHER** of the following conditions exist:

Core Cooling (C) CSF RED entry conditions met.

Heat Sink (H) CSF RED entry conditions met.

~~(Site specific indication of an inability to adequately remove heat from the core)~~  
~~(Site specific indication of an inability to adequately remove heat from the RCS)~~

Commented [DWS60]: V20 CSFST Core Cooling

Commented [DWS61]: V22 CSFST Heat sink

**Basis:**

This IC addresses a failure of the RPS to initiate or complete an automatic or manual reactor trip that results in a reactor shutdown, all subsequent operator actions to manually shutdown the reactor are unsuccessful, and continued power generation is challenging the capability to adequately remove heat from the core and/or the RCS. This condition will lead to fuel damage if additional mitigation actions are unsuccessful and thus warrants the declaration of a Site Area Emergency.

In some instances, the emergency classification resulting from this IC/EAL may be higher than that resulting from an assessment of the plant responses and symptoms against the Recognition Category F ICs/EALs. This is appropriate in that the Recognition Category F ICs/EALs do not address the additional threat posed by a failure to 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 would be via IC RG1 or FG1.



## MS8

**ECL:** Site Area Emergency

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

**Operating Mode Applicability:** 1, 2, 3, 4

**Emergency Action Levels:**

**Note:** The ~~Emergency Director~~ STED/SED should 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 105V (~~site specific bus voltage value~~) on ALL vital DC buses 11A, 11B, 11C and 11D (~~site specific Vital DC buses~~) for 15 minutes or longer.

Commented [DWS62]: V18 UFSAR 8.3.2 - DCV 105 limit

**Basis:**

This IC addresses a loss of Vital DC power which compromises the ability to monitor and control SAFETY SYSTEMS. In modes above Cold Shutdown, this condition involves a major failure of plant functions needed for the protection of the public.

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

Escalation of the emergency classification level would be via ICs RG1, FG1 or MG8.



## MA1

ECL: Alert

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

**Operating Mode Applicability:** 1, 2, 3, 4

**Emergency Action Levels:**

**Notes:**

- The ~~Emergency Director~~STED/SED should declare the Alert promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.
- For a bus to be considered energized from SEPS, both SEPS diesel generator sets must be functional.

- (1) ~~a. — AC power capability to BOTH AC emergency buses E5 AND E6 (site-specific emergency buses) is reduced to a single power source for 15 minutes or longer.~~

**AND**

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

**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. 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 may be powering one, or more than one, train of safety-related equipment. This IC provides an escalation path from IC MU1.

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

Escalation of the emergency classification level would be via IC MS1.

This Initiating Condition is not met if either Bus E5 or E6 is energized from the Supplemental Emergency Power System (SEPS).

The SEPS primary function is to supply power to one 4.16 kV emergency bus, EDE-SWG-5 (E5) or EDE-SWG-6 (E6), in the event of a loss-of-offsite-power (LOOP) and both EDGs fail to



start and load. In addition (SEPS) provides back up power to the emergency buses when one of the emergency diesel generators (EDG) is out of service for up to fourteen days. SEPS can be used when it is anticipated that one of the EDGs will be inoperable for longer than the technical specification allowable outage time (AOT) of 72 hours.

The design of the SEPS is capable of providing the required safety-related loads in the event of a loss of offsite power if both emergency diesel generators fail to start and load. During these events it is assumed that there is no seismic event or an event that requires safeguards actuation (SI, CBS, CVI, CI, etc.). In addition to providing power to the required loads, the total combined output of the SEPS system can supply either the RHR pump or the SI pump and one set of pressurizer heaters. These design conditions are based on Probabilistic Risk Evaluation (PRA) EE-03-007.

The SEPS consists of two 4.16 kV generators which use diesel fuel engines as the prime mover. The generator sets (gensets) SEPS-DG-2-A and SEPS-DG-2-B are capable of automatically starting, synchronizing together and energizing the SEPS electrical bus. The SEPS design requires a "dead bus" transfer back to an offsite power source, i.e., the emergency bus powered by SEPS must be de-energized before restoring offsite power.

For power restoration from the SEPS, both SEPS diesel generator sets must be functional.

The use of the SEPS is recognized in the Emergency Operating Procedures

Reference: UFSAR Section 8.3.1, AC Power Systems



## MA2

ECL: Alert

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

**Operating Mode Applicability:** 1, 2, 3, 4

**Emergency Action Levels:**

**Note:** The ~~Emergency Director~~STED/SED should 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
<del>RCS</del> -Pressurizer Level
RCS Pressure
<del>In-Core</del> Core Exit or RCS Temperature
Levels in at least <del>(site-specific number)</del> two steam generators
Steam Generator <del>Auxiliary or</del> Emergency 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
SI 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 thus represents a potential substantial degradation in the level of safety of the plant.

As used in this EAL, an "inability to monitor" means that values for one or more of the listed parameters cannot be determined from within the Control Room. This situation would require a loss of all of the Control Room sources for the given parameter(s). For example, the reactor power level cannot be determined from any analog, digital and recorder source within the Control Room.

An event involving a loss of plant indications, annunciators and/or display systems is evaluated in accordance with 10 CFR 50.72 (and associated guidance in NUREG-1022) to determine if an NRC event report is required. The event would be reported if it significantly impaired the capability to perform emergency assessments. In particular, emergency assessments necessary to implement abnormal operating procedures, emergency operating procedures, and emergency



plan implementing procedures addressing emergency classification, accident assessment, or protective action decision-making.

This EAL is focused on a selected subset of plant parameters associated with the key safety functions of reactivity control, core cooling and RCS heat removal. The loss of the ability to determine one or more of these parameters from within the Control Room is considered to be more significant than simply a reportable condition. In addition, if all indication sources for one or more of the listed parameters are lost, then the ability to determine the values of other SAFETY SYSTEM parameters may be impacted as well. For example, if the value for reactor vessel level cannot be determined from the indications and recorders on a main control board, the SPDS or the plant computer, the availability of other parameter values may be compromised as well.

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

Escalation of the emergency classification level would be via ICs FS1 or IC RS1.



## MA5

ECL: Alert

**Initiating Condition:** Automatic or manual trip fails to shutdown the reactor to neutron flux < 5%, and subsequent manual actions taken at the ~~reactor control consoles~~ Main Control Board are not successful in shutting down the reactor.

**Operating Mode Applicability:** 1

**Emergency Action Level:**

**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 trip did not shutdown the reactor to neutron flux < 5%.

AND

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

Commented [DWS63]: V29 CSFST Subcriticality

### 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~~ MCB to shutdown the reactor are also unsuccessful. This condition represents an actual or potential substantial degradation of the level of safety of the plant. An emergency declaration is required even if the reactor is subsequently shutdown by an action taken away from the ~~reactor control consoles~~ MCB since this event entails a significant failure of the RPS.

A manual action at the ~~reactor control consoles~~ MCB is any operator action, or set of actions, which causes the control rods to be rapidly inserted into the core (e.g., initiating a manual reactor trip). This action does not include manually driving in control rods or implementation of boron injection strategies. If this action(s) is unsuccessful, operators would immediately pursue additional manual actions at locations away from the ~~reactor control consoles~~ MCB (e.g., locally opening breakers). Actions taken at back-panels or other locations within the Control Room, or any location outside the Control Room, are not considered to be "at the ~~reactor control console~~ MCBs".

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 MS5. Depending upon plant responses and symptoms, escalation is also possible via IC FS1. Absent the plant conditions needed to meet either IC MS5 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.



## MA9

ECL: Alert

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

**Operating Mode Applicability:** 1, 2, 3, 4

**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
◆ (site-specific hazards)

**AND**

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

1. Event damage has caused indications of degraded performance in at least one train of a SAFETY SYSTEM needed for the current operating mode.

**OR**

2. The event has caused **VISIBLE DAMAGE** to a SAFETY SYSTEM component or structure needed for the current operating mode.

**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. Systems classified as safety-related.

**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.

**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 safety of the plant.



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

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

Escalation of the emergency classification level would be via IC FS1 or RS1.



## MU1

**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:** 1, 2, 3, 4

**Emergency Action Levels:**

**Note:** The ~~Emergency Director~~ STED/SED should 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 to **BOTH AC emergency** buses **E5 AND E6** ~~(site-specific emergency buses)~~ for 15 minutes or longer.

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

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

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

Escalation of the emergency classification level would be via IC MA1.



## MU2

**ECL:** Notification of Unusual Event

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

**Operating Mode Applicability:** 1, 2, 3, 4

**Emergency Action Levels:**

**Note:** The ~~Emergency Director~~STED/SED 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
<del>RCS-Pressurizer</del> Level
RCS Pressure
<del>In-Core</del> Core Exit Temperature
Levels in at least ( <del>site-specific number</del> )two steam generators
Steam Generator <del>Auxiliary or</del> Emergency 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 safety of the plant.

As used in this EAL, an "inability to monitor" means that values for one or more of the listed parameters cannot be determined from within the Control Room. This situation would require a loss of all of the Control Room sources for the given parameter(s). For example, the reactor power level cannot be determined from any analog, digital and recorder source within the Control Room.

An event involving a loss of plant indications, annunciators and/or display systems is evaluated in accordance with 10 CFR 50.72 (and associated guidance in NUREG-1022) to determine if an NRC event report is required. The event would be reported if it significantly impaired the capability to perform emergency assessments. In particular, emergency assessments necessary to implement abnormal operating procedures, emergency operating procedures, and emergency plan implementing procedures addressing emergency classification, accident assessment, or protective action decision-making.

This EAL is focused on a selected subset of plant parameters associated with the key safety functions of reactivity control, core cooling and RCS heat removal. The loss of the ability to determine one or more of these parameters from within the Control Room is considered to be more significant than simply a reportable condition. In addition, if all indication sources for one or more of the listed parameters are lost, then the ability to determine the values of other



SAFETY SYSTEM parameters may be impacted as well. For example, if the value for reactor vessel level cannot be determined from the indications and recorders on a main control board, the SPDS or the plant computer, the availability of other parameter values may be compromised as well.

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

Escalation of the emergency classification level would be via IC MA2.



## MU3

**ECL:** Notification of Unusual Event

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

**Operating Mode Applicability:** 1, 2, 3, 4

**Emergency Action Levels:** (1 or 2)

- (1) ~~RM-6520-1(Site-specific radiation monitor)~~ reading greater than 2,670 mR/hr ~~(site-specific value)~~.

Commented [DWS64]: V30 EPCALC-06-03- Letdown Monitor Value

**OR**

- (2) Sample analysis indicates that a reactor coolant activity value is greater than the Limiting Condition for Operation (LCO) ~~an allowable limit~~ specified in Technical Specifications 3.4.8 Reactor Coolant System Specific Activity.

Commented [DWS65]: V31 TS 3.4.8 Specific Activity

**Basis:**

This IC addresses a reactor coolant activity value that exceeds an allowable limit specified in Technical Specifications. This condition is a precursor to a more significant event and represents a potential degradation of the level of safety of the plant.

Escalation of the emergency classification level would be via ICs FA1 or the Recognition Category R ICs.



## MU4

**ECL:** Notification of Unusual Event

**Initiating Condition:** RCS leakage for 15 minutes or longer.

**Operating Mode Applicability:** 1, 2, 3, 4

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

**Note:** The ~~Emergency Director~~ STED/SED should 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 ~~(site-specific value)~~ 10 gpm for 15 minutes or longer.

**OR**

(2) RCS IDENTIFIED LEAKAGE greater than ~~(site-specific value)~~ 25 gpm for 15 minutes or longer.

**OR**

(3) Leakage from the RCS to a location outside containment greater than 25 gpm for 15 minutes or longer.

**Basis:**

### IDENTIFIED LEAKAGE

- a. Leakage (except CONTROLLED LEAKAGE) into closed systems, such as pump seal or valve packing leaks that are captured and conducted to a sump or collecting tank, or
- b. Leakage into the containment atmosphere from sources that are both specifically located and known either not to interfere with the operation of Leakage Detection Systems or not to be PRESSURE BOUNDARY LEAKAGE, or
- c. Reactor Coolant System leakage through a steam generator to the Secondary Coolant System (primary to secondary leakage).

### PRESSURE BOUNDARY LEAKAGE

- a. PRESSURE BOUNDARY LEAKAGE shall be leakage (except primary to secondary leakage) through a nonisolable fault in a Reactor Coolant System component body, pipe wall, or vessel wall.

This IC addresses RCS leakage which may be a precursor to a more significant event. In this case, RCS leakage has been detected and operators, following applicable procedures, have been unable to promptly isolate the leak. This condition is considered to be a potential degradation of the level of safety of the plant.

EAL #1 and EAL #2 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. For PWRs, an emergency classification would be required if a mass loss is caused by a relief valve that is not functioning as designed/expected ~~(e.g., a relief valve sticks open and the line flow cannot be isolated)~~.

The 15-minute threshold duration allows sufficient time for prompt operator actions to isolate the leakage, if possible.

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



## MU5

**ECL:** Notification of Unusual Event

**Initiating Condition:** Automatic or manual trip fails to shutdown the reactor to neutron flux < 5%.

**Operating Mode Applicability:** 1

**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 or 2)

- (1) a. An automatic trip did not shutdown the reactor to neutron flux < 5%.

**AND**

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

**OR**

- (2) a. A manual trip did not shutdown the reactor to neutron flux < 5%.

**AND**

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

1. A subsequent manual action taken at the ~~reactor control consoles~~ MCB is successful in shutting down the reactor.

**OR**

2. A subsequent automatic trip is successful in shutting down the reactor.

Commented [DWS66]: V29 CSFST Subcriticality

**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~~ MCB or an automatic trip is successful in shutting down the reactor. This event is a precursor to a more significant condition and thus represents a potential degradation of the level of safety of the plant.

Following the failure on an automatic reactor trip, operators will promptly initiate manual actions at the ~~reactor control consoles~~ MCB 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~~ MCB 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 MCB 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 MCB".

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 MCB are also unsuccessful in shutting down the reactor, then the emergency classification level will escalate to an Alert via IC MA5. Depending upon the plant response, escalation is also possible via IC FA1. Absent the plant conditions needed to meet either IC MA5 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 should be evaluated.
- If the signal does not cause a plant transient and the trip failure is determined through other means ~~(e.g., assessment of test results)~~, then this IC and the EALs are not applicable and no classification is warranted.



## MU6

**ECL:** Notification of Unusual Event

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

**Operating Mode Applicability:** 1, 2, 3, 4

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

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

In-Plant (PBX) Telephones
Gai-Tronics
Plant Radio System

OR

~~(site-specific list of communications methods)~~

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

Nuclear Alert System (NAS)
Backup NAS
All plant telephones
Cellular telephones

OR

~~(site-specific list of communications methods)~~

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

Emergency Notification System (ENS)
All plant telephones
FTS telephones in the TSC
Cellular telephones

~~(site-specific list of communications methods)~~

### Basis:

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

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

EAL #1 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 [Commonwealth of Massachusetts and State of New Hampshire](#).

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



## MU7

ECL: Notification of Unusual Event

**Initiating Condition:** Failure to isolate containment or loss of containment pressure control.  
~~[PWR]~~

**Operating Mode Applicability:** 1, 2, 3, 4

**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.

OR

- (2) a. Containment pressure greater than ~~18 psig~~(site-specific pressure).  
AND  
b. Less than one full train of Containment Building Spray (CBS) ~~(site-specific system or equipment)~~ is operating per design for 15 minutes or longer.

Commented [DWS67]: V25 Containment Spray Setpoint

### 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 safety of the plant.

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

EAL #2 addresses a condition where containment pressure is greater than the setpoint at which containment energy (heat) removal systems are designed to automatically actuate, and less than one full train of equipment is capable of operating per design. The 15-minute criterion is included to allow operators time to manually start equipment that may not have automatically started, if possible. The inability to start the required equipment indicates that containment heat removal/depressurization systems ~~(e.g., containment sprays or ice condenser fans)~~ are either lost or performing in a degraded manner.

This event would escalate to a Site Area Emergency in accordance with IC FS1 if there were a concurrent loss or potential loss of either the Fuel Clad or RCS fission product barriers.



## APPENDIX A – ACRONYMS AND ABBREVIATIONS

AC.....	Alternating Current
AOP.....	Abnormal Operating Procedure
<del>PRM.....</del>	<del>Average Power Range Meter</del>
ATWS.....	Anticipated Transient Without Scram
<del>&amp;W.....</del>	<del>Babcock and Wilcox</del>
<del>HT.....</del>	<del>Boron Injection Initiation Temperature</del>
<del>WR.....</del>	<del>Boiling Water Reactor</del>
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
EOF.....	Emergency Operations Facility
EOP.....	Emergency Operating Procedure
EPA.....	Environmental Protection Agency
<del>PG.....</del>	<del>Emergency Procedure Guideline</del>
<del>PIP.....</del>	<del>Emergency Plan Implementing Procedure</del>
<del>PR.....</del>	<del>Evolutionary Power Reactor</del>
<del>PRI.....</del>	<del>Electric Power Research Institute</del>
<del>RG.....</del>	<del>Emergency Response Guideline</del>
FEMA.....	Federal Emergency Management Agency
FSAR.....	Final Safety Analysis Report
GE.....	General Emergency
<del>CTL.....</del>	<del>Heat Capacity Temperature Limit</del>
<del>PCI.....</del>	<del>High Pressure Coolant Injection</del>
<del>SI.....</del>	<del>Human System Interface</del>
IC.....	Initiating Condition
ID.....	Inside Diameter
<del>PEEE.....</del>	<del>Individual Plant Examination of External Events (Generic Letter 88-20)</del>
ISFSI.....	Independent Spent Fuel Storage Installation (Dry Fuel Storage Facility)



Keff.....	Effective Neutron Multiplication Factor
LCO .....	Limiting Condition of Operation
LOCA .....	Loss of Coolant Accident
<del>MCRMCB.....</del>	<del>Main Control Room Board</del>
MSIV .....	Main Steam Isolation Valve
MSL .....	Main Steam Line
mR, mRem, mrem, mREM .....	milli-Roentgen Equivalent Man
MW .....	Megawatt
NEI .....	Nuclear Energy Institute
NPP .....	Nuclear Power Plant
NRC .....	Nuclear Regulatory Commission
NSSS.....	Nuclear Steam Supply System
NORAD .....	North American Aerospace Defense Command
<hr/>	
<del>NOJUE.....</del>	<del>(Notification Of) Unusual Event</del>
<hr/>	
<del>UMARC<sup>+</sup>.....</del>	<del>Nuclear Management and Resources Council</del>
OBE .....	Operating Basis Earthquake
OCA .....	Owner Controlled Area
ODCM/ <del>ODAM</del> .....	Offsite Dose Calculation ( <del>Assessment</del> ) Manual
ORO .....	Off-site Response Organization
PA .....	Protected Area
<hr/>	
<del>ACS .....</del>	<del>Priority Actuation and Control System</del>
PAG .....	Protective Action Guideline
<hr/>	
<del>ICS .....</del>	<del>Process Information and Control System</del>
PRA/ <del>PSA</del> .....	Probabilistic Risk Assessment / <del>Probabilistic Safety Assessment</del>
PWR .....	Pressurized Water Reactor
<hr/>	
<del>S.....</del>	<del>Protection System</del>
PSIG .....	Pounds per Square Inch Gauge
R .....	Roentgen
<hr/>	
<del>CC .....</del>	<del>Reactor Control Console</del>
<hr/>	
<del>CIC .....</del>	<del>Reactor Core Isolation Cooling</del>
RCS.....	Reactor Coolant System
Rem, rem, REM .....	Roentgen Equivalent Man
<hr/>	
<del>ETS .....</del>	<del>Radiological Effluent Technical Specifications</del>
RPS .....	Reactor Protection System
RPV .....	Reactor Pressure Vessel
RVLIS.....	Reactor Vessel Level Instrumentation System
<hr/>	
<del>WCU .....</del>	<del>Reactor Water Cleanup</del>
SAR .....	Safety Analysis Report
SAS.....	<del>Safety Automation System</del> <del>Secondary Alarm Station</del>

<sup>+</sup>NUMARC was a predecessor organization of the Nuclear Energy Institute (NEI).



SBO .....	Station Blackout
SCBA.....	Self-Contained Breathing Apparatus
SG .....	Steam Generator
SI .....	Safety Injection
<hr/>	
<del>ICS.....</del>	<del>Safety Information and Control System</del>
SPDS.....	Safety Parameter Display System
SRO .....	Senior Reactor Operator
TEDE.....	Total Effective Dose Equivalent
TOAF.....	Top of Active Fuel
TSC.....	Technical Support Center
WOG.....	Westinghouse Owners Group
<hr/>	



## **APPENDIX B – DEFINITIONS**

The following definitions are taken from Title 10, Code of Federal Regulations, 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 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.

**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.

**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.

**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.

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

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

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

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

**Fission Product Barrier Threshold:** A pre-determined, 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:** ~~(Insert a site-specific definition for this term.)~~ **Developer Note** – The barrier(s) between spent fuel and the environment once the spent fuel is processed for dry storage.

**CONTAINMENT INTEGRITY:** ~~(Insert a site-specific definition for this term.)~~ **Developer Note** – The procedurally defined conditions or actions taken to secure containment ~~(primary or secondary for BWR)~~ and its associated structures, systems, and components as a functional barrier to fission product release under shutdown conditions.

**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. **Developer Note** ~~This term is applicable to PWRs only.~~

**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 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).

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

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

**IMPEDE:** Entry into an area requires extraordinary measures to facilitate entry of personnel into the affected room/area by installing temporary shielding, requiring use of non-routine protective equipment, or requesting an extension in dose limits beyond normal administrative limits.



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. (Dry Fuel Storage Facility)

INTACT: Capable of being pressurized.

~~——— 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: ~~(Insert a site-specific definition for this term.)~~ **Developer Note** ~~This term is typically taken to mean the~~ The site property owned by, or otherwise under the control of, the licensee. ~~In some cases, it may be appropriate for a licensee to define a smaller area with a perimeter closer to the plant Protected Area perimeter (e.g., a site with a large OCA where some portions of the boundary may be a significant distance from the Protected Area). In these cases, developers should consider using the boundary defined by the Restricted or Secured Owner Controlled Area (ROCA/SOCA). The area and boundary selected for scheme use must be consistent with the description of the same area and boundary contained in the Security Plan.~~

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

PROTECTED AREA: ~~(Insert a site-specific definition for this term.)~~ **Developer Note** ~~This term is typically taken to mean the~~ The area under continuous access monitoring and control, and armed protection as described in the site Security Plan.

REFUELING PATHWAY: The reactor refueling cavity, spent fuel pool and fuel transfer canal. ~~(Insert a site-specific definition for this term.)~~ **Developer Note** ~~This description should include all the cavities, tubes, canals and pools through which irradiated fuel may be moved, but not including the reactor vessel.~~

RUPTURE(D): The condition of a steam generator in which primary-to-secondary leakage is of sufficient magnitude to require a safety injection. **Developer Note** ~~This term is applicable to PWRs only.~~

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. **Developer Note** ~~This term may be modified to include the attributes of "safety-related" in accordance with 10 CFR 50.2 or other site-specific terminology, if desired.~~

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.