

Enclosure II

**Wolf Creek Generating Station
Proposed Revised EAL Technical Basis Document
(226 Pages)**

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1.0 PURPOSE

This document provides an explanation and rationale for each Emergency Action Level (EAL) included in the EAL Upgrade Project for Wolf Creek Generating Station (WCGS). Decision-makers responsible for implementation of procedure EPP 06-005 "Emergency Classification" may use this document as a technical reference in support of EAL interpretation. This information may assist the Emergency Manager in making classifications, particularly those involving judgment or multiple events. The basis information may also be useful in training and for explaining event classifications to offsite officials.

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

Because the information in a basis document can affect emergency classification decision-making (e.g., the Emergency Manager refers to it during an event), the NRC staff expects that changes to the basis document will be evaluated in accordance with the provisions of 10 CFR 50.54(q). Additionally, changes to plant OFNs and EMGs that may impact EAL bases shall be evaluated in accordance with the provisions of 10 CFR 50.54(q).

2.0 DISCUSSION

2.1 Background

EALs are the plant-specific indications, conditions or instrument readings that are utilized to classify emergency conditions defined in the Wolf Creek Station Radiological Emergency Response Plan (RERP) AP 06-002.

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

NEI 99-01 Revisions 4 and 5 were subsequently issued for industry implementation. Enhancements over earlier revisions included:

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

Subsequently, Revision 6 of NEI 99-01 has been issued which incorporates resolutions to numerous implementation issues including the NRC EAL Frequently Asked Questions (FAQs). Using NEI 99-01 Revision 6, "Methodology for the Development of Emergency Action Levels for Non-Passive Reactors," November 2012 (ADAMS Accession Number ML12326A805) (ref. 4.1.1), Wolf Creek Nuclear Operating Company (WCNOC) conducted an EAL implementation upgrade project that produced the EALs discussed herein.

2.2 Fission Product Barriers

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

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

The primary fission product barriers are:

- A. Fuel Clad (FC): The Fuel Clad Barrier consists of the cladding material that contains the fuel pellets.
- B. Reactor Coolant System (RCS): The RCS Barrier includes the RCS primary side and its connections up to and including the pressurizer safety and relief valves, and other connections up to and including the primary isolation valves.
- C. Containment (CMT): The Containment Barrier includes the containment building and connections up to and including the outermost containment isolation valves. This barrier also includes the main steam, feedwater, and blowdown line extensions outside the containment building up to and including the outermost secondary side isolation valve. Containment Barrier thresholds are used as criteria for escalation of the emergency classification level (ECL) from Alert to a Site Area Emergency or a General Emergency

2.3 Fission Product Barrier Classification Criteria

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

Alert:

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

Site Area Emergency:

Loss or potential loss of any two barriers

General Emergency:

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

2.4 EAL Organization

The WCGS EAL scheme includes the following features:

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

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

- Within each group, assignment of EALs to categories and subcategories:

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

EAL Groups, Categories and Subcategories

EAL Group/Category	EAL Subcategory
<u>Any Operating Mode:</u>	
R – Abnormal Rad Levels / Rad Effluent	1 – Radiological Effluent 2 – Irradiated Fuel Event 3 – Area Radiation Levels
H – Hazards and Other Conditions Affecting Plant Safety	1 – Security 2 – Seismic Event 3 – Natural or Technological Hazard 4 – Fire 5 – Hazardous Gases 6 – Control Room Evacuation 7 – Emergency Manager Judgment
<u>Hot Conditions:</u>	
S – System Malfunction	1 – Loss of Emergency AC Power 2 – Loss of Vital DC Power 3 – Loss of Control Room Indications 4 – RCS Activity 5 – RCS Leakage 6 – RTS Failure 7 – Loss of Communications 8 – Containment Failure 9 – Hazardous Event Affecting Safety Systems
F – Fission Product Barrier Degradation	None
<u>Cold Conditions:</u>	
C – Cold Shutdown / Refueling System Malfunction	1 – RCS Level 2 – Loss of Emergency AC Power 3 – RCS Temperature 4 – Loss of Vital DC Power 5 – Loss of Communications 6 – Hazardous Event Affecting Safety Systems

The primary tool for determining the emergency classification level is the EAL Classification Matrix. The user of the EAL Classification Matrix may (but is not required to) consult the EAL Technical Bases Document in order to obtain additional information concerning the EALs under classification consideration. The user should consult Section 3.0 and Attachments 1 & 2 of this document for such information.

2.5 Technical Basis Information

EAL technical bases are provided in Attachment 1 for each EAL according to EAL group (Any, Hot, Cold), EAL category (R, C, H, S and F) and EAL subcategory. A summary explanation of

each category and subcategory is given at the beginning of the technical bases discussions of the EALs included in the category. For each EAL, the following information is provided:

Category Letter & Title

Subcategory Number & Title

Initiating Condition (IC)

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

EAL Identifier (enclosed in rectangle)

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

1. First character (letter): Corresponds to the EAL category as described above (R, C, H, S, or F)
2. Second character (letter): The emergency classification (G, S, A or U)
 - G = General Emergency
 - S = Site Area Emergency
 - A = Alert
 - U = Unusual Event
3. Third character (number): Subcategory number within the given category. Subcategories are sequentially numbered beginning with the number one (1). If a category does not have a subcategory, this character is assigned the number one (1).
4. Fourth character (number): The numerical sequence of the EAL within the EAL subcategory. If the subcategory has only one EAL, it is given the number one (1).

Classification (enclosed in rectangle):

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

EAL (enclosed in rectangle)

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

Mode Applicability

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

Definitions:

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

Basis:

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

WCGS Basis Reference(s):

Site-specific source documentation from which the EAL is derived

2.6 Operating Mode Applicability (ref. 4.1.7)

1 Power Operation

$K_{eff} \geq 0.99$ and rated thermal power $> 5\%$

2 Startup

$K_{eff} \geq 0.99$ and rated thermal power $\leq 5\%$

3 Hot Standby

$K_{eff} < 0.99$ and average reactor coolant temperature $\geq 350^\circ\text{F}$

4 Hot Shutdown

$K_{eff} < 0.99$ and average reactor coolant temperature $350^\circ\text{F} > T_{avg} > 200^\circ\text{F}$ and all reactor vessel head closure bolts fully tensioned, except as specified in Technical Specification

5.5.17, "Reactor Vessel Head Closure Bolt Integrity."

5 Cold Shutdown

$K_{eff} < 0.99$ and average reactor coolant temperature $\leq 200^\circ\text{F}$ and all reactor vessel head closure bolts fully tensioned, except as specified in Technical Specification 5.5.17, "Reactor Vessel Head Closure Bolt Integrity."

6 Refueling

One or more reactor vessel head closure bolts are less than fully tensioned, except as specified in Technical Specification 5.5.17, "Reactor Vessel Head Closure Bolt Integrity."

D Defueled

All fuel assemblies have been removed from Containment and placed in the spent fuel pool and the SFP transfer canal gate valve is closed.

The mode in effect at the time that an event or condition occurred, and prior to any plant or operator response, is the mode that determines whether or not an IC is applicable. If an event or condition occurs, and results in a mode change before the emergency is declared, the emergency classification level is still based on the mode that existed at the time that the event or condition was initiated (and not when it was declared). Once a different mode is reached, any new event or condition, not related to the original event or condition, requiring emergency classification should be evaluated against the ICs and EALs applicable to the operating mode at the time of the new event or condition. For events that occur in Cold Shutdown or Refueling, escalation is via EALs that are applicable in the Cold Shutdown or Refueling modes, even if Hot Shutdown (or a higher mode) is entered during the subsequent plant response. In particular, the fission product barrier EALs are applicable only to events that initiate in the Hot Shutdown mode or higher.

3.0 GUIDANCE ON MAKING EMERGENCY CLASSIFICATIONS

3.1 General Considerations

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

3.1.1 Classification Timeliness

NRC regulations require the licensee to establish and maintain the capability to assess, classify, and declare an emergency condition within 15 minutes after the availability of indications to plant operators that an EAL has been exceeded and to promptly declare the emergency condition as soon as possible following identification of the appropriate emergency classification level. The NRC staff has provided guidance on implementing this requirement in NSIR/DPR-ISG-01, "Interim Staff Guidance, Emergency Planning for Nuclear Power Plants" (ref. 4.1.9).

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

3.1.2 Valid Indications

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

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

3.1.3 Imminent Conditions

For ICs and EALs that have a stipulated time duration (e.g., 15 minutes, 30 minutes, etc.), the Emergency Manager should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the condition has exceeded, or will likely exceed, the applicable time. If an ongoing radiological release is detected and the release start time is unknown, it should be assumed that the release duration specified in the IC/EAL has been exceeded, absent data to the contrary.

3.1.4 Planned vs. Unplanned Events

A planned work activity that results in an expected event or condition which meets or exceeds an EAL does not warrant an emergency declaration provided that: 1) the activity proceeds as planned, and 2) the plant remains within the limits imposed by the operating license. Such activities include planned work to test, manipulate, repair, maintain or modify a system or component. In these cases, the controls associated with the planning, preparation and

execution of the work will ensure that compliance is maintained with all aspects of the operating license provided that the activity proceeds and concludes as expected. Events or conditions of this type may be subject to the reporting requirements of 10CFR 50.72 (ref. 4.1.4).

3.1.5 Classification Based on Analysis

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

3.1.6 Emergency Manager Judgment

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

3.2 Classification Methodology

To make an emergency classification, the user will compare an event or condition (i.e., the relevant plant indications and reports) to an EAL(s) and determine if the EAL has been met or exceeded. The evaluation of an EAL must be consistent with the related Operating Mode Applicability and Notes. If an EAL has been met or exceeded, the associated IC is likewise met, the emergency classification process "clock" starts, and the ECL must be declared in accordance with plant procedures no later than 15 minutes after the process "clock" started.

When assessing an EAL that specifies a time duration for the off-normal condition, the "clock" for the EAL time duration runs concurrently with the emergency classification process "clock." For a full discussion of this timing requirement, refer to NSIR/DPR-ISG-01 (ref. 4.1.9).

3.2.1 Classification of Multiple Events and Conditions

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

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

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

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

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

3.2.2 Consideration of Mode Changes During Classification

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

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

3.2.3 Classification of Imminent Conditions

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

3.2.4 Emergency Classification Level Upgrading and Downgrading

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

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

3.2.5 Classification of Short-Lived Events

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

3.2.6 Classification of Transient Conditions

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

to a few minutes). The following guidance should be applied to the classification of these conditions.

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

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

An ATWS occurs and the high pressure ECCS fail to automatically start. RPV level rapidly decreases and the plant enters an inadequate core cooling condition (a potential loss of both the fuel clad and RCS barriers). If an operator manually starts a high pressure ECCS system in accordance with an EMG step and clears the inadequate core cooling condition prior to an emergency declaration, then the classification should be based on the ATWS only.

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

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

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

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

3.2.8 Retraction of an Emergency Declaration

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

4.0 REFERENCES

4.1 Developmental

- 4.1.1 NEI 99-01 Revision 6, Methodology for the Development of Emergency Action Levels for Non-Passive Reactors, ADAMS Accession Number ML12326A805
- 4.1.2 RIS 2007-02 Clarification of NRC Guidance for Emergency Notifications During Quickly Changing Events, February 2, 2007.
- 4.1.3 NUREG-1022 Event Reporting Guidelines: 10CFR50.72 and 50.73
- 4.1.4 10 § CFR 50.72 Immediate Notification Requirements for Operating Nuclear Power Reactors
- 4.1.5 Wolf Creek USAR Figure 2.1-6 Site Features
- 4.1.6 Wolf Creek USAR Figure 1.2-44 Site Plan
- 4.1.7 Technical Specifications Table 1.1-1 Modes
- 4.1.8 GEN 00-008 RCS Level Less Than Reactor Vessel Flange Operations
- 4.1.9 NSIR/DPR-ISG-01 Interim Staff Guidance, Emergency Planning for Nuclear Power Plants
- 4.1.10 AP 06-002 Wolf Creek Radiological Emergency Response Plan (RERP)
- 4.1.11 OFN EJ-015 Loss of RHR Cooling
- 4.1.12 STS GP-006 CTMT Closure Verification

4.2 Implementing

- 4.2.1 EPP 06-005 Emergency Classification
- 4.2.2 NEI 99-01 Rev. 6 to Wolf Creek EAL Comparison Matrix
- 4.2.3 WCGS EAL Matrix

5.0 DEFINITIONS, ACRONYMS & ABBREVIATIONS

5.1 Definitions (ref. 4.1.1 except as noted)

Selected terms used in IC and EAL statements are set in all capital letters (e.g., ALL CAPS). These words are defined terms that have specific meanings as used in this document. The definitions of these terms are provided below.

Alert

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

Containment Closure

The procedurally defined actions taken to secure containment and its associated structures, systems, and components as a functional barrier to fission product release under shutdown conditions.

As applied to WCGS, Containment Closure is established when the requirements of STS GP-006 CTMT Closure Verification are met (ref. 4.1.12).

Emergency Action Level

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

Emergency Classification Level

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

Explosion

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

Faulted

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

Fire

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

Fission Product Barrier Threshold

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

Flooding

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

General Emergency

Events are in process or have occurred which involve actual or imminent substantial core degradation or melting with potential for loss of containment integrity or hostile actions that result in an actual loss of physical control of the facility. Releases can be reasonably expected to exceed EPA Protective Action Guideline exposure levels offsite for more than the immediate site area.

Hostage

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

Hostile Action

An act toward WCGS 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 WCGS. 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(d)

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

Initiating Condition

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.

Maintain

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

Owner Controlled Area (OCA)

Property contiguous to the reactor site and acquired by fee, title or easement for WCGS for which public access is limited (ref 4.1.10).

Projectile

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

Protected Area (PA)

An area encompassed by physical barriers and to which access is controlled. The Protected Area refers to the designated security area around the process buildings and is depicted in USAR Figure 1.2-44 Site Plan (ref. 4.1.6).

RCS Intact

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

Reduced Inventory

Plant condition when fuel is in the reactor vessel and Reactor Coolant System level is lower than 3 feet below the Reactor Vessel flange (< 64.1 in.) with fuel in the vessel (ref. 4.1.8).

Refueling Pathway

The reactor refueling cavity, spent fuel pool and fuel transfer canal comprise the refueling pathway.

Ruptured

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

Restore

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

Safety System

A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related (as defined in 10 CFR 50.2):

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

- (1) The integrity of the reactor coolant pressure boundary;
- (2) The capability to shut down the reactor and maintain it in a safe shutdown condition;
- (3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures.

Security Condition

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

Site Area Emergency

Events are in process or have occurred which involve actual or likely major failures of plant functions needed for protection of the public or hostile actions that result in intentional damage or malicious acts; (1) toward site personnel or equipment that could lead to the likely failure of or; (2) that prevent effective access to equipment needed for the protection of the public. Any releases are **not** expected to result in exposure levels which exceed EPA Protective Action Guidelines exposure levels beyond the site boundary.

Site Boundary

Exclusion Area Boundary is a synonymous term for Site Boundary. The Exclusion Area is defined as the area that encompasses the land surrounding the Plant to a radius of 1,200 meters (3,937 feet) from the midpoint of the Unit 1 Reactor. The exclusion area boundary location coincides with the restricted area boundary. Control of access to this is by virtue of ownership and in accordance with 10 CFR 100. (ref. 4.1.5).

Unisolable

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

Unplanned

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

Unusual Event

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

Valid

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

Visible Damage

Damage to a component or structure that is readily observable without measurements, testing, or analysis. The visual impact of the damage is sufficient to cause concern regarding the operability or reliability of the affected component or structure. Damage resulting from an equipment failure and limited to the failed component (i.e., the failure did **not** cause damage to a structure or any other equipment) is **not** visible damage.

5.2 Abbreviations/Acronyms

°F	Degrees Fahrenheit
°	Degrees
AC	Alternating Current
ATWS	Anticipated Transient Without Scram
CDE	Committed Dose Equivalent
CFR	Code of Federal Regulations
CMT	Containment
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
EMG	Emergency Operating Procedure
EOF	Emergency Operations Facility
EPA	Environmental Protection Agency
ERG	Emergency Response Guideline
EPIP	Emergency Plan Implementing Procedure
ESF	Engineered Safety Feature
ESW	Essential Service Water
FAA	Federal Aviation Administration
FBI	Federal Bureau of Investigation
FEMA	Federal Emergency Management Agency
GE	General Emergency
IC	Initiating Condition
IPEEE	Individual Plant Examination of External Events (Generic Letter 88-20)
K_{eff}	Effective Neutron Multiplication Factor
LCO	Limiting Condition for Operation
LER	Licensee Event Report
LOCA	Loss of Coolant Accident
LWR	Light Water Reactor
MPC	Maximum Permissible Concentration/Multi-Purpose Canister
mR, mRem, mrem, mREM	milli-Roentgen Equivalent Man
MSL	Main Steam Line
MW	Megawatt
NEI	Nuclear Energy Institute
NESP	National Environmental Studies Project
NPIS	Nuclear Plant Information System
NPP	Nuclear Power Plant

NRC.....Nuclear Regulatory Commission
 NSSS..... Nuclear Steam Supply System
 NORAD..... North American Aerospace Defense Command
 (NO)UE..... Notification of Unusual Event
 OBE..... Operating Basis Earthquake
 OCA.....Owner Controlled Area
 ODCM..... Offsite Dose Calculation Manual
 OFN..... Off-Normal Operating Procedure
 PA..... Protected Area
 PAG..... Protective Action Guideline
 PRA/PSA..... Probabilistic Risk Assessment / Probabilistic Safety Assessment
 PWR..... Pressurized Water Reactor
 PSIG.....Pounds per Square Inch Gauge
 R..... Roentgen
 RCC..... Reactor Control Console
 RCS..... Reactor Coolant System
 Rem, rem, REMRoentgen Equivalent Man
 RETS..... Radiological Effluent Technical Specifications
 R(P)V..... Reactor (Pressure) Vessel
 RTS..... Reactor Trip System
 RVLIS..... Reactor Vessel Level Indicating System
 SBO..... Station Blackout
 SCBA..... Self-Contained Breathing Apparatus
 SG..... Steam Generator
 SI..... Safety Injection
 SGTR.....Steam Generator Tube Rupture
 SPDS..... Safety Parameter Display System
 SRO..... Senior Reactor Operator
 SSF.....Safe Shutdown Facility
 TEDE..... Total Effective Dose Equivalent
 TOAF..... Top of Active Fuel
 TSC..... Technical Support Center
 USAR..... Updated Safety Analysis Report
 WCGS..... Wolf Creek Generating Station
 WCNOG..... Wolf Creek Nuclear Operating Company
 WOG..... Westinghouse Owners Group

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

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

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

WCGS	NEI 99-01 Rev. 6	
EAL	IC	Example EAL
CU1.2	CU1	2
CU2.1	CU2	1
CU3.1	CU3	1
CU3.2	CU3	2
CU4.1	CU4	1
CU5.1	CU5	1, 2, 3
CA1.1	CA1	1
CA1.2	CA1	2
CA2.1	CA2	1
CA3.1	CA3	1, 2
CA6.1	CA6	1
CS1.1	CS1	1
CS1.2	CS1	2
CS1.3	CS1	3
CG1.1	CG1	1
CG1.2	CG1	2
FA1.1	FA1	1
FS1.1	FS1	1
FG1.1	FG1	1
HU1.1	HU1	1, 2, 3
HU2.1	HU2	1
HU3.1	HU3	1
HU3.2	HU3	2
HU3.3	HU3	3
HU3.4	HU3	4

WCGS	NEI 99-01 Rev. 6	
EAL	IC	Example EAL
HU4.1	HU4	1
HU4.2	HU4	2
HU4.3	HU4	3
HU4.4	HU4	4
HU7.1	HU7	1
HA1.1	HA1	1, 2
HA5.1	HA5	1
HA6.1	HA6	1
HA7.1	HA7	1
HS1.1	HS1	1
HS6.1	HS6	1
HS7.1	HS7	1
HG7.1	HG7	1
SU1.1	SU1	1
SU3.1	SU2	1
SU4.1	SU3	2
SU5.1	SU4	1, 2, 3
SU6.1	SU5	1
SU6.2	SU5	2
SU7.1	SU6	1, 2, 3
SU8.1	SU7	1, 2
SA1.1	SA1	1
SA3.1	SA2	1
SA6.1	SA5	1
SA9.1	SA9	1

WCGS	NEI 99-01 Rev. 6	
EAL	IC	Example EAL
SS1.1	SS1	1
SS2.1	SS8	1
SS6.1	SS5	1
SG1.1	SG1	1
SG1.2	SG8	1

7.0 ATTACHMENTS

7.1 Attachment 1, EAL Bases

7.2 Attachment 2, Fission Product Barrier Loss/Potential Loss Matrix and Basis

7.3 Attachment 3, Safe Operation & Shutdown Areas Tables R-3 & H-2 Bases

ATTACHMENT 1
EAL Bases

Category R – Abnormal Rad Release / Rad Effluent

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

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

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

Events of this category pertain to the following subcategories:

1. Radiological Effluent

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

2. Irradiated Fuel Event

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

3. Area Radiation Levels

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

ATTACHMENT 1 EAL Bases

Category: R – Abnormal Rad Levels / Rad Effluent
Subcategory: 1 – Radiological Effluent
Initiating Condition: Release of gaseous or liquid radioactivity greater than 2 times the ODCM limits for 60 minutes or longer

EAL:

RU1.1 Unusual Event

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

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

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

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

Table R-1 Effluent Monitor Classification Thresholds

Release Point		Monitor	GE	SAE	Alert	UE
Gaseous	Unit Vent (EFF)	0-GT-RE-21B	4.45E+8 $\mu\text{Ci/sec}$	4.45E+7 $\mu\text{Ci/sec}$	4.45E+6 $\mu\text{Ci/sec}$	7.85E+5 $\mu\text{Ci/sec}$
	Radwaste Vent (EFF)	0-GH-RE-10B	4.45E+8 $\mu\text{Ci/sec}$	4.45E+7 $\mu\text{Ci/sec}$	4.45E+6 $\mu\text{Ci/sec}$	7.85E+5 $\mu\text{Ci/sec}$
Liquid	SG Blowdown Discharge	0-BM-RE-52	----	----	----	6.91E-3 $\mu\text{Ci/ml}$
	Turbine Building Drain	0-LE-RE-59	----	----	----	2.00E-5 $\mu\text{Ci/ml}$
	Waste Water Treatment System	0-HF-RE-95	----	----	----	2.09E-3 $\mu\text{Ci/ml}$
	Liquid Radwaste Discharge	0-HB-RE-18	----	----	----	1.00E-2 $\mu\text{Ci/ml}$
	Secondary Liquid Waste System	0-HF-RE-45	----	----	----	1.00E-2 $\mu\text{Ci/ml}$

Mode Applicability:

All

Definition(s):

None

ATTACHMENT 1

EAL Bases

Basis:

The column "UE" gaseous and liquid release values in Table R-1 represent two times the appropriate ODCM release rate limits associated with the specified monitors (ref. 1, 2, 3).

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

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

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

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

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

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

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

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

WCGS Basis Reference(s):

1. AP 07B-003 Offsite Dose Calculation Manual
2. USAR Section 7.6, All Other instrumentation Systems Required for Safety
3. EP-CALC-WCNOC-1601 Radiological Effluent EAL Values
4. NEI 99-01 AU1

ATTACHMENT 1
EAL Bases

Category: R – Abnormal Rad Levels / Rad Effluent
Subcategory: 1 – Radiological Effluent
Initiating Condition: Release of gaseous or liquid radioactivity greater than 2 times the ODCM limits for 60 minutes or longer.

EAL:

RU1.2 Unusual Event

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

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

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

Mode Applicability:

All

Definition(s):

None

Basis:

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

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

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

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

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

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

ATTACHMENT 1
EAL Bases

WCGS Basis Reference(s):

1. AP 07B-003 Offsite Dose Calculation Manual Section
2. NEI 99-01 AU1

ATTACHMENT 1

EAL Bases

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 1 – Radiological Effluent

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

EAL:

RA1.1 Alert

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

- Note 1: The Emergency Manager should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.
- Note 2: If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded the specified time limit.
- Note 3: If the effluent flow past an effluent radiation monitor is known to have stopped, indicating that the release path is isolated, the effluent monitor reading is no longer VALID for classification purposes.
- Note 4: The pre-calculated effluent monitor values presented in EALs RA1.1, RS1.1 and RG1.1 should be used for emergency classification assessments until the results from a dose assessment using actual meteorology are available.

Table R-1 Effluent Monitor Classification Thresholds

Release Point		Monitor	GE	SAE	Alert	UE
Gaseous	Unit Vent (EFF)	0-GT-RE-21B	4.45E+8 $\mu\text{Ci/sec}$	4.45E+7 $\mu\text{Ci/sec}$	4.45E+6 $\mu\text{Ci/sec}$	7.85E+5 $\mu\text{Ci/sec}$
	Radwaste Vent (EFF)	0-GH-RE-10B	4.45E+8 $\mu\text{Ci/sec}$	4.45E+7 $\mu\text{Ci/sec}$	4.45E+6 $\mu\text{Ci/sec}$	7.85E+5 $\mu\text{Ci/sec}$
Liquid	SG Blowdown Discharge	0-BM-RE-52	----	----	----	6.91E-3 $\mu\text{Ci/ml}$
	Turbine Building Drain	0-LE-RE-59	----	----	----	2.00E-5 $\mu\text{Ci/ml}$
	Waste Water Treatment System	0-HF-RE-95	----	----	----	2.09E-3 $\mu\text{Ci/ml}$
	Liquid Radwaste Discharge	0-HB-RE-18	----	----	----	1.00E-2 $\mu\text{Ci/ml}$
	Secondary Liquid Waste System	0-HF-RE-45	----	----	----	1.00E-2 $\mu\text{Ci/ml}$

Mode Applicability:

All

Definition(s):

None

ATTACHMENT 1

EAL Bases

Basis:

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

- 10 mRem TEDE
- 50 mRem CDE Thyroid

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

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

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

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

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

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

WCGS Basis Reference(s):

1. EP-CALC-WCNOC-1601 Radiological Effluent EAL Values
2. NEI 99-01 AA1

ATTACHMENT 1

EAL Bases

Category: R – Abnormal Rad Levels / Rad Effluent
Subcategory: 1 – Radiological Effluent
Initiating Condition: Release of gaseous or liquid radioactivity resulting in offsite dose greater than 10 mrem TEDE or 50 mrem thyroid CDE

EAL:

RA1.2 Alert

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

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

Mode Applicability:

All

Definition(s):

SITE BOUNDARY - Exclusion Area Boundary is a synonymous term for Site Boundary. The Exclusion Area is defined as the area that encompasses the land surrounding the Plant to a radius of 1,200 meters (3,937 feet) from the midpoint of the Reactor. The exclusion area boundary location coincides with the restricted area boundary. Control of access to this is by virtue of ownership and in accordance with 10CFR100.

Basis:

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

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

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

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

WCGS Basis Reference(s):

1. NEI 99-01 AA1

ATTACHMENT 1
EAL Bases

Category: R – Abnormal Rad Levels / Rad Effluent
Subcategory: 1 – Radiological Effluent
Initiating Condition: Release of gaseous or liquid radioactivity resulting in offsite dose greater than 10 mrem TEDE or 50 mrem thyroid CDE

EAL:

RA1.3 Alert

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

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

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

Mode Applicability:

All

Definition(s):

SITE BOUNDARY - - Exclusion Area Boundary is a synonymous term for Site Boundary. The Exclusion Area is defined as the area that encompasses the land surrounding the Plant to a radius of 1,200 meters (3,937 feet) from the midpoint of the Reactor. The exclusion area boundary location coincides with the restricted area boundary. Control of access to this is by virtue of ownership and in accordance with 10CFR100.

Basis:

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

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

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

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

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

ATTACHMENT 1
EAL Bases

WCGS Basis Reference(s):

1. AP 07B-003 Wolf Creek Offsite Dose Calculation Manual Section
2. NEI 99-01 AA1

ATTACHMENT 1
EAL Bases

Category: R – Abnormal Rad Levels / Rad Effluent
Subcategory: 1 – Radiological Effluent
Initiating Condition: Release of gaseous or liquid radioactivity resulting in offsite dose greater than 10 mrem TEDE or 50 mrem thyroid CDE

EAL:

RA1.4 Alert

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

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

(Notes 1, 2)

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

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

Mode Applicability:

All

Definition(s):

SITE BOUNDARY - Exclusion Area Boundary is a synonymous term for Site Boundary. The Exclusion Area is defined as the area that encompasses the land surrounding the Plant to a radius of 1,200 meters (3,937 feet) from the midpoint of the Reactor. The exclusion area boundary location coincides with the restricted area boundary. Control of access to this is by virtue of ownership and in accordance with 10CFR100.

Basis:

EPP 06-011, Team Formation provides guidance for emergency or post-accident radiological environmental monitoring (ref. 1).

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

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

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

ATTACHMENT 1
EAL Bases

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

WCGS Basis Reference(s):

1. EPP 06-011, Team Formation
2. NEI 99-01 AA1

ATTACHMENT 1 EAL Bases

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

EAL:

RS1.1 Site Area Emergency

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

- Note 1: The Emergency Manager should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.
- Note 2: If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded the specified time limit.
- Note 3: If the effluent flow past an effluent radiation monitor is known to have stopped, indicating that the release path is isolated, the effluent monitor reading is no longer VALID for classification purposes.
- Note 4: The pre-calculated effluent monitor values presented in EALs RA1.1, RS1.1 and RG1.1 should be used for emergency classification assessments until the results from a dose assessment using actual meteorology are available.

Table R-1 Effluent Monitor Classification Thresholds

Release Point		Monitor	GE	SAE	Alert	UE
Gaseous	Unit Vent (EFF)	0-GT-RE-21B	4.45E+8 $\mu\text{Ci/sec}$	4.45E+7 $\mu\text{Ci/sec}$	4.45E+6 $\mu\text{Ci/sec}$	7.85E+5 $\mu\text{Ci/sec}$
	Radwaste Vent (EFF)	0-GH-RE-10B	4.45E+8 $\mu\text{Ci/sec}$	4.45E+7 $\mu\text{Ci/sec}$	4.45E+6 $\mu\text{Ci/sec}$	7.85E+5 $\mu\text{Ci/sec}$
Liquid	SG Blowdown Discharge	0-BM-RE-52	----	----	----	6.91E-3 $\mu\text{Ci/ml}$
	Turbine Building Drain	0-LE-RE-59	----	----	----	2.00E-5 $\mu\text{Ci/ml}$
	Waste Water Treatment System	0-HF-RE-95	----	----	----	2.09E-3 $\mu\text{Ci/ml}$
	Liquid Radwaste Discharge	0-HB-RE-18	----	----	----	1.00E-2 $\mu\text{Ci/ml}$
	Secondary Liquid Waste System	0-HF-RE-45	----	----	----	1.00E-2 $\mu\text{Ci/ml}$

Mode Applicability:

All

Definition(s):

None

ATTACHMENT 1

EAL Bases

Basis:

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

- 100 mRem TEDE
- 500 mRem CDE Thyroid

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

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

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

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

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

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

WCGS Basis Reference(s):

1. EP-CALC-WCNOC-1601 Radiological Effluent EAL Values
2. NEI 99-01 AS1

ATTACHMENT 1
EAL Bases

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

EAL:

RS1.2 Site Area Emergency

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

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

Mode Applicability:

All

Definition(s):

SITE BOUNDARY - Exclusion Area Boundary is a synonymous term for Site Boundary. The Exclusion Area is defined as the area that encompasses the land surrounding the Plant to a radius of 1,200 meters (3,937 feet) from the midpoint of the Reactor. The exclusion area boundary location coincides with the restricted area boundary. Control of access to this is by virtue of ownership and in accordance with 10CFR100.

Basis:

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

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

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

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

WCGS Basis Reference(s):

1. NEI 99-01 AS1

ATTACHMENT 1
EAL Bases

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

EAL:

RS1.3 Site Area Emergency

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

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

(Notes 1, 2)

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

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

Mode Applicability:

All

Definition(s):

SITE BOUNDARY - Exclusion Area Boundary is a synonymous term for Site Boundary. The Exclusion Area is defined as the area that encompasses the land surrounding the Plant to a radius of 1,200 meters (3,937 feet) from the midpoint of the Reactor. The exclusion area boundary location coincides with the restricted area boundary. Control of access to this is by virtue of ownership and in accordance with 10CFR100.

Basis:

EPP 06-011, Team Formation provides guidance for emergency or post-accident radiological environmental monitoring (ref. 1).

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

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

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

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

ATTACHMENT 1
EAL Bases

WCGS Basis Reference(s):

1. EPP 06-011, Team Formation
2. NEI 99-01 AS1

ATTACHMENT 1 EAL Bases

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 1 – Radiological Effluent

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

EAL:

RG1.1 General Emergency

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

- Note 1: The Emergency Manager should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.
- Note 2: If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded the specified time limit.
- Note 3: If the effluent flow past an effluent radiation monitor is known to have stopped, indicating that the release path is isolated, the effluent monitor reading is no longer VALID for classification purposes.
- Note 4: The pre-calculated effluent monitor values presented in EALs RA1.1, RS1.1 and RG1.1 should be used for emergency classification assessments until the results from a dose assessment using actual meteorology are available.

Table R-1 Effluent Monitor Classification Thresholds

Release Point		Monitor	GE	SAE	Alert	UE
Gaseous	Unit Vent (EFF)	0-GT-RE-21B	4.45E+8 $\mu\text{Ci/sec}$	4.45E+7 $\mu\text{Ci/sec}$	4.45E+6 $\mu\text{Ci/sec}$	7.85E+5 $\mu\text{Ci/sec}$
	Radwaste Vent (EFF)	0-GH-RE-10B	4.45E+8 $\mu\text{Ci/sec}$	4.45E+7 $\mu\text{Ci/sec}$	4.45E+6 $\mu\text{Ci/sec}$	7.85E+5 $\mu\text{Ci/sec}$
Liquid	SG Blowdown Discharge	0-BM-RE-52	----	----	----	6.91E-3 $\mu\text{Ci/ml}$
	Turbine Building Drain	0-LE-RE-59	----	----	----	2.00E-5 $\mu\text{Ci/ml}$
	Waste Water Treatment System	0-HF-RE-95	----	----	----	2.09E-3 $\mu\text{Ci/ml}$
	Liquid Radwaste Discharge	0-HB-RE-18	----	----	----	1.00E-2 $\mu\text{Ci/ml}$
	Secondary Liquid Waste System	0-HF-RE-45	----	----	----	1.00E-2 $\mu\text{Ci/ml}$

Mode Applicability:

All

Definition(s):

None

ATTACHMENT 1

EAL Bases

Basis:

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

- 1000 mRem TEDE
- 5000 mRem CDE Thyroid

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

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

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

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

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

WCGS Basis Reference(s):

1. EP-CALC-WCNOC-1601 Radiological Effluent EAL Values
2. NEI 99-01 AG1

ATTACHMENT 1
EAL Bases

Category: R – Abnormal Rad Levels / Rad Effluent
Subcategory: 1 – Radiological Effluent
Initiating Condition: Release of gaseous radioactivity resulting in offsite dose greater than 1,000 mrem TEDE or 5,000 mrem thyroid CDE

EAL:

RG1.2 General Emergency

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

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

Mode Applicability:

All

Definition(s):

SITE BOUNDARY - Exclusion Area Boundary is a synonymous term for Site Boundary. The Exclusion Area is defined as the area that encompasses the land surrounding the Plant to a radius of 1,200 meters (3,937 feet) from the midpoint of the Reactor. The exclusion area boundary location coincides with the restricted area boundary. Control of access to this is by virtue of ownership and in accordance with 10CFR100.

Basis:

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

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

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

WCGS Basis Reference(s):

1. NEI 99-01 AG1

ATTACHMENT 1
EAL Bases

Category: R – Abnormal Rad Levels / Rad Effluent
Subcategory: 1 – Radiological Effluent
Initiating Condition: Release of gaseous radioactivity resulting in offsite dose greater than 1,000 mrem TEDE or 5,000 mrem thyroid CDE

EAL:

RG1.3 General Emergency

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

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

(Notes 1, 2)

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

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

Mode Applicability:

All

Definition(s):

SITE BOUNDARY - Exclusion Area Boundary is a synonymous term for Site Boundary. The Exclusion Area is defined as the area that encompasses the land surrounding the Plant to a radius of 1,200 meters (3,937 feet) from the midpoint of the Reactor. The exclusion area boundary location coincides with the restricted area boundary. Control of access to this is by virtue of ownership and in accordance with 10CFR100.

Basis:

EPP 06-011, Team Formation provides guidance for emergency or post-accident radiological environmental monitoring (ref. 1).

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

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

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

ATTACHMENT 1
EAL Bases

WCGS Basis Reference(s):

1. EPP 06-011, Team Formation
2. NEI 99-01 AG1

ATTACHMENT 1
EAL Bases

Category: R – Abnormal Rad Levels / Rad Effluent
Subcategory: 2 – Irradiated Fuel Event
Initiating Condition: Unplanned loss of water level above irradiated fuel
EAL:

RU2.1 Unusual Event

UNPLANNED water level drop in the REFUELING PATHWAY as indicated by low water level alarm or indication (EC LI-39A, EC LI-39B, EC LIT-39, local observation of SFP level)

AND

UNPLANNED rise in corresponding area radiation levels as indicated by **any** Table R-2 radiation monitors

Table R-2 Fuel Building & Containment Area Radiation Monitors

Fuel Building:

- SD RE-34, Cask Handling Area Radiation
- SD RE-35, New Fuel Storage Area Radiation
- SD RE-36, New Fuel Storage Area Radiation
- SD RE-37, Fuel Pool Bridge Crane Radiation
- SD RE-38, Spent Fuel Pool Area Radiation

Containment:

- SD RE-40, Personnel Access Hatch Area Radiation
- SD RE-41, Manipulator Bridge Crane Radiation
- SD RE-42, Containment Building Radiation
- GT RE-59 Containment High Area Radiation Monitor
- GT RE-60 Containment High Area Radiation Monitor

Mode Applicability:

All

Definition(s):

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

REFUELING PATHWAY- The reactor refueling cavity, spent fuel pool and fuel transfer canal comprise the refueling pathway.

ATTACHMENT 1

EAL Bases

Basis:

The low water level alarm in this EAL refers to the Spent Fuel Pool (SFP) low level alarm (Window Number 00-076D, SFP LEV HI LO) (ref. 1). During the fuel transfer phase of refueling operations, the fuel transfer canal is normally in communication with the spent fuel pool and the refueling pool in the Containment is in communication with the fuel transfer canal when the fuel transfer tube is open. A lowering in water level in the SFP, fuel transfer canal or refueling pool is therefore sensed by the SFP low level alarm. Neither the refueling pool nor the fuel transfer canal is equipped with a low level alarm (ref. 1). The SFP level is monitored in the Control Room by level indicator EC LI-39A. The level switch initiates high and low level annunciators.

Technical Specification Section 3.7.15 (ref. 2) requires at least 23 ft of water above the Spent Fuel Pool storage racks. Technical Specification Section 3.9.7 (ref. 3) requires at least 23 ft of water above the Reactor Vessel flange in the refueling pool. During refueling, this maintains sufficient water level in the fuel transfer canal, refueling pool, and SFP to retain iodine fission product activity in the water in the event of a fuel handling accident.

The Table R-2 radiation monitors are those expected to see increase area radiation levels as a result of a loss of REFUELING PATHWAY inventory (ref. 1, 4). Increasing radiation indications on these monitors in the absence of indications of decreasing REFUELING CAVITY level are not classifiable under this EAL.

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

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

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

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

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

Escalation of the emergency classification level would be via IC RA2.

ATTACHMENT 1
EAL Bases

WCGS Basis Reference(s):

1. ALR 00-076D SFP LEV HI LO
2. Technical Specification Section 3.7.15 Fuel Storage Pool Water Level
3. Technical Specification Section 3.9.7 Refueling Pool Water Level
4. OFN KE-018 Fuel Handling Accident
5. NEI 99-01 AU2

ATTACHMENT 1
EAL Bases

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 2 – Irradiated Fuel Event

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

EAL:

RA2.1 Alert

Uncovery of irradiated fuel in the REFUELING PATHWAY
--

Mode Applicability:

All

Definition(s):

REFUELING PATHWAY-. The reactor refueling cavity, spent fuel pool and fuel transfer canal comprise the refueling pathway.

Basis:

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

This IC applies to irradiated fuel that is licensed for dry storage up to the point that the loaded storage cask is sealed. Once sealed, damage to a loaded cask causing loss of the Confinement Boundary is classified in accordance with IC EU1.

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

This EAL escalates from RU2.1 in that the loss of level, in the affected portion of the REFUELING PATHWAY, is of sufficient magnitude to have resulted in uncovery of irradiated fuel. Indications of irradiated fuel uncovery may include direct or indirect visual observation (e.g., reports from personnel or camera images), as well as significant changes in water and radiation levels, or other plant parameters. Computational aids may also be used (e.g., a boil-off curve). Classification of an event using this EAL should be based on the totality of available indications, reports and observations.

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

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

ATTACHMENT 1
EAL Bases

WCGS Basis Reference(s):

1. ALR 00-076D SFP LEV HI LO
2. OFN KE-018 Fuel Handling Accident
3. NEI 99-01 AA2

ATTACHMENT 1
EAL Bases

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 2 – Irradiated Fuel Event

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

EAL:

RA2.2 Alert

Mechanical damage to irradiated fuel resulting in a release of radioactivity from the fuel as indicated by HI HI alarm on **any** of the following:

- Fuel Building atmosphere monitors (GG RE-27 or 28)
- Containment purge monitors (GT RE-22 or 33)
- Containment atmosphere monitors (GG RE-31 or 32)
- Manipulator bridge crane radiation monitor (SD RE-41)
- Fuel Pool Bridge Crane **OR** Spent Fuel Pool Area radiation monitor (SD RE-37 or 38)

Mode Applicability:

All

Definition(s):

None

Basis:

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

The specified radiation monitors are those expected to see increase area radiation levels as a result of damage to irradiated fuel (ref. 1, 2).

The bases for the SFP ventilation radiation HI HI alarm and the SFP and containment area radiation high alarms are a spent fuel handling accident (ref. 1, 2). In the Fuel Handling Building, a fuel assembly could be dropped in the fuel transfer canal or in the SFP. Should a fuel assembly be dropped in the fuel transfer canal or in the SFP and release radioactivity above a prescribed level, the fuel handling building ventilation monitors sound an alarm, alerting personnel to the problem (ref. 1, 2).

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

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

ATTACHMENT 1
EAL Bases

WCGS Basis Reference(s):

1. OFN EC-046 Fuel Pool Cooling and Cleanup Malfunctions
2. OFN KE-018 Fuel Handling Accident
3. NEI 99-01 AA2

ATTACHMENT 1

EAL Bases

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 2 – Irradiated Fuel Event

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

EAL:

RA2.3 Alert

Lowering of spent fuel pool level to 120 in. on EC-LI-0059 or 0060 (Level 2)

Mode Applicability:

All

Definition(s):

None

Basis:

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

For WCGS, SFP Level 2 is a reading of 120 in. (plant elevation 2031 ft. 1.25 in.), as indicated on EC-LI-0059 or EC-LI-0060 (ref. 3).

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

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

Escalation of the emergency classification level would be via ICs RS1 or RS2.

WCGS Basis Reference(s):

1. NRC EA-12-51 Issuance of Order to Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation
2. Drawing EID-0004 Pool Parameters
3. Drawing J-481A-00071 Full Range Level Measurement
4. NEI 99-01 AA2

ATTACHMENT 1
EAL Bases

Category: R – Abnormal Rad Levels / Rad Effluent
Subcategory: 2 – Irradiated Fuel Event
Initiating Condition: Spent fuel pool level at the top of the fuel racks
EAL:

RS2.1 Site Area Emergency

Lowering of spent fuel pool level to elevation 15 in. on EC-LI-0059 or 0060 (Level 3)

Mode Applicability:

All

Definition(s):

None

Basis:

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

For WCGS, SFP Level 3 has been set at a reading of 15 in. (elevation 2022 ft.4.25 in.) as indicated on EC-LI-0059 or EC-LI-0060 (ref. 2, 3).

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

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

Escalation of the emergency classification level would be via IC RG1 or RG2.

WCGS Basis Reference(s):

1. NRC EA-12-51 Issuance of Order to Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation
2. Drawing EID-0004 Pool Parameters
3. Drawing J-481A-00071 Full Range Level Measurement
4. NEI 99-01 AS2

ATTACHMENT 1
EAL Bases

Category: R – Abnormal Rad Levels / Rad Effluent
Subcategory: 2 – Irradiated Fuel Event
Initiating Condition: Spent fuel pool level cannot be restored to at least the top of the fuel racks for 60 minutes or longer

EAL:

RG2.1 General Emergency

Spent fuel pool level cannot be restored to at least 15 in. (Level 3) on EC-LI-0059 or 0060 for ≥ 60 min. (Note 1)

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

Mode Applicability:

All

Definition(s):

None

Basis:

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

For WCGS, SFP Level 3 has been set at a reading of 15 in. (elevation 2022 ft.4.25 in.) as indicated on EC-LI-0059 or EC-LI-0060 (ref. 2, 3).

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

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

WCGS Basis Reference(s):

1. NRC EA-12-51 Issuance of Order to Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation
2. Drawing EID-0004 Pool Parameters
3. Drawing J-481A-00071 Full Range Level Measurement
4. NEI 99-01 AG2

ATTACHMENT 1
EAL Bases

Category: R – Abnormal Rad Levels / Rad Effluent
Subcategory: 3 – Area Radiation Levels
Initiating Condition: Radiation levels that IMPEDE access to equipment necessary for normal plant operations, cooldown or shutdown

EAL:

RA3.1 Alert

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

Control Room (SD-RE-33)

OR

Central Alarm Station (by survey)

Mode Applicability:

All

Definition(s):

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

Basis:

Areas that meet this threshold include the Control Room and the Central Alarm Station (CAS). SD-RE-33 monitors the Control Room for area radiation (ref. 1). The CAS is included in this EAL because of its' importance to permitting access to areas required to assure safe plant operations.

There is no permanently installed CAS area radiation monitors that may be used to assess this EAL threshold. Therefore this threshold must be assessed via local radiation survey for the CAS (ref. 1).

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

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

WCGS Basis Reference(s):

1. USAR Section 12.3 Table 12.3-2 Area Radiation Monitors
2. NEI 99-01 AA3

ATTACHMENT 1
EAL Bases

Category: R – Abnormal Rad Levels / Rad Effluent
Subcategory: 3 – Area Radiation Levels
Initiating Condition: Radiation levels that IMPEDE access to equipment necessary for normal plant operations, cooldown or shutdown

EAL:

RA3.2 Alert

An UNPLANNED event results in radiation levels that prohibit or IMPEDE access to **any** Table R-3 rooms or areas (Note 5)

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

Table R-3 Safe Operation & Shutdown Rooms/Areas	
Room/Area	Mode Applicability
North Electrical Pen. Room A	3, 4
South Electrical Pen. Room B	3, 4
ESF SWGR Room No. 1 (TRN A)	4
ESF SWGR Room No. 2 (TRN B)	4
Auxiliary Building/West Hall Elev 2000	3,4,5

Mode Applicability:

3 - Hot Standby, 4 – Hot Shutdown, 5 – Cold Shutdown

Definition(s):

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

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

Basis:

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

An Alert declaration is warranted if entry into the affected room/area is, or may be, procedurally

ATTACHMENT 1

EAL Bases

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

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

- The plant is in an operating mode different than the mode specified for the affected room/area (i.e., entry is not required during the operating mode in effect at the time of the elevated radiation levels). For example, the plant is in Mode 5 when the radiation increase occurs, and the procedures used for normal operation, cooldown and shutdown only require entry into the affected room in Modes 1-4.
- The increased radiation levels are a result of a planned activity that includes compensatory measures which address the temporary inaccessibility of a room or area (e.g., radiography, spent filter or resin transfer, etc.).
- The action for which room/area entry is required is of an administrative or record keeping nature (e.g., normal rounds or routine inspections).
- The access control measures are of a conservative or precautionary nature, and would not actually prevent or impede a required action.

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

NOTE: EAL RA3.2 mode applicability has been limited to the applicable modes identified in Table R-3 Safe Operation & Shutdown Rooms/Areas. If due to plant operating procedure or plant configuration changes, the applicable plant modes specified in Table R-3 are changed, a corresponding change to Attachment 3 'Safe Operation & Shutdown Areas Tables R-3 & H-2 Bases' and to EAL RA3.2 mode applicability is required.

WCGS Basis Reference(s):

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

ATTACHMENT 1
EAL Bases

Category C – Cold Shutdown / Refueling System Malfunction

EAL Group: Cold Conditions (RCS temperature $\leq 200^{\circ}\text{F}$); EALs in this category are applicable only in one or more cold operating modes.

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

The events of this category pertain to the following subcategories:

1. RCS Level

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

2. Loss of Emergency AC Power

Loss of emergency plant electrical power can compromise plant safety system operability including decay heat removal and emergency core cooling systems which may be necessary to ensure fission product barrier integrity. This category includes loss of onsite and offsite power sources for 4.16KV AC emergency buses.

3. RCS Temperature

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

4. Loss of Vital DC Power

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

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EAL Bases

5. Loss of Communications

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

6. Hazardous Event Affecting Safety Systems

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

ATTACHMENT 1
EAL Bases

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 1 – RCS Level

Initiating Condition: UNPLANNED loss of RCS inventory

EAL:

CU1.1 Unusual Event

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

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

Mode Applicability:

5 - Cold Shutdown, 6 - Refueling

Definition(s):

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

Basis:

With the plant in Cold Shutdown, RCS water level is normally maintained above the pressurizer low level setpoint of 17% (ref. 1). However, if RCS level is being controlled below the pressurizer low level setpoint, or if level is being maintained in a designated band in the reactor vessel it is the inability to maintain level above the low end of the designated control band due to a loss of inventory resulting from a leak in the RCS that is the concern.

With the plant in Refueling mode, RCS water level is normally maintained at or above the reactor vessel flange (100.1 in.) (Technical Specification LCO 3.9.7 requires at least 23 ft. of water above the top of the reactor vessel flange in the refueling cavity during refueling operations) (ref. 2).

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

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

This EAL recognizes that the minimum required RCS level can change several times during the course of a refueling outage as different plant configurations and system lineups are implemented. This EAL is met if the minimum level, specified for the current plant conditions, cannot be maintained for 15 minutes or longer. The minimum level is typically specified in the applicable operating procedure but may be specified in another controlling document.

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EAL Bases

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

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

WCGS Basis Reference(s):

1. FR-I2 Response to Low Pressurizer Level
2. Technical Specification Section 3.9.7 Refueling Pool Water Level
3. Gen 00-008 RCS Level Less Than Reactor Vessel Flange Operations
4. NEI 99-01 CU1

ATTACHMENT 1
EAL Bases

Category: C – Cold Shutdown / Refueling System Malfunction
Subcategory: 1 – RCS Level
Initiating Condition: UNPLANNED loss of RCS inventory for 15 minutes or longer
EAL:

CU1.2 Unusual Event

RCS water level cannot be monitored

AND EITHER

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

Table C-1 Sumps / Tanks
<ul style="list-style-type: none">• Containment Normal Sump• PRT• RCDT• Auxiliary Building Sump• Liquid Waste Holdup Tank• Recycle Holdup Tank• CCW Surge Tank

Mode Applicability:

5 - Cold Shutdown, 6 – Refueling

Definition(s):

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

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

Basis:

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

In this EAL, all water level indication is unavailable and the RCS inventory loss must be detected by indirect leakage indications. Level increases must be evaluated against other potential sources of leakage such as cooling water sources inside the containment to ensure they are indicative of RCS leakage. If the make-up rate to the RCS unexplainably rises above the pre-established rate, a loss of RCS inventory may be occurring even if the source of the leakage cannot be immediately identified. Visual observation of leakage from systems

ATTACHMENT 1

EAL Bases

connected to the RCS that cannot be isolated could also be indicative of a loss of RCS inventory (ref. 1, 2).

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

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

This EAL addresses a condition where all means to determine RCS level have been lost. In this condition, operators may determine that an inventory loss is occurring by observing changes in sump and/or tank levels. Sump and/or tank level changes must be evaluated against other potential sources of water flow to ensure they are indicative of leakage from the RCS.

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

WCGS Basis Reference(s):

1. OFN BB-007 RCS Leakage High
2. STS BB-004 RCS Water Inventory Balance
3. NEI 99-01 CU1

ATTACHMENT 1
EAL Bases

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 1 – RCS Level

Initiating Condition: Loss of RCS inventory

EAL:

CA1.1 Alert

Loss of RCS inventory as indicated by RCS level < 12 in.
--

Mode Applicability:

5 - Cold Shutdown, 6 – Refueling

Definition(s):

None

Basis:

A RCS level of 12 inches as measured by BB LI-53(54)A and/or BB LI-53(54)B is indicative of a loss of level that is well below the desired RCS water level between 20 and 22 inches for RCS fill and also below the desired level of 15 to 17 inches for RCS vacuum fill (ref. 1).

This IC addresses conditions that are precursors to a loss of the ability to adequately cool irradiated fuel (i.e., a precursor to a challenge to the fuel clad barrier). This condition represents a potential substantial reduction in the level of plant safety.

For this EAL, a lowering of water level below 12 in. indicates that operator actions have not been successful in restoring and maintaining RCS water level. The heat-up rate of the coolant will increase as the available water inventory is reduced. A continuing decrease in water level will lead to core uncover.

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

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

WCGS Basis Reference(s):

1. GEN 00-008 RCS Level Less Than Reactor Vessel Flange Operations Figure 1 RCS Level Versus RHR Flow
2. NEI 99-01 CA1

ATTACHMENT 1
EAL Bases

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 1 – RCS Level

Initiating Condition: Loss of RCS inventory

EAL:

CA1.2 Alert

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

AND EITHER

- UNPLANNED increase in **any** Table C-1 Sump / Tank level
- Visual observation of UNISOLABLE RCS leakage

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

Table C-1 Sumps / Tanks
<ul style="list-style-type: none">• Containment Normal Sump• PRT• RCDT• Auxiliary Building Sump• Liquid Waste Holdup Tank• Recycle Holdup Tank• CCW Surge Tank

Mode Applicability:

5 - Cold Shutdown, 6 – Refueling

Definition(s):

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

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

Basis:

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

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

In this EAL, all RCS water level indication would be unavailable for greater than 15 minutes, and the RCS inventory loss must be detected by indirect leakage indications (Table C-1).

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EAL Bases

Surveillance procedures provide instructions for calculating primary system leak rate by manual or computer-based water inventory balances. Level increases must be evaluated against other potential sources of leakage such as cooling water sources inside the containment to ensure they are indicative of RCS leakage. If the make-up rate to the RCS unexplainably rises above the pre-established rate, a loss of RCS inventory may be occurring even if the source of the leakage cannot be immediately identified. Visual observation of leakage from systems connected to the RCS that cannot be isolated could also be indicative of a loss of RCS inventory (ref. 1, 2).

This IC addresses conditions that are precursors to a loss of the ability to adequately cool irradiated fuel (i.e., a precursor to a challenge to the fuel clad barrier). This condition represents a potential substantial reduction in the level of plant safety.

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

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

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

WCGS Basis Reference(s):

1. OFN BB-007 RCS Leakage High
2. STS BB-004 RCS Water Inventory Balance
3. NEI 99-01 CA1

ATTACHMENT 1
EAL Bases

Category: C – Cold Shutdown / Refueling System Malfunction
Subcategory: 1 – RCS Level
Initiating Condition: Loss of RCS inventory affecting core decay heat removal capability
EAL:

CS1.1 Site Area Emergency

With CONTAINMENT CLOSURE **not** established, RVLIS natural circulation range < 72%

Mode Applicability:

5 – Cold Shutdown

Definition(s):

Containment Closure - The procedurally defined actions taken to secure containment and its associated structures, systems, and components as a functional barrier to fission product release under shutdown conditions.

As applied to WCGS, Containment Closure is established when the requirements of STS GP-006 CTMT Closure Verification are met.

Basis:

When Reactor Vessel water level lowers to 72%, water level is six inches below the elevation of the bottom of the RCS hot leg penetration. Six inches below the elevation of the bottom of the RCS hot leg penetration can be monitored only by RVLIS with RVLIS in service (ref. 1).

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

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

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

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

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

ATTACHMENT 1
EAL Bases

WCGS Basis Reference(s):

1. WCOP-24 EMG/OFN Setpoints - Setpoint F.36 and F.37
2. NEI 99-01 CS1

ATTACHMENT 1
EAL Bases

Category: C – Cold Shutdown / Refueling System Malfunction
Subcategory: 1 – RCS Level
Initiating Condition: Loss of RCS inventory affecting core decay heat removal capability
EAL:

CS1.2 Site Area Emergency

With CONTAINMENT CLOSURE established, RVLIS natural circulation range < 66%

Mode Applicability:

5 – Cold Shutdown

Definition(s):

Containment Closure - The procedurally defined actions taken to secure containment and its associated structures, systems, and components as a functional barrier to fission product release under shutdown conditions.

As applied to WCGS, Containment Closure is established when the requirements of STS GP-006 CTMT Closure Verification are met.

Basis:

When Reactor Vessel water level lowers to 66%, core uncover is about to occur. The top of the reactor fuel can be monitored only by RVLIS with RVLIS in service (ref. 1).

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

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

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

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

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

ATTACHMENT 1
EAL Bases

WCGS Basis Reference(s):

1. WCOP-24 EMG/OFN Setpoints - Setpoint F.37
2. NEI 99-01 CS1

ATTACHMENT 1
EAL Bases

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 1 – RCS Level

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

EAL:

CS1.3 Site Area Emergency

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

AND

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

- UNPLANNED increase in **any** Table C-1 sump/tank level of sufficient magnitude to indicate core uncover
- Manipulator bridge crane radiation monitor SD RE-41 Hi-Hi alarm
- Erratic Source Range Monitor indication

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

Table C-1 Sumps / Tanks

- Containment Normal Sump
- PRT
- RCDT
- Auxiliary Building Sump
- Liquid Waste Holdup Tank
- Recycle Holdup Tank
- CCW Surge Tank

Mode Applicability:

5 – Cold Shutdown, 6 – Refueling

Definition(s):

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

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

Basis:

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

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

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EAL Bases

In this EAL, all RCS water level indication would be unavailable for greater than 30 minutes, and the RCS inventory loss must be detected by indirect leakage indications (Table C-1). Surveillance procedures provide instructions for calculating primary system leak rate by manual or computer-based water inventory balances. Level increases must be evaluated against other potential sources of leakage such as cooling water sources inside the containment to ensure they are indicative of RCS leakage. If the make-up rate to the RCS unexplainably rises above the pre-established rate, a loss of RCS inventory may be occurring even if the source of the leakage cannot be immediately identified (ref. 1, 2).

The Reactor Vessel inventory loss may be detected by the manipulator bridge crane radiation monitor or erratic Source Range Monitor indication. As water level in the Reactor Vessel lowers, the dose rate above the core will rise. The dose rate due to this core shine should result in up-scaled (Hi-Hi alarm) manipulator crane radiation monitor (SD-RE-41) indication (ref.3).

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

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

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

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

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

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

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

ATTACHMENT 1
EAL Bases

WCGS Basis Reference(s):

1. OFN BB-007 RCS Leakage High
2. STS BB-004 RCS Water Inventory Balance
3. USAR Table 12.3-2 Area Radiation Monitors
4. Nuclear Safety Analysis Center (NSAC), 1980, "Analysis of Three Mile Island - Unit 2 Accident," NSAC-1
5. NEI 99-01 CS1

ATTACHMENT 1
EAL Bases

Category: C – Cold Shutdown / Refueling System Malfunction
Subcategory: 1 – RCS Level
Initiating Condition: Loss of RCS inventory affecting fuel clad integrity with containment challenged

EAL:

CG1.1 General Emergency

RVLIS natural circulation range < 66% for ≥ 30 min. (Note 1)

AND

Any Containment Challenge indication, Table C-2

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

Table C-2 Containment Challenge Indications

- **CONTAINMENT CLOSURE not established** (Note 6)
- Containment hydrogen concentration $\geq 4\%$
- **UNPLANNED** rise in Containment pressure

Mode Applicability:

5 - Cold Shutdown

Definition(s):

CONTAINMENT CLOSURE - The procedurally defined conditions or actions taken to secure Primary or Secondary Containment and its associated structures, systems, and components as a functional barrier to fission product release under shutdown conditions.

As applied to WCGS, Containment Closure is established when the requirements of STS GP-006 CTMT Closure Verification are met.

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

Basis:

When Reactor Vessel water level lowers to 66%, core uncover is about to occur. The top of the reactor fuel can be monitored only by RVLIS with RVLIS in service (ref. 1).

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

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EAL Bases

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

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

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

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

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

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

WCGS Basis Reference(s):

1. WCOP-24 EMG/OFN Setpoints – Setpoint F.37
2. FSAR Section 6.2.5 Combustible Gas Control In Containment
3. NEI 99-01 CG1

ATTACHMENT 1
EAL Bases

Category: C – Cold Shutdown / Refueling System Malfunction
Subcategory: 1 – RCS Level
Initiating Condition: Loss of RCS inventory affecting fuel clad integrity with containment challenged

EAL:

CG1.2 General Emergency

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

AND

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

- UNPLANNED increase in **any** Table C-1 sump/tank level of sufficient magnitude to indicate core uncover
- Manipulator bridge crane radiation monitor SD RE-41 Hi-Hi alarm
- Erratic Source Range Monitor indication

AND

Any Containment Challenge indication, Table C-2

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

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

Table C-1 Sumps / Tanks

- Containment Normal Sump
- PRT
- RCDT
- Auxiliary Building Sump
- Liquid Waste Holdup Tank
- Recycle Holdup Tank
- CCW Surge Tank

Table C-2 Containment Challenge Indications

- CONTAINMENT CLOSURE **not** established (Note 6)
- Containment hydrogen concentration $\geq 4\%$
- UNPLANNED rise in Containment pressure

ATTACHMENT 1
EAL Bases

Mode Applicability:

5 - Cold Shutdown, 6 – Refueling

Definition(s):

CONTAINMENT CLOSURE - The procedurally defined conditions or actions taken to secure Primary or Secondary Containment and its associated structures, systems, and components as a functional barrier to fission product release under shutdown conditions.

As applied to WCGS, Containment Closure is established when the requirements of STS GP-006 CTMT Closure Verification are met.

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

Basis:

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

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

In this EAL, all RCS water level indication would be unavailable for greater than 30 minutes, and the RCS inventory loss must be detected by indirect leakage indications (Table C-1). Surveillance procedures provide instructions for calculating primary system leak rate by manual or computer-based water inventory balance (ref. 1, 2).

The Reactor Vessel inventory loss may be detected by the manipulator bridge crane radiation monitor or erratic Source Range Monitor indication. As water level in the Reactor Vessel lowers, the dose rate above the core will rise. The dose rate due to this core shine should result in up-scaled (Hi-Hi alarm) manipulator crane radiation monitor (SD-RE-41) indication (ref.3).

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

Three conditions are associated with a challenge to Containment integrity:

1. **CONTAINMENT COSURE** not established - The status of Containment closure is tracked if plant conditions change that could raise the risk of a fission product release as a result of a loss of decay heat removal.
2. Containment hydrogen $\geq 4\%$ - The 4% hydrogen concentration threshold is generally considered the lower limit for hydrogen deflagrations. WCGS is equipped with a Hydrogen Control System (HCS) which serves to limit or reduce combustible gas concentrations in the Containment. The HCS is an engineered safety feature with redundant hydrogen recombiners, hydrogen mixing system, hydrogen monitoring subsystem, and a backup hydrogen purge subsystem. The HCS is designed to maintain the Containment hydrogen concentration below 4% by volume (ref.5). Two Containment

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hydrogen monitors (GS AI-10 and GS AI-19) with a range of 0% to 10% provide indication on Control Room Panel CL020 and NPIS (ref.6).

3. UNPLANNED rise in Containment pressure - An unplanned pressure rise in containment while in cold Shutdown or Refueling modes can threaten Containment Closure capability and thus Containment potentially cannot be relied upon as a barrier to fission product release.

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

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

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

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

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

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

The inability to monitor RCS level may be caused by instrumentation and/or power failures, or water level dropping below the range of available instrumentation. If water level cannot be monitored, operators may determine that an inventory loss is occurring by observing changes

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in sump and/or tank levels. Sump and/or tank level changes must be evaluated against other potential sources of water flow to ensure they are indicative of leakage from the RCS.

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

WCGS Basis Reference(s):

1. OFN BB-007 RCS Leakage High
2. STS BB-004 RCS Water Inventory Balance
3. USAR Table 12.3-2 Area Radiation Monitors
4. Nuclear Safety Analysis Center (NSAC), 1980, "Analysis of Three Mile Island - Unit 2 Accident," NSAC-1
5. FSAR Section 6.2.5 Combustible Gas Control In Containment
6. FSAR Table 7A-3 (Sheet 6.4)
7. NEI 99-01 CG1

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EAL Bases

Category: C – Cold Shutdown / Refueling System Malfunction
Subcategory: 2 – Loss of Emergency AC Power
Initiating Condition: Loss of **all but one** AC power source to emergency buses for 15 minutes or longer

EAL:

CU2.1 Unusual Event

AC power capability, Table C-3, to emergency 4.16KV buses NB01 and NB02 reduced to a single power source for ≥ 15 min. (Note 1)

AND

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

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

Table C-3 AC Power Sources
Offsite: <ul style="list-style-type: none">• ESF XFMR XNB01• ESF XFMR XNB02
Onsite: <ul style="list-style-type: none">• EDG NE01• EDG NE02

Mode Applicability:

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

Definition(s):

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

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

- (1) The integrity of the reactor coolant pressure boundary;
- (2) The capability to shut down the reactor and maintain it in a safe shutdown condition;
- (3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures.

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Basis:

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

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

4.16KV buses NB01 and NB02 are the emergency (essential) buses. NB01 supplies power to Load Group 1 (Red Train) safety related loads and NB02 supplies power to Load Group 2 (Yellow Train) safety related loads. Each bus has two sources of offsite power. One source is from 4.16KV ESF transformer XNB01 and the other source is from the ESF transformer XNB02. Transformer XNB01 is the normal supply to bus NB01 and the alternate supply to bus NB02; XNB02 is the normal supply to bus NB02 and the alternate supply to bus NB01 (ref. 1, 2).

In addition, NB01 and NB02 each have an emergency diesel generator which supply electrical power to the bus automatically in the event that the preferred source becomes unavailable (ref. 2).

An additional source of power are the SBO diesel generators SBO DGs (ref. 3, 4). Credit can be taken for this source only if they are already aligned because they cannot be aligned within 15 minutes.

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

If the capability of a second source of emergency bus power is not restored to at least one emergency bus within 15 minutes, an Unusual Event is declared under this EAL.

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

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

An "AC power source" is a source recognized in OFNs and EMGs, and capable of supplying required power to an essential bus. Some examples of this condition are presented below.

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

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

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

WCGS Basis Reference(s):

1. USAR figure 8.2-5 Electrical one line diagram of Wolf Creek 345 KV switchyard
2. USAR Section 8.3
3. OFN NB-030 Loss of AC Emergency Bus NB01 (NB02)
4. SYS KU-121(122) Energizing NB01(NB02) From Station Blackout Diesel Generators
5. NEI 99-01 CU2

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Category: C – Cold Shutdown / Refueling System Malfunction
Subcategory: 2 – Loss of Emergency AC Power
Initiating Condition: Loss of **all** offsite and **all** onsite AC power to emergency buses for 15 minutes or longer

EAL:

CA2.1 Alert

Loss of **all** offsite and **all** onsite AC power capability to emergency 4.16KV buses NB01 and NB02 for ≥ 15 min. (Note 1)

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

Mode Applicability:

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

Definition(s):

None

Basis:

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

The emergency 4.16KV AC System provides the power requirements for operation and safe shutdown of the plant. The essential switchgear are buses NB01 and NB02 (ref. 1).

4.16KV buses NB01 and NB02 are the emergency (essential) buses. NB01 supplies power to Load Group 1 (Red Train) safety related loads and NB02 supplies power to Load Group 2 (Yellow Train) safety related loads. Each bus has two sources of offsite power. One source is from 4.16KV ESF transformer XNB01 and the other source is from the ESF transformer XNB02. Transformer XNB01 is the normal supply to bus NB01 and the alternate supply to bus NB02; XNB02 is the normal supply to bus NB02 and the alternate supply to bus NB01 (ref. 1, 2).

In addition, NB01 and NB02 each have an emergency diesel generator which supply electrical power to the bus automatically in the event that the preferred source becomes unavailable (ref. 2).

An additional source of power are the SBO diesel generators SBO DGs (ref. 3, 4). Credit can be taken for this source only if they are already aligned because they cannot be aligned within 15 minutes.

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

The interval begins when both offsite and onsite AC power capability are lost.

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.

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

Fifteen minutes was selected as a threshold to exclude transient or momentary power losses. Escalation of the emergency classification level would be via IC CS1 or RS1.

WCGS Basis Reference(s):

1. USAR figure 8.2-5 Electrical one line diagram of Wolf Creek 345 KV switchyard
2. USAR Section 8.3
3. OFN NB-030 Loss of AC Emergency Bus NB01 (NB02)
4. SYS KU-121(122) Energizing NB01(NB02) From Station Blackout Diesel Generators
5. NEI 99-01.CA2

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EAL Bases

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 3 – RCS Temperature

Initiating Condition: UNPLANNED increase in RCS temperature

EAL:

CU3.1 Unusual Event

UNPLANNED increase in RCS temperature to > 200°F (Note 10)

Note 10: Begin monitoring hot condition EALs concurrently for any new event or condition **not** related to the loss of decay heat removal.

Mode Applicability:

5 - Cold Shutdown, 6 - Refueling

Definition(s):

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

Basis:

Several instruments are capable of providing indication of RCS temperature with respect to the Technical Specification cold shutdown temperature limit (200°F, ref. 1). These include core exit thermocouples (T/Cs) and Wide Range hot leg temperature indications. Plant computer screens are available for monitoring heatup and cooldown. The most limiting temperature indication should be used. For example, during heatup, the highest reading temperature indication should be used; during cooldown, the lowest (ref. 2, 3).

In the absence of reliable RCS temperature indication caused by a loss of decay heat removal capability, classification should be based on EAL CU3.2 should RCS level indication be subsequently lost.

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

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

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

During an outage, the level in the reactor vessel will normally be maintained above the reactor vessel flange. Refueling evolutions that lower water level below the reactor vessel flange are

ATTACHMENT 1
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carefully planned and controlled. A loss of forced decay heat removal at reduced inventory may result in a rapid increase in reactor coolant temperature depending on the time after shutdown.

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

WCGS Basis Reference(s):

1. Wolf Creek Technical Specifications Table 1.1-1
2. GEN 00-002 Cold Shutdown to Hot Standby
3. USAR Section 7.2.2.3.2
4. NEI 99-01 CU3

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EAL Bases

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 3 – RCS Temperature

Initiating Condition: UNPLANNED increase in RCS temperature

EAL:

CU3.2 Unusual Event

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

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

Mode Applicability:

5 - Cold Shutdown, 6- Refueling

Definition(s):

None

Basis:

In cold operating modes RCS water level is normally monitored using the following instruments (ref.2):

- LI-462, Pressurizer Cold Calibrated Level
- RCS Loop level indications):
 - Mid-loop level indicators on RL018:
 - BB LI-53A, RCS LEVEL LOOP 4 WR MIDLOOP
 - BB LI-53B, RCS LEVEL LOOP 4 NR
 - BB LI-54A, RCS LEVEL LOOP 1 WR MIDLOOP
 - BB LI-54B, RCS LEVEL LOOP 1 NR
 - Computer points:
 - BBL0053A, RCS LEVEL LOOP 4 WR MIDLOOP
 - BBL0053B, RCS LEVEL LOOP 4 NR
 - BBL0054A, RCS LEVEL LOOP 1 WR MIDLOOP
 - BBL0054B, RCS LEVEL LOOP 1 NR
- Tygon Hose
- Visual observation (if vessel head is removed)

Several instruments are capable of providing indication of RCS temperature with respect to the Technical Specification cold shutdown temperature limit (200°F, ref. 1). These include core exit thermocouples (T/Cs) and Wide Range hot leg temperature indications. (ref. 3).

This EAL addresses the inability to determine RCS temperature and level, and represents a potential degradation of the level of safety of the plant. If the RCS is not intact and CONTAINMENT CLOSURE is not established during this event, the Emergency Manager should also refer to IC CA3.

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

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

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

WCGS Basis Reference(s):

1. Wolf Creek Technical Specifications Table 1.1-1
2. SYS BB-215 RCS Drain Down with Fuel in Reactor
3. FSAR Section 7.2.2.3.2
4. NEI 99-01 CU3

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EAL Bases

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 3 – RCS Temperature

Initiating Condition: Inability to maintain plant in cold shutdown

EAL:

CA3.1 Alert

UNPLANNED increase in RCS temperature to > 200°F for > Table C-4 duration
(Notes 1, 10)

OR

UNPLANNED RCS pressure increase > 10 psig (This EAL does **not** apply during water-solid plant conditions)

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

Note 10: Begin monitoring hot condition EALs concurrently for any new event or condition **not** related to the loss of decay heat removal.

Table C-4: RCS Heat-up Duration Thresholds

RCS Status	CONTAINMENT CLOSURE Status	Heat-up Duration
Intact (but not REDUCED INVENTORY)	N/A	60 min.*
Not intact OR REDUCED INVENTORY	established	20 min.*
	not established	0 min.
* If an RCS heat removal system is in operation within this time frame and RCS temperature is being reduced, the EAL is not applicable.		

Mode Applicability:

5 - Cold Shutdown, 6 – Refueling

Definition(s):

CONTAINMENT CLOSURE - The procedurally defined conditions or actions taken to secure Primary or Secondary Containment and its associated structures, systems, and components as a functional barrier to fission product release under shutdown conditions.

As applied to WCGS, Containment Closure is established when the requirements of STS GP-006 CTMT Closure Verification are met.

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

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REDUCED INVENTORY -. Plant condition when fuel is in the reactor vessel and Reactor Coolant System level is lower than 3 feet below the Reactor Vessel flange (< 64.1 in.).

Basis:

Several instruments are capable of providing indication of RCS temperature with respect to the Technical Specification cold shutdown temperature limit (200°F, ref. 1). These include core exit thermocouples (T/Cs) and Wide Range hot leg temperature indications. (ref. 2).

RCS pressure instrument BB PI-403 and BB PI-405 are capable of measuring pressure to less than 10 psig (ref. 3).

In the absence of reliable RCS temperature indication caused by the loss of decay heat removal capability, classification should be based on the RCS pressure increase criteria when the RCS is intact in Mode 5 or based on time to boil data when in Mode 6 or the RCS is not intact in Mode 5.

This IC addresses conditions involving a loss of decay heat removal capability or an addition of heat to the RCS in excess of that which can currently be removed. Either condition represents an actual or potential substantial degradation of the level of safety of the plant.

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

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

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

Finally, in the case where there is an increase in RCS temperature, the RCS is not intact or is at Reduced Inventory, and CONTAINMENT CLOSURE is not established, no heat-up duration is allowed (i.e., 0 minutes). This is because 1) the evaporated reactor coolant may be released directly into the Containment atmosphere and subsequently to the environment, and 2) there is reduced reactor coolant inventory above the top of irradiated fuel.

The second condition provides a pressure-based indication of RCS heat-up.

Escalation of the emergency classification level would be via IC CS1 or RS1.

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WCGS Basis Reference(s):

1. Wolf Creek Technical Specifications Table 1.1-1
2. FSAR Section 7.2.2.3.2
3. GEN 00-006 Hot Standby to Cold Shutdown
4. NEI 99-01 CA3

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Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 4 – Loss of Vital DC Power

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

EAL:

CU4.1 Unusual Event

< 105 VDC bus voltage indications on Technical Specification **required** 125 VDC buses for ≥ 15 min. (Note 1)

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

Mode Applicability:

5 - Cold Shutdown, 6 - Refueling

Definition(s):

None

Basis:

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

The vital DC buses are the following 125 VDC Class 1E buses (ref. 1):

Division 1 (Train A):

- NK01
- NK03

Division 2 (Train B):

- NK02
- NK04

There are four, 60 cell, lead-calcium storage batteries (NK11, NK12, NK13 and NK14) that supplement the output of the battery chargers. They supply DC power to the distribution buses when AC power to the chargers is lost or when transient loads exceed the 300 amp capacity of the battery chargers.

Each battery is designed to have sufficient stored energy to supply the required emergency loads for 240 minutes following a loss of AC power (station blackout) (ref. 2, 3).

Minimum DC bus voltage is 105 VDC (ref. 4).

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

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

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

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

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

WCGS Basis Reference(s):

1. OFN NK-020 Loss of Vital 125 VDC Bus NK01, NK02, NK03, and NK04
2. FSAR Tables 8.3-2, -3
3. FSAR Section 8.3.2 DC Power Systems
4. Calculation NK-E-001 125 VDC Class 1 E Battery System Sizing, Voltage Drop and Short Circuit Studies
5. NEI 99-01 CU4

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Category: C – Cold Shutdown / Refueling System Malfunction
Subcategory: 5 – Loss of Communications
Initiating Condition: Loss of **all** onsite or offsite communications capabilities
EAL:

CU5.1 Unusual Event

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

OR

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

OR

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

Table C-5 Communication Methods			
System	Onsite	Offsite	NRC
PA system	X		
Plant Radios	X	X	
Site Telephone System	X	X	X
Local Telephone Company Direct Lines	X	X	X
ENS Line			X

Mode Applicability:

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

Definition(s):

None

Basis:

Onsite/offsite/NRC communications include one or more of the systems listed in Table C-5 (ref. 1, 2).

1. Public Address (PA) system

The system provides five separate independent Communication lines and one general page channel. Communication between parties in the plant and the Control Room can be easily and quickly established using the Control Room page channel (channel 1).

Communication between parties within the plant can be easily and quickly established by

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using the general page channel. The party line channel is normally used after the page call is completed. As many as five party lines may communicate simultaneously.

2. Plant Radios

The Plant Radio System consists of two repeater sites: the Turbine Building and the Meteorological Tower. The sites have multiple repeaters to support communications inside the Plant structures as well as in a 5 mile radius of the Plant. The system provides two-way portable and mobile communications for normal and emergency Plant operation. Portable and mobile users have communications capability with fixed operator positions in the Control Room, TSC and EOF, and with security radio consoles, if desired.

3. Site Telephone System

The Touchtone Telephone System consists of telephone stations located throughout the Power Block, in the main Control Room, Security Building, Administration Building and various other buildings around the site. The system has diverse routing to provide multiple routes for both inward and outward dialing. The telephone system is powered through a battery backup system, which can provide about 8 hours of service after loss of offsite power.

4. Local Telephone Company Direct Lines

In the event of a total system failure there are multiple direct telephone lines from the local telephone company which remain operational for access to the local Burlington exchange.

5. ENS line

The NRC Emergency Notification System (ENS) is a Federal Telephone System (FTS) telephone used for official communications with NRC Headquarters. The NRC Headquarters has the capability to patch into the NRC Regional offices. The primary purpose of this phone is to provide a reliable method for the initial notification of the NRC and to maintain continuous communications with the NRC after initial notification. ENS telephones are located in the Control Room, TSC and EOF.

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

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 Offsite Response Organizations (OROs) and the NRC.

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

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

The second condition addresses a total loss of the communications methods used to notify all offsite organizations of an emergency declaration. The offsite organizations referred to here are the State and Coffey County EOCs.

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

WCGS Basis Reference(s):

1. Wolf Creek Plant Radiological Emergency Response Plan (RERP), Section 6.16.1
2. USAR Section 9.5.2
3. NEI 99-01 CU5

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EAL Bases

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 6 – Hazardous Event Affecting Safety Systems

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

EAL:

CA6.1 Alert

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

AND EITHER:

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

Table C-6 Hazardous Events

- Seismic event (earthquake)
- Internal or external FLOODING event
- High winds or tornado strike
- FIRE
- EXPLOSION
- Other events with similar hazard characteristics as determined by the Emergency Manager

Mode Applicability:

5 - Cold Shutdown, 6 - Refueling

Definition(s):

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

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

ATTACHMENT 1
EAL Bases

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

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

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

- (1) The integrity of the reactor coolant pressure boundary;
- (2) The capability to shut down the reactor and maintain it in a safe shutdown condition;
- (3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures.

VISIBLE DAMAGE - Damage to a component or structure that is readily observable without measurements, testing, or analysis. The visual impact of the damage is sufficient to cause concern regarding the operability or reliability of the affected component or structure. Damage resulting from an equipment failure and limited to the failed component (i.e., the failure did **not** cause damage to a structure or any other equipment) is **not** visible damage.

Basis:

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

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

With respect to hazards caused by an equipment failure (e.g., an electrical breaker failure leading to an explosion), no emergency declaration is warranted if the hazard did not cause any damage to another safety system, or another train of the affected safety system. If the hazard resulting from an equipment failure causes damage to another safety system, or another train of the affected safety system (i.e., a system or train that was not the source of the initiating equipment failure), then an emergency declaration is required per this EAL.

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

Escalation of the emergency classification level would be via IC CS1 or RS1.

WCGS Basis Reference(s):

1. NEI 99-01 CA6

ATTACHMENT 1
EAL Bases

Category H – Hazards and Other Conditions Affecting Plant Safety

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

Hazards are non-plant, system-related events that can directly or indirectly affect plant operation, reactor plant safety or personnel safety.

1. Security

Unauthorized entry attempts into the Protected Area, credible bomb threats, sabotage attempts, and actual security compromises threatening loss of physical control of the plant.

2. Seismic Event

Natural events such as earthquakes have potential to cause plant structure or equipment damage of sufficient magnitude to threaten personnel or plant safety.

3. Natural or Technology Hazard

Other natural and non-naturally occurring events that can cause damage to plant facilities include tornados, FLOODING, hazardous material releases and events restricting site access warranting classification.

4. Fire

FIRES can pose significant hazards to personnel and reactor safety. Appropriate for classification are FIRES within the site Protected Area or which may affect operability of equipment needed for safe shutdown

5. Hazardous Gases

Toxic, corrosive, asphyxiant or flammable gas leaks can affect normal plant operations or preclude access to plant areas required to safely shutdown the plant.

6. Control Room Evacuation

Events that are indicative of loss of Control Room habitability. If the Control Room must be evacuated, additional support for monitoring and controlling plant functions is necessary through the emergency response facilities.

ATTACHMENT 1
EAL Bases

7. Emergency Manager Judgment

The EALs defined in other categories specify the predetermined symptoms or events that are indicative of emergency or potential emergency conditions and thus warrant classification. While these EALs have been developed to address the full spectrum of possible emergency conditions which may warrant classification and subsequent implementation of the Emergency Plan, a provision for classification of emergencies based on operator/management experience and judgment is still necessary. The EALs of this category provide the Emergency Manager the latitude to classify emergency conditions consistent with the established classification criteria based upon Emergency Manager judgment.

ATTACHMENT 1
EAL Bases

Category: H – Hazards
Subcategory: 1 – Security
Initiating Condition: Confirmed SECURITY CONDITION or threat
EAL:

HU1.1 Unusual Event

A SECURITY CONDITION that does **not** involve a HOSTILE ACTION as reported by the Security Shift Lieutenant

OR

Notification of a credible security threat directed at the site

OR

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

Mode Applicability:

All

Definition(s):

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

HOSTILE ACTION - An act toward WCGS 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 WCGS. 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).

Basis:

The security shift supervision is defined as the Security Shift Lieutenant.

This EAL is based on the Wolf Creek Generating Station Security Plan (ref. 1).

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

Timely and accurate communications between Security Shift Supervision and the Control Room is essential for proper classification of a security-related event (ref. 2, 3). Classification of these events will initiate appropriate threat-related notifications to plant personnel and Offsite Response Organizations.

ATTACHMENT 1

EAL Bases

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*.

The first threshold references the Shift Security Lieutenant because these are the individuals trained to confirm that a security event is occurring or has occurred. Training on security event confirmation and classification is controlled due to the nature of Safeguards and 10 CFR § 2.39 information.

The second threshold addresses the receipt of a credible security threat. The credibility of the threat is assessed in accordance with the Wolf Creek Generating Station Security Plan.

The third threshold addresses the threat from the impact of an aircraft on the plant. The NRC Headquarters Operations Officer (HOO) will communicate to the licensee if the threat involves an aircraft. The status and size of the plane may also be provided by NORAD through the NRC. Validation of the threat is performed in accordance with the Wolf Creek Generating Station Security Plan (ref. 1).

Emergency plans and implementing procedures are public documents; therefore, EALs should not incorporate Security-sensitive information. This includes information that may be advantageous to a potential adversary, such as the particulars concerning a specific threat or threat location. Security-sensitive information should be contained in non-public documents such as the Wolf Creek Generating Station Security Plan (ref. 1).

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

WCGS Basis Reference(s):

1. Wolf Creek Generating Station Security Plan (Safeguards)
2. OFN SK-039 Security Event
3. OFN 00-036 Bomb Threat, Sabotage, Medical Emergency/Rescue, and Spills
4. NEI 99-01 HU1

ATTACHMENT 1
EAL Bases

Category: H – Hazards
Subcategory: 1 – Security
Initiating Condition: HOSTILE ACTION within the OWNER CONTROLLED AREA or airborne attack threat within 30 minutes

EAL:

HA1.1 Alert

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

OR

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

Mode Applicability:

All

Definition(s):

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

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

Basis:

The security shift supervision is defined as the Security Shift Lieutenant.

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

Security plans and terminology are based on the guidance provided by NEI 03-12, *Template for the Security Plan, Training and Qualification Plan, Safeguards Contingency Plan*.

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.

ATTACHMENT 1

EAL Bases

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

The first threshold is applicable for any Hostile Action occurring, or that has occurred, in the Owner Controlled Area.

The second threshold addresses the threat from the impact of an aircraft on the plant, and the anticipated arrival time is within 30 minutes. The intent of this EAL is to ensure that threat-related notifications are made in a timely manner so that plant personnel and offsite organizations are in a heightened state of readiness. This EAL is met when the threat-related information has been validated in accordance with site-specific procedures.

In some cases, it may not be readily apparent if an aircraft impact within the Owner Controlled Area was intentional (i.e., a Hostile Action). It is expected, although not certain, that notification by an appropriate Federal agency to the site would clarify this point. In this case, the appropriate federal agency is intended to be NORAD, FBI, FAA or NRC. The emergency declaration, including one based on other ICs/EALs, should not be unduly delayed while awaiting notification by a Federal agency.

Emergency plans and implementing procedures are public documents; therefore, EALs should not incorporate Security-sensitive information. This includes information that may be advantageous to a potential adversary, such as the particulars concerning a specific threat or threat location. Security-sensitive information should be contained in non-public documents such as the Wolf Creek Generating Station Security Plan (ref. 1).

WCGS Basis Reference(s):

1. Wolf Creek Generating Station Security Plan (Safeguards)
2. OFN SK-039 Security Event
3. OFN 00-036 Bomb Threat, Sabotage, Medical Emergency/Rescue, and Spills
4. NEI 99-01 HA1

ATTACHMENT 1
EAL Bases

Category: H – Hazards
Subcategory: 1 – Security
Initiating Condition: HOSTILE ACTION within the PROTECTED AREA
EAL:

HS1.1 Site Area Emergency

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

Mode Applicability:

All

Definition(s):

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

PROTECTED AREA - An area encompassed by physical barriers and to which access is controlled. The Protected Area refers to the designated security area around the process buildings and is depicted in USAR Figure 1.2-44 Site Plan.

Basis:

The security shift supervision is defined as the Security Shift Lieutenant.

These individuals are the designated on-site personnel qualified and trained to confirm that a security event is occurring or has occurred. Training on security event classification confirmation is closely controlled due to the strict secrecy controls placed on the Wolf Creek Plant Security Plan (Safeguards) information. (ref. 1)

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

Security plans and terminology are based on the guidance provided by NEI 03-12, *Template for the Security Plan, Training and Qualification Plan, Safeguards Contingency*.

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 state and county 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.

ATTACHMENT 1

EAL Bases

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

Emergency plans and implementing procedures are public documents; therefore, EALs should not incorporate Security-sensitive information. This includes information that may be advantageous to a potential adversary, such as the particulars concerning a specific threat or threat location. Security-sensitive information should be contained in non-public documents such as the Wolf Creek Generating Station Security Plan (ref. 1).

WCGS Basis Reference(s):

1. Wolf Creek Generating Station Security Plan (Safeguards)
2. OFN SK-039 Security Event
3. OFN 00-036 Bomb Threat, Sabotage, Medical Emergency/Rescue, and Spills
4. NEI 99-01 HS1

ATTACHMENT 1
EAL Bases

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 2 – Seismic Event

Initiating Condition: Seismic event greater than OBE level

EAL:

HU2.1 Unusual Event

Seismic event > OBE as indicated by Seismic Activity Annunciator 00-098D

Mode Applicability:

All

Definition(s):

None

Basis:

Ground motion acceleration of 0.06 g horizontal or .04 g vertical is the Operating Basis Earthquake for WCGS(ref. 1).

Annunciator 00-098D, OBE will illuminate if the seismic instrument detects ground motion in excess of the OBE threshold (ref. 2).

OFN SG-003, Natural Events provides the guidance for determining if the OBE earthquake threshold is exceeded and any required response actions. (ref. 3)

To avoid inappropriate emergency classification resulting from spurious actuation of the seismic instrumentation or felt motion not attributable to seismic activity, an offsite agency (USGS, National Earthquake Information Center) can confirm that an earthquake has occurred in the area of the plant. Such confirmation should not, however, preclude a timely emergency declaration based on receipt of the OBE alarm. The NEIC can be contacted by calling **(303) 273-8500**. Select **option #1** and inform the analyst you wish to confirm recent seismic activity in the vicinity of WCGS. Alternatively, near real-time seismic activity can be accessed via the NEIC website:

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

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

Event verification with external sources should not be necessary during or following an OBE. Earthquakes of this magnitude should be readily felt by on-site personnel and recognized as a seismic event (e.g., lateral accelerations in excess of 0.06g). The Shift Manager or Emergency Manager may seek external verification if deemed appropriate (e.g., a call to the

ATTACHMENT 1
EAL Bases

USGS, check internet news sources, etc.); however, the verification action must not preclude a timely emergency declaration.

Depending upon the plant mode at the time of the event, escalation of the emergency classification level would be via IC CA6 or SA9.

WCGS Basis Reference(s):

1. FSAR Section 2.5.2.7 Operating Basis Earthquake
2. ALR 00-098D OBE
3. OFN SG-003, Natural Events
4. NEI 99-01 HU2

ATTACHMENT 1
EAL Bases

Category: H – Hazards and Other Conditions Affecting Plant Safety
Subcategory: 3 – Natural or Technology Hazard
Initiating Condition: Hazardous event
EAL:

HU3.1 Unusual Event

A tornado strike within the PROTECTED AREA
--

Mode Applicability:

All

Definition(s):

PROTECTED AREA - An area encompassed by physical barriers and to which access is controlled. The Protected Area refers to the designated security area around the process buildings and is depicted in USAR Figure 1.2-44 Site Plan.

Basis:

Response actions associated with a tornado onsite is provided in OFN SG-003 Natural Events (ref. 1).

If damage is confirmed visually or by other in-plant indications, the event may be escalated to an Alert under EAL CA6.1 or SA9.1.

A tornado striking (touching down) within the Protected Area warrants declaration of an Unusual Event regardless of the measured wind speed at the meteorological tower. A tornado is defined as a violently rotating column of air in contact with the ground and extending from the base of a thunderstorm.

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

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

WCGS Basis Reference(s):

1. OFN SG-003 Natural Events
2. NEI 99-01 HU3

ATTACHMENT 1
EAL Bases

Category: H – Hazards and Other Conditions Affecting Plant Safety
Subcategory: 3 – Natural or Technology Hazard
Initiating Condition: Hazardous event
EAL:

HU3.2 Unusual Event

Internal room or area FLOODING of a magnitude sufficient to require manual or automatic electrical isolation of a SAFETY SYSTEM component needed for the current operating mode

Mode Applicability:

All

Definition(s):

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

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

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

- (1) The integrity of the reactor coolant pressure boundary;
- (2) The capability to shut down the reactor and *maintain* it in a safe shutdown condition;
- (3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures.

Basis:

Refer to EAL CA6.1 or SA9.1 for internal or external flooding affecting one or more SAFETY SYSTEM trains.

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

This EAL addresses flooding of a building room or area that results in operators isolating power to a Safety System component due to water level or other wetting concerns.

Classification is also required if the water level or related wetting causes an automatic isolation of a Safety System component from its power source (e.g., a breaker or relay trip). To warrant classification, operability of the affected component must be required by Technical Specifications for the current operating mode.

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

ATTACHMENT 1
EAL Bases

WCGS Basis Reference(s):

1. NEI 99-01 HU3

ATTACHMENT 1
EAL Bases

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 3 – Natural or Technology Hazard

Initiating Condition: Hazardous event

EAL:

HU3.3 Unusual Event

Movement of personnel within the PROTECTED AREA is IMPEDED due to an offsite event involving hazardous materials (e.g., an offsite chemical spill or toxic gas release)

Mode Applicability:

All

Definition(s):

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

PROTECTED AREA - An area encompassed by physical barriers and to which access is controlled. The Protected Area refers to the designated security area around the process buildings and is depicted in USAR Figure 1.2-44 Site Plan.

Basis:

As used here, the term "offsite" is meant to be areas external to the WCGS Protected Area.

This EAL addresses a hazardous materials event originating at an offsite location and of sufficient magnitude to impede the movement of personnel within the Protected Area.

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

WCGS Basis Reference(s):

1. NEI 99-01 HU3

ATTACHMENT 1
EAL Bases

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 3 – Natural or Technology Hazard

Initiating Condition: Hazardous event

EAL:

HU3.4 Unusual Event

A hazardous event that results in on-site conditions sufficient to prohibit the plant staff from accessing the site via personal vehicles (Note 7)

Note 7: This EAL does **not** apply to routine traffic impediments such as fog, snow, ice, or vehicle breakdowns or accidents.

Mode Applicability:

All

Definition(s):

None

Basis:

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

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

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

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

WCGS Basis Reference(s):

1. NEI 99-01 HU3

ATTACHMENT 1
EAL Bases

Category: H – Hazards and Other Conditions Affecting Plant Safety
Subcategory: 4 – Fire
Initiating Condition: FIRE potentially degrading the level of safety of the plant
EAL:

HU4.1 Unusual Event

A FIRE is **not** extinguished within 15 min. of **any** of the following FIRE detection indications (Note 1):

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

AND

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

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

Table H-1 Fire Areas

- | |
|---|
| <ul style="list-style-type: none">• Auxiliary Building• Reactor Building• Control Building• Fuel Building• Emergency Diesel Generator Building• ESW Pump House• Refueling Water Storage Tank Valve Room |
|---|

Mode Applicability:

All

Definition(s):

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

Basis:

The 15 minute requirement begins with a credible notification that a fire is occurring, or receipt of multiple valid fire detection system alarms in the same fire area or field validation of a single fire alarm. The alarm is to be validated using available Control Room indications or alarms to prove that it is not spurious, or by reports from the field.

Table H-1 Fire Areas are based on AP 10-100 Fire Protection Program Section 4.15 Safety Related Areas. Table H-1 Fire Areas include those structures containing functions and systems required for safe shutdown of the plant (Safety Systems) (ref. 1).

ATTACHMENT 1
EAL Bases

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

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

Upon receipt, operators will take prompt actions to confirm the validity of initial fire alarms, indications, or report. For EAL assessment purposes, the emergency declaration clock starts at the time that the initial alarms, 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 multiple initial alarms, indication or report.

Depending upon the plant mode at the time of the event, escalation of the emergency classification level would be via IC CA6 or SA9.

WCGS Basis Reference(s):

1. AP 10-100 Fire Protection Program Section 4.15 Safety Related Areas
2. NEI 99-01 HU4

ATTACHMENT 1
EAL Bases

Category: H – Hazards and Other Conditions Affecting Plant Safety
Subcategory: 4 – Fire
Initiating Condition: FIRE potentially degrading the level of safety of the plant
EAL:

HU4.2 Unusual Event

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

AND

The fire alarm is indicating a FIRE within **any** Table H-1 area

AND

The existence of a FIRE is **not** verified within 30 min. of alarm receipt (Note 1)

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

Table H-1 Fire Areas
<ul style="list-style-type: none">• Auxiliary Building• Reactor Building• Control Building• Fuel Building• Emergency Diesel Generator Building• ESW Pump House• Refueling Water Storage Tank Valve Room

Mode Applicability:

All

Definition(s):

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

Basis:

The 30 minute requirement begins upon receipt of a single fire detection system alarm. The alarm is to be validated using available Control Room indications or alarms to prove that it is not spurious, or by reports from the field. Actual field reports must be made within the 30 minute time limit or a classification must be made. If a FIRE is verified to be occurring by field report, classification shall be made based on EAL HU4.1.

Table H-1 Fire Areas are based on AP 10-100 Fire Protection Program Section 4.15 Safety Related Areas. Table H-1 Fire Areas include those structures containing functions and systems required for safe shutdown of the plant (Safety Systems) (ref. 1).

ATTACHMENT 1

EAL Bases

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

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

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

If an actual FIRE is verified by a report from the field, then EAL HU4.1 is immediately applicable, and the emergency must be declared if the FIRE is not extinguished within 15-minutes of the report. If the alarm is verified to be due to an equipment failure or a spurious activation, and this verification occurs within 30-minutes of the receipt of the alarm, then this EAL is not applicable and no emergency declaration is warranted.

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 HU4.2, the 30-minutes to verify a single alarm is well within this worst-case 1-hour time period.

Depending upon the plant mode at the time of the event, escalation of the emergency classification level would be via IC CA6 or SA9.

ATTACHMENT 1
EAL Bases

WCGS Basis Reference(s):

1. AP 10-100 Fire Protection Program Section 4.15 Safety Related Areas
2. NEI 99-01 HU4

ATTACHMENT 1
EAL Bases

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 4 – Fire

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

EAL:

HU4.3 Unusual Event

A FIRE within the plant PROTECTED AREA **not** extinguished within 60 min. of the initial report, alarm or indication (Note 1)

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

Mode Applicability:

All

Definition(s):

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

PROTECTED AREA - An area encompassed by physical barriers and to which access is controlled. The Protected Area refers to the designated security area around the process buildings and is depicted in USAR Figure 1.2-44 Site Plan.

Basis:

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

In addition to a fire addressed by HU4.1 or HU4.2, a FIRE within the plant Protected Area not extinguished within 60-minutes may also potentially degrade the level of plant safety.

Depending upon the plant mode at the time of the event, escalation of the emergency classification level would be via IC CA6 or SA9.

WCGS Basis Reference(s):

1. NEI 99-01 HU4

ATTACHMENT 1
EAL Bases

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 4 – Fire

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

EAL:

HU4.4 Unusual Event

A FIRE within the plant PROTECTED AREA that requires firefighting support by an offsite fire response agency to extinguish

Mode Applicability:

All

Definition(s):

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

PROTECTED AREA - An area encompassed by physical barriers and to which access is controlled. The Protected Area refers to the designated security area around the process buildings and is depicted in USAR Figure 1.2-44 Site Plan.

Basis:

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

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

Depending upon the plant mode at the time of the event, escalation of the emergency classification level would be via IC CA6 or SA9.

WCGS Basis Reference(s):

1. NEI 99-01 HU4

ATTACHMENT 1
EAL Bases

Category: H – Hazards and Other Conditions Affecting Plant Safety
Subcategory: 5 – Hazardous Gases
Initiating Condition: Gaseous release IMPEDING access to equipment necessary for normal plant operations, cooldown or shutdown

EAL:

HA5.1 Alert

Release of a toxic, corrosive, asphyxiant or flammable gas that prohibits or IMPEDES access to **any** Table H-2 rooms or areas (Note 5)

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

Table H-2 Safe Operation & Shutdown Rooms/Areas	
Room/Area	Mode Applicability
North Electrical Pen. Room A	3, 4
South Electrical Pen. Room B	3, 4
ESF SWGR Room No. 1 (TRN A)	4
ESF SWGR Room No. 2 (TRN B)	4
Auxiliary Building/West Hall Elev 2000	3,4,5

Mode Applicability:

3 - Hot Standby, 4 – Hot Shutdown, 5 – Cold Shutdown

Definition(s):

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

Basis:

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

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 Manager's judgment that the gas concentration in the affected room/area is

ATTACHMENT 1

EAL Bases

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 elevated radiation levels). For example, the plant is in Mode 5 when the radiation increase occurs, and the procedures used for normal operation, cooldown and shutdown only require entry into the affected room in Modes 1-4.
- 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.

NOTE: EAL HA5.1 mode applicability has been limited to the applicable modes identified in Table H-2 Safe Operation & Shutdown Rooms/Areas. If due to plant operating procedure or plant configuration changes, the applicable plant modes specified in Table H-2 are changed, a corresponding change to Attachment 3 'Safe Operation & Shutdown Areas Tables R-3 & H-2 Bases' and to EAL HA5.1 mode applicability is required.

WCGS Basis Reference(s):

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

ATTACHMENT 1
EAL Bases

Category: H – Hazards and Other Conditions Affecting Plant Safety
Subcategory: 6 – Control Room Evacuation
Initiating Condition: Control Room evacuation resulting in transfer of plant control to alternate locations

EAL:

HA6.1 Alert

An event has resulted in plant control being transferred from the Control Room to the Auxiliary Shutdown Panel (ASP)

Mode Applicability:

All

Definition(s):

None

Basis:

The Shift Manager (SM) determines if the Control Room is inoperable and requires evacuation. Control Room inhabitability may be caused by FIRE, dense smoke, noxious vapors or radiation/airborne activity in or adjacent to the Control Room, or other life threatening conditions. OFN RP-013 Control Room Not Habitable and/or OFN RP-017 Control Room Evacuation provides the instructions for tripping the unit, and maintaining RCS inventory and Hot Shutdown conditions from outside the Control Room (Ref. 1, 2).

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

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.

WCGS Basis Reference(s):

1. OFN RP-013 Control Room Not Habitable
2. OFN RP-017 Control Room Evacuation
3. NEI 99-01 HA6

ATTACHMENT 1
EAL Bases

Category: H – Hazards and Other Conditions Affecting Plant Safety
Subcategory: 6 – Control Room Evacuation
Initiating Condition: Inability to control a key safety function from outside the Control Room
EAL:

HS6.1 Site Area Emergency

An event has resulted in plant control being transferred from the Control Room to the Auxiliary Shutdown Panel (ASP)

AND

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

- Reactivity (Modes 1, 2 and 3 **only**)
- Core Cooling
- RCS heat removal

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

Mode Applicability:

1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 – Hot Shutdown, 5 - Cold Shutdown,
6 - Refueling

Definition(s):

None

Basis:

For the purpose of this EAL the 15 minute clock starts when the last licensed operator leaves the Control Room.

The Shift Manager (SM) determines if the Control Room is inoperable and requires evacuation. Control Room inhabitability may be caused by FIRE, dense smoke, noxious vapors or radiation/airborne activity in or adjacent to the Control Room, or other life threatening conditions. OFN RP-013 Control Room Not Habitable and/or OFN RP-017 Control Room Evacuation provides the instructions for tripping the unit, and maintaining RCS inventory and Hot Shutdown conditions from outside the Control Room (Ref. 1, 2).

The intent of this EAL is to capture events in which control of the plant cannot be reestablished in a timely manner. The fifteen minute time for transfer starts when the last licensed operator leaves the Control Room (not when OFN RP-013 or OFN RP-017 is entered). The time interval is based on how quickly control must be reestablished without core uncover and/or core damage.

Once the Control Room is evacuated, the objective is to establish control of important plant equipment and maintain knowledge of important plant parameters in a timely manner. Primary emphasis should be placed on components and instruments that supply protection for and

ATTACHMENT 1

EAL Bases

information about safety functions. Typically, these safety functions are reactivity control (ability to shutdown the reactor and maintain it shutdown), RCS inventory (ability to cool the core), and secondary heat removal (ability to maintain a heat sink).

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 Manager judgment. The Emergency Manager is expected to make a reasonable, informed judgment within (the site-specific time for transfer) 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.

WCGS Basis Reference(s):

1. OFN RP-013 Control Room Not Habitable
2. OFN RP-017 Control Room Evacuation
3. NEI 99-01 HS6

ATTACHMENT 1

EAL Bases

Category: H – Hazards and Other Conditions Affecting Plant Safety
Subcategory: 7 – Emergency Manager Judgment
Initiating Condition: Other conditions existing that in the judgment of the Emergency Manager warrant declaration of a UE

EAL:

HU7.1 Unusual Event

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

Mode Applicability:

All

Definition(s):

None

Basis:

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

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 Manager to fall under the emergency classification level description for an Unusual Event.

WCGS Basis Reference(s):

1. Wolf Creek Radiological Emergency Response Plan section 5.1 Site Emergency Manager
2. Wolf Creek Radiological Emergency Response Plan section 5.7 Shift Manager
3. NEI 99-01 HU7

ATTACHMENT 1
EAL Bases

Category: H – Hazards and Other Conditions Affecting Plant Safety
Subcategory: 7 – Emergency Manager Judgment
Initiating Condition: Other conditions exist that in the judgment of the Emergency Manager warrant declaration of an Alert

EAL:

HA7.1 Alert

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

Mode Applicability:

All

Definition(s):

HOSTILE ACTION - An act toward WCGS 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 WCGS. 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).

Basis:

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

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 Manager to fall under the emergency classification level description for an Alert.

ATTACHMENT 1
EAL Bases

WCGS Basis Reference(s):

1. Wolf Creek Radiological Emergency Response Plan section 5.1 Site Emergency Manager
2. Wolf Creek Radiological Emergency Response Plan section 5.7 Shift Manager
3. NEI 99-01 HA7

ATTACHMENT 1

EAL Bases

Category: H – Hazards and Other Conditions Affecting Plant Safety
Subcategory: 7 – Emergency Manager Judgment
Initiating Condition: Other conditions existing that in the judgment of the Emergency Manager warrant declaration of a Site Area Emergency

EAL:

HS7.1 Site Area Emergency

Other conditions exist which in the judgment of the Emergency Manager indicate that events are in progress or have occurred which involve actual or likely major failures of plant functions needed for protection of the public or HOSTILE ACTION that results in intentional damage or malicious acts, (1) toward site personnel or equipment that could lead to the likely failure of or, (2) that prevent effective access to equipment needed for the protection of the public. Any releases are **not** expected to result in exposure levels which exceed EPA Protective Action Guideline exposure levels beyond the SITE BOUNDARY

Mode Applicability:

All

Definition(s):

HOSTILE ACTION - An act toward WCGS 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 WCGS. 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).

Basis:

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

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 Manager to fall under the emergency classification level description for a Site Area Emergency.

ATTACHMENT 1
EAL Bases

WCGS Basis Reference(s):

1. Wolf Creek Radiological Emergency Response Plan section 5.1 Site Emergency Manager
2. Wolf Creek Radiological Emergency Response Plan section 5.7 Shift Manager
3. NEI 99-01 HS7

ATTACHMENT 1

EAL Bases

Category: H – Hazards and Other Conditions Affecting Plant Safety
Subcategory: 7 – Emergency Manager Judgment
Initiating Condition: Other conditions exist which in the judgment of the Emergency Manager warrant declaration of a General Emergency

EAL:

HG7.1 General Emergency

Other conditions exist which in the judgment of the Emergency Manager indicate that events are in progress or have occurred which involve actual or **IMMINENT** substantial core degradation or melting with potential for loss of containment integrity or **HOSTILE ACTION** that results in an actual loss of physical control of the facility. Releases can be reasonably expected to exceed EPA Protective Action Guideline exposure levels offsite for more than the immediate site area

Mode Applicability:

All

Definition(s):

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

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

Basis:

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

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

ATTACHMENT 1
EAL Bases

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 Manager to fall under the emergency classification level description for a General Emergency.

WCGS Basis Reference(s):

1. Wolf Creek Radiological Emergency Response Plan section 5.1 Site Emergency Manager
2. Wolf Creek Radiological Emergency Response Plan section 5.7 Shift Manager
3. NEI 99-01 HG7

ATTACHMENT 1
EAL Bases

Category S – System Malfunction

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

Numerous system-related equipment failure events that warrant emergency classification have been identified in this category. They may pose actual or potential threats to plant safety.

The events of this category pertain to the following subcategories:

1. Loss of Emergency AC Power

Loss of emergency electrical power can compromise plant safety system operability including decay heat removal and emergency core cooling systems which may be necessary to ensure fission product barrier integrity. This category includes loss of onsite and offsite sources for 4.16KV AC emergency buses.

2. Loss of Vital DC Power

Loss of emergency electrical power can compromise plant safety system operability including decay heat removal and emergency core cooling systems which may be necessary to ensure fission product barrier integrity. This category includes loss of vital plant 125 VDC power sources.

3. Loss of Control Room Indications

Certain events that degrade plant operator ability to effectively assess plant conditions within the plant warrant emergency classification. Losses of indicators are in this subcategory.

4. RCS Activity

During normal operation, reactor coolant fission product activity is very low. Small concentrations of fission products in the coolant are primarily from the fission of tramp uranium in the fuel clad or minor perforations in the clad itself. Any significant increase from these base-line levels (2% - 5% clad failures) is indicative of fuel failures and is covered under the Fission Product Barrier Degradation category. However, lesser amounts of clad damage may result in coolant activity exceeding Technical Specification limits. These fission products will be circulated with the reactor coolant and can be detected by coolant sampling.

5. RCS Leakage

The reactor vessel provides a volume for the coolant that covers the reactor core. The reactor pressure vessel and associated pressure piping (reactor coolant system) together provide a barrier to limit the release of radioactive material should the reactor fuel clad integrity fail. Excessive RCS leakage greater than Technical Specification limits indicates potential pipe cracks that may propagate to an extent threatening fuel clad, RCS and containment integrity.

6. RTS Failure

This subcategory includes events related to failure of the Reactor Trip System (RTS) to initiate and complete reactor trips. In the plant licensing basis, postulated failures of the RTS to complete a reactor trip comprise a specific set of analyzed events referred to as

ATTACHMENT 1
EAL Bases

Anticipated Transient Without Scram (ATWS) events. For EAL classification, however, ATWS is intended to mean any trip failure event that does not achieve reactor shutdown. If RTS actuation fails to assure reactor shutdown, positive control of reactivity is at risk and could cause a threat to fuel clad, RCS and containment integrity.

7. Loss of Communications

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

8. Containment Failure

Failure of containment isolation capability (under conditions in which the containment is not currently challenged) warrants emergency classification. Failure of containment pressure control capability also warrants emergency classification.

9. Hazardous Event Affecting Safety Systems

Various natural and technological events that result in degraded plant safety system performance or significant VISIBLE DAMAGE warrant emergency classification under this subcategory.

ATTACHMENT 1
EAL Bases

Category: S – System Malfunction
Subcategory: 1 – Loss of Emergency AC Power
Initiating Condition: Loss of all offsite AC power capability to emergency buses for 15 minutes or longer

EAL:

SU1.1 Unusual Event

Loss of all offsite AC power capability, Table S-1, to emergency 4.16KV buses NB01 and NB02 for ≥ 15 min. (Note 1)

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

Table S-1 AC Power Sources
Offsite: <ul style="list-style-type: none">• ESF XFMR XNB01• ESF XFMR XNB02
Onsite: <ul style="list-style-type: none">• EDG NE01• EDG NE02

Mode Applicability:

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

Definition(s):

None

Basis:

The 4.16KV AC System provides the power requirements for operation and safe shutdown of the plant. The essential switchgear are buses NB01 and NB02 (ref. 1). 4.16KV buses NB01 and NB02 are the emergency (essential) buses. NB01 supplies power to Load Group 1 (Red Train) safety related loads and NB02 supplies power to Load Group 2 (Yellow Train) safety related loads. Each bus has two sources of offsite power. One source is from 4.16KV ESF transformer XNB01 and the other source is from the ESF transformer XNB02. Transformer XNB01 is the normal supply to bus NB01 and the alternate supply to bus NB02; XNB02 is the normal supply to bus NB02 and the alternate supply to bus NB01 (ref. 1, 2).

In addition, NB01 and NB02 each have an emergency diesel generator which supply electrical power to the bus automatically in the event that the preferred source becomes unavailable (ref. 2).

An additional source of power are the SBO diesel generators SBO DGs (ref. 3, 4). Credit can be taken for this source only if they are already aligned because they cannot be aligned within 15 minutes.

ATTACHMENT 1

EAL Bases

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 SA1.

WCGS Basis Reference(s):

1. USAR figure 8.2-5 Electrical one line diagram of Wolf Creek 345 KV switchyard
2. USAR Section 8.3
3. OFN NB-030 Loss of AC Emergency Bus NB01 (NB02)
4. SYS KU-121(122) Energizing NB01(NB02) From Station Blackout Diesel Generators
5. NEI 99-01 SU1

ATTACHMENT 1
EAL Bases

Category: S – System Malfunction
Subcategory: 1 – Loss of Emergency AC Power
Initiating Condition: Loss of **all but one** AC power source to emergency buses for 15 minutes or longer

EAL:

SA1.1 Alert

AC power capability, Table S-1, to emergency 4.16KV buses NB01 and NB02 reduced to a single power source for ≥ 15 min. (Note 1)

AND

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

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

Table S-1 AC Power Sources
Offsite: <ul style="list-style-type: none">• ESF XFMR XNB01• ESF XFMR XNB02
Onsite: <ul style="list-style-type: none">• EDG NE01• EDG NE02

Mode Applicability:

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

Definition(s):

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

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

- (1) The integrity of the reactor coolant pressure boundary;
- (2) The capability to shut down the reactor and maintain it in a safe shutdown condition;
- (3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures.

ATTACHMENT 1 EAL Bases

Basis:

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

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

The 4.16KV AC System provides the power requirements for operation and safe shutdown of the plant. The essential switchgear are buses NB01 and NB02 (ref. 1).

4.16KV buses NB01 and NB02 are the emergency (essential) buses. NB01 supplies power to Load Group 1 (Red Train) safety related loads and NB02 supplies power to Load Group 2 (Yellow Train) safety related loads. Each bus has two sources of offsite power. One source is from 4.16KV ESF transformer XNB01 and the other source is from the ESF transformer XNB02. Transformer XNB01 is the normal supply to bus NB01 and the alternate supply to bus NB02; XNB02 is the normal supply to bus NB02 and the alternate supply to bus NB01 (ref. 1, 2).

In addition, NB01 and NB02 each have an emergency diesel generator which supply electrical power to the bus automatically in the event that the preferred source becomes unavailable (ref. 2).

An additional source of power are the SBO diesel generators SBO DGs (ref. 3, 4). Credit can be taken for this source only if they are already aligned because they cannot be aligned within 15 minutes.

This hot condition EAL is equivalent to the cold condition EALCU2.1.

If the capability of a second source of emergency bus power is not restored to at least one emergency bus within 15 minutes, an Alert is declared under this EAL.

This IC describes a significant degradation of offsite and onsite AC power sources such that any additional single failure would result in a loss of all AC power to Safety Systems. In this condition, the sole AC power source may be powering one, or more than one, train of safety-related equipment. This IC provides an escalation path from IC SU1.

An "AC power source" is a source recognized in OFNs and EMGs, 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 fed from an offsite power source.

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

Escalation of the emergency classification level would be via IC SS1.

ATTACHMENT 1
EAL Bases

WCGS Basis Reference(s):

1. USAR figure 8.2-5 Electrical one line diagram of Wolf Creek 345 KV switchyard
2. USAR Section 8.3
3. OFN NB-030 Loss of AC Emergency Bus NB01 (NB02)
4. SYS KU-121(122) Energizing NB01(NB02) From Station Blackout Diesel Generators
5. NEI 99-01 SA1

ATTACHMENT 1
EAL Bases

Category: S – System Malfunction
Subcategory: 1 – Loss of Emergency AC Power
Initiating Condition: Loss of **all** offsite power and **all** onsite AC power to emergency buses for 15 minutes or longer

EAL:

SS1.1 Site Area Emergency

Loss of **all** offsite and **all** onsite AC power capability to emergency 4.16KV buses NB01 and NB02 for ≥ 15 min. (Note 1)

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

Mode Applicability:

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

Definition(s):

None

Basis:

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

The 4.16KV AC System provides the power requirements for operation and safe shutdown of the plant. The essential switchgear are buses NB01 and NB02 (ref. 1).

4.16KV buses NB01 and NB02 are the emergency (essential) buses. NB01 supplies power to Load Group 1 (Red Train) safety related loads and NB02 supplies power to Load Group 2 (Yellow Train) safety related loads. Each bus has two sources of offsite power. One source is from 4.16KV ESF transformer XNB01 and the other source is from the ESF transformer XNB02. Transformer XNB01 is the normal supply to bus NB01 and the alternate supply to bus NB02; XNB02 is the normal supply to bus NB02 and the alternate supply to bus NB01 (ref. 1, 2).

In addition, NB01 and NB02 each have an emergency diesel generator, which supply electrical power to the bus automatically in the event that the preferred source becomes unavailable (ref. 2).

An additional source of power are the SBO diesel generators SBO DGs (ref. 3, 4). Credit can be taken for this source only if they are already aligned because they cannot be aligned within 15 minutes.

The interval begins when both offsite and onsite AC power capability are lost.

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

ATTACHMENT 1

EAL Bases

conditions. This IC represents a condition that involves actual or likely major failures of plant functions needed for the protection of the public.

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

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

WCGS Basis Reference(s):

1. USAR figure 8.2-5 Electrical one line diagram of Wolf Creek 345 KV switchyard
2. USAR Section 8.3
3. OFN NB-030 Loss of AC Emergency Bus NB01 (NB02)
4. SYS KU-121(122) Energizing NB01(NB02) From Station Blackout Diesel Generators
5. BD-EMG C-0 Loss of All AC Power
6. NEI 99-01 SS1

ATTACHMENT 1
EAL Bases

Category: S –System Malfunction
Subcategory: 1 – Loss of Emergency AC Power
Initiating Condition: Prolonged loss of **all** offsite and **all** onsite AC power to emergency buses

EAL:

SG1.1 General Emergency

Loss of **all** offsite and **all** onsite AC power capability to emergency 4.16KV buses NB01 and NB02

AND EITHER:

- Restoration of at least one emergency bus in < 4 hours is **not** likely (Note 1)
- CSFST Core Cooling **RED** Path conditions met

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

Mode Applicability:

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

Definition(s):

None

Basis:

This EAL is indicated by the extended loss of all offsite and onsite AC power capability to 4.16KV emergency buses NB01 and NB02 either for greater than the WCGS Station Blackout (SBO) coping analysis time (4 hrs.) (ref. 1) or that has resulted in indications of an actual loss of adequate core cooling.

Indication of continuing core cooling degradation is manifested by CSFST Core Cooling **RED PATH** conditions being met. (ref. 2).

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

The 4.16KV AC System provides the power requirements for operation and safe shutdown of the plant. The essential switchgear are buses NB01 and NB02 (ref. 3).

4.16KV buses NB01 and NB02 are the emergency (essential) buses. NB01 supplies power to Load Group 1 (Red Train) safety related loads and NB02 supplies power to Load Group 2 (Yellow Train) safety related loads. Each bus has two sources of offsite power. One source is from 4.16KV ESF transformer XNB01 and the other source is from the ESF transformer XNB02. Transformer XNB01 is the normal supply to bus NB01 and the alternate supply to bus NB02; XNB02 is the normal supply to bus NB02 and the alternate supply to bus NB01 (ref. 3, 4).

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In addition, NB01 and NB02 each have an emergency diesel generator which supply electrical power to the bus automatically in the event that the preferred source becomes unavailable (ref. 4).

An additional source of power are the SBO diesel generators SBO DGs (ref. 5). Credit can be taken for this source only if they can be aligned within the 4 hours period.

Indication of continuing core cooling degradation must be based on fission product barrier monitoring with particular emphasis on Emergency Manager judgment as it relates to imminent Loss of fission product barriers and degraded ability to monitor fission product barriers.

Indication of continuing core cooling degradation is manifested by CSFST Core Cooling **RED PATH** conditions being met. Specifically, Core Cooling RED PATH conditions exist if either core exit T/Cs are reading greater than or equal to 1200°F or core exit T/Cs are reading greater than or equal to 712°F with RCS subcooling less than or equal to 30°F [45°F], and RVLIS natural circulation range indication is less than 45% (ref. 2).

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.

WCGS Basis Reference(s):

1. FSAR Section 8.3A.3
2. CSF F-02 Critical Safety Function Status Trees (CSFST) Figure 2, Core Cooling
3. FSAR figure 8.2-5 Electrical one line diagram of Wolf Creek 345 KV switchyard
4. FSAR Section 8.3
5. SYS KU-121(122) Energizing NB01(NB02) From Station Blackout Diesel Generators
6. BD-EMG C-0 Loss of All AC Power
7. NEI 99-01 SG1

ATTACHMENT 1

EAL Bases

Category: S –System Malfunction

Subcategory: 1 – Loss of Emergency AC Power

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

EAL:

SG1.2 General Emergency

Loss of all offsite and all onsite AC power capability to emergency 4.16KV buses NB01 and NB02 for ≥ 15 min.

AND

Loss of all 125 VDC power based on battery bus voltage indications < 105 VDC on all vital DC buses NK01, NK03 (Division 1) and NK02, NK04 (Division 2) for ≥ 15 min.

(Note 1)

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

Mode Applicability:

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

Definition(s):

None

Basis:

This EAL is indicated by the loss of all offsite and onsite emergency AC power capability to 4.16KV emergency buses NB01 and NB02 for greater than 15 minutes in combination with degraded vital DC power voltage. This EAL addresses operating experience from the March 2011 accident at Fukushima Daiichi.

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

The 4.16KV AC System provides the power requirements for operation and safe shutdown of the plant. The essential switchgear are buses NB01 and NB02 (ref. 1).

4.16KV buses NB01 and NB02 are the emergency (essential) buses. NB01 supplies power to Load Group 1 (Red Train) safety related loads and NB02 supplies power to Load Group 2 (Yellow Train) safety related loads. Each bus has two sources of offsite power. One source is from 4.16KV ESF transformer XNB01 and the other source is from the ESF transformer XNB02. Transformer XNB01 is the normal supply to bus NB01 and the alternate supply to bus NB02; XNB02 is the normal supply to bus NB02 and the alternate supply to bus NB01 (ref. 1, 2).

In addition, NB01 and NB02 each have an emergency diesel generator which supply electrical power to the bus automatically in the event that the preferred source becomes unavailable (ref. 2).

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EAL Bases

An additional source of power are the SBO diesel generators SBO DGs (ref. 3). Credit can be taken for this source only if they are already aligned because they cannot be aligned within 15 minutes.

The vital DC buses are the following 125 VDC Class 1E buses (ref. 4):

Division 1 (Train A):

- NK01
- NK03

Division 2 (Train B):

- NK02
- NK04

There are four, 60 cell, lead-calcium storage batteries (NK11, NK12, NK13 and NK14) that supplement the output of the battery chargers. They supply DC power to the distribution buses when AC power to the chargers is lost or when transient loads exceed the 300 amp capacity of the battery chargers.

Each battery is designed to have sufficient stored energy to supply the required emergency loads for 240 minutes following a loss of AC power (station blackout) (ref. 4, 5, 6).

Minimum DC bus voltage is 105.0 VDC (ref. 7).

This IC addresses a concurrent and prolonged loss of both emergency AC and Vital DC power. A loss of all emergency AC power compromises the performance of all Safety Systems requiring electric power including those necessary for emergency core cooling, containment heat removal/pressure control, spent fuel heat removal and the ultimate heat sink. A loss of vital DC power compromises the ability to monitor and control Safety Systems. A sustained loss of both emergency AC and vital DC power will lead to multiple challenges to fission product barriers.

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

WCGS Basis Reference(s):

1. FSAR figure 8.2-5 Electrical one line diagram of Wolf Creek 345 KV switchyard
2. FSAR Section 8.3
3. SYS KU-121(122) Energizing NB01(NB02) From Station Blackout Diesel Generators
4. OFN NK-020 Loss of Vital 125 VDC Bus NK01, NK02, NK03, and NK04
5. FSAR Tables 8.3-1, -2, -3
6. FSAR Section 8.3.2
7. Calculation NK-E-001 125 VDC Class 1 E Battery System Sizing, Voltage Drop and Short Circuit Studies
8. NEI 99-01 SG8

ATTACHMENT 1
EAL Bases

Category: S – System Malfunction
Subcategory: 2 – Loss of Vital DC Power
Initiating Condition: Loss of **all** vital DC power for 15 minutes or longer
EAL:

SS2.1 Site Area Emergency

Loss of **all** 125 VDC power based on battery bus voltage indications < 105 VDC on **all** vital DC buses NK01, NK03 (Division 1) and NK02, NK04 (Division 2) for ≥ 15 min. (Note 1)

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

Mode Applicability:

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

Definition(s):

None

Basis:

The vital DC buses are the following 125 VDC Class 1E buses (ref. 1):

Division 1 (Train A):

- NK01
- NK03

Division 2 (Train B):

- NK02
- NK04

There are four, 60 cell, lead-calcium storage batteries (NK11, NK12, NK13 and NK14) that supplement the output of the battery chargers. They supply DC power to the distribution buses when AC power to the chargers is lost or when transient loads exceed the 300 amp capacity of the battery chargers.

Each battery is designed to have sufficient stored energy to supply the required emergency loads for 240 minutes following a loss of AC power (station blackout) (ref. 2, 3, 4).

Minimum DC bus voltage is 105.0 VDC (ref. 4).

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

Fifteen minutes was selected as a threshold to exclude transient or momentary power losses. Escalation of the emergency classification level would be via ICs RG1, FG1 or SG1.

ATTACHMENT 1
EAL Bases

WCGS Basis Reference(s):

1. OFN NK-020 Loss of Vital 125 VDC Bus NK01, NK02, NK03, and NK04
2. FSAR Tables 8.3-1, -2, -3
3. FSAR Section 8.3.2
4. Calculation NK-E-001 125 VDC Class 1 E Battery System Sizing, Voltage Drop and Short Circuit Studies
5. NEI 99-01 SS8

ATTACHMENT 1
EAL Bases

Category: S – System Malfunction
Subcategory: 3 – Loss of Control Room Indications
Initiating Condition: UNPLANNED loss of Control Room indications for 15 minutes or longer

EAL:

SU3.1 Unusual Event

An UNPLANNED event results in the inability to monitor one or more Table S-2 parameters from within the Control Room for ≥ 15 min. (Note 1)

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

Table S-2 Safety System Parameters

- Reactor power
- RCS level
- RCS pressure
- Core Exit T/C temperature
- Level in at least one S/G
- Auxiliary or emergency feed flow in at least one S/G

Mode Applicability:

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

Definition(s):

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

Basis:

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

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.

ATTACHMENT 1

EAL Bases

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

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

Escalation of the emergency classification level would be via IC SA3.

WCGS Basis Reference(s):

1. USAR Section 7.5 Safety-Related Display Instrumentation
2. OFN RJ-023 NPIS Malfunctions
3. NEI 99-01 SU2

ATTACHMENT 1
EAL Bases

Category: S – System Malfunction
Subcategory: 3 – Loss of Control Room Indications
Initiating Condition: UNPLANNED loss of Control Room indications for 15 minutes or longer with a significant transient in progress

EAL:

SA3.1 Alert

An UNPLANNED event results in the inability to monitor one or more Table S-2 parameters from within the Control Room for ≥ 15 min. (Note 1)

AND

Any significant transient is in progress, Table S-3

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

Table S-2 Safety System Parameters

- Reactor power
- RCS level
- RCS pressure
- Core Exit T/C temperature
- Level in at least one S/G
- Auxiliary or emergency feed flow in at least one S/G

Table S-3 Significant Transients

- Reactor trip
- Runback $\geq 25\%$ thermal power
- Electrical load rejection $> 25\%$ electrical load
- ECCS actuation

Mode Applicability:

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

Definition(s):

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

ATTACHMENT 1
EAL Bases

Basis:

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

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

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 NPIS, 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

WCGS Basis Reference(s):

1. USAR Section 7.5 Safety-Related Display Instrumentation
2. OFN RJ-023 NPIS Malfunctions
3. NEI 99-01 SA2

ATTACHMENT 1
EAL Bases

Category: S – System Malfunction
Subcategory: 4 – RCS Activity
Initiating Condition: Reactor coolant activity greater than Technical Specification allowable limits

EAL:

SU4.1 Unusual Event

Sample analysis indicates RCS activity > Technical Specification Section 3.4.16 limits

Mode Applicability:

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

Definition(s):

None

Basis:

The specific iodine activity is limited to either $\leq 60 \mu\text{Ci/gm}$ Dose Equivalent I-131 or $\leq 1.0 \mu\text{Ci/gm}$ Dose Equivalent I-131 for a > 48 hr continuous period. The specific Xe-133 activity is limited to $\leq 500 \mu\text{Ci/gm}$ Dose Equivalent Xe-133 (ref 1, 2).

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.

WCGS Basis Reference(s):

1. Wolf Creek Technical Specifications section 3.4.16 RCS Specific Activity
2. OFN BB-006 High Reactor Coolant Activity
3. NEI 99-01 SU3

ATTACHMENT 1
EAL Bases

Category: S – System Malfunction
Subcategory: 5 – RCS Leakage
Initiating Condition: RCS leakage for 15 minutes or longer
EAL:

SU5.1 Unusual Event

RCS unidentified or pressure boundary leakage > 10 gpm for ≥ 15 min.

OR

RCS identified leakage > 25 gpm for ≥ 15 min.

OR

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

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

Mode Applicability:

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

Definition(s):

None

Basis:

Manual or computer-based methods of performing an RCS inventory balance are normally used to determine RCS leakage. The NPIS Computer is preferred method of calculating RCS leak rate. When the NPIS Computer is not available, procedural guidance is available to perform the manual RCS inventory balance (ref. 1, 2).

Identified leakage includes

- Leakage such as that from pump seals or valve packing (except reactor coolant pump (RCP) seal water injection or leakoff), that is captured and conducted to collection systems or a sump or collecting tank, or
- Leakage into the containment atmosphere from sources that are both specifically located and known either not to interfere with the operation of leakage detection systems or not to be pressure boundary leakage, or
- RCS leakage through a steam generator to the secondary system (ref. 3).

Unidentified leakage is all leakage (except RCP seal water injection or leakoff) that is not identified leakage (ref. 3).

Pressure Boundary leakage is leakage (except primary to secondary leakage) through a nonisolable fault in an RCS component body, pipe wall, or vessel wall (ref. 3)

RCS leakage outside of the containment that is not considered identified or unidentified leakage per Technical Specifications includes leakage via interfacing systems such as RCS to the Component Cooling Water, or systems that directly see RCS pressure outside containment

ATTACHMENT 1

EAL Bases

such as Chemical & Volume Control System, Safety Injection, Nuclear Sampling system and Residual Heat Removal system (when in the shutdown cooling mode) (ref. 4, 5)

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.

Thresholds #1 and #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). The third threshold 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) 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). The first threshold uses a lower value that reflects the greater significance of unidentified or pressure boundary leakage.

The release of mass from the RCS due to the as-designed/expected operation of a relief valve does not warrant an emergency classification. An emergency classification would be required if a mass loss is caused by a relief valve that is not functioning as designed/expected (e.g., a relief valve sticks open and the line flow cannot be isolated).

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

WCGS Basis Reference(s):

1. STS BB-006 RCS Water Inventory Balance Using the NPIS Computer
2. STS BB-004 RCS Water Inventory Balance
3. Wolf Creek Technical Specifications Definitions section 1.1
4. USAR Section 5.2.5.2.1 Intersystem Leakage
5. OFN BB-007 RCS Leakage High
6. NEI 99-01 SU4

ATTACHMENT 1
EAL Bases

Category: S – System Malfunction
Subcategory: 6 – RTS Failure
Initiating Condition: Automatic or manual trip fails to shut down the reactor
EAL:

SU6.1 Unusual Event

An automatic trip did **not** shut down the reactor as indicated by reactor power $\geq 5\%$ after any RTS setpoint is exceeded

AND

A subsequent automatic trip or manual trip action taken at the reactor control consoles (SB HS-1 or SB HS-42) is successful in shutting down the reactor as indicated by reactor power $< 5\%$ (Note 8)

Note 8: A manual trip action is any operator action, or set of actions, which causes the control rods to be rapidly inserted into the core, and **does not** include manually driving in control rods, tripping rod drive power or implementation of boron injection strategies.

Mode Applicability:

1 - Power Operation

Definition(s):

None

Basis:

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

Following a successful reactor trip, rapid insertion of the control rods occurs. Nuclear power promptly drops to a fraction of the original power level and then decays to a level several decades less with a negative startup rate. The reactor power drop continues until reactor power reaches the point at which the influence of source neutrons on reactor power starts to be observable. A predictable post-trip response from an automatic reactor trip signal should therefore consist of a prompt drop in reactor power as sensed by the nuclear instrumentation and a lowering of power into the source range. A successful trip has therefore occurred when there is sufficient rod insertion from the trip of RTS to bring the reactor power below the immediate shutdown decay heat level of 5% (ref. 2, 3, 4).

For the purposes of emergency classification, successful manual trip actions are those which can be quickly performed from the reactor control console; SB HS-1 on Panel RL003 or SB HS-42 on Panel RL006. Reactor shutdown achieved by use of other trip actions specified in EMG FR-S1 Response to ATWS (such as opening PG HIS-16 and PG HIS-18 supply breakers, depressing manual pushbutton on turbine control panel, emergency boration or manually driving control rods) do not constitute a successful manual trip (ref. 4).

Following any automatic RTS trip signal, EMG E-0 (ref. 2) and EMG FR-S1 (ref. 4) prescribe insertion of redundant manual trip signals to back up the automatic RTS trip function and

ATTACHMENT 1

EAL Bases

ensure reactor shutdown is achieved. Even if the first subsequent manual trip signal inserts all control rods to the full-in position immediately after the initial failure of the automatic trip, the lowest level of classification that must be declared is an Unusual Event (ref. 6).

A reactor trip resulting from actuation of the ATWS Mitigation System Actuation Circuitry (AMSAC) logic that results in full insertion of control rods and diminishing neutron flux is considered a successful reactor trip. AMSAC automatically initiates auxiliary feedwater and a turbine trip under conditions indicative of an Anticipated Transient Without Scram (ATWS) event (ref. 5).

In the event that the operator identifies a reactor trip is imminent and initiates a successful manual reactor trip before the automatic RTS trip setpoint is reached, no declaration is required. The successful manual trip of the reactor before it reaches its automatic trip setpoint or reactor trip signals caused by instrumentation channel failures do not lead to a potential fission product barrier loss. However, if subsequent manual reactor trip actions fail to reduce reactor power below 5%, the event escalates to the Alert under EAL SA6.1.

If by procedure, operator actions include the initiation of an immediate manual trip following receipt of an automatic trip signal and there are no clear indications that the automatic trip failed (such as a time delay following indications that a trip setpoint was exceeded), it may be difficult to determine if the reactor was shut down because of automatic trip or manual actions. If a subsequent review of the trip actuation indications reveals that the automatic trip did not cause the reactor to be shut down, then consideration should be given to evaluating the fuel for potential damage, and the reporting requirements of 50.72 should be considered for the transient event.

This IC addresses a failure of the RTS to initiate or complete an automatic reactor trip that results in a reactor shutdown, and either a subsequent operator manual action taken at the reactor control consoles or an automatic trip is successful in shutting down the reactor. This event is a precursor to a more significant condition and thus represents a potential degradation of the level of safety of the plant.

Following the failure on an automatic reactor trip, operators will promptly initiate manual actions at the reactor control consoles to shutdown the reactor (e.g., initiate a manual reactor trip). If these manual actions are successful in shutting down the reactor, core heat generation will quickly fall to a level within the capabilities of the plant's decay heat removal systems.

A manual action at the reactor control consoles is any operator action, or set of actions, which causes the control rods to be rapidly inserted into the core (e.g., initiating a manual reactor trip). This action does not include manually driving in control rods or implementation of boron injection strategies. Actions taken at back-panels or other locations within the Control Room, or any location outside the Control Room, are not considered to be "at the reactor control consoles".

The plant response to the failure of an automatic reactor trip will vary based upon several factors including the reactor power level prior to the event, availability of the condenser, performance of mitigation equipment and actions, other concurrent plant conditions, etc. If subsequent operator manual actions taken at the reactor control consoles are also unsuccessful in shutting down the reactor, then the emergency classification level will escalate to an Alert via IC SA5. Depending upon the plant response, escalation is also possible via IC

ATTACHMENT 1
EAL Bases

FA1. Absent the plant conditions needed to meet either IC SA6 or FA1, an Unusual Event declaration is appropriate for this event.

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

Should a reactor trip signal be generated as a result of plant work (e.g., RTS 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 RTS 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.

WCGS Basis Reference(s):

1. Wolf Creek Technical Specifications section 3.3.1 Reactor Trip System (RTS) Instrumentation
2. EMG E-0 Reactor Trip or Safety Injection
3. EMG F-0 Critical Safety Function Status Trees - Subcriticality
4. EMG FR-S1 Response to Nuclear Power Generation/ATWS
5. FSAR Section 7.7.1
6. NEI 99-01 SU5

ATTACHMENT 1
EAL Bases

Category: S – System Malfunction
Subcategory: 6 – RTS Failure
Initiating Condition: Automatic or manual trip fails to shut down the reactor
EAL:

SU6.2 Unusual Event

A manual trip did **not** shut down the reactor as indicated by reactor power $\geq 5\%$ after **any** manual trip action was initiated

AND

A subsequent automatic trip or manual trip action taken at the reactor control console (SB HS-1 or SB HS-42) is successful in shutting down the reactor as indicated by reactor power $< 5\%$ (Note 8)

Note 8: A manual trip action is any operator action, or set of actions, which causes the control rods to be rapidly inserted into the core, and **does not** include manually driving in control rods, tripping rod drive power or implementation of boron injection strategies.

Mode Applicability:

1 - Power Operation

Definition(s):

None

Basis:

This EAL addresses a failure of a manually initiated trip in the absence of having exceeded an automatic RTS trip setpoint and a subsequent automatic or manual trip is successful in shutting down the reactor (reactor power $< 5\%$) (ref. 1).

Following a successful reactor trip, rapid insertion of the control rods occurs. Nuclear power promptly drops to a fraction of the original power level and then decays to a level several decades less with a negative startup rate. The reactor power drop continues until reactor power reaches the point at which the influence of source neutrons on reactor power starts to be observable. A predictable post-trip response from an automatic reactor trip signal should therefore consist of a prompt drop in reactor power as sensed by the nuclear instrumentation and a lowering of power into the source range. A successful trip has therefore occurred when there is sufficient rod insertion from the trip of RTS to bring the reactor power below the immediate shutdown decay heat level of 5% (ref. 2, 3, 4).

For the purposes of emergency classification, successful manual trip actions are those which can be quickly performed from the reactor control console; SB HS-1 on Panel RL003 or SB HS-42 on Panel RL006. Reactor shutdown achieved by use of other trip actions specified in EMG FR-S1 Response to ATWS (such as opening PG HIS-16 and PG HIS-18 supply breakers, depressing manual pushbutton on turbine control panel, emergency boration or manually driving control rods) do not constitute a successful manual trip (ref. 4).

Following the failure of any manual trip signal, EMG E-0 (ref. 2) and EMG FR-S1 (ref. 4) prescribe insertion of redundant manual trip signals to back up the RTS trip function and

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EAL Bases

ensure reactor shutdown is achieved. Even if a subsequent automatic trip signal or the first subsequent manual trip signal inserts all control rods to the full-in position immediately after the initial failure of the manual trip, the lowest level of classification that must be declared is an Unusual Event (ref. 6).

A reactor trip resulting from actuation of the ATWS Mitigation System Actuation Circuitry (AMSAC) logic that results in full insertion of control rods and diminishing neutron flux is considered a successful reactor trip. AMSAC automatically initiates auxiliary feedwater and a turbine trip under conditions indicative of an Anticipated Transient Without Scram (ATWS) event (ref. 5).

If both subsequent automatic and subsequent manual reactor trip actions in the Control Room fail to reduce reactor power below the power associated with the safety system design ($< 5\%$) following a failure of an initial manual trip, the event escalates to an Alert under EAL SA6.1

This IC addresses a failure of the RTS to initiate or complete a manual reactor trip that results in a reactor shutdown, and either a subsequent operator manual action taken at the reactor control consoles or an automatic trip is successful in shutting down the reactor. This event is a precursor to a more significant condition and thus represents a potential degradation of the level of safety of the plant.

If an initial manual reactor trip is unsuccessful, operators will promptly take manual action at another location(s) on the reactor control consoles to shutdown the reactor (e.g., initiate a manual reactor trip using a different switch). Depending upon several factors, the initial or subsequent effort to manually trip the reactor, or a concurrent plant condition, may lead to the generation of an automatic reactor trip signal. If a subsequent manual or automatic trip is successful in shutting down the reactor, core heat generation will quickly fall to a level within the capabilities of the plant's decay heat removal systems.

A manual action at the reactor control consoles is any operator action, or set of actions, which causes the control rods to be rapidly inserted into the core (e.g., initiating a manual reactor trip). This action does not include manually driving in control rods or implementation of boron injection strategies. Actions taken at back-panels or other locations within the Control Room, or any location outside the Control Room, are not considered to be "at the reactor control consoles".

The plant response to the failure of a manual reactor trip will vary based upon several factors including the reactor power level prior to the event, availability of the condenser, performance of mitigation equipment and actions, other concurrent plant conditions, etc. If subsequent operator manual actions taken at the reactor control consoles are also unsuccessful in shutting down the reactor, then the emergency classification level will escalate to an Alert via IC SA6. Depending upon the plant response, escalation is also possible via IC FA1. Absent the plant conditions needed to meet either IC SA6 or FA1, an Unusual Event declaration is appropriate for this event.

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

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EAL Bases

Should a reactor trip signal be generated as a result of plant work (e.g., RTS 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 RTS 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.

WCGS Basis Reference(s):

1. Wolf Creek Technical Specifications section 3.3.1 Reactor Trip System (RTS) Instrumentation
2. EMG E-0 Reactor Trip or Safety Injection
3. EMG F-0 Critical Safety Function Status Trees - Subcriticality
4. EMG FR-S1 Response to Nuclear Power Generation/ATWS
5. FSAR Section 7.7.1
6. NEI 99-01 SU5

ATTACHMENT 1
EAL Bases

Category: S – System Malfunction
Subcategory: 2 – RTS Failure
Initiating Condition: Automatic or manual trip fails to shut down the reactor and subsequent manual actions taken at the reactor control consoles are **not** successful in shutting down the reactor

EAL:

SA6.1 Alert

An automatic or manual trip fails to shut down the reactor as indicated by reactor power $\geq 5\%$

AND

Manual trip actions taken at the reactor control console (SB HS-1 or SB HS-42) are **not** successful in shutting down the reactor as indicated by reactor power $\geq 5\%$ (Note 8)

Note 8: A manual trip action is any operator action, or set of actions, which causes the control rods to be rapidly inserted into the core, and **does not** include manually driving in control rods, tripping rod drive power or implementation of boron injection strategies.

Mode Applicability:

1 - Power Operation

Definition(s):

None

Basis:

This EAL addresses any automatic or manual reactor trip signal that fails to shut down the reactor (reactor power $< 5\%$) followed by a subsequent manual trip that fails to shut down the reactor to an extent the reactor is producing energy in excess of the heat load for which the safety systems were designed (ref. 1).

For the purposes of emergency classification, successful manual trip actions are those which can be quickly performed from the reactor control console; SB HS-1 on Panel RL003 or SB HS-42 on Panel RL006. Reactor shutdown achieved by use of other trip actions specified in EMG FR-S1 Response to ATWS (such as opening PG HIS-16 and PG HIS-18 supply breakers, depressing manual pushbutton on turbine control panel, emergency boration or manually driving control rods) do not constitute a successful manual trip (ref. 4).

A reactor trip resulting from actuation of the ATWS Mitigation System Actuation Circuitry (AMSAC) logic that results in full insertion of control rods and diminishing neutron flux is considered a successful reactor trip. AMSAC automatically initiates auxiliary feedwater and a turbine trip under conditions indicative of an Anticipated Transient Without Scram (ATWS) event (ref. 5).

5% rated power is a minimum reading on the power range scale that indicates continued power production. It also approximates the decay heat which the shutdown systems were designed to remove and is indicative of a condition requiring immediate response to prevent subsequent core damage. Below 5%, plant response will be similar to that observed during a

ATTACHMENT 1

EAL Bases

normal shutdown. Nuclear instrumentation can be used to determine if reactor power is greater than 5 % power (ref. 3, 4).

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

This IC addresses a failure of the RTS to initiate or complete an automatic or manual reactor trip that results in a reactor shutdown, and subsequent operator manual actions taken at the reactor control consoles to shutdown the reactor are also unsuccessful. This condition represents an actual or potential substantial degradation of the level of safety of the plant. An emergency declaration is required even if the reactor is subsequently shutdown by an action taken away from the reactor control consoles since this event entails a significant failure of the RTS.

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

The plant response to the failure of an automatic or manual reactor 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 SS6. Depending upon plant responses and symptoms, escalation is also possible via IC FS1. Absent the plant conditions needed to meet either IC SS6 or FS1, an Alert declaration is appropriate for this event.

It is recognized that plant responses or symptoms may also require an Alert declaration in accordance with the Recognition Category F ICs; however, this IC and EAL are included to ensure a timely emergency declaration.

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

WCGS Basis Reference(s):

1. Wolf Creek Technical Specifications section 3.3.1 Reactor Trip System (RTS) Instrumentation
2. EMG E-0 Reactor Trip or Safety Injection
3. EMG F-0 Critical Safety Function Status Trees - Subcriticality
4. EMG FR-S1 Response to Nuclear Power Generation/ATWS
5. FSAR Section 7.7.1
6. NEI 99-01 SA5

ATTACHMENT 1
EAL Bases

Category: S – System Malfunction
Subcategory: 2 – RTS Failure
Initiating Condition: Inability to shut down the reactor causing a challenge to core cooling or RCS heat removal

EAL:

SS6.1 Site Area Emergency

An automatic or manual trip fails to shut down the reactor as indicated by reactor power $\geq 5\%$

AND

All actions to shut down the reactor are **not** successful as indicated by reactor power $\geq 5\%$

AND EITHER:

- CSFST Core Cooling **RED** Path conditions met
- CSFST Heat Sink **RED** Path conditions met

Mode Applicability:

1 - Power Operation

Definition(s):

None

Basis:

This EAL addresses the following:

- Any automatic reactor trip signal followed by a manual trip that fails to shut down the reactor to an extent the reactor is producing energy in excess of the heat load for which the safety systems were designed (EAL SA6.1), and
- Indications that either core cooling is extremely challenged or heat removal is extremely challenged.

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

Reactor shutdown achieved by use of EMG FR-S1 Response to Nuclear Power Generation/ATWS (such as opening PG HIS-16 and PG HIS-18 supply breakers, depressing manual pushbutton on turbine control panel, emergency boration or manually driving control rods) are also credited as a successful manual trip provided reactor power can be reduced below 5% before indications of an extreme challenge to either core cooling or heat removal exist (ref. 1, 4).

5% rated power is a minimum reading on the power range scale that indicates continued power production. It also approximates the decay heat which the shutdown systems were designed to remove and is indicative of a condition requiring immediate response to prevent

ATTACHMENT 1 EAL Bases

subsequent core damage. Below 5%, plant response will be similar to that observed during a normal shutdown. Nuclear instrumentation can be used to determine if reactor power is greater than 5 % power (ref. 1, 4).

Indication of continuing core cooling degradation is manifested by CSFST Core Cooling **RED PATH** conditions being met (ref. 2). Specifically, Core Cooling **RED PATH** conditions exist if either core exit T/Cs are reading greater than or equal to 1200°F or core exit T/Cs are reading greater than or equal to 712°F with RCS subcooling less than or equal to 30°F [45°F], and RVLIS natural circulation range indication is less than 45% (ref. 2).

Indication of inability to adequately remove heat from the RCS is manifested by CSFST Heat Sink **RED PATH** conditions being met (ref. 2). Specifically, Heat Sink **RED PATH** conditions exist if narrow range level in at least on steam generator is not greater than or equal to 6% [29%] and total feedwater flow to the steam generators is less than or equal to 270,000 lbm/hr. (ref. 3).

This IC addresses a failure of the RTS 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.

WCGS Basis Reference(s):

1. EMG F-0 Critical Safety Function Status Trees – Figure 1 Subcriticality
2. EMG F-0 Critical Safety Function Status Tress – Figure 2 Core Cooling
3. EMG F-0 Critical Safety Function Status Tress – Figure 3 Heat Sink
4. EMG FR-S1 Response to Nuclear Power Generation/ATWS
5. NEI 99-01 SS5

ATTACHMENT 1
EAL Bases

Category: S – System Malfunction
Subcategory: 7 – Loss of Communications
Initiating Condition: Loss of **all** onsite or offsite communications capabilities
EAL:

SU7.1 Unusual Event

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

OR

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

OR

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

Table S-4 Communication Methods			
System	Onsite	Offsite	NRC
PA system	X		
Plant Radios	X	X	
Site Telephone System	X	X	X
Local Telephone Company Direct Lines	X	X	X
ENS Line			X

Mode Applicability:

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

Definition(s):

None

Basis:

Onsite/offsite/NRC communications include one or more of the systems listed in Table S-4 (ref. 1, 2).

1. Public Address (PA) system

The system provides five separate independent Communication lines and one general page channel. Communication between parties in the plant and the Control Room can be easily and quickly established using the Control Room page channel (channel 1).

Communication between parties within the plant can be easily and quickly established by using the general page channel. The party line channel is normally used after the page call

ATTACHMENT 1

EAL Bases

is completed. As many as five party lines may communicate simultaneously.

2. Plant Radios

The Plant Radio System consists of two repeater sites: the Turbine Building and the Meteorological Tower. The sites have multiple repeaters to support communications inside the Plant structures as well as in a 5 mile radius of the Plant. The system provides two-way portable and mobile communications for normal and emergency Plant operation. Portable and mobile users have communications capability with fixed operator positions in the Control Room, TSC and EOF, and with security radio consoles, if desired.

3. Site Telephone System

The Touchtone Telephone System consists of telephone stations located throughout the Power Block, in the main Control Room, Security Building, Administration Building and various other buildings around the site. The system has diverse routing to provide multiple routes for both inward and outward dialing. The telephone system is powered through a battery backup system, which can provide about 8 hours of service after loss of offsite power.

4. Local Telephone Company Direct Lines

In the event of a total system failure there are multiple direct telephone lines from the local telephone company which remain operational for access to the local Burlington exchange.

5. ENS line

The NRC Emergency Notification System (ENS) is a Federal Telephone System (FTS) telephone used for official communications with NRC Headquarters. The NRC Headquarters has the capability to patch into the NRC Regional offices. The primary purpose of this phone is to provide a reliable method for the initial notification of the NRC and to maintain continuous communications with the NRC after initial notification. ENS telephones are located in the Control Room, TSC and EOF.

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

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 Offsite Response Organizations (OROs) and the NRC.

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

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

The second condition addresses a total loss of the communications methods used to notify all offsite organizations of an emergency declaration. The offsite organizations referred to here are the State and Coffey County EOCs.

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

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WCGS Basis Reference(s):

1. Wolf Creek Generating Station Radiological Emergency Response Plan (RERP), Section 6.16.1
2. FSAR Section 9.5.2
3. NEI 99-01 SU6

ATTACHMENT 1
EAL Bases

Category: S – System Malfunction
Subcategory: 8 – Containment Failure
Initiating Condition: Failure to isolate containment or loss of containment pressure control.
EAL:

SU8.1 Unusual Event

Any penetration is **not** isolated within 15 min. of a VALID containment isolation signal
OR

Containment pressure > 27 psig with < one full train of containment depressurization equipment operating per design for ≥ 15 min. (Note 9)
(Note 1)

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

Note 9: One Containment Spray System train and one Containment Cooling System train comprise one full train of depressurization equipment.

Mode Applicability:

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

Definition(s):

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

Basis:

The Containment Spray System consists of two separate trains of equal capacity, each capable of meeting the design bases requirement. Each train includes a containment spray pump, spray headers, nozzles, valves, and piping. The containment spray additive tank supplies 30 weight percent (nominal) sodium hydroxide to both trains. The refueling water storage tank (RWST) supplies borated water to the Containment Spray System during the injection phase of operation. In the recirculation mode of operation, Containment Spray pump suction is transferred from the RWST to the Containment sumps (ref. 2).

The Containment Cooling System consists of two trains of Containment cooling, each of sufficient capacity to supply 100% of the design cooling requirement. Each train of two fan units is supplied with cooling water from a separate train of essential service water (ESW). Air is drawn into the coolers through the fan and discharged to the steam generator compartments, pressurizer compartment, and instrument tunnel, and outside the secondary shield wall. The air supplied to each steam generator compartment is drawn upwards through the compartments by the hydrogen mixing fans and discharged into the upper elevations of the containment. During normal operation, all four fan units are normally operating. In post-

ATTACHMENT 1

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accident operation following an actuation signal, the Containment Cooling System fans are designed to start automatically in slow speed if not already running (ref. 3).

The Containment pressure setpoint (27 psig, ref. 4, 5, 6) is the pressure at which the equipment should actuate and begin performing its function. The design basis accident analyses and evaluations assume the loss of one Containment Spray System train and one Containment Cooling System train (ref. 7). Consistent with the design requirement, "one full train of depressurization equipment" is therefore defined to be the availability of one train of each system. If less than this equipment is operating and Containment pressure is above the actuation setpoint, the threshold is met.

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 the first threshold, 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 OFNs and EMGs. The 15-minute criterion is included to allow operators time to manually isolate the required penetrations, if possible.

The second threshold 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.

WCGS Basis Reference(s):

1. FSAR Section 6.2.2
2. FSAR Section 6.2.2.1.2.1
3. FSAR Section 6.2.2.2.2
4. EMG F-0 Critical Safety Function Status Trees (CSFST) Figure 6, Containment
5. EMG FR-Z1 Response to High Containment Pressure
6. Technical Specifications Table 3.3.2-1
7. Technical Specifications B3.6.6
8. NEI 99-01 SU7

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EAL Bases

Category: S – System Malfunction
Subcategory: 9 – Hazardous Event Affecting Safety Systems
Initiating Condition: Hazardous event affecting a SAFETY SYSTEM needed for the current operating mode

EAL:

SA9.1 Alert

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

AND EITHER:

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

Table S-5 Hazardous Events

- Seismic event (earthquake)
- Internal or external FLOODING event
- High winds or tornado strike
- FIRE
- EXPLOSION
- Other events with similar hazard characteristics as determined by the Emergency Manager

Mode Applicability:

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

Definition(s):

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

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

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

SAFETY SYSTEM - A system required for safe plant operation, cooling down the plant and/or placing it in the cold shutdown condition, including the ECCS. These are typically systems

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classified as safety-related (as defined in 10CFR50.2):

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

- (1) The integrity of the reactor coolant pressure boundary;
- (2) The capability to shut down the reactor and maintain it in a safe shutdown condition;
- (3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures.

VISIBLE DAMAGE - Damage to a component or structure that is readily observable without measurements, testing, or analysis. The visual impact of the damage is sufficient to cause concern regarding the operability or reliability of the affected component or structure. Damage resulting from an equipment failure and limited to the failed component (i.e., the failure did **not** cause damage to a structure or any other equipment) is **not** visible damage.

Basis:

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

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

With respect to hazards caused by an equipment failure (e.g., an electrical breaker failure leading to an explosion), no emergency declaration is warranted if the hazard did not cause any damage to another safety system, or another train of the affected safety system. If the hazard resulting from an equipment failure causes damage to another safety system, or another train of the affected safety system (i.e., a system or train that was not the source of the initiating equipment failure), then an emergency declaration is required per this EAL.

The second condition addresses damage to a Safety System component that is not in service/operation or readily apparent through indications alone, or to a structure containing safety system components. Operators will make this determination based on the totality of available event and damage report information. This is intended to be a brief assessment not requiring lengthy analysis or quantification of the damage.

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

WCGS Basis Reference(s):

1. NEI 99-01 SA9

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Category F – Fission Product Barrier Degradation

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

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

- A. Fuel Clad (FC): The Fuel Clad Barrier consists of the cladding material that contains the fuel pellets.
- B. Reactor Coolant System (RCS): The RCS Barrier includes the RCS primary side and its connections up to and including the pressurizer safety and relief valves, and other connections up to and including the primary isolation valves.
- C. Containment (CMT): The Containment 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.

The EALs in this category require evaluation of the loss and potential loss thresholds listed in the fission product barrier matrix of Table F-1 (Attachment 2). "Loss" and "Potential Loss" signify the relative damage and threat of damage to the barrier. "Loss" means the barrier no longer assures containment of radioactive materials. "Potential Loss" means integrity of the barrier is threatened and could be lost if conditions continue to degrade. The number of barriers that are lost or potentially lost and the following criteria determine the appropriate emergency classification level:

Alert:

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

Site Area Emergency:

Loss or potential loss of any two barriers

General Emergency:

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

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

- The Fuel Clad Barrier and the RCS Barrier are weighted more heavily than the Containment Barrier.
- Unusual Event ICs associated with RCS and Fuel Clad Barriers are addressed under System Malfunction ICs.

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- For accident conditions involving a radiological release, evaluation of the fission product barrier thresholds will need to be performed in conjunction with dose assessments to ensure correct and timely escalation of the emergency classification. For example, an evaluation of the fission product barrier thresholds may result in a Site Area Emergency classification while a dose assessment may indicate that an EAL for General Emergency IC RG1 has been exceeded.
- The fission product barrier thresholds specified within a scheme reflect plant-specific WCGS design and operating characteristics.
- As used in this category, the term RCS leakage encompasses not just those types defined in Technical Specifications but also includes the loss of RCS mass to any location— inside the primary containment, an interfacing system, or outside of the primary containment. The release of liquid or steam mass from the RCS due to the as-designed/expected operation of a relief valve is not considered to be RCS leakage.
- At the Site Area Emergency level, EAL users should maintain cognizance of how far present conditions are from meeting a threshold that would require a General Emergency declaration. For example, if the Fuel Clad and RCS fission product barriers were both lost, then there should be frequent assessments of containment radioactive inventory and integrity. Alternatively, if both the Fuel Clad and RCS fission product barriers were potentially lost, the Emergency Manager would have more assurance that there was no immediate need to escalate to a General Emergency.

ATTACHMENT 1
EAL Bases

Category: Fission Product Barrier Degradation
Subcategory: N/A
Initiating Condition: Any loss or any potential loss of either Fuel Clad or RCS
EAL:

FA1.1 Alert

Any loss or any potential loss of **EITHER** Fuel Clad or RCS (Table F-1)

Mode Applicability:

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

Definition(s):

None

Basis:

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

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

WCGS Basis Reference(s):

1. NEI 99-01 FA1

ATTACHMENT 1
EAL Bases

Category: Fission Product Barrier Degradation
Subcategory: N/A
Initiating Condition: Loss or potential loss of **any** two barriers
EAL:

FS1.1 Site Area Emergency

Loss or potential loss of any two barriers (Table F-1)

Mode Applicability:

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

Definition(s):

None

Basis:

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

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

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

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

WCGS Basis Reference(s):

1. NEI 99-01 FS1

ATTACHMENT 1
EAL Bases

Category: Fission Product Barrier Degradation

Subcategory: N/A

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

EAL:

FG1.1 General Emergency

Loss of **any** two barriers

AND

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

Mode Applicability:

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

Definition(s):

None

Basis:

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

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

- Loss of Fuel Clad, RCS and Containment barriers
- Loss of Fuel Clad and RCS barriers with potential loss of Containment barrier
- Loss of RCS and Containment barriers with potential loss of Fuel Clad barrier
- Loss of Fuel Clad and Containment barriers with potential loss of RCS barrier

WCGS Basis Reference(s):

1. NEI 99-01 FG1

ATTACHMENT 2

Fission Product Barrier Loss/Potential Loss Matrix and Bases

Introduction

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

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

- A. RCS or SG Tube Leakage
- B. Inadequate Heat removal
- C. CMT Radiation / RCS Activity
- D. CMT Integrity or Bypass
- E. Emergency Manager Judgment

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

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

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

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

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

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

ATTACHMENT 2
Fission Product Barrier Loss/Potential Loss Matrix and Bases

Losses and Potential Losses are then applied to the algorithms given in EALs FG1.1, FS1.1, and FA1.1 to determine the appropriate emergency classification.

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

ATTACHMENT 2

Fission Product Barrier Loss/Potential Loss Matrix and Bases

Table F-1 Fission Product Barrier Threshold Matrix

Category	Fuel Clad (FC) Barrier		Reactor Coolant System (RCS) Barrier		Containment (CMT) Barrier	
	Loss	Potential Loss	Loss	Potential Loss	Loss	Potential Loss
A RCS or SG Tube Leakage	None	None	1. An automatic or manual ECCS (SI) actuation required by EITHER : <ul style="list-style-type: none"> UNISOLABLE RCS leakage SG tube RUPTURE 	1. CSFST Integrity- RED Path conditions met	1. A leaking or RUPTURED SG is FAULTED outside of containment	None
B Inadequate Heat Removal	1. CSFST Core Cooling- RED Path conditions met	1. CSFST Core Cooling- ORANGE Path conditions met 2. CSFST Heat Sink- RED Path conditions met AND Heat sink is required	None	1. CSFST Heat Sink- RED Path conditions met AND Heat sink is required	None	1. CSFST Core Cooling- RED Path conditions met AND Restoration procedures not effective within 15 min. (Note 1)
C CMT Radiation / RCS Activity	1. Containment radiation > 600 R/hr on GT RE-59 or GT RE-60 2. Dose equivalent I-131 coolant activity > 300 µCi/gm	None	1. Containment radiation > 60 R/hr on GT RE-59 or GT RE-60	None	None	1. Containment radiation > 6,000 R/hr on GT RE-59 or GT RE-60
D CMT Integrity or Bypass	None	None	None	None	1. Containment isolation is required AND EITHER : <ul style="list-style-type: none"> Containment integrity has been lost based on Emergency Manager judgment UNISOLABLE pathway from Containment to the environment exists 2. Indications of RCS leakage outside of Containment	1. CSFST Containment- RED Path conditions met 2. Containment hydrogen concentration ≥ 4% 3. Containment pressure > 27 psig with < one full train of depressurization equipment operating per design for > 15 min. (Note 1, 9)
E EC Judgment	1. Any condition in the opinion of the Emergency Manager that indicates loss of the fuel clad barrier	1. Any condition in the opinion of the Emergency Manager that indicates potential loss of the fuel clad barrier	1. Any condition in the opinion of the Emergency Manager that indicates loss of the RCS barrier	1. Any condition in the opinion of the Emergency Manager that indicates potential loss of the RCS barrier	1. Any condition in the opinion of the Emergency Manager that indicates loss of the Containment barrier	1. Any condition in the opinion of the Emergency Manager that indicates potential loss of the Containment barrier

ATTACHMENT 2
Fission Product Barrier Loss/Potential Loss Matrix and Bases

Barrier: Fuel Clad
Category: A. RCS or SG Tube Leakage
Degradation Threat: Loss
Threshold:

None

ATTACHMENT 2
Fission Product Barrier Loss/Potential Loss Matrix and Bases

Barrier: Fuel Clad
Category: A. RCS or SG Tube Leakage
Degradation Threat: Potential Loss
Threshold:

None

ATTACHMENT 2
Fission Product Barrier Loss/Potential Loss Matrix and Bases

Barrier: Fuel Clad
Category: B. Inadequate Heat Removal
Degradation Threat: Loss
Threshold:

1. CSFST Core Cooling-RED Path conditions met

Definition(s):

None

Basis:

Critical Safety Function Status Tree (CSFST) Core Cooling-RED path indicates significant core exit superheating and core uncover. The CSFSTs can be monitored using the SPDS display on the NPIS Computer (ref. 1).

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

WCGS Basis Reference(s):

1. EMG F-0 Critical Safety Function Status Trees
2. NEI 99-01 Inadequate Heat Removal Fuel Clad Loss 2.A

ATTACHMENT 2
Fission Product Barrier Loss/Potential Loss Matrix and Bases

Barrier: Fuel Clad
Category: B. Inadequate Heat Removal
Degradation Threat: Potential Loss
Threshold:

1. CSFST Core Cooling-**ORANGE** Path conditions met

Definition(s):

None

Basis:

Critical Safety Function Status Tree (CSFST) Core Cooling-ORANGE path indicates subcooling has been lost and that some fuel clad damage may potentially occur. The CSFSTs can be monitored using the SPDS display on the NPIS Computer (ref. 1).

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

WCGS Basis Reference(s):

1. EMG F-0 Critical Safety Function Status Trees
2. NEI 99-01 Inadequate Heat Removal Fuel Clad Loss 2.A

ATTACHMENT 2
Fission Product Barrier Loss/Potential Loss Matrix and Bases

Barrier: Fuel Clad
Category: B. Inadequate Heat Removal
Degradation Threat: Potential Loss
Threshold:

2. CSFST Heat Sink-**RED** Path conditions met
AND
Heat sink is required

Definition(s):

None

Basis:

In combination with RCS Potential Loss B.1, meeting this threshold results in a Site Area Emergency.

Critical Safety Function Status Tree (CSFST) Heat Sink-RED path indicates the ultimate heat sink function is under extreme challenge and that some fuel clad damage may potentially occur (ref. 1).

The CSFSTs can be monitored using the SPDS display on the NPIS Computer (ref. 1).

The phrase "and heat sink required" precludes the need for classification for conditions in which RCS pressure is less than SG pressure or Heat Sink-RED path entry was created through operator action directed by an EOP. For example, EMG FR-H1 is entered from CSFST Heat Sink-Red. Step 1 tells the operator to determine if heat sink is required by checking that RCS pressure is greater than any non-faulted SG pressure. If these conditions exist, Heat Sink is required. Otherwise, the operator is to either return to the procedure and step in effect and place RHR in service for heat removal. For large LOCA events inside the Containment, the SGs are moot because heat removal through the containment heat removal systems takes place. Therefore, Heat Sink Red should not be required and, should not be assessed for EAL classification because a LOCA event alone should not require higher than an Alert classification. (ref. 2).

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.

ATTACHMENT 2
Fission Product Barrier Loss/Potential Loss Matrix and Bases

WCGS Basis Reference(s):

1. EMG F-0 Critical Safety Function Status Trees Figure 3 Heat Sink
2. EMG FR-H1 Response to Loss of Secondary Heat Sink
3. NEI 99-01 Inadequate Heat Removal Fuel Clad Loss 2.B

ATTACHMENT 2
Fission Product Barrier Loss/Potential Loss Matrix and Bases

Barrier: Fuel Clad
Category: C. CMT Radiation / RCS Activity
Degradation Threat: Loss
Threshold:

1. Containment radiation > 600 R/hr on GT RE-59 or GT RE-60

Definition(s):

None

Basis:

Containment radiation monitor readings greater than 600 R/hr (ref. 1) indicate the release of reactor coolant, with elevated activity (> 300 $\mu\text{Ci/gm}$ dose equivalent I-131) indicative of fuel damage, into the Containment (ref. 1).

Monitors used for this fission product barrier loss threshold are the Containment High Range Radiation Monitors GT RE-59 and GT RE-60 (ref.1).

The radiation monitor reading corresponds to an instantaneous release of all reactor coolant mass into the containment, assuming that reactor coolant activity equals 300 $\mu\text{Ci/gm}$ 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.

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

WCGS Basis Reference(s):

1. EP-CALC-WCNOC-1602 Containment Radiation EAL Threshold Values
2. NEI 99-01 CMT Radiation / RCS Activity Fuel Clad Loss 3.A

ATTACHMENT 2
Fission Product Barrier Loss/Potential Loss Matrix and Bases

Barrier: Fuel Clad
Category: C. CMT Radiation / RCS Activity
Degradation Threat: Loss
Threshold:

2. Dose equivalent I-131 coolant activity > 300 $\mu\text{Ci/gm}$

Definition(s):

None

Basis:

Dose Equivalent Iodine (DEI) is determined by Chemistry procedure CHA RC-004 Gamma Isotopic, Total Curie Content and Dose Equivalent Iodine Determination (ref. 1).

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.

WCGS Basis Reference(s):

1. CHA RC-004 Gamma Isotopic, Total Curie Content and Dose Equivalent Iodine Determination
2. NEI 99-01 CMT Radiation / RCS Activity Fuel Clad Loss 3.B

ATTACHMENT 2
Fission Product Barrier Loss/Potential Loss Matrix and Bases

Barrier: Fuel Clad
Category: C. CMT Radiation / RCS Activity
Degradation Threat: Potential Loss
Threshold:

None

ATTACHMENT 2
Fission Product Barrier Loss/Potential Loss Matrix and Bases

Barrier: Fuel Clad
Category: D. CMT Integrity or Bypass
Degradation Threat: Loss
Threshold:

None

ATTACHMENT 2
Fission Product Barrier Loss/Potential Loss Matrix and Bases

Barrier: Fuel Clad
Category: D. CMT Integrity or Bypass
Degradation Threat: Potential Loss
Threshold:

None

ATTACHMENT 2
Fission Product Barrier Loss/Potential Loss Matrix and Bases

Barrier: Fuel Clad

Category: E. Emergency Manager Judgment

Degradation Threat: Loss

Threshold:

1. **Any** condition in the opinion of the Emergency Manager that indicates loss of the Fuel Clad barrier

Definition(s):

None

Basis:

The Emergency Manager judgment threshold addresses any other factors relevant to determining if the Fuel Clad barrier is lost. Such a determination should include imminent barrier degradation, barrier monitoring capability and dominant accident sequences.

- Imminent barrier degradation exists if the degradation will likely occur within relatively short period of time based on a projection of current safety system performance. The term "imminent" refers to recognition of the inability to reach safety acceptance criteria before completion of all checks.
- Barrier monitoring capability is decreased if there is a loss or lack of reliable indicators. This assessment should include instrumentation operability concerns, readings from portable instrumentation and consideration of offsite monitoring results.
- Dominant accident sequences lead to degradation of all fission product barriers and likely entry to the EOPs. The Emergency Manager should be mindful of the Loss of AC power (Station Blackout) and ATWS EALs to assure timely emergency classification declarations.

This threshold addresses any other factors that are to be used by the Emergency Manager in determining whether the Fuel Clad barrier is lost.

WCGS Basis Reference(s):

1. NEI 99-01 Emergency Director Judgment Fuel Clad Loss 6.A

ATTACHMENT 2
Fission Product Barrier Loss/Potential Loss Matrix and Bases

Barrier: Fuel Clad

Category: E. Emergency Manager Judgment

Degradation Threat: Potential Loss

Threshold:

1. **Any** condition in the opinion of the Emergency Manager that indicates potential loss of the Fuel Clad barrier

Basis:

The Emergency Manager judgment threshold addresses any other factors relevant to determining if the Fuel Clad barrier is potentially lost. Such a determination should include imminent barrier degradation, barrier monitoring capability and dominant accident sequences.

- Imminent barrier degradation exists if the degradation will likely occur within relatively short period of time based on a projection of current safety system performance. The term "imminent" refers to recognition of the inability to reach safety acceptance criteria before completion of all checks.
- Barrier monitoring capability is decreased if there is a loss or lack of reliable indicators. This assessment should include instrumentation operability concerns, readings from portable instrumentation and consideration of offsite monitoring results.
- Dominant accident sequences lead to degradation of all fission product barriers and likely entry to the EOPs. The Emergency Manager should be mindful of the Loss of AC power (Station Blackout) and ATWS EALs to assure timely emergency classification declarations.

This threshold addresses any other factors that are to be used by the Emergency Manager in determining whether the Fuel Clad barrier is potentially lost. The Emergency Manager should also consider whether or not to declare the barrier potentially lost in the event that barrier status cannot be monitored.

WCGS Basis Reference(s):

1. NEI 99-01 Emergency Director Judgment Potential Fuel Clad Loss 6.A

ATTACHMENT 2
Fission Product Barrier Loss/Potential Loss Matrix and Bases

Barrier: Reactor Coolant System

Category: A. RCS or SG Tube Leakage

Degradation Threat: Loss

Threshold:

1. An automatic or manual ECCS (SI) actuation required by **EITHER**:
- UNISOLABLE RCS leakage
 - SGTR

Definition(s):

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

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

Basis:

ECCS (SI) actuation is caused by (ref. 1):

- Pressurizer low pressure < 1830 psig
- Steamline low pressure < 615 psig
- Containment high pressure > 3.5 psig

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 A.1 will also be met.

WCGS Basis Reference(s):

1. EMG E-0 Reactor Trip or Safety Injection
2. EMG E-3 Steam Generator Tube Rupture
3. NEI 99-01 RCS or SG Tube Leakage Reactor Coolant System Loss 1.A

ATTACHMENT 2
Fission Product Barrier Loss/Potential Loss Matrix and Bases

Barrier: Reactor Coolant System
Category: A. RCS or SG Tube Leakage
Degradation Threat: Potential Loss
Threshold:

1. CSFST Integrity- RED Path conditions met
--

Definition(s):

None

Basis:

The "Potential Loss" threshold is defined by the CSFST Reactor Coolant Integrity - RED path. CSFST RCS Integrity - Red Path plant conditions and associated PTS Limit Curve A indicates an extreme challenge to the safety function when plant parameters are to the left of the limit curve following excessive RCS cooldown under pressure (ref. 1, 2).

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).

WCGS Basis Reference(s):

1. EMG F-0 Critical Safety Function Status Trees
2. EMG FR-P1 Response to Imminent Pressurized Thermal Shock
3. NEI 99-01 RCS or SG Tube Leakage Reactor Coolant System Potential Loss 1.B

ATTACHMENT 2
Fission Product Barrier Loss/Potential Loss Matrix and Bases

Barrier: Reactor Coolant System
Category: B. Inadequate Heat Removal
Degradation Threat: Loss
Threshold:

None

ATTACHMENT 2
Fission Product Barrier Loss/Potential Loss Matrix and Bases

Barrier: Reactor Coolant System

Category: B. Inadequate Heat Removal

Degradation Threat: Potential Loss

Threshold:

1. CSFST Heat Sink-**RED** path conditions met
- AND**
- Heat sink is required

Definition(s):

None

Basis:

Critical Safety Function Status Tree (CSFST) Heat Sink-RED path indicates the ultimate heat sink function is under extreme challenge and that some fuel clad damage may potentially occur (ref. 1).

The CSFSTs can be monitored using the SPDS display on the NPIS Computer (ref. 1).

The phrase "and heat sink required" precludes the need for classification for conditions in which RCS pressure is less than SG pressure or Heat Sink-RED path entry was created through operator action directed by an EOP. For example, EMG FR-H1 is entered from CSFST Heat Sink-Red. Step 1 tells the operator to determine if heat sink is required by checking that RCS pressure is greater than any non-faulted SG pressure. If these conditions exist, Heat Sink is required. Otherwise, the operator is to either return to the procedure and step in effect and place RHR in service for heat removal. For large LOCA events inside the Containment, the SGs are moot because heat removal through the containment heat removal systems takes place. Therefore, Heat Sink Red should not be required and, should not be assessed for EAL classification because a LOCA event alone should not require higher than an Alert classification. (ref. 2).

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

Meeting this threshold results in a Site Area Emergency because this threshold is identical to Fuel Clad Barrier Potential Loss threshold B.2; both will be met. This condition warrants a Site Area Emergency declaration because inadequate RCS heat removal may result in fuel heat-up sufficient to damage the cladding and increase RCS pressure to the point where mass will be lost from the system.

ATTACHMENT 2
Fission Product Barrier Loss/Potential Loss Matrix and Bases

WCGS Basis Reference(s):

1. EMG F-0 Critical Safety Function Status Trees
2. EMG FR-H1 Response to Loss of Secondary Heat Sink
3. NEI 99-01 Inadequate Heat Removal RCS Loss 2.B

ATTACHMENT 2
Fission Product Barrier Loss/Potential Loss Matrix and Bases

Barrier: Reactor Coolant System
Category: C. CMT Radiation/ RCS Activity
Degradation Threat: Loss
Threshold:

1. Containment radiation > 60 R/hr on GT RE-59 or GT RE-60
--

Definition(s):

N/A

Basis:

Containment radiation monitor readings greater than 60 R/hr (ref. 1) indicate the release of reactor coolant, with Technical Specification allowed spiked coolant activity, into the Containment.

Monitors used for this fission product barrier loss threshold are the Containment High Range Radiation Monitors GT RE-59 and GT RE-60 (ref.1).

The radiation monitor reading corresponds to an instantaneous release of all reactor coolant mass into the containment, assuming that reactor coolant activity equals Technical Specification allowable limits. This value is lower than that specified for Fuel Clad Barrier Loss threshold C.1 since it indicates a loss of the RCS Barrier only.

There is no Potential Loss threshold associated with RCS Activity / Containment Radiation.

WCGS Basis Reference(s):

1. EP-CALC-WCNOC-1602 Containment Radiation EAL Threshold Values
2. NEI 99-01 CMT Radiation / RCS Activity RCS Loss 3.A

ATTACHMENT 2
Fission Product Barrier Loss/Potential Loss Matrix and Bases

Barrier: Reactor Coolant System

Category: C. CMT Radiation/ RCS Activity

Degradation Threat: Potential Loss

Threshold:

None

ATTACHMENT 2
Fission Product Barrier Loss/Potential Loss Matrix and Bases

Barrier: Reactor Coolant System

Category: D. CMT Integrity or Bypass

Degradation Threat: Loss

Threshold:

None

ATTACHMENT 2
Fission Product Barrier Loss/Potential Loss Matrix and Bases

Barrier: Reactor Coolant System
Category: D. CMT Integrity or Bypass
Degradation Threat: Potential Loss
Threshold:

None

ATTACHMENT 2
Fission Product Barrier Loss/Potential Loss Matrix and Bases

Barrier: Reactor Coolant System
Category: E. Emergency Manager Judgment
Degradation Threat: Loss
Threshold:

1. **Any** condition in the opinion of the Emergency Manager that indicates loss of the RCS barrier

Definition(s):

None

Basis:

The Emergency Manager judgment threshold addresses any other factors relevant to determining if the RCS barrier is lost. Such a determination should include imminent barrier degradation, barrier monitoring capability and dominant accident sequences.

- Imminent barrier degradation exists if the degradation will likely occur within relatively short period of time based on a projection of current safety system performance. The term "imminent" refers to recognition of the inability to reach safety acceptance criteria before completion of all checks.
- Barrier monitoring capability is decreased if there is a loss or lack of reliable indicators. This assessment should include instrumentation operability concerns, readings from portable instrumentation and consideration of offsite monitoring results.
- Dominant accident sequences lead to degradation of all fission product barriers and likely entry to the EOPs. The Emergency Manager should be mindful of the Loss of AC power (Station Blackout) and ATWS EALs to assure timely emergency classification declarations.

This threshold addresses any other factors that may be used by the Emergency Manager in determining whether the RCS Barrier is lost.

WCGS Basis Reference(s):

1. NEI 99-01 Emergency Director Judgment RCS Loss 6.A

ATTACHMENT 2
Fission Product Barrier Loss/Potential Loss Matrix and Bases

Barrier: Reactor Coolant System
Category: E. Emergency Manager Judgment

Degradation Threat: Potential Loss

Threshold:

1. **Any** condition in the opinion of the Emergency Manager that indicates potential loss of the RCS barrier

Definition(s):

None

Basis:

The Emergency Manager judgment threshold addresses any other factors relevant to determining if the RCS barrier is potentially lost. Such a determination should include imminent barrier degradation, barrier monitoring capability and dominant accident sequences.

- Imminent barrier degradation exists if the degradation will likely occur within relatively short period of time based on a projection of current safety system performance. The term "imminent" refers to recognition of the inability to reach safety acceptance criteria before completion of all checks.
- Barrier monitoring capability is decreased if there is a loss or lack of reliable indicators. This assessment should include instrumentation operability concerns, readings from portable instrumentation and consideration of offsite monitoring results.
- Dominant accident sequences lead to degradation of all fission product barriers and likely entry to the EOPs. The Emergency Manager should be mindful of the Loss of AC power (Station Blackout) and ATWS EALs to assure timely emergency classification declarations.

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

WCGS Basis Reference(s):

1. NEI 99-01 Emergency Director Judgment RCS Potential Loss 6.A

ATTACHMENT 2
Fission Product Barrier Loss/Potential Loss Matrix and Bases

Barrier: Containment

Category: A. RCS or SG Tube Leakage

Degradation Threat: Loss

Threshold:

1. A RUPTURED SG is FAULTED outside of containment

Definition(s):

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

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

Basis:

This threshold addresses a RUPTURED Steam Generator (SG) that is also FAULTED outside of containment. The condition of the SG is determined in accordance with the threshold for RCS Loss A.1. This condition represents a bypass of the containment barrier.

FAULTED is a defined term within the NEI 99-01 methodology; this determination is not necessarily dependent upon entry into, or diagnostic steps within, an EOP. For example, if the pressure in a steam generator is decreasing uncontrollably (part of the FAULTED definition) and the FAULTED steam generator isolation procedure is not entered because EOP user rules are dictating implementation of another procedure to address a higher priority condition, the steam generator is still considered FAULTED for emergency classification purposes.

The FAULTED criterion establishes an appropriate lower bound on the size of a steam release that may require an emergency classification. Steam releases of this size are readily observable with normal Control Room indications. The lower bound for this aspect of the containment barrier is analogous to the lower bound criteria specified in IC SU4 for the fuel clad barrier (i.e., RCS activity values) and IC SU5 for the RCS barrier (i.e., RCS leak rate values).

This threshold also applies to prolonged steam releases necessitated by operational considerations such as the forced steaming of a 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

ATTACHMENT 2

Fission Product Barrier Loss/Potential Loss Matrix and Bases

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 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 SU5.1	Unusual Event per SU5.1
Requires an automatic or manual ECCS (SI) actuation (<i>RCS Barrier Loss</i>)	Site Area Emergency per FS1.1	Alert per FA1.1

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

WCGS Basis Reference(s):

1. EMG E-2 Faulted Steam Generator Isolation
2. EMG E-3 Steam Generator Tube Rupture
3. NEI 99-01 RCS or SG Tube Leakage Containment Loss 1.A

ATTACHMENT 2
Fission Product Barrier Loss/Potential Loss Matrix and Bases

Barrier: Containment
Category: A. RCS or SG Tube Leakage
Degradation Threat: Potential Loss
Threshold:

None

ATTACHMENT 2
Fission Product Barrier Loss/Potential Loss Matrix and Bases

Barrier: Containment
Category: B. Inadequate heat Removal
Degradation Threat: Loss
Threshold:

None

ATTACHMENT 2
Fission Product Barrier Loss/Potential Loss Matrix and Bases

Barrier: Containment

Category: B. Inadequate heat Removal

Degradation Threat: Potential Loss

Threshold:

1. CSFST Core Cooling-**RED** path conditions met
AND
Restoration procedures **not** effective within 15 min. (Note 1)

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

Definition(s):

None

Basis:

Critical Safety Function Status Tree (CSFST) Core Cooling-RED path indicates significant core exit superheating and core uncover. The CSFSTs can be monitored using the SPDS display on the NPIS Computer (ref. 1).

The function restoration procedures are those emergency operating procedures that address the recovery of the core cooling critical safety functions. The procedure is considered effective if the temperature is decreasing or if the vessel water level is increasing (ref. 1, 2, 3).

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 Manager 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.

ATTACHMENT 2
Fission Product Barrier Loss/Potential Loss Matrix and Bases

WCGS Basis Reference(s):

1. EMG F-0 Critical Safety Function Status Trees
2. EMG FR-C1 Response to Inadequate Core Cooling
3. EMG FR-C.2 Response to Degraded Core Cooling
4. NEI 99-01 Inadequate Heat Removal Containment Potential Loss 2.A

ATTACHMENT 2
Fission Product Barrier Loss/Potential Loss Matrix and Bases

Barrier: Containment

Category: C. CMT Radiation/RCS Activity

Degradation Threat: Loss

Threshold:

None

ATTACHMENT 2
Fission Product Barrier Loss/Potential Loss Matrix and Bases

Barrier: Containment

Category: C. CMT Radiation/RCS Activity

Degradation Threat: Potential Loss

Threshold:

1. Containment radiation > 6,000 R/hr on GT RE-59 or GT RE-60

Definition(s):

None

Basis:

Containment radiation monitor readings greater than 6,000 R/hr (ref. 1) indicate the release of reactor coolant, with coolant activity corresponding to 20% clad failure, into the Containment.

Monitors used for this fission product barrier loss threshold are the Containment High Range Radiation Monitors GT RE-59 and GT RE-60 (ref. 1).

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. Containment radiation readings at or above the Containment barrier Potential Loss threshold, therefore, signify a loss of two fission product barriers and Potential Loss of a third, indicating the need to upgrade the emergency classification to a General Emergency.

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 to a General Emergency.

WCGS Basis Reference(s):

1. EP-CALC-WCNOC-1602 Containment Radiation EAL Threshold Values
2. NEI 99-01 CMT Radiation / RCS Activity Containment Potential Loss 3.A

ATTACHMENT 2
Fission Product Barrier Loss/Potential Loss Matrix and Bases

Barrier: Containment

Category: D. CMT Integrity or Bypass

Degradation Threat: Loss

Threshold:

1. Containment isolation is required

AND EITHER:

- Containment integrity has been lost based on Emergency Manager judgment
- UNISOLABLE pathway from containment to the environment exists

Definition(s):

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

Basis:

The status of the containment barrier during an event involving steam generator tube leakage is assessed using Loss Threshold A.1.

These thresholds address a situation where containment isolation is required and one of two conditions exists as discussed below. Users are reminded that there may be accident and release conditions that simultaneously meet both bulleted thresholds.

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

Refer to the middle piping run of Figure 1. Two simplified examples are provided. One is leakage from a penetration and the other is leakage from an in-service system valve. Depending upon radiation monitor locations and sensitivities, the leakage could be detected by any of the four monitors depicted in the figure.

Another example would be a loss or potential loss of the RCS barrier, and the simultaneous occurrence of two FAULTED locations on a steam generator where one fault is located inside containment (e.g., on a steam or feedwater line) and the other outside of containment. In this case, the associated steam line provides a pathway for the containment atmosphere to escape to an area outside the containment.

Following the leakage of RCS mass into containment and a rise in containment pressure, there may be minor radiological releases associated with allowable (design) containment leakage through various penetrations or system components. These releases do not constitute a loss

ATTACHMENT 2
Fission Product Barrier Loss/Potential Loss Matrix and Bases

or potential loss of containment but should be evaluated using the Recognition Category R ICs.

Second Bulleted Threshold – Conditions are such that there is an UNISOLABLE pathway for the migration of radioactive material from the containment atmosphere to the environment. As used here, the term “environment” includes the atmosphere of a room or area, outside the containment, that may, in turn, communicate with the outside-the-plant atmosphere (e.g., through discharge of a ventilation system or atmospheric leakage). Depending upon a variety of factors, this condition may or may not be accompanied by a noticeable drop in containment pressure.

Refer to the top piping run of Figure 1. In this simplified example, the inboard and outboard isolation valves remained open after a containment isolation was required (i.e., containment isolation was not successful). There is now an UNISOLABLE pathway from the containment to the environment.

The existence of a filter is not considered in the threshold assessment. Filters do not remove fission product noble gases. In addition, a filter could become ineffective due to iodine and/or particulate loading beyond design limits (i.e., retention ability has been exceeded) or water saturation from steam/high humidity in the release stream.

Leakage between two interfacing liquid systems, by itself, does not meet this threshold.

Refer to the bottom piping run of Figure 1. In this simplified example, leakage in an RCP seal cooler is allowing radioactive material to enter the Auxiliary Building. The radioactivity would be detected by the Process Monitor. If there is no leakage from the closed water cooling system to the Auxiliary Building, then no threshold has been met. If the pump developed a leak that allowed steam/water to enter the Auxiliary Building, then the second threshold would be met. Depending upon radiation monitor locations and sensitivities, this leakage could be detected by any of the four monitors depicted in the figure and cause the first threshold to be met as well.

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

WCGS Basis Reference(s):

1. NEI 99-01 CMT Integrity or Bypass Containment Loss 4.A

ATTACHMENT 2
Fission Product Barrier Loss/Potential Loss Matrix and Bases

Barrier: Containment
Category: D. CMT Integrity or Bypass
Degradation Threat: Loss
Threshold:

2. Indications of RCS leakage outside of containment
--

Definition(s):

None

Basis:

The status of the containment barrier during an event involving steam generator tube leakage is assessed using Loss Threshold A.1.

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 threshold A.1 to be met.

EMG C-12 LOCA Outside Containment (ref. 1) provides instructions to identify and isolate a LOCA outside of the containment. Potential RCS leak pathways outside containment include (ref. 1, 2, 3):

- Residual Heat Removal
- Safety Injection
- Chemical & Volume Control
- RCP seals
- RCS sample lines

Containment sump, temperature, pressure and/or radiation levels will increase if reactor coolant mass is leaking into the containment. If these parameters have not increased, then the reactor coolant mass may be leaking outside of containment (i.e., a containment bypass sequence). Increases in sump, temperature, pressure, flow and/or radiation level readings outside of the containment may indicate that the RCS mass is being lost outside of containment.

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

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

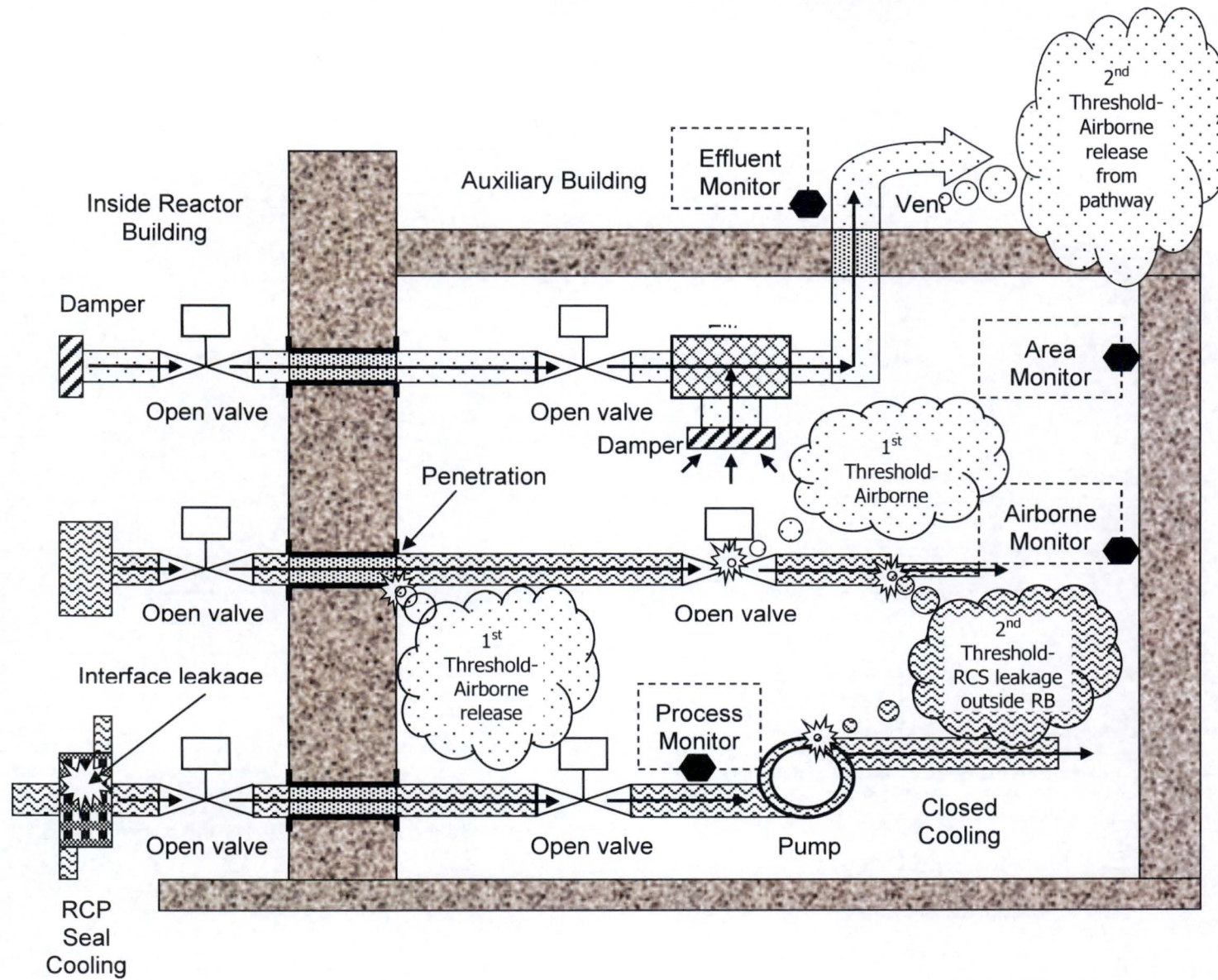
ATTACHMENT 2
Fission Product Barrier Loss/Potential Loss Matrix and Bases

WCGS Basis Reference(s):

1. EMG C-12 LOCA Outside Containment
2. EMG E-1 Loss of Reactor or Secondary Coolant
3. USAR Section 5.2.5.2 Intersystem Leakage
4. NEI 99-01 CMT Integrity or Bypass Containment Loss

ATTACHMENT 2
Fission Product Barrier Loss/Potential Loss Matrix and Bases

Figure 1: Containment Integrity or Bypass Examples



ATTACHMENT 2
Fission Product Barrier Loss/Potential Loss Matrix and Bases

Barrier: Containment

Category: D. CMT Integrity or Bypass

Degradation Threat: Potential Loss

Threshold:

- | |
|--|
| 1. CSFST Containment-RED path conditions met |
|--|

Definition(s):

None

Basis:

Critical Safety Function Status Tree (CSFST) Containment-RED path is entered if containment pressure is greater than or equal to 60 psig and represents an extreme challenge to the containment barrier. The CSFSTs can be monitored using the SPDS display on the NPIS Computer (ref. 1).

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.

WCGS Basis Reference(s):

1. BD-EMG F-0 Critical Safety Function Status Trees
2. NEI 99-01 CMT Integrity or Bypass Containment Potential Loss 4.A

ATTACHMENT 2
Fission Product Barrier Loss/Potential Loss Matrix and Bases

Barrier: Containment

Category: D. CMT Integrity or Bypass

Degradation Threat: Potential Loss

Threshold:

2. Containment hydrogen concentration \geq 4%

Definition(s):

None

Basis:

Following a design basis accident, hydrogen gas may be generated inside the containment by reactions such as zirconium metal with water, corrosion of materials of construction and radiolysis of aqueous solution in the core and sump. (ref. 1).

WCGS is equipped with a Hydrogen Control System (HCS) which serves to limit or reduce combustible gas concentrations in the Containment. The HCS is an engineered safety feature with redundant hydrogen recombiners, hydrogen mixing system, hydrogen monitoring subsystem, and a backup hydrogen purge subsystem. The HCS is designed to maintain the Containment hydrogen concentration below 4% by volume (ref. 1).

HCS operation is prescribed by EMGs if Containment hydrogen concentration should reach 0.5% by volume (ref. 2). If the Potential Loss threshold is reached or exceeded, the primary means of controlling Containment hydrogen concentration must have failed to perform its design function or has otherwise been inadequate in mitigating the hydrogen generation rate. For either case, continued hydrogen production may yield a flammable hydrogen concentration and a consequent threat to Containment integrity.

To generate such levels of combustible gas, loss of the Fuel Clad and RCS barriers must have occurred. With the Potential Loss of the containment barrier, the threshold hydrogen concentration, therefore, will likely warrant declaration of a General Emergency.

Two Containment hydrogen monitors (GS AI-10 and GS AI-19) with a range of 0% to 10% provide indication on Control Room Panel RL020 and NPIS (ref. 1, 3).

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.

WCGS Basis Reference(s):

1. USAR Section 6.2.5 Combustible Gas Control in Containment
2. EMG FR-C1 Response to Inadequate Core Cooling
3. USAR Section 7.5 Safety-Related Display Instrumentation
4. NEI 99-01 CMT Integrity or Bypass Containment Potential Loss 4.B

ATTACHMENT 2
Fission Product Barrier Loss/Potential Loss Matrix and Bases

Barrier: Containment

Category: D. CMT Integrity or Bypass

Degradation Threat: Potential Loss

Threshold:

3. Containment pressure > 27 psig with < one full train of containment depressurization equipment operating per design for ≥ 15 min. (Note 1, 9)

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

Note 9: One Containment Spray System train and one Containment Cooling System train comprise one full train of depressurization equipment.

Definition(s):

None

Basis:

The Containment Spray System consists of two separate trains of equal capacity, each capable of meeting the design bases requirement. Each train includes a containment spray pump, spray headers, nozzles, valves, and piping. The containment spray additive tank supplies 30 weight percent (nominal) sodium hydroxide to both trains. The refueling water storage tank (RWST) supplies borated water to the Containment Spray System during the injection phase of operation. In the recirculation mode of operation, Containment Spray pump suction is transferred from the RWST to the Containment sumps (ref. 2).

The Containment Cooling System consists of two trains of Containment cooling, each of sufficient capacity to supply 100% of the design cooling requirement. Each train of two fan units is supplied with cooling water from a separate train of essential service water (ESW). Air is drawn into the coolers through the fan and discharged to the steam generator compartments, pressurizer compartment, and instrument tunnel, and outside the secondary shield wall. The air supplied to each steam generator compartment is drawn upwards through the compartments by the hydrogen mixing fans and discharged into the upper elevations of the containment. During normal operation, all four fan units are normally operating. In post-accident operation following an actuation signal, the Containment Cooling System fans are designed to start automatically in slow speed if not already running (ref. 3).

The Containment pressure setpoint (27 psig, ref. 4, 5, 6) is the pressure at which the equipment should actuate and begin performing its function. The design basis accident analyses and evaluations assume the loss of one Containment Spray System train and one Containment Cooling System train (ref. 7). Consistent with the design requirement, "one full train of depressurization equipment" is therefore defined to be the availability of one train of each system. If less than this equipment is operating and Containment pressure is above the actuation setpoint, the threshold is met.

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

ATTACHMENT 2
Fission Product Barrier Loss/Potential Loss Matrix and Bases

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.

WCGS Basis Reference(s):

1. USAR Section 6.2.2
2. USAR Section 6.2.2.1.2.1
3. USAR Section 6.2.2.2.2
4. EMG F-0 Critical Safety Function Status Trees (CSFST)
5. EMG FR-Z1 Response to High Containment Pressure
6. Technical Specifications Table 3.3.2-1
7. Technical Specifications B3.6.6
8. NEI 99-01 CMT Integrity or Bypass Containment Potential Loss 4.C

ATTACHMENT 2
Fission Product Barrier Loss/Potential Loss Matrix and Bases

Barrier: Containment
Category: E. Emergency Manager Judgment
Degradation Threat: Loss
Threshold:

1. **Any** condition in the opinion of the Emergency Manager that indicates loss of the Containment barrier

Definition(s):

None

Basis:

The Emergency Manager judgment threshold addresses any other factors relevant to determining if the Primary Containment barrier is lost. Such a determination should include imminent barrier degradation, barrier monitoring capability and dominant accident sequences.

- Imminent barrier degradation exists if the degradation will likely occur within relatively short period of time based on a projection of current safety system performance. The term “imminent” refers to recognition of the inability to reach safety acceptance criteria before completion of all checks.
- Barrier monitoring capability is decreased if there is a loss or lack of reliable indicators. This assessment should include instrumentation operability concerns, readings from portable instrumentation and consideration of offsite monitoring results.
- Dominant accident sequences lead to degradation of all fission product barriers and likely entry to the EOPs. The Emergency Manager should be mindful of the Loss of AC power (Station Blackout) and ATWS EALs to assure timely emergency classification declarations.

This threshold addresses any other factors that may be used by the Emergency Manager in determining whether the Containment Barrier is lost.

WCGS Basis Reference(s):

1. NEI 99-01 Emergency Director Judgment PC Loss 6.A

ATTACHMENT 2
Fission Product Barrier Loss/Potential Loss Matrix and Bases

Barrier: Containment

Category: E. Emergency Manager Judgment

Degradation Threat: Potential Loss

Threshold:

1. **Any** condition in the opinion of the Emergency Manager that indicates potential loss of the Containment barrier

Definition(s):

None

Basis:

The Emergency Manager judgment threshold addresses any other factors relevant to determining if the Primary Containment barrier is potentially lost. Such a determination should include imminent barrier degradation, barrier monitoring capability and dominant accident sequences.

- Imminent barrier degradation exists if the degradation will likely occur within relatively short period of time based on a projection of current safety system performance. The term "imminent" refers to recognition of the inability to reach safety acceptance criteria before completion of all checks.
- Barrier monitoring capability is decreased if there is a loss or lack of reliable indicators. This assessment should include instrumentation operability concerns, readings from portable instrumentation and consideration of offsite monitoring results.
- Dominant accident sequences lead to degradation of all fission product barriers and likely entry to the EOPs. The Emergency Manager should be mindful of the Loss of AC power (Station Blackout) and ATWS EALs to assure timely emergency classification declarations.

This threshold addresses any other factors that may be used by the Emergency Manager in determining whether the Containment Barrier is lost.

WCGS Basis Reference(s):

1. NEI 99-01 Emergency Director Judgment PC Potential Loss 6.A

ATTACHMENT 3
Safe Operation & Shutdown Areas Tables R-3 & H-2 Bases

Background

NEI 99-01 Revision 6 ICs AA3 and HA5 prescribe declaration of an Alert based on impeded access to rooms or areas (due to either area radiation levels or hazardous gas concentrations) where equipment necessary for normal plant operations, cooldown or shutdown is located. These areas are intended to be plant operating mode dependent. Specifically the Developers Notes for AA3 and HA5 states:

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

The list should not include rooms or areas for which entry is required solely to perform actions of an administrative or record keeping nature (e.g., normal rounds or routine inspections).

Further, as specified in IC HA5:

The list need not include the Control Room if adequate engineered safety/design features are in place to preclude a Control Room evacuation due to the release of a hazardous gas. Such features may include, but are not limited to, capability to draw air from multiple air intakes at different and separate locations, inner and outer atmospheric boundaries, or the capability to acquire and maintain positive pressure within the Control Room envelope.

ATTACHMENT 3
Safe Operation & Shutdown Areas Tables R-3 & H-2 Bases

WCGS Table R-3 and H-2 Bases

A review of station operating procedures identified the following mode dependent in-plant actions and associated areas that are required for normal plant operation, cooldown or shutdown:

WCGS Procedure and Step	Step Action	Building/Elevation/Room	Mode(s)	Required for normal plant operations, cooldown or shutdown?
GEN 00-005 Step 6.8.1, 6.25 and 6.11	Chemistry directed to obtain boron sample	Aux/2000/Sampling Room	3,4,5	Yes – Chemistry sampling requires access to sampling panel
GEN 00-006 Step 6.18.1 and Attachment J	Isolate Accumulators	Aux/2026/ Electrical Pen Rooms	3	Yes - for breaker operation in electrical pen rooms
GEN 00-006 Step 6.22.3	Make SI pumps and one CCP incapable of injection	Control/2000/ESF Switchgear Rooms	4	Yes – NB Breakers must be racked down in switchgear rooms
GEN 00-006 Step 6.22.4 and 6.33.2	Place RHR in service using SYS EJ-120	Aux/2000/Heat Exchanger Rooms Aux/2026/Electrical Pen Rooms	4,5	Yes - for breaker operation and low pressure letdown

Table R-3 & H-2 Results

Table R-3/H-2 Safe Operation & Shutdown Rooms/Areas	
Room/Area	Mode Applicability
North Electrical Pen. Room A	3, 4
South Electrical Pen. Room B	3, 4
ESF SWGR Room No. 1 (TRN A)	4
ESF SWGR Room No. 2 (TRN B)	4
Auxiliary Building/West Hall Elev 2000	3,4,5

Plant Operating Procedures Reviewed

1. GEN 00-004 - Power Operation
2. GEN 00-005 - Minimum Load to Hot Standby
3. GEN 00-006 – Hot Standby to Cold Shutdown
4. OFN MA-038 – Rapid Plant Shutdown

Enclosure III

**Wolf Creek Generating Station
EAL Comparison Matrix
(120 Pages)**

**Wolf Creek Generating Station
NEI 99-01 Revision 6
EAL Comparison Matrix**

[Draft D5 9/13/16]

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Introduction

This document provides a line-by-line comparison of the Initiating Conditions (ICs), Mode Applicability and Emergency Action Levels (EALs) in NEI 99-01 Rev. 6 Final, Development of Emergency Action Levels for Non-Passive Reactors, ADAMS Accession Number ML12326A805, and the Wolf Creek Generating Station (WCGS) ICs, Mode Applicability and EALs. This document provides a means of assessing WCGS differences and deviations from the NRC endorsed guidance given in NEI 99-01. Discussion of WCGS EAL bases and lists of source document references are given in the EAL Technical Bases Document. It is, therefore, advisable to reference the EAL Technical Bases Document for background information while using this document.

Comparison Matrix Format

The ICs and EALs discussed in this document are grouped according to NEI 99-01 Recognition Categories. Within each Recognition Category, the ICs and EALs are listed in tabular format according to the order in which they are given in NEI 99-01. Generally, each row of the comparison matrix provides the following information:

- NEI EAL/IC identifier
- NEI EAL/IC wording
- WCGS EAL/IC identifier
- WCGS EAL/IC wording
- Description of any differences or deviations

EAL Wording

In Section 4.1, NEI recommends the following: "The guidance in NEI 99-01 is not intended to be applied to plants "as-is"; however, developers should attempt to keep their site-specific schemes as close to the generic guidance as possible. The goal is to meet the intent of the generic Initiating Conditions (ICs) and Emergency Action Levels (EALs) within the context of site-specific characteristics – locale, plant design, operating features, terminology, etc. Meeting this goal will result in a shorter and less cumbersome NRC review and approval process, closer alignment with the schemes of other nuclear

power plant sites and better positioning to adopt future industry-wide scheme enhancements"

To assist the Emergency Manager (EM), the WCGS EALs have been written in a clear and concise style (to the extent that the differences from the NEI EAL wording could be reasonably documented and justified). This supports timely and accurate classification in the tense atmosphere of an emergency event. The EAL differences introduced to reduce reading burden comprise almost all of the differences justified in this document.

EAL Emphasis Techniques

Due to the width of the table columns and table formatting constraints in this document, line breaks and indentation may differ slightly from the appearance of comparable wording in the source documents. NEI 99-01 is the source document for the NEI EALs; the WCGS EAL Technical Bases Document for the WCGS EALs.

Development of the WCGS IC/EAL wording has attempted to minimize inconsistencies and apply sound human factors principles. As a result, differences occur between NEI and WCGS ICs/EALs for these reasons alone. When such difference may infer a technical difference in the associated NEI IC/EAL, the difference is identified and a justification provided.

The print and paragraph formatting conventions summarized below guide presentation of the WCGS EALs in accordance with the EAL writing criteria. Space restrictions in the EAL table of this document sometimes override this criteria in cases when following the criteria would introduce undesirable complications in the EAL layout.

- Upper case-bold print is used for the logic terms **AND**, **OR** and **EITHER**.
- Bold font is used for certain logic terms, negative terms (**not**, **cannot**, etc.), **any**, **all**.
- Upper case print is reserved for defined terms, acronyms, system abbreviations, logic terms (and, or, etc. when not used as a conjunction), annunciator window engravings.
- Three or more items in a list are normally introduced with "**Any** of the following..." or "**All** of the following..." Items of the list begin with bullets when a priority or sequence is not inferred.

- The use of **AND/OR** logic within the same EAL has been avoided when possible. When such logic cannot be avoided, indentation and separation of subordinate contingent phrases is employed.

Global Differences

The differences listed below generally apply throughout the set of EALs and are not repeated in the Justification sections of this document. The global differences do not decrease the effectiveness of the intent of NEI 99-01.

1. The NEI phrase "Notification of Unusual Event" has been changed to "Unusual Event" or abbreviated "UE" to reduce EAL-user reading burden.
2. NEI 99-01 IC Example EALs are implemented in separate plant EALs to improve clarity and readability. For example, NEI lists all IC HU3 Example EALs under one IC. The corresponding WCGS EALs appear as unique EALs (e.g., HU3.1 through HU3.4).
3. Mode applicability identifiers (numbers/letter) modify the NEI 99-01 mode applicability names as follows: 1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 - Hot Shutdown, 5 - Cold Shutdown, 6 - Refueling, D - Defueled. NEI 99-01 defines Defueled as follows: "Reactor Vessel contains no irradiated fuel (full core off-load during refueling or extended outage)."
4. NEI 99-01 uses the terms greater than, less than, greater than or equal to, etc. in the wording of some example EALs. For consistency and reduce EAL-user reading burden, WCGS has adopted use of boolean symbols in place of the NEI 99-01 text modifiers within the EAL wording.
5. "min." is the standard abbreviation for "minutes" and is used to reduce EAL user reading burden.
6. The term "Emergency Director" has been replaced by "Emergency Manager" consistent with site-specific nomenclature.
7. Wherever the generic bracketed PWR term "reactor vessel/RCS" is provided, WCGS uses the term "RCS" as the site-specific nomenclature.
8. IC/EAL identification:

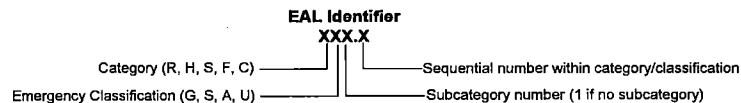
- NEI Recognition Category A "Abnormal Radiation Levels/ Radiological Effluents" has been changed to Category R "Abnormal Rad Levels / Rad Effluents." The designator "R" is more intuitively associated with radiation (rad) or radiological events. NEI IC designators beginning with "A" have likewise been changed to "R."
- NEI 99-01 defines the thresholds requiring emergency classification (example EALs) and assigns them to ICs which, in turn, are grouped in "Recognition Categories." WCGS endeavors to optimize the NEI EAL organization and identification scheme to enhance usability of the plant-specific EAL set. To this end, the WCGS IC/EAL scheme includes the following features:
 - a. Division of the NEI EAL set into three groups:
 - EALs applicable under all plant operating modes – This group would be reviewed by the EAL-user any time emergency classification is considered.
 - EALs applicable only under hot operating modes – This group would only be reviewed by the EAL-user when the plant is in Hot Shutdown, Hot Standby, Startup or Power Operation mode.
 - EALs applicable only under cold operating modes – This group would only be reviewed by the EAL-user when the plant is in Cold Shutdown, Refueling or Defueled mode.

The purpose of the groups is to avoid review of hot condition EALs when the plant is in a cold condition and avoid review of cold condition EALs when the plant is in a hot condition. This approach significantly minimizes the total number of EALs that must be reviewed by the EAL-user for a given plant condition, reduces EAL-user reading burden and, thereby, speeds identification of the EAL that applies to the emergency.
 - b. Within each of the above three groups, assignment of EALs to categories/subcategories – Category and subcategory titles are selected to represent conditions that are operationally significant to the EAL-user. Subcategories are used as necessary to further divide the

EALs of a category into logical sets of possible emergency classification thresholds. The WCGS EAL categories/subcategories and their relationship to NEI Recognition Categories are listed in Table 1.

- c. Unique identification of each EAL – Four characters comprise the EAL identifier as illustrated in Figure 1.

Figure 1 – EAL Identifier



The first character is a letter associated with the category in which the EAL is located. The second character is a letter associated with the emergency classification level (G for General Emergency, S for Site Area Emergency, A for Alert, and U for Notification of Unusual Event). The third character is a number associated with one or more subcategories within a given category. Subcategories are sequentially numbered beginning with the number "1". If a category does not have a subcategory, this character is assigned the number "1". The fourth character is a number preceded by a period for each EAL within a subcategory. EALs are sequentially numbered within the emergency classification level of a subcategory beginning with the number "1".

The EAL identifier is designed to fulfill the following objectives:

- Uniqueness – The EAL identifier ensures that there can be no confusion over which EAL is driving the need for emergency classification.
- Speed in locating the EAL of concern – When the EALs are displayed in a matrix format, knowledge of the EAL identifier alone can lead the EAL-user to the location of the EAL within the classification matrix. The identifier conveys the category,

subcategory and classification level. This assists ERO responders (who may not be in the same facility as the EM) to find the EAL of concern in a timely manner without the need for a word description of the classification threshold.

- Possible classification upgrade – The category/subcategory/identifier scheme helps the EAL-user find higher emergency classification EALs that may become active if plant conditions worsen.

Table 2 lists the WCGS ICs and EALs that correspond to the NEI ICs/Example EALs when the above EAL/IC organization and identification scheme is implemented.

Differences and Deviations

In accordance NRC Regulatory Issue Summary (RIS) 2003-18 "Use of Nuclear Energy Institute (NEI) 99-01, Methodology for Development of Emergency Action Levels" Supplements 1 and 2, a difference is an EAL change in which the basis scheme guidance differs in wording but agrees in meaning and intent, such that classification of an event would be the same, whether using the basis scheme guidance or the WCGS EAL. A deviation is an EAL change in which the basis scheme guidance differs in wording and is altered in meaning or intent, such that classification of the event could be different between the basis scheme guidance and the WCGS proposed EAL.

Administrative changes that do not actually change the textual content are neither differences nor deviations. Likewise, any format change that does not alter the wording of the IC or EAL is considered neither a difference nor a deviation.

The following are examples of differences:

- Choosing the applicable EAL based upon plant type (i.e., BWR vs. PWR).
- Using a numbering scheme other than that provided in NEI 99-01 that does not change the intent of the overall scheme.
- Where the NEI 99-01 guidance specifically provides an option to not include an EAL if equipment for the EAL does not exist at WCGS (e.g., automatic real-time dose assessment capability).

- Pulling information from the bases section up to the actual EAL that does not change the intent of the EAL.
- Choosing to state ALL Operating Modes are applicable instead of stating N/A, or listing each mode individually under the Abnormal Rad Level/Radiological Effluent and Hazard and Other Conditions Affecting Plant Safety sections.
- Using synonymous wording (e.g., greater than or equal to vs. at or above, less than or equal vs. at or below, greater than or less than vs. above or below, etc.)
- Adding WCGS equipment/instrument identification and/or noun names to EALs.
- Combining like ICs that are exactly the same but have different operating modes as long as the intent of each IC is maintained and the overall progression of the EAL scheme is not affected.
- Any change to the IC and/or EAL, and/or basis wording, as stated in NEI 99-01, that does not alter the intent of the IC and/or EAL, i.e., the IC and/or EAL continues to:
 - Classify at the correct classification level.
 - Logically integrate with other EALs in the EAL scheme.
 - Ensure that the resulting EAL scheme is complete (i.e., classifies all potential emergency conditions).

The following are examples of deviations:

- Use of altered mode applicability.
- Altering key words or time limits.
- Changing words of physical reference (protected area, safety-related equipment, etc.).
- Eliminating an IC. This includes the removal of an IC from the Fission Product Barrier Degradation category as this impacts the logic of Fission Product Barrier ICs.
- Changing a Fission Product Barrier from a Loss to a Potential Loss or vice-versa.
- Not using NEI 99-01 definitions as the intent is for all NEI 99-01 users to have a standard set of defined terms as defined in NEI 99-01.

Differences due to plant types are permissible (BWR or PWR). Verbatim compliance to the wording in NEI 99-01 is not necessary as long as the intent of the defined word is maintained. Use of the wording provided in NEI 99-01 is encouraged since the intent is for all users to have a standard set of defined terms as defined in NEI 99-01.

- Any change to the IC and/or EAL, and/or basis wording as stated in NEI 99-01 that does alter the intent of the IC and/or EAL, i.e., the IC and/or EAL:
 - Does not classify at the classification level consistent with NEI 99-01.
 - Is not logically integrated with other EALs in the EAL scheme.
 - Results in an incomplete EAL scheme (i.e., does not classify all potential emergency conditions).

The "Difference/Deviation Justification" columns in the remaining sections of this document identify each difference between the NEI 99-01 IC/EAL wording and the WCGS IC/EAL wording. An explanation that justifies the reason for each difference is then provided. If the difference is determined to be a deviation, a statement is made to that affect and explanation is given that states why classification may be different from the NEI 99-01 IC/EAL and the reason for its acceptability. In all cases, however, the differences and deviations do not decrease the effectiveness of the intent of NEI 99-01. A summary list of WCGS EAL deviations from NEI 99-01 is given in Table 3.

Table 1 – WCGS EAL Categories/Subcategories

WCGS EALs		NEI Recognition Category
Category	Subcategory	
<u>Group: Any Operating Mode:</u>		
R – Abnormal Rad Levels/Rad Effluent	1 – Radiological Effluent 2 – Irradiated Fuel Event 3 – Area Radiation Levels	Abnormal Rad Levels/Radiological Effluent ICs/EALs
H – Hazards and Other Conditions Affecting Plant Safety	1 – Security 2 – Seismic Event 3 – Natural or Technological Hazard 4 – Fire 5 – Hazardous Gases 6 – Control Room Evacuation 7 – Emergency Manager Judgment	Hazards and Other Conditions Affecting Plant Safety ICs/EALs
<u>Group: Hot Conditions:</u>		
S – System Malfunction	1 – Loss of Emergency AC Power 2 – Loss of Vital DC Power 3 – Loss of Control Room Indications 4 – RCS Activity 5 – RCS Leakage 6 – RPS Failure 7 – Loss of Communications 8 – Containment Failure 9 – Hazardous Event Affecting Safety Systems	System Malfunction ICs/EALs
F – Fission Product Barrier	None	Fission Product Barrier ICs/EALs
<u>Group: Cold Conditions:</u>		
C – Cold Shutdown/Refueling System Malfunction	1 – RCS Level 2 – Loss of Emergency AC Power 3 – RCS Temperature 4 – Loss of Vital DC Power 5 – Loss of Communications 6 – Hazardous Event Affecting Safety Systems	Cold Shutdown./ Refueling System Malfunction ICs/EALs

Table 2 – NEI / WCGS EAL Identification Cross-Reference

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

NEI		WCGS	
IC	Example EAL	Category and Subcategory	EAL
AS2	1	R – Abnormal Rad Levels / Rad Effluent, 2 – Irradiated Fuel Event	RS2.1
AG1	1	R – Abnormal Rad Levels / Rad Effluent, 1 – Radiological Effluent	RG1.1
AG1	2	R – Abnormal Rad Levels / Rad Effluent, 1 – Radiological Effluent	RG1.2
AG1	3	R – Abnormal Rad Levels / Rad Effluent, 1 – Radiological Effluent	RG1.3
AG2	1	R – Abnormal Rad Levels / Rad Effluent, 2 – Irradiated Fuel Event	RG2.1
CU1	1	C – Cold SD/ Refueling System Malfunction, 1 – RCS Level	CU1.1
CU1	2	C – Cold SD/ Refueling System Malfunction, 1 – RCS Level	CU1.2
CU2	1	C – Cold SD/ Refueling System Malfunction, 2 – Loss of ESF AC Power	CU2.1
CU3	1	C – Cold SD/ Refueling System Malfunction, 3 – RCS Temperature	CU3.1
CU3	2	C – Cold SD/ Refueling System Malfunction, 3 – RCS Temperature	CU3.2
CU4	1	C – Cold SD/ Refueling System Malfunction, 4 – Loss of Vital DC Power	CU4.1
CU5	1, 2, 3	C – Cold SD/ Refueling System Malfunction, 5 – Loss of Communications	CU5.1
CA1	1	C – Cold SD/ Refueling System Malfunction, 1 – RCS Level	CA1.1
CA1	2	C – Cold SD/ Refueling System Malfunction, 1 – RCS Level	CA1.2
CA2	1	C – Cold SD/ Refueling System Malfunction, 1 – Loss of ESF AC Power	CA2.1
CA3	1, 2	C – Cold SD/ Refueling System Malfunction, 3 – RCS Temperature	CA3.1
CA6	1	C – Cold SD/ Refueling System Malfunction, 6 – Hazardous Event Affecting Safety Systems	CA6.1
CS1	1	C – Cold SD/ Refueling System Malfunction, 1 – RCS Level	CS1.1

NEI		WCGS	
IC	Example EAL	Category and Subcategory	EAL
CS1	2	C – Cold SD/ Refueling System Malfunction, 1 – RCS Level	CS1.2
CS1	3	C – Cold SD/ Refueling System Malfunction, 1 – RCS Level	CS1.3
CG1	1	C – Cold SD/ Refueling System Malfunction, 1 – RCS Level	CG1.1
CG1	2	C – Cold SD/ Refueling System Malfunction, 1 – RCS Level	CG1.2
E-HU1	1	N/A	N/A
FA1	1	F – Fission Product Barrier Degradation	FA1.1
FS1	1	F – Fission Product Barrier Degradation	FS1.1
FG1	1	F – Fission Product Barrier Degradation	FG1.1
HU1	1, 2, 3	H – Hazards and Other Conditions Affecting Plant Safety, 1 – Security	HU1.1
HU2	1	H – Hazards and Other Conditions Affecting Plant Safety, 2 – Seismic Event	HU2.1
HU3	1	H – Hazards and Other Conditions Affecting Plant Safety, 3 – Natural or Technological Hazard	HU3.1
HU3	2	H – Hazards and Other Conditions Affecting Plant Safety, 3 – Natural or Technological Hazard	HU3.2
HU3	3	H – Hazards and Other Conditions Affecting Plant Safety, 3 – Natural or Technological Hazard	HU3.3
HU3	4	H – Hazards and Other Conditions Affecting Plant Safety, 3 – Natural or Technological Hazard	HU3.4
HU3	5	N/A	N/A
HU4	1	H – Hazards and Other Conditions Affecting Plant Safety, 4 – Fire or Explosion	HU4.1
HU4	2	H – Hazards and Other Conditions Affecting Plant Safety, 4 – Fire or Explosion	HU4.2
HU4	3	H – Hazards and Other Conditions Affecting Plant Safety, 4 – Fire or Explosion	HU4.3

NEI		WCGS	
IC	Example EAL	Category and Subcategory	EAL
HU4	4	H – Hazards and Other Conditions Affecting Plant Safety, 4 – Fire or Explosion	HU4.4
HU7	1	H – Hazards and Other Conditions Affecting Plant Safety, 7 – Judgment	HU7.1
HA1	1, 2	H – Hazards and Other Conditions Affecting Plant Safety, 1 – Security	HA1.1
HA5	1	H – Hazards and Other Conditions Affecting Plant Safety, 5 – Hazardous Gases	HA5.1
HA6	1	H – Hazards and Other Conditions Affecting Plant Safety, 6 – Control Room Evacuation	HA6.1
HA7	1	H – Hazards and Other Conditions Affecting Plant Safety, 7 – Judgment	HA7.1
HS1	1	H – Hazards and Other Conditions Affecting Plant Safety, 1 – Security	HS1.1
HS6	1	H – Hazards and Other Conditions Affecting Plant Safety, 6 – Control Room Evacuation	HS6.1
HS7	1	H – Hazards and Other Conditions Affecting Plant Safety, 7 – Judgment	HS7.1
HG1	1	N/A	N/A
HG7	2	H – Hazards and Other Conditions Affecting Plant Safety, 7 – Judgment	HG7.1
SU1	1	S – System Malfunction, 1 – Loss of Emergency AC Power	SU1.1
SU2	1	S – System Malfunction, 3 – Loss of Control Room Indications	SU3.1
SU3	1	N/A	N/A
SU3	2	S – System Malfunction, 4 – RCS Activity	SU4.1
SU4	1, 2, 3	S – System Malfunction, 5 – RCS Leakage	SU5.1
SU5	1	S – System Malfunction, 6 – RPS Failure	SU6.1
SU5	2	S – System Malfunction, 6 – RPS Failure	SU6.2

NEI		WCGS	
IC	Example EAL	Category and Subcategory	EAL
SU6	1, 2, 3	S – System Malfunction, 7 – Loss of Communications	SU7.1
SU7	1, 2	S – System Malfunction, 8 – Containment Failure	SU8.1
SA1	1	S – System Malfunction, 1 – Loss of Emergency AC Power	SA1.1
SA2	1	S – System Malfunction, 3 – Loss of Control Room Indications	SA3.1
SA5	1	S – System Malfunction, 6 – RPS Failure	SA6.1
SA9	1	S – Hazardous Event Affecting Safety Systems	SA9.1
SS1	1	S – System Malfunction, 1 – Loss of Emergency AC Power	SS1.1
SS5	1	S – System Malfunction, 6 – RPS Failure	SS6.1
SS8	1	S – System Malfunction, 2 – Loss of Vital DC Power	SS2.1
SG1	1	S – System Malfunction, 1 – Loss of Emergency AC Power	SG1.1
SG8	2	S – System Malfunction, 1 – Loss of Emergency AC Power	SG1.2

Table 3 – Summary of Deviations

NEI		WCGS EAL	Description
IC	Example EAL		
HG1	1	N/A	<p>IC HG1 and associated example EAL are not implemented in the WCGS scheme.</p> <p>There are several other ICs that are redundant with this IC, and are better suited to ensure timely and effective emergency declarations. In addition, the development of new spent fuel pool level EALs, as a result of NRC Order EA-12-051, clarified the intended emergency classification level for spent fuel pool level events. This deviation is justified because:</p> <ol style="list-style-type: none"> 1. Hostile Action in the Protected Area is bounded by ICs HS1 and HS7. Hostile Action resulting in a loss of physical control is bound by EAL HG7, as well as any event that may lead to radiological releases to the public in excess of Environmental Protection Agency (EPA) Protective Action Guides (PAGs). <ol style="list-style-type: none"> a. If, for whatever reason, the Control Room must be evacuated, and control of safety functions (e.g., reactivity control, core cooling, and RCS heat removal) cannot be reestablished, then IC HS6 would apply, as well as IC HS7 if desired by the EAL decision-maker. b. Also, as stated above, any event (including Hostile Action) that could reasonably be expected to have a release exceeding EPA PAGs would be bound by IC HG7. c. From a Hostile Action perspective, ICs HS1, HS7 and HG7 are appropriate, and therefore, make this part of HG1 redundant and unnecessary. d. From a loss of physical control perspective, ICs HS6, HS7 and HG7 are appropriate, and therefore, make this part of HG1 redundant and unnecessary. 2. Any event which causes a loss of spent fuel pool level will be bounded by ICs AA2, AS2 and AG2, regardless of whether it was based upon a Hostile Action or not, thus making this part of HG1 redundant and unnecessary. <ol style="list-style-type: none"> a. An event that leads to a radiological release will be bounded by ICs AU1, AA1, AS1 and AG1. Events that lead to radiological releases in excess of

NEI		WCGS EAL	Description
IC	Example EAL		
			<p>EPA PAGs will be bounded by EALs AG1 and HG7, thus making this part of HG1 redundant and unnecessary.</p> <p>ICs AA2, AS2, AG2, AS1, AG1, HS1, HS6, HS7 and HG7 have been implemented consistent with NEI 99-01 Revision 6 and thus HG1 is adequately bounded as described above.</p> <p>This is an acceptable deviation from the generic NEI 99-01 Revision 6 guidance.</p>
HS6	1	HS6.1	<p>Deleted defueled mode applicability. Control of the cited safety functions are not critical for a defueled reactor as there is no energy source in the reactor vessel or RCS.</p> <p>The Mode applicability for the reactivity control safety function has been limited to Modes 1, 2, and 3 (hot operating conditions). In the cold operating modes adequate shutdown margin exists under all conditions.</p> <p>This is an acceptable deviation from the generic NEI 99-01 Revision 6 guidance.</p>

Category A

Abnormal Rad Levels / Radiological Effluent

NEI IC#	NEI IC Wording and Mode Applicability	WCGS IC#(s)	WCGS IC Wording and Mode Applicability	Difference/Deviation Justification
AU1	Release of gaseous or liquid radioactivity greater than 2 times the (site-specific effluent release controlling document) limits for 60 minutes or longer. MODE: All	RU1	Release of gaseous or liquid radioactivity greater than 2 times the ODCM limits for 60 minutes or longer MODE: All	The WCGS ODCM is the site-specific effluent release controlling document.

NEI Ex. EAL #	NEI Example EAL Wording	WCGS EAL #	WCGS EAL Wording	Difference/Deviation Justification
1	Reading on ANY effluent radiation monitor greater than 2 times the (site-specific effluent release controlling document) limits for 60 minutes or longer: (site-specific monitor list and threshold values corresponding to 2 times the controlling document limits)	RU1.1	Reading on any Table R-1 effluent radiation monitor > column "UE" for ≥ 60 min. (Notes 1, 2, 3)	<p>Example EALs #1 and #2 have been combined into a single EAL to simplify presentation.</p> <p>The NEI phrase "...effluent radiation monitor greater than 2 times the (site-specific effluent release controlling document)" and "effluent radiation monitor greater than 2 times the alarm setpoint established by a current radioactivity discharge permit" have been replaced with "...any Table R-1 effluent radiation monitor > column "UE".</p> <p>UE thresholds for all WCGS continuously monitored gaseous release pathways are listed in Table R-1 to consolidate the information in a single location and, thereby, simplify identification of the thresholds by the EAL user. The values shown in Table R-1 column "UE", consistent with the NEI bases, represent two times the ODCM release limits for both liquid and gaseous release.</p> <p>EP-CALC-WCNOC-1601 – The UE gaseous and liquid thresholds are derived from the station ODCM setpoint calculations with assumptions and inputs from the ODCM.</p>
2	Reading on ANY effluent radiation monitor greater than 2 times the alarm setpoint established by a current radioactivity discharge permit for 60 minutes or longer.			
3	Sample analysis for a gaseous or liquid release indicates a concentration or release rate	RU1.2	Sample analysis for a gaseous or liquid release indicates a concentration or release rate > 2 x ODCM limits for \geq	The WCGS ODCM is the site-specific effluent release controlling document.

NEI Ex. EAL #	NEI Example EAL Wording	WCGS EAL #	WCGS EAL Wording	Difference/Deviation Justification
	greater than 2 times the (site-specific effluent release controlling document) limits for 60 minutes or longer.		60 min. (Notes 1, 2)	
Notes	<ul style="list-style-type: none"> The Emergency Director should declare the Unusual Event promptly upon determining that 60 minutes has been exceeded, or will likely be exceeded. If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded 60 minutes. If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is no longer valid for classification purposes. 	N/A	<p>Note 1: The Emergency Manager should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.</p> <p>Note 2: If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded the specified time limit.</p> <p>Note 3: If the effluent flow past an effluent radiation monitor is known to have stopped, indicating that the release path is isolated, the effluent monitor reading is no longer VALID for classification purposes.</p>	<p>The classification timeliness note has been standardized across the WCGS EAL scheme by referencing the "time limit" specified within the EAL wording.</p> <p>The classification timeliness note has been standardized across the WCGS EAL scheme by referencing the "time limit" specified within the EAL wording.</p> <p>None</p>

Table R-1 Effluent Monitor Classification Thresholds						
Release Point		Monitor	GE	SAE	Alert	UE
Gaseous	Unit Vent (EFF)	0-GT-RE-21B	4.45E+8 $\mu\text{Ci/sec}$	4.45E+7 $\mu\text{Ci/sec}$	4.45E+6 $\mu\text{Ci/sec}$	7.85E+5 $\mu\text{Ci/sec}$
	Radwaste Vent (EFF)	0-GH-RE-10B	4.45E+8 $\mu\text{Ci/sec}$	4.45E+7 $\mu\text{Ci/sec}$	4.45E+6 $\mu\text{Ci/sec}$	7.85E+5 $\mu\text{Ci/sec}$
Liquid	SG Blowdown Discharge	0-BM-RE-52	----	----	----	6.91E-3 $\mu\text{Ci/ml}$
	Turbine Building Drain	0-LE-RE-59	----	----	----	2.00E-5 $\mu\text{Ci/ml}$
	Waste Water Treatment System	0-HF-RE-95	----	----	----	2.09E-3 $\mu\text{Ci/ml}$
	Liquid Radwaste Discharge	0-HB-RE-18	----	----	----	1.00E-2 $\mu\text{Ci/ml}$
	Secondary Liquid Waste System	0-HF-RE-45	----	----	----	1.00E-2 $\mu\text{Ci/ml}$

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

NEI Ex. EAL #	NEI Example EAL Wording	WCGS EAL #	WCGS EAL Wording	Difference/Deviation Justification
1	<p>a. UNPLANNED water level drop in the REFUELING PATHWAY as indicated by ANY of the following: (site-specific level indications).</p> <p>AND</p> <p>b. UNPLANNED rise in area radiation levels as indicated by ANY of the following radiation monitors. (site-specific list of area radiation monitors)</p>	RU2.1	<p>UNPLANNED water level drop in the REFUELING PATHWAY as indicated by low water level alarm or indication (EC LI-39A, EC LI-39B, EC LIT-39, local observation of SFP level)</p> <p>AND</p> <p>UNPLANNED rise in corresponding area radiation levels as indicated by any Table R-2 radiation monitors</p>	Site-specific area radiation monitors are listed in Table R-2.

Table R-2 Fuel Building & Containment Area Radiation Monitors**Fuel Building:**

- SD RE-34, Cask Handling Area Radiation
- SD RE-35, New Fuel Storage Area Radiation
- SD RE-36, New Fuel Storage Area Radiation
- SD RE-37, Fuel Pool Bridge Crane Radiation
- SD RE-38, Spent Fuel Pool Area Radiation

Containment:

- SD RE-40, Personnel Access Hatch Area Radiation
- SD RE-41, Manipulator Bridge Crane Radiation
- SD RE-42, Containment Building Radiation
- GT RE-59 Containment High Area Radiation Monitor
- GT RE-60 Containment High Area Radiation Monitor

NEI IC#	NEI IC Wording	WCGS IC#(s)	WCGS IC Wording	Difference/Deviation Justification
AA1	Release of gaseous or liquid radioactivity resulting in offsite dose greater than 10 mrem TEDE or 50 mrem thyroid CDE. MODE: All	RA1	Release of gaseous or liquid radioactivity resulting in offsite dose greater than 10 mrem TEDE or 50 mrem thyroid CDE MODE: All	None

NEI Ex. EAL #	NEI Example EAL Wording	WCGS EAL #	WCGS EAL Wording	Difference/Deviation Justification
1	Reading on ANY of the following radiation monitors greater than the reading shown for 15 minutes or longer: (site-specific monitor list and threshold values)	RA1.1	Reading on any Table R-1 effluent radiation monitor > column "ALERT" for ≥ 15 min. (Notes 1, 2, 3, 4)	The WCGS radiation monitors that detect radioactivity effluent release to the environment are listed in Table R-1. UE, Alert, SAE and GE thresholds for all WCGS continuously monitored gaseous and liquid release pathways are listed in Table R-1 to consolidate the information in a single location and, thereby, simplify identification of the thresholds by the EAL-user. EP-CALC-WCNOC-1601 – The GE, SAE and Alert gaseous thresholds are derived from the EDCP dose assessment model with assumptions and inputs from the USAR.
2	Dose assessment using actual meteorology indicates doses greater than 10 mrem TEDE or 50 mrem thyroid CDE at or beyond (site-specific dose receptor point).	RA1.2	Dose assessment using actual meteorology indicates doses > 10 mrem TEDE or 50 mrem thyroid CDE at or beyond the SITE BOUNDARY (Notes 4)	The site boundary is the site-specific receptor point.
3	Analysis of a liquid effluent sample indicates a concentration or release rate that would result in doses greater than 10 mrem TEDE or 50 mrem thyroid CDE at or beyond (site-specific dose receptor point) for one hour of	RA1.3	Analysis of a liquid effluent sample indicates a concentration or release rate that would result in doses > 10 mrem TEDE or 50 mrem thyroid CDE at or beyond the SITE BOUNDARY for 60 min. of exposure (Notes 1, 2)	The site boundary is the site-specific receptor point.

	exposure.			
4	<p>Field survey results indicate EITHER of the following at or beyond (site-specific dose receptor point):</p> <ul style="list-style-type: none"> ● Closed window dose rates greater than 10 mR/hr expected to continue for 60 minutes or longer. ● Analyses of field survey samples indicate thyroid CDE greater than 50 mrem for one hour of inhalation. 	RA1.4	<p>Field survey results indicate EITHER of the following at or beyond the SITE BOUNDARY:</p> <ul style="list-style-type: none"> ● Closed window dose rates > 10 mR/hr expected to continue for ≥ 60 min. ● Analyses of field survey samples indicate thyroid CDE > 50 mrem for 60 min. of inhalation. <p>(Notes 1, 2)</p>	The site boundary is the site-specific receptor point.
Notes	<ul style="list-style-type: none"> ● The Emergency Director should declare the Alert promptly upon determining that the applicable time has been exceeded, or will likely be exceeded. ● If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded 15 minutes. ● If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is no longer valid for classification purposes. ● The pre-calculated effluent monitor values presented in EAL #1 should be used for 	N/A	<p>Note 1: The Emergency Manager should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.</p> <p>Note 2: If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded the specified time limit.</p> <p>Note 3: If the effluent flow past an effluent radiation monitor is known to have stopped, indicating that the release path is isolated, the effluent monitor reading is no longer VALID for classification purposes.</p> <p>Note 4: The pre-calculated effluent monitor values presented in EALs RA1.1, RS1.1 and</p>	<p>The classification timeliness note has been standardized across the WCGS EAL scheme by referencing the "time limit" specified within the EAL wording.</p> <p>The classification timeliness note has been standardized across the WCGS EAL scheme by referencing the "time limit" specified within the EAL wording.</p> <p>None</p> <p>Incorporated site-specific EAL numbers associated with generic EAL#1.</p>

	emergency classification assessments until the results from a dose assessment using actual meteorology are available.		RG1.1 should be used for emergency classification assessments until the results from a dose assessment using actual meteorology are available.	
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NEI IC#	NEI IC Wording	WCGS IC#(s)	WCGS IC Wording	Difference/Deviation Justification
AA2	Significant lowering of water level above, or damage to, irradiated fuel. MODE: All	RA2	Significant lowering of water level above, or damage to, irradiated fuel MODE: All	None

NEI Ex. EAL #	NEI Example EAL Wording	WCGS EAL #	WCGS EAL Wording	Difference/Deviation Justification
1	Uncovery of irradiated fuel in the REFUELING PATHWAY.	RA2.1	Uncovery of irradiated fuel in the REFUELING PATHWAY	None
2	Damage to irradiated fuel resulting in a release of radioactivity from the fuel as indicated by ANY of the following radiation monitors: (site-specific listing of radiation monitors, and the associated readings, setpoints and/or alarms)	RA2.2	Mechanical damage to irradiated fuel resulting in a release of radioactivity from the fuel as indicated by HI HI alarm on any of the following: <ul style="list-style-type: none"> Fuel Building atmosphere monitors (GG RE-27 or 28) Containment purge monitors (GT RE-22 or 33) Containment atmosphere monitors (GG RE-31 or 32) Manipulator bridge crane radiation monitor (SD RE-41) Fuel Pool Bridge Crane OR Spent Fuel Pool Area radiation monitor (SD RE-37 or 38) 	Added the word "Mechanical" to EAL statement consistent with the generic bases that states: " <i>This EAL addresses a release of radioactive material caused by mechanical damage to irradiated fuel</i> " Site-specific list of radiation monitors was bulletized. The bases for the ventilation radiation and Fuel Building and Containment area radiation hi-hi alarms are a spent fuel handling accident.
3	Lowering of spent fuel pool level to (site-specific Level 2 value). [See Developer Notes]	RA2.3	Lowering of spent fuel pool level to 120 in. on EC-LI-0059 or 0060 (Level 2)	Post-Fukushima order EA-12-051 required the installation of reliable SFP level indication capable of identifying normal level (Level 1), SFP level 10 ft. above the top of the fuel racks

				(Level 2) and SFP level at the top of the fuel racks (Level 3). For Wolf Creek SFP Level 2 is a reading of 120 in. on EC-LI-0059 or 0060 (10 ft. above the top of the spent fuel racks).
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NEI IC#	NEI IC Wording	WCGS IC#(s)	WCGS IC Wording	Difference/Deviation Justification
AA3	Radiation levels that impede access to equipment necessary for normal plant operations, cooldown or shutdown MODE: All	RA3	Radiation levels that IMPEDE access to equipment necessary for normal plant operations, cooldown or shutdown MODE: All except for RA3.2 applicable in only modes 1, 2, 3 and 4.	Mode applicability of RA3.2 limited to the modes determined to be applicable per Table R-3. See RA3.2 bases and Attachment 3 of the Technical Bases Document.

NEI Ex. EAL #	NEI Example EAL Wording	WCGS EAL #	WCGS EAL Wording	Difference/Deviation Justification
1	Dose rate greater than 15 mR/hr in ANY of the following areas: <ul style="list-style-type: none"> Control Room Central Alarm Station (other site-specific areas/rooms) 	RA3.1	Dose rate > 15 mR/hr in <u>EITHER</u> of the following areas: <ul style="list-style-type: none"> Control Room (SD-RE-33) Central Alarm Station (by survey) 	No other site-specific areas requiring continuous occupancy exist at WCGS. SD-RE-33 is the installed CR ARM. The CAS does not have installed area radiation monitoring and thus must be determined by survey.
2	An UNPLANNED event results in radiation levels that prohibit or impede access to any of the following plant rooms or areas: (site-specific list of plant rooms or areas with entry-related mode applicability identified)	RA3.2	An UNPLANNED event results in radiation levels that prohibit or IMPEDE access to any Table R-3 rooms or areas (Note 5)	Analysis by Operations Subject Matter Experts determined areas external to the Main Control Room that require access in any operating mode to maintain safe plant operations or to perform a normal plant shutdown and cooldown to Cold Shutdown conditions. Table R-3 and Attachment 3 of the Technical Bases Document.
Note	If the equipment in the listed room or area was already inoperable or out-of-service before the event occurred, then no emergency classification is warranted.	N/A	Note 5: If the equipment in the listed room or area was already inoperable or out-of-service before the event occurred, then no emergency classification is warranted.	None

Table R-3 Safe Operation & Shutdown Rooms/Areas	
Room/Area	Mode Applicability
North Electrical Pen. Room A	3, 4
South Electrical Pen. Room B	3, 4
ESF SWGR Room No. 1 (TRN A)	4
ESF SWGR Room No. 2 (TRN B)	4
Auxiliary Building/West Hall Elev 2000	3,4,5

NEI IC#	NEI IC Wording	WCGS IC#(s)	WCGS IC Wording	Difference/Deviation Justification
AS1	Release of gaseous radioactivity resulting in offsite dose greater than 100 mrem TEDE or 500 mrem thyroid CDE MODE: All MODE: All	RS1	Release of gaseous radioactivity resulting in offsite dose greater than 100 mrem TEDE or 500 mrem thyroid CDE MODE: All	None

NEI Ex. EAL #	NEI Example EAL Wording	WCGS EAL #	WCGS EAL Wording	Difference/Deviation Justification
1	Reading on ANY of the following radiation monitors greater than the reading shown for 15 minutes or longer: (site-specific monitor list and threshold values)	RS1.1	Reading on any Table R-1 effluent radiation monitor > column "SAE" for ≥ 15 min. (Notes 1, 2, 3, 4)	The WCGS radiation monitors that detect radioactivity effluent release to the environment are listed in Table R-1. UE, Alert, SAE and GE thresholds for all WCGS continuously monitored gaseous and liquid release pathways are listed in Table R-1 to consolidate the information in a single location and, thereby, simplify identification of the thresholds by the EAL-user. EP-CALC-WCNOC-1601 – The GE, SAE and Alert gaseous thresholds are derived from the EDCP dose assessment model with assumptions and inputs from the USAR.
2	Dose assessment using actual meteorology indicates doses greater than 100 mrem TEDE or 500 mrem thyroid CDE at or beyond (site-specific dose receptor point)	RS1.2	Dose assessment using actual meteorology indicates doses > 100 mrem TEDE or 500 mrem thyroid CDE at or beyond the SITE BOUNDARY (Notes 4)	The site boundary is the site-specific receptor point.
3	Field survey results indicate EITHER of the following at or beyond (site-specific dose receptor point): <ul style="list-style-type: none"> Closed window dose rates greater than 100 mR/hr expected to continue for 60 	RS1.3	Field survey results indicate <u>EITHER</u> of the following at or beyond the SITE BOUNDARY: <ul style="list-style-type: none"> Closed window dose rates > 100 mR/hr expected to continue for ≥ 60 min. 	The site boundary is the site-specific receptor point.

	<ul style="list-style-type: none"> minutes or longer. Analyses of field survey samples indicate thyroid CDE greater than 500 mrem for one hour of inhalation. 		<ul style="list-style-type: none"> Analyses of field survey samples indicate thyroid CDE > 500 mrem for 60 min. of inhalation. <p>(Notes 1, 2)</p>	
Notes	<ul style="list-style-type: none"> The Emergency Director should declare the Site Area Emergency promptly upon determining that the applicable time has been exceeded, or will likely be exceeded. If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded 15 minutes. If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is no longer valid for classification purposes. The pre-calculated effluent monitor values presented in EAL #1 should be used for emergency classification assessments until the results from a dose assessment using actual meteorology are available. 		<p>Note 1: The Emergency Manager should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.</p> <p>Note 2: If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded the specified time limit.</p> <p>Note 3: If the effluent flow past an effluent radiation monitor is known to have stopped, indicating that the release path is isolated, the effluent monitor reading is no longer VALID for classification purposes.</p> <p>Note 5 The pre-calculated effluent monitor values presented in EALs RA1.1, RS1.1 and RG1.1 should be used for emergency classification assessments until the results from a dose assessment using actual meteorology are available.</p>	<p>The classification timeliness note has been standardized across the WCGS EAL scheme by referencing the "time limit" specified within the EAL wording.</p> <p>The classification timeliness note has been standardized across the WCGS EAL scheme by referencing the "time limit" specified within the EAL wording.</p> <p>None</p> <p>Incorporated site-specific EAL numbers associated with generic EAL#1.</p>

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

NEI Ex. EAL #	NEI Example EAL Wording	WCGS EAL #	WCGS EAL Wording	Difference/Deviation Justification
1	Lowering of spent fuel pool level to (site-specific Level 3 value)	RS2.1	Lowering of spent fuel pool level to 15 in. on EC-LI-0059 or 0060 (Level 3)	Post-Fukushima order EA-12-051 required the installation of reliable SFP level indication capable of identifying normal level (Level 1), SFP level 10 ft. above the top of the fuel racks (Level 2) and SFP level at the top of the fuel racks (Level 3). For Wolf Creek SFP Level 3 is a reading of 15 in. on EC-LI-0059 or 0060.

NEI IC#	NEI IC Wording	WCGS IC#(s)	WCGS IC Wording	Difference/Deviation Justification
AG1	Release of gaseous radioactivity resulting in offsite dose greater than 1,000 mrem TEDE or 5,000 mrem thyroid CDE. MODE: All	RG1	Release of gaseous radioactivity resulting in offsite dose greater than 1,000 mrem TEDE or 5,000 mrem thyroid CDE MODE: All	None

NEI Ex. EAL #	NEI Example EAL Wording	WCGS EAL #	WCGS EAL Wording	Difference/Deviation Justification
1	Reading on ANY of the following radiation monitors greater than the reading shown for 15 minutes or longer: (site-specific monitor list and threshold values)	RG1.1	Reading on any Table R-1 effluent radiation monitor > column "GE" for ≥ 15 min. (Notes 1, 2, 3, 4)	The WCGS radiation monitors that detect radioactivity effluent release to the environment are listed in Table R-1. UE, Alert, SAE and GE thresholds for all WCGS continuously monitored gaseous or liquid release pathways are listed in Table R-1 to consolidate the information in a single location and, thereby, simplify identification of the thresholds by the EAL-user. EP-CALC-WCNOC-1601 – The GE, SAE and Alert gaseous thresholds are derived from the EDCP dose assessment model with assumptions and inputs from the USAR.
2	Dose assessment using actual meteorology indicates doses greater than 1,000 mrem TEDE or 5,000 mrem thyroid CDE at or beyond (site-specific dose receptor point).	RG1.2	Dose assessment using actual meteorology indicates doses > 1000 mrem TEDE or 5000 mrem thyroid CDE at or beyond the SITE BOUNDARY (Note 4)	The site boundary is the site-specific receptor point.
3	Field survey results indicate EITHER of the following at or beyond (site-specific dose receptor point): <ul style="list-style-type: none">● Closed window dose rates greater than 1,000 mR/hr expected to continue for 60 minutes or longer.	RG1.3	Field survey results indicate <u>EITHER</u> of the following at or beyond the SITE BOUNDARY: <ul style="list-style-type: none">● Closed window dose rates > 1000 mR/hr expected to continue for ≥ 60 min.● Analyses of field survey	The site boundary is the site-specific receptor point.

	<ul style="list-style-type: none"> Analyses of field survey samples indicate thyroid CDE greater than 5,000 mrem for one hour of inhalation. 		<p>samples indicate thyroid CDE > 5000 mrem for 60 min. of inhalation.</p> <p>(Notes 1, 2)</p>	
Notes	<ul style="list-style-type: none"> The Emergency Director should declare the Site Area Emergency promptly upon determining that the applicable time has been exceeded, or will likely be exceeded. If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded 15 minutes. If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is no longer valid for classification purposes. The pre-calculated effluent monitor values presented in EAL #1 should be used for emergency classification assessments until the results from a dose assessment using actual meteorology are available. 		<p>Note 1: The Emergency Manager should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.</p> <p>Note 2: If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded the specified time limit.</p> <p>Note 3: If the effluent flow past an effluent radiation monitor is known to have stopped, indicating that the release path is isolated, the effluent monitor reading is no longer VALID for classification purposes.</p> <p>Note 5: The pre-calculated effluent monitor values presented in EALs RA1.1, RS1.1 and RG1.1 should be used for emergency classification assessments until the results from a dose assessment using actual meteorology are</p>	<p>The classification timeliness note has been standardized across the WCGS EAL scheme by referencing the "time limit" specified within the EAL wording.</p> <p>The classification timeliness note has been standardized across the WCGS EAL scheme by referencing the "time limit" specified within the EAL wording.</p> <p>None</p> <p>Incorporated site-specific EAL numbers associated with generic EAL#1.</p>

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

NEI Ex. EAL #	NEI Example EAL Wording	WCGS EAL #	WCGS EAL Wording	Difference/Deviation Justification
1	Spent fuel pool level cannot be restored to at least (site-specific Level 3 value) for 60 minutes or longer	RG2.1	Spent fuel pool level cannot be restored to at least 15 in. (Level 3) on EC-LI-0059 or 0060 for ≥ 60 min. (Note 1)	Post-Fukushima order EA-12-051 required the installation of reliable SFP level indication capable of identifying normal level (Level 1), SFP level 10 ft. above the top of the fuel racks (Level 2) and SFP level at the top of the fuel racks (Level 3). For Wolf Creek SFP Level 3 is a reading of 15 in. on EC-LI-0059 or 0060.
Note	The Emergency Director should declare the General Emergency promptly upon determining that 60 minutes has been exceeded, or will likely be exceeded.	N/A	Note 1: The Emergency Manager should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.	The classification timeliness note has been standardized across the WCGS EAL scheme by referencing the "time limit" specified within the EAL wording.

Category C

Cold Shutdown / Refueling System Malfunction

NEI IC#	NEI IC Wording	WCGS IC#(s)	WCGS IC Wording	Difference/Deviation Justification
CU1	UNPLANNED loss of (reactor vessel/RCS [PWR] or RWC [BWR]) inventory for 15 minutes or longer. MODE: Cold Shutdown, Refueling	CU1	UNPLANNED loss of RCS inventory MODE: 5 - Cold Shutdown, Refueling	Deleted "...for 15 minutes or longer" as the 15 minute criteria only applies to EAL threshold #1.

NEI Ex. EAL #	NEI Example EAL Wording	WCGS EAL #	WCGS EAL Wording	Difference/Deviation Justification
1	UNPLANNED loss of reactor coolant results in (reactor vessel/RCS [PWR] or RWC [BWR]) level less than a required lower limit for 15 minutes or longer.	CU1.1	UNPLANNED loss of reactor coolant results in RCS water level less than a required lower limit for ≥ 15 min. (Note 1)	None
2	a. (Reactor vessel/RCS [PWR] or RWC [BWR]) level cannot be monitored. AND b. UNPLANNED increase in (site-specific sump and/or tank) levels.	CU1.2	RCS water level cannot be monitored AND EITHER <ul style="list-style-type: none"> UNPLANNED increase in any Table C-1 sump/tank level due to loss of RCS inventory Visual observation of UNISOLABLE RCS leakage 	Table C-1 provides a tabularized list of site-specific applicable sumps and tanks. Added bulleted criteria "Visual observation of UNISOLABLE RCS leakage" to include direct observation of RCS leakage. Added "...due to loss of RCS inventory" consistent with the IC and generic bases.
Note	The Emergency Director should declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.	N/A	Note 1: The Emergency Manager should declare the event promptly upon determining that time limit has been exceeded, or will likely	The classification timeliness note has been standardized across the WCGS EAL scheme by referencing the "time limit" specified within the EAL wording.

			be exceeded.	
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Table C-1 Sumps / Tanks

- Containment Normal Sump
- PRT
- RCDT
- Auxiliary Building Sump
- Liquid Waste Holdup Tank
- Recycle Holdup Tank
- CCW Surge Tank

NEI IC#	NEI IC Wording	WCGS IC#(s)	WCGS IC Wording	Difference/Deviation Justification
CU2	Loss of all but one AC power source to emergency buses for 15 minutes or longer. MODE: Cold Shutdown, Refueling, Defueled	CU2	Loss of all but one AC power source to emergency buses for 15 minutes or longer. MODE: 6 - Cold Shutdown, Refueling, Defueled	None

NEI Ex. EAL #	NEI Example EAL Wording	WCGS EAL #	WCGS EAL Wording	Difference/Deviation Justification
1	a. AC power capability to (site-specific emergency buses) is reduced to a single power source for 15 minutes or longer. AND b. Any additional single power source failure will result in loss of all AC power to SAFETY SYSTEMS.	CU2.1	AC power capability, Table C-3, to emergency 4.16KV buses NB01 and NB02 reduced to a single power source for ≥ 15 min. (Note 1) AND Any additional single power source failure will result in loss of all AC power to SAFETY SYSTEMS	4.16KV buses NB01 and NB02 are the emergency buses. Site-specific AC power sources are tabularized in Table C-3.
Note	The Emergency Director should declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.	N/A	Note 1: The Emergency Manager should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.	The classification timeliness note has been standardized across the WCGS EAL scheme by referencing the "time limit" specified within the EAL wording.

Table C-3 AC Power Sources**Offsite:**

- ESF XFMR XNB01
- ESF XFMR XNB02

Onsite:

- EDG NE01
- EDG NE02

NEI IC#	NEI IC Wording	WCGS IC#(s)	WCGS IC Wording	Difference/Deviation Justification
CU3	UNPLANNED increase in RCS temperature MODE: Cold Shutdown, Refueling	CU3	UNPLANNED increase in RCS temperature MODE: Cold Shutdown, Refueling	None

NEI Ex. EAL #	NEI Example EAL Wording	WCGS EAL #	WCGS EAL Wording	Difference/Deviation Justification
1	UNPLANNED increase in RCS temperature to greater than (site-specific Technical Specification cold shutdown temperature limit)	CU3.1	UNPLANNED increase in RCS temperature to > 200°F (Note 10)	200°F is the site-specific Tech. Spec. cold shutdown temperature limit. Cited Note 10 below.
2	Loss of ALL RCS temperature and (reactor vessel/RCS [<i>PWR</i>] or RWC [<i>BWR</i>]) level indication for 15 minutes or longer.	CU3.2	Loss of all RCS temperature and RCS level indication for ≥ 15 min. (Note 1)	None
Note	The Emergency Director should declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded	N/A	Note 1: The Emergency Manager should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.	The classification timeliness note has been standardized across the WCGS EAL scheme by referencing the "time limit" specified within the EAL wording.
N/A	N/A	N/A	Note 10: Begin monitoring hot condition EALs concurrently for any new event or condition not related to the loss of decay heat removal.	Added note to remind end-user that the hot condition EALs become applicable once operating mode changes to hot conditions.

NEI IC#	NEI IC Wording	WCGS IC#(s)	WCGS IC Wording	Difference/Deviation Justification
CU4	Loss of Vital DC power for 15 minutes or longer. MODE: Cold Shutdown, Refueling	CU4	Loss of Vital DC power for 15 minutes or longer. MODE: 5 - Cold Shutdown, 6 - Refueling	None

NEI Ex. EAL #	NEI Example EAL Wording	WCGS EAL #	WCGS EAL Wording	Difference/Deviation Justification
1	Indicated voltage is less than (site-specific bus voltage value) on required Vital DC buses for 15 minutes or longer.	CU4.1	< 105 VDC bus voltage indications on Technical Specification required 125 VDC buses for ≥ 15 min. (Note 1)	105 VDC is the site-specific minimum vital DC bus voltage. DC operability requirements are specified in Technical Specifications.
Note	The Emergency Director should declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.	N/A	Note 1: The Emergency Manager should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.	The classification timeliness note has been standardized across the WCGS EAL scheme by referencing the "time limit" specified within the EAL wording.

NEI IC#	NEI IC Wording	WCGS IC#(s)	WCGS IC Wording	Difference/Deviation Justification
CU5	Loss of all onsite or offsite communications capabilities. MODE: Cold Shutdown, Refueling, Defueled	CU5	Loss of all onsite or offsite communications capabilities. MODE: Cold Shutdown, Refueling, Defueled	None

NEI Ex. EAL #	NEI Example EAL Wording	WCGS EAL #	WCGS EAL Wording	Difference/Deviation Justification
1	Loss of ALL of the following onsite communication methods: (site specific list of communications methods)	CU5.1	Loss of all Table C-5 onsite communication methods OR Loss of all Table C-5 offsite communication methods OR Loss of all Table C-5 NRC communication methods	Example EALs #1, 2 and 3 have been combined into a single EAL for simplification of presentation. Table C-5 provides a site-specific list of onsite, ORO and NRC communications methods. Changes the acronym "ORO" to "offsite" consistent with WC usage.
2	Loss of ALL of the following ORO communications methods: (site specific list of communications methods)			
3	Loss of ALL of the following NRC communications methods: (site specific list of communications methods)			

Table C-5 Communication Methods			
System	Onsite	Offsite	NRC
PA system	X		
Plant Radios	X	X	
Site Telephone System	X	X	X
Local Telephone Company Direct Lines	X	X	X
ENS Line			X

NEI IC#	NEI IC Wording	WCGS IC#(s)	WCGS IC Wording	Difference/Deviation Justification
CA1	Loss of (reactor vessel/RCS [PWR] or RWC [BWR]) inventory MODE: Cold Shutdown, Refueling	CA1	Loss of RCS inventory MODE: Cold Shutdown, Refueling	None

NEI Ex. EAL #	NEI Example EAL Wording	WCGS EAL #	WCGS EAL Wording	Difference/Deviation Justification
1	Loss of (reactor vessel/RCS [PWR] or RWC [BWR]) inventory as indicated by level less than (site-specific level).	CA1.1	Loss of RCS inventory as indicated by RCS level < 12 in.	12 in. is the lowest RCS water level for unrestricted operation of an RHR pump in the shutdown cooling mode.
2	a. (Reactor vessel/RCS [PWR] or RWC [BWR]) level cannot be monitored for 15 minutes or longer AND b. UNPLANNED increase in (site-specific sump and/or tank) levels due to a loss of (reactor vessel/RCS [PWR] or RWC [BWR]) inventory.	CA1.2	RCS water level cannot be monitored for ≥ 15 min. (Note 1) AND EITHER <ul style="list-style-type: none"> UNPLANNED increase in any Table C-1 Sump / Tank level Visual observation of UNISOLABLE RCS leakage 	Table C-1 provides a tabularized list of site-specific applicable sumps and tanks. Added bulleted criteria "Visual observation of UNISOLABLE RCS leakage" to include direct observation of RCS leakage.
Note	The Emergency Director should declare the Alert promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded	N/A	Note 1: The Emergency Manager should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.	The classification timeliness note has been standardized across the WCGS EAL scheme by referencing the "time limit" specified within the EAL wording.

NEI IC#	NEI IC Wording	WCGS IC#(s)	WCGS IC Wording	Difference/Deviation Justification
CA2	Loss of all offsite and all onsite AC power to emergency buses for 15 minutes or longer MODE: Cold Shutdown, Refueling, Defueled	CA2	Loss of all offsite and all onsite AC power to emergency buses for 15 minutes or longer. MODE: Cold Shutdown, Refueling, Defueled	None

NEI Ex. EAL #	NEI Example EAL Wording	WCGS EAL #	WCGS EAL Wording	Difference/Deviation Justification
1	Loss of ALL offsite and ALL onsite AC Power to (site-specific emergency buses) for 15 minutes or longer.	CA2.1	Loss of all offsite and all onsite AC power capability to emergency 4.16KV buses NB01 and NB02 for ≥ 15 min. (Note 1)	4.16KV buses NB01 and NB01 are the site-specific emergency buses.
Note	The Emergency Director should declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.	N/A	Note 1: The Emergency Manager should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.	The classification timeliness note has been standardized across the WCGS EAL scheme by referencing the "time limit" specified within the EAL wording.

NEI IC#	NEI IC Wording	WCGS IC#(s)	WCGS IC Wording	Difference/Deviation Justification
CA3	Inability to maintain the plant in cold shutdown. MODE: Cold Shutdown, Refueling	CA3	Inability to maintain the plant in cold shutdown. MODE: Cold Shutdown, Refueling	None

NEI Ex. EAL #	NEI Example EAL Wording	WCGS EAL #	WCGS EAL Wording	Difference/Deviation Justification
1	UNPLANNED increase in RCS temperature to greater than (site-specific Technical Specification cold shutdown temperature limit) for greater than the duration specified in the following table.	CA3.1	UNPLANNED increase in RCS temperature to > 200°F for > Table C-4 duration (Note 1, 10) OR UNPLANNED RCS pressure increase > 10 psig (This EAL does not apply during water-solid plant conditions)	Example EALs #1 and #2 have been combined into a single EAL as EAL #2 is the alternative threshold based on a loss of RCS temperature indication. 200°F is the site-specific Tech. Spec. cold shutdown temperature limit. Table C-3 is the site-specific implementation of the generic RCS Heat-up Duration Threshold table. 10 psig is the site-specific pressure increase readable by Control Room indications. Cited Note 10 below.
2	UNPLANNED RCS pressure increase greater than (site-specific pressure reading). (This EAL does not apply during water-solid plant conditions. [PWR])			
Note	The Emergency Director should declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.	N/A	Note 1: The Emergency Manager should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.	The classification timeliness note has been standardized across the WCGS EAL scheme by referencing the "time limit" specified within the EAL wording.

N/A	N/A	N/A	Note 10: Begin monitoring hot condition EALs concurrently for any new event or condition not related to the loss of decay heat removal.	Added note to remind end-user that the hot condition EALs become applicable once operating mode changes to hot conditions.
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Table: RCS Heat-up Duration Thresholds		
RCS Status	Containment Closure Status	Heat-up Duration
Intact (but not at reduced inventory [PWR])	Not applicable	60 minutes*
Not intact (or at reduced inventory [PWR])	Established	20 minutes*
	Not Established	0 minutes
* If an RCS heat removal system is in operation within this time frame and RCS temperature is being reduced, the EAL is not applicable.		

Table C-4: RCS Heat-up Duration Thresholds		
RCS Status	CONTAINMENT CLOSURE Status	Heat-up Duration
Intact (but not REDUCED INVENTORY)	N/A	60 min.*
Not intact OR REDUCED INVENTORY	established	20 min.*
	not established	0 min.
* If an RCS heat removal system is in operation within this time frame and RCS temperature is being reduced, the EAL is not applicable.		

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

NEI Ex. EAL #	NEI Example EAL Wording	WCGS EAL #	WCGS EAL Wording	Difference/Deviation Justification
1	<p>a. The occurrence of ANY of the following hazardous events:</p> <ul style="list-style-type: none"> ● Seismic event (earthquake) ● Internal or external flooding event ● High winds or tornado strike ● FIRE ● EXPLOSION ● (site-specific hazards) ● Other events with similar hazard characteristics as determined by the Shift Manager <p>AND</p> <p>b. EITHER of the following:</p> <ol style="list-style-type: none"> 1. Event damage has caused indications of degraded performance in at least one train of a SAFETY SYSTEM needed for the current operating mode. <p>OR</p> <ol style="list-style-type: none"> 2. The event has caused VISIBLE DAMAGE to a SAFETY SYSTEM component or structure needed for the current operating mode. 	CA6.1	<p>The occurrence of any Table C-6 hazardous event</p> <p>AND EITHER:</p> <ul style="list-style-type: none"> ● Event damage has caused indications of degraded performance in at least one train of a SAFETY SYSTEM needed for the current operating mode ● The event has caused VISIBLE DAMAGE to a SAFETY SYSTEM component or structure needed for the current operating mode 	<p>The hazardous events have been tabularized in Table C-6.</p> <p>Replaced "Shift Manager" with "Emergency Manager" as the EC can be either the SM or augmented ERO EM.</p>

Table C-6 Hazardous Events
<ul style="list-style-type: none">● 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 Emergency Manager

NEI IC#	NEI IC Wording	WCGS IC#(s)	WCGS IC Wording	Difference/Deviation Justification
CS1	Loss of (reactor vessel/RCS [PWR] or RWC [BWR]) inventory affecting core decay heat removal capability. MODE: Cold Shutdown, Refueling	CS1	Loss of RCS inventory affecting core decay heat removal capability MODE: CS1.1 and CS1.2 – Cold Shutdown only CS1.3 - Cold Shutdown, Refueling	RVLIS is the only vessel level instrumentation capable of measuring reactor vessel water level below the bottom of the RCS hot leg. RVLIS is disconnected when in the Refueling mode and therefore EAL CS1.1 and CS1.1 are only applicable in Cold Shutdown.

NEI Ex. EAL #	NEI Example EAL Wording	WCGS EAL #	WCGS EAL Wording	Difference/Deviation Justification
1	a. CONTAINMENT CLOSURE not established. AND b. (Reactor vessel/RCS [PWR] or RWC [BWR]) level less than (site-specific level).	CS1.1	With CONTAINMENT CLOSURE not established, RVLIS natural circulation range < 72%	72% on RVLIS natural circulation range corresponds to 6" below the bottom ID of the RCS loop.
2	a. CONTAINMENT CLOSURE established. AND b. (Reactor vessel/RCS [PWR] or RWC [BWR]) level less than (site-specific level).	CS1.2	With CONTAINMENT CLOSURE established, RVLIS natural circulation range < 66%	66% on RVLIS natural circulation range corresponds to the top of reactor fuel in the reactor vessel.
3	a. (Reactor vessel/RCS [PWR] or RWC [BWR]) level cannot be monitored for 30 minutes or longer. AND b. Core uncover is indicated by	CS1.3	RCS water level cannot be monitored for ≥ 30 min. (Note 1) AND Core uncover is indicated by any of the following: • UNPLANNED increase in any Table C-1 sump/tank	Table C-1 provides a tabularized list of site-specific applicable sumps and tanks. Manipulator crane radiation monitor SD RE-41 > Hi-Hi alarm would be indicative of possible core uncover in the Refueling mode. The dose rate due to core shine when the top of the core becomes uncovered should result in upscale dose rates.

	<p>ANY of the following:</p> <ul style="list-style-type: none"> • (Site-specific radiation monitor) reading greater than (site-specific value) • Erratic source range monitor indication [<i>PWR</i>] • UNPLANNED increase in (site-specific sump and/or tank) levels of sufficient magnitude to indicate core uncover • (Other site-specific indications) 		<p>level of sufficient magnitude to indicate core uncover</p> <ul style="list-style-type: none"> • Manipulator bridge crane radiation monitor SD RE-41 Hi-Hi alarm • Erratic Source Range Monitor indication 	
Note	The Emergency Director should declare the Site Area Emergency promptly upon determining that 30 minutes has been exceeded, or will likely be exceeded	N/A	Note 1: The Emergency Manager should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.	The classification timeliness note has been standardized across the WCGS EAL scheme by referencing the "time limit" specified within the EAL wording.

NEI IC#	NEI IC Wording	WCGS IC#(s)	WCGS IC Wording	Difference/Deviation Justification
CG1	Loss of (reactor vessel/RCS [PWR] or RWC [BWR]) inventory affecting fuel clad integrity with containment challenged MODE: Cold Shutdown, Refueling	CG1	Loss of RCS inventory affecting fuel clad integrity with containment challenged MODE: CG1.1 – Cold Shutdown only CG1.2 - Cold Shutdown, Refueling	RVLIS is the only vessel level instrumentation capable of measuring reactor vessel water level below the bottom of the RCS hot leg. RVLIS is disconnected when in the Refueling mode and therefore EAL CG1.1 is only applicable in Cold Shutdown.

NEI Ex. EAL #	NEI Example EAL Wording	WCGS EAL #	WCGS EAL Wording	Difference/Deviation Justification
1	a. (Reactor vessel/RCS [PWR] or RWC [BWR]) level less than (site-specific level) for 30 minutes or longer. AND b. ANY indication from the Containment Challenge Table (see below).	CG1.1	RVLIS natural circulation range < 66% for ≥ 30 min. (Note 1) AND Any Containment Challenge indication, Table C-2	66% on RVLIS natural circulation range corresponds to the top of reactor fuel in the reactor vessel. Table C-2 provides a tabularized list of containment challenge indications. 4% hydrogen concentration in the presence of oxygen represents an explosive mixture in containment.
2	a. (Reactor vessel/RCS [PWR] or RWC [BWR]) level cannot be monitored for 30 minutes or longer. AND b. Core uncover is indicated by ANY of the following: <ul style="list-style-type: none"> • (Site-specific radiation monitor) reading greater than (site-specific value) • Erratic source range monitor indication [PWR] • UNPLANNED increase in 	CG1.2	RCS water level cannot be monitored for ≥ 30 min. (Note 1) AND Core uncover is indicated by any of the following: <ul style="list-style-type: none"> • UNPLANNED increase in any Table C-1 sump/tank level • Manipulator bridge crane radiation monitor SD RE-41 Hi-Hi alarm • Erratic Source Range Monitor indication 	Table C-1 provides a tabularized list of site-specific applicable sumps and tanks. Manipulator crane radiation monitor SD RE-41 > Hi-Hi alarm would be indicative of possible core uncover in the Refueling mode. The dose rate due to core shine when the top of the core becomes uncovered should result in upscale dose rates. Table C-2 provides a tabularized list of containment challenge indications. 4% hydrogen concentration in the presence of oxygen represents an explosive mixture in containment.

	<p>(site-specific sump and/or tank) levels of sufficient magnitude to indicate core uncover</p> <ul style="list-style-type: none"> • (Other site-specific indications) <p>AND</p> <p>c. ANY indication from the Containment Challenge Table (see below).</p>		<p>AND</p> <p>Any Containment Challenge indication, Table C-2</p>	
Note	<p>The Emergency Director should declare the General Emergency promptly upon determining that 30 minutes has been exceeded, or will likely be exceeded.</p> <p>N/A</p>	N/A	<p>Note 1: The Emergency Manager should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.</p> <p>Note 6: If CONTAINMENT CLOSURE is re-established prior to exceeding the 30-minute time limit, declaration of a General Emergency is not required.</p>	<p>The classification timeliness note has been standardized across the WCGS EAL scheme by referencing the "time limit" specified within the EAL wording.</p> <p>Note 6 implements the asterisked note associated with the generic Containment Challenge table.</p>

Containment Challenge Table	
■	CONTAINMENT CLOSURE not established*
■	(Explosive mixture) exists inside containment
■	UNPLANNED increase in containment pressure
■	Secondary containment radiation monitor reading above (site-specific value) [BWR]

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

Table C-2 Containment Challenge Indications

- CONTAINMENT CLOSURE **not** established (Note 6)
- Containment hydrogen concentration $\geq 4\%$
- Unplanned rise in Containment pressure

Category D

Permanently Defueled Station Malfunction

NEI IC#	NEI IC Wording	WCGS IC#(s)	WCGS IC Wording	Difference/Deviation Justification
PD-AU1 PD-AU2 PD-SU1 PD-HU1 PD-HU2 PD-HU3 PD-AA1 PD-AA2 PD-HA1 PD-HA3	Recognition Category D Permanently Defueled Station	N/A	N/A	NEI Recognition Category PD ICs and EALs are applicable only to permanently defueled stations. WCGS is not a defueled station.

Category E

Independent Spent Fuel Storage Installation

NEI IC#	NEI IC Wording	WCGS IC#(s)	WCGS IC Wording	Difference/Deviation Justification
E-HU1	Damage to a loaded cask CONFINEMENT BOUNDARY MODE: All	N/A	N/A	NEI Recognition Category E ICs and EALs are applicable only to stations with ISFSI's. WCGS does not have an ISFSI.

NEI Ex. EAL #	NEI Example EAL Wording	WCGS EAL #	WCGS EAL Wording	Difference/Deviation Justification
1	Damage to a loaded cask CONFINEMENT BOUNDARY as indicated by an on-contact radiation reading greater than (2 times the site-specific cask specific technical specification allowable radiation level) on the surface of the spent fuel cask.	N/A	N/A	NEI Recognition Category E ICs and EALs are applicable only to stations with ISFSI's. WCGS does not have an ISFSI.

Category F

Fission Product Barrier Degradation

NEI IC#	NEI IC Wording	WCGS IC#(s)	WCGS IC Wording	Difference/Deviation Justification
FA1	Any Loss or any Potential Loss of either the Fuel Clad or RCS barrier. MODE: Power Operation, Hot Standby, Startup, Hot Shutdown	FA1	Any loss or any potential loss of either Fuel Clad or RCS MODE: 1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 - Hot Shutdown	None

NEI Ex. EAL #	NEI Example EAL Wording	WCGS EAL #	WCGS EAL Wording	Difference/Deviation Justification
1	Any Loss or any Potential Loss of either the Fuel Clad or RCS barrier.	FA1.1	Any loss or any potential loss of EITHER Fuel Clad or RCS (Table F-1)	Table F-1 provides the fission product barrier loss and potential loss thresholds.

NEI IC#	NEI IC Wording	WCGS IC#(s)	WCGS IC Wording	Difference/Deviation Justification
FS1	Loss or Potential Loss of any two barriers MODE: Power Operation, Hot Standby, Startup, Hot Shutdown	FS1	Loss or potential loss of any two barriers MODE: 1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 - Hot Shutdown	None

NEI Ex. EAL #	NEI Example EAL Wording	WCGS EAL #	WCGS EAL Wording	Difference/Deviation Justification
1	Loss or Potential Loss of any two barriers	FS1.1	Loss or potential loss of any two barriers (Table F-1)	Table F-1 provides the fission product barrier loss and potential loss thresholds.

NEI IC#	NEI IC Wording	WCGS IC#(s)	WCGS IC Wording	Difference/Deviation Justification
FG1	Loss of any two barriers and Loss or Potential Loss of third barrier MODE: Power Operation, Hot Standby, Startup, Hot Shutdown	FG1	Loss of any two barriers and loss or potential loss of the third barrier MODE: 1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 - Hot Shutdown	None

NEI Ex. EAL #	NEI Example EAL Wording	WCGS EAL #	WCGS EAL Wording	Difference/Deviation Justification
1	Loss of any two barriers and Loss or Potential Loss of third barrier	FG1.1	Loss of any two barriers AND Loss or potential loss of the third barrier (Table F-1)	Table F-1 provides the fission product barrier loss and potential loss thresholds.

PWR Fuel Clad Fission Product Barrier Degradation Thresholds

NEI FPB#	NEI Threshold Wording	WCGS FPB #(s)	WCGS FPB Wording	Difference/Deviation Justification
FC Loss 1	RCS or SG Tube Leakage Not Applicable	N/A	N/A	N/A
FC Loss 2	Inadequate Heat Removal A. Core exit thermocouple readings greater than (site-specific temperature value).	FC Loss B.1	CSFST Core Cooling- RED Path conditions met	Consistent with the generic developers note options CSFST Core Cooling Red Path is used in lieu of CET temperatures.
FC Loss 3	RCS Activity/CMNT Rad A. Containment radiation monitor reading greater than (site-specific value) OR B. (Site-specific indications that reactor coolant activity is greater than 300 $\mu\text{Ci/gm}$ dose equivalent I-131)	FC Loss C.1	Containment radiation > 600 R/hr on GT RE-59 or GT RE-60	GT RE-59 and GT RE-60 are the site-specific containment high range radiation monitors. The specified monitors and values are containment radiation monitor readings corresponding to 300 $\mu\text{Ci/gm}$. EP-CALC-WCNOC-1602 – The containment potential failure and fuel clad failure fission product barrier thresholds are derived from the station core damage assessment procedure, which itself is based on the Westinghouse Owner's Group Core Damage Assessment Guidance WCAP-14696-A, with assumptions and inputs from the USAR and other guidance documents calcs and other guidance documents.
		FC Loss C.2	Dose equivalent I-131 coolant activity > 300 $\mu\text{Ci/gm}$	Site-specific units for DEI is $\mu\text{Ci/gm}$.
FC Loss 4	CNMT Integrity or Bypass Not Applicable	N/A	N/A	N/A
FC Loss 5	Other Indications A. (site-specific as applicable)	N/A	N/A	No other site-specific Fuel Clad Loss indication has been identified for WCGS.

NEI FPB#	NEI Threshold Wording	WCGS FPB #(s)	WCGS FPB Wording	Difference/Deviation Justification
FC Loss 6	ED Judgment A. ANY condition in the opinion of the Emergency Director that indicates Loss of the Fuel Clad Barrier.	FC Loss E.1	Any condition in the opinion of the Emergency Manager that indicates loss of the fuel clad barrier	None
FC P-Loss 1	RCS or SG Tube Leakage A. RCS/reactor vessel level less than (site-specific level)	N/A	N/A	See FC P-Loss B.1. The RCS level threshold is implemented as CSFST Core Cooling Orange Path conditions met.
FC P-Loss 2	Inadequate Heat Removal A. Core exit thermocouple readings greater than (site-specific temperature value) OR B. Inadequate RCS heat removal capability via steam generators as indicated by (site-specific indications).	FC P-Loss B.1	CSFST Core Cooling- ORANGE Path conditions met	Consistent with the generic developers note options CSFST Core Cooling Orange Path is used in lieu of CET temperatures.
		FC P-Loss B.2	CSFST Heat Sink- RED Path conditions met AND Heat sink is required	Consistent with the generic developers note options CSFST Heat Sink Red Path is used. The phrase "and heat sink required" was added to preclude the need for classification for conditions in which RCS pressure is less than SG pressure or Heat Sink-RED path entry was created through operator action directed by an EOP.
FC P-Loss 3	RCS Activity/CMNT Rad Not Applicable	N/A	N/A	N/A
FC P-Loss 4	CNMT Integrity or Bypass Not Applicable	N/A	N/A	N/A
FC P-Loss 5	Other Indications A. (site-specific as applicable)	N/A	N/A	No other site-specific Fuel Clad Potential Loss indication has been identified for WCGS.

NEI FPB#	NEI Threshold Wording	WCGS FPB #(s)	WCGS FPB Wording	Difference/Deviation Justification
FC P-Loss 6	Emergency Director Judgment A. Any condition in the opinion of the Emergency Director that indicates Potential Loss of the Fuel Clad Barrier.	FC P-Loss E.1	Any condition in the opinion of the Emergency Manager that indicates potential loss of the fuel clad barrier	None

PWR RCS Fission Product Barrier Degradation Thresholds

NEI FPB#	NEI IC Wording	WCGS FPB #(s)	WCGS FPB Wording	Difference/Deviation Justification
RCS Loss 1	RCS or SG Tube Leakage A. An automatic or manual ECCS (SI) actuation is required by EITHER of the following: 1. UNISOLABLE RCS leakage OR 2. SG tube RUPTURE.	RCS Loss A.1	An automatic or manual ECCS (SI) actuation required by EITHER : <ul style="list-style-type: none"> • UNISOLABLE RCS leakage • SGTR 	None
RCS Loss 2	Inadequate Heat Removal Not Applicable	N/A	N/A	N/A
RCS Loss 3	RCS Activity/CMNT Rad A. Containment radiation monitor reading greater than (site-specific value).	RCS Loss C.1	Containment radiation > 60 R/hr on GT RE-59 or GT RE-60	GT RE-59 and GT RE-60 are the site-specific containment high range radiation monitors. The specified monitors and values are containment radiation monitor readings corresponding to T.S. spiked coolant activity release to containment. EP-CALC-WCNOC-1602 – The RCS failure fission product barrier threshold is derived from NUREG-1940 with assumptions and inputs from the USAR, station engineering calcs and other guidance documents.
RCS Loss 4	CNMT Integrity or Bypass Not Applicable	N/A	N/A	N/A

NEI FPB#	NEI IC Wording	WCGS FPB #(s)	WCGS FPB Wording	Difference/Deviation Justification
RCS Loss 5	Other Indications A. (site-specific as applicable)	N/A	N/A	No other site-specific RCS Loss indication has been identified for WCGS.
RCS Loss 6	Emergency Director Judgment A. ANY condition in the opinion of the Emergency Director that indicates Loss of the RCS Barrier.	RCS Loss E.1	Any condition in the opinion of the Emergency Manager that indicates loss of the RCS barrier	None
RCS P-Loss 1	RCS or SG Tube Leakage A. Operation of a standby charging (makeup) pump is required by EITHER of the following: 1. UNISOLABLE RCS leakage OR 2. SG tube leakage. OR B. RCS cooldown rate greater than (site-specific pressurized thermal shock criteria/limits defined by site-specific indications).	N/A	N/A	Wolf Creek operating procedures that respond to RCS leaks or Steam Generator Tube Leakage direct actuation of Safety Injection if an RCS leak exceeds the capacity of the currently running charging pump. Therefore any leak of a magnitude of the capacity of a running charging pump would, by procedure, exceed RCS Loss A.1. Refer to OFN BB-007 RCS Leakage High and OFN BB-007A Steam Generator Tube Leakage. Therefore RCS P-Loss 1.A is not implemented.
		RCS P-Loss A.1	CSFST Integrity- RED Path conditions met	Consistent with the generic developers note options CSFST Integrity Red Path is used.
RCS P-Loss 2	Inadequate Heat Removal A. Inadequate RCS heat removal capability via steam generators as indicated by (site-specific indications).	RCS P-Loss B.1	CSFST Heat Sink- RED Path conditions met AND Heat sink is required	Consistent with the generic developers note options CSFST Heat Sink Red Path is used. The phrase "and heat sink required" was added to preclude the need for classification for conditions in which RCS pressure is less than SG pressure or Heat Sink-RED path entry was created through operator action directed by an EOP.

NEI FPB#	NEI IC Wording	WCGS FPB #(s)	WCGS FPB Wording	Difference/Deviation Justification
RCS P-Loss 3	CS Activity/CMNT Rad Not Applicable	N/A	N/A	N/A
RCS P-Loss 4	CNMT Integrity or Bypass Not Applicable	N/A	N/A	N/A
RCS P-Loss 5	Other Indications A. (site-specific as applicable)	N/A	N/A	No other site-specific RCS Potential Loss indication has been identified for WCGS.
RCS P-Loss 6	Emergency Director Judgment A. ANY condition in the opinion of the Emergency Director that indicates Potential Loss of the RCS Barrier.	RCS P-Loss E.1	Any condition in the opinion of the Emergency Manager that indicates potential loss of the RCS barrier	None

PWR Containment Fission Product Barrier Degradation Thresholds

NEI FPB#	NEI IC Wording	WCGS FPB #(s)	WCGS FPB Wording	Difference/Deviation Justification
CNMT Loss 1	RCS or SG Tube Leakage A. A leaking or RUPTURED SG is FAULTED outside of containment.	CNMT Loss A.1	A RUPTURED SG is FAULTED outside of containment	Deleted the term "leaking." Consistent with the generic bases, the condition of the SG whether leaking or ruptured is determined in accordance with the thresholds for RCS barrier potential loss 1.A or Loss 1.A. However, since RCS potential loss 1.A [A.1] is not implemented in the WC scheme (see RCS potential loss 1.A justification), Containment loss 1.A [A.1] is bounded by the ruptured SG only.
CNMT Loss 2	Inadequate Heat Removal Not Applicable	N/A	N/A	N/A
CNMT Loss 3	RCS Activity/CNMT Rad Not applicable	N/A	N/A	N/A
CNMT Loss 4	CNMT Integrity or Bypass A. Containment isolation is required AND EITHER of the following: 1. Containment integrity has been lost based on Emergency Director judgment.	CNMT Loss D.1	Containment isolation is required AND EITHER: <ul style="list-style-type: none"> Containment integrity has been lost based on Emergency Manager judgment UNISOLABLE pathway from Containment to the environment exists 	None

NEI FPB#	NEI IC Wording	WCGS FPB #(s)	WCGS FPB Wording	Difference/Deviation Justification
	<p>OR</p> <p>2. UNISOLABLE pathway from the containment to the environment exists.</p> <p>OR</p> <p>B. Indications of RCS leakage outside of containment.</p>	CNMT Loss D.2	Indications of RCS leakage outside of containment	None
CNMT Loss 5	<p>Other Indications</p> <p>A. (site-specific as applicable)</p>	N/A	N/A	No other site-specific Containment Loss indication has been identified for WCGS.
CNMT Loss 6	<p>Emergency Director Judgment</p> <p>ANY condition in the opinion of the Emergency Director that indicates Loss of the Containment Barrier.</p>	CNMT Loss E.1	Any condition in the opinion of the Emergency Manager that indicates loss of the containment barrier	None
CNMT P-Loss 1	<p>RCS or SG Tube Leakage</p> <p>Not Applicable</p>	N/A	N/A	N/A
CNMT P-Loss 2	<p>Inadequate Heat Removal</p> <p>A. 1. (Site-specific criteria for entry into core cooling restoration procedure)</p> <p>AND</p> <p>2. Restoration procedure not effective within 15 minutes.</p>	CNMT P-Loss B.1	<p>CSFST Core Cooling-RED Path conditions met</p> <p>AND</p> <p>Restoration procedures not effective within 15 min. (Note 1)</p>	<p>Consistent with the generic developers note options CSFST Core Cooling Red Path is used in lieu of CET temperatures and RCS levels.</p> <p>Added Note 1 consistent with other thresholds with a timing component.</p>

NEI FPB#	NEI IC Wording	WCGS FPB #(s)	WCGS FPB Wording	Difference/Deviation Justification
CNMT P-Loss 3	RCS Activity/CMNT Rad A. Containment radiation monitor reading greater than (site-specific value).	CNMT P-Loss C.1	Containment radiation > 6,000 R/hr on GT RE-59 or GT RE-60	GT RE-59 and GT RE-60 are the site-specific containment high range radiation monitors. The specified monitors and values are containment radiation monitor readings corresponding to 20% clad failure. EP-CALC-WCNOC-1602 – The containment potential failure and fuel clad failure fission product barrier thresholds are derived from the station core damage assessment procedure, which itself is based on the Westinghouse Owner's Group Core Damage Assessment Guidance WCAP-14696-A, with assumptions and inputs from the USAR and other guidance documents.
CNMT P-Loss 4	CNMT Integrity or Bypass A. Containment pressure greater than (site-specific value) OR B. Explosive mixture exists inside containment OR C. 1. Containment pressure greater than (site-specific pressure setpoint) AND 2. Less than one full train of (site-specific system or equipment) is operating per design for 15 minutes or longer.	CNMT P-Loss D.1	CSFST Containment- RED Path conditions met	Consistent with the generic developers note options CSFST Containment Red Path is used in lieu of containment pressure. For WCGS, the Containment CSFST Red Path is defined by containment pressure exceeding containment design pressure of 60 psig.
		CNMT P-Loss D.2	Containment hydrogen concentration \geq 4%	4% hydrogen concentration in the presence of oxygen represents an explosive mixture in containment.
		CNMT P-Loss D.3	Containment pressure > 27 psig with < one full train of Containment depressurization equipment operating per design for \geq 15 min. (Note 1, 9)	The Containment pressure setpoint (27 psig) is the pressure at which the Containment Spray System should actuate and begin performing its function. Added Note 1 consistent with other thresholds with a timing component. Added new Note 9 to define what constitutes one full train of depressurization equipment.

NEI FPB#	NEI IC Wording	WCGS FPB #(s)	WCGS FPB Wording	Difference/Deviation Justification
CNMT P-Loss 5	Other Indications A. (site-specific as applicable)	N/A	N/A	No other site-specific Containment Potential Loss indication has been identified for WCGS.
CNMT P-Loss 6	Emergency Director Judgment A. ANY condition in the opinion of the Emergency Director that indicates Potential Loss of the Containment Barrier.	CNMT P-Loss E.1	Any condition in the opinion of the Emergency Manager that indicates potential loss of the containment barrier	None

Category H

Hazards and Other Conditions Affecting Plant Safety

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

NEI Ex. EAL #	NEI Example EAL Wording	WCGS EAL #	WCGS EAL Wording	Difference/Deviation Justification
1	A SECURITY CONDITION that does not involve a HOSTILE ACTION as reported by the (site-specific security shift supervision).	HU1.1	A SECURITY CONDITION that does not involve a HOSTILE ACTION as reported by the Security Shift Lieutenant OR Notification of a credible security threat directed at the site OR A validated notification from the NRC providing information of an aircraft threat	Example EALs #1, 2 and 3 have been combined into a single EAL for ease of presentation and use. The security shift supervision is defined as the Security Shift Lieutenant
2	Notification of a credible security threat directed at the site.			
3	A validated notification from the NRC providing information of an aircraft threat.			

NEI IC#	NEI IC Wording	WCGS IC#(s)	WCGS IC Wording	Difference/Deviation Justification
HU2	Seismic event greater than OBE level MODE: All	HU2	Seismic event greater than OBE level MODE: All	None

NEI Ex. EAL #	NEI Example EAL Wording	WCGS EAL #	WCGS EAL Wording	Difference/Deviation Justification
1	Seismic event greater than Operating Basis Earthquake (OBE) as indicated by: (site-specific indication that a seismic event met or exceeded OBE limits)	HU2.1	Seismic event > OBE as indicated by Seismic Activity Annunciator 00-098D	The WCGS OBE indicator is Seismic Activity, Annunciator 00-098D.

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

NEI Ex. EAL #	NEI Example EAL Wording	WCGS EAL #	WCGS EAL Wording	Difference/Deviation Justification
1	A tornado strike within the PROTECTED AREA.	HU3.1	A tornado strike within the PROTECTED AREA	None
2	Internal room or area flooding of a magnitude sufficient to require manual or automatic electrical isolation of a SAFETY SYSTEM component needed for the current operating mode.	HU3.2	Internal room or area FLOODING of a magnitude sufficient to require manual or automatic electrical isolation of a SAFETY SYSTEM component needed for the current operating mode	None
3	Movement of personnel within the PROTECTED AREA is impeded due to an offsite event involving hazardous materials (e.g., an offsite chemical spill or toxic gas release).	HU3.3	Movement of personnel within the PROTECTED AREA is IMPEDED due to an offsite event involving hazardous materials (e.g., an offsite chemical spill or toxic gas release)	None
4	A hazardous event that results in on-site conditions sufficient to prohibit the plant staff from accessing the site via personal vehicles.	HU3.4	A hazardous event that results in on-site conditions sufficient to prohibit the plant staff from accessing the site via personal vehicles (Note 7)	Added reference to Note 7.
5	(Site-specific list of natural or technological hazard events)	N/A	N/A	No other site-specific hazard has been identified for WCGS.
Note	EAL #3 does not apply to routine traffic impediments such as fog,	N/A	Note 7: This EAL does not apply to routine traffic	This note, designated Note #7, is intended to apply to generic example EAL #4, not #3 as specified in the generic guidance.

	snow, ice, or vehicle breakdowns or accidents.		impediments such as fog, snow, ice, or vehicle breakdowns or accidents.	
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NEI IC#	NEI IC Wording	WCGS IC#(s)	WCGS IC Wording	Difference/Deviation Justification
HU4	FIRE potentially degrading the level of safety of the plant. MODE: All	HU4	FIRE potentially degrading the level of safety of the plant MODE: All	None

NEI Ex. EAL #	NEI Example EAL Wording	WCGS EAL #	WCGS EAL Wording	Difference/Deviation Justification
1	<p>a. A FIRE is NOT extinguished within 15-minutes of ANY of the following FIRE detection indications:</p> <ul style="list-style-type: none"> ● 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 <p>AND</p> <p>b. The FIRE is located within ANY of the following plant rooms or areas:</p> <p>(site-specific list of plant rooms or areas)</p>	HU4.1	<p>A FIRE is not extinguished within 15 min. of any of the following FIRE detection indications (Note 1):</p> <ul style="list-style-type: none"> ● Report from the field (i.e., visual observation) ● Receipt of multiple (more than 1) fire alarms or indications in the same fire area ● Field verification of a single fire alarm <p>AND</p> <p>The FIRE is located within any Table H-1 area</p>	<p>Added "...in the same fire area" to the second bullet. Single fire alarms in different fire areas is not indicative of a higher likelihood of a fire in either area.</p> <p>Table H-1 provides a tabularized list of site-specific fire areas.</p>
2	<p>a. Receipt of a single fire alarm (i.e., no other indications of a FIRE).</p> <p>AND</p> <p>b. The FIRE is located within</p>	HU4.2	<p>Receipt of a single fire alarm (i.e., no other indications of a FIRE)</p> <p>AND</p> <p>The fire alarm is indicating a</p>	Table H-1 provides a tabularized list of site-specific fire areas.

	<p>ANY of the following plant rooms or areas:</p> <p>(site-specific list of plant rooms or areas)</p> <p>AND</p> <p>c. The existence of a FIRE is not verified within 30-minutes of alarm receipt.</p>		<p>FIRE within any Table H-1 area</p> <p>AND</p> <p>The existence of a FIRE is not verified within 30 min. of alarm receipt (Note 1)</p>	
3	<p>A FIRE within the plant <i>or ISFSI</i> [for plants with an <i>ISFSI</i> outside the plant Protected Area] PROTECTED AREA not extinguished within 60-minutes of the initial report, alarm or indication.</p>	HU4.3	<p>A FIRE within the plant PROTECTED AREA not extinguished within 60 min. of the initial report, alarm or indication (Note 1)</p>	WCGS does not have an ISFSI.
4	<p>A FIRE within the plant <i>or ISFSI</i> [for plants with an <i>ISFSI</i> outside the plant Protected Area] PROTECTED AREA that requires firefighting support by an offsite fire response agency to extinguish.</p>	HU4.4	<p>A FIRE within the plant PROTECTED AREA that requires firefighting support by an offsite fire response agency to extinguish</p>	WCGS does not have an ISFSI.
Note	<p>Note: The Emergency Director should declare the Unusual Event promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.</p>	N/A	<p>Note 1: The Emergency Manager should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.</p>	<p>The classification timeliness note has been standardized across the WCGS EAL scheme by referencing the "time limit" specified within the EAL wording.</p>

Table H-1 Fire Areas

- Auxiliary Building
- Reactor Building
- Control Building
- Fuel Building
- Emergency Diesel Generator Building
- ESW Pump House
- Refueling Water Storage Tank Valve Room
- Refueling Water Storage Tank (TBN01)

NEI IC#	NEI IC Wording	WCGS IC#(s)	WCGS IC Wording	Difference/Deviation Justification
HU7	Other conditions exist which in the judgment of the Emergency Director warrant declaration of a (NO)UE MODE: All	HU6	Other conditions existing that in the judgment of the Emergency Manager warrant declaration of a UE MODE: All	None

NEI Ex. EAL #	NEI Example EAL Wording	WCGS EAL #	WCGS EAL Wording	Difference/Deviation Justification
1	Other conditions exist which in the judgment of the Emergency Director indicate that events are in progress or have occurred which indicate a potential degradation of the level of safety of the plant or indicate a security threat to facility protection has been initiated. No releases of radioactive material requiring offsite response or monitoring are expected unless further degradation of safety systems occurs.	HU6.1	Other conditions exist which in the judgment of the Emergency Manager 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.	Emergency Manager is the site-specific title for Emergency director.

NEI IC#	NEI IC Wording	WCGS IC#(s)	WCGS IC Wording	Difference/Deviation Justification
HA1	HOSTILE ACTION within the OWNER CONTROLLED AREA or airborne attack threat within 30 minutes. MODE: All	HA1	HOSTILE ACTION within the OWNER CONTROLLED AREA or airborne attack threat within 30 minutes MODE: All	None

NEI Ex. EAL #	NEI Example EAL Wording	WCGS EAL #	WCGS EAL Wording	Difference/Deviation Justification
1	A HOSTILE ACTION is occurring or has occurred within the OWNER CONTROLLED AREA as reported by the (site-specific security shift supervision).	HA1.1	A HOSTILE ACTION is occurring or has occurred within the OWNER CONTROLLED AREA as reported by the Security Shift Lieutenant OR A validated notification from NRC of an aircraft attack threat within 30 min. of the site	Example EALs #1 and #2 have been combined into a single EAL for ease of use. The security shift supervision is defined as the Security Shift Lieutenant
2	A validated notification from NRC of an aircraft attack threat within 30 minutes of the site.			

NEI IC#	NEI IC Wording	WCGS IC#(s)	WCGS IC Wording	Difference/Deviation Justification
HA5	Gaseous release impeding access to equipment necessary for normal plant operations, cooldown or shutdown. MODE: All	HA5	Gaseous release impeding access to equipment necessary for normal plant operations, cooldown or shutdown. MODE: 1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 - Hot Shutdown	Mode applicability of HA5 limited to the modes determined to be applicable per Table H-2. See bases note and Attachment 3 of the Technical Bases Document.

NEI Ex. EAL #	NEI Example EAL Wording	WCGS EAL #	WCGS EAL Wording	Difference/Deviation Justification
1	a. Release of a toxic, corrosive, asphyxiant or flammable gas into any of the following plant rooms or areas: (site-specific list of plant rooms or areas with entry-related mode applicability identified) AND b. Entry into the room or area is prohibited or impeded.	HA5.1	Release of a toxic, corrosive, asphyxiant or flammable gas that prohibits or IMPEDES access to any Table H-2 rooms or areas (Note 5)	Analysis by Operations Subject Matter Experts determined areas external to the Main Control Room that require access in any operating mode to maintain safe plant operations or to perform a normal plant shutdown and cooldown to Cold Shutdown conditions. Table H-2 and Attachment 3 of the Technical Bases Document.
Note	Note: If the equipment in the listed room or area was already inoperable or out-of-service before the event occurred, then no emergency classification is warranted.	N/A	Note 5: If the equipment in the listed room or area was already inoperable or out-of-service before the event occurred, then no emergency classification is warranted.	None

Table H-2 Safe Operation & Shutdown Rooms/Areas	
Room/Area	Mode Applicability
North Electrical Pen. Room A	3, 4
South Electrical Pen. Room B	3, 4
ESF SWGR Room No. 1 (TRN A)	4
ESF SWGR Room No. 2 (TRN B)	4
Auxiliary Building/West Hall Elev 2000	3,4,5

NEI IC#	NEI IC Wording	WCGS IC#(s)	WCGS IC Wording	Difference/Deviation Justification
HA6	Control Room evacuation resulting in transfer of plant control to alternate locations. MODE: All	HA6	Control Room evacuation resulting in transfer of plant control to alternate locations MODE: All	None

NEI Ex. EAL #	NEI Example EAL Wording	WCGS EAL #	WCGS EAL Wording	Difference/Deviation Justification
1	An event has resulted in plant control being transferred from the Control Room to (site-specific remote shutdown panels and local control stations).	HA6.1	An event has resulted in plant control being transferred from the Control Room to the Auxiliary Shutdown Panel (ASP)	Auxiliary Shutdown Panel (ASP) is the site-specific remote shutdown panels/local control stations.

NEI IC#	NEI IC Wording	WCGS IC#(s)	WCGS IC Wording	Difference/Deviation Justification
HA7	Other conditions exist which in the judgment of the Emergency Director warrant declaration of an Alert. MODE: All	HA7	Other conditions exist that in the judgment of the Emergency Manager warrant declaration of an Alert MODE: All	None

NEI Ex. EAL #	NEI Example EAL Wording	WCGS EAL #	WCGS EAL Wording	Difference/Deviation Justification
1	Other conditions exist which, in the judgment of the Emergency Director, indicate that events are in progress or have occurred which involve an actual or potential substantial degradation of the level of safety of the plant or a security event that involves probable life threatening risk to site personnel or damage to site equipment because of HOSTILE ACTION. Any releases are expected to be limited to small fractions of the EPA Protective Action Guideline exposure levels.	HA7.1	Other conditions exist which, in the judgment of the Emergency Manager, 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.	Emergency Manager is the site-specific title for Emergency director.

NEI IC#	NEI IC Wording	WCGS IC#(s)	WCGS IC Wording	Difference/Deviation Justification
HS1	HOSTILE ACTION within the PROTECTED AREA MODE: All	HS1	HOSTILE ACTION within the PROTECTED AREA MODE: All	None

NEI Ex. EAL #	NEI Example EAL Wording	WCGS EAL #	WCGS EAL Wording	Difference/Deviation Justification
1	A HOSTILE ACTION is occurring or has occurred within the PROTECTED AREA as reported by the (site-specific security shift supervision).	HS1.1	A HOSTILE ACTION is occurring or has occurred within the PROTECTED AREA as reported by the Security Shift Lieutenant	The security shift supervision is defined as the Security Shift Lieutenant

NEI IC#	NEI IC Wording	WCGS IC#(s)	WCGS IC Wording	Difference/Deviation Justification
HS6	Inability to control a key safety function from outside the Control Room. MODE: All	HS6	Inability to control a key safety function from outside the Control Room MODE: 1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 - Hot Shutdown, 5 - Cold Shutdown, 6 - Refueling	Deleted defueled mode applicability. Control of the cited safety functions are not critical for a defueled reactor as there is no energy source in the reactor vessel or RCS. This is an acceptable deviation from the generic NEI 99-01 Revision 6 guidance.

NEI Ex. EAL #	NEI Example EAL Wording	WCGS EAL #	WCGS EAL Wording	Difference/Deviation Justification
1	a. An event has resulted in plant control being transferred from the Control Room to (site-specific remote shutdown panels and local control stations). AND b. Control of ANY of the following key safety functions is not reestablished within (site-specific number of minutes). <ul style="list-style-type: none">● Reactivity control● Core cooling [PWR] / RWC water level [BWR]● RCS heat removal	HS6.1	An event has resulted in plant control being transferred from the Control Room to the Auxiliary Shutdown Panel (ASP) AND Control of any of the following key safety functions is not re-established within 15 min. (Note 1): <ul style="list-style-type: none">● Reactivity (Modes 1, 2 and 3 only)● Core cooling● RCS heat removal	Auxiliary Shutdown Panel (ASP) is the site-specific remote shutdown panels/local control stations. The Mode applicability for the reactivity control safety function has been limited to Modes 1, 2, and 3 (hot operating conditions). In the cold operating modes adequate shutdown margin exists under all conditions. This is an acceptable deviation from the generic NEI 99-01 Revision 6 guidance.

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

NEI Ex. EAL #	NEI Example EAL Wording	WCGS EAL #	WCGS EAL Wording	Difference/Deviation Justification
1	Other conditions exist which in the judgment of the Emergency Director indicate that events are in progress or have occurred which involve actual or likely major failures of plant functions needed for protection of the public or HOSTILE ACTION that results in intentional damage or malicious acts, (1) toward site personnel or equipment that could lead to the likely failure of or, (2) that prevent effective access to equipment needed for the protection of the public. Any releases are not expected to result in exposure levels which exceed EPA Protective Action Guideline exposure levels beyond the site boundary.	HS7.1	Other conditions exist which in the judgment of the Emergency Manager 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.	Emergency Manager is the site-specific title for Emergency director.

NEI IC#	NEI IC Wording	WCGS IC#(s)	WCGS IC Wording	Difference/Deviation Justification
HG1	HOSTILE ACTION resulting in loss of physical control of the facility. MODE: All	N/A	N/A	IC HG1 and associated example EAL are not implemented in the WCGS scheme. There are several other ICs that are redundant with this IC, and are better suited to ensure timely and effective emergency declarations. In addition, the development of new spent fuel pool level EALs, as a result of NRC Order EA-12-051, clarified the intended emergency classification level for spent fuel pool level events. This is an acceptable deviation from the generic NEI 99-01 Revision 6 guidance.

NEI Ex. EAL #	NEI Example EAL Wording	WCGS EAL #	WCGS EAL Wording	Difference/Deviation Justification
1	a. A HOSTILE ACTION is occurring or has occurred within the PROTECTED AREA as reported by the (site-specific security shift supervision). AND b. EITHER of the following has occurred: 1. ANY of the following safety functions cannot be controlled or maintained. <ul style="list-style-type: none"> ● Reactivity control ● Core cooling [PWR]/RWC water level [BWR] ● RCS heat removal 	N/A	N/A	IC HG1 and associated example EAL are not implemented in the WCGS scheme. There are several other ICs that are redundant with this IC, and are better suited to ensure timely and effective emergency declarations. In addition, the development of new spent fuel pool level EALs, as a result of NRC Order EA-12-051, clarified the intended emergency classification level for spent fuel pool level events. This deviation is justified because: 1. Hostile Action in the Protected Area is bounded by ICs HS1 and HS7. Hostile Action resulting in a loss of physical control is bound by EAL HG7, as well as any event that may lead to radiological releases to the public in excess of Environmental Protection Agency (EPA) Protective Action Guides (PAGs). a. If, for whatever reason, the Control Room must be evacuated, and control of safety functions (e.g., reactivity control, core cooling, and RCS heat

	<p>OR</p> <p>2. Damage to spent fuel has occurred or is IMMINENT.</p>		<p>removal) cannot be reestablished, then IC HS6 would apply, as well as IC HS7 if desired by the EAL decision-maker.</p> <p>b. Also, as stated above, any event (including Hostile Action) that could reasonably be expected to have a release exceeding EPA PAGs would be bound by IC HG7.</p> <p>c. From a Hostile Action perspective, ICs HS1, HS7 and HG7 are appropriate, and therefore, make this part of HG1 redundant and unnecessary.</p> <p>d. From a loss of physical control perspective, ICs HS6, HS7 and HG7 are appropriate, and therefore, make this part of HG1 redundant and unnecessary.</p> <p>2. Any event which causes a loss of spent fuel pool level will be bounded by ICs AA2, AS2 and AG2, regardless of whether it was based upon a Hostile Action or not, thus making this part of HG1 redundant and unnecessary.</p> <p>a. An event that leads to a radiological release will be bounded by ICs AU1, AA1, AS1 and AG1. Events that lead to radiological releases in excess of EPA PAGs will be bounded by EALs AG1 and HG7, thus making this part of HG1 redundant and unnecessary.</p> <p>ICs AA2, AS2, AG2, AS1, AG1, HS1, HS6, HS7 and HG7 have been implemented consistent with NEI 99-01 Revision 6 and thus HG1 is adequately bounded as described above.</p> <p>This is an acceptable deviation from the generic NEI 99-01 Revision 6 guidance.</p>
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NEI IC#	NEI IC Wording	WCGS IC#(s)	WCGS IC Wording	Difference/Deviation Justification
HG7	Other conditions exist which in the judgment of the Emergency Director warrant declaration of a General Emergency MODE: All	HG6	Other conditions exist which in the judgment of the Emergency Manager warrant declaration of a General Emergency MODE: All	None

NEI Ex. EAL #	NEI Example EAL Wording	WCGS EAL #	WCGS EAL Wording	Difference/Deviation Justification
1	Other conditions exist which in the judgment of the Emergency Director indicate that events are in progress or have occurred which involve actual or IMMINENT substantial core degradation or melting with potential for loss of containment integrity or HOSTILE ACTION that results in an actual loss of physical control of the facility. Releases can be reasonably expected to exceed EPA Protective Action Guideline exposure levels offsite for more than the immediate site area.	HG6.1	Other conditions exist which in the judgment of the Emergency Manager 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.	Emergency Manager is the site-specific title for Emergency director.

Category S

System Malfunction

NEI IC#	NEI IC Wording	WCGS IC#(s)	WCGS IC Wording	Difference/Deviation Justification
SU1	Loss of all offsite AC power capability to emergency buses for 15 minutes or longer. MODE: Power Operation, Startup, Hot Standby, Hot Shutdown	SU1	Loss of all offsite AC power capability to emergency buses for 15 minutes or longer MODE: 1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 - Hot Shutdown	None

NEI Ex. EAL #	NEI Example EAL Wording	WCGS EAL #	WCGS EAL Wording	Difference/Deviation Justification
1	Loss of ALL offsite AC power capability to (site-specific emergency buses) for 15 minutes or longer.	SU1.1	Loss of all offsite AC power capability, Table S-1, to emergency 4.16KV buses NB01 and NB02 for ≥ 15 min. (Note 1)	4.16KV buses NB01 and NB02 are the site-specific emergency buses. Site-specific AC power sources are tabularized in Table S-1.
Note	The Emergency Director should declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.	N/A	Note 1: The Emergency Manager should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.	The classification timeliness note has been standardized across the WCGS EAL scheme by referencing the "time limit" specified within the EAL wording.

Table S-1 AC Power Sources
Offsite: <ul style="list-style-type: none">• ESF XFMR XNB01• ESF XFMR XNB02
Onsite: <ul style="list-style-type: none">• EDG NE01• EDG NE02

NEI IC#	NEI IC Wording	WCGS IC#(s)	WCGS IC Wording	Difference/Deviation Justification
SU2	UNPLANNED loss of Control Room indications for 15 minutes or longer. MODE: Power Operation, Startup, Hot Standby, Hot Shutdown	SU3	UNPLANNED loss of Control Room indications for 15 minutes or longer. MODE: 1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 - Hot Shutdown	None

NEI Ex. EAL #	NEI Example EAL Wording	WCGS EAL #	WCGS EAL Wording	Difference/Deviation Justification
1	An UNPLANNED event results in the inability to monitor one or more of the following parameters from within the Control Room for 15 minutes or longer.	SU3.1	An UNPLANNED event results in the inability to monitor one or more Table S-2 parameters from within the Control Room for ≥ 15 min. (Note 1)	The site-specific Safety System Parameter list is tabulated in Table S-2. Added the words "to at least one S/G" to Auxiliary or emergency feedwater flow. This is consistent with Level in at least on S/G.
Note	The Emergency Director should declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.	N/A	Note 1: The Emergency Manager should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.	The classification timeliness note has been standardized across the WCGS EAL scheme by referencing the "time limit" specified within the EAL wording.

<i>[BWR parameter list]</i>	<i>[PWR parameter list]</i>
Reactor Power	Reactor Power
RWC Water Level	RCS Level
RWC Pressure	RCS Pressure
Primary Containment Pressure	In-Core/Core Exit Temperature
Suppression Pool Level	Levels in at least (site-specific number) steam generators
Suppression Pool Temperature	Steam Generator Auxiliary or Emergency Feed Water Flow

Table S-2 Safety System Parameters

- Reactor power
- RCS level
- RCS pressure
- Core Exit T/C temperature
- Level in at least one S/G
- Auxiliary or emergency feed flow in at least one S/G

NEI IC#	NEI IC Wording	WCGS IC#(s)	WCGS IC Wording	Difference/Deviation Justification
SU3	Reactor coolant activity greater than Technical Specification allowable limits. MODE: Power Operation, Startup, Hot Standby, Hot Shutdown	SU4	Reactor coolant activity greater than Technical Specification allowable limits MODE: 1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 - Hot Shutdown	None

NEI Ex. EAL #	NEI Example EAL Wording	WCGS EAL #	WCGS EAL Wording	Difference/Deviation Justification
1	(Site-specific radiation monitor) reading greater than (site-specific value).	N/A	N/A	WCGS does not have any site-specific radiation monitor correlation to TS coolant activity limits.
2	Sample analysis indicates that a reactor coolant activity value is greater than an allowable limit specified in Technical Specifications.	SU4.1	Sample analysis indicates RCS activity > Technical Specification Section 3.4.16 limits	Changed 'reactor coolant activity' to 'RCS' to conform to site specific terminology. WCGS T.S. Section 3.4.16 provides the TS allowable coolant activity limits.

NEI IC#	NEI IC Wording	WCGS IC#(s)	WCGS IC Wording	Difference/Deviation Justification
SU4	RCS leakage for 15 minutes or longer. MODE: Power Operation, Startup, Hot Standby, Hot Shutdown	SU5	RCS leakage for 15 minutes or longer MODE: 1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 - Hot Shutdown	None

NEI Ex. EAL #	NEI Example EAL Wording	WCGS EAL #	WCGS EAL Wording	Difference/Deviation Justification
1	RCS unidentified or pressure boundary leakage greater than (site-specific value) for 15 minutes or longer.	SU5.1	RCS unidentified or pressure boundary leakage > 10 gpm for ≥ 15 min. OR RCS identified leakage > 25 gpm for ≥ 15 min. OR Leakage from the RCS to a location outside containment > 25 gpm for ≥ 15 min. (Note 1)	Example EALs #1, 2 and 3 have been combined into a single EAL for usability.
2	RCS identified leakage greater than (site-specific value) for 15 minutes or longer.			
3	Leakage from the RCS to a location outside containment greater than 25 gpm for 15 minutes or longer.			
Note	The Emergency Director should declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.	N/A	Note 1: The Emergency Manager should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.	The classification timeliness note has been standardized across the WCGS EAL scheme by referencing the "time limit" specified within the EAL wording.

NEI IC#	NEI IC Wording	WCGS IC#(s)	WCGS IC Wording	Difference/Deviation Justification
SU5	Automatic or manual (trip [PWR] / scram [BWR]) fails to shutdown the reactor. MODE: Power Operation	SU6	Automatic or manual trip fails to shut down the reactor MODE: 1 - Power Operation	None

NEI Ex. EAL #	NEI Example EAL Wording	WCGS EAL #	WCGS EAL Wording	Difference/Deviation Justification
1	a. An automatic (trip [PWR] / scram [BWR]) did not shutdown the reactor. AND b. A subsequent manual action taken at the reactor control consoles is successful in shutting down the reactor.	SU6.1	An automatic trip did not shut down the reactor as indicated by reactor power $\geq 5\%$ after any RTS setpoint is exceeded AND A subsequent automatic trip or manual trip action taken at the reactor control consoles (SB HS-1 or SB HS-42) is successful in shutting down the reactor as indicated by reactor power $< 5\%$ (Note 8)	As specified in the generic developers guidance "Developers may include site-specific EOP criteria indicative of a successful reactor shutdown in an EAL statement, the Basis or both (e.g., a reactor power level)." Reactor power $< 5\%$ is the site-specific indication of a successful reactor trip. Added the words "... as indicated by reactor power $\geq 5\%$ after any RTS setpoint is exceeded" to clarify that it is a failure of the automatic trip when a valid trip signal has been exceed. SB HS-1 (Panel RL003) or SB HS-42 (Panel RL006) are the site-specific reactor control console trip switches credited for a successful manual trip.
2	a. A manual trip ([PWR] / scram [BWR]) did not shutdown the reactor. AND b. EITHER of the following: 1. A subsequent manual action taken at the reactor control consoles is successful in shutting down the reactor.	SU6.2	A manual trip did not shut down the reactor as indicated by reactor power $\geq 5\%$ after any manual trip action was initiated AND A subsequent automatic trip or manual trip action taken at the reactor control console (SB HS-1 or SB HS-42) is successful in shutting down the reactor as indicated by reactor	As specified in the generic developers guidance "Developers may include site-specific EOP criteria indicative of a successful reactor shutdown in an EAL statement, the Basis or both (e.g., a reactor power level)." Reactor power $< 5\%$ is the site-specific indication of a successful reactor trip. Added the words "... as indicated by reactor power $\geq 5\%$ after any manual trip action was initiated" to clarify that it is a failure of any manual trip when an actual manual trip signal has been inserted. Combined conditions b.1 and b.2 into a single statement to simplify the presentation.

	OR 2 A subsequent automatic (trip [PWR] / scram [BWR]) is successful in shutting down the reactor.		power < 5% (Note 8)	SB HS-1 (Panel RL003) or SB HS-42 (Panel RL006) are the site-specific reactor control console trip switches credited for a successful manual trip.
Notes	Note: A manual action is any operator action, or set of actions, which causes the control rods to be rapidly inserted into the core, and does not include manually driving in control rods or implementation of boron injection strategies.	N/A	Note 8: A manual action is any operator action, or set of actions, which causes the control rods to be rapidly inserted into the core, and does not include manually driving in control rods, tripping rod drive power or implementation of boron injection strategies.	Added "...tripping rod drive power..." as a site-specific, manual trip action taken away from the reactor control consoles.

NEI IC#	NEI IC Wording	WCGS IC#(s)	WCGS IC Wording	Difference/Deviation Justification
SU6	Loss of all onsite or offsite communications capabilities. MODE: Power Operation, Startup, Hot Standby, Hot Shutdown	SU7	Loss of all onsite or offsite communications capabilities. MODE: 1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 - Hot Shutdown	None

NEI Ex. EAL #	NEI Example EAL Wording	WCGS EAL #	WCGS EAL Wording	Difference/Deviation Justification
1	Loss of ALL of the following onsite communication methods: (site-specific list of communications methods)	SU7.1	Loss of all Table S-4 onsite communication methods OR Loss of all Table S-4 offsite communication methods OR Loss of all Table S-4 NRC communication methods	Example EALs #1, 2 and 3 have been combined into a single EAL for simplification of presentation. Table S-4 provides a site-specific list of onsite, ORO and NRC communications methods. Changes the acronym "ORO" to "offsite" consistent with WC usage.
2	Loss of ALL of the following ORO communications methods: (site-specific list of communications methods)			
3	Loss of ALL of the following NRC communications methods: (site-specific list of communications methods)			

Table S-4 Communication Methods			
System	Onsite	Offsite	NRC
PA system	X		
Plant Radios	X	X	
Site Telephone System	X	X	X
Local Telephone Company Direct Lines	X	X	X
ENS Line			X

NEI IC#	NEI IC Wording	WCGS IC#(s)	WCGS IC Wording	Difference/Deviation Justification
SU7	<p>Failure to isolate containment or loss of containment pressure control. [PWR]</p> <p>MODE: Power Operation, Startup, Hot Standby, Hot Shutdown</p>	SU8	<p>Failure to isolate containment or loss of containment pressure control</p> <p>MODE: 1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 - Hot Shutdown</p>	None

NEI Ex. EAL #	NEI Example EAL Wording	WCGS EAL #	WCGS EAL Wording	Difference/Deviation Justification
1	<p>a. Failure of containment to isolate when required by an actuation signal.</p> <p>AND</p> <p>b. ALL required penetrations are not closed within 15 minutes of the actuation signal.</p>	SU8.1	<p>Any penetration is not isolated within 15 min. of a VALID containment isolation signal</p> <p>OR</p> <p>Containment pressure > 27 psig with < one full train of containment depressurization equipment operating per design for ≥ 15 min. (Note 9) (Note 1)</p>	<p>Reworded EAL to better describe the intent. Penetrations cannot close, but they can be isolated by closure of one or more isolation valves associated with that penetration. The revised wording maintains the generic example EAL intent while more clearly describing failure to isolate threshold.</p> <p>The containment pressure setpoint (27 psig) is the pressure at which the containment depressurization equipment should actuate and begin performing its function. One train of containment depressurization equipment is defined in Note 9.</p>
2	<p>a. Containment pressure greater than (site-specific pressure).</p> <p>AND</p> <p>b. Less than one full train of (site-specific system or equipment) is operating per design for 15 minutes or longer.</p>			
N/A	N/A	N/A	Note 1: The Emergency Manager should declare the event promptly upon determining that time	Added Note 1 to be consistent in its use for EAL thresholds with a timing component.

			limit has been exceeded, or will likely be exceeded.	
N/A	N/A	N/A	Note 9: One Containment Spray System train and one Containment Cooling System train comprise one full train of depressurization equipment	Added new Note 9 to provide clarification regarding what constitutes on full train of a containment depressurization system.

NEI IC#	NEI IC Wording	WCGS IC#(s)	WCGS IC Wording	Difference/Deviation Justification
SA1	Loss of all but one AC power source to emergency buses for 15 minutes or longer. MODE: Power Operation, Startup, Hot Standby, Hot Shutdown	SA1	Loss of all but one AC power source to emergency buses for 15 minutes or longer. MODE: 1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 - Hot Shutdown	None

NEI Ex. EAL #	NEI Example EAL Wording	WCGS EAL #	WCGS EAL Wording	Difference/Deviation Justification
1	a. AC power capability to (site-specific emergency buses) is reduced to a single power source for 15 minutes or longer. AND b. Any additional single power source failure will result in a loss of all AC power to SAFETY SYSTEMS.	SA1.1	AC power capability, Table S-1, to emergency 4.16KV buses NB01 and NB02 reduced to a single power source for ≥ 15 min. (Note 1) AND Any additional single power source failure will result in loss of all AC power to SAFETY SYSTEMS	4.16KV buses NB01 and NB02 are the site-specific emergency buses. Site-specific AC power sources are tabularized in Table S-1.
Note	The Emergency Director should declare the Alert promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.	N/A	Note 1: The Emergency Manager should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.	The classification timeliness note has been standardized across the WCGS EAL scheme by referencing the "time limit" specified within the EAL wording.

Table S-1 AC Power Sources**Offsite:**

- ESF XFMR XNB01
- ESF XFMR XNB02

Onsite:

- EDG NE01
- EDG NE02

NEI IC#	NEI IC Wording	WCGS IC#(s)	WCGS IC Wording	Difference/Deviation Justification
SA2	<p>UNPLANNED loss of Control Room indications for 15 minutes or longer with a significant transient in progress.</p> <p>MODE: Power Operation, Startup, Hot Standby, Hot Shutdown</p>	SA3	<p>UNPLANNED loss of Control Room indications for 15 minutes or longer with a significant transient in progress.</p> <p>MODE: 1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 - Hot Shutdown</p>	None

NEI Ex. EAL #	NEI Example EAL Wording	WCGS EAL #	WCGS EAL Wording	Difference/Deviation Justification
1	<p>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.</p> <p>AND</p> <p>ANY of the following transient events in progress.</p> <ul style="list-style-type: none"> Automatic or manual runback greater than 25% thermal reactor power Electrical load rejection greater than 25% full electrical load Reactor scram [BWR] / trip [PWR] ECCS (SI) actuation Thermal power oscillations greater than 10% [BWR] 	SA3.1	<p>An UNPLANNED event results in the inability to monitor one or more Table S-2 parameters from within the Control Room for ≥ 15 min. (Note 1)</p> <p>AND</p> <p>Any significant transient is in progress, Table S-3</p>	<p>The site-specific Safety System Parameter list to tabulated in Table S-2.</p> <p>The site-specific significant transients list to tabulated in Table S-3.</p> <p>WCGS is a PWR and thus does not include thermal power oscillations > 10%.</p>

Note	The Emergency Director should declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.	N/A	Note 1: The Emergency Manager should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.	The classification timeliness note has been standardized across the WCGS EAL scheme by referencing the "time limit" specified within the EAL wording.
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<i>[BWR parameter list]</i>	<i>[PWR parameter list]</i>
Reactor Power	Reactor Power
RWC Water Level	RCS Level
RWC Pressure	RCS Pressure
Primary Containment Pressure	In-Core/Core Exit Temperature
Suppression Pool Level	Levels in at least (site-specific number) steam generators
Suppression Pool Temperature	Steam Generator Auxiliary or Emergency Feed Water Flow

Table S-2 Safety System Parameters

- Reactor power
- RCS level
- RCS pressure
- Core Exit T/C temperature
- Level in at least one S/G
- Auxiliary or emergency feed flow in at least one S/G

Table S-3 Significant Transients

- Reactor trip
- Runback $\geq 25\%$ thermal power
- Electrical load rejection $> 25\%$ electrical load
- ECCS actuation

NEI IC#	NEI IC Wording	WCGS IC#(s)	WCGS IC Wording	Difference/Deviation Justification
SA5	Automatic or manual (trip [PWR] / scram [BWR]) fails to shutdown the reactor, and subsequent manual actions taken at the reactor control consoles are not successful in shutting down the reactor. MODE: Power Operation	SA6	Automatic or manual trip fails to shut down the reactor and subsequent manual actions taken at the reactor control consoles are not successful in shutting down the reactor MODE: 1 - Power Operation	None

NEI Ex. EAL #	NEI Example EAL Wording	WCGS EAL #	WCGS EAL Wording	Difference/Deviation Justification
1	a. An automatic or manual (trip [PWR] / scram [BWR]) did not shutdown the reactor. AND b. Manual actions taken at the reactor control consoles are not successful in shutting down the reactor.	SA6.1	An automatic or manual trip fails to shut down the reactor as indicated by reactor power $\geq 5\%$ AND Manual trip actions taken at the reactor control console (SB-HS-1 or SB-HS-42) are not successful in shutting down the reactor as indicated by reactor power $\geq 5\%$ (Note 8)	As specified in the generic developers guidance "Developers may include site-specific EOP criteria indicative of a successful reactor shutdown in an EAL statement, the Basis or both (e.g., a reactor power level)." Reactor power $< 5\%$ is the site-specific indication of a successful reactor trip. SB-HS-1 (Panel RL003) or SB-HS-42 (Panel RL006) are the site-specific reactor control console trip switches credited for a successful manual trip.
Notes	Note: A manual action is any operator action, or set of actions, which causes the control rods to be rapidly inserted into the core, and does not include manually driving in control rods or implementation of boron injection strategies.	N/A	Note 8: A manual action is any operator action, or set of actions, which causes the control rods to be rapidly inserted into the core, and does not include manually driving in control rods, tripping rod drive power or	Added "...tripping rod drive power..." as a site-specific, manual trip action taken away from the reactor control consoles.

			implementation of boron injection strategies.	
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NEI IC#	NEI IC Wording	WCGS IC#(s)	WCGS IC Wording	Difference/Deviation Justification
SA9	Hazardous event affecting a SAFETY SYSTEM needed for the current operating mode. MODE: Power Operation, Startup, Hot Standby, Hot Shutdown	SA9	Hazardous event affecting a SAFETY SYSTEM needed for the current operating mode MODE: 1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 - Hot Shutdown	None

NEI Ex. EAL #	NEI Example EAL Wording	WCGS EAL #	WCGS EAL Wording	Difference/Deviation Justification
1	<p>a. The occurrence of ANY of the following hazardous events:</p> <ul style="list-style-type: none"> ● Seismic event (earthquake) ● Internal or external flooding event ● High winds or tornado strike ● FIRE ● EXPLOSION ● (site-specific hazards) ● Other events with similar hazard characteristics as determined by the Shift Manager <p>AND</p> <p>b. EITHER of the following:</p> <ol style="list-style-type: none"> 1. Event damage has caused indications of degraded performance in at least one train of a SAFETY SYSTEM needed for the current operating mode. <p>OR</p> <ol style="list-style-type: none"> 2. The event has caused VISIBLE DAMAGE to a SAFETY SYSTEM component or structure needed for the current operating mode. 	SA9.1	<p>The occurrence of any Table S-5 hazardous event</p> <p>AND EITHER:</p> <ul style="list-style-type: none"> ● Event damage has caused indications of degraded performance in at least one train of a SAFETY SYSTEM needed for the current operating mode ● The event has caused VISIBLE DAMAGE to a SAFETY SYSTEM component or structure needed for the current operating mode 	<p>The hazardous events have been tabularized in Table S-5.</p> <p>Replaced "Shift Manager" with "Emergency Manager" as the EC can be either the SM or augmented ERO EC.</p>

Table S-5 Hazardous Events
<ul style="list-style-type: none">● 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 Emergency Manager

NEI IC#	NEI IC Wording	WCGS IC#(s)	WCGS IC Wording	Difference/Deviation Justification
SS1	Loss of all offsite and all onsite AC power to emergency buses for 15 minutes or longer. MODE: Power Operation, Startup, Hot Standby, Hot Shutdown	SS1	Loss of all offsite and all onsite AC power to emergency buses for 15 minutes or longer MODE: 1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 - Hot Shutdown	None

NEI Ex. EAL #	NEI Example EAL Wording	WCGS EAL #	WCGS EAL Wording	Difference/Deviation Justification
1	Loss of ALL offsite and ALL onsite AC power to (site-specific emergency buses) for 15 minutes or longer.	SS1.1	Loss of all offsite and all onsite AC power capability to emergency 4.16KV buses NB01 and NB02 for ≥ 15 min. (Note 1)	4.16KV buses NB01 and NB02 are the site-specific emergency buses.
Note	The Emergency Director should declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.	N/A	Note 1: The Emergency Manager should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.	The classification timeliness note has been standardized across the WCGS EAL scheme by referencing the "time limit" specified within the EAL wording.

NEI IC#	NEI IC Wording	WCGS IC#(s)	WCGS IC Wording	Difference/Deviation Justification
SS5	Inability to shutdown the reactor causing a challenge to (core cooling [PWR] / RWC water level [BWR]) or RCS heat removal. MODE: Power Operation	SS6	Inability to shut down the reactor causing a challenge to core cooling or RCS heat removal MODE: 1 - Power Operation	None

NEI Ex. EAL #	NEI Example EAL Wording	WCGS EAL #	WCGS EAL Wording	Difference/Deviation Justification
1	<p>a. An automatic or manual (trip [PWR] / scram [BWR]) did not shutdown the reactor.</p> <p>AND</p> <p>b. All manual actions to shutdown the reactor have been unsuccessful.</p> <p>AND</p> <p>c. EITHER of the following conditions exist:</p> <ul style="list-style-type: none"> • (Site-specific indication of an inability to adequately remove heat from the core) • (Site-specific indication of an inability to adequately remove heat from the RCS) 	SS6.1	<p>An automatic or manual trip fails to shut down the reactor as indicated by reactor power $\geq 5\%$</p> <p>AND</p> <p>All actions to shut down the reactor are not successful as indicated by reactor power $\geq 5\%$</p> <p>AND EITHER:</p> <ul style="list-style-type: none"> • CSFST Core Cooling RED Path conditions met • CSFST Heat Sink RED Path conditions met 	<p>As specified in the generic developers guidance "Developers may include site-specific EOP criteria indicative of a successful reactor shutdown in an EAL statement, the Basis or both (e.g., a reactor power level)." Reactor power < 5% is the site-specific indication of a successful reactor trip.</p> <p>Indication that core cooling is extremely challenged is manifested by CSFST Core Cooling RED Path conditions met.</p> <p>Indication that heat removal is extremely challenged is manifested by CSFST Heat Sink RED Path conditions met.</p>

NEI IC#	NEI IC Wording	WCGS IC#(s)	WCGS IC Wording	Difference/Deviation Justification
SS8	Loss of all Vital DC power for 15 minutes or longer. MODE: Power Operation, Startup, Hot Standby, Hot Shutdown	SS2	Loss of all vital DC power for 15 minutes or longer. MODE: 1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 - Hot Shutdown	None

NEI Ex. EAL #	NEI Example EAL Wording	WCGS EAL #	WCGS EAL Wording	Difference/Deviation Justification
1	Indicated voltage is less than (site-specific bus voltage value) on ALL (site-specific Vital DC busses) for 15 minutes or longer.	SS2.1	Loss of all 125 VDC power based on battery bus voltage indications < 105 VDC on all vital DC buses NK01, NK03 (Division 1) and NK02, NK04 (Division 2) for ≥ 15 min. (Note 1)	105 VDC is the site-specific minimum vital DC bus voltage. DC buses NK01, NK03 (Division 1) and NK02, NK04 (Division 2) are the site-specific vital DC buses.
Note	The Emergency Director should declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.	N/A	Note 1: The Emergency Manager should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.	The classification timeliness note has been standardized across the WCGS EAL scheme by referencing the "time limit" specified within the EAL wording.

NEI IC#	NEI IC Wording	WCGS IC#(s)	WCGS IC Wording	Difference/Deviation Justification
SG1	Prolonged loss of all offsite and all onsite AC power to emergency buses. MODE: Power Operation, Startup, Hot Standby, Hot Shutdown	SG1a	Prolonged loss of all offsite and all onsite AC power to emergency buses MODE: 1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 - Hot Shutdown	None

NEI Ex. EAL #	NEI Example EAL Wording	WCGS EAL #	WCGS EAL Wording	Difference/Deviation Justification
1	a. Loss of ALL offsite and ALL onsite AC power to (site-specific emergency buses). AND b. EITHER of the following: <ul style="list-style-type: none"> Restoration of at least one AC emergency bus in less than (site-specific hours) is not likely. (Site-specific indication of an inability to adequately remove heat from the core) 	SG1.1	Loss of all offsite and all onsite AC power capability to emergency 4.16KV buses NB01 and NB02 AND EITHER: <ul style="list-style-type: none"> Restoration of at least one emergency bus in < 4 hours is not likely (Note 1) CSFST Core Cooling RED Path conditions met 	4.16KV buses NB01 and NB02 are the site-specific emergency buses. 4 hours is the site-specific SBO coping analysis time. CSFST Core Cooling RED Path conditions met indicates significant core exit superheating and core uncover.
Note	The Emergency Director should declare the General Emergency promptly upon determining that (site-specific hours) has been exceeded, or will likely be exceeded.	N/A	Note 1: The Emergency Manager should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.	The classification timeliness note has been standardized across the WCGS EAL scheme by referencing the "time limit" specified within the EAL wording.

NEI IC#	NEI IC Wording	WCGS IC#(s)	WCGS IC Wording	Difference/Deviation Justification
SG8	<p>Loss of all AC and Vital DC power sources for 15 minutes or longer.</p> <p>MODE: Power Operation, Startup, Hot Standby, Hot Shutdown</p>	SG1b	<p>Loss of all AC and vital DC power sources for 15 minutes or longer</p> <p>MODE: 1 - Power Operation, 2 - Startup, 3 - Hot Standby, 4 - Hot Shutdown</p>	None

NEI Ex. EAL #	NEI Example EAL Wording	WCGS EAL #	WCGS EAL Wording	Difference/Deviation Justification
1	<p>a. Loss of ALL offsite and ALL onsite AC power to (site-specific emergency buses) for 15 minutes or longer.</p> <p>AND</p> <p>b. Indicated voltage is less than (site-specific bus voltage value) on ALL (site-specific Vital DC busses) for 15 minutes or longer.</p>	SG1.2	<p>Loss of all offsite and all onsite AC power capability to emergency 4.16KV buses NB01 and NB02 for ≥ 15 min.</p> <p>AND</p> <p>Loss of all 125 VDC power based on battery bus voltage indications < 105 VDC on all vital DC buses NK01, NK03 (Division 1) and NK02, NK04 (Division 2) for ≥ 15 min. (Note 1)</p>	<p>4.16KV buses NB01 and NB02 are the site-specific emergency buses.</p> <p>105 VDC is the site-specific minimum vital DC bus voltage.</p> <p>NK01, NK03 (Division 1) and NK02, NK04 (Division 2) are the site-specific vital DC buses.</p>
Note	The Emergency Director should declare the Unusual Event promptly upon determining that 15 minutes has been exceeded, or will likely be exceeded.	N/A	Note 1: The Emergency Manager should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded.	The classification timeliness note has been standardized across the WCGS EAL scheme by referencing the "time limit" specified within the EAL wording.

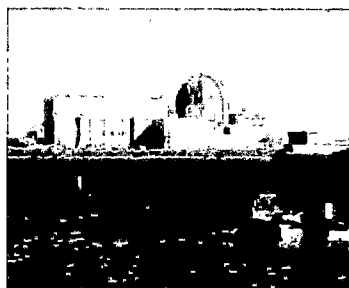
Enclosure IV

**Wolf Creek Nuclear Operating Corporation
EP-CALC-WCNOC-1601
Revision 0**

**“Radiological Effluent EAL Values”
(23 Pages)**



**Wolf Creek Nuclear
Operating Corporation**



Wolf Creek Nuclear Operating Corporation (WCNOC)

Radiological Effluent EAL Values

**EP-CALC-WCNOC-1601
REVISION 0**

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1. PURPOSE

The Wolf Creek Nuclear Operating Corporation (WCNOC) Emergency Action Level (EAL) Technical Bases Manual contains background information, event declaration thresholds, bases and references for the EAL and Fission Product Barrier (FPB) values used to implement the Nuclear Energy Institute (NEI) 99-01 Rev. 6 EAL guidance. This calculation document provides additional technical detail specific to the derivation of the gaseous and liquid radiological effluent EAL values developed in accordance with the guidance in NEI 99-01 Rev. 6.

Documentation of the assumptions, calculations and results are provided for the WCNOC Rx1 series EAL effluent monitor values associated the NEI 99-01 Rev 6 EALs listed below.

- | | |
|--------------------------------------|-----------------|
| • NEI EAL AU1.1 (gaseous and liquid) | RU1.1 for WCNOC |
| • NEI EAL AA1.1 (gaseous and liquid) | RA1.1 for WCNOC |
| • NEI EAL AS1.1 (gaseous) | RS1.1 for WCNOC |
| • NEI EAL AG1.1 (gaseous) | RG1.1 for WCNOC |

2. DEVELOPMENT METHODS AND BASES**2.1. Threshold Limits****2.1.1. RU1.1 Liquid Threshold Limits****Guidance Criteria**

The RU1 Initiating Condition (IC) addresses a release of gaseous or liquid radioactivity greater than 2 times the Offsite Dose Calculation Manual (ODCM) limits for 60 minutes or longer.

WCNOC Bases

AP 07B-003 Attachment A Section 2.1 states that the concentration of radioactive material released in liquid effluents from the site to unrestricted areas shall be limited as follows:

- 10 times the limit specified in 10 CFR Part 20, Appendix B, Table 2, Column 2, for radionuclides other than dissolved or entrained noble gases
- 2.0E-04 $\mu\text{Ci/ml}$ total activity for dissolved and entrained noble gases

The site specific RU1.1 liquid effluent EAL threshold values will equate to 2 times the ODCM limit.

2.1.2. RU1.1 Gaseous Threshold Limits

Guidance Criteria

The RU1 Initiating Condition (IC) addresses a release of gaseous or liquid radioactivity greater than 2 times the Offsite Dose Calculation Manual limits for 60 minutes or longer.

WCNOC Bases

AP 07B-003 Attachment A Section 3.1 states that the dose rate due to radioactive materials released in gaseous effluents from the site to areas at or beyond the site boundary shall be limited to the following:

- Less than or equal to 500 mrem/yr to the whole body (Noble Gasses)
- Less than or equal to 3000 mrem/yr to the skin (Noble Gasses)
- Less than or equal to 1500 mrem/yr to any organ (I-131, I-133, tritium, and particulate with half-lives greater than 8 days)

The inhalation (internal organ) ODCM dose limit is not applicable for the Unusual Event EAL threshold since; (1) individual uptake dose assessment is highly variable and requires real time representative samples, and (2) a predominant Noble Gas source term (no core damage) is assumed for the unusual event accident level.

The site specific RU1.1 gaseous effluent EAL threshold values will equate to 2 times the ODCM limit for the lesser of the whole body or skin exposure pathways.

2.1.3. RA1.1 Liquid Threshold Limits

Guidance Criteria

The RA1 Initiating Condition (IC) addresses a release of radioactivity resulting in offsite dose greater than 10 mrem TEDE or 50 mrem thyroid CDE.

This is based on values at 1% of the EPA Protective Action Guides (PAGs).

Per NEI 99-01, the effluent monitor readings should correspond to the above dose limits at the "site-specific dose receptor point" (consistent with the calculation methods employed) for one hour of exposure.

WCNOC Bases

Liquid effluent limits are based on water concentration values given in 10 CFR 20 Appendix B Table 2 Column 2 (see Section 2.1.1 above). Those values are equivalent to the radionuclide concentrations which, if ingested continuously over the course of a year, would produce a total effective dose equivalent of 0.05 rem (50 millirem). The EPA PAGs are based on a TEDE dose from atmospheric immersion, inhalation and ground deposition. The 10 CFR 20 limits and the EPA limits do not represent the same type of exposure and thus cannot be compared on a one to one basis.

Thus, the site specific EALs will not contain an RA1.1 liquid effluent monitor threshold value that equates to 1% of the EPA PAG. However, EALs RA1.3 and RA1.4 will remain applicable for liquid effluent releases that exceed the threshold based upon sample and field survey results.

2.1.4. RA1.1 Gaseous Threshold Limits

Guidance Criteria

The RA1 IC addresses a release of radioactivity resulting in offsite dose greater than 10 mrem TEDE or 50 mrem thyroid CDE.

Per NEI 99-01, the effluent monitor readings are based on values at 1% of the EPA Protective Action Guides (PAGs) at the "site-specific dose receptor point" (consistent with the calculation methods employed) for one hour of exposure.

WCNOC Bases

The gaseous effluent limits for RA1.1 are based on values that equate to an offsite dose greater than 10 mrem TEDE or 50 mrem CDE thyroid, which are 1% of the EPA PAGs.

2.1.5. RS1.1 Gaseous Threshold Limits

Guidance Criteria

The RS1 IC addresses a release of radioactivity resulting in offsite dose greater than 100 mrem TEDE or 500 mrem thyroid CDE.

This is based on values at 10% of the EPA Protective Action Guides (PAGs) at the "site-specific dose receptor point" (consistent with the calculation methods employed) for one hour of exposure.

WCNOC Bases

The gaseous effluent limits for RS1.1 are based on values that equate to an offsite dose greater than 100 mrem TEDE or 500 mrem CDE thyroid, which are 10% of the EPA PAGs.

2.1.6. RG1.1 Gaseous Threshold Limits

Guidance Criteria

The RG1 IC addresses a release of radioactivity resulting in offsite dose greater than 1,000 mrem TEDE or 5,000 mrem thyroid CDE.

This is based on values at 100% of the EPA Protective Action Guides (PAGs) at the "site-specific dose receptor point" (consistent with the calculation methods employed) for one hour of exposure.

WCNOC Bases

The gaseous effluent limits for RG1.1 are based on values that equate to an offsite dose greater than 1,000 mrem TEDE or 5,000 mrem CDE thyroid, which are 100% of the EPA PAGs.

2.2. Effluent Release Points

Note – All effluent release points assume a background reading of zero to conservatively account for all modes of operation applicable to the EALs.

2.2.1. Liquid Release Points

Guidance Criteria

Per NEI 99-01, the RU1 IC addresses normally occurring continuous radioactivity releases from monitored gaseous or liquid effluent pathways (NEI AU1 EAL #1) and planned batch releases from non-continuous release pathways (NEI AU1 EAL #2).

Per NEI 99-01, the RA1 IC includes events or conditions involving a radiological release, whether gaseous or liquid, monitored or un-monitored. Classification based on effluent monitor readings assumes that a release path to the environment is established. If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is no longer valid for classification purposes.

The “site-specific monitor list and threshold values” should be determined with consideration of the selection of the appropriate installed gaseous and liquid effluent monitors.

WCNOC Bases

There are three monitors associated with continuous liquid releases that discharge to the environment at WCNOC (ODCM Appendix A Section 2.4.4.1)

<u>Monitor ID</u>	<u>Description</u>
0-BM-RE-52	Steam Generator Blowdown Discharge Monitor
0-LE-RE-59	Turbine Building Drain Monitor
0-HF-RE-95	Waste Water Treatment System Influent Monitor

There are two monitors associated with batch liquid releases that discharge to the environment at WCNOC (ODCM Appendix A Section 2.4.4.2)

<u>Monitor ID</u>	<u>Description</u>
0-HB-RE-18	Liquid Radwaste Discharge Monitor
0-HF-RE-45	Secondary Liquid Waste System Monitor

2.2.2. Gaseous Release Points

Guidance Criteria

Per NEI 99-01, the RU1 IC addresses normally occurring continuous radioactivity releases from monitored gaseous or liquid effluent pathways (EAL #1) and planned batch releases from non-continuous release pathways (EAL #2).

Per NEI 99-01, the RA1 IC includes events or conditions involving a radiological release, whether gaseous or liquid, monitored or un-monitored. Classification based on effluent monitor readings assumes that a release path to the environment is established. If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is no longer valid for classification purposes.

Per NEI 99-01, the RS1 and RG1 ICs address monitored and un-monitored releases of gaseous radioactivity. Classification based on effluent monitor readings assumes that a release path to the environment is established. If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is no longer valid for classification purposes.

The "site-specific monitor list and threshold values" should include the effluent monitors described in emergency plan and emergency dose assessment procedures.

WCNOC Bases

Gaseous effluent releases from the Unit Vent and Radwaste Building Vent are monitored continuously. The Unit Vent is the release point for the Fuel/Auxiliary Building, access control area, containment purge, and condenser air discharge. The Radwaste Building Vent is the release point for Waste Gas Decay Tanks and the Radwaste Building Ventilation System.

Waste Gas Decay Tank releases and Containment Building releases are treated as batch releases. Containment Building releases (purges) are monitored by the Plant Unit Vent Monitor. Waste Gas Decay Tank releases are monitored by the Radwaste Building Exhaust Monitor.

<u>Monitor ID</u>	<u>Description</u>
O-GT-RE-21 A/B	Unit Vent
O-GH-RE-10 A/B	Radwaste Building Vent

2.3. Source Term

2.3.1. RU1.1 Liquid Source Term

Guidance Criteria

NEI 99-01 does not provide source term guidance for the RU1.1 EAL liquid source term assumptions.

WCNOC Bases

Per ODCM Attachment A Section 2.4.4.1, monitor setpoints for liquid effluent pathways will be conservatively based on I-131, which the most restrictive isotope expected to be present.

The 10 CFR 20 Appendix B Table 2 Column 2 I-131 limit is 1E-6 µCi/ml.

2.3.2. RU1.1 Gaseous Source Term

Guidance Criteria

NEI 99-01 does not provide source term guidance for the RU1.1 gaseous source term assumptions.

WCNOC Bases

ODCM setpoints for gaseous monitors are based on the source activity taken from USAR Table 11.1-1 (as referenced from ODCM Attachment A Section 3.4.4.2.1).

2.3.3. RA1.1, RS1.1 and RG1.1 Gaseous Source Terms

Guidance Criteria

NEI 99-01 specifies that the calculation of monitor readings will require use of an assumed release isotopic mix; the selected mix should be the same for ICs AA1, AS1 and AG1.

WCNOC Bases

The source term utilized for the Unit and Radwaste vent EAL thresholds is provided by the Emergency Dose Calculation Program (EDCP) dose model with the following settings:

- LOCA event with clad damage
- Containment spray on
- Iodine filtration on
- Particulate filtration on

A zero (0) time after shutdown (TAS) was chosen for the source decay period based on the assumption that the event, trip and release occur simultaneously.

2.4. Release Duration

Guidance Criteria

Per NEI 99-01, the effluent monitor readings for RA1.1, RS1.1 and RG1.1 gaseous EAL threshold values should correspond to a dose at the "site-specific dose receptor point" (consistent with the calculation methods employed) for one hour of exposure.

WCNOC Bases

The effluent monitor readings for RA1.1, RS1.1 and RG1.1 gaseous EAL threshold values are calculated for a release duration of one hour.

2.5. Meteorological Inputs

Guidance Criteria

The effluent monitor readings should correspond to the applicable dose limit at the "site-specific dose receptor point." The "site-specific dose receptor point" is the distance(s) and/or locations used by the licensee to distinguish between on-site and offsite doses. The selected distance(s) and/or locations should reflect the content of the emergency plan, and the procedural methods used to determine offsite doses and protective action recommendations. This is typically the boundary of the Owner Controlled Area.

Monitor readings will be calculated using a set of assumed meteorological data or atmospheric dispersion factors; the data or factors selected for use should be the same for ICs AA1, AS1 and AG1.

WCNOC Bases

The site specific meteorology used for selections and inputs in the EDCP dose assessment model is based upon the USAR as documented below.

2.5.1. Limiting Site Boundary Direction

The WCNOC site boundary is equivalent to the Exclusion areas boundary described in USAR Section 2.1.2.1. It is a 1,200 meter radius circle centered on the reactor. Thus, there is no limiting site boundary direction that would result in a more limiting X/Q dispersion value. A wind direction from 180° is utilized for the EDCP dose assessment cases.

2.5.2. Stability

The predominant stability class based on annual percent occurrence is Class D from the total % occurrences given in USAR Section 2.3.2.1.5.

2.5.3. Wind Speed

The mean wind speed for a D stability class is 13.1 knots (15 mph) given in USAR Section 2.3.2.1.5.

2.5.4. Dispersion Inputs

Note - All releases from the plant are considered as ground releases (USAR Section 2.3.5.1.2.1).

RU1.1 site boundary atmospheric dispersion X/Q value of $2.2E-06 \text{ sec/m}^3$ is obtained from ODCM Attachment A Section 3.1.2.

RA1.1, RS1.1 and RG1.1 site boundary atmospheric dispersion X/Q values were developed from the EDCP dose assessment model using the USAR mean wind speed and most predominant stability as inputs.

2.5.5. Other Parameters

No precipitation is assumed to occur for the duration of the release and plume transport throughout the EPZ.

3. DESIGN INPUTS

3.1. General Constants and Conversion Factors

3.1.1. 10^6 μCi per Ci

3.2. Liquid Effluent

3.2.1. Liquid Effluent Monitor Ranges (UFSAR Table 11.5-2)

- 1) Steam Generator Blowdown Discharge Monitor (0-BM-RE-52)..... $1\text{E-}7$ to $1\text{E-}2$ $\mu\text{Ci/cc}$
- 2) Turbine Building Drain Monitor (0-LE-RE-59)..... $1\text{E-}7$ to $1\text{E-}2$ $\mu\text{Ci/cc}$
- 3) Waste Water Treatment System Influent Monitor (0-HF-RE-95) ... $1\text{E-}7$ to $1\text{E-}2$ $\mu\text{Ci/cc}$
- 4) Liquid Radwaste Discharge Monitor (0-HB-RE-18)..... $1\text{E-}7$ to $1\text{E-}2$ $\mu\text{Ci/cc}$
- 5) Secondary Liquid Waste System Monitor (0-HF-RE-45) $1\text{E-}7$ to $1\text{E-}2$ $\mu\text{Ci/cc}$

3.2.2. Liquid Effluent Dilution Flow (F)

Normal Situations

Note – a single circ pump is assumed for dilution on the applicable discharge points.

- 1) Turbine Building Sump (AI 07B-019 6.2.15.2)..... 0 gpm
- 2) All Other Liquid Discharge Points (AI 07B-019 6.2.15.1)..... $1.24\text{E}+5$ gpm

3.2.3. Liquid Effluent Source Flow (f)

- 1) SG Blowdown (AI 07B-036 Section 6.1.5) 360 gpm
- 2) Turbine Building Drain (AI 07B-036 Section 6.1.5)..... 500 gpm
- 3) Waste Water Treatment System (AI 07B-036 Section 6.1.5) 1,200 gpm
- 4) Liquid Radwaste Discharge (AI 07B-036 Section 6.1.5)..... 100 gpm
- 5) Secondary Liquid Waste System (AI 07B-036 Section 6.1.5)..... 200 gpm

3.2.4. Source Term Limit (C_i)

- 10 CFR 20 Appendix B, Table 2, Column 2 I-131 Limit..... $1\text{E-}6$ $\mu\text{Ci/ml}$
- ODCM I-131 Limit..... $1\text{E-}5$ $\mu\text{Ci/ml}$

3.3. Gaseous Effluent

3.3.1. Vent Flow (USAR Table 11.5-4)

- 1) Unit Vent..... 66,000 cfm
- 2) Radwaste Building Vent..... 12,000 cfm

3.3.2. Gaseous Effluent Monitor Ranges (UFSAR Table 11.5-2)

- 1) Unit Vent (O-GT-RE-21B)..... 1E-7 to 1E+5 $\mu\text{Ci/cc}$
- 2) Radwaste Building Vent (O-GH-RE-10B)..... 1E-7 to 1E+5 $\mu\text{Ci/cc}$

3.3.3. RU1.1 Dispersion Factor (X/Q)

Dispersion Factor (ODCM Attachment A Section 3.1.2)2.2E-06 sec/m^3

3.3.4. RU1.1 Source Term Fraction (S_i)

Source activity taken from USAR Table 11.1-1 (as referenced from ODCM Attachment A Section 3.4.4.2.1).

	RCS Activity ($\mu\text{Ci/g}$)	Source Term Fraction - S_i
Kr-83m	6.93E-02	1.69E-03
Kr-85m	2.83E-01	6.89E-03
Kr-85	1.18E+00	2.87E-02
Kr-87	1.84E-01	4.48E-03
Kr-88	5.33E-01	1.30E-02
Kr-89	1.51E-02	3.67E-04
Xe-131m	4.26E-01	1.04E-02
Xe-133m	6.71E-01	1.63E-02
Xe-133	3.63E+01	8.83E-01
Xe-135m	7.55E-02	1.84E-03
Xe-135	1.23E+00	2.99E-02
Xe-137	2.80E-02	6.81E-04
Xe-138	1.02E-01	2.48E-03
	4.11E+01	1.00E+00

3.3.5. ODCM Dose Factors (ODCM Attachment A Table A.1-2)

	Total Body DF Ki (mrem/yr per $\mu\text{Ci}/\text{m}^3$)	Skin Beta DF Li (mrem/yr per $\mu\text{Ci}/\text{m}^3$)	Gamma Air DF Mi (mrad/yr per $\mu\text{Ci}/\text{m}^3$)
Kr-83m	7.56E-02	0.00E+00	1.93E+01
Kr-85m	1.17E+03	1.46E+03	1.23E+03
Kr-85	1.61E+01	1.34E+03	1.72E+01
Kr-87	5.92E+03	9.73E+03	6.17E+03
Kr-88	1.47E+04	2.37E+03	1.52E+04
Kr-89	1.66E+04	1.01E+04	1.73E+04
Xe-131m	9.15E+01	4.76E+02	1.56E+02
Xe-133m	2.51E+02	9.94E+02	3.27E+02
Xe-133	2.94E+02	3.06E+02	3.53E+02
Xe-135m	3.12E+03	7.11E+02	3.36E+03
Xe-135	1.81E+03	1.86E+03	1.92E+03
Xe-137	1.42E+03	1.22E+04	1.51E+03
Xe-138	8.83E+03	4.13E+03	9.21E+03

4. CALCULATIONS

4.1. RU1.1 Liquid Release

4.1.1. ODCM Liquid Release Limit (ODCM Appendix A Section 2.4.4.1)

$$S(\mu\text{Ci}/\text{ml}) = ECL_{I-131} \frac{F(\text{gpm}) + f(\text{gpm})}{f(\text{gpm})} \times AF \times SF$$

Where:

S	radiation monitor setpoint ($\mu\text{Ci}/\text{ml}$)
ECL_{I-131}	effluent concentration limit of I-131, ($\mu\text{Ci}/\text{ml}$)
F	dilution flow (gpm)
f	effluent (waste water) flow rate (gpm)
AF	allocation fraction (Not used for EAL calculations)
SF	safety factor (Not used for EAL calculations)

4.1.2. RU1.1 Liquid Release EAL Threshold

RU1.1 liquid is two times the calculated ODCM limit setpoint.

See Attachment 1 for the spreadsheet calculations that develop the RU1.1 liquid effluent EAL threshold values for each applicable monitor.

4.2. RU1.1 Gaseous Release

4.2.1. ODCM Gaseous Total Body Dose Limit (ODCM Appendix A Section 3.4.4.1.1)

$$S_{tb} = \frac{500 \times AF \times SF}{X/Q_{RP} \times \sum(S_i \times K_i)}$$

Where:

S_{tb}	total body setpoint for the given ODCM limit (μCi/sec)
500	ODCM whole body limit (mrem/yr)
AF	allocation fraction (not used for EAL calculations)
SF	safety factor (not used for EAL calculations)
X/Q_{RP}	highest annual average dispersion factor for the release point (sec/m ³)
S_i	activity released (fraction – unit less)
K_i	total body dose correction factor (mrem/yr per μCi/m ³)

4.2.2. ODCM Gaseous Skin Dose Limit (ODCM Appendix A Section 3.4.4.1.2)

$$S_{skin} = \frac{3000 \times AF \times SF}{X/Q_{RP} \times \sum(S_i \times (L_i + 1.1M_i))}$$

Where:

S_{skin}	skin setpoint for the given ODCM limit (μCi/sec)
3000	ODCM skin limit (mrem/yr)
AF	allocation fraction (not used for EAL calculations)
SF	safety factor (not used for EAL calculations)
X/Q_{RP}	highest annual average dispersion factor for the release point (sec/m ³)
S_i	activity released (fraction – unit less)
L_i + 1.1M_i	skin dose correction factor (mrem/yr per μCi/m ³)

4.2.3. RU1.1 Gaseous Release EAL Threshold

RU1.1 gaseous is two times the lesser of the calculated total body or skin ODCM limit setpoint.

See Attachment 2 for the spreadsheet calculations that develop the RU1.1 gaseous effluent EAL threshold values for each applicable monitor.

4.3. RA1.1, RS1.1 and RG1.1 Gaseous Release

The RA1.1, RS1.1 and RG1.1 gaseous release EAL thresholds are developed using the site specific EDCP dose assessment model with the inputs described in Sections 2.3.3, 2.5 and 3.3.

Refer to Attachment 3 for the results of the EDCP gaseous effluent EAL threshold calculations.

5. **CONCLUSIONS**

	Release Point	Monitor	GE	SAE	Alert	UE
Gaseous	Unit Vent (EFF)	O-GT-RE-21B	4.45E+8 ($\mu\text{Ci/sec}$)	4.45E+7 ($\mu\text{Ci/sec}$)	4.45E+6 ($\mu\text{Ci/sec}$)	7.85E+5 ($\mu\text{Ci/sec}$)
	Radwaste Vent (EFF)	O-GH-RE-10B	4.45E+8 ($\mu\text{Ci/sec}$)	4.45E+7 ($\mu\text{Ci/sec}$)	4.45E+6 ($\mu\text{Ci/sec}$)	7.85E+5 ($\mu\text{Ci/sec}$)
Liquid Release	Steam Generator Blowdown Discharge Monitor	0-BM-RE-52	N/A	N/A	N/A	6.91E-3 ($\mu\text{Ci/ml}$)
	Turbine Building Drain Monitor	0-LE-RE-59	N/A	N/A	N/A	2.00E-5 ($\mu\text{Ci/ml}$)
	Waste Water Treatment System Influent Monitor	0-HF-RE-95	N/A	N/A	N/A	2.09E-3 ($\mu\text{Ci/ml}$)
	Liquid Radwaste Discharge Monitor	0-HB-RE-18	N/A	N/A	N/A	1.00E-2 ($\mu\text{Ci/ml}$)
	Secondary Liquid Waste System Monitor	0-HF-RE-45	N/A	N/A	N/A	1.00E-2 ($\mu\text{Ci/ml}$)

Currently, the highest procedural alarm setpoint for the Unit Vent is $3.15\text{E}+5 \mu\text{Ci/sec}$ (AI 07B-026 Section 6.6.6). The UE threshold for the Unit Vent is sufficiently above the highest alarm setpoint for that monitor.

Currently, the highest procedural alarm setpoint for the Radwaste Vent is $6.23\text{E}+4 \mu\text{Ci/sec}$ (AI 07B-026 Section 6.6.6). The UE threshold for the Radwaste Vent is sufficiently above the highest alarm setpoint for that monitor.

Currently, the highest procedural alarm setpoint for the Steam Generator Blowdown Discharge Monitor is $8.64\text{E}-4 \mu\text{Ci/ml}$ based on the ECL for I-131 and an allocation factor of 0.25 (AI 07B-036 Section 6.1.17). The UE threshold for the Steam Generator Blowdown Discharge Monitor is sufficiently above the highest alarm setpoint for that monitor.

Currently, the highest procedural alarm setpoint for the Turbine Building Drain Monitor is $1.00\text{E}-5 \mu\text{Ci/ml}$ based on the ECL for I-131 (AI 07B-036 Section 6.1.17). The UE threshold for the Turbine Building Drain Monitor is sufficiently above the highest alarm setpoint for that monitor.

Currently, the highest procedural alarm setpoint for the Waste Water Treatment System Influent Monitor is $2.61\text{E}-4 \mu\text{Ci/ml}$ based on the ECL for I-131 and an allocation factor of 0.25 (AI 07B-036 Section 6.1.17). The UE threshold for the Waste Water Treatment System Influent Monitor is sufficiently above the highest alarm setpoint for that monitor.

Currently, the highest procedural alarm setpoint for the Liquid Radwaste Discharge and the Secondary Liquid Waste System monitors is $1.0\text{E-}2 \mu\text{Ci/ml}$ (AI 07B-019 Section 6.4.1.6.f.2.c). The UE threshold for the Liquid Radwaste Discharge and the Secondary Liquid Waste System monitors are lowered to the maximum readable value to ensure the ability to identify the threshold is established.

6. REFERENCES

- 6.1. 10 CFR Part 20, Appendix B, Table 2, Column 2
- 6.2. NEI 99-01 R6, Methodology for Development of Emergency Action Levels, November 2012
- 6.3. AP 07B-003, Offsite Dose Calculation Manual, Revision 8
- 6.4. AP 07B-004, Offsite Dose Calculation Manual (Radiological Environmental Monitoring Program), Revision 21
- 6.5. AI 07B-019, Instructions For Liquid Release Permits, Revision 20
- 6.6. AI 07B-026, Instructions for Unit Vent and Radwaste Vent Permits, Revision 12
- 6.7. AI 07B-036, Liquid Release Permits Using RADEAS, Revision 2
- 6.8. Wolf Creek Final Safety Analysis Report (USAR)
 - Chapter 2.0, Site Characteristics
 - Table 11.1-1, Reactor Coolant and Secondary Coolant Specific Activities - 0.125% Fuel Defects
 - Table 11.5-2, Liquid Effluent Radioactivity Monitors
 - Table 11.5-4, Airborne Effluent Radioactivity Monitors

Monitor	Dilution Flow - F (gpm)	Effluent Flow - f (gpm)	Monitor Reading at Limit ($\mu\text{Ci/ml}$)	RU1.1 EAL Threshold Value ($\mu\text{Ci/ml}$)
0-BM-RE-52	1.24E+05	360	3.45E-03	6.91E-03
0-LE-RE-59	0.00E+00	500	1.00E-05	2.00E-05
0-HF-RE-95	1.24E+05	1200	1.04E-03	2.09E-03
0-HB-RE-18	1.24E+05	100	1.24E-02	2.48E-02
0-HF-RE-45	1.24E+05	200	6.21E-03	1.24E-02

I-131 10 CFR 20 Limit ($\mu\text{Ci/ml}$):

1.00E-06

I-131 ODCM Limit - ECL ($\mu\text{Ci/ml}$):

1.00E-05

	Total Body Dose Factor - Ki (mRem/yr per $\mu\text{Ci}/\text{m}^3$)	Skin Beta Dose Factor - Li (mRem/yr per $\mu\text{Ci}/\text{m}^3$)	Gamma Air Dose Factor - Mi (mRad/yr per $\mu\text{Ci}/\text{m}^3$)	Source Term Fraction - Si	Si x Ki (mRem/yr)	Si x (Li + 1.1Mi) (mRem/yr)
Kr-83m	7.56E-02	0.00E+00	1.93E+01	1.69E-03	1.27E-04	3.58E-02
Kr-85m	1.17E+03	1.46E+03	1.23E+03	6.89E-03	8.06E+00	1.94E+01
Kr-85	1.61E+01	1.34E+03	1.72E+01	2.87E-02	4.62E-01	3.90E+01
Kr-87	5.92E+03	9.73E+03	6.17E+03	4.48E-03	2.65E+01	7.40E+01
Kr-88	1.47E+04	2.37E+03	1.52E+04	1.30E-02	1.91E+02	2.48E+02
Kr-89	1.66E+04	1.01E+04	1.73E+04	3.67E-04	6.10E+00	1.07E+01
Xe-131m	9.15E+01	4.76E+02	1.56E+02	1.04E-02	9.48E-01	6.71E+00
Xe-133m	2.51E+02	9.94E+02	3.27E+02	1.63E-02	4.10E+00	2.21E+01
Xe-133	2.94E+02	3.06E+02	3.53E+02	8.83E-01	2.60E+02	6.13E+02
Xe-135m	3.12E+03	7.11E+02	3.36E+03	1.84E-03	5.73E+00	8.10E+00
Xe-135	1.81E+03	1.86E+03	1.92E+03	2.99E-02	5.42E+01	1.19E+02
Xe-137	1.42E+03	1.22E+04	1.51E+03	6.81E-04	9.67E-01	9.44E+00
Xe-138	8.83E+03	4.13E+03	9.21E+03	2.48E-03	2.19E+01	3.54E+01
				1.00E+00	5.79E+02	1.20E+03

Calculation Constants

Total Body Dose Rate Limit (mRem/yr):	500
Skin Dose Rate Limit (mRem/yr):	3000
X/Q (sec/m ³):	2.20E-06
DCF (mRad to mRem):	1.1

Calculation Results

ODCM Limit for Total Body ($\mu\text{Ci}/\text{sec}$):	3.92E+05
ODCM Limit for Skin ($\mu\text{Ci}/\text{sec}$):	1.13E+06
2x ODCM Limit ($\mu\text{Ci}/\text{sec}$):	7.85E+05

O-GT-RE-21B Unit Vent – Alert**EDCP - Version 5.2 - Radiation Monitoring System**

Wind Speed **13** Gaseous Activity (uCi/cc) **1.43E-01**
 Stability Class [A-G] **D** Iodine/Noble Gas Ratio **5.75E-03**
 Wind Direction From **180** to **0** Particulate Activity (uCi/cc) **2.87E-03**
 Projected Release Duration (hrs) **1** Vent Flow (cfm) **6.60E+04**

Time Since RX Trip / RCS Sample (hrs) **0** Start Time of Release:

Remarks:

Performed By _____

Approved By: _____

Verified By _____

Date: _____ Time: _____

Time Calculations Performed:

Thursday, June 23, 2016 12:06:17 PM

Release Rates (Ci/sec): Part: **2.87E-03** Noble Gas: **4.45E+00** Iodine: **2.56E-02**

PAR's Doses

*Warning: PAR's include Summed and Projected Doses.

Evacuate	Projected Centerline Dose Segment Distance	TEDE(REM)	Thy(REM)
*CCL	EAB	1.00E-02	4.32E-02
*JRR	2 MI	2.15E-03	9.25E-03
	5 MI	5.42E-04	2.33E-03
	10 MI	1.95E-04	8.40E-04

*JRR and CCL are recommended for evacuation upon declaration of an SAE or above.

Distance	Dose Rate		Plume Arrival Minutes	Est Hours Until Evacuation is Necessary.
	Dose Rate R/Hr TEDE	Dose Rate R/Hr Thyroid		
EAB	1.95E-02	4.51E-02	3.	22.3
2 MI	4.18E-03	9.65E-03	9.	103.8
5 MI	1.05E-03	2.43E-03	23.	411.1
10 MI	3.79E-04	8.76E-04	46.	1142.

DOSE BY SUBZONE

Doses attributed to subzones, both summed and current segments are considered.

SBZ	TEDE (REM)	Thy Dose (REM)	SBZ	TEDE (REM)	Thy Dose (REM)	SBZ	TEDE (REM)	Thy Dose (REM)
CTR	1.00E-2	4.32E-2	SW1	0.00E+0	0.00E+0	SE2	0.00E+0	0.00E+0
CCL	1.00E-2	4.32E-2	W1	0.00E+0	0.00E+0	SE3	0.00E+0	0.00E+0
JRR	0.00E+0	0.00E+0	NW1	0.00E+0	0.00E+0	SE4	0.00E+0	0.00E+0
N1	1.66E-3	7.17E-3	N2	4.90E-4	2.11E-3	S2	0.00E+0	0.00E+0
NE1	0.00E+0	0.00E+0	NE2	1.85E-5	7.95E-5	SW2	0.00E+0	0.00E+0
E1	0.00E+0	0.00E+0	NE3	0.00E+0	0.00E+0	W2	0.00E+0	0.00E+0
SE1	0.00E+0	0.00E+0	E2	0.00E+0	0.00E+0	NW2	0.00E+0	0.00E+0
S1	0.00E+0	0.00E+0						

Iodine Filtration Status = ON (90%)

Particulate Filtration Status = ON (90%)

Containment Spray Status = ON (75%)

Calculation WorkSheet.dot

O-GT-RE-21B Unit Vent – Site Area Emergency**EDCP - Version 5.2 - Radiation Monitoring System**

Wind Speed 13 Gaseous Activity (uCi/cc) 1.43E+00
 Stability Class [A-G] D Iodine/Noble Gas Ratio 5.75E-03
 Wind Direction From 180 to 0 Particulate Activity (uCi/cc) 2.87E-02
 Projected Release Duration (hrs) 1 Vent Flow (cfm) 6.60E+04

Time Since RX Trip / RCS Sample (hrs) 0 Start Time of Release:
 Remarks:

Performed By _____ Approved By: _____

Verified By _____ Date: _____ Time: _____

Time Calculations Performed: Thursday, June 23, 2016 12:06:01 PM

Release Rates (Ci/sec): Part: 2.87E-02 Noble Gas: 4.45E+01 Iodine: 2.56E-01

PAR's Doses

*Warning: PAR's include Summed and Projected Doses.

Evacuate	Projected Centerline Dose Segment		
	Distance	TEDE(REM)	Thy(REM)
*CCL	EAB	1.00E-01	4.32E-01
*JRR	2 MI	2.15E-02	9.25E-02
	5 MI	5.42E-03	2.33E-02
	10 MI	1.95E-03	8.40E-03

*JRR and CCL are recommended for evacuation upon declaration of an SAE or above.

Distance	Dose Rate R/Hr		Plume Arrival Minutes	Est Hours Until Evacuation is Necessary.
	TEDE	Thyroid		
EAB	1.95E-01	4.51E-01	3.	2.3
2 MI	4.18E-02	9.65E-02	9.	10.5
5 MI	1.05E-02	2.43E-02	23.	41.5
10 MI	3.79E-03	8.76E-03	46.	114.9

DOSE BY SUBZONE

Doses attributed to subzones, both summed and current segments are considered.

SBZ	TEDE (REM)	Thy Dose (REM)	SBZ	TEDE (REM)	Thy Dose (REM)	SBZ	TEDE (REM)	Thy Dose (REM)
CTR	1.00E-1	4.32E-1	SW1	0.00E+0	0.00E+0	SE2	0.00E+0	0.00E+0
CCL	1.00E-1	4.32E-1	W1	0.00E+0	0.00E+0	SE3	0.00E+0	0.00E+0
JRR	0.00E+0	0.00E+0	NW1	0.00E+0	0.00E+0	SE4	0.00E+0	0.00E+0
N1	1.66E-2	7.17E-2	N2	4.90E-3	2.11E-2	S2	0.00E+0	0.00E+0
NE1	0.00E+0	0.00E+0	NE2	1.85E-4	7.95E-4	SW2	0.00E+0	0.00E+0
E1	0.00E+0	0.00E+0	NE3	0.00E+0	0.00E+0	W2	0.00E+0	0.00E+0
SE1	0.00E+0	0.00E+0	E2	0.00E+0	0.00E+0	NW2	9.62E-6	4.14E-5
S1	0.00E+0	0.00E+0						

Iodine Filtration Status = ON (90%)

Particulate Filtration Status = ON (90%)

Containment Spray Status = ON (75%)

Calculation WorkSheet.dot

O-GT-RE-21B Unit Vent – General Emergency**EDCP - Version 5.2 - Radiation Monitoring System**

Wind Speed **13** Gaseous Activity (uCi/cc) **1.43E+01**
 Stability Class [A-G] **D** Iodine/Noble Gas Ratio **5.75E-03**
 Wind Direction From **180** to **0** Particulate Activity (uCi/cc) **2.87E-01**
 Projected Release Duration (hrs) **1** Vent Flow (cfm) **6.60E+04**

Time Since RX Trip / RCS Sample (hrs) **0** Start Time of Release:

Remarks:

Performed By _____

Approved By: _____

Verified By _____

Date: _____ Time: _____

Time Calculations Performed:

Thursday, June 23, 2016 12:05:00 PM

Release Rates (Ci/sec): Part: **2.87E-01** Noble Gas: **4.45E+02** Iodine: **2.56E+00**

PAR's Doses

*Warning: PAR's include Summed and Projected Doses.

	Evacuate	Projected Centerline Dose Segment		
		Distance	TEDE(REM)	Thy(REM)
*CCL		EAB	1.00E+00	4.32E+00
*JRR		2 MI	2.15E-01	9.25E-01
CTR		5 MI	5.42E-02	2.33E-01
		10 MI	1.95E-02	8.40E-02

*JRR and CCL are recommended for evacuation upon declaration of an SAE or above.

Distance	Dose Rate R/Hr		Plume Arrival Minutes	Est Hours Until Evacuation is Necessary.
	TEDE	Thyroid		
EAB	1.95E+00	4.51E+00	3.	0.3
2 MI	4.18E-01	9.65E-01	9.	1.2
5 MI	1.05E-01	2.43E-01	23.	4.5
10 MI	3.79E-02	8.76E-02	46.	12.2

DOSE BY SUBZONE

Doses attributed to subzones, both summed and current segments are considered.

SBZ	TEDE (REM)	Thy Dose (REM)	SBZ	TEDE (REM)	Thy Dose (REM)	SBZ	TEDE (REM)	Thy Dose (REM)
CTR	1.00E+0	4.32E+0	SW1	0.00E+0	0.00E+0	SE2	0.00E+0	0.00E+0
CCL	1.00E+0	4.32E+0	W1	0.00E+0	0.00E+0	SE3	0.00E+0	0.00E+0
JRR	0.00E+0	0.00E+0	NW1	0.00E+0	0.00E+0	SE4	0.00E+0	0.00E+0
N1	1.66E-1	7.17E-1	N2	4.90E-2	2.11E-1	S2	0.00E+0	0.00E+0
NE1	0.00E+0	0.00E+0	NE2	1.85E-3	7.95E-3	SW2	0.00E+0	0.00E+0
E1	0.00E+0	0.00E+0	NE3	0.00E+0	0.00E+0	W2	0.00E+0	0.00E+0
SE1	0.00E+0	0.00E+0	E2	0.00E+0	0.00E+0	NW2	9.62E-5	4.14E-4
S1	0.00E+0	0.00E+0						

Iodine Filtration Status = ON (90%)

Particulate Filtration Status = ON (90%)

Containment Spray Status = ON (75%)

Calculation Worksheet.dot

O-GH-RE-10B Radwaste Vent – Alert**EDCP - Version 5.2 - Radiation Monitoring System**

Wind Speed 13 Gaseous Activity (uCi/cc) 7.85E-01
 Stability Class [A-G] D Iodine/Noble Gas Ratio 5.75E-03
 Wind Direction From 180 to 0 Particulate Activity (uCi/cc) 2.86E-03
 Projected Release Duration (hrs) 1 Vent Flow (cfm) 1.20E+04

Time Since RX Trip / RCS Sample (hrs) 0 Start Time of Release:
 Remarks:

Performed By _____ Approved By: _____

Verified By _____ Date: _____ Time: _____

Time Calculations Performed: Thursday, June 23, 2016 12:08:02 PM

Release Rates (Ci/sec): Part: 2.86E-03 Noble Gas: 4.45E+00 Iodine: 2.56E-02

PAR's Doses

*Warning: PAR's include Summed and Projected Doses.

Evacuate	Projected Centerline Dose Segment		
	Distance	TEDE(REM)	Thy(REM)
*CCL	EAB	1.00E-02	4.31E-02
*JRR	2 MI	2.14E-03	9.23E-03
	5 MI	5.41E-04	2.33E-03
	10 MI	1.95E-04	8.38E-04

*JRR and CCL are recommended for evacuation upon declaration of an SAE or above.

Distance	Dose Rate R/Hr		Plume Arrival Minutes	Est Hours Until Evacuation is Necessary.
	TEDE	Thyroid		
EAB	1.95E-02	4.50E-02	3.	22.3
2 MI	4.17E-03	9.63E-03	9.	104.
5 MI	1.05E-03	2.43E-03	23.	411.9
10 MI	3.78E-04	8.75E-04	46.	1144.2

DOSE BY SUBZONE

Doses attributed to subzones, both summed and current segments are considered.

SBZ	TEDE (REM)	Thy Dose (REM)	SBZ	TEDE (REM)	Thy Dose (REM)	SBZ	TEDE (REM)	Thy Dose (REM)
CTR	1.00E-2	4.31E-2	SW1	0.00E+0	0.00E+0	SE2	0.00E+0	0.00E+0
CCL	1.00E-2	4.31E-2	W1	0.00E+0	0.00E+0	SE3	0.00E+0	0.00E+0
JRR	0.00E+0	0.00E+0	NW1	0.00E+0	0.00E+0	SE4	0.00E+0	0.00E+0
N1	1.66E-3	7.15E-3	N2	4.89E-4	2.10E-3	S2	0.00E+0	0.00E+0
NE1	0.00E+0	0.00E+0	NE2	1.84E-5	7.94E-5	SW2	0.00E+0	0.00E+0
E1	0.00E+0	0.00E+0	NE3	0.00E+0	0.00E+0	W2	0.00E+0	0.00E+0
SE1	0.00E+0	0.00E+0	E2	0.00E+0	0.00E+0	NW2	0.00E+0	0.00E+0
S1	0.00E+0	0.00E+0						

Iodine Filtration Status = ON (90%)

Particulate Filtration Status = ON (90%)

Containment Spray Status = ON (75%)

Calculation WorkSheet.dot

O-GH-RE-10B Radwaste Vent – Site Area Emergency**EDCP - Version 5.2 - Radiation Monitoring System**

Wind Speed **13** Gaseous Activity (uCi/cc) **7.85E+00**
 Stability Class [A-G] **D** Iodine/Noble Gas Ratio **5.75E-03**
 Wind Direction From **180** to **0** Particulate Activity (uCi/cc) **2.86E-02**
 Projected Release Duration (hrs) **1** Vent Flow (cfm) **1.20E+04**

Time Since RX Trip / RCS Sample (hrs) **0** Start Time of Release:

Remarks:

Performed By _____

Approved By: _____

Verified By _____

Date: _____ Time: _____

Time Calculations Performed:

Thursday, June 23, 2016 12:07:48 PM

Release Rates (Ci/sec): Part: **2.86E-02** Noble Gas: **4.45E+01** Iodine: **2.56E-01**

PAR's Doses

*Warning: PAR's include Summed and Projected Doses.

Evacuate	Projected Centerline Dose Segment Distance	TEDE(REM)	Thy(REM)
*CCL	EAB	1.00E-01	4.31E-01
*JRR	2 MI	2.14E-02	9.23E-02
	5 MI	5.41E-03	2.33E-02
	10 MI	1.95E-03	8.38E-03

*JRR and CCL are recommended for evacuation upon declaration of an SAE or above.

Distance	Dose Rate		Plume Arrival Minutes	Est Hours Until Evacuation is Necessary.
	Dose Rate R/Hr TEDE	Dose Rate R/Hr Thyroid		
EAB	1.95E-01	4.50E-01	3.	2.3
2 MI	4.17E-02	9.63E-02	9.	10.5
5 MI	1.05E-02	2.43E-02	23.	41.5
10 MI	3.78E-03	8.75E-03	46.	115.1

DOSE BY SUBZONE

Doses attributed to subzones, both summed and current segments are considered.

SBZ	TEDE (REM)	Thy Dose (REM)	SBZ	TEDE (REM)	Thy Dose (REM)	SBZ	TEDE (REM)	Thy Dose (REM)
CTR	1.00E-1	4.31E-1	SW1	0.00E+0	0.00E+0	SE2	0.00E+0	0.00E+0
CCL	1.00E-1	4.31E-1	W1	0.00E+0	0.00E+0	SE3	0.00E+0	0.00E+0
JRR	0.00E+0	0.00E+0	NW1	0.00E+0	0.00E+0	SE4	0.00E+0	0.00E+0
N1	1.66E-2	7.15E-2	N2	4.89E-3	2.10E-2	S2	0.00E+0	0.00E+0
NE1	0.00E+0	0.00E+0	NE2	1.84E-4	7.94E-4	SW2	0.00E+0	0.00E+0
E1	0.00E+0	0.00E+0	NE3	0.00E+0	0.00E+0	W2	0.00E+0	0.00E+0
SE1	0.00E+0	0.00E+0	E2	0.00E+0	0.00E+0	NW2	9.60E-6	4.13E-5
S1	0.00E+0	0.00E+0						

Iodine Filtration Status = ON (90%)

Particulate Filtration Status = ON (90%)

Containment Spray Status = ON (75%)

Calculation WorkSheet.dot

O-GH-RE-10B Radwaste Vent – General Emergency**EDCP - Version 5.2 - Radiation Monitoring System**

Wind Speed 13 Gaseous Activity (uCi/cc) 7.85E+01
 Stability Class [A-G] D Iodine/Noble Gas Ratio 5.75E-03
 Wind Direction From 180 to 0 Particulate Activity (uCi/cc) 2.86E-01
 Projected Release Duration (hrs) 1 Vent Flow (cfm) 1.20E+04

Time Since RX Trip / RCS Sample (hrs) 0 Start Time of Release:

Remarks:

Performed By _____

Approved By: _____

Verified By _____

Date: _____ Time: _____

Time Calculations Performed:

Thursday, June 23, 2016 12:07:33 PM

Release Rates (Ci/sec): Part: 2.86E-01 Noble Gas: 4.45E+02 Iodine: 2.56E+00

PAR's Doses

*Warning: PAR's include Summed and Projected Doses.

Evacuate	Projected Centerline Dose Segment		
	Distance	TEDE(REM)	Thy(REM)
*CCL	EAB	1.00E+00	4.31E+00
*JRR	2 MI	2.14E-01	9.23E-01
CTR	5 MI	5.41E-02	2.33E-01
	10 MI	1.95E-02	8.38E-02

*JRR and CCL are recommended for evacuation upon declaration of an SAE or above.

Distance	Dose Rate R/Hr		Plume Arrival Minutes	Est Hours Until Evacuation is Necessary.
	TEDE	Thyroid		
EAB	1.95E+00	4.50E+00	3.	0.3
2 MI	4.17E-01	9.63E-01	9.	1.2
5 MI	1.05E-01	2.43E-01	23.	4.5
10 MI	3.78E-02	8.75E-02	46.	12.2

DOSE BY SUBZONE

Doses attributed to subzones, both summed and current segments are considered.

SBZ	TEDE (REM)	Thy Dose (REM)	SBZ	TEDE (REM)	Thy Dose (REM)	SBZ	TEDE (REM)	Thy Dose (REM)
CTR	1.00E+0	4.31E+0	SW1	0.00E+0	0.00E+0	SE2	0.00E+0	0.00E+0
CCL	1.00E+0	4.31E+0	W1	0.00E+0	0.00E+0	SE3	0.00E+0	0.00E+0
JRR	0.00E+0	0.00E+0	NW1	0.00E+0	0.00E+0	SE4	0.00E+0	0.00E+0
N1	1.66E-1	7.15E-1	N2	4.89E-2	2.10E-1	S2	0.00E+0	0.00E+0
NE1	0.00E+0	0.00E+0	NE2	1.84E-3	7.94E-3	SW2	0.00E+0	0.00E+0
E1	0.00E+0	0.00E+0	NE3	0.00E+0	0.00E+0	W2	0.00E+0	0.00E+0
SE1	0.00E+0	0.00E+0	E2	0.00E+0	0.00E+0	NW2	9.60E-5	4.13E-4
S1	0.00E+0	0.00E+0						

Iodine Filtration Status = ON (90%)

Particulate Filtration Status = ON (90%)

Containment Spray Status = ON (75%)

Calculation WorkSheet.dot

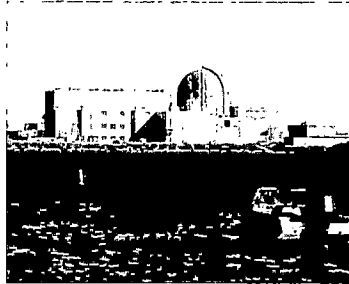
Enclosure V

**Wolf Creek Nuclear Operating Corporation
EP-CALC-WCNOC-1602
Revision 0**

**“Containment Radiation EAL Threshold Values”
(13 Pages)**



***Wolf Creek Nuclear
Operating Corporation***



Wolf Creek Nuclear Operating Corporation (WCNOC)

Containment Radiation EAL Threshold Values

**EP-CALC-WCNOC-1602
Revision 0**

Document Author: Scott McCain

Technical Reviewer: William Ketchum

EPS Approval: Tim East

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07/26/16

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1. PURPOSE

The Wolf Creek Nuclear Operating Corporation (WCNOC) Emergency Action Level (EAL) Technical Bases Manual contains background information, event declaration thresholds, bases and references for the EAL and fission product barrier (FPB) values used to implement the Nuclear Energy Institute (NEI) 99-01 Rev. 6 EAL guidance. This calculation document provides additional technical detail specific to the derivation of the FPB containment high range radiation monitor (CHRRM) readings developed in accordance with the guidance in NEI 99-01 Rev. 6.

Documentation of the assumptions, calculations and results are provided for the values associated with the NEI 99-01 Rev. 6 Table 9-F-3, PWR EAL Fission Product Barrier Table, thresholds listed below.

- NEI Fuel Clad Loss 3.A
- NEI Reactor Coolant Loss 3.A
- NEI Containment Potential Loss 3.A

2. DEVELOPMENT METHODS AND BASES

2.1. Fuel Clad Loss

Guidance Criteria

Per NEI 99-01 Rev. 6, this radiation monitor reading corresponds to an instantaneous release of all reactor coolant mass into the primary containment, assuming that reactor coolant activity equals 300 $\mu\text{Ci/g}$ dose equivalent I-131 (DEI-131). Reactor coolant activity above this level is greater than that expected for iodine spikes and corresponds to an approximate range of 2% to 5% fuel clad damage. Since this condition indicates that a significant amount of fuel clad damage has occurred, it represents a loss of the fuel clad barrier.

The radiation monitor reading in this threshold is higher than that specified for RCS barrier loss threshold since it indicates a loss of both the fuel clad and RCS barriers.

The reading should be determined assuming the instantaneous release and dispersal of the reactor coolant noble gas and iodine inventory, with RCS radioactivity concentration equal to 300 $\mu\text{Ci/g}$ dose equivalent I-131, into the primary containment atmosphere.

WCNOC Bases

The WCNOC fuel clad FPB threshold value is based on an instantaneous release of reactor coolant into the containment at a % fuel clad damage equivalent to 300 $\mu\text{Ci/g}$ DEI-131 RCS activity. That % fuel clad damage value is ratioed to a GT-RE-59/60 reading for 100% fuel clad damage to determine the fuel clad FBP threshold value in R/hr.

2.2. Reactor Coolant System Loss

Guidance Criteria

Per NEI 99-01 Rev. 6, this radiation monitor reading corresponds to an instantaneous release of all reactor coolant mass into the primary containment, assuming that reactor coolant activity equals Tech Spec allowable limits. This value is lower than that specified for the fuel clad barrier loss threshold since it indicates a loss of the RCS barrier only.

The reading should be determined assuming the instantaneous release and dispersal of the reactor coolant noble gas and iodine inventory, with RCS activity at Tech Spec allowable limits, into the primary containment atmosphere. RCS activity at this level will typically result in primary containment radiation levels that can be more readily detected by primary containment radiation monitors, and more readily differentiated from those caused by piping or component "shine" sources. If desired, a plant may use a lesser value of RCS activity for determining this value.

In some cases, the site-specific physical location and sensitivity of the containment radiation monitor(s) may be such that radiation from a cloud of released RCS gases cannot be distinguished from radiation emanating from piping and components containing elevated coolant activity. If so, determine if an alternate indication is available.

WCNOC Bases

WCNOC will adopt NRC guidance as the basis for this EAL threshold. NUREG-1940 provides estimates for standard plant containment radiation based on spiked RCS activity.

The WCNOC RCS FPB threshold value is based on standard plant containment radiation readings for an instantaneous release of spiked reactor coolant adjusted for the site specific power rating.

2.3. Containment Potential Loss

Guidance Criteria

Per NEI 99-01 Rev. 6, this radiation monitor reading corresponds to an instantaneous release of all reactor coolant mass into the primary containment, assuming that 20% of the fuel cladding has failed. This level of fuel clad failure is well above that used to determine the analogous fuel clad and RCS barrier loss thresholds.

NUREG-1228 indicates the fuel clad failure must be greater than approximately 20% in order for there to be a major release of radioactivity requiring offsite protective actions. For this condition to exist, there must already have been a loss of the RCS and the fuel clad barriers. It is therefore prudent to treat this condition as a potential loss of containment which would then escalate the classification level to a General Emergency.

NUREG-1228 provides the basis for using the 20% fuel cladding failure value. Unless there is a site-specific analysis justifying a different value, the reading should be determined assuming the instantaneous release and dispersal of the reactor coolant noble gas and iodine inventory associated with 20% fuel clad failure into the primary containment atmosphere.

WCNOC Bases

The WCNOC containment FPB threshold value is based on an instantaneous release of reactor coolant into the containment at an equivalent of 20% fuel clad damage. The 20% fuel clad damage value is ratioed to a GT-RE-59/60 reading for 100% fuel clad damage to determine the containment FBP threshold value in R/hr.

2.4. Source Term

Guidance Criteria

NEI 99-01 does not specify a basis for the source term activity or the reduction factors.

WCNOC Bases

Note – Source term reduction from containment spray is not included as an assumption for these thresholds.

Fuel Clad Damage Equivalent to 300 μ Ci/g DEI-131 – SAP 99-145, Letter 99-01466, Table 1 core activity was used in conjunction with the NUREG-1465 Table 3.13 halogen release fraction to develop the site specific iodine source term.

WCNOC Tech Spec definition of DEI-131 was utilized to determine the iodine conversion factors. The WCNOC Tech Spec definition references EPA-520/1-88-020 (Federal Guidance Report 11) as the basis used to develop the DEI-131 conversion factors.

Fuel Clad Loss and Containment Barrier Potential Loss Thresholds – SAP 99-145, Letter 99-01466, Table 1 core activity was used in conjunction with NUREG-1465 Table 3.13 core to RCS and WCAP-14696-A CDAG CRM3 RCS to containment release fraction assumptions to develop the site specific source term.

Per NUREG-1465 Table 3.13, only isotopes from the noble gases, halogens and alkali metals nuclide groups are released from the core to the RCS during a clad failure event. Thus, only the isotopes from those groups, adjusted for decay and abundance considerations, are taken from SAP 99-145, Letter 99-01466, Table 1 for the fuel clad and containment barrier thresholds.

NUREG-1465 Table 3.13 specifies that 3% core activity (noble gases, halogens and alkali metals) may be used as a reduction factor, rather than 5%, if long-term fuel cooling is maintained. WCAP-14696-A CDAG CRM3 recommends the NUREG-1465 short term fuel clad gap release value of 3% be used. The assumption for this calculation is that long-term fuel cooling is maintained.

WCAP-14696-A CDAG CRM3 specifies that 100% of the noble gas and 50% of the halogens and alkali metals in the RCS are released to containment for the low RCS pressure case. The assumption for this calculation is that the RCS will depressurize to containment.

RCS Barrier Loss Threshold – NUREG-1940 Figure 1-1 for spiked coolant is used as a basis to develop this threshold (see Attachment 3).

2.5. Decay Considerations

Guidance Criteria

Fission product barrier thresholds and their associated EALs are applicable only when the plant is in Hot Shutdown, Startup, or Power Operation modes (known as the hot operating modes).

Per NEI 99-01, the events for these thresholds correspond to an instantaneous release of all reactor coolant mass into the primary containment.

WCNOC Bases

This instantaneous release of the RCS to the containment is assumed to occur one hour after the damage event / reactor scram to account for damage progression, dispersion of activity and decay of the very short half-life isotopes. This is consistent with the WCAP-14696-A and NUREG-1940 assumptions.

3. DESIGN INPUTS

3.1. Constants and Conversion Factors

3.1.1. 453.592 g per lbm water conversion factor

3.2. Plant Inputs

3.2.1. Rated Power

- Standard Plant (NUREG-1940 Section 1.2.4)3,000 MWt
- Wolf Creek (USAR 1.1.5).....3,565 MWt

3.2.2. RCS Mass at Operating Conditions (USAR Table 6.2.1-5) 5.0452E+5 lbm

3.2.3. GR-RE-59/60 Range (USAR 11.5.2.3.2.4) 1E+0 – 1E+8 R/hr

3.3. Source Term

3.3.1. Release Fractions

RF_{Core} (NUREG-1465 Table 3.13)

RF_{Core} is the fraction of radioactive material released from the core to the fuel cladding (and thus to the RCS) by nuclide groups. The RF_{Core} values are as follows:

- Noble Gases, Halogens, Alkali Metals – Fuel Clad Damage..... 0.03 (3%)

RF_{RCS} (WCAP-14696-A CDAG CRM3 bases)

RF_{RCS} is the fraction of radioactive material released from the RCS to the containment by nuclide groups. The RF_{RCS} values are as follows:

- Noble Gases – Fuel Clad Damage 1 (100%)
- Non-Noble Gasses – Fuel Clad Damage 0.5 (50%)

3.3.2. Source Term Activity (SAP 99-145, Letter 99-01466 Table 1)

	Core Activity (Ci)
1-131	9.46E+07
1-132	1.37E+08
1-133	1.95E+08
1-134	2.15E+08
1-135	1.83E+08

3.3.3. Iodine Dose Conversion Factors (EPA-520-1-88-020 Table 2.1)

	Sv/Bq
1-131	2.92E-07
1-132	1.74E-09
1-133	4.86E-08
1-134	2.88E-10
1-135	8.46E-09

4. CALCULATIONS

4.1. Fuel Clad Damage Estimate Based on 300 $\mu\text{Ci/g}$ DEI-131

4.1.1. 100% Core Activity Equivalent Reactor Coolant Iodine Concentrations

$$100\% \text{ Core RCS Activity}_i(\mu\text{Ci/g}) = \frac{\text{Core RCS Activity}_i(\text{Ci}) \times 10^6}{\text{RCS Mass (g)}}$$

	RCS Activity ($\mu\text{Ci/g}$)
1-131	4.13E+05
1-132	5.99E+05
1-133	8.52E+05
1-134	9.39E+05
1-135	8.00E+05
Total	3.60E+06

4.1.2. 100% Fuel Clad Damage Activity Equivalent Reactor Coolant Iodine Concentrations

$$100\% \text{ Clad Damage RCS Activity}_i(\mu\text{Ci/g}) = 100\% \text{ Core RCS Activity}_i(\mu\text{Ci/g}) \times RF_{\text{Core}}$$

	RCS Activity ($\mu\text{Ci/g}$)
1-131	1.24E+04
1-132	1.80E+04
1-133	2.56E+04
1-134	2.82E+04
1-135	2.40E+04
Total	1.08E+05

4.1.3. 100% Fuel Clad Damage Activity Equivalent Reactor Coolant DEI-131 Concentrations

$$100\% \text{ DEI RCS Activity } (\mu\text{Ci/g}) = \sum 100\% \text{ Clad Damage RCS Activity}_i(\mu\text{Ci/g}) \times \text{DEI ICF}_i$$

The DEI-131 value for each iodine isotope is determined as follows:

$$\text{DEI DCF}_i = \frac{\text{EPA - 520 - 1 - 88 - 20 Table 2.1 Iodine DCF}_i(\text{Sv/Bq})}{\text{EPA - 520 - 1 - 88 - 20 Table 2.1 Iodine DCF}_{\text{I-131}}(\text{Sv/Bq})}$$

	RCS Activity ($\mu\text{Ci/g}$)
1-131	1.24E+04
1-132	1.07E+02
1-133	4.25E+03
1-134	2.78E+01
1-135	6.95E+02
Total	1.75E+04

4.1.4. % Fuel Clad Damage Activity Equivalent Reactor Coolant at 300 $\mu\text{Ci/g}$ DEI-131

$$\% \text{ Clad Damage} = \frac{300 \mu\text{Ci/g}}{100\% \text{ DEI RCS Activity } (\mu\text{Ci/g})}$$

300 $\mu\text{Ci/g}$ DEI-131 = 1.72% Fuel Clad Damage

See Attachment 1 for the spreadsheet calculations that develop the fuel clad damage source term activity and the % fuel clad damage.

4.2. GT-RE-59/60 Fission Product Barrier Thresholds

4.2.1. Containment Potential Loss (20% Fuel Clad Damage GT-RE-59/60 Reading)

$$\text{GT} - \text{RE} - 59/60_{20\% \text{ clad}} (R/hr) = \text{GT} - \text{RE} - 59/60_{100\% \text{ clad}} (R/hr) \times 0.20$$

Containment Potential Loss Threshold GT-RE-59/60 Reading = 6.68E+03 R/hr

See Attachment 2 for the spreadsheet calculations that develop the 20% fuel clad damage RM-30/31 reading.

4.2.2. Fuel Clad Loss (300% $\mu\text{Ci/g}$ DEI-131 Equivalent Clad Damage GT-RE-59/60 Reading)

$$\begin{aligned} \text{GT} - \text{RE} - 59/60_{1.72\% \text{ clad}} (R/hr) \\ = \text{GT} - \text{RE} - 59/60_{100\% \text{ clad}} (R/hr) \times 1.72\% \text{ Clad Damage} \end{aligned}$$

Fuel Clad Loss Threshold GT-RE-59/60 Reading = 5.73E+02 R/hr

4.2.3. RCS Loss (Spiked Coolant GT-RE-59/60 Reading)

$$\text{GT} - \text{RE} - 59/60_{\text{Spiked}} (R/hr) = \text{Std Plant}_{\text{Spiked}} (R/hr) \times \frac{MWt_{WC}}{MWt_{\text{Std Plant}}}$$

RCS Loss Threshold GT-RE-59/60 Reading = 5.94E+01 R/hr

5. CONCLUSIONS

5.1. 300 $\mu\text{Ci/g}$ DEI-131 is equivalent to 1.72% fuel clad (gap) damage.

5.2. Calculated containment high range radiation monitor values are as follows:

	Fuel Clad Loss	RCS Loss	Containment Potential Loss
GT-RE-59/60	5.73E+2 R/hr	5.94E+1 R/hr	6.68E+3 R/hr

Based on monitor accuracy/readability and human factors, the EAL Fission Product Barrier thresholds are established as follows:

	Fuel Clad Loss	RCS Loss	Containment Potential Loss
GT-RE-59/60	600 R/hr	60 R/hr	6,000 R/hr

6. REFERENCES

- 6.1. NEI 99-01 R6, Development of Emergency Action Levels for Non-Passive Reactors, September 2012
- 6.2. EPA-520/1-88-020 (EPA Federal Guidance Report No. 11), Limiting Values of Radionuclide Intake and Air Concentration and Dose Conversion Factors for Inhalation, Submersion, and Ingestion, 1988
- 6.3. WCAP-14696-A, Westinghouse Owners Group Core Damage Assessment Guide, Revision 1
- 6.4. NUREG-1940, RASCAL 4: Description of Models and Methods, December 2012
- 6.5. NUREG-1228, Source Term Estimation During Incident Response to Severe Nuclear Power Plant Accidents, October 1988
- 6.6. EPP 06-017, Core Damage Assessment Methodology, Revision 4
- 6.7. AN 98-029, Basis for Wolf Creek Core Damage Assessment Guidance (CDAG), Revision 1
- 6.8. SAP 99-145, Letter 99-01466, Core Inventory Radiation Sources, Table 1 - Core Fission Product Inventory
- 6.9. Wolf Creek Final Safety Analysis Report (USAR)
- 6.10. Technical Specifications, Wolf Creek Generating Station, Unit No. 1

	SAP 99-145, Letter 99-01466, Table 1 Core Activity (Ci)	RCS Activity ($\mu\text{Ci/g}$ 100% Core)	RCS Activity ($\mu\text{Ci/g}$ 100% Gap)	EPA-520-1-88-020 Table 2.1 Iodine DCFs (Sv per Bq)	DEI-131 ICF	100% Gap DEI-131 RCS Activity ($\mu\text{Ci/g}$)
I-131	9.46E+07	4.13E+05	1.24E+04	2.92E-07	1.00E+00	1.24E+04
I-132	1.37E+08	5.99E+05	1.80E+04	1.74E-09	5.96E-03	1.07E+02
I-133	1.95E+08	8.52E+05	2.56E+04	4.86E-08	1.66E-01	4.25E+03
I-134	2.15E+08	9.39E+05	2.82E+04	2.88E-10	9.86E-04	2.78E+01
I-135	1.83E+08	8.00E+05	2.40E+04	8.46E-09	2.90E-02	6.95E+02
Total	8.25E+08	3.60E+06	1.08E+05			1.75E+04

Volume Conversion (g/lbm): 453.592
 Halogen Core RF (%): 3.0%
 Target DEI-131 ($\mu\text{Ci/g}$): 3.00E+02

RCS Mass @ NOT (lbm): 5.05E+05
 RCS Liquid Mass @ NOT (g): 2.29E+08

% Clad Damage: 1.72%

	Reading for 20% Clad Failure (R/hr)	% Damage for 300 $\mu\text{Ci/cc}$ DEI-131 RCS Activity	Reading for 300 $\mu\text{Ci/cc}$ RCS Activity (R/hr)	Reading for Spiked RCS Activity (R/hr)
GT-RE-59/60	6.68E+03	1.72%	5.73E+02	5.94E+01

EPP 06-017 Figure 3 100% Clad Failure (R/hr): 3.34E+04
 NUREG-1940 Spiked Coolant (R/hr): 5.00E+01

Standard Plant (MWt): 3000
 WC Rated Power (MWt): 3565

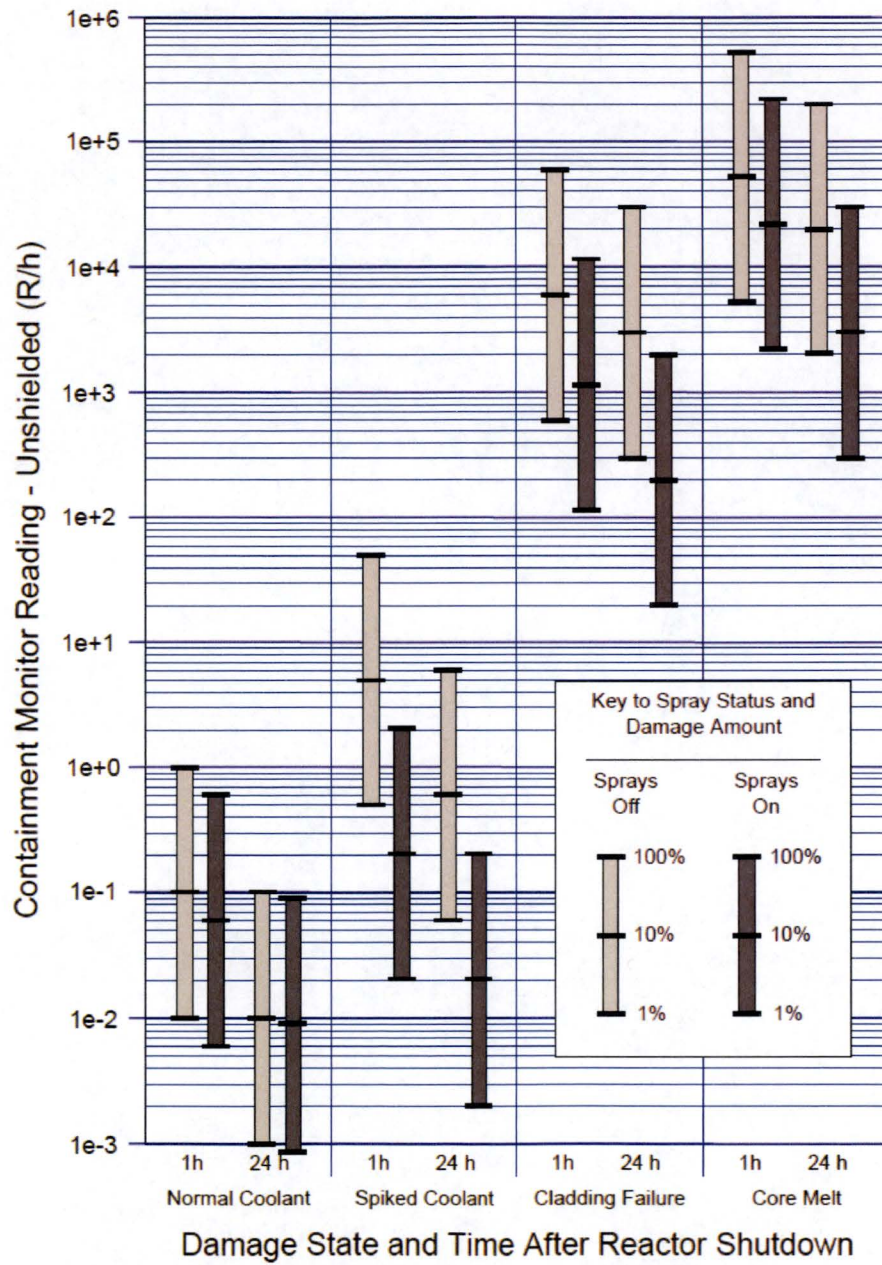


Figure 1-1 PWR containment monitor response

Enclosure VI

**Wolf Creek Generating Station
Proposed EAL Classification Matrix Wall Charts
(3 Pages)**

GENERAL EMERGENCY		SITE AREA EMERGENCY		ALERT		UNUSUAL EVENT	
1 Rad Effluent	RO1.1 1 2 3 4 5 6 DEF Reading on any Table R-1 effluent radiation monitor > column "OE" for ≥ 15 min. (Notes 1, 2, 3, 4)	RS1.1 1 2 3 4 5 6 DEF Reading on any Table R-1 effluent radiation monitor > column "SAE" for ≥ 15 min. (Notes 1, 2, 3, 4)	RA1.1 1 2 3 4 5 6 DEF Reading on any Table R-1 effluent radiation monitor > column "ALERT" for ≥ 15 min. (Notes 1, 2, 3, 4)	RU1.1 1 2 3 4 5 6 DEF Reading on any Table R-1 effluent radiation monitor > column "UE" for ≥ 60 min. (Notes 1, 2, 3)			
	RO1.2 1 2 3 4 5 6 DEF Dose assessment using actual meteorology indicates doses > 1000 mrem TEDE or 5000 mrem thyroid CDE at or beyond the SITE BOUNDARY (Note 4)	RS1.2 1 2 3 4 5 6 DEF Dose assessment using actual meteorology indicates doses > 100 mrem TEDE or 500 mrem thyroid CDE at or beyond the SITE BOUNDARY (Note 4)	RA1.2 1 2 3 4 5 6 DEF Dose assessment using actual meteorology indicates doses > 10 mrem TEDE or 50 mrem thyroid CDE at or beyond the SITE BOUNDARY (Note 4)	RU1.2 1 2 3 4 5 6 DEF Sample analyses for a gaseous or liquid release indicate a concentration or release rate > 2 x CDCM limits for ≥ 60 min. (Notes 1, 2)			
	RO1.3 1 2 3 4 5 6 DEF Field survey results indicate EITHER of the following at or beyond the SITE BOUNDARY: • Closed window dose rates > 1000 mR/hr expected to continue for ≥ 60 min. • Analyses of field survey samples indicate thyroid CDE > 5000 mrem for 60 min. of inhalation. (Notes 1, 2)	RS1.3 1 2 3 4 5 6 DEF Field survey results indicate EITHER of the following at or beyond the SITE BOUNDARY: • Closed window dose rates > 100 mR/hr expected to continue for ≥ 60 min. • Analyses of field survey samples indicate thyroid CDE > 500 mrem for 60 min. of inhalation. (Notes 1, 2)	RA1.3 1 2 3 4 5 6 DEF Analysis of a liquid effluent sample indicates a concentration or release rate that would result in doses > 10 mrem TEDE or 50 mrem thyroid CDE at or beyond the SITE BOUNDARY for 60 min. of exposure (Notes 1, 2)	RU1.3 1 2 3 4 5 6 DEF Field survey results indicate EITHER of the following at or beyond the SITE BOUNDARY: • Closed window dose rates > 10 mR/hr expected to continue for ≥ 60 min. • Analyses of field survey samples indicate thyroid CDE > 50 mrem for 60 min. of inhalation. (Notes 1, 2)			
	RO2.1 1 2 3 4 5 6 DEF Spent fuel pool level cannot be restored to at least the top of the fuel racks for 60 minutes or longer	RS2.1 1 2 3 4 5 6 DEF Spent fuel pool level at the top of the fuel racks	RA2.1 1 2 3 4 5 6 DEF Significant lowering of water level above, or damage to, irradiated fuel	RU2.1 1 2 3 4 5 6 DEF Unplanned loss of water level above irradiated fuel			
2 Irradiated Fuel Event	RO2.2 1 2 3 4 5 6 DEF Spent fuel pool level cannot be restored to at least 15 in. on EC-L1-0059 or 0590 (Level 3) for ≥ 60 min. (Note 1)	RS2.2 1 2 3 4 5 6 DEF Lowering of spent fuel pool level to 15 in. on EC-L1-0059 or 0590 (Level 3)	RA2.2 1 2 3 4 5 6 DEF Uncovery of irradiated fuel in the REFUELING PATHWAY as indicated by low water level alarm or indication (EC-L1-0059A, EC-L1-0059B, EC-L1-38, local observation of SFP level)	RU2.2 1 2 3 4 5 6 DEF UNPLANNED water level drop in the REFUELING PATHWAY as indicated by low water level alarm or indication (EC-L1-0059A, EC-L1-0059B, EC-L1-38, local observation of SFP level)			
	Table R-1 Effluent Radiation Monitor Classification Thresholds	Table R-2 Fuel Building & Containment Area Radiation Monitors	RA2.3 1 2 3 4 5 6 DEF Mechanical damage to irradiated fuel resulting in a release of radioactivity from the fuel as indicated by HI alarm on any of the following: • Fuel Building atmosphere monitors (GG RE-27 or 28) • Containment purge monitors (GT RE-22 or 33) • Containment atmosphere monitors (GG RE-31 or 32) • Manipulator bridge crane radiation monitor (SD RE-41) • Fuel Pool Bridge Crane OR Spent Fuel Pool Area radiation monitor (SD RE-37 or 38)	RU2.3 1 2 3 4 5 6 DEF UNPLANNED rise in corresponding area radiation levels as indicated by any Table R-2 radiation monitors			
3 Area Radiation Levels	Table R-3 Safe Operation & Shutdown Rooms/Areas	RA3.1 1 2 3 4 5 6 DEF Lowering of spent fuel pool level to 120 in. on EC-L1-0059 or 0590 (Level 2)	RU3.1 1 2 3 4 5 6 DEF Confirmed SECURITY CONDITION or threat				
	Table R-3 Safe Operation & Shutdown Rooms/Areas	RA3.2 1 2 3 4 5 6 DEF An UNPLANNED event results in radiation levels that prohibit or IMPEDE access to any Table R-3 rooms or areas (Note 5)	RU3.2 1 2 3 4 5 6 DEF A SECURITY CONDITION that does not involve a HOSTILE ACTION as reported by the Security Shift Lieutenant				
1 Security	HS1.1 1 2 3 4 5 6 DEF A HOSTILE ACTION is occurring or has occurred within the PROTECTED AREA as reported by the Security Shift Lieutenant	HA1.1 1 2 3 4 5 6 DEF A HOSTILE ACTION is occurring or has occurred within the OWNER CONTROLLED AREA as reported by the Security Shift Lieutenant	HU1.1 1 2 3 4 5 6 DEF A SECURITY CONDITION that does not involve a HOSTILE ACTION as reported by the Security Shift Lieutenant				
2 Seismic Event	None	None	HU2.1 1 2 3 4 5 6 DEF Seismic event > OBE as indicated by Seismic Activity Annunciator 00-0980				
3 Natural or Tech. Hazard	Notes	None	HU3.1 1 2 3 4 5 6 DEF A tornado strike within the PROTECTED AREA				
	Notes	None	HU3.2 1 2 3 4 5 6 DEF 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				
4 Fire	Notes	None	HU3.3 1 2 3 4 5 6 DEF 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)				
	Notes	None	HU3.4 1 2 3 4 5 6 DEF A hazardous event that results in on-site conditions sufficient to prohibit the plant staff from accessing the site via personal vehicles (Note 7)				
5 Hazardous Gases	Notes	None	HU4.1 1 2 3 4 5 6 DEF A FIRE is located within any Table H-1 area				
	Notes	None	HU4.2 1 2 3 4 5 6 DEF Receipt of a single fire alarm (i.e., no other indications of a FIRE)				
6 Control Room Evacuation	Notes	None	HU4.3 1 2 3 4 5 6 DEF The fire alarm is indicating a FIRE within any Table H-1 area				
	Notes	None	HU4.4 1 2 3 4 5 6 DEF The existence of a FIRE is not verified within 30 min. of alarm receipt (Note 1)				
7 Judgment	Notes	None	HU4.5 1 2 3 4 5 6 DEF A FIRE within the plant PROTECTED AREA not extinguished within 60 min. of the initial report, alarm or indication (Note 1)				
	Notes	None	HU4.6 1 2 3 4 5 6 DEF A FIRE within the plant PROTECTED AREA that requires firefighting support by an offsite fire response agency to extinguish				

Modes:

1 2 3 4 5 6 DEF

Power Operation Startup Hot Standby Hot Shutdown Cold Shutdown Refueling Defueled






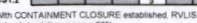

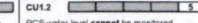






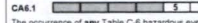

WOLF CREEK

APP [XX-XXX-XX] Addendum 1 Rev [xx]
EAL Classification Matrix
Page 1 of 3

ALL CONDITIONS

GENERAL EMERGENCY		SITE AREA EMERGENCY		ALERT		UNUSUAL EVENT																					
S System Malfunc.	<p>1 Loss of Emergency AC Power</p> <p>Prerogued loss of all offsite and all onsite AC power to emergency buses</p> <p>SG1.1 1 2 3 4</p> <p>Loss of all offsite and all onsite AC power capability to emergency 4.16KV buses NB01 and NB02</p> <p>AND EITHER:</p> <ul style="list-style-type: none">Restoration of at least one emergency bus in < 4 hours is not likely (Note 1)CSFST Core Cooling-RED Path conditions met <p>Loss of all AC and vital DC power sources for 15 minutes or longer</p> <p>SG1.2 1 2 3 4</p> <p>Loss of all offsite and all onsite AC power capability to emergency 4.16KV buses NB01 and NB02 for ≥ 15 min</p> <p>AND</p> <p>Loss of all 125 VDC power based on battery bus voltage indications < 105 VDC on all vital DC buses NK01, NK03 (Division 1) and NK02, NK04 (Division 2) for ≥ 15 min. (Note 1)</p>	<p>SS1.1 1 2 3 4</p> <p>Loss of all offsite and all onsite AC power capability to emergency 4.16KV buses NB01 and NB02 for ≥ 15 min. (Note 1)</p> <p>Loss of all vital DC power for 15 minutes or longer</p> <p>SS2.1 1 2 3 4</p> <p>Loss of all 125 VDC power based on battery bus voltage indications < 105 VDC on all vital DC buses NK01, NK03 (Division 1) and NK02, NK04 (Division 2) for ≥ 15 min. (Note 1)</p>	<p>SA1.1 1 2 3 4</p> <p>AC power capability Table S-1 to emergency 4.16KV buses NB01 and NB02 reduced to a single power source for ≥ 15 min. (Note 1)</p> <p>AND</p> <p>Any additional single power source failure will result in loss of all AC power to SAFETY SYSTEMS</p>	<p>SU1.1 1 2 3 4</p> <p>Loss of all offsite AC power capability Table S-1 to emergency 4.16KV buses NB01 and NB02 for ≥ 15 min. (Note 1)</p> <div><p>Table S-1 AC Power Supplies</p><p>Offsite:</p><ul style="list-style-type: none">ESF XFMR XNB01ESF XFMR XNB02<p>Onsite:</p><ul style="list-style-type: none">EDG NE01EDG NE02</div>																							
	<p>2 Loss of Vital DC Power</p>																										
	<p>3 Loss of Control Room Indications</p>	None	<p>Table S-2 Safety System Parameters</p> <ul style="list-style-type: none">Reactor powerRCS levelRCS pressureCore Exit T/C temperatureLevel in at least one SIGAuxiliary or emergency feed flow in at least one SIG	<p>UNPLANNED loss of Control Room indications for 15 minutes or longer with a significant transient in progress</p> <p>SA3.1 1 2 3 4</p> <p>An UNPLANNED event results in the inability to monitor one or more Table S-2 parameters from within the Control Room for ≥ 15 min. (Note 1)</p> <p>AND</p> <p>Any significant transient is in progress, Table S-3</p>	<p>UNPLANNED loss of Control Room indications for 15 minutes or longer</p> <p>SU3.1 1 2 3 4</p> <p>An UNPLANNED event results in the inability to monitor one or more Table S-2 parameters from within the Control Room for ≥ 15 min. (Note 1)</p>																						
	<p>4 RCS Activity</p>	None	<p>Table S-3 Significant Transients</p> <ul style="list-style-type: none">Reactor tripRunback ≥ 25% thermal powerElectrical load rejection > 25% electrical loadECOSS actuation	<p>[Evaluate Fission Product Barrier Degradation Category for potential classification upgrade.]</p>	<p>Reactor coolant activity greater than Technical Specification allowable limits</p> <p>SU4.1 1 2 3 4</p> <p>Sample analysis indicates RCS activity > Technical Specification Section 3.4.16 limits</p>																						
	<p>5 RCS Leakage</p>	None		<p>[Evaluate Fission Product Barrier Degradation Category for potential classification upgrade.]</p>	<p>RCS leakage for 15 minutes or longer</p> <p>SU5.1 1 2 3 4</p> <p>RCS unidentified or pressure boundary leakage > 10 gpm for ≥ 15 min</p> <p>OR</p> <p>RCS identified leakage > 25 gpm for ≥ 15 min</p> <p>OR</p> <p>Leakage from the RCS to a location outside containment > 25 gpm for ≥ 15 min. (Note 1)</p>																						
	<p>6 RTS Failure</p>	<p>Inability to shut down the reactor causing a challenge to core cooling or RCS heat removal</p> <p>SS6.1 1</p> <p>An automatic or manual trip fails to shut down the reactor as indicated by reactor power ≥ 5%</p> <p>AND</p> <p>All actions to shut down the reactor are not successful as indicated by reactor power ≥ 5%</p> <p>AND EITHER:</p> <ul style="list-style-type: none">CSFST Core Cooling-RED Path conditions metCSFST Heat Sink-RED Path conditions met	<p>Automatic or manual trip fails to shut down the reactor and subsequent manual actions taken at the reactor control console are not successful in shutting down the reactor</p> <p>SA6.1 1</p> <p>An automatic or manual trip fails to shut down the reactor as indicated by reactor power ≥ 5%</p> <p>AND</p> <p>Manual trip actions taken at the reactor control console (SB-HS-1 or SB-HS-42) are not successful in shutting down the reactor as indicated by reactor power ≥ 5% (Note 8)</p>	<p>Automatic or manual trip fails to shut down the reactor</p> <p>SU6.1 1</p> <p>An automatic trip did not shut down the reactor as indicated by reactor power ≥ 5% after any RTS setpoint is exceeded</p> <p>AND</p> <p>A subsequent automatic trip or manual trip action taken at the reactor control console (SB-HS-1 or SB-HS-42) is successful in shutting down the reactor as indicated by reactor power < 5% (Note 8)</p> <p>SU6.2 1</p> <p>A manual trip did not shut down the reactor as indicated by reactor power ≥ 5% after any manual trip action was initiated</p> <p>AND</p> <p>A subsequent automatic trip or manual trip action taken at the reactor control console (SB-HS-1 or SB-HS-42) is successful in shutting down the reactor as indicated by reactor power < 5% (Note 8)</p>																							
	<p>7 Loss of Comm.</p>	<p>Notes</p> <p>Note 1: The Emergency Manager should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded</p> <p>Note 2: 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, tripping rod drive power or implementation of boron injection strategies</p> <p>Note 3: One Containment Spray System train and one Containment Cooling System train comprise one full train of depressurization equipment</p>	<p>Table S-4 Communications Methods</p> <table><tr><th>System</th><th>Onsite</th><th>Offsite</th><th>NRC</th></tr><tr><td>PA system</td><td>X</td><td></td><td></td></tr><tr><td>Plant Radios</td><td>X</td><td>X</td><td></td></tr><tr><td>Site Telephone System</td><td>X</td><td>X</td><td>X</td></tr><tr><td>Local Telephone Company Direct Lines</td><td>X</td><td>X</td><td>X</td></tr><tr><td>ENS Line</td><td></td><td></td><td>X</td></tr></table>	System	Onsite	Offsite	NRC	PA system	X			Plant Radios	X	X		Site Telephone System	X	X	X	Local Telephone Company Direct Lines	X	X	X	ENS Line			X
System	Onsite	Offsite	NRC																								
PA system	X																										
Plant Radios	X	X																									
Site Telephone System	X	X	X																								
Local Telephone Company Direct Lines	X	X	X																								
ENS Line			X																								
<p>8 CMT Isolation Failure</p>				<p>Failure to isolate containment or loss of containment pressure control</p> <p>SU8.1 1 2 3 4</p> <p>Any penetration is not isolated within 15 min. of a VALID containment isolation signal</p> <p>OR</p> <p>Containment pressure > 27 psig with < one full train of containment depressurization equipment operating per design for ≥ 15 min. (Note 9) (Note 1)</p>																							
<p>9 Hazardous Event Affecting Safety Systems</p>	<p>Table S-5 Hazardous Events</p> <ul style="list-style-type: none">Seismic event (earthquake)Internal or external FLOODING eventHigh winds or tornado strikeFIREEXPLOSIONOther events with similar hazard characteristics as determined by the Emergency Manager	<p>Hazardous event affecting a SAFETY SYSTEM needed for the current operating mode</p> <p>SA9.1 1 2 3 4</p> <p>The occurrence of any Table S-5 hazardous event</p> <p>AND EITHER:</p> <ul style="list-style-type: none">Event damage has caused indications of degraded performance in at least one train of a SAFETY SYSTEM needed for the current operating modeThe event has caused VISIBLE DAMAGE to a SAFETY SYSTEM component or structure needed for the current operating mode																									
<p>F Fission Product Barrier Degradation</p>	<p>FG1.1 1 2 3 4</p> <p>Loss of any two barriers</p> <p>AND</p> <p>Loss or potential loss of third barrier (Table F-1)</p>	<p>FS1.1 1 2 3 4</p> <p>Loss or potential loss of any two barriers (Table F-1)</p>	<p>FA1.1 1 2 3 4</p> <p>Any loss or any potential loss of EITHER Fuel Clad or RCS (Table F-1)</p>																								

Table F-1 Fission Product Barrier Matrix						
Category	Fuel Clad (FC) Barrier		Reactor Coolant System (RCS) Barrier		Containment (CMT) Barrier	
	Loss	Potential Loss	Loss	Potential Loss	Loss	Potential Loss
A RCS or SG Tube Leakage	None	None	1. An automatic or manual ECSS (S) actuation required by either: <ul style="list-style-type: none"> UNISOLABLE RCS leakage SGTR 	1. CSFST integrity-RED Path conditions met	1. A RUPTURED SG is FAULTED outside of containment	None
B Inadequate Heat Removal	1. CSFST Core Cooling-RED Path conditions met	1. CSFST Core Cooling-ORANGE Path conditions met 2. CSFST Heat Sink-RED Path conditions met AND Heat sink required	None	1. CSFST Heat Sink-RED Path conditions met AND Heat sink required	None	1. CSFST Core Cooling-RED Path conditions met AND Restoration procedures not effective within 15 min. (Note 1)
C CMT Radiation / RCS Activity	1. Containment radiation > 600 R/hr on GT-RE-59 or GT-RE-60 2. Dose equivalent 1-131 coolant activity > 300 µCi/cc	None	1. Containment radiation > 60 R/hr on GT-RE-59 or GT-RE-60	None	None	1. Containment radiation > 6,000 R/hr on GT-RE-59 or GT-RE-60
D CMT Integrity or Bypass	None	None	None	None	1. Containment isolation is required AND EITHER: <ul style="list-style-type: none"> Containment integrity has been lost based on Emergency Manager judgment UNISOLABLE pathway from containment to the environment exists 	1. CSFST Containment-RED Path conditions met 2. Containment hydrogen concentration ≥ 4% 3. Containment pressure > 27 psig with < one full train of Containment depressurization equipment operating per design for ≥ 15 min. (Note 1, 9)
E Judgment	1. Any condition in the opinion of the Emergency Manager that indicates loss of the Fuel Clad barrier	1. Any condition in the opinion of the Emergency Manager that indicates potential loss of the Fuel Clad barrier	1. Any condition in the opinion of the Emergency Manager that indicates loss of the RCS barrier	1. Any condition in the opinion of the Emergency Manager that indicates potential loss of the RCS barrier	1. Any condition in the opinion of the Emergency Manager that indicates loss of the Containment barrier	1. Any condition in the opinion of the Emergency Manager that indicates potential loss of the Containment barrier

	GENERAL EMERGENCY	SITE AREA EMERGENCY	ALERT	UNUSUAL EVENT																									
1 RCS Level	Loss of RCS inventory affecting feed clad integrity with Containment challenged	Loss of RCS inventory affecting core decay heat removal capability	Loss of RCS inventory	UNPLANNED loss of RCS inventory																									
	CG1.1  5 RVLS natural circulation range < 66% for ≥ 30 min. (Note 1) AND Any Containment Challenge Indication, Table C-2	CS1.1  5 With CONTAINMENT CLOSURE not established, RVLS natural circulation range < 72%	CA1.1  5 6 Loss of RCS inventory as indicated by RCS level < 12 in	CU1.1  5 6 UNPLANNED loss of reactor coolant results in RCS level less than a required lower limit for ≥ 15 min. (Note 1)																									
2 Loss of Emergency AC Power	CG1.2  5 6 RCS level cannot be monitored for ≥ 30 min. (Note 1) AND Core uncover is indicated by any of the following: • UNPLANNED increase in any Table C-1 sump/tank level of sufficient magnitude to indicate core uncover • Manipulator bridge crane radiation monitor SD-RE-41 Hi-Hi alarm • Erratic Source Range Monitor indication AND Any Containment Challenge Indication, Table C-2	CS1.2  5 With CONTAINMENT CLOSURE established, RVLS natural circulation range < 66%	CA1.2  5 6 RCS water level cannot be monitored for ≥ 15 min. (Note 1) AND EITHER • UNPLANNED increase in any Table C-1 Sump / Tank level • Visual observation of UNISOLABLE RCS leakage	CU1.2  5 6 RCS water level cannot be monitored AND EITHER: • UNPLANNED increase in any Table C-1 sump/ tank level due to a loss of RCS inventory • Visual observation of UNISOLABLE RCS leakage																									
	<div>Table C-1 Sumps/Tanks</div> <div><ul style="list-style-type: none">Containment Normal SumpPRTRCDTAuxiliary Building SumpLiquid Waste Holdup TankRecycle Holdup TankCCW Surge Tank</div> <div>None</div>	<div>Table C-2 Containment Challenge Indications</div> <div><ul style="list-style-type: none">CONTAINMENT CLOSURE not established (Note 6)Containment hydrogen concentration > 4%Unplanned rise in Containment pressure</div> <div>None</div>																											
3 Cold SD/Refueling System Malfunction		<div>Table C-3 AC Power Supplies</div> <div>Offsite:<ul style="list-style-type: none">ESF XFMR XNB01ESF XFMR XNB02Onsite:<ul style="list-style-type: none">EDG NED1EDG NED2</div> <div>None</div>	Loss of all offsite and all onsite AC power to emergency buses for greater than 15 minutes	Loss of all but one AC power source to emergency buses for 15 minutes or longer																									
			CA2.1  5 6 DEF Loss of all offsite and all onsite AC power capability to emergency 4.16KV buses NBO1 and NBO2 for ≥ 15 min (Note 1)	CU2.1  5 6 DEF AC power capability, Table C-3, to emergency 4.16KV buses NBO1 and NBO2 reduced to a single power source for ≥ 15 min. (Note 1) AND Any additional single power source failure will result in loss of all AC power to SAFETY SYSTEMS																									
4 RCS Temp.		<div>Table C-4 RCS Reheat Duration Thresholds</div> <div>* If an RCS heat removal system is in operation within this time frame and RCS temperature is being reduced the EAL is not applicable</div> <table><tr><th>RCS Status</th><th>Containment Closure Status</th><th>Heat-up Duration</th></tr><tr><td>Intact (but not REDUCED INVENTORY)</td><td>N/A</td><td>60 min. *</td></tr><tr><td>Not intact OR REDUCED INVENTORY</td><td>established</td><td>20 min. *</td></tr><tr><td></td><td>not established</td><td>0 min.</td></tr></table> <div>None</div>	RCS Status	Containment Closure Status	Heat-up Duration	Intact (but not REDUCED INVENTORY)	N/A	60 min. *	Not intact OR REDUCED INVENTORY	established	20 min. *		not established	0 min.	Loss of ability to maintain plant in cold shutdown	UNPLANNED increase in RCS temperature													
	RCS Status	Containment Closure Status	Heat-up Duration																										
Intact (but not REDUCED INVENTORY)	N/A	60 min. *																											
Not intact OR REDUCED INVENTORY	established	20 min. *																											
	not established	0 min.																											
5 Loss of Vital DC Power			CA3.1  5 6 UNPLANNED increase in RCS temperature to > 200°F for > Table C-4 duration (Notes 1, 10) OR UNPLANNED RCS pressure increase > 10 psig (This EAL does not apply during water-solid plant conditions)	CU3.1  5 6 UNPLANNED increase in RCS temperature to > 200°F (Note 10)																									
				CU3.2  5 6 Loss of all RCS temperature and RCS level indication for ≥ 15 min. (Note 1)																									
6 Hazardous Event Affecting Safety Systems	<div>Notes</div> <div>Note 1: The Emergency Manager should declare the event promptly upon determining that time limit has been exceeded, or will likely be exceeded</div> <div>Note 6: If CONTAINMENT CLOSURE is re-established prior to exceeding the 30-minute time limit, declaration of a General Emergency is not required</div> <div>Note 10: Begin monitoring hot condition EALs concurrently for any new event or condition not related to the loss of decay heat removal</div>	<div>Table C-6 Hazardous Events</div> <div><ul style="list-style-type: none">Seismic event (earthquake)Internal or external FLOODING eventHigh winds or tornado strikeFIREEXPLOSIONOther events with similar hazard characteristics as determined by the Emergency Manager</div>	<div>Table C-5 Communications Methods</div> <table><tr><th>System</th><th>Onsite</th><th>Offsite</th><th>NRC</th></tr><tr><td>PA system</td><td>X</td><td></td><td></td></tr><tr><td>Plant Radios</td><td>X</td><td>X</td><td></td></tr><tr><td>Site Telephone System</td><td>X</td><td>X</td><td>X</td></tr><tr><td>Local Telephone Company Direct Lines</td><td>X</td><td>X</td><td>X</td></tr><tr><td>ENS Line</td><td></td><td></td><td>X</td></tr></table>	System	Onsite	Offsite	NRC	PA system	X			Plant Radios	X	X		Site Telephone System	X	X	X	Local Telephone Company Direct Lines	X	X	X	ENS Line			X	Loss of all vital DC power for 15 minutes or longer	CU4.1  5 6 < 105 VDC bus voltage indications on Technical Specification required 125 VDC buses for ≥ 15 min. (Note 1)
	System	Onsite	Offsite	NRC																									
PA system	X																												
Plant Radios	X	X																											
Site Telephone System	X	X	X																										
Local Telephone Company Direct Lines	X	X	X																										
ENS Line			X																										
		<div>Hazardous event affecting a SAFETY SYSTEM needed for the current operating mode</div> <div>CA1.1  5 6 The occurrence of any Table C-6 hazardous event AND EITHER • Event damage has caused indications of degraded performance in at least one train of a SAFETY SYSTEM needed for the current operating mode • The event has caused VISIBLE DAMAGE to a SAFETY SYSTEM component or structure needed for the current operating mode</div>	Loss of all onsite or offsite communications capabilities	CU5.1  5 6 DEF Loss of all Table C-5 onsite communication methods OR Loss of all Table C-5 offsite communication methods OR Loss of all Table C-5 NRC communication methods																									

DEFINITIONS

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.

Containment Closure

The procedurally defined actions taken to secure containment and its associated structures, systems, and components as a functional barrier to fission product release under shutdown conditions.

As applied to Wolf Creek, Containment Closure is established when the requirements of GEN 00-008 RCS Level Less Than Reactor Vessel Flange Operations are met.

Explosion

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

Faulted

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

Fire

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

Flooding

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

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 Wolf Creek 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 Wolf Creek. 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.

Impeded(d)

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

Maintain

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

Owner Controlled Area (OCA)

Property contiguous to the reactor site and acquired by fee, title or easement for Wolf Creek Generating Station for which public access is limited.

Projectile

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

Protected Area (PA)

An area encompassed by physical barriers and to which access is controlled. The Protected Area refers to the designated security area around the process buildings and is depicted in USAR Figure 1.2-44 Site Plan.

RCS Intact

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

Reduced Inventory

Plant condition when fuel is in the reactor vessel and Reactor Coolant System level is lower than 3 feet below the Reactor Vessel flange (< 64.1 in) with fuel in the vessel.

Refueling Pathway

The reactor refueling cavity, spent fuel pool and fuel transfer canal comprise the refueling pathway.

Ruptured

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

Restore

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

Safety System

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

Secure

(1) The integrity of the reactor coolant pressure boundary.
(2) The capability to shut down the reactor and maintain it in a safe shutdown condition.
(3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures.

Security Condition

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

Site Boundary

Exclusion Area Boundary is a synonymous term for Site Boundary. The Exclusion Area is defined as the area that encompasses the land surrounding the Plant to a radius of 1,200 meters (3,937 feet) from the midpoint of the Unit 1 Reactor. The exclusion area boundary location coincides with the restricted area boundary. Control of access to this is by virtue of ownership and in accordance with 10CFR100.

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.

Valid

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

Visible Damage

Damage to a component or structure that is readily observable without measurements, testing, or analysis. The visual impact of the damage is sufficient to cause concern regarding the operability or reliability of the affected component or structure. Damage resulting from an equipment failure and limited to the failed component (i.e., the failure did **not** cause damage to a structure or any other equipment) is **not** visible damage.

Modes:

1

2

3

4

5

6

DEF

Power Operation

Startup

Hot Standby

Hot Shutdown

Cold Shutdown

Refueling

Defueled

WOLF CREEK

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EAL Classification Matrix
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COLD CONDITIONS
(RCS ≤ 200°F)