ATTACHMENT 3 TO TXX-15101

EMERGENCY ACTION LEVEL

TECHNICAL BASES

(CLEAN VERSION)

(260 PAGES)

Luminant

Comanche Peak Nuclear Power Plant
EPP-201
Emergency Action Level Technical Bases Document

	Print Name	Signature	Date
Prepared by:			
Technical Reviewer:			
Reviewer:			
Approval:			

Effective Date: _____

DRAFT D2 6/24/15

TABLE OF CONTENTS

SECTION PAGE

1.0 PURPOSE 3

2.0 DISCUSSION 3
2.1 Background 3
2.2 Fission Product Barriers 4
2.3 Fission Product Barrier Classification Criteria 4
2.4 EAL Organization 5
2.5 Technical Bases Information 7
2.6 Operating Mode Applicability 8
2.7 Unit Designation 8

3.0 GUIDANCE ON MAKING EMERGENCY CLASSIFICATIONS 9
3.1 General Considerations 9
3.2 Classification Methodology 10

4.0 REFERENCES 13
4.1 Developmental 13
4.2 Implementing 13

5.0 DEINITIONS, ACRONYMS & ABBREVIATIONS 14

6.0 CPNPP TO NEI 99-01 Rev. 6 EAL CROSS-REFERENCE 20

7.0 ATTACHMENTS 24
1 Emergency Action Level Technical Bases 25
Category R Abnormal Rad Release / Rad Effluent 25
Category E ISFSI 65
Category C Cold Shutdown / Refueling System Malfunction 68
Category H Hazards 112
Category S System Malfunction 155
Category F Fission Product Barrier Degradation 200
2 Fission Product Barrier Loss / Potential Loss Matrix and Bases 205
3 Safe Operation & Shutdown Areas Tables R-3 & H-2 Bases 258

1.0 PURPOSE

This document provides an explanation and rationale for each Emergency Action Level (EAL) included in the EAL Upgrade Project for Comanche Peak Nuclear Power Plant (CPNPP). It should be used to facilitate review of the CPNPP EALs and provide historical documentation for future reference. Decision-makers responsible for implementation of EPP-201, "Assessment of Emergency Action Levels, Emergency Classification and Plan Activation," may use this document as a technical reference in support of EAL interpretation. This information may assist the Emergency Coordinator in making classifications, particularly those involving judgment or multiple events. The basis information may also be useful in training and for explaining event classifications to off-site officials.

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

Because the information in a basis document can affect emergency classification decision-making (e.g., the Emergency Coordinator refers to it during an event), the NRC staff expects that changes to the basis document will be evaluated in accordance with the provisions of 10 CFR 50.54(q).

2.0 DISCUSSION

2.1 Background

EALs are the plant-specific indications, conditions or instrument readings that are utilized to classify emergency conditions defined in the CPNPP Plant Radiological Emergency Response Plan (RERP).

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

NEI 99-01 (NUMARC/NESP-007) Revisions 4 and 5 were subsequently issued for industry implementation. Enhancements over earlier revisions included:

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

Subsequently, Revision 6 of NEI 99-01 has been issued which incorporates resolutions to numerous implementation issues including the NRC EAL Frequently Asked Questions (FAQs). Using NEI 99-01 Revision 6, "Methodology for the Development of Emergency Action Levels for Non-Passive Reactors," November 2012 (ADAMS Accession Number ML12326A805) (ref. 4.1.1), CPNPP 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 (CNTMT): 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

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 CPNPP 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 CPNPP EAL categories are aligned to and represent the NEI 99-01"Recognition Categories." Subcategories are used in the CPNPP scheme as necessary to further divide the EALs of a category into logical sets of possible emergency classification thresholds. The CPNPP EAL categories and subcategories are listed below.

EAL Groups, Categories and Subcategories

EAL Group/Category	EAL Subcategory
Any Operating Mode:	
R – Abnormal **R**ad Levels / Rad Effluent	1 – Radiological Effluent 2 – Irradiated Fuel Event 3 – Area Radiation Levels
H – **H**azards and Other Conditions Affecting Plant Safety	1 – Security 2 – Seismic Event 3 – Natural or Technological Hazard 4 – Fire 5 – Hazardous Gases 6 – Control Room Evacuation 7 – Emergency Coordinator Judgment
E – ISFSI	1 – Confinement Boundary
Hot Conditions:	
S – **S**ystem 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
F – **F**ission Product Barrier Degradation	None
Cold Conditions:	
C – **C**old 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 Bases Information

EAL technical bases are provided in Attachment 1 for each EAL according to EAL group (Any, Hot, Cold), EAL category (R, C, H, S, E and F) and EAL subcategory. A summary explanation of each category and subcategory is given at the beginning of the technical bases discussions of the EALs included in the category. For each EAL, the following information is provided:

Category Letter & Title

Subcategory Number & Title

Initiating Condition (IC)

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

EAL Identifier (enclosed in rectangle)

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

1. First character (letter): Corresponds to the EAL category as described above (R, C, H, S, E or F)
2. Second character (letter): The emergency classification (G, S, A or U)

   G = General Emergency
   S = Site Area Emergency
   A = Alert
   U = Unusual Event
3. Third character (number): Subcategory number within the given category. Subcategories are sequentially numbered beginning with the number one (1). If a category does not have a subcategory, this character is assigned the number one (1).
4. Fourth character (number): The numerical sequence of the EAL within the EAL subcategory. If the subcategory has only one EAL, it is given the number one (1).

Classification (enclosed in rectangle):

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

EAL (enclosed in rectangle)

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

Mode Applicability

One or more of the following plant operating conditions comprise the mode to which each EAL is applicable: 1 - Power Operation, 2 - Startup, 3 – Hot Standby, 4 - Hot Shutdown, 5 - Cold Shutdown, 6 - Refueling, 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 Plant-Specific basis section that provides CPNPP-relevant information concerning the EAL. This is followed by a Generic basis section that provides a description of the rationale for the EAL as provided in NEI 99-01 Rev. 6.

CPNPP Basis Reference(s):

Site-specific source documentation from which the EAL is derived.

2.6 Operating Mode Applicability (ref. 4.1.8)

1 Power Operation
K_{eff} greater than or equal to 0.99 and reactor thermal power greater than 5%

2 Startup
K_{eff} greater than or equal t 0.99 and reactor thermal power ≤ 5%

3 Hot Standby
K_{eff} less than 0.99 and average coolant temperature greater than or equal to 350°F

4 Hot Shutdown
K_{eff} less than 0.99 and average coolant temperature 350°F greater than T_{avg} greater than 200 °F and all reactor vessel head closure bolts fully tensioned

5 Cold Shutdown
K_{eff} less than 0.99 and average coolant temperature ≤ 200°F

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

D Defueled
All reactor fuel removed from reactor pressure vessel (full core off load during refueling or extended outage).

The plant operating mode that exists at the time that the event occurs (prior to any protective system or operator action being initiated in response to the condition) should be compared to the mode applicability of the EALs. If a lower or higher plant operating mode is reached before the emergency classification is made, the declaration shall be based on the mode that existed at the time the event occurred.

2.7 Unit Designation

The specific unit designator (1 or 2) is represented within these instructions by the symbol "u". The appropriate unit digit may be substituted for this symbol to obtain the unit specific equipment number (Example *u*-FK-121 represents 1-FK-121 for Unit 1 and 2-FK-121 for Unit 2). For equipment or components that are common or non unit-specific the "X" designator is used. (Example *X*-RE-6272 represents a radiation monitor that is common to both units).

3.0 GUIDANCE ON MAKING EMERGENCY CLASSIFICATIONS

3.1 General Considerations

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

3.1.1 Classification Timeliness

NRC regulations require the licensee to establish and maintain the capability to assess, classify, and declare an emergency condition within 15 minutes after the availability of indications to plant operators that an emergency action level has been exceeded and to promptly declare the emergency condition as soon as possible following identification of the appropriate emergency classification level. The NRC staff has provided guidance on implementing this requirement in NSIR/DPR-ISG-01, "Interim Staff Guidance, Emergency Planning for Nuclear Power Plants" (ref. 4.1.11).

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.

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

3.1.3 Imminent Conditions

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

3.1.4 Planned vs. Unplanned Events

A planned work activity that results in an expected event or condition which meets or exceeds an EAL does not warrant an emergency declaration provided that: 1) the activity proceeds as planned, and 2) the plant remains within the limits imposed by the operating license. Such activities include planned work to test, manipulate, repair, maintain or modify a system or component. In these cases, the controls associated with the planning, preparation and execution of the work will ensure that compliance is maintained with all aspects of the operating license provided that the activity proceeds and concludes as expected. Events or conditions of this type may be subject to the reporting requirements of 10 § CFR 50.72 (ref. 4.1.4).

3.1.5 Classification Based on Analysis

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

3.1.6 Emergency Coordinator Judgment

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

3.2 Classification Methodology

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

When assessing an EAL that specifies a time duration for the off-normal condition, the "clock" for the EAL time duration runs concurrently with the emergency classification process "clock." For a full discussion of this timing requirement, refer to NSIR/DPR-ISG-01 (ref. 4.1.11).

3.2.1 Classification of Multiple Events and Conditions

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

- If an Alert EAL and a Site Area Emergency EAL are met, whether at one unit or at two different units, a Site Area Emergency should be declared.

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

- If two Alert EALs are met, whether at one unit or at two different units, an Alert should be declared.

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

3.2.2 Consideration of Mode Changes During Classification

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

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

3.2.3 Classification of Imminent Conditions

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

3.2.4 Emergency Classification Level Upgrading and Downgrading

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

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

3.2.5 Classification of Short-Lived Events

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

3.2.6 Classification of Transient Conditions

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

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

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

> An ATWS occurs and the high pressure ECCS systems fail to automatically start. 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 EOP step and clears the inadequate core cooling condition prior to an emergency declaration, then the classification should be based on the ATWS only.

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

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

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

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

3.2.8 Retraction of an Emergency Declaration

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

4.0 REFERENCES

4.1 Developmental

4.1.1 NEI 99-01 Revision 6, Methodology for the Development of Emergency Action Levels for Non-Passive Reactors, ADAMS Accession Number ML12326A805

4.1.2 RIS 2007-02 Clarification of NRC Guidance for Emergency Notifications During Quickly Changing Events, February 2, 2007.

4.1.3 NUREG-1022 Event Reporting Guidelines: 10CFR50.72 and 50.73

4.1.4 10 § CFR 50.72 Immediate Notification Requirements for Operating Nuclear Power Reactors

4.1.5 10 § CFR 50.73 License Event Report System

4.1.6 CPNPP Emergency Plan Appendix E, Complex and Owner Controlled Area

4.1.7 CPNPP FSAR Section 2.1.1 Site Location and Description

4.1.8 Technical Specifications Table 1.1-1 Modes

4.1.9 OPT-408A/B Refueling Containment Penetration Verification

4.1.10 ODA-207 Guidelines on the Preparation and Review of Operations Procedures

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

4.1.12 IPO-010A/B Reactor Coolant System Reduced Inventory Operations

4.1.13 Technical Specifications 3.9.4

4.1.14 CPNPP Offsite Dose Calculation Manual (ODCM)

4.2 Implementing

4.2.1 EPP-201, Assessment of Emergency Action Levels, Emergency Classification and Plan Activation

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

4.2.3 CPNPP EAL Matrix

5.0 DEFINITIONS, ACRONYMS & ABBREVIATIONS

5.1 Definitions (ref. 4.1.1 except as noted)

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

Alert

Events are in 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. Containment closure means that all potential escape paths are closed or capable of being closed (ref.4.1.13).

A. All penetrations providing direct access from Containment atmosphere to outside atmosphere are closed except:
   - Penetrations with automatic valves capable of being closed by an operable CVI
   - Penetrations under administrative controls (e.g., Control Room notified and designated person to close if required by fuel handling accident)

B. Equipment hatch is closed and held in place by 4 bolts, or is capable of being closed and held in place by 4 bolts

C. One emergency airlock door is closed

D. One personnel airlock door is capable of being closed (ref. 4.1.9)

EPA PAGs

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

Exclusion Area Boundary

Exclusion Area Boundary is a synonymous term for Site Boundary. CPNPP FSAR Section 2.1.1.3 and Figure 2.1-2 define the Exclusion Area Boundary. This boundary is used for establishing effluent release limits with respect to the requirements of 10CFR20 (ref. 4.1.7). See also CPNPP Emergency Plan Appendix E, Complex and Owner Controlled Area (ref. 4.1.6) and CCNPP ODCM Section 5.0 Design Features (ref. 4.1.14).

Explosion

A rapid, violent and catastrophic failure of a piece of equipment due to combustion, chemical reaction or overpressurization. A release of steam (from high energy lines or components) or an electrical component failure (caused by short circuits, grounding, arcing, etc.) should not

automatically be considered an explosion. Such events require a post-event inspection to determine if the attributes of an explosion are present.

Faulted

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

Fire

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

Flooding

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

General Emergency

Events are in 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 CPNPP 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 CPNPP. 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).

Independent Spent Fuel Storage Installation (ISFSI)

A complex that is designed and constructed for the interim storage of spent nuclear fuel and other radioactive materials associated with spent fuel storage.

Maintain

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

Owner Controlled Area

As shown in CPNPP Emergency Plan Appendix E, Complex and Owner Controlled Area.

Projectile

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

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 FSAR Figure 1.2-1 Plot Plan (ref. 4.1.7).

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 ≤ 80 inches above core plate (829'8") (ref. 4.1.12).

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):

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

See EXCLUSION AREA BOUNDARY

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.

5.2 Abbreviations/Acronyms

°F ..... Degrees Fahrenheit
° ..... Degrees
AC ..... Alternating Current
APDG ..... Alternate Power Diesel Generator
ATWS ..... Anticipated Transient Without Scram
CPNPP ..... Comanche Peak Nuclear Power Plant
CDE ..... Committed Dose Equivalent
CFR ..... Code of Federal Regulations
CNTMT ..... 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
EOF ..... Emergency Operations Facility
EOP ..... Emergency Operating Procedure
EPA ..... Environmental Protection Agency
ERG ..... Emergency Response Guideline
EPIP ..... Emergency Plan Implementing Procedure
ESF ..... Engineered Safety Feature
ESW ..... Emergency Service Water
FAA ..... Federal Aviation Administration
FBI ..... Federal Bureau of Investigation
FEMA ..... Federal Emergency Management Agency
FSAR ..... Final Safety Analysis Report
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 of 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
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 ..... Off-site Dose Calculation Manual
ORO ..... Offsite Response Organization
OTO ..... 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, REM ..... Roentgen Equivalent Man
RETS ..... Radiological Effluent Technical Specifications
RPS ..... Reactor Protection System
R(P)V ..... Reactor (Pressure) Vessel
RVLIS ..... Reactor Vessel Level Indicating System
SAR ..... Safety Analysis Report
SBO ..... Station Blackout
SCBA ..... Self-Contained Breathing Apparatus
SG ..... Steam Generator
SI ..... Safety Injection
ODCM ..... Offsite Dose Calculation Manual
SPDS ..... Safety Parameter Display System
SRO ..... Senior Reactor Operator
TEDE ..... Total Effective Dose Equivalent
TOAF ..... Top of Active Fuel
TSC ..... Technical Support Center
WOG ..... Westinghouse Owners Group

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

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

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

CPNPP	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	2
FA1.1	FA1	1
FS1.1	FS1	1
FG1.1	FG1	1
HU1.1	HU1	1
HU1.2	HU1	2
HU1.3	HU1	3
HU2.1	HU2	1
HU3.1	HU3	1
HU3.2	HU3	2
HU3.3	HU3	3

CPNPP	NEI 99-01 Rev. 6	
EAL	IC	Example EAL
HU3.4	HU3	4
HU4.1	HU4	1
HU4.2	HU4	2
HU4.3	HU4	3
HU4.4	HU4	4
HU7.1	HU7	1
HA1.1	HA1	1
HA1.2	HA1	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
HG1.1	HG1	1
HG7.1	HG7	1
SU1.1	SU1	1
SU3.1	SU2	1
SU4.1	SU3	1
SU4.2	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

CPNPP	NEI 99-01 Rev. 6	
EAL	**IC**	**Example EAL**
SA1.1	SA1	1
SA3.1	SA2	1
SA6.1	SA5	1
SA9.1	SA9	1
SS1.1	SS1	1
SS2.1	SS8	1
SS6.1	SS5	1
SG1.1	SG1	1
SG1.2	SG8	1
EU1.1	E-HU1	1

7.0 ATTACHMENTS

7.1 Attachment 1, Emergency Action Level Technical Bases

7.2 Attachment 2, Fission Product Barrier Matrix and Basis

Category R – Abnormal Rad Release / Rad Effluent

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

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

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

Events of this category pertain to the following subcategories:

1. Radiological Effluent

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

2. Irradiated Fuel Event

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

3. Area Radiation Levels

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

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 1 – Radiological Effluent

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

EAL:

RU1.1 Unusual Event

Reading on **any** Table R-1 effluent radiation monitor greater than column "UE" for greater than or equal to 60 min.
(Notes 1, 2, 3)

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

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

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

Table R-1 Effluent Monitor Classification Thresholds

	Release Point	Monitor	GE	SAE	Alert	UE
Gaseous	**Plant Vent** PVG384 + PVG385	X-RE-5567 A + B	-----	-----	-----	6.52E-4 µCi/ml
Gaseous	**Plant Vent (WRGM)** PVF684 + PVF685	X-RE-5570 A + B	4.0E+7 µCi/sec	4.0E+6 µCi/sec	4.0E+5 µCi/sec	4.0E+4 µCi/sec
Gaseous	**Main Steam** MSLu78 MSLu79 MSLu80 MSLu81	u-RE-2325 u-RE-2326 u-RE-2327 u-RE-2328	90 µCi/ml*	9.0 µCi/ml*	0.9 µCi/ml*	2 x high alarm setpoint*
Liquid	**Liquid Waste** LWE-076	X-RE-5253	-----	-----	-----	2 x high alarm setpoint
Liquid	**Service Water** SSWu65 SSWu66	u-RE-4269 u-RE-4270	-----	-----	-----	2 x high alarm setpoint

* with reactor shutdown

Mode Applicability:

All

Definition(s):

None

CPNPP Basis:

The column "UE" gaseous and liquid release values in Table R-1 represent two times the alarm setpoint of the specified monitors. The setpoints are established to ensure the ODCM release limits are not exceeded. (ref. 1)

Plant Vent Monitors sample both plant vent stacks prior to discharge to the environment. They detect normal operational levels of noble gases. The noble gas detectors (X-RE-5567A, B) can be used as backups to the wide range gas monitors (X-RE-5570A, B). These monitors communicate with the RM-23s in the Control Room. Indication and annunciation are provided in the Control Room for alert and high radiation levels and monitor failure. (ref. 2)

The WRGM system is a gaseous effluent monitoring system composed of two identical monitors used for detection of noble gas releases through the two plant vent stacks. Exhaust from the main turbine gland steam condenser exhauster is routed to the vent stacks for monitoring prior to release. Particulate and iodine grab samples may also be obtained from the WRGM. These monitors also initiate the automatic closure of the gas release valve in the waste gas processing system on detection of high radiation. Indication and annunciation are provided in the Control Room for alert and high radiation levels and monitor failure. (ref. 2)

There are four online Main Steam Line Monitors (MSL) for each steam generator. Each one consists of a shielded, Category II seismic detector mounted adjacent to a main steam line, a remote RM-80 microprocessor and a remote customer interface junction box. The RM-80 associated with the MSL monitor communicates with the PC-11 CRT console computer. (ref. 2).

Plant Liquid Waste Processing System (LWPS) discharge is continuously monitored by a shielded gamma sensitive (NaI(T1)) scintillation detector. When a LWPS discharge is required, normally locked-closed control valves can be opened directing flow through a path containing a radiation monitor (X-RE-5253) and a control valve which discharges waste to the circulating water discharge tunnel. The control valves are administratively controlled with a key-operated switch selectable to closed, automatic, or "key-held" open modes. In the automatic position, the valve will close on monitor high radiation alarm or monitor failure signals. Indication and annunciation are provided on the Waste Processing System (WPS) control panel for alert or monitor failure alarm and in the Control Room for alert, high, and monitor failure alarms. (ref. 2)

Service Water monitors are provided to monitor the Service Water System for radiation since leakage from radioactive fluid systems could cause potential radioactive leakage to the environment. A shielded gamma sensitive scintillation (NaI(T1)) detector is located in an off-line sample assembly downstream of each component cooling water heat exchanger to monitor service water being discharged. Indication and annunciation are provided at the Control Room RMS console. (ref. 2)

NEI 99-01 Basis:

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

monitored or un-monitored, including those for which a radioactivity discharge permit is normally prepared.

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

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

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

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

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

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

CPNPP Basis Reference(s):

1. CPNPP ODCM Unit 1 and 2
2. DBD-EE-023 Radiation Monitoring System
3. EAL Section R Revision 6 Table R-1 Effluent Monitor Classification Thresholds Review
4. NEI 99-01 AU1

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 1 – Radiological Effluent

Initiating Condition: Release of gaseous or liquid radioactivity greater than 2 times the 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 x ODCM limits for greater than or equal to 60 min. (Notes 1, 2)

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

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

Mode Applicability:

All

Definition(s):

None

CPNPP Basis:

None

NEI 99-01 Basis:

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

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

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

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

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

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

CPNPP Basis Reference(s):

1. CPNPP ODCM Unit 1 and 2
2. NEI 99-01 AU1

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 1 – Radiological Effluent

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

EAL:

RA1.1 Alert

Reading on **any** Table R-1 effluent radiation monitor greater than column "ALERT" for greater than or equal to 15 min. (Notes 1, 2, 3, 4)

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

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

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

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

Table R-1 Effluent Monitor Classification Thresholds

	Release Point	Monitor	GE	SAE	Alert	UE
Gaseous	**Plant Vent** PVG384 + PVG385	X-RE-5567 A + B	-----	-----	-----	6.52E-4 µCi/ml
Gaseous	**Plant Vent (WRGM)** PVF684 + PVF685	X-RE-5570 A + B	4.0E+7 µCi/sec	4.0E+6 µCi/sec	4.0E+5 µCi/sec	4.0E+4 µCi/sec
Gaseous	**Main Steam** MSLu78 MSLu79 MSLu80 MSLu81	u-RE-2325 u-RE-2326 u-RE-2327 u-RE-2328	90 µCi/ml*	9.0 µCi/ml*	0.9 µCi/ml*	2 x high alarm setpoint*
Liquid	**Liquid Waste** LWE-076	X-RE-5253	-----	-----	-----	2 x high alarm setpoint
Liquid	**Service Water** SSWu65 SSWu66	u-RE-4269 u-RE-4270	-----	-----	-----	2 x high alarm setpoint

* with reactor shutdown

Mode Applicability:

All

Definition(s):

None

CPNPP 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 Protective Action Guidelines (TEDE or CDE Thyroid) (ref. 1).

NEI 99-01 Basis:

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

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

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

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

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

CPNPP Basis Reference(s):

1. EAL Section R Revision 6 Table R-1 Effluent Monitor Classification Thresholds Review
2. NEI 99-01 AA1

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 1 – Radiological Effluent

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

EAL:

RA1.2 Alert

Dose assessment using actual meteorology indicates doses greater than 10 mrem TEDE or 50 mrem thyroid CDE at or beyond the EXCLUSION AREA BOUNDARY (Notes 3, 4)

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

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

Mode Applicability:

All

Definition(s):

EXCLUSION AREA BOUNDARY - Exclusion Area Boundary is a synonymous term for Site Boundary. CPNPP FSAR Section 2.1.1.3 and Figure 2.1-2 define the Exclusion Area Boundary. This boundary is used for establishing effluent release limits with respect to the requirements of 10CFR20. See also CPNPP Emergency Plan Appendix E, Complex and Owner Controlled Area and CCNPP ODCM Section 5.0 Design Features.

CPNPP Basis:

Dose assessments are performed by computer-based method (ref. 1)

NEI 99-01 Basis:

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

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

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

Classification based on effluent monitor readings assumes that a release path to the environment is established. If the effluent flow past an effluent monitor is known to have

stopped due to actions to isolate the release path, then the effluent monitor reading is no longer valid for classification purposes.

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

CPNPP Basis Reference(s):

1. EPP-303 Operation of Computer Based Dose Assessment System
2. NEI 99-01 AA1

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 1 – Radiological Effluent

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

EAL:

RA1.3 Alert

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

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

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

Mode Applicability:

All

Definition(s):

EXCLUSION AREA BOUNDARY - Exclusion Area Boundary is a synonymous term for Site Boundary. CPNPP FSAR Section 2.1.1.3 and Figure 2.1-2 define the Exclusion Area Boundary. This boundary is used for establishing effluent release limits with respect to the requirements of 10CFR20. See also CPNPP Emergency Plan Appendix E, Complex and Owner Controlled Area and CCNPP ODCM Section 5.0 Design Features.

CPNPP Basis:

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

NEI 99-01 Basis:

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

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

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

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

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

CPNPP Basis Reference(s):

1. CPNPP Offsite Dose Calculation Manual
2. NEI 99-01 AA1

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 1 – Radiological Effluent

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

EAL:

RA1.4 Alert

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

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

(Notes 1, 2)

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

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

Mode Applicability:

All

Definition(s):

EXCLUSION AREA BOUNDARY - Exclusion Area Boundary is a synonymous term for Site Boundary. CPNPP FSAR Section 2.1.1.3 and Figure 2.1-2 define the Exclusion Area Boundary. This boundary is used for establishing effluent release limits with respect to the requirements of 10CFR20. See also CPNPP Emergency Plan Appendix E, Complex and Owner Controlled Area and CCNPP ODCM Section 5.0 Design Features.

CPNPP Basis:

EPP-309 Onsite/In-Plant Radiological Surveys and Offsite Radiological Monitoring provides guidance for emergency or post-accident radiological environmental monitoring (ref. 1).

NEI 99-01 Basis:

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

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

the spectrum of possible accident events and conditions.

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

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

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

CPNPP Basis Reference(s):

1. EPP-309 Onsite/In-Plant Radiological Surveys and Offsite Radiological Monitoring
2. NEI 99-01 AA1

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 1 – Radiological Effluent

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

EAL:

RS1.1 Site Area Emergency

Reading on **any** Table R-1 effluent radiation monitor greater than column "SAE" for greater than or equal to 15 min.
(Notes 1, 2, 3, 4)

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

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

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

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

Table R-1 Effluent Monitor Classification Thresholds

	Release Point	Monitor	GE	SAE	Alert	UE
Gaseous	**Plant Vent** PVG384 + PVG385	X-RE-5567 A + B	-----	-----	-----	6.52E-4 µCi/ml
Gaseous	**Plant Vent** **(WRGM)** PVF684 + PVF685	X-RE-5570 A + B	4.0E+7 µCi/sec	4.0E+6 µCi/sec	4.0E+5 µCi/sec	4.0E+4 µCi/sec
Gaseous	**Main Steam** MSLu78 MSLu79 MSLu80 MSLu81	u-RE-2325 u-RE-2326 u-RE-2327 u-RE-2328	90 µCi/ml*	9.0 µCi/ml*	0.9 µCi/ml*	2 x high alarm setpoint*
Liquid	**Liquid Waste** LWE-076	X-RE-5253	-----	-----	-----	2 x high alarm setpoint
Liquid	**Service Water** SSWu65 SSWu66	u-RE-4269 u-RE-4270	-----	-----	-----	2 x high alarm setpoint

* with reactor shutdown

Mode Applicability:

All

Definition(s):

None

CPNPP 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).

NEI 99-01 Basis:

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

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

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

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

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

CPNPP Basis Reference(s):

1. EAL Section R Revision 6 Table R-1 Effluent Monitor Classification Thresholds Review
2. NEI 99-01 AS1

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 1 – Radiological Effluent

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

EAL:

RS1.2 Site Area Emergency

Dose assessment using actual meteorology indicates doses greater than 100 mrem TEDE
or
500 mrem thyroid CDE at or beyond the EXCLUSION AREA BOUNDARY (Notes 3, 4)

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

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

Mode Applicability:

All

Definition(s):

EXCLUSION AREA BOUNDARY - Exclusion Area Boundary is a synonymous term for Site Boundary. CPNPP FSAR Section 2.1.1.3 and Figure 2.1-2 define the Exclusion Area Boundary. This boundary is used for establishing effluent release limits with respect to the requirements of 10CFR20. See also CPNPP Emergency Plan Appendix E, Complex and Owner Controlled Area and CCNPP ODCM Section 5.0 Design Features.

CPNPP Basis:

Dose assessments are performed by computer-based method (ref. 1)

NEI 99-01 Basis:

This IC addresses a release of gaseous radioactivity that results in projected or actual offsite doses greater than or equal to 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.

CPNPP Basis Reference(s):

1. EPP-303 Operation of Computer Based Dose Assessment System
2. NEI 99-01 AS1

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 1 – Radiological Effluent

Initiating Condition: Release of gaseous radioactivity resulting in offsite dose greater than 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 EXCLUSION AREA BOUNDARY:

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

(Notes 1, 2)

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

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

Mode Applicability:

All

Definition(s):

EXCLUSION AREA BOUNDARY - Exclusion Area Boundary is a synonymous term for Site Boundary. CPNPP FSAR Section 2.1.1.3 and Figure 2.1-2 define the Exclusion Area Boundary. This boundary is used for establishing effluent release limits with respect to the requirements of 10CFR20. See also CPNPP Emergency Plan Appendix E, Complex and Owner Controlled Area and CCNPP ODCM Section 5.0 Design Features.

CPNPP Basis:

EPP-309 Onsite/In-Plant Radiological Surveys and Offsite Radiological Monitoring provides guidance for emergency or post-accident radiological environmental monitoring (ref. 1).

NEI 99-01Basis:

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

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

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

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

CPNPP Basis Reference(s):

1. EPP-309 Onsite/In-Plant Radiological Surveys and Offsite Radiological Monitoring
2. NEI 99-01 AS1

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 1 – Radiological Effluent

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

EAL:

RG1.1 General Emergency

Reading on **any** Table R-1 effluent radiation monitor greater than column "GE" for greater than or equal to 15 min.
(Notes 1, 2, 3, 4)

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

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

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

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

Table R-1 Effluent Monitor Classification Thresholds

	Release Point	Monitor	GE	SAE	Alert	UE
Gaseous	**Plant Vent** PVG384 + PVG385	X-RE-5567 A + B	-----	-----	-----	6.52E-4 µCi/ml
Gaseous	**Plant Vent** **(WRGM)** PVF684 + PVF685	X-RE-5570 A + B	4.0E+7 µCi/sec	4.0E+6 µCi/sec	4.0E+5 µCi/sec	4.0E+4 µCi/sec
Gaseous	**Main Steam** MSLu78 MSLu79 MSLu80 MSLu81	u-RE-2325 u-RE-2326 u-RE-2327 u-RE-2328	90 µCi/ml*	9.0 µCi/ml*	0.9 µCi/ml*	2 x high alarm setpoint*
Liquid	**Liquid Waste** LWE-076	X-RE-5253	-----	-----	-----	2 x high alarm setpoint
Liquid	**Service Water** SSWu65 SSWu66	u-RE-4269 u-RE-4270	-----	-----	-----	2 x high alarm setpoint

* with reactor shutdown

Mode Applicability:

All

Definition(s):

None

CPNPP 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).

NEI 99-01Basis:

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

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

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

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

CPNPP Basis Reference(s):

1. EAL Section R Revision 6 Table R-1 Effluent Monitor Classification Thresholds Review
2. NEI 99-01 AG1

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 1 – Radiological Effluent

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

EAL:

RG1.2 General Emergency

Dose assessment using actual meteorology indicates doses greater than 1,000 mrem TEDE or
5,000 mrem thyroid CDE at or beyond the EXCLUSION AREA BOUNDARY (Notes 3, 4)

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

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

Mode Applicability:

All

Definition(s):

EXCLUSION AREA BOUNDARY - Exclusion Area Boundary is a synonymous term for Site Boundary. CPNPP FSAR Section 2.1.1.3 and Figure 2.1-2 define the Exclusion Area Boundary. This boundary is used for establishing effluent release limits with respect to the requirements of 10CFR20. See also CPNPP Emergency Plan Appendix E, Complex and Owner Controlled Area and CCNPP ODCM Section 5.0 Design Features.

CPNPP Basis:

Dose assessments are performed by computer-based method (ref. 1)

NEI 99-01 Basis:

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

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

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

Classification based on effluent monitor readings assumes that a release path to the environment is established. If the effluent flow past an effluent monitor is known to have

stopped due to actions to isolate the release path, then the effluent monitor reading is no longer valid for classification purposes.

CPNPP Basis Reference(s):

1. EPP-303 Operation of Computer Based Dose Assessment System
2. NEI 99-01 AG1

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 1 – Radiological Effluent

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

EAL:

RG1.3 General Emergency

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

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

(Notes 1, 2)

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

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

Mode Applicability:

All

Definition(s):

EXCLUSION AREA BOUNDARY - Exclusion Area Boundary is a synonymous term for Site Boundary. CPNPP FSAR Section 2.1.1.3 and Figure 2.1-2 define the Exclusion Area Boundary. This boundary is used for establishing effluent release limits with respect to the requirements of 10CFR20. See also CPNPP Emergency Plan Appendix E, Complex and Owner Controlled Area and CCNPP ODCM Section 5.0 Design Features.

CPNPP Basis:

EPP-309 Onsite/In-Plant Radiological Surveys and Offsite Radiological Monitoring provides guidance for emergency or post-accident radiological environmental monitoring (ref. 1).

NEI 99-01 Basis:

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

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

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

CPNPP Basis Reference(s):

1. EPP-309 Onsite/In-Plant Radiological Surveys and Offsite Radiological Monitoring
2. NEI 99-01 AG1

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 2 – Irradiated Fuel Event

Initiating Condition: Unplanned loss of water level above irradiated fuel

EAL:

RU2.1 Unusual Event

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

AND

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

Table R-2 SFP & Refueling Cavity Area Radiation Monitors

SFP:

- SFP001, LRAM SFP 2 E WALL (X-RE-6272)
- SFP002, LRAM SFP 2 N WALL (X-RE-6273)
- SFP003, LRAM SFP 1 E WALL (X-RE-6274)
- SFP004, LRAM SFP 1 S WALL (X-RE-6275)

Refueling Cavity:

- RFCu10, LRAM W REFUEL CAV860 (u-RE-6251)
- RFCu12, LRAM E REFUEL CAV 860 (u-RE-6253)

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.

CPNPP Basis:

Indication of decreasing level includes Spent Fuel Pool Panel (FB 810) (ref. 2):

- RFL CAVITY 1 LEVEL LO (upender area) (SFP-3.3)
- RFL CAVITY 2 LEVEL LO (upender area) (SFP-3.7)
- SFP 1 LEVEL LO (SFP-3.9)
- SFP 2 LEVEL LO (SFP-3.10)

- RFL CAVITY 1 LEVEL LO (vessel area) (SFP-4.3)
- RFL CAVITY 2 LEVEL LO (vessel area) (SFP-4.7)
- SFP 1 TRANSFER CANAL LEVEL LO (SFP-4.9)
- SFP 2 TRANSFER CANAL LEVEL LO (SFP-4.10)

Allowing level to decrease could result in spent fuel being uncovered, reducing spent fuel decay heat removal and creating an extremely hazardous radiation environment. Technical Specification Section 3.7.15 (ref. 4) requires at least 23 ft of water above the Spent Fuel Pool storage racks (857' 3½") (ref. 2). Technical Specification Section 3.9.7 (ref. 5) requires at least 23 ft of water above the Reactor Vessel flange in the refueling cavity (856' 11" in refueling cavity or 407" above core plate) (ref. 6). During refueling, this maintains sufficient water level in the fuel transfer canal, refueling cavity, and SFP to retain iodine fission product activity in the water in the event of a fuel handling accident. ABN-909, Spent Fuel Pool/Refueling Cavity Malfunctions, provides appropriate guidance to restore and maintain normal water levels in the fuel transfer canal, refueling cavity, and SFP, and to determine if water levels have dropped below the Technical Specification LCOs (ref. 2). The fuel transfer canal is only of concern in assessing this EAL when irradiated fuel transfer is in progress, in which case the spent fuel pool gates are open and connected to the fuel transfer canal.

NEI 99-01 Basis:

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

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

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

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

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

CPNPP Basis Reference(s):

1. ABN-908 Fuel Handling Accident
2. ABN-909 Spent Fuel Pool/Refueling Cavity Malfunctions
3. 1-ALB-6B SFPCS TRBL
4. Technical Specifications 3.7.15 Fuel Storage Area Water Level
5. Technical Specifications 3.9.7 Refueling Cavity Water Level
6. RFO-102A/B Refueling Operations

7. NEI 99-01 AU2

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 2 – Irradiated Fuel Event

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

EAL:

RA2.1 Unusual Event

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.

CPNPP Basis:

None.

NEI 99-01 Basis:

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

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

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

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

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

CPNPP Basis Reference(s):

1. ABN-909 Spent Fuel Pool/Refueling Cavity Malfunctions

2. NEI 99-01 AA2

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 2 – Irradiated Fuel Event

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

EAL:

RA2.2 Alert

Damage to irradiated fuel resulting in a release of radioactivity

AND

High alarm on **any** of the following:

- **Any** Table R-2 area radiation monitors
- CAGu97, CNTMT AIR PIG GAS (u-RE-5503)
- CAPu98, CNTMT AIR PIG PART (u-RE-5502)
- CAIu99, CNTMT AIR PIG IODINE (u-RE-5566)
- FBV088, FB VENT EXH (X-RE-5700)

Table R-2 SFP & Refueling Cavity Area Radiation Monitors

SFP:

- SFP001, LRAM SFP 2 E WALL (X-RE-6272)
- SFP002, LRAM SFP 2 N WALL (X-RE-6273)
- SFP003, LRAM SFP 1 E WALL (X-RE-6274)
- SFP004, LRAM SFP 1 S WALL (X-RE-6275)

Refueling Cavity:

- RFCu10, LRAM W REFUEL CAV860 (u-RE-6251)
- RFCu12, LRAM E REFUEL CAV 860 (u-RE-6253)

Mode Applicability:

All

Definition(s):

None

CPNPP Basis:

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 High alarm and the SFP and containment area radiation readings are a spent fuel handling accident (ref. 1). 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.

NEI 99-01 Basis:

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

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

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

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

CPNPP Basis Reference(s):

1. ABN-908 Fuel Handling Accident
2. ABN-909 Spent Fuel Pool/Refueling Cavity Malfunctions
3. NEI 99-01 AA2

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 2 – Irradiated Fuel Event

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

EAL:

RA2.3 Alert

Lowering of spent fuel pool level to El. 844.3' (Level 2)

Mode Applicability:

All

Definition(s):

None

CPNPP 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) (ref. 1).

Level 2 is the level that is adequate to provide substantial radiation shielding for a person standing on the spent fuel pool operating deck. It represents the range of water level where any necessary operations in the vicinity of the spent fuel pool can be completed without significant dose consequences from direct gamma radiation from the stored spent fuel. Comanche Peak designated as Level 2 the water level 10 feet (± 1.0 foot) above the top of the fuel racks (El 844' – 2.75" rounded to 844.3' indicated) (ref. 2).

The enhanced SFP level instruments (X-LI-4876, 4878, 4877, 4879) do not have indication available in the control room and must be read remotely outside of the control room.

NEI 99-01 Basis:

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

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

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

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

CPNPP Basis Reference(s):

1. NRC EA-12-51 Issuance of Order to Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation
2. TXX-13103 Overall Integrated Plan in Response to March 12,2012 Commission Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation (Order Number EA-12-051), Response to Request for Additional Information
3 NEI 99-01 AA2

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 2 – Irradiated Fuel Event

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

EAL:

RS2.1 Site Area Emergency

Lowering of spent fuel pool level to El. 835.3' (Level 3)

Mode Applicability:

All

Definition(s):

None

CPNPP 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) (ref. 1).

Level 3 is the level where fuel remains covered and actions to implement make-up water addition should no longer be deferred. Level 3 corresponds nominally (i.e., +/- 1 foot) to the highest point of any fuel rack seated in the spent fuel pool. Level 3 is defined in this manner to provide the maximum range of information to operators, decision makers and emergency response personnel. Comanche Peak designated as Level 3 the water level greater than 1 foot above the top of the fuel storage racks plus the accuracy of the SFP level instrument channel (El. 835' – 2.75" rounded to 835.3' indicated). Designation of this level as Level 3 is conservative; its selection assures that the fuel will remain covered, and at that point there would be no functional or operational reason to defer action to implement the addition of make-up water to the pool (ref. 2).

The enhanced SFP level instruments (X-LI-4876, 4878, 4877, 4879) do not have indication available in the control room and must be read remotely outside of the control room.

NEI 99-01 Basis:

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

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

Escalation of the emergency classification level would be via IC AG1 or RG2.

CPNPP Basis Reference(s):

1. NRC EA-12-51 Issuance of Order to Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation
2. TXX-13103 Overall Integrated Plan in Response to March 12,2012 Commission Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation (Order Number EA-12-051), Response to Request for Additional Information
3. NEI 99-01 AS2

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 2 – Irradiated Fuel Event

Initiating Condition: Spent fuel pool level cannot be restored to at least the top of the fuel racks for 60 minutes or longer

EAL:

RG2.1 General Emergency

Spent fuel pool level **cannot** be restored to at least El. 835.3' (Level 3) for greater than or equal to 60 min. (Note 1)

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

Mode Applicability:

All

Definition(s):

None

CPNPP 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) (ref. 1).

Level 3 is the level where fuel remains covered and actions to implement make-up water addition should no longer be deferred. Level 3 corresponds nominally (i.e., +/- 1 foot) to the highest point of any fuel rack seated in the spent fuel pool. Level 3 is defined in this manner to provide the maximum range of information to operators, decision makers and emergency response personnel. Comanche Peak designated as Level 3 the water level greater than 1 foot above the top of the fuel storage racks plus the accuracy of the SFP level instrument channel (El. 835' – 2.75" rounded to 835.3' indicated). Designation of this level as Level 3 is conservative; its selection assures that the fuel will remain covered, and at that point there would be no functional or operational reason to defer action to implement the addition of make-up water to the pool (ref. 2).

The enhanced SFP level instruments (X-LI-4876, 4878, 4877, 4879) do not have indication available in the control room and must be read remotely outside of the control room.

NEI 99-01 Basis:

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

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

CPNPP Basis Reference(s):

1. NRC EA-12-51 Issuance of Order to Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation
2. TXX-13103 Overall Integrated Plan in Response to March 12,2012 Commission Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation (Order Number EA-12-051), Response to Request for Additional Information
3. NEI 99-01 AG2

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 3 – Area Radiation Levels

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

EAL:

RA3.1 Alert

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

Control Room

CRM048 (X-RE-6281) or CRM049 (X-RE-6282)

OR

Central Alarm Station (by survey)

Mode Applicability:

All

Definition(s):

None

CPNPP Basis:

X-RE-6281 and X-RE-6282 are the installed Control Room area radiation monitors and may be used to assess this EAL threshold (range of 1E-4 to 1E+5 mR/hr). However, no permanently installed area radiation monitoring is installed in the CAS and therefore this threshold must be assessed via local radiation survey (ref. 1).

NEI 99-01 Basis:

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

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

CPNPP Basis Reference(s):

1. DBD-EE-023 Radiation Monitoring System
2. NEI 99-01 AA3

Category: R – Abnormal Rad Levels / Rad Effluent

Subcategory: 3 – Area Radiation Levels

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

EAL:

RA3.2 Alert

An UNPLANNED event results in radiation levels that prohibit or IMPEDE access to **any** Table R-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
Charging Pump Rooms	1, 2, 3, 4, 5, 6
CVCS Valve Rooms	1, 2, 3, 4, 5, 6
1E Switchgear Rooms	All
RHR Pump Rooms	4, 5, 6

Mode Applicability:

All

Definition(s):

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

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

CPNPP Basis:

For this EAL, area or room access is considered impeded if radiation levels require locked high radiation controls to to be imposed.

If the equipment in the listed room or area was already inoperable, or out-of-service, before the event occurred, then no emergency should be declared since the event will have no adverse impact beyond that already allowed by Technical Specifications at the time of the event.

The list of plant rooms or areas with entry-related mode applicability identified specify those rooms or areas that contain equipment which require a manual/local action as specified in operating procedures used for normal plant operation, cooldown and shutdown. Rooms or areas in which actions of a contingent or emergency nature would be performed (e.g., an action to address an off-normal or emergency condition such as emergency repairs, corrective

measures or emergency operations) are not included. In addition, the list specifies the plant mode(s) during which entry would be required for each room or area (ref. 1).

NEI 99-01 Basis:

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

For RA3.2, an Alert declaration is warranted if entry into the affected room/area is, or may be, procedurally required during the plant operating mode in effect at the time of the elevated radiation levels. The emergency classification is not contingent upon whether entry is actually necessary at the time of the increased radiation levels. Access should be considered as impeded if extraordinary measures are necessary to facilitate entry of personnel into the affected room/area (e.g., installing temporary shielding, requiring use of non-routine protective equipment, requesting an extension in dose limits beyond normal administrative limits).

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

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

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

CPNPP Basis Reference(s):

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

Category E – Independent Spent Fuel Storage Installation (ISFSI)

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

An independent spent fuel storage installation (ISFSI) is a complex that is designed and constructed for the interim storage of spent nuclear fuel and other radioactive materials associated with spent fuel storage. A significant amount of the radioactive material contained within a canister must escape its packaging and enter the biosphere for there to be a significant environmental effect resulting from an accident involving the dry storage of spent nuclear fuel.

An Unusual Event is declared on the basis of the occurrence of an event of sufficient magnitude that a loaded cask confinement boundary is damaged or violated.

Category: ISFSI

Subcategory: Confinement Boundary

Initiating Condition: Damage to a loaded cask CONFINEMENT BOUNDARY

EAL:

EU1.1 Unusual Event

Damage to a loaded cask CONFINEMENT BOUNDARY as indicated by an on-contact radiation reading greater than **EITHER**:

- 60 mrem/hr ($\gamma + n$) on the top of the overpack
- 600 mrem/hr ($\gamma + n$) on the side of the overpack (excluding inlet and outlet ducts)

Mode Applicability:

All

Definition(s):

CONFINEMENT BOUNDARY-. The barrier(s) between spent fuel and the environment once the spent fuel is processed for dry storage. As applied to the CPNPP ISFSI, the CONFINEMENT BOUNDARY is defined to be the Multi-Purpose Canister (MPC).

CPNPP Basis:

The ISFSI includes the dry-cask storage system, the cask transfer facility, onsite transporter, and the storage pads. The dry-cask storage system is the HI-STORM 100 System. This is a canister-based storage system that stores spent nuclear fuel in a vertical orientation. It consists of three discrete components: the MPC, the HI-TRAC 125 Transfer Cask, and the HI-STORM 100 System Overpack. The MPC provides the confinement boundary for the stored fuel. The HI-TRAC 125 Transfer Cask provides radiation shielding and structural protection of the MPC during transfer operations, while the storage overpack provides radiation shielding and structural protection of the MPC during storage (ref. 1).

The value shown represents 2 times the limits specified in the ISFSI Certificate of Compliance Technical Specification section 5.7.4 for radiation external to a loaded MPC overpack (ref. 1).

NEI 99-01 Basis:

This IC addresses an event that results in damage to the CONFINEMENT BOUNDARY of a storage cask containing spent fuel. It applies to irradiated fuel that is licensed for dry storage beginning at the point that the loaded storage cask is sealed. The issues of concern are the creation of a potential or actual release path to the environment, degradation of one or more fuel assemblies due to environmental factors, and configuration changes which could cause challenges in removing the cask or fuel from storage.

The existence of "damage" is determined by radiological survey. The technical specification multiple of "2 times", which is also used in Recognition Category R IC RU1, is used here to

distinguish between non-emergency and emergency conditions. The emphasis for this classification is the degradation in the level of safety of the spent fuel cask and not the magnitude of the associated dose or dose rate. It is recognized that in the case of extreme damage to a loaded cask, the fact that the "on-contact" dose rate limit is exceeded may be determined based on measurement of a dose rate at some distance from the cask.

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

CPNPP Basis Reference(s):

1. HI-2104635, HI-STORM Certificate of Compliance Appendix A Technical Specification Section 5.7.4
2. RPI-792 HI-STORM Overpack Surface Dose Rates
3. NEI 99-01 E-HU1

Category C – Cold Shutdown / Refueling System Malfunction

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

Category C EALs are directly associated with cold shutdown or refueling system safety functions. Given the variability of plant configurations (e.g., systems out-of-service for maintenance, containment open, reduced AC power redundancy, time since shutdown) during these periods, the consequences of any given initiating event can vary greatly. For example, a loss of decay heat removal capability that occurs at the end of an extended outage has less significance than a similar loss occurring during the first week after shutdown. Compounding these events is the likelihood that instrumentation necessary for assessment may also be inoperable. The cold shutdown and refueling system malfunction EALs are based on performance capability to the extent possible with consideration given to RCS integrity, containment closure, and fuel clad integrity for the applicable operating modes (5 - Cold Shutdown, 6 - Refueling, 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 6.9 KV 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.

5. Loss of Communications

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

6. Hazardous Event Affecting Safety Systems

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

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 1 – RCS Level

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

EAL:

CU1.1 Unusual Event

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

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

Mode Applicability:

5 - Cold Shutdown, 6 - Refueling

Definition(s):

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

CPNPP 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 (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). The Reactor Vessel flange level is 834' ½" elevation or 132.5 in. above the upper core plate (top) (ref. 3).

NEI 99-01 Basis:

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

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

This EAL recognizes that the minimum required RCS level can change several times during the course of a refueling outage as different plant configurations and system lineups are implemented. This EAL is met if the minimum level, specified for the current plant conditions,

cannot be maintained for 15 minutes or longer. The minimum level is typically specified in the applicable operating procedure but may be specified in another controlling document.

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

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

CPNPP Basis Reference(s):

1. ALM-0052A/B Alarm Procedure u-ALB-5B (5B-3.6)
2. Technical Specification Section 3.9.7 Refueling Cavity Water Level
3. IPO-010A/B Reactor Coolant System Reduced Inventory Operations
4. NEI 99-01 CU1

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 1 – RCS Level

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

EAL:

CU1.2 Unusual Event

RCS 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
• Containment Sump 1
• Containment Sump 2
• Reactor Cavity Sump
• CCW Surge Tank A
• CCW Surge Tank B
• PRT
• RCDT

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.

CPNPP 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 (Table C-1). Level increases must be evaluated against other potential sources of leakage such as cooling water sources inside the containment to ensure they are indicative of RCS leakage. If the make-up rate to the RCS unexplainably rises above the pre-established rate, a loss of RCS inventory may be occurring even if the source of the leakage cannot be immediately identified. Visual observation of

leakage from systems connected to the RCS that cannot be isolated could also be indicative of a loss of RCS inventory (ref. 1, 2, 3, 4).

NEI 99-01 Basis:

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

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

This EAL addresses a condition where all means to determine level have been lost. In this condition, operators may determine that an inventory loss is occurring by observing changes in sump and/or tank levels (Table C-1). Sump and/or tank level changes must be evaluated against other potential sources of water flow to ensure they are indicative of leakage from the RCS.

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

CPNPP Basis Reference(s):

1. IPO-010A/B Reactor Coolant System Reduced Inventory Operations
2. SOP-101A/B Reactor Coolant System
3. ABN-103 Excessive Reactor Coolant Leakage
4. ABN-108 Shutdown Loss of Coolant
5. NEI 99-01 CU1

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 1 – RCS Level

Initiating Condition: Loss of RCS inventory

EAL:

CA1.1 Alert

Loss of RCS inventory as indicated by RCS level less than 48 in. above upper core plate (top)

Mode Applicability:

5 - Cold Shutdown, 6 – Refueling

Definition(s):

None

CPNPP Basis:

When Reactor Vessel water level decreases to 48 in. above the upper core plate (top) (EL 827' 0"), RHR pump cavitation may occur. RCS level can be monitored by one or more of the following (ref. 1, 2, 3, 4, 5, 6):

- RCS Level Wide Range u-LI-3615B
- RCS Level Narrow Range u-LI-3615A
- RCS Extended Wide Range u-LI-3615C
- Mansell Level Monitor System u-LT-3619A/B/C-1, -2
- Plant Computer
- RVLIS
- Ultrasonic Level monitoring (optional)

NEI 99-01 Basis:

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

For this EAL, a lowering of RCS water level below 48 in. above the upper core plate (top) indicates that operator actions have not been successful in restoring and maintaining RCS water level. The heat-up rate of the coolant will increase as the available water inventory is reduced. A continuing decrease in water level will lead to core uncovery.

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

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

CPNPP Basis Reference(s):

1. IPO-010A/B Reactor Coolant System Reduced Inventory Operations
2. INC-6269 Calibration of the Mansell RCS Measurement System
3. SOP-101A/B Reactor Coolant System
4. ABN-103 Excessive Reactor Coolant Leakage
5. ABN-104 Residual Heat Removal System Malfunction
6. ABN-108 Shutdown Loss of Coolant
7. NEI 99-01 CA1

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 1 – RCS Level

Initiating Condition: Loss of RCS inventory

EAL:

CA1.2 Alert

RCS water level cannot be monitored for greater than or equal to 15 min. (Note 1)

AND EITHER

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

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

Table C-1 Sumps / Tanks
• Containment Sump 1
• Containment Sump 2
• Reactor Cavity Sump
• CCW Surge Tank A
• CCW Surge Tank B
• PRT
• RCDT

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.

CPNPP 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).

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, 3).

NEI 99-01 Basis:

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

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

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

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

CPNPP Basis Reference(s):

1. ABN-103 Excessive Reactor Coolant Leakage
2. ABN-108 Shutdown Loss of Coolant
3. FSAR 5.2.5.2
4. NEI 99-01 CA1

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 1 – RCS Level

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

EAL:

CS1.1 Site Area Emergency

With CONTAINMENT CLOSURE **not** established, RCS level less than 27.3 in. above upper core plate (top)

Mode Applicability:

5 – Cold Shutdown, 6 – Refueling

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. Containment closure means that all potential escape paths are closed or capable of being closed:

A. All penetrations providing direct access from Containment atmosphere to outside atmosphere are closed except:
   - Penetrations with automatic valves capable of being closed by an operable CVI
   - Penetrations under administrative controls (e.g., Control Room notified and designated person to close if required by fuel handling accident)
B. Equipment hatch is closed and held in place by 4 bolts, or is capable of being closed and held in place by 4 bolts
C. One emergency airlock door is closed
D. One personnel airlock door is capable of being closed

CPNPP Basis:

When Reactor Vessel water level decreases to 27.25 in. (rounded to 27.3 in. for instrument readability), 825'-3 ¼" elevation (ref. 1), water level is six inches below the elevation of the bottom of the RCS hot leg penetration. When Reactor Vessel water level drops significantly below the elevation of the bottom of the RCS hot leg penetration, all sources of RCS injection have failed or are incapable of making up for the inventory loss. RCS elevations are illustrated in Figure C-3. RCS level can be monitored by one or more of the following (ref. 1, 2, 3):

- RCS Level Wide Range u-LI-3615B
- RCS Level Narrow Range u-LI-3615A
- RCS Extended Wide Range u-LI-3615C
- Mansell Level Monitor System u-LT-3619A/B/C-1, -2
- Plant Computer
- RVLIS
- Ultrasonic Level monitoring (optional)

In Refueling mode, Reactor Vessel water level indication from RVLIS is likely unavailable but alternate means of level indication are normally installed (including visual observation) to assure that the ability to monitor water level will not be interrupted.

The status of Containment closure is tracked if plant conditions change that could raise the risk of a fission product release as a result of a loss of decay heat removal (ref. 4, 5).

NEI 99-01 Basis:

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

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

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 CS2.2 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

CPNPP Basis Reference(s):

1. IPO-010A/B Reactor Coolant System Reduced Inventory Operations
2. INC-6269 Calibration of the Mansell RCS Measurement System
3. SOP-101A/B Reactor Coolant System
4. Technical Specifications 3.9.4
5. OPT-408A/B Refueling Containment Penetration Verification
6. NEI 99-01 CS1

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, RCS level less than or equal to 0 in. above upper core plate (top)

Mode Applicability:

5 – Cold Shutdown, 6 – Refueling

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. Containment closure means that all potential escape paths are closed or capable of being closed:

A. All penetrations providing direct access from Containment atmosphere to outside atmosphere are closed except:
   - Penetrations with automatic valves capable of being closed by an operable CVI
   - Penetrations under administrative controls (e.g., Control Room notified and designated person to close if required by fuel handling accident)
B. Equipment hatch is closed and held in place by 4 bolts, or is capable of being closed and held in place by 4 bolts
C. One emergency airlock door is closed
D. One personnel airlock door is capable of being closed

CPNPP Basis:

When Reactor Vessel water level drops below 0 in. above upper core plate (top) 823'-0" elevation (ref. 1), core uncovery is about to occur. RCS level can be monitored by one or more of the following (ref. 1, 2, 3):

- RCS Level Wide Range u-LI-3615B
- RCS Level Narrow Range u-LI-3615A
- RCS Extended Wide Range u-LI-3615C
- Mansell Level Monitor System u-LT-3619A/B/C-1, -2
- Plant Computer
- RVLIS
- Ultrasonic Level monitoring (optional)

Under the conditions specified by this EAL, continued lowering of Reactor Vessel water level is indicative of a loss of inventory control. Inventory loss may be due to a vessel breach, RCS pressure boundary leakage or continued boiling in the Reactor Vessel. The magnitude of this

loss of water indicates that makeup systems have not been effective and may not be capable of preventing further RCS or Reactor Vessel water level drop and potential core uncovery. The inability to restore and maintain level after reaching this setpoint infers a failure of the RCS barrier and Potential Loss of the Fuel Clad barrier.

The status of Containment closure is tracked if plant conditions change that could raise the risk of a fission product release as a result of a loss of decay heat removal (ref. 4, 5).

NEI 99-01 Basis:

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

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

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

CPNPP Basis Reference(s):

1. IPO-010A/B Reactor Coolant System Reduced Inventory Operations
2. INC-6269 Calibration of the Mansell RCS Measurement System
3. SOP-101A/B Reactor Coolant System
4. Technical Specifications 3.9.4
5. OPT-408A/B Refueling Containment Penetration Verification
6. NEI 99-01 CS1

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 greater than or equal to 30 min. (Note 1)

AND

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

- UNPLANNED increase in **any** Table C-1 sump/tank level of sufficient magnitude to indicate core uncovery
- Erratic Source Range Monitor indication
- greater than 20,000 R/hr on **any** of the following:
  - CTEu16, Containment HRRM (u-RE-6290A)
  - CTWu17, Containment HRRM (u-RE-6290B)

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

Table C-1 Sumps / Tanks
• Containment Sump 1
• Containment Sump 2
• Reactor Cavity Sump
• CCW Surge Tank A
• CCW Surge Tank B
• PRT
• RCDT

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.

CPNPP 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 RCS level may be monitored by different means, including the ability to monitor level visually.

In this EAL, all RCS water level indication would be unavailable for greater than 30 minutes, and the RCS inventory loss must be detected by indirect leakage indications (Table C-1). 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 RCS inventory loss may be detected by the Containment High Range Radiation Monitor (HRRM) 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 Containment High Range Radiation Monitor indication greater than 20,000 R/hr (ref. 3). The Containment HRRMs have a range of 1E-1 to 1E+8 R/hr.

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

NEI 99-01 Basis:

This IC 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 level cannot be restored, fuel damage is probable.

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

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

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

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

CPNPP Basis Reference(s):

1. ABN-103 Excessive Reactor Coolant Leakage
2. ABN-108 Shutdown Loss of Coolant
3. Engineering Handbook, Guidelines for Events Beyond Design Basis: Spent Fuel Pools, Figure D "Dose Rate at Elevation 860' above Stored Fuel vs. Water Level Depth in SFP"
4. Severe Accident Management Guidance Technical Basis Report, Volume 1: Candidate High-Level Actions and Their Effects, pgs 2-18, 2-19
5. Nuclear Safety Analysis Center (NSAC), 1980, "Analysis of Three Mile Island - Unit 2 Accident," NSAC-1
6. NEI 99-01 CS1

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 1 – RCS Level

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

EAL:

CG1.1 General Emergency

RCS level less than or equal to 0 in. above upper core plate (top) for ≥ 30 min. (Note 1)

AND

Any Containment Challenge indication, Table C-2

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

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

Table C-2 Containment Challenge Indications
• CONTAINMENT CLOSURE **not** established (Note 6) • Containment hydrogen concentration greater than 4% • Unplanned rise greater than 1 psig in Containment pressure

Mode Applicability:

5 – Cold Shutdown, 6 – Refueling

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. Containment closure means that all potential escape paths are closed or capable of being closed:

A. All penetrations providing direct access from Containment atmosphere to outside atmosphere are closed except:
   - Penetrations with automatic valves capable of being closed by an operable CVI
   - Penetrations under administrative controls (e.g., Control Room notified and designated person to close if required by fuel handling accident)
B. Equipment hatch is closed and held in place by 4 bolts, or is capable of being closed and held in place by 4 bolts
C. One emergency airlock door is closed
D. One personnel airlock door is capable of being closed

CPNPP Basis:

When Reactor Vessel water level drops below 0 in. above upper core plate (top) 823'-0" elevation (ref. 1), core uncovery is about to occur. RCS level can be monitored by one or more of the following (ref. 1, 2, 3):

- RCS Level Wide Range u-LI-3615B
- RCS Level Narrow Range u-LI-3615A
- RCS Extended Wide Range u-LI-3615C
- Mansell Level Monitor System u-LT-3619A/B/C-1, -2
- Plant Computer
- RVLIS
- Ultrasonic Level monitoring (optional)

Under the conditions specified by this EAL, continued lowering of Reactor Vessel water level is indicative of a loss of inventory control. Inventory loss may be due to a vessel breach, RCS pressure boundary leakage or continued boiling in the Reactor Vessel. The magnitude of this loss of water indicates that makeup systems have not been effective and may not be capable of preventing further RCS or Reactor Vessel water level drop and potential core uncovery. The inability to restore and maintain level after reaching this setpoint infers a failure of the RCS barrier and Potential Loss of the Fuel Clad barrier.

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 (ref. 4, 5). If containment closure is re-established prior to exceeding the 30 minute core uncovery time limit then escalation to GE would not occur.
2. Containment hydrogen greater than 4% - The 4% hydrogen concentration threshold is generally considered the lower limit for hydrogen deflagrations. CPNPP is equipped with a Hydrogen Control System (HCS) which serves to limit or reduce combustible gas concentrations in the Containment. The plant has two hydrogen monitoring systems. Each monitoring system consists of four sensor modules and one microprocessor analyzer. Two sensors from each Containment are coupled to one of the two hydrogen microprocessors located in the Control Room. Thus each microprocessor analyzer is shared by Units 1 and 2. The analyzer system has a range of 0-10% hydrogen by volume. The detector modules are located on the 905', 873', and 860' elevations in Containment. A fourth detector is located on 832' level across from the loop room entrance for loops 1 and 4. Hydrogen concentration is displayed in the Control Room on u-AI-5506A/B and u-AI-5506C/D. Hydrogen concentration can also be displayed on the Plant Computer. Alarms at ~3% are provided for high hydrogen concentration, u-ALB-3A, window 3.7. If a hydrogen concentration value can not be obtained from the hydrogen monitoring system, a grab sample from the containment PIG radiation monitor may be used to determine the hydrogen concentration (ref. 6, 7, 8, 9).
3. UNPLANNED rise in Containment pressure - An unplanned pressure rise in containment while in cold Shutdown or Refueling modes can threaten Containment

Closure capability and thus Containment potentially cannot be relied upon as a barrier to fission product release.

NEI 99-01 Basis:

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

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

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

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

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

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

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*.

CPNPP Basis Reference(s):

1. IPO-010A/B Reactor Coolant System Reduced Inventory Operations
2. INC-6269 Calibration of the Mansell RCS Measurement System
3. SOP-101A/B Reactor Coolant System
4. Technical Specifications 3.9.4
5. OPT-408A/B Refueling Containment Penetration Verification
6. FRC-0.1A/B Response to Inadequate Core Cooling, Attachment 5
7. FSAR Section 6.2.5
8. FSAR Table 7.5-7A
9. CHM-111 Primary Chemistry Accident Assessment Sampling Program
10. NEI 99-01 CS1

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 1 – RCS Level

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

EAL:

CG1.2 General Emergency

RCS level **cannot** be monitored for greater than or equal to 30 min. (Note 1)

AND

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

- UNPLANNED increase in **any** Table C-1 sump/tank level of sufficient magnitude to indicate core uncovery
- Erratic Source Range Monitor indication
- Greater than 20,000 R/hr on **any** of the following:

  - CTEu16, Containment HRRM (u-RE-6290A)
  - CTWu17, Containment HRRM (u-RE-6290B)

AND

Any Containment Challenge indication, Table C-2

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

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

Table C-1 Sumps / Tanks
• Containment Sump 1
• Containment Sump 2
• Reactor Cavity Sump
• CCW Surge Tank A
• CCW Surge Tank B
• PRT
• RCDT

Table C-2 Containment Challenge Indications
• CONTAINMENT CLOSURE **not** established (Note 6) • Containment hydrogen concentration greater than 4% • Unplanned rise greater than 1 psig in Containment pressure

Mode Applicability:

5 - Cold Shutdown, 6 – Refueling

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. Containment closure means that all potential escape paths are closed or capable of being closed:

A. All penetrations providing direct access from Containment atmosphere to outside atmosphere are closed except:
   - Penetrations with automatic valves capable of being closed by an operable CVI
   - Penetrations under administrative controls (e.g., Control Room notified and designated person to close if required by fuel handling accident)
B. Equipment hatch is closed and held in place by 4 bolts, or is capable of being closed and held in place by 4 bolts
C. One emergency airlock door is closed
D. One personnel airlock door is capable of being closed

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.

CPNPP 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 RCS level may be monitored by different means, including the ability to monitor level visually.

In this EAL, all RCS water level indication would be unavailable for greater than 30 minutes, and the RCS inventory loss must be detected by indirect leakage indications (Table C-1). 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 RCS inventory loss may be detected by the Containment High Range Radiation Monitor (HRRM) 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 Containment High Range Radiation Monitor indication greater than 20,000 R/hr (ref. 3). The Containment HRRMs have a range of 1E-1 to 1E+8 R/hr.

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

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 (ref. 6, 7). If containment closure is re-established prior to exceeding the 30 minute core uncovery time limit then escalation to GE would not occur.
2. Containment hydrogen greater than 4% - The 4% hydrogen concentration threshold is generally considered the lower limit for hydrogen deflagrations. CPNPP is equipped with a Hydrogen Control System (HCS) which serves to limit or reduce combustible gas concentrations in the Containment. The plant has two hydrogen monitoring systems. Each monitoring system consists of four sensor modules and one microprocessor analyzer. Two sensors from each Containment are coupled to one of the two hydrogen microprocessors located in the Control Room. Thus each microprocessor analyzer is shared by Units 1 and 2. The analyzer system has a range of 0-10% hydrogen by volume. The detector modules are located on the 905', 873', and 860' elevations in Containment. A fourth detector is located on 832' level across from the loop room entrance for loops 1 and 4. Hydrogen concentration is displayed in the Control Room on u-AI-5506A/B and u-AI-5506C/D. Hydrogen concentration can also be displayed on the Plant Computer. Alarms at ~3% are provided for high hydrogen concentration, u-ALB-3A, window 3.7. If a hydrogen concentration value can not be obtained from the hydrogen monitoring system, a grab sample from the containment PIG radiation monitor may be used to determine the hydrogen concentration (ref. 8, 9, 10, 11).
3. UNPLANNED rise in Containment pressure - An unplanned pressure rise in containment while in cold Shutdown or Refueling modes can threaten Containment Closure capability and thus Containment potentially cannot be relied upon as a barrier to fission product release.

NEI 99-01 Basis:

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

Following an extended loss of core decay heat removal and inventory makeup, decay heat will cause reactor coolant boiling and a further reduction in reactor vessel level. If RCS level

cannot be restored, fuel damage is probable.

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

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

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

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

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

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.*

CPNPP Basis Reference(s):

1. ABN-103 Excessive Reactor Coolant Leakage
2. ABN-108 Shutdown Loss of Coolant
3. Engineering Handbook, Guidelines for Events Beyond Design Basis: Spent Fuel Pools, Figure D "Dose Rate at Elevation 860' above Stored Fuel vs. Water Level Depth in SFP"
4. Severe Accident Management Guidance Technical Basis Report, Volume 1: Candidate High-Level Actions and Their Effects, pgs 2-18, 2-19
5. Nuclear Safety Analysis Center (NSAC), 1980, "Analysis of Three Mile Island - Unit 2 Accident," NSAC-1
6. Technical Specifications 3.9.4
7. OPT-408A/B Refueling Containment Penetration Verification
8. FRC-0.1A/B Response to Inadequate Core Cooling, Attachment 5
9. FSAR Section 6.2.5
10. FSAR Table 7.5-7A
11. CHM-111 Primary Chemistry Accident Assessment Sampling Program
12. NEI 99-01 CG1

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 safeguard buses for 15 minutes or longer

EAL:

CU2.1 Unusual Event

AC power capability, Table C-3, to 6.9 KV safeguard buses uEA1 and uEA2 reduced to a single power source for greater than or equal to 15 min. (Note 1)

AND

Any additional single Table C-3 power source failure will result in loss of **all** AC power to SAFETY SYSTEMS

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

Table C-3 AC Power Sources
Offsite: • 138 KV switchyard circuit • 345 KV switchyard circuit **Onsite:** • uEG1 • uEG2

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.

CPNPP Basis:

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.

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 safeguards AC distribution system power sources consist of the preferred and alternate offsite power sources, and the onsite standby emergency diesel generators uEG1 and uEG2. Offsite power is supplied to the plant switchyards from the transmission network by five 345 KV and two 138 KV transmission lines. From the switchyards, two electrically and physically separated circuits provide AC power through step down startup transformers, to the 6.9 kV safeguard buses. The 138 kV switchyard circuit is the preferred source for Unit 2 and alternate source for Unit 1. The 345 KV circuit is the preferred source for Unit 1 and alternate source for Unit 2. The onsite AC distribution system is divided into redundant trains so that the loss of any one load group does not prevent the minimum safety functions from being performed. Each train has connections to two offsite power sources and a dedicated diesel generator. Each offsite circuit can supply the Unit 1 and Unit 2 6.9 KV safeguard buses. (ref. 1, 2, 3, 4).

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

NEI 99-01 Basis:

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

When in the cold shutdown, refueling, or defueled 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 AOPs and EOPs, and capable of supplying required power to an essential bus. Some examples of this condition are presented below.

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

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

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

CPNPP Basis Reference(s):

1. FSAR Figure 8.3-1
2. FSAR Section 8.2
3. FSAR Section 8.3
4. Technical Specifications B3.8.1
5. ABN-601 Response to a 138/345 KV System Malfunction
6. ABN-602 Response to a 6900/480V System Malfunction
7. NEI 99-01 CU2

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 safeguard buses for 15 minutes or longer

EAL:

CA2.1 Alert

Loss of **all** offsite and **all** onsite AC power capability, Table C-3, to 6.9 KV safeguard buses uEA1 and uEA2 for greater than or equal to 15 min. (Note 1)

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

Table C-3 AC Power Sources

Offsite:

- 138 KV switchyard circuit
- 345 KV switchyard circuit

Onsite:

- uEG1
- uEG2

Mode Applicability:

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

CPNPP Basis:

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.

The safeguards AC distribution system power sources consist of the preferred and alternate offsite power sources, and the onsite standby emergency diesel generators uEG1 and uEG2. Offsite power is supplied to the plant switchyards from the transmission network by five 345 KV and two 138 KV transmission lines. From the switchyards, two electrically and physically separated circuits provide AC power through step down startup transformers, to the 6.9 kV safeguard buses. The 138 kV switchyard circuit is the preferred source for Unit 2 and alternate source for Unit 1. The 345 KV circuit is the preferred source for Unit 1 and alternate source for Unit 2. The onsite AC distribution system is divided into redundant trains so that the loss of any one load group does not prevent the minimum safety functions from being performed. Each train has connections to two offsite power sources and a dedicated diesel generator. Each offsite circuit can supply the Unit 1 and Unit 2 6.9 KV safeguard buses. (ref. 1, 2, 3, 4)

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

NEI 99-01 Basis:

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

When in the cold shutdown, refueling, or defueled 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.

CPNPP Basis Reference(s):

1. FSAR Figure 8.3-1
2. FSAR Section 8.2
3. FSAR Section 8.3
4. Technical Specifications B3.8.1
5. ABN-601 Response to a 138/345 KV System Malfunction
6. ABN-602 Response to a 6900/480V System Malfunction
7. NEI 99-01 CA2

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 3 – RCS Temperature

Initiating Condition: UNPLANNED increase in RCS temperature

EAL:

CU3.1 Unusual Event
UNPLANNED increase in RCS temperature to greater than 200°F due to loss of decay heat removal capability (Note 9)

Note 9: Begin monitoring hot condition EALs concurrently.

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.

CPNPP 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 loop T_{hot} (u-TR-413A/23A, u -TR-433A/43A, u -TI-413A, u -TI-423A) and, if no RCPs are operating, the Core Exit Thermocouples (TCs). 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, 4, 5).

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.

The note is a reminder that any temperature increase above 200°F is an operating mode change from cold to hot conditions. Since each EAL is associated with operating mode applicability, the set of EALs that must be monitored must now include EALs associated with hot condition operating modes.

NEI 99-01 Basis:

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

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

This EAL involves a loss of decay heat removal capability, or an addition of heat to the RCS in excess of that which can currently be removed, such that reactor coolant temperature cannot

be maintained below the cold shutdown temperature limit specified in Technical Specifications. During this condition, there is no immediate threat of fuel damage because the core decay heat load has been reduced since the cessation of power operation.

During an outage, the level in the reactor vessel will normally be maintained at or above the reactor vessel flange. Refueling evolutions that lower water level below the reactor vessel flange are carefully planned and controlled. A loss of forced decay heat removal at reduced inventory may result in a rapid increase in reactor coolant temperature depending on the time after shutdown.

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

CPNPP Basis Reference(s):

1. Technical Specifications Table 1.1-1
2. IPO-005A/B Plant Cooldown From Hot Standby To Cold Shutdown
3. Technical Specifications 3.4.3
4. OPT-407 RCS Pressure and Temperature Verification
5. IPO-010A/B Reactor Coolant System Reduced Inventory Condition
6. NEI 99-01 CU3

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 3 – RCS Temperature

Initiating Condition: UNPLANNED increase in RCS temperature

EAL:

CU3.2	**Unusual Event**
Loss of **all** RCS temperature and RCS level indication for greater than or equal to 15 min. (Note 1)	

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

Mode Applicability:

5 - Cold Shutdown, 6- Refueling

Definition(s):

None

CPNPP Basis:

RCS level can be monitored by one or more of the following (ref. 2, 3, 4):

- RCS Level Wide Range u-LI-3615B
- RCS Level Narrow Range u-LI-3615A
- RCS Extended Wide Range u-LI-3615C
- Mansell Level Monitor System u-LT-3619A/B/C-1, -2
- Plant Computer
- RVLIS
- Ultrasonic Level monitoring (optional)

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 loop T_{hot} (u-TR-413A/23A, u -TR-433A/43A, u -TI-413A, u -TI-423A) and, if no RCPs are operating, the Core Exit Thermocouples (TCs). 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. 5, 6, 7, 8).

In the absence of reliable RCS temperature indication caused by the loss of decay heat removal capability, classification should be based on heat up rate data or additionally if in Mode 5 with RCS intact on pressure increase.

NEI 99-01 Basis:

This EAL addresses the inability to determine RCS temperature and level, and represents a potential degradation of the level of safety of the plant. If the RCS is not intact and

CONTAINMENT CLOSURE is not established during this event, the Emergency Coordinator should also refer to IC CA3.

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

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

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

CPNPP Basis Reference(s):

1. Technical Specifications Table 1.1-1
2. IPO-010A/B Reactor Coolant System Reduced Inventory Operations
3. INC-6269 Calibration of the Mansell RCS Measurement System
4. SOP-101A/B Reactor Coolant System
5. IPO-005A/B Plant Cooldown From Hot Standby To Cold Shutdown
6. Technical Specifications 3.4.3
7. OPT-407 RCS Pressure and Temperature Verification
8. IPO-010A/B Reactor Coolant System Reduced Inventory Condition
9. NEI 99-01 CU3

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 3 – RCS Temperature

Initiating Condition: Inability to maintain plant in cold shutdown

EAL:

CA3.1 Alert

UNPLANNED increase in RCS temperature to greater than 200°F for greater than Table C-4 duration
(Notes 1, 9)

OR

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

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

Note 9: Begin monitoring hot condition EALs concurrently.

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 actions taken to secure containment and its associated structures, systems, and components as a functional barrier to fission product release under shutdown conditions. Containment closure means that all potential escape paths are closed or capable of being closed:

A. All penetrations providing direct access from Containment atmosphere to outside atmosphere are closed except:
   - Penetrations with automatic valves capable of being closed by an operable CVI
   - Penetrations under administrative controls (e.g., Control Room notified and designated person to close if required by fuel handling accident)

B. Equipment hatch is closed and held in place by 4 bolts, or is capable of being closed and held in place by 4 bolts
C. One emergency airlock door is closed
D. One personnel airlock door is capable of being closed

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

REDUCED INVENTORY - Plant condition when fuel is in the reactor vessel and Reactor Coolant System level is ≤ 80 inches above core plate (829'8").

CPNPP 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 loop T_{hot} (u-TR-413A/23A, u -TR-433A/43A, u -TI-413A, u -TI-423A) and, if no RCPs are operating, the Core Exit Thermocouples (TCs). 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, 4, 5).

In the absence of reliable RCS temperature indication caused by the loss of decay heat removal capability, classification should be based on heat up rate data or additionally if in Mode 5 with RCS intact on pressure increase.

A 10 psig RCS pressure increase can be monitored on u-PI-403A and computer points P6498A and P6499A (ref. 9, 10).

The status of Containment closure is tracked if plant conditions change that could raise the risk of a fission product release as a result of a loss of decay heat removal (ref. 6, 7).

The note is a reminder that any temperature increase above 200°F is an operating mode change from cold to hot conditions. Since each EAL is associated with operating mode applicability, the set of EALs that must be monitored must now include EALs associated with hot condition operating modes.

NEI 99-01 Basis:

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

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

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

The RCS Heat-up Duration Thresholds table also addresses an increase in RCS temperature with the RCS intact. The status of CONTAINMENT CLOSURE is not crucial in this condition since the intact RCS is providing a high pressure barrier to a fission product release. The 60-

minute time frame should allow sufficient time to address the temperature increase without a substantial degradation in plant safety.

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

The RCS pressure increase threshold provides a pressure-based indication of RCS heat-up in the absence of RCS temperature monitoring capability.

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

CPNPP Basis Reference(s):

1. Technical Specifications Table 1.1-1
2. IPO-005A/B Plant Cooldown From Hot Standby To Cold Shutdown
3. Technical Specifications 3.4.3
4. OPT-407 RCS Pressure and Temperature Verification
5. IPO-010A/B Reactor Coolant System Reduced Inventory Condition
6. Technical Specifications 3.9.4
7. OPT-408A/B Refueling Containment Penetration Verification
8. IPO-010A/B Reactor Coolant System Reduced Inventory Operations
9. IPO-005A/B Plant Cooldown From Hot Standby To Cold Shutdown
10. SOP-101A/B Reactor Coolant System Reduced Inventory
11. NEI 99-01 CA3

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 4 – Loss of Vital DC Power

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

EAL:

CU4.1 Unusual Event

Less than 105 VDC bus voltage indications on Technical Specification **required** 125 VDC buses (uED1, uED2, uED3, uED4) for greater than or equal to 15 min. (Note 1)

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

Mode Applicability:

5 - Cold Shutdown, 6 - Refueling

Definition(s):

None

CPNPP Basis:

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

The safeguards 125 VDC buses are the Class 1E buses uED1, uED2, uED3 and uED4 (ref. 1). The 125 VDC safeguard distribution system is illustrated in Figure C-2 (ref. 2, 3).

Each redundant safeguards 125 VDC system consists of two independent batteries each having one main distribution bus, two static battery chargers (one spare), and local distribution panels. For Unit 1, batteries BT1ED1 and BT1ED3 feed all train A load requirements, while batteries BT1ED2 and BT1ED4 supply train B load requirements.

For Unit 2, batteries BT2ED1 and BT2ED3 feed all train A load requirements, while batteries BT2ED2 and BT2ED4 supply train B load requirements. There are no bus ties or sharing of power supplies between redundant trains (ref. 1).

Minimum DC bus voltage is 105 VDC (ref. 4). Bus voltage may be monitored from the following indications (ref. 6):

Control Room Panel CP-10	Annunciator u--ALB-10B	Plant Computer
V-1ED1, 125VDC SWITCH PNL 1ED1 VOLT	1.13	V6501A BATT BT1ED1 VOLT
V-1ED2, 125VDC SWITCH PNL 1ED2 VOLT	2.13	V6502A BATT BT1ED2 VOLT
V-1ED3, 125VDC SWITCH PNL 1ED3 VOLT	1.9	V6503A BATT BT1ED3 VOLT
V-1ED4, 125VDC SWITCH PNL 1ED4 VOLT	3.9	V6504A BATT BT1ED4 VOLT

This EAL is the cold condition equivalent of the hot condition loss of DC power EAL SS7.1.

NEI 99-01 Basis

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

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

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

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

CPNPP Basis Reference(s):

1. FSAR 8.3.2
2. FSAR Figure 8.3-14
3. FSAR Figure 8.3-14A
4. ECA-0.0A/B Loss of All AC Power
5. SOP-605A/B 125 VDC Switchgear and Distribution Systems, Batteries and Battery Chargers
6. ALM-0102A/B Alarm Procedures Manual, u-ALB-10B, nos. 1.9, 1.13, 2.13, 3.8
7. NEI 99-01 CU4

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 5 – Loss of Communications

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

EAL:

CU5.1 Unusual Event

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

OR

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

OR

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

Table C-5 Communication Methods

System	Onsite	Offsite	NRC
Gai-tronics Page/Party (PA)	X		
Plant Radios	X		
PABX	X	X	X
Public Telephone	X	X	X
Federal Telephone System (FTS)		X	X

Mode Applicability:

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

Definition(s):

None

CPNPP Basis:

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

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

NEI 99-01 Basis:

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

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

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

The second EAL condition addresses a total loss of the communications methods used to notify all OROs of an emergency declaration. The offsite (OROs) referred to here are the State Department of Public Safety, Somervell and Hood County EOCs

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

CPNPP Basis Reference(s):

1. FSAR 9.5.2
2. DBD-EE-048 Communication System
3. NEI 99-01 CU5

Category: C – Cold Shutdown / Refueling System Malfunction

Subcategory: 6 – Hazardous Event Affecting Safety Systems

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

EAL:

CA6.1 Alert

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

AND EITHER:

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

Table C-6 Hazardous Events

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

Mode Applicability:

5 - Cold Shutdown, 6 - Refueling

Definition(s):

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

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

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

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

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

(1) The integrity of the reactor coolant pressure boundary;

(2) The capability to shut down the reactor and maintain it in a safe shutdown condition;

(3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures.

VISIBLE DAMAGE - Damage to a component or structure that is readily observable without measurements, testing, or analysis. The visual impact of the damage is sufficient to cause concern regarding the operability or reliability of the affected component or structure.

CPNPP Basis:

- The significance of seismic events are discussed under EAL HU2.1 (ref. 1).
- Internal FLOODING may be caused by events such as component failures, equipment misalignment, or outage activity mishaps (ref. 2).
- External flooding may be due to high lake level (ref. 3, 4).
- Seismic Category I structures are analyzed to withstand a sustained, design wind velocity of at least 80 mph. (ref. 5).
- Areas containing functions and systems required for safe shutdown of the plant are identified by fire area (ref. 6, 7).
- An explosion that degrades the performance of a SAFETY SYSTEM train or visibly damages a SAFETY SYSTEM component or structure would be classified under this EAL.

NEI 99-01 Basis:

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

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

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

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

CPNPP Basis Reference(s):

1. ABN-907 Acts of Nature
2. CPNPP PRA Accident Sequence Analysis "Internal Flooding Sequences"
3. FSAR Section 2.4.3.7 Flood Evaluations for Safe Shutdown Impoundment
4. DBD-CS-071 Maximum Probable Flood
5. FSAR Section 3.3.1.1 Wind Loadings
6. CPNPP Fire Protection Report, Section 5.0 "Fire Safe Shutdown Equipment List"
7. FSAR Section 7.4 Systems Required for Safe Shutdown
8. NEI 99-01 CA6

Category H – Hazards and Other Conditions Affecting Plant Safety

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

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

1. Security

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

2. Seismic Event

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

3. Natural or Technology Hazard

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

4. Fire

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

5. Hazardous Gas

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

6. Control Room Evacuation

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

7. Emergency Coordinator Judgment

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

Category: H – Hazards

Subcategory: 1 – Security

Initiating Condition: Confirmed SECURITY CONDITION or threat

EAL:

HU1.1 Unusual Event

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

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 CPNPP 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 CPNPP. 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).

CPNPP Basis:

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

This EAL is based on the CPNPP Safeguards Contingency Plan (ref. 1).

NEI 99-01 Basis:

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

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

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

This EAL references the Shift Security Supervisor because these are the individuals trained

to confirm that a security event is occurring or has occurred. Training on security event confirmation and classification is controlled due to the nature of Safeguards and 10 CFR § 2.39 information.

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 CPNPP Safeguards Contingency Plan (ref. 1).

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

CPNPP Basis Reference(s):

1. CPNPP Safeguards Contingency Plan (Safeguards)
2. NEI 99-01 HU1

Category: H – Hazards

Subcategory: 1 – Security

Initiating Condition: Confirmed SECURITY CONDITION or threat

EAL:

HU1.2 Unusual Event

Notification of a credible security threat directed at the site

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 CPNPP 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 CPNPP. 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).

CPNPP Basis:

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

This EAL is based on the CPNPP Safeguards Contingency Plan (ref. 1).

NEI 99-01 Basis:

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

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

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

This EAL addresses the receipt of a credible security threat. The credibility of the threat is assessed in accordance with (site-specific procedure).

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

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

CPNPP Basis Reference(s):

1. CPNPP Safeguards Contingency Plan (Safeguards)
2. NEI 99-01 HU1

Category: H – Hazards

Subcategory: 1 – Security

Initiating Condition: Confirmed SECURITY CONDITION or threat

EAL:

HU1.3 Unusual Event

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

Mode Applicability:

All

Definition(s):

None

CPNPP Basis:

This EAL is based on the CPNPP Safeguards Contingency Plan (ref. 1).

NEI 99-01 Basis:

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

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

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

This EAL addresses the threat from the impact of an aircraft on the plant. The NRC Headquarters Operations Officer (HOO) will communicate to the licensee if the threat involves an aircraft. The status and size of the plane may also be provided by NORAD through the NRC. Validation of the threat is performed in accordance with (site-specific procedure).

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 CPNPP Safeguards Contingency Plan (ref. 1).

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

CPNPP Basis Reference(s):

1. CPNPP Safeguards Contingency Plan (Safeguards)
2. NEI 99-01 HU1

Category: H – Hazards

Subcategory: 1 – Security

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

EAL:

HA1.1 Alert

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

Mode Applicability:

All

Definition(s):

HOSTILE ACTION - An act toward CPNPP 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 CPNPP. 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 - As shown in CPNPP Emergency Plan Appendix E, Complex and Owner Controlled Area.

CPNPP Basis:

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

NEI 99-01 Basis:

This IC addresses the occurrence of a HOSTILE ACTION within the OWNER CONTROLLED AREA. 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 Security Shift Supervisor and the Control Room is essential for proper classification of a security-related event.

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

As time and conditions allow, these events require a heightened state of readiness by the plant staff and implementation of onsite protective measures (e.g., evacuation, dispersal or sheltering). The Alert declaration will also heighten the awareness of Offsite Response Organizations (OROs), allowing them to be better prepared should it be necessary to consider further actions.

This IC does not apply to incidents that are accidental events, acts of civil disobedience, or otherwise are not a HOSTILE ACTION perpetrated by a HOSTILE FORCE. Examples include

the crash of a small aircraft, shots from hunters, physical disputes between employees, etc. Reporting of these types of events is adequately addressed by other EALs, or the requirements of 10 CFR § 73.71 or 10 CFR § 50.72.

This EAL is applicable for any HOSTILE ACTION occurring, or that has occurred, in the OWNER CONTROLLED AREA. This includes any action directed against an ISFSI that is located outside the plant PROTECTED AREA.

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 CPNPP Safeguards Contingency Plan (ref. 1).

CPNPP Basis Reference(s):

1. CPNPP Safeguards Contingency Plan (Safeguards)
2. NEI 99-01 HA1

Category: H – Hazards

Subcategory: 1 – Security

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

EAL:

HA1.2 Alert

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

Mode Applicability:

All

Definition(s):

None

CPNPP Basis:

None

NEI 99-01 Basis:

This IC addresses the occurrence 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 Security Shift Supervisor and the Control Room is essential for proper classification of a security-related event.

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

As time and conditions allow, these events require a heightened state of readiness by the plant staff and implementation of onsite protective measures (e.g., evacuation, dispersal or sheltering). The Alert declaration will also heighten the awareness of Offsite Response Organizations (OROs), allowing them to be better prepared should it be necessary to consider further actions.

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

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

The NRC Headquarters Operations Officer (HOO) will communicate to the licensee if the threat involves an aircraft. The status and size of the plane may be provided by NORAD through the NRC.

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

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

CPNPP Basis Reference(s):

1. CPNPP Safeguards Contingency Plan (Safeguards)
2. NEI 99-01 HA1

Category: H – Hazards

Subcategory: 1 – Security

Initiating Condition: HOSTILE ACTION within the PROTECTED AREA

EAL:

HS1.1 Site Area Emergency

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

Mode Applicability:

All

Definition(s):

HOSTILE ACTION - An act toward CPNPP 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 CPNPP. 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 FSAR Figure 1.2-1 Plot Plan.

CPNPP Basis:

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

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 CPNPP Safeguards Contingency Plan (Safeguards) information. (ref. 1)

NEI 99-01 Basis:

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

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

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 Site Area Emergency declaration will mobilize Offsite Response Organization

(ORO) resources and have them available to develop and implement public protective actions in the unlikely event that the attack is successful in impairing multiple safety functions.

This IC does not apply to a HOSTILE ACTION directed at an ISFSI PROTECTED AREA located outside the plant PROTECTED AREA; such an attack should be assessed using IC HA1. It also does not apply to incidents that are accidental events, acts of civil disobedience, or otherwise are not a HOSTILE ACTION perpetrated by a HOSTILE FORCE. Examples include the crash of a small aircraft, shots from hunters, physical disputes between employees, etc. Reporting of these types of events is adequately addressed by other EALs, or the requirements of 10 CFR § 73.71 or 10 CFR § 50.72.

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

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

CPNPP Basis Reference(s):

1. CPNPP Safeguards Contingency Plan (Safeguards)
2. NEI 99-01 HS1

Category: H – Hazards

Subcategory: 1 – Security

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

EAL:

HG1.1 General Emergency

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

AND EITHER of the following has occurred:

- One or more of the following safety functions cannot be controlled or maintained
  - Reactivity control
  - Core cooling
  - RCS heat removal

  OR
- Damage to spent fuel has occurred or is IMMINENT

Mode Applicability:

All

Definition(s):

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

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

PROTECTED AREA - 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 FSAR Figure 1.2-1 Plot Plan.

CPNPP Basis:

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

NEI 99-01 Basis:

This IC addresses an event in which a HOSTILE FORCE has taken physical control of the facility to the extent that the plant staff can no longer operate equipment necessary to maintain key safety functions. It also addresses a HOSTILE ACTION leading to a loss of physical control that results in actual or IMMINENT damage to spent fuel due to 1) damage to a spent

fuel pool cooling system (e.g., pumps, heat exchangers, controls, etc.) or, 2) loss of spent fuel pool integrity such that sufficient water level cannot be maintained.

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

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

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 CPNPP Safeguards Contingency Plan (ref.1).

CPNPP Basis Reference(s):

1. CPNPP Safeguards Contingency Plan (Safeguards)
2. NEI 99-01 HG1

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 greater than OBE as indicated by annunciator 2A-3.1, OBE EXCEEDED, or yellow OBE light on Seismic Monitoring system panel

Mode Applicability:

All

Definition(s):

None

CPNPP Basis:

Seismic events of this magnitude can result in a areas needed for safe shutdown being subjected to forces beyond design limits, and thus damage may be assumed to have occurred to plant safety systems.

A conservative Safe Shutdown Earthquake (SSE) having a peak horizontal ground acceleration at the top of bedrock of 0.12 g has been selected for design (FSAR Section 2.5.2.6). The Operating Basis Earthquake (OBE) is equal to ½ the SSE (ref. 1).

When the seismic recorder indicates that the OBE has been exceeded, System Engineering must evaluate and determine whether the reactor must be shut down and remain shutdown until inspection of the facility shows that no damage has been incurred which would jeopardize safe operation of the facility or until such damage is repaired. CPNPP was designed such that, for ground motion less than the OBE, the features of the plant necessary for continued operation without undue risk to the health and safety of the public will remain functional. Any ground motion in excess of this results in an uncertainty as to the extent of the damage which must be resolved before continued operation can be considered safe (ref. 2).

The seismic trigger, CP1-SIATAS-03, is set to activate the strong motion recording system at an acceleration level slightly above normal ambient vibrations (0.01g) and well below the postulated OBE "free field" ground acceleration (0.06g horizontal). This causes an alarm in the control room to alert the operator. (ref. 2, 3) The seismic recorders (strong motion accelerators) monitor earth vibration and, when triggered, store data in the recorder. Triaxial SMAs are installed at appropriate locations to provide data on the frequency, amplitude, and phase relationship of the seismic response of the containment structure and the seismic input to other seismic Category I structures, systems, and components. The Seismic Instrumentation consists of strong motion accelerograph (triaxial time history accelerograph system), triaxial peak accelerograph recorders, passive response spectrum recorders, a response spectrum switch, and a seismic switch. Except for sensors for the active instrumentation, all electronics for processing and storage of the seismic data are located in the seismic instrumentation panel CPX-ECPRCV-11 in the control room. There is no additional seismic instrumentation required for Unit 2. However, alarms from seismic instrumentation in Unit 1 are duplicated in Unit 2. The

time history accelerograph system is fully operational within 0.1 second after the seismic trigger is actuated.

It will operate continuously during the period in which the earthquake exceeds the seismic trigger threshold (0.01g) plus 5 seconds (minimum) beyond the last seismic trigger signal.

ABN-907 Acts of Nature provides the guidance for determining if the OBE earthquake threshold is exceeded and any required response actions. (ref. 2)

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 CPNPP. Alternatively, near real-time seismic activity can be accessed via the NEIC website:

http://earthquake.usgs.gov/earthquakes/dyfi/archives.php

NEI 99-01 Basis:

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

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

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

CPNPP Basis Reference(s):

1. FSAR Section 2.5.4.9 Earthquake Design Basis
2. ABN-907 Acts of Nature
3. DBD-EE-077 Seismic Instrumentation
4. 1, 2-ALB-2A-3.1 OBE EXCEEDED
5. DBD-ME-028 Classification of Structures, Systems and Components
6. NEI 99-01 HU2

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 FSAR Figure 1.2-1 Plot Plan.

CPNPP Basis:

Response actions associated with a tornado onsite is provided in ABN-907 Acts of Nature (ref. 1).

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

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

NEI 99-01 Basis:

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

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

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

CPNPP Basis Reference(s):

1. ABN-907 Acts of Nature
2. NEI 99-01 HU3

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.

CPNPP Basis:

The internal flooding areas of concern are the Safeguards Building and Turbine Building (ref.1). Refer to EAL CA6.1 for internal flooding affecting one or more SAFETY SYSTEM trains.

NEI 99-01 Basis:

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

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

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

CPNPP Basis Reference(s):

1. CPNPP PRA Accident Sequence Analysis "Internal Flooding Sequences"
2. NEI 99-01 HU3

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 FSAR Figure 1.2-1 Plot Plan.

CPNPP Basis:

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

NEI 99-01 Basis:

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

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

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

CPNPP Basis Reference(s):

1. NEI 99-01 HU3

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

CPNPP Basis:

None

NEI 99-01 Basis:

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

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

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

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

CPNPP Basis Reference(s):

1. NEI 99-01 HU3

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 4 – Fire

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

EAL:

HU4.1 Unusual Event

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

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

AND

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

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

Table H-1 Fire Areas

- u-Containment
- u-Safeguards Building
- X-Auxiliary Building
- X-Electrical & Control Building
- X-Fuel Building
- X-Service Water Intake Structure
- u-Diesel Generator Building
- u-Normal Switchgear Rooms
- u-CST
- u-RWST

Mode Applicability:

All

Definition(s):

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

CPNPP Basis:

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

time limit or a classification must be made. If a fire is verified to be occurring by field report, the 15 minute time limit is from the original receipt of the fire detection alarm.

Table H-1 applies to buildings and areas housing equipment needed for safe shutdown (SAFETY SYSTEMS) (ref. 1, 2).

NEI 99-01 Basis:

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

For EAL HU4.1 the intent of the 15-minute duration is to size the FIRE and to discriminate against small FIRES that are readily extinguished (e.g., smoldering waste paper basket). In addition to alarms, other indications of a FIRE could be a drop in fire main pressure, automatic activation of a suppression system, etc.

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

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

CPNPP Basis Reference(s):

1. CPNPP Fire Protection Report, Section 5.0 "Fire Safe Shutdown Equipment List"
2. FSAR Section 7.4 Systems Required for Safe Shutdown
3. NEI 99-01 HU4

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 4 – Fire

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

EAL:

HU4.2 Unusual Event

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

AND

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

AND

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

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

Table H-1 Fire Areas

- u-Containment
- u-Safeguards Building
- X-Auxiliary Building
- X-Electrical & Control Building
- X-Fuel Building
- X-Service Water Intake Structure
- u-Diesel Generator Building
- u-Normal Switchgear Rooms
- u-CST
- u-RWST

Mode Applicability:

All

Definition(s):

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

CPNPP Basis:

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

Table H-1 applies to buildings and areas housing equipment needed for safe shutdown (SAFETY SYSTEMS) (ref. 1, 2).

NEI 99-01 Basis:

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

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

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

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

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.

CPNPP Basis Reference(s):

1. CPNPP Fire Protection Report, Section 5.0 "Fire Safe Shutdown Equipment List"
2. FSAR Section 7.4 Systems Required for Safe Shutdown
3. NEI 99-01 HU4

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 4 – Fire

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

EAL:

HU4.3 Unusual Event

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

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

Mode Applicability:

All

Definition(s):

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

PROTECTED AREA - 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 FSAR Figure 1.2-1 Plot Plan.

CPNPP Basis:

None

NEI 99-01 Basis:

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

In addition to a FIRE addressed by EAL HU4.1 or HU4.2, a FIRE within the plant PROTECTED AREA not extinguished within 60-minutes may also potentially degrade the level of plant safety. This basis extends to a FIRE occurring within the PROTECTED AREA of an ISFSI located outside the plant 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.

CPNPP Basis Reference(s):

1. NEI 99-01 HU4

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 4 – Fire

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

EAL:

HU4.4 Unusual Event

A FIRE within the ISFSI or 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 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 FSAR Figure 1.2-1 Plot Plan.

CPNPP Basis:

None

NEI 99-01 Basis:

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

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

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

CPNPP Basis Reference(s):

1. NEI 99-01 HU4

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 5 – Hazardous Gases

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

EAL:

HA5.1 Alert

Release of a toxic, corrosive, asphyxiant or flammable gas into **any** Table H-2 rooms or areas

AND

Entry into the room or area is prohibited or IMPEDED (Note 5)

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

Table H-2 Safe Operation & Shutdown Rooms/Areas

Room/Area	Mode Applicability
Charging Pump Rooms	1, 2, 3, 4, 5, 6
CVCS Valve Rooms	1, 2, 3, 4, 5, 6
1E Switchgear Rooms	All
RHR Pump Rooms	4, 5, 6

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).

CPNPP Basis:

If the equipment in the listed room or area was already inoperable, or out-of-service, before the event occurred, then no emergency should be declared since the event will have no adverse impact beyond that already allowed by Technical Specifications at the time of the event.

The list of plant rooms or areas with entry-related mode applicability identified specify those rooms or areas that contain equipment which require a manual/local action as specified in operating procedures used for normal plant operation, cooldown and shutdown. Rooms or areas in which actions of a contingent or emergency nature would be performed (e.g., an action to address an off-normal or emergency condition such as emergency repairs, corrective measures or emergency operations) are not included. In addition, the list specifies the plant mode(s) during which entry would be required for each room or area (ref. 1).

NEI 99-01 Basis:

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

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

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

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

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

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.

CPNPP Basis Reference(s):

1. Attachment 3 Safe Operation & Shutdown Areas Tables R-3 & H-2 Bases
2. NEI 99-01 HA5

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 6 – Control Room Evacuation

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

EAL:

HA6.1 Alert

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

Mode Applicability:

All

Definition(s):

None

CPNPP Basis:

Upon evacuation of the Control Room plant control is established at the Remote Shutdown Panel (RSP). ABN-905A/B "Loss of Control Room Habitability" and ABN-803A/B "Response to a Fire in the Control Room or Cable Spreading Room" provide the instructions for tripping the unit, and maintaining RCS inventory and Hot Shutdown conditions from outside 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 fumes, bomb threat in or adjacent to the Control Room, or other life threatening conditions. (Ref. 1, 2, 3, 4, 5).

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

NEI 99-01 Basis:

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

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

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

CPNPP Basis Reference(s):

1. DBD-ME-003 Control Room Habitability
2. ABN-905A Loss of Control Room Habitability
3. ABN-905B Loss of Control Room Habitability
4. ABN-803A Response to a Fire in the Control Room or Cable Spreading Room
5. ABN-803B Response to a Fire in the Control Room or Cable Spreading Room
6. NEI 99-01 HA6

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 6 – Control Room Evacuation

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

EAL:

HS6.1 Site Area Emergency

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

AND

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

- Reactivity
- Core Cooling
- RCS heat removal

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

Mode Applicability:

All

Definition(s):

None

CPNPP Basis:

Upon evacuation of the Control Room plant control is established at the Remote Shutdown Panel (RSP). ABN-905A/B "Loss of Control Room Habitability" and ABN-803A/B "Response to a Fire in the Control Room or Cable Spreading Room" provide the instructions for tripping the unit, and maintaining RCS inventory and Hot Shutdown conditions from outside 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 fumes, bomb threat in or adjacent to the Control Room, or other life threatening conditions. (Ref. 1, 2, 3, 4, 5).

The intent of this EAL is to capture events in which control of the plant cannot be reestablished in a timely manner. The fifteen minute time for transfer starts when the Control Room begins to be evacuated (not when the ABN is entered). The time interval is based on how quickly control must be reestablished without core uncovery and/or core damage. The determination of whether or not control is established from outside the Control Room is based on Emergency Coordinator judgment. The Emergency Coordinator is expected to make a reasonable, informed judgment that control of the plant from outside the Control Room cannot be established within the fifteen minute interval.

Once the Control Room is evacuated, the objective is to establish control of important plant equipment and maintain knowledge of important plant parameters in a timely manner. Primary

emphasis should be placed on components and instruments that supply protection for and information about safety functions. Typically, these safety functions are reactivity control (ability to shutdown the reactor and maintain it shutdown), RCS inventory (ability to cool the core), and secondary heat removal (ability to maintain a heat sink).

NEI 99-01 Basis:

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

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

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

CPNPP Basis Reference(s):

1. DBD-ME-003 Control Room Habitability
2. ABN-905A Loss of Control Room Habitability
3. ABN-905B Loss of Control Room Habitability
4. ABN-803A Response to a Fire in the Control Room or Cable Spreading Room
5. ABN-803B Response to a Fire in the Control Room or Cable Spreading Room
6. NEI 99-01 HS6

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 7 – *Emergency Coordinator Judgment*

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

EAL:

HU7.1 Unusual Event

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

Mode Applicability:

All

Definition(s):

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

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

(1) The integrity of the reactor coolant pressure boundary;

(2) The capability to shut down the reactor and *maintain* it in a safe shutdown condition;

(3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures.

CPNPP Basis:

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

NEI 99-01 Basis:

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

CPNPP Basis Reference(s):

1. CPNPP Radiological Emergency Response Plan section 1.1.2 Response
2. NEI 99-01 HU7

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 7 – Emergency Coordinator Judgment

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

EAL:

HA7.1 Alert

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

Mode Applicability:

All

Definition(s):

HOSTILE ACTION - An act toward CPNPP 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 CPNPP. 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).

CPNPP Basis:

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

NEI 99-01 Basis:

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

CPNPP Basis Reference(s):

1. CPNPP Radiological Emergency Response Plan section 1.1.2 Response
2. NEI 99-01 HA7

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 7 – Emergency Coordinator Judgment

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

EAL:

HS7.1 Site Area Emergency

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

Mode Applicability:

All

Definition(s):

EXCLUSION AREA BOUNDARY - Exclusion Area Boundary is a synonymous term for Site Boundary. CPNPP FSAR Section 2.1.1.3 and Figure 2.1-2 define the Exclusion Area Boundary. This boundary is used for establishing effluent release limits with respect to the requirements of 10CFR20. See also CPNPP Emergency Plan Appendix E, Complex and Owner Controlled Area and CCNPP ODCM Section 5.0 Design Features.

HOSTILE ACTION - An act toward CPNPP 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 CPNPP. 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)

CPNPP Basis:

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

NEI 99-01 Basis:

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

CPNPP Basis Reference(s):

1. CPNPP Radiological Emergency Response Plan section 1.1.2 Response
2. NEI 99-01 HS7

Category: H – Hazards and Other Conditions Affecting Plant Safety

Subcategory: 7 – Emergency Coordinator Judgment

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

EAL:

HG7.1 General Emergency

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

Mode Applicability:

All

Definition(s):

HOSTILE ACTION - An act toward CPNPP 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 CPNPP. 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.

CPNPP Basis:

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

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

NEI 99-01 Basis:

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

CPNPP Basis Reference(s):

1. CPNPP Radiological Emergency Response Plan section 1.1.2 Response
2. NEI 99-01 HG7

Category S – System Malfunction

EAL Group: Hot Conditions (RCS temperature greater than 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 6.9KV AC safeguard 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. RPS Failure

This subcategory includes events related to failure of the Reactor Protection System (RPS) to initiate and complete reactor trips. In the plant licensing basis, postulated failures of the RPS to complete a reactor trip comprise a specific set of analyzed events referred to as

Anticipated Transient Without Scram (ATWS) events. For EAL classification, however, ATWS is intended to mean any trip failure event that does not achieve reactor shutdown. If RPS actuation fails to assure reactor shutdown, positive control of reactivity is at risk and could cause a threat to fuel clad, RCS and containment integrity.

7. Loss of Communications

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

8. Containment Failure

Failure of containment isolation capability (under conditions in which the containment is not currently challenged) warrants emergency classification. Failure of containment pressure control capability also warrants emergency classification.

9. Hazardous Event Affecting Safety Systems

Various natural and technological events that result in degraded plant safety system performance or significant visible damage warrant emergency classification under this subcategory.

Category: S – System Malfunction

Subcategory: 1 – Loss of Emergency AC Power

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

EAL:

SU1.1 Unusual Event

Loss of **all** offsite AC power capability, Table S-1, to 6.9 KV safeguard buses uEA1 and uEA2 for greater than or equal to 15 min. (Note 1)

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

Table S-1 AC Power Sources

Offsite:

- 138 KV switchyard circuit
- 345 KV switchyard circuit

Onsite:

- uEG1
- uEG2

Mode Applicability:

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

Definition(s):

None

Basis:

CPNPP Basis:

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

The safeguards AC distribution system power sources consist of the preferred and alternate offsite power sources, and the onsite standby emergency diesel generators uEG1 and uEG2. Offsite power is supplied to the plant switchyards from the transmission network by five 345 KV and two 138 KV transmission lines. From the switchyards, two electrically and physically separated circuits provide AC power through step down startup transformers, to the 6.9 kV safeguard buses. The 138 kV switchyard circuit is the preferred source for Unit 2 and alternate source for Unit 1. The 345 KV circuit is the preferred source for Unit 1 and alternate source for Unit 2. The onsite AC distribution system is divided into redundant trains so that the loss of any one load group does not prevent the minimum safety functions from being performed. Each train has connections to two offsite power sources and a dedicated diesel generator. Each offsite circuit can supply the Unit 1 and Unit 2 6.9 KV safeguard buses. (ref. 1, 2, 3, 4)

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

NEI 99-01 Basis:

This IC addresses a prolonged loss of offsite power. The loss of offsite power sources renders the plant more vulnerable to a complete loss of power to AC emergency 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.

CPNPP Basis Reference(s):

1. FSAR Figure 8.3-1
2. FSAR Section 8.2
3. FSAR Section 8.3
4. Technical Specifications B3.8.1
5. ABN-601 Response to a 138/345 KV System Malfunction
6. ABN-602 Response to a 6900/480V System Malfunction
7. NEI 99-01 SU1

Category: S – System Malfunction

Subcategory: 1 – Loss of Emergency AC Power

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

EAL:

SA1.1 Alert

AC power capability, Table S-1, to 6.9 KV safeguard buses uEA1 and uEA2 reduced to a single power source for greater than or equal to 15 min. (Note 1)

AND

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

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

Table S-1 AC Power Sources

Offsite:

- 138 KV switchyard circuit
- 345 KV switchyard circuit

Onsite:

- uEG1
- uEG2

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.

Basis:

CPNPP Basis:

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.

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 safeguard buses.

The safeguards AC distribution system power sources consist of the preferred and alternate offsite power sources, and the onsite standby emergency diesel generators uEG1 and uEG2. Offsite power is supplied to the plant switchyards from the transmission network by five 345 KV and two 138 KV transmission lines. From the switchyards, two electrically and physically separated circuits provide AC power through step down startup transformers, to the 6.9 kV safeguard buses. The 138 kV switchyard circuit is the preferred source for Unit 2 and alternate source for Unit 1. The 345 KV circuit is the preferred source for Unit 1 and alternate source for Unit 2. The onsite AC distribution system is divided into redundant trains so that the loss of any one load group does not prevent the minimum safety functions from being performed. Each train has connections to two offsite power sources and a dedicated diesel generator. Each offsite circuit can supply the Unit 1 and Unit 2 6.9 KV safeguard buses. (ref. 1, 2, 3, 4).

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

This hot condition EAL is equivalent to the cold condition EAL CU2.1.

NEI 99-01 Basis:

This IC describes a significant degradation of offsite and onsite AC power sources such that any additional single failure would result in a loss of all AC power to SAFETY SYSTEMS. In this condition, the sole AC power source may be powering one, or more than one, train of safety-related equipment. This IC provides an escalation path from IC SU1.

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

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

CPNPP Basis Reference(s):

1. FSAR Figure 8.3-1
2. FSAR Section 8.2
3. FSAR Section 8.3
4. Technical Specifications B3.8.1
5. ABN-601 Response to a 138/345 KV System Malfunction
6. ABN-602 Response to a 6900/480V System Malfunction
7. NEI 99-01 SA1

Category: S – System Malfunction

Subcategory: 1 – Loss of Emergency AC Power

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

EAL:

SS1.1 Site Area Emergency

Loss of **all** offsite and **all** onsite AC power capability, Table S-1, to 6.9 KV safeguard buses uEA1 and uEA2 for greater than or equal to 15 min. (Note 1)

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

Table S-1 AC Power Sources

Offsite:

- 138 KV switchyard circuit
- 345 KV switchyard circuit

Onsite:

- uEG1
- uEG2

Mode Applicability:

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

Definition(s):

None

CPNPP Basis:

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

The safeguards AC distribution system power sources consist of the preferred and alternate offsite power sources, and the onsite standby emergency diesel generators uEG1 and uEG2. Offsite power is supplied to the plant switchyards from the transmission network by five 345 KV and two 138 KV transmission lines. From the switchyards, two electrically and physically separated circuits provide AC power through step down startup transformers, to the 6.9 kV safeguard buses. The 138 kV switchyard circuit is the preferred source for Unit 2 and alternate source for Unit 1. The 345 KV circuit is the preferred source for Unit 1 and alternate source for Unit 2. The onsite AC distribution system is divided into redundant trains so that the loss of any one load group does not prevent the minimum safety functions from being performed. Each train has connections to two offsite power sources and a dedicated diesel generator. Each offsite circuit can supply the Unit 1 and Unit 2 6.9 KV safeguard buses. (ref. 1, 2, 3, 4).

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

NEI 99-01 Basis:

This IC addresses a total loss of AC power that compromises the performance of all SAFETY SYSTEMS requiring electric power including those necessary for emergency core cooling, containment heat removal/pressure control, spent fuel heat removal and the ultimate heat sink. In addition, fission product barrier monitoring capabilities may be degraded under these conditions. This IC represents a condition that involves actual or likely major failures of plant functions needed for the protection of the public.

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

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

CPNPP Basis Reference(s):

1. FSAR Figure 8.3-1
2. FSAR Section 8.2
3. FSAR Section 8.3
4. Technical Specifications B3.8.1
5. ABN-601 Response to a 138/345 KV System Malfunction
6. ABN-602 Response to a 6900/480V System Malfunction
7. NEI 99-01 SS1

Category: S –System Malfunction

Subcategory: 1 – Loss of Emergency AC Power

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

EAL:

SG1.1 General Emergency

Loss of **all** offsite and **all** onsite AC power capability, Table S-1, to 6.9 KV safeguard buses uEA1 and uEA2

AND EITHER:

- Restoration of at least one safeguard bus from a Table S-1 source or APDG in less than 4 hours is **not** likely (Note 1)
- CSFST Core Cooling RED Path conditions met

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

Table S-1 AC Power Sources
Offsite:
• 138 KV switchyard circuit
• 345 KV switchyard circuit
Onsite:
• uEG1
• uEG2

Mode Applicability:

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

Definition(s):

None

CPNPP Basis:

This EAL is indicated by the extended loss of all offsite and onsite AC power capability to 6.9 KV safeguard buses uEA1 and uEA2 either for greater then the CPNPP Station Blackout (SBO) coping analysis time (4 hrs.) (ref. 7) 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. 8).

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 safeguards AC distribution system power sources consist of the preferred and alternate offsite power sources, and the onsite standby emergency diesel generators uEG1 and uEG2.

Offsite power is supplied to the plant switchyards from the transmission network by five 345 KV and two 138 KV transmission lines. From the switchyards, two electrically and physically separated circuits provide AC power through step down startup transformers, to the 6.9 kV safeguard buses. The 138 kV switchyard circuit is the preferred source for Unit 2 and alternate source for Unit 1. The 345 KV circuit is the preferred source for Unit 1 and alternate source for Unit 2. The onsite AC distribution system is divided into redundant trains so that the loss of any one load group does not prevent the minimum safety functions from being performed. Each train has connections to two offsite power sources and a dedicated diesel generator. Each offsite circuit can supply the Unit 1 and Unit 2 6.9 KV safeguard buses. (ref. 1, 2, 3, 4).

CPNPP has also provided a set of non-safety related Alternate Power Diesel Generators (APDGs) for each unit with the capability to connect to a safeguards bus one at a time to provide defense-in-depth for safe shutdown of a unit during outages or during extended duration of an inoperable offsite circuit on occurrence of concurrent loss of offsite power and failure of EDGs. The APDGs can provide 3450 kVA to provide long term cooling of each unit (ref. 3).

Four hours is the station blackout coping time (ref 7).

Indication of continuing core cooling degradation must be based on fission product barrier monitoring with particular emphasis on Emergency Coordinator 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 (ref. 8). Critical Safety Function Status Tree (CSFST) Core Cooling-RED path indicates significant core exit superheating and core uncovery. (ref. 3).

NEI-9901 Basis:

This IC addresses a prolonged loss of all power sources to AC emergency buses. A loss of all AC power compromises the performance of all SAFETY SYSTEMS requiring electric power including those necessary for emergency core cooling, containment heat removal/pressure control, spent fuel heat removal and the ultimate heat sink. A prolonged loss of these buses will lead to a loss of one or more fission product barriers. In addition, fission product barrier monitoring capabilities may be degraded under these conditions.

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

Escalation of the emergency classification from Site Area Emergency will occur if it is projected that power cannot be restored to at least one AC emergency bus by the end of the analyzed station blackout coping period. Beyond this time, plant responses and event trajectory are subject to greater uncertainty, and there is an increased likelihood of challenges to multiple fission product barriers.

The estimate for restoring at least one emergency bus should be based on a realistic appraisal of the situation. Mitigation actions with a low probability of success should not be used as a basis for delaying a classification upgrade. The goal is to maximize the time available to prepare for, and implement, protective actions for the public.

The EAL will also require a General Emergency declaration if the loss of AC power results in parameters that indicate an inability to adequately remove decay heat from the core.

CPNPP Basis Reference(s):

1. FSAR Figure 8.3-1
2. FSAR Section 8.2
3. FSAR Section 8.3
4. Technical Specifications B3.8.1
5. ABN-601 Response to a 138/345 KV System Malfunction
6. ABN-602 Response to a 6900/480V System Malfunction
7. FSAR Section 8B Station Blackout
8. FRC-0.1A/B Response to Inadequate Core Cooling
9. NEI 99-01 SG1

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, Table S-1, to 6.9 KV safeguard buses uEA1 and uEA2 for greater than or equal to 15 min.

AND

Less than 105 VDC on **all** 125 VDC safeguard buses uED1, uED2, uED3 and uED4 for greater than or equal to 15 min.

(Note 1)

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

Table S-1 AC Power Sources

Offsite:

- 138 KV switchyard circuit
- 345 KV switchyard circuit

Onsite:

- uEG1
- uEG2

Mode Applicability:

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

Definition(s):

None

CPNPP Basis:

This EAL is indicated by the loss of all offsite and onsite emergency AC power capability to 6.9 KV safeguard buses uEA1 and uEA2 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 safeguards AC distribution system power sources consist of the preferred and alternate offsite power sources, and the onsite standby emergency diesel generators uEG1 and uEG2. Offsite power is supplied to the plant switchyards from the transmission network by five 345 KV and two 138 KV transmission lines. From the switchyards, two electrically and physically

separated circuits provide AC power through step down startup transformers, to the 6.9 kV safeguard buses. The 138 kV switchyard circuit is the preferred source for Unit 2 and alternate source for Unit 1. The 345 KV circuit is the preferred source for Unit 1 and alternate source for Unit 2. The onsite AC distribution system is divided into redundant trains so that the loss of any one load group does not prevent the minimum safety functions from being performed. Each train has connections to two offsite power sources and a dedicated diesel generator. Each offsite circuit can supply the Unit 1 and Unit 2 6.9 KV safeguard buses. (ref. 1, 2, 3, 4).

The safeguards 125 VDC buses are the Class 1E buses uED1, uED2, uED3 and uED4 (ref. 7, 8, 9).

Each redundant safeguards 125 VDC system consists of two independent batteries each having one main distribution bus, two static battery chargers (one spare), and local distribution panels. For Unit 1, batteries BT1ED1 and BT1ED3 feed all train A load requirements, while batteries BT1ED2 and BT1ED4 supply train B load requirements.

For Unit 2, batteries BT2ED1 and BT2ED3 feed all train A load requirements, while batteries BT2ED2 and BT2ED4 supply train B load requirements. There are no bus ties or sharing of power supplies between redundant trains (ref. 7).

Minimum DC bus voltage is 105 VDC (ref. 10). Bus voltage may be monitored from the following indications (ref. 12):

Control Room Panel CP-10	Annunciator u--ALB-10B	Plant Computer
V-1ED1, 125VDC SWITCH PNL 1ED1 VOLT	1.13	V6501A BATT BT1ED1 VOLT
V-1ED2, 125VDC SWITCH PNL 1ED2 VOLT	2.13	V6502A BATT BT1ED2 VOLT
V-1ED3, 125VDC SWITCH PNL 1ED3 VOLT	1.9	none
V-1ED4, 125VDC SWITCH PNL 1ED4 VOLT	3.9	V6504A BATT BT1ED4 VOLT

NEI-9901 Basis:

This IC addresses a concurrent and prolonged loss of both emergency AC and Vital DC power. A loss of all emergency AC power compromises the performance of all SAFETY SYSTEMS requiring electric power including those necessary for emergency core cooling, containment heat removal/pressure control, spent fuel heat removal and the ultimate heat sink. A loss of vital DC power compromises the ability to monitor and control SAFETY SYSTEMS. A sustained loss of both emergency AC and vital DC power will lead to multiple challenges to fission product barriers.

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

CPNPP Basis Reference(s):

1. FSAR Figure 8.3-1
2. FSAR Section 8.2
3. FSAR Section 8.3
4. Technical Specifications B3.8.1
5. ABN-601 Response to a 138/345 KV System Malfunction
6. ABN-602 Response to a 6900/480V System Malfunction
7. FSAR 8.3.2
8. FSAR Figure 8.3-14
9. FSAR Figure 8.3-14A
10. ECA-0.0A/B Loss of All AC Power
11. SOP-605A/B 125 VDC Switchgear and Distribution Systems, Batteries and Battery Chargers
12. ALM-0102A/B Alarm Procedures Manual, u-ALB-10B, nos. 1.9, 1.13, 2.13, 3.8
13. NEI 99-01 SG8

Category: S – System Malfunction

Subcategory: 2 – Loss of Vital DC Power

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

EAL:

SS2.1 Site Area Emergency

Less than 105 VDC on **all** 125 VDC safeguard buses uED1, uED2, uED3 and uED4 for greater than or equal to 15 min. (Note 1)

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

Mode Applicability:

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

Definition(s):

None

CPNPP Basis:

The safeguards 125 VDC buses are the Class 1E buses uED1, uED2, uED3 and uED4 (ref. 1, 2, 3).

Each redundant safeguards 125 VDC system consists of two independent batteries each having one main distribution bus, two static battery chargers (one spare), and local distribution panels. For Unit 1, batteries BT1ED1 and BT1ED3 feed all train A load requirements, while batteries BT1ED2 and BT1ED4 supply train B load requirements.

For Unit 2, batteries BT2ED1 and BT2ED3 feed all train A load requirements, while batteries BT2ED2 and BT2ED4 supply train B load requirements. There are no bus ties or sharing of power supplies between redundant trains (ref. 1).

Minimum DC bus voltage is 105 VDC (ref. 4). Bus voltage may be monitored from the following indications (ref. 6):

Control Room Panel CP-10	Annunciator u--ALB-10B	Plant Computer
V-1ED1, 125VDC SWITCH PNL 1ED1 VOLT	1.13	V6501A BATT BT1ED1 VOLT
V-1ED2, 125VDC SWITCH PNL 1ED2 VOLT	2.13	V6502A BATT BT1ED2 VOLT
V-1ED3, 125VDC SWITCH PNL 1ED3 VOLT	1.9	V6503A BATT BT1ED3 VOLT
V-1ED4, 125VDC SWITCH PNL 1ED4 VOLT	3.9	V6504A BATT BT1ED4 VOLT

NEI 99-01 Basis:

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

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

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

CPNPP Basis Reference(s):

1. FSAR 8.3.2
2. FSAR Figure 8.3-14
3. FSAR Figure 8.3-14A
4. ECA-0.0A/B Loss of All AC Power
5. SOP-605A/B 125 VDC Switchgear and Distribution Systems, Batteries and Battery Chargers
6. ALM-0102A/B Alarm Procedures Manual, u-ALB-10B, nos. 1.9, 1.13, 2.13, 3.8
7. NEI 99-01 SS8

Category: S – System Malfunction

Subcategory: 3 – Loss of Control Room Indications

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

EAL:

SU3.1 Unusual Event

An UNPLANNED event results in the inability to monitor one or more Table S-2 parameters from within the Control Room for greater than or equal to 15 min. (Note 1)

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

Table S-2 Safety System Parameters

- Reactor power
- RCS level
- RCS pressure
- Core Exit T/C temperature
- Level in at least one SG
- Auxiliary or emergency feed flow in at least one SG

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.

CPNPP 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 Plant Process Computer, 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, 3, 4).

NEI 99-01 Basis:

This IC addresses the difficulty associated with monitoring normal plant conditions without the ability to obtain SAFETY SYSTEM parameters from within the Control Room. This condition is a precursor to a more significant event and represents a potential degradation in the level of safety of the plant.

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

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

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

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

Escalation of the emergency classification level would be via IC SA3.

CPNPP Basis Reference(s):

1. FSAR Section 7.5
2. DBD-EE-033 Detailed Control Room Design, 5.1.2, Figure 1
3. SOP 906 Plant Process Computer System Guidelines
4. ABN 906 Plant Process Computer System Malfunction
5. NEI 99-01 SU2

Category: S – System Malfunction

Subcategory: 3 – Loss of Control Room Indications

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

EAL:

SA3.1 Alert

An UNPLANNED event results in the inability to monitor one or more Table S-2 parameters from within the Control Room for greater than or equal to 15 min. (Note 1)

AND

Any significant transient is in progress, Table S-3

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

Table S-2 Safety System Parameters
• Reactor power • RCS level • RCS pressure • Core Exit T/C temperature • Level in at least one SG • Auxiliary or emergency feed flow in at least one SG

Table S-3 Significant Transients
• Reactor trip • Runback greater than or equal to 25% thermal power • Electrical load rejection greater than 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.

CPNPP Basis:

SAFETY SYSTEM parameters listed in Table S-1 are monitored in the Control Room through a combination of hard control panel indicators as well as computer based information systems. The Plant Computer, 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, 3, 4).

Significant transients are listed in Table S-2 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.

NEI 99-01 Basis:

This IC addresses the difficulty associated with monitoring rapidly changing plant conditions during a transient without the ability to obtain SAFETY SYSTEM parameters from within the Control Room. During this condition, the margin to a potential fission product barrier challenge is reduced. It thus represents a potential substantial degradation in the level of safety of the plant.

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

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

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

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

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

CPNPP Basis Reference(s):

1. FSAR Section 7.5
2. DBD-EE-033 Detailed Control Room Design, 5.1.2, Figure 1
3. SOP 906 Plant Process Computer System Guidelines
4. ABN 906 Plant Process Computer System Malfunction
5. NEI 99-01 SA2

Category: S – System Malfunction

Subcategory: 4 – RCS Activity

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

EAL:

SU4.1 Unusual Event

Reactor coolant Dose Equivalent I-131 specific activity greater than 60 µCi/gm

OR

Reactor coolant Dose Equivalent XE-133 specific activity greater than 500 µCi/gm

Mode Applicability:

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

Definition(s):

None

CPNPP Basis:

This EAL addresses reactor coolant samples exceeding Technical Specification LCOs 3.4.16.A and 3.4.16.B which are applicable in Modes 1, 2, and 3 and 4 (ref. 1). The Technical Specification limits accommodate an iodine spike phenomenon that may occur following changes in thermal power. The Technical Specification LCO limits are established to minimize the offsite radioactivity dose consequences in the event of a steam generator tube rupture (SGTR) accident (ref. 2).

NEI 99-01 Basis:

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

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

CPNPP Basis Reference(s):

1. Technical Specifications Section 3.4.16
2. Technical Specifications Section B3.4.16
3. NEI 99-01 SU3

Category: S – System Malfunction

Subcategory: 4 – RCS Activity

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

EAL:

SU4.2 Unusual Event

Gross Failed Fuel Monitor, FFLu60 (u-RE-0406), High Alarm (RED)

Mode Applicability:

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

Definition(s):

None

CPNPP Basis:

This EAL addresses reactor coolant letdown line radiation levels sensed by FFLu60 (u-RE-0406) in excess of Technical Specification allowable limits. The High Alarm (RED) setpoint is based on the Technical Specifications maximum allowable concentration of radioactivity in the reactor coolant (ref. 1, 2, 3). A Geiger-Mueller tube is mounted on the reactor coolant letdown line after the letdown heat exchanger to monitor fission-product activity. Detection of increased system activity may be indicative of failed fuel. The monitor initiates Alert and High alarms in the Control Room (PC-11 and Plant Computer) (ref. 3, 4, 5, 6, 7, 8).

FFLu60 (u-RE-0406) has a range of 1E-2 – 1E+7 µCi/ml.

NEI 99-01 Basis:

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

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

CPNPP Basis Reference(s):

1. Technical Specifications Section 3.4.16
2. ALM-3200 Alarm Procedure DRMS, Channel in High Alarm (RED), pg 54
3. DBD-EE-023 Radiation Monitoring System
4. SWEC-NU(S)-174 Radiation Monitor Alarm Concentrations for Failed Fuel Monitors 1-RE-406 & 2-RE-406
5. ABN-102 High Coolant Activity
6. FSAR Section 11.5.2.7.11
7. FSAR Table 11.5-1
8. CHM-111 Primary Chemistry Accident Assessment Sampling Program

9. DBD-EE-023 Radiation Monitoring System
10. NEI 99-01 SU3

Category: S – System Malfunction

Subcategory: 5 – RCS Leakage

Initiating Condition: RCS leakage for 15 minutes or longer

EAL:

SU5.1 Unusual Event

RCS unidentified or pressure boundary leakage greater than 10 gpm for greater than or equal to 15 min.

OR

RCS identified leakage greater than 25 gpm for greater than or equal to 15 min.

OR

UNISOLABLE leakage from the RCS to a location outside containment greater than 25 gpm for greater than or equal to 15 min.
(Note 1)

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

Mode Applicability:

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

Definition(s):

None

CPNPP Basis:

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 such as Chemical & Volume Control System, Nuclear Sampling system and Residual Heat Removal system (when in the shutdown cooling mode) (ref. 3, 6, 8)

Isolating letdown is a standard abnormal operating procedure action and may prevent unnecessary classification when a non-RCS leakage path, such as a CVCS leak, exists.

Unidentified leakage and identified leakage are determined by performance of the RCS water inventory balance. Pressure boundary leakage would first appear as unidentified leakage and can only be positively identified by inspection (ref. 1). OPT-303 (ref. 1) is used to ensure RCS leakage is within Technical Specification limits (ref. 2). ABN-103 Attachments 1 and 3 (ref. 3) are used for excessive RCS leakage.

Technical Specifications (ref. 4) defines RCS leakage as follows:

- Identified Leakage:
  - 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

  - 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.
  - Reactor Coolant System leakage through a steam generator to the Secondary System (primary to secondary leakage);
- Unidentified Leakage: All leakage (except RCP seal water injection or leakoff) that is not identified leakage.
- Pressure Boundary Leakage: Leakage (except primary to secondary leakage) through a non-isolable fault in an RCS component body, pipe wall, or vessel wall.

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

NEI 99-01 Basis:

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

The first and second EAL conditions are focused on a loss of mass from the RCS due to "unidentified leakage", "pressure boundary leakage" or "identified leakage" (as these leakage types are defined in the plant Technical Specifications). The third condition addresses an RCS mass loss caused by an UNISOLABLE leak through an interfacing system. These conditions thus apply to leakage into the containment, a secondary-side system (e.g., steam generator tube leakage) or a location outside of containment.

The leak rate values for each condition were selected because they are usually observable with normal Control Room indications. Lesser values typically require time-consuming calculations to determine (e.g., a mass balance calculation). The first condition uses a lower value that reflects the greater significance of unidentified or pressure boundary leakage.

The release of mass from the RCS due to the as-designed/expected operation of a relief valve does not warrant an emergency classification. An emergency classification would be required if a mass loss is caused by a relief valve that is not functioning as designed/expected (e.g., a relief valve sticks open and the line flow cannot be isolated).

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

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

CPNPP Basis Reference(s):

1. OPT-303 Reactor Coolant System Water Inventory
2. Technical Specifications 3.4.13
3. ABN-103 Excessive Reactor Coolant Leakage
4. Technical Specifications 1.1
5. ABN-108 Shutdown Loss of Coolant
6. FSAR 5.2.5.2
7. FSAR 5.2.5.8
8. ECA-1.2 LOCA Outside Containment
9. NEI 99-01 SU4

Category: S – System Malfunction

Subcategory: 6 – RPS Failure

Initiating Condition: Automatic or manual trip fails to shut down the reactor

EAL:

SU6.1 Unusual Event

An automatic trip did **not** shut down the reactor as indicated by reactor power greater than 5% after **any** RPS setpoint is exceeded

AND

A subsequent automatic trip or manual trip action taken at the reactor control consoles (MCB reactor trip switches or deenergizing uB3 and uB4) is successful in shutting down the reactor as indicated by reactor power less than or equal to 5% (Note 8)

Note 8: A manual trip action is any operator action, or set of actions, which causes the control rods to be rapidly inserted into the core, and **does not** include manually driving in control rods or implementation of boron injection strategies.

Mode Applicability:

1 - Power Operation

Definition(s):

None

CPNPP Basis:

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

Following a successful reactor trip, rapid insertion of the control rods occurs. Nuclear power promptly drops to a fraction of the original power level and then decays to a level several decades less with a negative startup rate. The reactor power drop continues until reactor power reaches the point at which the influence of source neutrons on reactor power starts to be observable. A predictable post-trip response from an automatic reactor trip signal should therefore consist of a prompt drop in reactor power as sensed by the nuclear instrumentation and a lowering of power into the source range. A successful trip has therefore occurred when there is sufficient rod insertion from the trip of RPS to bring the reactor power below the immediate shutdown decay heat level of 5% (ref. 1, 2).

For the purposes of emergency classification, successful manual trip actions are those which can be quickly performed from the reactor control console; MCB reactor trip switches or deenergizing uB3 and uB4. Reactor shutdown achieved by use of other trip actions specified in FR-S.1 Response to Nuclear Power Generation/ATWS (such as manually insert control rods, opening the reactor trip and bypass breakers in the reactor switchgear, tripping the Rod Drive MG sets in the normal switchgear or emergency boration) do not constitute a successful manual trip (ref. 2).

Following any automatic RPS trip signal, E-0.0 (ref. 1) and /FR-S.1 (ref. 2) prescribe insertion of redundant manual trip signals to back up the automatic RPS trip function and ensure reactor shutdown is achieved. Even if the first subsequent manual trip signal inserts all control rods to the full-in position immediately after the initial failure of the automatic trip, the lowest level of classification that must be declared is an Unusual Event (ref. 2).

In the event that the operator identifies a reactor trip is imminent and initiates a successful manual reactor trip before the automatic RPS trip setpoint is reached, no declaration is required. The successful manual trip of the reactor before it reaches its automatic trip setpoint or reactor trip signals caused by instrumentation channel failures do not lead to a potential fission product barrier loss. However, if subsequent manual reactor trip actions fail to reduce reactor power to or 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.

NEI 99-01 Basis:

This IC addresses a failure of the RPS to initiate or complete an automatic or manual reactor trip that results in a reactor shutdown, and either a subsequent operator manual action taken at the reactor control consoles or an automatic trip is successful in shutting down the reactor. This event is a precursor to a more significant condition and thus represents a potential degradation of the level of safety of the plant.

Following the failure on an automatic reactor trip , operators will promptly initiate manual actions at the reactor control consoles to shutdown the reactor (e.g., initiate a manual reactor trip). If these manual actions are successful in shutting down the reactor, core heat generation will quickly fall to a level within the capabilities of the plant's decay heat removal systems.

If an initial manual reactor trip is unsuccessful, operators will promptly take manual action at another location(s) on the reactor control consoles to shutdown the reactor (e.g., initiate a manual reactor trip) using a different switch). Depending upon several factors, the initial or subsequent effort to manually trip the reactor, or a concurrent plant condition, may lead to the generation of an automatic reactor trip signal. If a subsequent manual or automatic trip is successful in shutting down the reactor, core heat generation will quickly fall to a level within the capabilities of the plant's decay heat removal systems.

A manual action at the reactor control consoles is any operator action, or set of actions, which causes the control rods to be rapidly inserted into the core (e.g., initiating a manual reactor trip). This action does not include manually driving in control rods or implementation of boron injection strategies. Actions taken at back-panels or other locations within the Control Room, or any location outside the Control Room, are not considered to be "at the reactor control consoles".

The plant response to the failure of an automatic or manual reactor trip will vary based upon several factors including the reactor power level prior to the event, availability of the condenser, performance of mitigation equipment and actions, other concurrent plant conditions, etc. If subsequent operator manual actions taken at the reactor control consoles are also unsuccessful in shutting down the reactor, then the emergency classification level will escalate to an Alert via IC SA6. Depending upon the plant response, escalation is also possible via IC FA1. Absent the plant conditions needed to meet either IC SA6 or FA1, an Unusual Event declaration is appropriate for this event.

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

Should a reactor trip signal be generated as a result of plant work (e.g., RPS setpoint testing), the following classification guidance should be applied.

- If the signal causes a plant transient that should have included an automatic reactor trip and the RPS fails to automatically shutdown the reactor, then this IC and the EALs are applicable, and should be evaluated.
- If the signal does not cause a plant transient and the trip failure is determined through other means (e.g., assessment of test results), then this IC and the EALs are not applicable and no classification is warranted.

CPNPP Basis Reference(s):

1. EOP-0.0A/B Reactor Trip or Safety Injection
2. FR-S.1 Response to Nuclear Power Generation/ATWS
3 NEI 99-01 SU5

Category: S – System Malfunction

Subcategory: 6 – RPS Failure

Initiating Condition: Automatic or manual trip fails to shut down the reactor

EAL:

SU6.2 Unusual Event

A manual trip did **not** shut down the reactor as indicated by reactor power greater than 5% after **any** manual trip action was initiated

AND

A subsequent automatic trip or manual trip action taken at the reactor control console (MCB reactor trip switches or deenergizing uB3 and uB4) is successful in shutting down the reactor as indicated by reactor power less than or equal to 5% (Note 8)

Note 8: A manual trip action is any operator action, or set of actions, which causes the control rods to be rapidly inserted into the core, and **does not** include manually driving in control rods or implementation of boron injection strategies.

Mode Applicability:

1 - Power Operation

Definition(s):

None

CPNPP 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 less than or equal to 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 RPS to bring the reactor power below the immediate shutdown decay heat level of 5% (ref. 1, 2).

For the purposes of emergency classification, successful manual trip actions are those which can be quickly performed from the reactor control console; MCB reactor trip switches or deenergizing uB3 and uB4. Reactor shutdown achieved by use of other trip actions specified in FR-S.1 Response to Nuclear Power Generation/ATWS (such as manually insert control rods, opening the reactor trip and bypass breakers in the reactor switchgear, tripping the Rod Drive MG sets in the normal switchgear or emergency boration) do not constitute a successful manual trip (ref. 2).

Following the failure of any manual trip signal, E-0.0 (ref. 1) and FR-S.1 (ref. 2) prescribe insertion of redundant manual trip signals to back up the RPS trip function and ensure reactor shutdown is achieved. Even if a subsequent automatic trip signal or the first subsequent manual trip signal inserts all control rods to the full-in position immediately after the initial failure of the manual trip, the lowest level of classification that must be declared is an Unusual Event (ref. 2).

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 (less than or equal to 5%) following a failure of an initial manual trip, the event escalates to an Alert under EAL SA6.1.

NEI 99-01 Basis:

This IC addresses a failure of the RPS to initiate or complete an automatic or manual reactor trip that results in a reactor shutdown, and either a subsequent operator manual action taken at the reactor control consoles or an automatic trip is successful in shutting down the reactor. This event is a precursor to a more significant condition and thus represents a potential degradation of the level of safety of the plant.

Following the failure on an automatic reactor trip , operators will promptly initiate manual actions at the reactor control consoles to shutdown the reactor (e.g., initiate a manual reactor trip). If these manual actions are successful in shutting down the reactor, core heat generation will quickly fall to a level within the capabilities of the plant's decay heat removal systems.

If an initial manual reactor trip is unsuccessful, operators will promptly take manual action at another location(s) on the reactor control consoles to shutdown the reactor (e.g., initiate a manual reactor trip) using a different switch). Depending upon several factors, the initial or subsequent effort to manually the reactor, or a concurrent plant condition, may lead to the generation of an automatic reactor trip signal. If a subsequent manual or automatic trip is successful in shutting down the reactor, core heat generation will quickly fall to a level within the capabilities of the plant's decay heat removal systems.

A manual action at the reactor control consoles is any operator action, or set of actions, which causes the control rods to be rapidly inserted into the core (e.g., initiating a manual reactor trip). This action does not include manually driving in control rods or implementation of boron injection strategies. Actions taken at back-panels or other locations within the Control Room, or any location outside the Control Room, are not considered to be "at the reactor control consoles".

The plant response to the failure of an automatic or manual reactor trip will vary based upon several factors including the reactor power level prior to the event, availability of the condenser, performance of mitigation equipment and actions, other concurrent plant conditions, etc. If subsequent operator manual actions taken at the reactor control consoles are also unsuccessful in shutting down the reactor, then the emergency classification level will escalate to an Alert via IC SA6. Depending upon the plant response, escalation is also possible via IC FA1. Absent the plant conditions needed to meet either IC SA6 or FA1, an Unusual Event declaration is appropriate for this event.

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

Should a reactor trip signal be generated as a result of plant work (e.g., RPS setpoint testing), the following classification guidance should be applied.

- If the signal causes a plant transient that should have included an automatic reactor trip and the RPS fails to automatically shutdown the reactor, then this IC and the EALs are applicable, and should be evaluated.
- If the signal does not cause a plant transient and the trip failure is determined through other means (e.g., assessment of test results), then this IC and the EALs are not applicable and no classification is warranted.

CPNPP Basis Reference(s):

1. EOP-0.0A/B Reactor Trip or Safety Injection
2. FR-S.1 Response to Nuclear Power Generation/ATWS
3. NEI 99-01 SU5

Category: S – System Malfunction

Subcategory: 2 – RPS Failure

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

EAL:

SA6.1 Alert

An automatic or manual trip fails to shut down the reactor as indicated by reactor power greater than 5%

AND

Manual trip actions taken at the reactor control console (MCB reactor trip switches or deenergizing uB3 and uB4) are **not** successful in shutting down the reactor as indicated by reactor power greater than 5% (Note 8)

Note 8: A manual trip action is any operator action, or set of actions, which causes the control rods to be rapidly inserted into the core, and **does not** include manually driving in control rods or implementation of boron injection strategies.

Mode Applicability:

1 - Power Operation

Definition(s):

None

CPNPP Basis:

This EAL addresses any automatic or manual reactor trip signal that fails to shut down the reactor (reactor power less than or equal to 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; MCB reactor trip switches or deenergizing uB3 and uB4. Reactor shutdown achieved by use of other trip actions specified in FR-S.1 Response to Nuclear Power Generation/ATWS (such as manually insert control rods, opening the reactor trip and bypass breakers in the reactor switchgear, tripping the Rod Drive MG sets in the normal switchgear or emergency boration) do not constitute a successful manual trip (ref. 2).

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 normal shutdown. Nuclear instrumentation can be used to determine if reactor power is greater than 5 % power (ref. 1, 2).

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

NEI 99-01 Basis:

This IC addresses a failure of the RPS to initiate or complete an automatic or manual reactor trip that results in a reactor shutdown, and subsequent operator manual actions taken at the reactor control consoles to shutdown the reactor are also unsuccessful. This condition represents an actual or potential substantial degradation of the level of safety of the plant. An emergency declaration is required even if the reactor is subsequently shutdown by an action taken away from the reactor control consoles since this event entails a significant failure of the RPS.

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

The plant response to the failure of an automatic or manual reactor trip will vary based upon several factors including the reactor power level prior to the event, availability of the condenser, performance of mitigation equipment and actions, other concurrent plant conditions, etc. If the failure to shut down the reactor is prolonged enough to cause a challenge to the core cooling or RCS heat removal safety functions, the emergency classification level will escalate to a Site Area Emergency via IC SS6. Depending upon plant responses and symptoms, escalation is also possible via IC FS1. Absent the plant conditions needed to meet either IC SS6 or FS1, an Alert declaration is appropriate for this event.

It is recognized that plant responses or symptoms may also require an Alert declaration in accordance with the Recognition Category F ICs; however, this IC and EAL are included to ensure a timely emergency declaration.

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

CPNPP Basis Reference(s):

1. EOP-0.0A/B Reactor Trip or Safety Injection
2. FR-S.1 Response to Nuclear Power Generation/ATWS
3. NEI 99-01 SA5

Category: S – System Malfunction

Subcategory: 2 – RPS Failure

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

EAL:

SS6.1 Site Area Emergency

An automatic or manual trip fails to shut down the reactor as indicated by reactor power greater than 5%

AND

All actions to shut down the reactor are **not** successful as indicated by reactor power greater than 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

CPNPP 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 FR-S.1 Response to Nuclear Power Generation/ATWS (such as manually insert control rods, opening the reactor trip and bypass breakers in the reactor switchgear, tripping the Rod Drive MG sets in the normal switchgear or emergency boration) 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, 2).

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 normal shutdown. Nuclear instrumentation can be used to determine if reactor power is greater than 5% power (ref. 1, 2).

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 (ref. 3).

Indication of inability to adequately remove heat from the RCS is manifested by CSFST Heat Sink RED Path conditions being met. Specifically, Heat Sink RED Path conditions exist if narrow range level in at least one steam generator is not greater than or equal to (43[50]% ACC) on Unit 1 or (10 [18]% ACC) on Unit 2 and total feedwater flow to the steam generators is less than or equal to 460 gpm (ref. 4).

NEI 99-01 Basis:

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

In some instances, the emergency classification resulting from this IC/EAL may be higher than that resulting from an assessment of the plant responses and symptoms against the Recognition Category F ICs/EALs. This is appropriate in that the Recognition Category F ICs/EALs do not address the additional threat posed by a failure to shut down the reactor. The inclusion of this IC and EAL ensures the timely declaration of a Site Area Emergency in response to prolonged failure to shutdown the reactor.

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

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

CPNPP Basis Reference(s):

1. EOP-0.0A/B Reactor Trip or Safety Injection
2. FR-S.1 Response to Nuclear Power Generation/ATWS
3. FR-C.1 Response to Inadequate Core Cooling
4. FR-H.1 Response to Loss of Heat Sink
5. NEI 99-01 SS5

Category: S – System Malfunction

Subcategory: 7 – Loss of Communications

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

EAL:

SU7.1 Unusual Event

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

OR

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

OR

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

Table S-4 Communication Methods

System	Onsite	Offsite	NRC
Gai-tronics Page/Party (PA)	X		
Plant Radios	X		
PABX	X	X	X
Public Telephone	X	X	X
Federal Telephone System (FTS)		X	X

Mode Applicability:

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

Definition(s):

None

CPNPP Basis:

Onsite/offsite communications include one or more of the systems listed in Table S-4 (ref. 1, 2).

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

NEI 99-01 Basis:

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

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

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

The second EAL condition addresses a total loss of the communications methods used to notify all OROs of an emergency declaration. The offsite (OROs) referred to here are the State Department of Public Safety, Somervell and Hood County EOCs

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

CPNPP Basis Reference(s):

1. FSAR 9.5.2
2. DBD-EE-048 Communication System
3. NEI 99-01 SU6

Category: S – System Malfunction

Subcategory: 8 – Containment Failure

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

EAL:

SU8.1 Unusual Event

Any penetration is not isolated within 15 min. of a VALID containment isolation signal

OR

Containment pressure greater than 18 psig with **neither** Containment Spray system operating per design for greater than or equal to 15 min.

(Note 1)

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

Mode Applicability:

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

Definition(s):

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

CPNPP Basis:

The Containment Spray System (CSS) is designed to remove heat from the Containment environment following a LOCA, a main steam line break accident, or a feedwater line break accident. Each unit of the CPNPP is equipped with two redundant Containment spray trains, each designed to provide emergency Containment heat removal in the event of a LOCA. This system, in conjunction with the ECCS, removes post-accident thermal energy from the Containment environment, thereby reducing the Containment pressure and temperature. Each train includes two containment spray pumps, spray headers, nozzles, valves, and piping. Each train is powered from a separate safeguard bus. (ref. 1)

The Containment pressure setpoint (18 psig, ref. 2) is the pressure at which the Containment Spray System should actuate and begin performing its function. The design basis accident analyses and evaluations assume the loss of one Containment Spray System train (ref. 1).

NEI 99-01 Basis:

This EAL addresses a failure of one or more containment penetrations to automatically isolate (close) when required by an actuation signal. It also addresses an event that results in high containment pressure with a concurrent failure of containment pressure control systems. Absent challenges to another fission product barrier, either condition represents potential degradation of the level of safety of the plant.

For the first condition, the containment isolation signal must be generated as the result on an off-normal/accident condition (e.g., a safety injection or high containment pressure); a failure resulting from testing or maintenance does not warrant classification. The determination of containment and penetration status – isolated or not isolated – should be made in accordance with the appropriate criteria contained in the plant AOPs and EOPs. The 15-minute criterion is included to allow operators time to manually isolate the required penetrations, if possible.

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

CPNPP Basis Reference(s):

1. FSAR Section 6.2.2
2. FRC-Z.1A/B Response to High Containment Pressure
3. NEI 99-01 SU7

Category: S – System Malfunction

Subcategory: 9 – Hazardous Event Affecting Safety Systems

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

EAL:

SA9.1 Alert

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

AND EITHER:

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

Table S-5 Hazardous Events

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

Mode Applicability:

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

Definition(s):

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

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

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

SAFETY SYSTEM - A system required for safe plant operation, cooling down the plant and/or

placing it in the cold shutdown condition, including the ECCS. These are typically systems classified as safety-related (as defined in 10CFR50.2):

> Those structures, systems and components that are relied upon to remain functional during and following design basis events to assure:
>
> (1) The integrity of the reactor coolant pressure boundary;
>
> (2) The capability to shut down the reactor and maintain it in a safe shutdown condition;
>
> (3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures.

VISIBLE DAMAGE - Damage to a component or structure that is readily observable without measurements, testing, or analysis. The visual impact of the damage is sufficient to cause concern regarding the operability or reliability of the affected component or structure.

CPNPP Basis:

- The significance of seismic events are discussed under EAL HU2.1 (ref. 1).
- Internal FLOODING may be caused by events such as component failures, equipment misalignment, or outage activity mishaps (ref. 2).
- External flooding may be due to high lake level (ref. 3, 4).
- Seismic Category I structures are analyzed to withstand a sustained, design wind velocity of at least 80 mph. (ref. 5).
- Areas containing functions and systems required for safe shutdown of the plant are identified by fire area (ref. 6, 7).
- An explosion that degrades the performance of a SAFETY SYSTEM train or visibly damages a SAFETY SYSTEM component or structure would be classified under this EAL.

NEI 99-01 Basis:

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

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

The second condition addresses damage to a SAFETY SYSTEM component that is not in service/operation or readily apparent through indications alone, or to a structure containing

SAFETY SYSTEM components. Operators will make this determination based on the totality of available event and damage report information. This is intended to be a brief assessment not requiring lengthy analysis or quantification of the damage.

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

CPNPP Basis Reference(s):

1. ABN-907 Acts of Nature
2. CPNPP PRA Accident Sequence Analysis "Internal Flooding Sequences"
3. FSAR Section 2.4.3.7 Flood Evaluations for Safe Shutdown Impoundment
4. DBD-CS-071 Maximum Probable Flood
5. FSAR Section 3.3.1.1 Wind Loadings
6. CPNPP Fire Protection Report, Section 5.0 "Fire Safe Shutdown Equipment List"
7. FSAR Section 7.4 Systems Required for Safe Shutdown
8. NEI 99-01 SA9

Category F – Fission Product Barrier Degradation

EAL Group: Hot Conditions (RCS temperature greater than 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 (CNTMT): 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.

- 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 CPNPP design and operating characteristics.
- As used in this category, the term RCS leakage encompasses not just those types defined in Technical Specifications but also includes the loss of RCS mass to any location– inside the primary containment, an interfacing system, or outside of the primary containment. The release of liquid or steam mass from the RCS due to the as-designed/expected operation of a relief valve is not considered to be RCS leakage.
- At the Site Area Emergency level, EAL users should maintain cognizance of how far present conditions are from meeting a threshold that would require a General Emergency declaration. For example, if the Fuel Clad and RCS fission product barriers were both lost, then there should be frequent assessments of containment radioactive inventory and integrity. Alternatively, if both the Fuel Clad and RCS fission product barriers were potentially lost, the Emergency Coordinator would have more assurance that there was no immediate need to escalate to a General Emergency.

Category: Fission Product Barrier Degradation

Subcategory: N/A

Initiating Condition: **Any** loss or **any** potential loss of either Fuel Clad or RCS

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

CPNPP Basis:

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

At the Alert classification level, Fuel Clad and RCS barriers are weighted more heavily than the Containment barrier. Unlike the Containment barrier, loss or potential loss of either the Fuel Clad or RCS barrier may result in the relocation of radioactive materials or degradation of core cooling capability. Note that the loss or potential loss of Containment barrier in combination with loss or potential loss of either Fuel Clad or RCS barrier results in declaration of a Site Area Emergency under EAL FS1.1

NEI 99-01 Basis:

None

CPNPP Basis Reference(s):

1. NEI 99-01 FA1

Category: Fission Product Barrier Degradation

Subcategory: N/A

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

EAL:

FS1.1 Site Area Emergency

Loss or potential loss of **any** two barriers (Table F-1)

Mode Applicability:

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

Definition(s):

None

CPNPP Basis:

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

At the Site Area Emergency classification level, each barrier is weighted equally. A Site Area Emergency is therefore appropriate for any combination of the following conditions:

- One barrier loss and a second barrier loss (i.e., loss - loss)
- One barrier loss and a second barrier potential loss (i.e., loss - potential loss)
- One barrier potential loss and a second barrier potential loss (i.e., potential loss - potential loss)

At the Site Area Emergency classification level, the ability to dynamically assess the proximity of present conditions with respect to the threshold for a General Emergency is important. For example, the existence of Fuel Clad and RCS Barrier loss thresholds in addition to offsite dose assessments would require continual assessments of radioactive inventory and Containment integrity in anticipation of reaching a General Emergency classification. Alternatively, if both Fuel Clad and RCS potential loss thresholds existed, the Emergency Coordinator would have greater assurance that escalation to a General Emergency is less imminent.

NEI 99-01 Basis:

None

CPNPP Basis Reference(s):

1. NEI 99-01 FS1

Category: Fission Product Barrier Degradation

Subcategory: N/A

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

EAL:

FG1.1 General Emergency

Loss of **any** two barriers

AND

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

Mode Applicability:

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

Definition(s):

None

CPNPP Basis:

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

At the General Emergency classification level each barrier is weighted equally. A General Emergency is therefore appropriate for any combination of the following conditions:

- Loss of Fuel Clad, RCS and Containment barriers
- Loss of Fuel Clad and RCS barriers with potential loss of Containment barrier
- Loss of RCS and Containment barriers with potential loss of Fuel Clad barrier
- Loss of Fuel Clad and Containment barriers with potential loss of RCS barrier

NEI 99-01 Basis:

None

CPNPP Basis Reference(s):

1. NEI 99-01 FG1

Introduction

Table F-1 lists the threshold conditions that define the Loss and Potential Loss of the three fission product barriers (Fuel Clad, Reactor Coolant System, and Containment). The table is structured so that each of the three barriers occupies adjacent columns. Each fission product barrier column is further divided into two columns; one for Loss thresholds and one for Potential Loss thresholds.

The first column of the table (to the left of the Fuel Clad Loss column) lists the categories (types) of fission product barrier thresholds. The fission product barrier categories are:

A. RCS or SG Tube Leakage

B. Inadequate Heat removal

C. CNTMT Radiation / RCS Activity

D. CNTMT Integrity or Bypass

E. Emergency Coordinator Judgment

Each category occupies a row in Table F-1 thus forming a matrix defined by the categories. The intersection of each row with each Loss/Potential Loss column forms a cell in which one or more fission product barrier thresholds appear. If NEI 99-01 does not define a threshold for a barrier Loss/Potential Loss, the word "None" is entered in the cell.

Thresholds are assigned sequential numbers within each Loss and Potential Loss column beginning with number one. In this manner, a threshold can be identified by its category title and number. For example, the first Fuel Clad barrier Loss in Category A would be assigned "FC Loss A.1," the third Containment barrier Potential Loss in Category C would be assigned "CNTMT P-Loss C.3," etc.

If a cell in Table F-1 contains more than one numbered threshold, each of the numbered thresholds, if exceeded, signifies a Loss or Potential Loss of the barrier. It is not necessary to exceed all of the thresholds in a category before declaring a barrier Loss/Potential Loss.

Subdivision of Table F-1 by category facilitates association of plant conditions to the applicable fission product barrier Loss and Potential Loss thresholds. This structure promotes a systematic approach to assessing the classification status of the fission product barriers.

When equipped with knowledge of plant conditions related to the fission product barriers, the EAL-user first scans down the category column of Table F-1, locates the likely category and then reads across the fission product barrier Loss and Potential Loss thresholds in that category to determine if a threshold has been exceeded. If a threshold has not been exceeded, the EAL-user proceeds to the next likely category and continues review of the thresholds in the new category

If the EAL-user determines that any threshold has been exceeded, by definition, the barrier is lost or potentially lost – even if multiple thresholds in the same barrier column are exceeded, only that one barrier is lost or potentially lost. The EAL-user must examine each of the three fission product barriers to determine if other barrier thresholds in the category are lost or potentially lost. For example, if containment radiation is sufficiently high, a Loss of the Fuel Clad and RCS barriers and a Potential Loss of the Containment barrier can occur. Barrier

Losses and Potential Losses are then applied to the algorithms given in EALs FG1.1, FS1.1, and FA1.1 to determine the appropriate emergency classification.

In the remainder of this Attachment, the Fuel Clad barrier threshold bases appear first, followed by the RCS barrier and finally the Containment barrier threshold bases. In each barrier, the bases are given according category Loss followed by category Potential Loss beginning with Category A, then B,..., E.

Table F-1 Fission Product Barrier Threshold Matrix

	Fuel Clad (FC) Barrier		Reactor Coolant System (RCS) Barrier		Containment (CNTMT) Barrier	
Category	**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:** • UNISOLABLE RCS leakage • SG tube RUPTURE	1. Operation of a standby charging pump is required by **EITHER:** • UNISOLABLE RCS leakage • SG tube leakage 2. 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 **CNTMT Radiation / RCS Activity**	1. Containment radiation greater than 85 R/hr CTEu16 Containment HRRM (u-RE-6290A), or CTWu17 Containment HRRM (u-RE-6290B) 2. Dose equivalent I-131 coolant activity greater than 300 µCi/cc 3. Gross Failed Fuel Monitor, FFLu60 (u-RE-0406), radiation greater than 1.0E04 µCi/cc	None	1. Containment radiation greater than 5 R/hr CTEu16 Containment HRRM (u-RE-6290A), or CTWu17 Containment HRRM (u-RE-6290B)	None	None	1. Containment radiation greater than 2,110 R/hr CTEu16 Containment HRRM (u-RE-6290A), or CTWu17 Containment HRRM (u-RE-6290B)
D **CNTMT Integrity or Bypass**	None	None	None	None	1. Containment isolation is required **AND EITHER:** • Containment integrity has been lost based on Emergency Coordinator judgment • UNISOLABLE pathway from Containment to the environment exists 2. Indications of RCS leakage outside of Containment	1. CSFST Containment-RED Path conditions met 2. Containment hydrogen concentration greater than 4% 3. Containment pressure greater than 18 psig with **neither** Containment Spray system train operating greater than or equal to 15 min. (Note 1)
E **EC Judgment**	1. **Any** condition in the opinion of the Emergency Coordinator that indicates loss of the fuel clad barrier	1. **Any** condition in the opinion of the Emergency Coordinator that indicates potential loss of the fuel clad barrier	1. **Any** condition in the opinion of the Emergency Coordinator that indicates loss of the RCS barrier	1. **Any** condition in the opinion of the Emergency Coordinator that indicates potential loss of the RCS barrier	1. **Any** condition in the opinion of the Emergency Coordinator that indicates loss of the Containment barrier	1. **Any** condition in the opinion of the Emergency Coordinator that indicates potential loss of the Containment barrier

Barrier: Fuel Clad

Category: A. RCS or SG Tube Leakage

Degradation Threat: Loss

Threshold:

None

Barrier: Fuel Clad

Category: A. RCS or SG Tube Leakage

Degradation Threat: Potential Loss

Threshold:

None

Barrier: Fuel Clad

Category: B. Inadequate Heat Removal

Degradation Threat: Loss

Threshold:

1. CSFST Core Cooling-RED Path conditions met

Definition(s):

None

Basis:

Plant-Specific

Critical Safety Function Status Tree (CSFST) Core Cooling-RED Path indicates significant core exit superheating and core uncovery. The CSFSTs are normally monitored using the SPDS display on the Plant Computer (ref. 1).

Generic

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

CPNPP Basis Reference(s):

1. FRC-0.1A/B Response to Inadequate Core Cooling
2. NEI 99-01 Inadequate Heat Removal Fuel Clad Loss 2.A

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:

Plant-Specific

Critical Safety Function Status Tree (CSFST) Core Cooling-ORANGE path indicates indicates subcooling has been lost and that some fuel clad damage may potentially occur. The CSFSTs are normally monitored using the SPDS display on the Plant Computer (ref. 1, 2).

Generic

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

CPNPP Basis Reference(s):

1. FRC-0.1A/B Response to Inadequate Core Cooling
2. FRC-0.2A/B Response to Degraded Core Cooling
3. NEI 99-01 Inadequate Heat Removal Fuel Clad Loss 2.A

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:

Plant-Specific

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 are normally monitored using the SPDS display on the Plant 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 ERG. For example, FRH-0.1 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 and RCS temperature is greater than 350°F. 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. 1).

Generic

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.

CPNPP Basis Reference(s):

1. FRH-0.1A/B Response to Loss of Secondary Heat Sink
2. 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. CNTMT Radiation / RCS Activity

Degradation Threat: Loss

Threshold:

1. Containment radiation greater than 85 R/hr
   CTEu16 Containment HRRM (u-RE-6290A), or
   CTWu17 Containment HRRM (u-RE-6290B)

Definition(s):

None

Basis:

Plant-Specific

Containment radiation monitor readings greater than 85 R/hr indicate the release of reactor coolant, with elevated activity indicative of fuel damage, into the Containment. The reading is derived assuming the instantaneous release and dispersal of the reactor coolant noble gas and iodine inventory associated with a 2% clad failures into the Containment atmosphere. Reactor coolant concentrations of this magnitude are several times larger than the maximum concentrations (including iodine spiking) allowed within technical specifications and are therefore indicative of fuel damage. This value is higher than that specified for RCS Loss C.1 (ref. 2, 3).

Per NUS-174, the design basis CPNPP RCS specific activity for 1% fuel defects is 340 µCi/gm; therefore, a threshold corresponding to 2% fuel clad damage correlates to a coolant activity of 680 µCi/gm. VL-03-000032 Figure 2A/2B (CRM2) corresponds to approximately 50% clad damage released to the containment atmosphere. Figure 2A/2B provides several potential limits depending on the pressure of the RCS and the presence of containment spray. The high RCS pressure with containment spray is the most limiting threshold; however, per NEI 99-01, the fuel clad barrier loss threshold should represent a loss of both the fuel clad and RCS barriers. Therefore, the value of curve representing low RCS pressure with spray was used. The change in dose rates based on amount of fuel defects is a linear function; therefore, the threshold at 2% fuel defects is: 2120R/hr *(2% / 50%) = 85 R/hr (ref. 2).

The Containment High Range Radiation Monitors (HRRMs) provide indication of radiation levels in Containment during and after postulated accidents. The monitors are two ion chamber detectors located on the 905' level of Containment approximately 90° apart. The range of each monitor is 1 to 10^8 R/hr. The output of each detector is fed to an RM-80 located outside Containment. The RM-80 provides monitoring, alarming, and recording functions for the monitor channel. The RM-80 works in conjunction with the PC-11, RM-21, and RM-23 assemblies. (ref. 1)

Generic

The radiation monitor reading corresponds to an instantaneous release of all reactor coolant mass into the containment, assuming that reactor coolant activity equals 300 µCi/gm dose equivalent I-131. Reactor coolant activity above this level is greater than that expected for iodine spikes and corresponds to an approximate range of 2% to 5% fuel clad damage. Since this condition indicates that a significant amount of fuel clad damage has occurred, it represents a loss of the Fuel Clad Barrier.

The radiation monitor reading in this threshold is higher than that specified for RCS Barrier Loss threshold C.1 since it indicates a loss of both the Fuel Clad Barrier and the RCS Barrier. Note that a combination of the two monitor readings appropriately escalates the ECL to a Site Area Emergency.

CPNPP Basis Reference(s):

1. DBD-EE-023 Radiation Monitoring System
2. Evaluation performed by Design Engineering & Analysis (Andrea Lemons) (AI-CR-2014-012646-15)
3. EPP-312 Core Damage Assessment
4. NEI 99-01 CNTMT Radiation / RCS Activity Fuel Clad Loss 3.A

Barrier: Fuel Clad

Category: C. CNTMT Radiation / RCS Activity

Degradation Threat: Loss

Threshold:

2. Dose equivalent I-131 coolant activity greater than 300 µCi/cc

Definition(s):

None

Basis:

Plant-Specific

None

Generic

This threshold indicates that RCS radioactivity concentration is greater than 300 µCi/gm dose equivalent I-131. Reactor coolant activity above this level is greater than that expected for iodine spikes and corresponds to an approximate range of 2% to 5% fuel clad damage. Since this condition indicates that a significant amount of fuel clad damage has occurred, it represents a loss of the Fuel Clad Barrier.

There is no Potential Loss threshold associated with RCS Activity / Containment Radiation.

CPNPP Basis Reference(s):

1. NEI 99-01 CNTMT Radiation / RCS Activity Fuel Clad Loss 3.B

Barrier: Fuel Clad

Category: C. CNTMT Radiation / RCS Activity

Degradation Threat: Loss

Threshold:

3. Gross Failed Fuel Monitor, FFLu60 (u-RE-0406), radiation greater than 1.0E04 µCi/ml

Definition(s):

None

Basis:

Plant-Specific

The normal Chemical and Volume Control System (CVCS) charging and letdown flow path allows purification of the reactor coolant and control of the RCS volume while maintaining a continuous feed and bleed flow between the RCS and the CVCS. Reactor coolant is first "letdown" from the RCS through a regenerative heat exchanger, which minimizes heat losses from the RCS. Additional cooling takes place in a letdown heat exchanger that acts as the heat sink for the system. Downstream of the letdown heat exchanger pressure control valve and upstream of the mixed bed demineralizers, the letdown stream passes by a Geiger-Mueller radiation detector, FFLu60 (u-RE-0406), mounted on the reactor coolant letdown line to monitor coolant activity and warn of fission products in the letdown coolant if a fuel element failure occurs. Detection of increased coolant activity may be indicative of failed fuel. The monitor initiates Alert and High alarms in the Control Room (PC-11 and Plant Computer). (ref. 1).

Core Damage Assessment Guidelines (VL-03-000032) which was incorporated into EPP-312 "Core Damage Assessment" provides the basis for loss of the Fuel Cladding as monitored by the Gross Failed Fuel Monitor. The setpoint recommended by Westinghouse is 1E+04 µCi/ml (ref. 2, 3).

FFLu60 (u-RE-0406) has a range of 1E-2 – 1E+7 µCi/ml.

Generic

None

CPNPP Basis Reference(s):

1. DBD-EE-023 Radiation Monitoring System
2. Evaluation performed by Design Engineering & Analysis (Andrea Lemons) (AI-CR-2014-012646-15)
3. EPP-312 Core Damage Assessment
4. NEI 99-01 Other Indications Fuel Clad Loss 5.A

ATTACHMENT 2
Fission Product Barrier Loss/Potential Loss Matrix and Bases

Barrier: Fuel Clad

Category: C. CNTMT Radiation / RCS Activity

Degradation Threat: Potential Loss

Threshold:

None

Barrier: Fuel Clad

Category: D. CNTMT Integrity or Bypass

Degradation Threat: Loss

Threshold:

None

Barrier: Fuel Clad

Category: D. CNTMT Integrity or Bypass

Degradation Threat: Potential Loss

Threshold:

None

Barrier: Fuel Clad

Category: E. Emergency Coordinator Judgment

Degradation Threat: Loss

Threshold:

1. **Any** condition in the opinion of the Emergency Coordinator that indicates loss of the Fuel Clad barrier

Definition(s):

None

Basis:

Plant-Specific

The Emergency Coordinator judgment threshold addresses any other factors relevant to determining if the Fuel Clad barrier is lost. Such a determination should include imminent barrier degradation, barrier monitoring capability and dominant accident sequences.

- Imminent barrier degradation exists if the degradation will likely occur within relatively short period of time based on a projection of current safety system performance. The term "imminent" refers to recognition of the inability to reach safety acceptance criteria before completion of all checks.
- Barrier monitoring capability is decreased if there is a loss or lack of reliable indicators. This assessment should include instrumentation operability concerns, readings from portable instrumentation and consideration of offsite monitoring results.
- Dominant accident sequences lead to degradation of all fission product barriers and likely entry to the EOPs. The Emergency Coordinator should be mindful of the Loss of AC power (Station Blackout) and ATWS EALs to assure timely emergency classification declarations.

Generic

This threshold addresses any other factors that are to be used by the Emergency Coordinator in determining whether the Fuel Clad barrier is lost

CPNPP 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 Coordinator Judgment

Degradation Threat: Potential Loss

Threshold:

1. **Any** condition in the opinion of the Emergency Coordinator that indicates potential loss of the Fuel Clad barrier

Basis:

Plant-Specific

The Emergency Coordinator judgment threshold addresses any other factors relevant to determining if the Fuel Clad barrier is potentially lost. Such a determination should include imminent barrier degradation, barrier monitoring capability and dominant accident sequences.

- Imminent barrier degradation exists if the degradation will likely occur within relatively short period of time based on a projection of current safety system performance. The term "imminent" refers to recognition of the inability to reach safety acceptance criteria before completion of all checks.
- Barrier monitoring capability is decreased if there is a loss or lack of reliable indicators. This assessment should include instrumentation operability concerns, readings from portable instrumentation and consideration of offsite monitoring results.
- Dominant accident sequences lead to degradation of all fission product barriers and likely entry to the EOPs. The Emergency Coordinator should be mindful of the Loss of AC power (Station Blackout) and ATWS EALs to assure timely emergency classification declarations.

Generic

This threshold addresses any other factors that are to be used by the Emergency Coordinator in determining whether the Fuel Clad barrier is potentially lost. The Emergency Coordinator should also consider whether or not to declare the barrier potentially lost in the event that barrier status cannot be monitored.

CPNPP Basis Reference(s):

1. NEI 99-01 Emergency Director Judgment Potential Fuel Clad Loss 6.A

Barrier: Reactor Coolant System

Category: A. RCS or SG Tube Leakage

Degradation Threat: Loss

Threshold:

1. An automatic or manual ECCS (SI) actuation required by **EITHER:**
   - UNISOLABLE RCS leakage
   - SG tube RUPTURE

Definition(s):

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

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

Basis:

Plant-Specific

ECCS (SI) actuation is caused by (ref. 1):

- Pressurizer low pressure less than 1820 psig
- Steamline low pressure less than 610 psig
- Containment high pressure greater than 3.0 psig

Generic

This threshold is based on an UNISOLABLE RCS leak of sufficient size to require an automatic or manual actuation of the Emergency Core Cooling System (ECCS). This condition clearly represents a loss of the RCS Barrier.

This threshold is applicable to unidentified and pressure boundary leakage, as well as identified leakage. It is also applicable to UNISOLABLE RCS leakage through an interfacing system. The mass loss may be into any location – inside containment, to the secondary-side (i.e., steam generator tube leakage) or outside of containment.

A steam generator with primary-to-secondary leakage of sufficient magnitude to require a safety injection is considered to be RUPTURED. If a RUPTURED steam generator is also FAULTED outside of containment, the declaration escalates to a Site Area Emergency since the Containment Barrier Loss threshold 1.A will also be met.

CPNPP Basis Reference(s):

1. EOP-0.0A/B Reactor Trip or Safety Injection
2. EOP-3.0A/B Steam Generator Tube Rupture
3. NEI 99-01 RCS or SG Tube Leakage Reactor Coolant System Loss 1.A

Barrier: Reactor Coolant System

Category: A. RCS or SG Tube Leakage

Degradation Threat: Potential Loss

Threshold:

1. Operation of a standby charging pump is required by **EITHER:**
   - UNISOLABLE RCS leakage
   - SG tube leakage

Definition(s):

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

Basis:

Plant-Specific

The Chemical and Volume Control System (CVCS) includes three charging pumps (one positive displacement pump and two centrifugal charging pumps) that take suction from the volume control tank and return the cooled, purified reactor coolant to the RCS. The centrifugal charging pumps in the CVCS also serve as the high-head safety injection pumps in the Emergency Core Cooling System. Positive displacement pump capacity is 98 gpm. The capacity of each centrifugal pump is 150 gpm. A second charging pump being required (positive displacement or centrifugal) is indicative of a substantial RCS leak. (ref. 1, 2, 3)

Generic

This threshold is based on an UNISOLABLE RCS leak that results in the inability to maintain pressurizer level within specified limits by operation of a normally used charging (makeup) pump, but an ECCS (SI) actuation has not occurred. The threshold is met when an operating procedure, or operating crew supervision, directs that a standby charging (makeup) pump be placed in service to restore and maintain pressurizer level.

This threshold is applicable to unidentified and pressure boundary leakage, as well as identified leakage. It is also applicable to UNISOLABLE RCS leakage through an interfacing system. The mass loss may be into any location – inside containment, to the secondary-side (i.e., steam generator tube leakage) or outside of containment.

If a leaking steam generator is also FAULTED outside of containment, the declaration escalates to a Site Area Emergency since the Containment Barrier Loss threshold 1.A will also be met.

CPNPP Basis Reference(s):

1. FSAR 9.3.4
2. FSAR Table 9.3-7
3. SOP-103A/B Chemical and Volume Control System
4. NEI 99-01 RCS or SG Tube Leakage Reactor Coolant System Potential Loss 1.A

Barrier: Reactor Coolant System

Category: A. RCS or SG Tube Leakage

Degradation Threat: Potential Loss

Threshold:

2. CSFST Integrity-RED Path conditions met

Definition(s):

None

Basis:

Plant-Specific

Critical Safety Function Status Tree (CSFST) RCS Integrity-RED path indicates the RCS barrier is under significant challenge (ref. 1).

Generic

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).

CPNPP Basis Reference(s):

1. FRP-0.1A/B Response to Imminent Pressurized Thermal Shock Condition
2. NEI 99-01 RCS or SG Tube Leakage Reactor Coolant System Potential Loss 1.B

Barrier: Reactor Coolant System

Category: B. Inadequate Heat Removal

Degradation Threat: Loss

Threshold:

None

Barrier: Reactor Coolant System

Category: B. Inadequate Heat Removal

Degradation Threat: Potential Loss

Threshold:

1. CSFST Heat Sink-RED path conditions met
   AND
   Heat sink is required

Definition(s):

None

Basis:

Plant-Specific

In combination with FC Potential Loss B.2, 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 are normally monitored using the SPDS display on the Plant 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 ERG. For example, FRH-0.1 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 and RCS temperature is greater than 350°F. 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. 1).

Generic

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.

CPNPP Basis Reference(s):

1. FRH-0.1A/B Response to Loss of Secondary Heat Sink
2. NEI 99-01 Inadequate Heat Removal RCS Loss 2.B

Barrier: Reactor Coolant System

Category: C. CNTMT Radiation/ RCS Activity

Degradation Threat: Loss

Threshold:

1. Containment radiation greater than 5 R/hr
   CTEu16 Containment HRRM (u-RE-6290A), or
   CTWu17 Containment HRRM (u-RE-6290B)

Definition(s):

N/A

Basis:

Plant-Specific

As part of the elimination of the Post-Accident Sampling system, Westinghouse performed analysis for Comanche Peak on Core Damage Assessment Guidelines (VL-03-000032) which was incorporated into EPP-312 "Core Damage Assessment". For setpoint CRM1, Westinghouse assumptions match the requirements of NEI 99-01 for RCS barrier loss with the exception that the level of radioactivity in the RCS is assumed to be at 10% of Technical Specifications levels rather than 100% as recommended by NEI 99-01. However, this adds conservatism to this threshold. The limiting maximum value found in Figure 1A is 4.75 R/hr. This value is time dependent and corresponds to an hour after shutdown. This value has been rounded to 5 R/hr for instrument readability (ref. 1, 3, 4, 5).

The Containment High Range Radiation Monitors (HRRMs) provide indication of radiation levels in Containment during and after postulated accidents. The monitors are two ion chamber detectors located on the 905' level of Containment approximately 90° apart. The range of each monitor is 1 to 10^8 R/hr. The output of each detector is fed to an RM-80 located outside Containment.

The RM-80 provides monitoring, alarming, and recording functions for the monitor channel. The RM-80 works in conjunction with the PC-11, RM-21, and RM-23 assemblies. (ref. 2)

Generic

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.

CPNPP Basis Reference(s):

1. Technical Specifications Table 3.3.3-1
2. DBD-EE-023 Radiation Monitoring System
3. Evaluation performed by Design Engineering & Analysis (Andrea Lemons) (AI-CR-2014-012646-15)
4. Technical Specifications B3.3.3
5. EPP-312 Core Damage Assessment
6. NEI 99-01 CNTMT Radiation / RCS Activity RCS Loss 3.A

ATTACHMENT 2
Fission Product Barrier Loss/Potential Loss Matrix and Bases

Barrier: Reactor Coolant System

Category: B. CNTMT Radiation/ RCS Activity

Degradation Threat: Potential Loss

Threshold:

None

Barrier: Reactor Coolant System

Category: D. CNTMT 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. CNTMT Integrity or Bypass

Degradation Threat: Potential Loss

Threshold:

None

Barrier: Reactor Coolant System

Category: E. Emergency Coordinator Judgment

Degradation Threat: Loss

Threshold:

1. **Any** condition in the opinion of the Emergency Coordinator that indicates loss of the RCS barrier

Definition(s):

None

Basis:

Plant-Specific

The Emergency Coordinator judgment threshold addresses any other factors relevant to determining if the RCS barrier is lost. Such a determination should include imminent barrier degradation, barrier monitoring capability and dominant accident sequences.

- Imminent barrier degradation exists if the degradation will likely occur within relatively short period of time based on a projection of current safety system performance. The term "imminent" refers to recognition of the inability to reach safety acceptance criteria before completion of all checks.
- Barrier monitoring capability is decreased if there is a loss or lack of reliable indicators. This assessment should include instrumentation operability concerns, readings from portable instrumentation and consideration of offsite monitoring results.
- Dominant accident sequences lead to degradation of all fission product barriers and likely entry to the EOPs. The Emergency Coordinator should be mindful of the Loss of AC power (Station Blackout) and ATWS EALs to assure timely emergency classification declarations.

Generic

This threshold addresses any other factors that may be used by the Emergency Coordinator in determining whether the RCS Barrier is lost.

CPNPP Basis Reference(s):

1. NEI 99-01 Emergency Director Judgment RCS Loss 6.A

Barrier: Reactor Coolant System

Category: E. Emergency Coordinator Judgment

Degradation Threat: Potential Loss

Threshold:

1. **Any** condition in the opinion of the Emergency Coordinator that indicates potential loss of the RCS barrier

Definition(s):

None

Basis:

Plant-Specific

The Emergency Coordinator judgment threshold addresses any other factors relevant to determining if the RCS barrier is potentially lost. Such a determination should include imminent barrier degradation, barrier monitoring capability and dominant accident sequences.

- Imminent barrier degradation exists if the degradation will likely occur within relatively short period of time based on a projection of current safety system performance. The term "imminent" refers to recognition of the inability to reach safety acceptance criteria before completion of all checks.
- Barrier monitoring capability is decreased if there is a loss or lack of reliable indicators. This assessment should include instrumentation operability concerns, readings from portable instrumentation and consideration of offsite monitoring results.
- Dominant accident sequences lead to degradation of all fission product barriers and likely entry to the EOPs. The Emergency Coordinator should be mindful of the Loss of AC power (Station Blackout) and ATWS EALs to assure timely emergency classification declarations.

Generic

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

CPNPP Basis Reference(s):

1. NEI 99-01 Emergency Director Judgment RCS Potential Loss 6.A

Barrier: Containment

Category: A. RCS or SG Tube Leakage

Degradation Threat: Loss

Threshold:

1. A leaking or 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:

Plant-Specific

None.

Generic

This threshold addresses a leaking or RUPTURED Steam Generator (SG) that is also FAULTED outside of containment. The condition of the SG, whether leaking or RUPTURED, is determined in accordance with the thresholds for RCS Barrier Potential Loss A.1 and Loss A.1, respectively. This condition represents a bypass of the containment barrier.

FAULTED is a defined term within the NEI 99-01 methodology; this determination is not necessarily dependent upon entry into, or diagnostic steps within, an EOP. For example, if the pressure in a steam generator is decreasing uncontrollably (part of the FAULTED definition) and the FAULTED steam generator isolation procedure is not entered because EOP user rules are dictating implementation of another procedure to address a higher priority condition, the steam generator is still considered FAULTED for emergency classification purposes.

The FAULTED criterion establishes an appropriate lower bound on the size of a steam release that may require an emergency classification. Steam releases of this size are readily observable with normal Control Room indications. The lower bound for this aspect of the

containment barrier is analogous to the lower bound criteria specified in IC SU4 for the fuel clad barrier (i.e., RCS activity values) and IC SU5 for the RCS barrier (i.e., RCS leak rate values).

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

Steam releases associated with the expected operation of a SG power operated relief valve or safety relief valve do not meet the intent of this threshold. Such releases may occur intermittently for a short period of time following a reactor trip as operators process through emergency operating procedures to bring the plant to a stable condition and prepare to initiate a plant cooldown. Steam releases associated with the unexpected operation of a valve (e.g., a stuck-open safety valve) do meet this threshold.

Following an SG tube leak or rupture, there may be minor radiological releases through a secondary-side system component (e.g., air ejectors, glad 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 ECLs resulting from primary-to-secondary leakage, with or without a steam release from the FAULTED SG, are summarized below.

	Affected SG is FAULTED Outside of Containment?	
P-to-S Leak Rate	**Yes**	**No**
Less than or equal to 25 gpm	No classification	No classification
Greater than 25 gpm	Unusual Event per SU5.1	Unusual Event per SU5.1
Requires operation of a standby charging (makeup) pump (*RCS Barrier Potential Loss*)	Site Area Emergency per FS1.1	Alert per FA1.1
Requires an automatic or manual ECCS (SI) actuation (*RCS Barrier Loss*)	Site Area Emergency per FS1.1	Alert per FA1.1

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

CPNPP Basis Reference(s):

1. EOP-3.0 Steam Generator Tube Rupture
2. EOP-2.0A/B Faulted Steam Generator Isolation
3. NEI 99-01 RCS or SG Tube Leakage Containment Loss 1.A

Barrier: Containment

Category: A. RCS or SG Tube Leakage

Degradation Threat: Potential Loss

Threshold:

None

ATTACHMENT 2
Fission Product Barrier Loss/Potential Loss Matrix and Bases

Barrier: Containment

Category: B. Inadequate heat Removal

Degradation Threat: Loss

Threshold:

None

Barrier: Containment

Category: B. Inadequate heat Removal

Degradation Threat: Potential Loss

Threshold:

1. CSFST Core Cooling-RED Path conditions met **AND** Restoration procedures **not** effective within 15 min. (Note 1)

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

Definition(s):

None

Basis:

Plant-Specific

Critical Safety Function Status Tree (CSFST) Core Cooling-RED path indicates significant core exit superheating and core uncovery. The CSFSTs are normally monitored using the SPDS display on the Plant 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).

A direct correlation to status trees can be made if the effectiveness of the restoration procedures is also evaluated. If core exit thermocouple (TC) readings are greater than 1,200°F (ref. 1), Fuel Clad barrier is also lost.

Generic

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

CPNPP Basis Reference(s):

1. FRC-0.1A/B Response to Inadequate Core Cooling
2. NEI 99-01 Inadequate Heat Removal Containment Potential Loss 2.A

Barrier: Containment

Category: C. CNTMT Radiation/RCS Activity

Degradation Threat: Loss

Threshold:

None

ATTACHMENT 2
Fission Product Barrier Loss/Potential Loss Matrix and Bases

Barrier: Containment

Category: C. CNTMT Radiation/RCS Activity

Degradation Threat: Potential Loss

Threshold:

1. Containment radiation greater than 1,110 R/hr CTEu16 Containment HRRM (u-RE-6290A), or CTWu17 Containment HRRM (u-RE-6290B)

Definition(s):

None

Basis:

Plant-Specific

Containment radiation monitor readings greater than 1,110 R/hr indicate significant fuel damage well in excess of that required for loss of the RCS barrier and the Fuel Clad barrier. Regardless of whether the Containment barrier itself is challenged, this amount of activity in containment could have severe consequences if released. It is, therefore, prudent to treat this as a Potential Loss of the Containment barrier. (ref. 2, 3)

The readings are higher than that specified for Fuel Clad Loss C.3 and RCS Loss C.1. 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.

The analysis performed in VL-03-00032 was used to determine the potential containment loss threshold. Since the containment potential loss threshold also assumes a loss of the RCS barrier, the Figure 3A (CRM3) curve which represents the dose response at low RCS pressure with sprays present was used. The setpoint was developed on the assumption of 100% fuel rod rupture with 100% of the noble gas and 50% of the iodine and cesium in the RCS released to containment. With containment spray operating, the containment inventory of all fission products except the noble gases are reduced by a factor of 100. Per Figure 3A, the value one hour after shutdown for 100% rod rupture is 5560 R/hr; therefore, the EAL threshold at 20% fuel defects is: 5,560 R/hr *20% = 1,112 R/hr (rounded to 1,110 R/hr for instrument readability) (ref. 2, 3).

The Containment High Range Radiation Monitors (HRRMs) provide indication of radiation levels in Containment during and after postulated accidents. The monitors are two ion chamber detectors located on the 905' level of Containment approximately 90° apart. The range of each monitor is 1 to 10^8 R/hr. The output of each detector is fed to an RM-80 located outside Containment. The RM-80 provides monitoring, alarming, and recording functions for the monitor channel. The RM-80 works in conjunction with the PC-11, RM-21, and RM-23 assemblies. (ref. 1).

Generic

The radiation monitor reading corresponds to an instantaneous release of all reactor coolant mass into the containment, assuming that 20% of the fuel cladding has failed. This level of fuel clad failure is well above that used to determine the analogous Fuel Clad Barrier Loss and RCS Barrier Loss thresholds.

NUREG-1228, Source Estimations During Incident Response to Severe Nuclear Power Plant Accidents, indicates the fuel clad failure must be greater than approximately 20% in order for there to be a major release of radioactivity requiring offsite protective actions. For this condition to exist, there must already have been a loss of the RCS Barrier and the Fuel Clad Barrier. It is therefore prudent to treat this condition as a potential loss of containment which would then escalate the ECL to a General Emergency.

CPNPP Basis Reference(s):

1. DBD-EE-023 Radiation Monitoring System
2. Evaluation performed by Design Engineering & Analysis (Andrea Lemons) (AI-CR-2014-012646-15)
3. EPP-312 Core Damage Assessment
4. NEI 99-01 CNTMT Radiation / RCS Activity Containment Potential Loss 3.A

Barrier: Containment

Category: D. CNTMT Integrity or Bypass

Degradation Threat: Loss

Threshold:

1. Containment isolation is required
   AND EITHER:
   - Containment integrity has been lost based on Emergency Coordinator judgment
   - UNISOLABLE pathway from containment to the environment exists

Definition(s):

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

Basis:

Plant-Specific

None

Generic

These thresholds address a situation where containment isolation is required and one of two conditions exists as discussed below. Users are reminded that there may be accident and release conditions that simultaneously meet both bulleted thresholds.

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

Refer to the middle piping run of Figure 1. Two simplified examples are provided. One is leakage from a penetration and the other is leakage from an in-service system valve.

Depending upon radiation monitor locations and sensitivities, the leakage could be detected by any of the four monitors depicted in the figure.

Another example would be a loss or potential loss of the RCS barrier, and the simultaneous occurrence of two FAULTED locations on a steam generator where one fault is located inside containment (e.g., on a steam or feedwater line) and the other outside of containment. In this case, the associated steam line provides a pathway for the containment atmosphere to escape to an area outside the containment.

Following the leakage of RCS mass into containment and a rise in containment pressure, there may be minor radiological releases associated with allowable (design) containment leakage through various penetrations or system components. These releases do not constitute a loss or potential loss of containment but should be evaluated using the Recognition Category R ICs.

Second Threshold – Conditions are such that there is an UNISOLABLE pathway for the migration of radioactive material from the containment atmosphere to the environment. As used here, the term "environment" includes the atmosphere of a room or area, outside the containment, that may, in turn, communicate with the outside-the-plant atmosphere (e.g., through discharge of a ventilation system or atmospheric leakage). Depending upon a variety of factors, this condition may or may not be accompanied by a noticeable drop in containment pressure.

Refer to the top piping run of Figure 1. In this simplified example, the inboard and outboard isolation valves remained open after a containment isolation was required (i.e., containment isolation was not successful). There is now an UNISOLABLE pathway from the containment to the environment.

The existence of a filter is not considered in the threshold assessment. Filters do not remove fission product noble gases. In addition, a filter could become ineffective due to iodine and/or particulate loading beyond design limits (i.e., retention ability has been exceeded) or water saturation from steam/high humidity in the release stream.

Leakage between two interfacing liquid systems, by itself, does not meet this threshold.

Refer to the bottom piping run of Figure 1. In this simplified example, leakage in an RCP seal cooler is allowing radioactive material to enter the Auxiliary Building. The radioactivity would be detected by the Process Monitor. If there is no leakage from the closed water cooling system to the Auxiliary Building, then no threshold has been met. If the pump developed a leak that allowed steam/water to enter the Auxiliary Building, then second threshold would be met. Depending upon radiation monitor locations and sensitivities, this leakage could be detected by any of the four monitors depicted in the figure and cause the first threshold to be met as well.

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

The status of the containment barrier during an event involving steam generator tube leakage is assessed using Loss Threshold A.1.

CPNPP Basis Reference(s):

1. NEI 99-01 CNTMT Integrity or Bypass Containment Loss 4.A

Barrier: Containment

Category: D. CNTMT Integrity or Bypass

Degradation Threat: Loss

Threshold:

2. Indications of RCS leakage outside of containment

Definition(s):

None

Basis:

Plant-Specific

ECA-1.2A/B 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):

- Residual Heat Removal
- Safety Injection
- Chemical & Volume Control
- RCP seals
- PZR/RCS Loop sample lines

Generic

Containment sump, temperature, pressure and/or radiation levels will increase if reactor coolant mass is leaking into the containment. If these parameters have not increased, then the reactor coolant mass may be leaking outside of containment (i.e., a containment bypass sequence). Increases in sump, temperature, pressure, flow and/or radiation level readings outside of the containment may indicate that the RCS mass is being lost outside of containment.

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

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

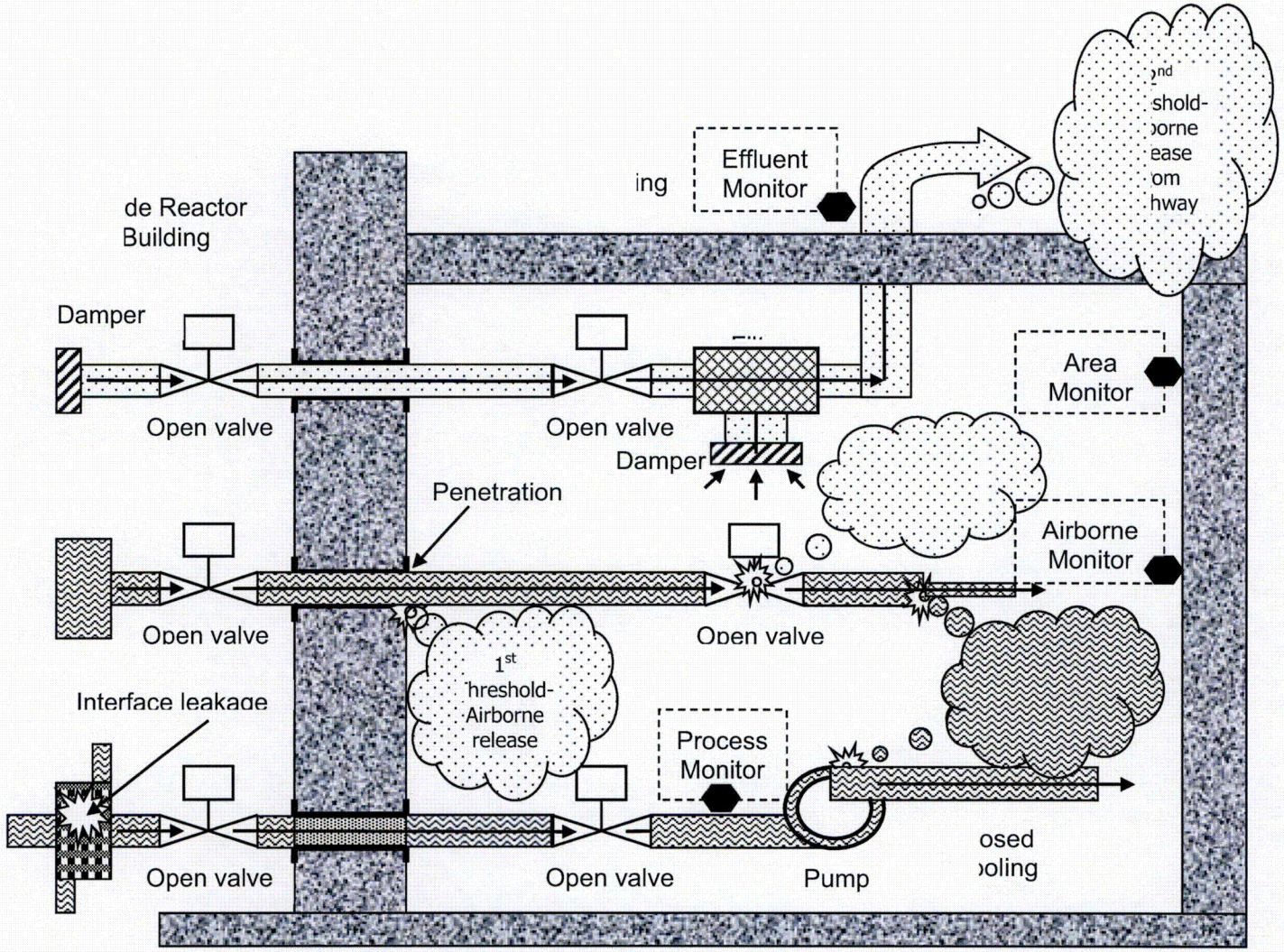
To ensure proper escalation of the emergency classification, the RCS leakage outside of containment must be related to the mass loss that is causing the RCS Loss and/or Potential Loss threshold A.1 to be met.

CPNPP Basis Reference(s):

1. ECA-1.2A/B LOCA Outside Containment
2. NEI 99-01 CNTMT Integrity or Bypass Containment Loss

ATTACHMENT 2
Fission Product Barrier Loss/Potential Loss Matrix and Bases

Figure 1: Containment Integrity or Bypass Examples



Barrier: Containment

Category: D. CNTMT Integrity or Bypass

Degradation Threat: Potential Loss

Threshold:

1. CSFST Containment-RED Path conditions met

Definition(s):

None

Basis:

Plant-Specific

Critical Safety Function Status Tree (CSFST) Containment-RED path is entered if containment pressure is greater than or equal to 50 psig and represents an extreme challenge to safety function. The CSFSTs are normally monitored using the SPDS display on the Plant Computer (ref. 1).

50 psig is the containment design pressure and is the pressure used to define CSFST Containment Red Path conditions (ref. 2).

Generic

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.

CPNPP Basis Reference(s):

1. FRC-Z.1A/B Response to High Containment Pressure
2. FSAR Table 6.2.1-1
3. NEI 99-01 CNTMT Integrity or Bypass Containment Potential Loss 4.A

Barrier: Containment

Category: D. CNTMT Integrity or Bypass

Degradation Threat: Potential Loss

Threshold:

2. Containment hydrogen concentration greater than 4%

Definition(s):

None

Basis:

Plant-Specific

In the early stages of a core uncovery event, it is unlikely that hydrogen buildup due to a core uncovery could result in an explosive mixture of dissolved gasses in Containment. However, Containment monitoring and/or sampling should be performed to verify this assumption and a General Emergency declared if it is determined that an explosive mixture exists. A combustible mixture can be formed when hydrogen gas concentration in the Containment atmosphere is greater than 4% by volume. All hydrogen measurements are referenced to concentrations in dry air even though the actual Containment environment may contain significant steam concentrations. The plant has two hydrogen monitoring systems. Each monitoring system consists of four sensor modules and one microprocessor analyzer. Two sensors from each Containment are coupled to one of the two hydrogen microprocessors located in the Control Room. Thus each microprocessor analyzer is shared by Units 1 and 2. The analyzer system has a range of 0-10% hydrogen by volume. The detector modules are located on the 905', 873', and 860' elevations in Containment. A fourth detector is located on 832' level across from the loop room entrance for loops 1 and 4. Hydrogen concentration is displayed in the Control Room on u-AI-5506A/B and u-AI-5506C/D.

Hydrogen concentration can also be displayed on the Plant Computer. Alarms at ~3% are provided for high hydrogen concentration, u-ALB-3A, window 3.7. If a hydrogen concentration value can not be obtained from the hydrogen monitoring system, a grab sample from the containment PIG radiation monitor may be used to determine the hydrogen concentration (ref. 1, 2, 3, 4).

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.

Generic

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.

CPNPP Basis Reference(s):

1. FRC-0.1A/B Response to Inadequate Core Cooling, Attachment 5
2. FSAR Section 6.2.5
3. FSAR Table 7.5-7A
4. CHM-111, Primary Chemistry Accident Assessment Sampling Program
7. NEI 99-01 CNTMT Integrity or Bypass Containment Potential Loss 4.B

Barrier: Containment

Category: D. CNTMT Integrity or Bypass

Degradation Threat: Potential Loss

Threshold:

3. Containment pressure greater than 18 psig with **neither** Containment Spray system train operating per design for greater than or equal to 15 min. (Note 1)

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

Definition(s):

None

Basis:

Plant-Specific

This threshold represents a Potential Loss of the Containment barrier because the Containment heat removal and depressurization equipment (but not including Containment venting strategies) is either lost or degraded. The Containment Spray System (CSS) is designed to remove heat from the Containment environment following a LOCA, a main steam line break accident, or a feedwater line break accident. Each unit of the CPNPP is equipped with two redundant Containment spray trains, each designed to provide emergency Containment heat removal in the event of a LOCA. This system, in conjunction with the ECCS, removes postaccident thermal energy from the Containment environment, thereby reducing the Containment pressure and temperature. Each train includes two containment spray pumps, spray headers, nozzles, valves, and piping. Each train is powered from a separate safeguard bus. (ref. 1)

The Containment pressure setpoint (18 psig, ref. 2) is the pressure at which the Containment Spray System should actuate and begin performing its function. The design basis accident analyses and evaluations assume the loss of one Containment Spray System train (ref. 1).

Generic

This threshold describes a condition where containment pressure is greater than the setpoint at which containment energy (heat) removal systems are designed to automatically actuate, and less than one full train of equipment is capable of operating per design. The 15-minute criterion is included to allow operators time to manually start equipment that may not have automatically started, if possible. This threshold represents a potential loss of containment in that containment heat removal/depressurization systems (e.g., containment sprays, ice condenser fans, etc., but not including containment venting strategies) are either lost or performing in a degraded manner.

CPNPP Basis Reference(s):

1. FSAR Section 6.2.2
2. FRC-Z.1A/B Response to High Containment Pressure
3. NEI 99-01 CNTMT Integrity or Bypass Containment Potential Loss 4.C

Barrier: Containment

Category: E. Emergency Coordinator Judgment

Degradation Threat: Loss

Threshold:

1. **Any** condition in the opinion of the Emergency Coordinator that indicates loss of the Containment barrier

Definition(s):

None

Basis:

Plant-Specific

The Emergency Coordinator 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 Coordinator should be mindful of the Loss of AC power (Station Blackout) and ATWS EALs to assure timely emergency classification declarations.

Generic

This threshold addresses any other factors that may be used by the Emergency Coordinator in determining whether the Containment Barrier is lost.

CPNPP Basis Reference(s):

1. NEI 99-01 Emergency Director Judgment PC Loss 6.A

Barrier: Containment

Category: E. Emergency Coordinator Judgment

Degradation Threat: Potential Loss

Threshold:

1. **Any** condition in the opinion of the Emergency Coordinator that indicates potential loss of the Containment barrier

Definition(s):

None

Basis:

Plant-Specific

The Emergency Coordinator 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 Coordinator should be mindful of the Loss of AC power (Station Blackout) and ATWS EALs to assure timely emergency classification declarations.

Generic

This threshold addresses any other factors that may be used by the Emergency Coordinator in determining whether the Containment Barrier is lost.

CPNPP Basis Reference(s):

1. NEI 99-01 Emergency Director Judgment PC Potential Loss 6.A

Background

NEI 99-01 Revision 6 ICs AA3 and HA5 prescribe declaration of an Alert based on impeded access to rooms or areas (due to either area radiation levels or hazardous gas concentrations) where equipment necessary for normal plant operations, cooldown or shutdown is located. These areas are intended to be plant operating mode dependent. Specifically the Developers Notes for AA3 and HA5 states:

> *The "site-specific list of plant rooms or areas with entry-related mode applicability identified" should specify those rooms or areas that contain equipment which require a manual/local action as specified in operating procedures used for normal plant operation, cooldown and shutdown. Do not include rooms or areas in which actions of a contingent or emergency nature would be performed (e.g., an action to address an off-normal or emergency condition such as emergency repairs, corrective measures or emergency operations). In addition, the list should specify the plant mode(s) during which entry would be required for each room or area.*
>
> *The list should not include rooms or areas for which entry is required solely to perform actions of an administrative or record keeping nature (e.g., normal rounds or routine inspections).*

Further, as specified in IC HA5:

> *The list need not include the Control Room if adequate engineered safety/design features are in place to preclude a Control Room evacuation due to the release of a hazardous gas. Such features may include, but are not limited to, capability to draw air from multiple air intakes at different and separate locations, inner and outer atmospheric boundaries, or the capability to acquire and maintain positive pressure within the Control Room envelope.*

CPNPP 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:

Location- Safe Shutdown Area	**Modes- 1, 2**	**Modes- 3, 4, 5, or 6**
Charging Pump Rooms	SDC Equipment. - *No entry required* Inventory Control Equipment **-Entry required during pump starts and stops**	Shut Down Cooling (SDC) - *No entry required* Inventory Control Equipment - **Entry required during pump starts and stops** Reactivity Control. - **Entry required during pump starts and stops**
-Containment Spray Pumps A and B	Post-accident Containment Pressure Control - *No entry required*	Post-accident Containment Pressure Control (modes 3 and 4) - *No entry required*
-SI Pumps A and B	Post-accident ECCS - *No entry required*	Post-accident ECCS - *No entry required*
-Residual Heat Removal Pumps A and B	Post-accident ECCS - *No entry required*	Decay Heat Removal (Modes 4, 5, and 6 - **Entry required for pumps starts and stops**
- CVCS Valve Rooms, Auxiliary Building 810' and 822'	Inventory Control Equipment - **Entry required during pump starts and stops** Reactivity Control. - **Entry required during pump starts and stops**	Inventory Control Equipment - **Entry required during pump starts and stops** Reactivity Control. - **Entry required during pump starts and stops**
-Service Water Intake Structure	Ultimate Heat Sink Equipment for Habitability Control, Containment Temperature, and Shutdown Cooling - *No entry required*	Ultimate Heat Sink Equipment for Habitability Control, Containment Temperature, and Shutdown Cooling *No entry required*
1E Switchgear Rooms 810', 832', and 852'	Electrical Power. - **Entry required for manual breaker manipulations on component operations, reactor startup and shutdown**	Electrical Power. - **Entry required for manual breaker manipulations on component operations**
Control Building 807'Cable Spreading Room	Electrical Power. - *No entry required*	Electrical Power. - *No entry required*
Control Building 792' UPS and Battery Rooms	Electrical Power. - *No entry required*	Electrical Power. -
Emergency Diesel Generators A & B	Electrical Power. - *No entry required*	Electrical Power. - *No entry required*
Emergency Diesel Generators Day Tank Rooms	Electrical Power. - *No entry required*	Electrical Power. - *No entry required*
Control Building 830' Control Room	- *Continuously occupied, capable of Ventilation Isolation mode, covered under H-6*	- *Continuously occupied, capable of Ventilation Isolation mode, covered under H-6*
Control Building 840' Technical Support Center	- *No entry required*	- *No entry required*

ATTACHMENT 3

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

Location- **Safe Shutdown Area**	**Modes-** **1, 2**	**Modes-** **3, 4, 5, or 6**
Control Building 778' Safety Chiller Rooms	- *No entry required*	- *No entry required*
Auxiliary Building 790'	- *No entry required*	- *No entry required*
Auxiliary Building 810' other than CVCS Valave Rooms and Charging Pump Rooms	- *No entry required*	- *No entry required*
Auxiliary Building 830'	- *No entry required*	- *No entry required*
Auxiliary Building 852'	- *No entry required*	- *No entry required*
Auxiliary Building 873'	- *No entry required*	- *No entry required*
Auxiliary Building 886'	- *No entry required*	- *No entry required*
Safeguards 790'	- *No entry required*	- *No entry required*
Safeguards 810'	- *No entry required*	- *No entry required*
Safeguards 831'	- *No entry required*	- *No entry required*
Safeguards 852'	- *No entry required*	- *No entry required*
Safeguards 873'	- *No entry required*	- *No entry required*
Turbine Building Elevations	- *No entry required*	- *No entry required*
Aux. Feedwater Pump Rooms A, B, and Turbine Driven	Steam Generator Heat Removal - *No entry required*	Steam Generator Heat Removal - *No entry required*

Table R-3 & H-2 Results

Table R-3/H-2 Safe Operation & Shutdown Rooms/Areas	
Room/Area	**Mode Applicability**
Charging Pump Rooms	1, 2, 3, 4, 5, 6
CVCS Valve Rooms	1, 2, 3, 4, 5, 6
1E Switchgear Rooms	All
RHR Pump Rooms	4, 5, 6

Plant Operating Procedures Reviewed

1. IPO-003A/B
2. IPO-005A/B
3. IPO-001A/B
4. IPO-002A/B
5. SOP-103
6. SOP-104
7. SOP-102