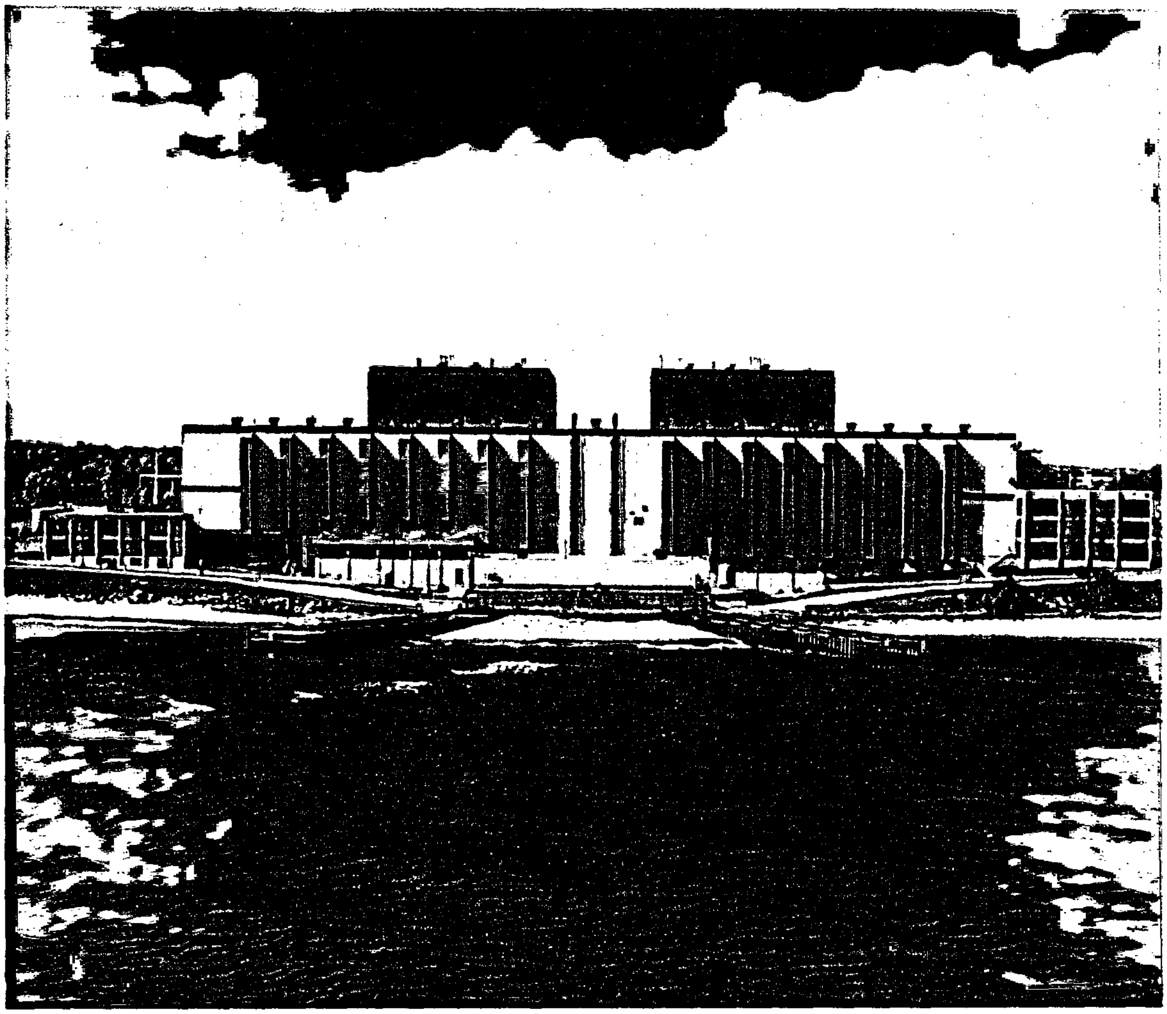
ENCLOSURE III



POINT BEACH EAL TECHNICAL BASIS DOCUMENT

Emergency Action Level Technical Bases Document

Table of Contents

1.0 PURPOSE

This document provides an explanation and rationale for each Emergency Action Level (EAL) included in the EAL Upgrade Program for Point Beach Nuclear Plant (PBNP). It should be used to facilitate review of the PBNP EALs and provide historical documentation for future reference. Personnel responsible for implementation of EPIP-1.2 "Emergency Classification" and the Emergency Action Level Matrix may use this document as a technical reference and an aid in EAL interpretation.

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 PBNP Emergency Plan.

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) Revision 4 represents the most recently accepted methodology. 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.
- Addressing 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.
- Simplifying the fission product barrier EAL threshold for a Site Emergency.

Using NEI 99-01 Rev. 4, PBNP conducted an EAL implementation upgrade project that produced the EALs discussed herein. While the upgraded EALs are site-specific, an objective of the project was to ensure to the extent possible EAL conformity and consistency between the NMC plant sites.

2.2 Fission Product Barriers

Many of the EALs derived from the NEI methodology are fission product barrier based. That is, the conditions that define the EALs are based upon loss or challenge of one or more of the three fission product barriers.

The primary fission product barriers are:

A. Reactor Fuel Cladding (FC): Zirconium tubes which house the ceramic uranium oxide pellets along with the end plugs which are welded into each end of the fuel rods comprise the FC barrier.

B. Reactor Coolant System (RCS): The reactor vessel shell, vessel head, vessel nozzles and penetrations and all primary systems directly connected to the reactor vessel up to the first containment isolation valve comprise the RCS barrier.

C. Containment (PC): The vapor containment structure and all isolation valves required to maintain containment integrity under accident conditions comprise the PC barrier.

2.3 Emergency Classification Based on Fission Product Barrier Degradation

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

Unusual Event:

Any loss or challenge of containment

Alert:

Any loss or any challenge of either fuel cladding or RCS

Site Emergency:

Loss or challenge of any two barriers

General Emergency:

Loss of any two barriers with loss or challenge of a third

2.4 EAL Relationship to EOPs and Critical Safety Function Status

Where possible, the EALs have been made consistent with and utilize the conditions defined in the PBNP Critical Safety Function Status Trees (CSFSTs). While the symptoms that drive operator actions specified in the CSFSTs are not indicative of <u>all</u> possible conditions which warrant emergency classification, they do define the symptoms, independent of initiating events, for which reactor plant safety and/or fission product barrier integrity are threatened. Where these symptoms are clearly representative of one of the NEI Initiating Conditions, they have been utilized as an EAL. This permits rapid classification of emergency situations based on plant conditions without the need for additional evaluation or event diagnosis. Although some of the EALs presented here are based on conditions defined in the CSFSTs, classification of emergencies using these EALs is not dependent upon Emergency Operating Procedures (EOP) entry or execution. The EALs can be utilized independently or in conjunction with the EOPs.

2.5 Symptom Based vs. Event Based Approach

To the extent possible, the EALs are symptom based. That is, the action level is defined by values of key plant operating parameters that identify emergency or potential emergency conditions. This approach is appropriate because it allows the full scope of variations in the types of events to be classified as emergencies. But, a purely symptom based approach is not sufficient to address all events for which emergency classification is appropriate. Particular events to which no predetermined symptoms can be ascribed have also been utilized as EALs since they may be indicative of potentially more serious conditions not yet fully realized.

Categories Reactor Fuel, Reactor Coolant System, Radioactivity Releases/Areas Radiation, Fission Product Barriers are primarily symptom based. The symptoms are indicative of actual or potential degradation of either fission product barriers or personnel safety.

Categories CR Evacuation, Communication Losses, ISFSI Events, ATWS, Loss of AC and DC Power Sources, and Equipment Failures are event based. Electrical Failures are those events associated with losses of either AC or vital DC electrical power. Equipment Failures are abnormal and emergency events associated with vital plant system failures, while Hazards are those non-plant system related events that have affected or may affect plant safety.

Category Other provides the Emergency Director (Shift Manager) the latitude to classify and declare emergencies based on plant symptoms or events that in their judgment warrants classification.

2.6 EAL Organization

The PBNP EALs are organized according to mode applicability. Operating modes are defined in Section 2.8, below.

- EAL Group A – EALs that are applicable under both HOT and COLD operating modes
- EAL Group H – EALs that are applicable only under one or more HOT operating modes (RCS temperature ≥ 200 °F)
- EAL Group C – EALs that are applicable only under one or more COLD operating modes (RCS temperature < 200 °F)

This organization minimizes the total number of possible EAL conditions that the Emergency Director must evaluate at any one time and, therefore, facilitates timely and accurate emergency classification.

Each EAL group is subdivided into categories to simplify presentation and promote rapid understanding as follows:

Group A:

Reactor Fuel
Reactor Coolant System Leakage
Radioactivity Release / Area Radiation
Control Room Evacuation
Communication Loss

Hazards

Other

ISFSI Events

Group H:

ATWS

Loss of AC Power Sources

Loss of DC Power Sources

Equipment Failures

Fission Product Barriers

Group C:

Reactor Coolant System (temp./pressure/level)

Loss of AC Power Sources

Loss of DC Power Sources

Some categories are further divided into one or more subcategories depending on the types and number of plant conditions that dictate emergency classifications. An EAL may or may not exist for each subcategory at all four classification levels. Similarly, more than one EAL may exist for a subcategory in a given emergency classification when appropriate (i.e., no EAL at the General Emergency level but three EALs at the Unusual Event level).

2.7 Technical Bases Information

EAL technical bases are provided in Attachment 1 for each EAL according to EAL category (A, H and C) and EAL subcategory. A summary explanation of each category 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:

<u>Initiating Condition (IC)</u>

Site specific description of the generic IC.

<u>EAL Number</u>

Four characters demarcated by periods – The first character (letter) corresponds to the category; second, to the classification level, and third and fourth the numerical sequence of the EAL beginning with the lowest classification to the highest classification.

Classification:

Unusual Event, Alert, Site Emergency, or General Emergency

EAL (enclosed in rectangle)

Exact wording of the EAL as it appears in the classification procedure

Mode Applicability

One or more of the following plant operating conditions are listed: Power Operation, Startup, Hot Shutdown, Cold Shutdown, Refuel, Defueled or All (see Section 2.8)

Basis:

Description of the rationale for the EAL

NEI Reference

Number and wording of the NEI initiating condition that corresponds to the EAL

PBNP Basis Reference(s):

Site specific source documentation from which the EAL is derived

Differences

Description of the differences, if any, from the generic NEI example EAL

2.8 Operating Mode Applicability

1 Power Operations

Reactor shutdown margin is less than Technical Specification minimum required and greater than 5% rated thermal power.

2 Startup

Reactor shutdown margin is less than Technical Specification minimum required and less than or equal to 5% rated thermal power.

3 Hot Standby

Reactor shutdown margin greater than or equal to Technical Specification minimum required with coolant temperature (Tavg) greater than or equal to 350°F.

4 Hot Shutdown

Reactor shutdown margin greater than or equal to Technical Specification minimum required with coolant temperature (Tavg) less than 350°F and greater than 200°F.

5 Cold Shutdown

Reactor shutdown margin greater than or equal to Technical Specification minimum required with coolant temperature (Tavg) less than or equal to 200°F.

6 Refuel

Reactor shutdown margin greater than or equal to Technical Specification minimum required for refueling operations and coolant temperature (Tavg) less than or equal to 140°F.

D Defueled

Reactor vessel contains no irradiated fuel (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 is 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.

3.0 REFERENCES

3.1 Developmental Documents

A. NEI 99-01 Revision 4, Methodology for Development of Emergency Action Levels

3.2 Interface Documents

A. EPIP-1.2 "Emergency Classification"

B. Emergency Action Level Matrix

3.3 Commitments

None

4.0 DEFINITIONS

Refer to Attachment 2, Word List.

5.0 ATTACHMENTS

5.1 Attachment 1, Emergency Action Level Technical Bases and Fission Product Barrier (FPB) Loss/Challenge Bases

5.2 Attachment 2, Word List

5.3 Attachment 3, Deviations

5.4 Attachment 4, NEI 99-01 to PBNP EAL Cross Reference

A.1 Reactor Fuel

The reactor fuel cladding serves as the primary fission product barrier. Over the useful life of a fuel bundle, the integrity of this barrier should remain intact as long as fuel cladding integrity limits are not exceeded and spent/irradiated fuel is not uncovered or mishandled.

Should fuel damage occur (breach of the fuel cladding integrity) radioactive fission products are released to the reactor coolant. The magnitude of such a release is dependent upon the extent of the damage as well as the mechanism by which the damage occurred. Once released into the reactor coolant, the highly radioactive fission products can pose significant radiological hazards in-plant from reactor coolant process streams. If other fission product barriers were to fail, these radioactive fission products can pose significant offsite radiological consequences.

This category identifies reactor fuel related conditions outside the fission product matrix which warrant emergency classification:

Inadvertent Criticality:

Inadvertent criticalities pose potential personnel safety hazards as well being indicative of losses of reactivity control.

Coolant Activity & Failed Fuel Monitor:

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 cladding or minor perforations in the cladding itself. Any significant rise from these base-line levels (2% - 5% cladding failures) is indicative of fuel failures and is covered under the Category H.5 Fission Product Barriers. However, lesser amounts of cladding 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 and failed fuel radiation monitor in the RCS letdown line.

Refueling Accidents & Other Radiation Monitors:

Both area and process radiation monitoring systems designed to detect fission products during refueling conditions as well as visual observation can be utilized to indicate loss or potential loss of spent fuel cladding integrity.

Category: A.1 – Reactor Fuel **Sub-category:** Inadvertent Criticality

Initiating Condition: Inadvertent Criticality

EAL:

MU1.1 Unusual Event
An unplanned sustained positive startup rate observed on nuclear instrumentation.

Mode Applicability:

3- Hot Standby, 4- Hot Shutdown, 5-Cold Shutdown, 6-Refuel

Basis:

This EAL addresses criticality events that occur in Cold Shutdown or Refueling modes (NUREG1449, Shutdown and Low-Power Operation at Commercial Nuclear Power Plants in the United States) such as fuel mis-loading events and inadvertent dilution events as well as inadvertent criticalities occurring in Hot Standby or Hot Shutdown mode. This EAL indicates a potential degradation of the level of safety of the plant, warranting an Unusual Event classification.

This condition can be identified using startup rate monitors (NI-31D/32D - Source Range Startup Rate, and NI-35D/36D - Intermediate Range Startup Rate). The term "sustained" is used in order to allow exclusion of expected short-term positive startup rates from planned fuel bundle or control rod movements during core alteration. These short-term positive startup rates are the result of the rise in neutron population due to subcritical multiplication. The intent of "sustained" is to identify a critical condition.

NEI Reference:

CU8/SU8 - Inadvertent Criticality

PBNP Basis Reference(s):

1. OP 1B, Reactor Startup, Step 5.1 and 5.18.15

Differences:

None

Category: A.1 – Reactor Fuel **Sub-category:** Coolant Activity

Initiating Condition: Fuel Cladding Degradation

EAL:

MU2.1 Unusual Event
Coolant activity ≥ 0.8 µCi/gm dose equivalent I-131

Mode Applicability:

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

Basis:

Elevated reactor coolant activity represents a potential degradation in the level of safety of the plant and a potential precursor of more serious problems. This EAL addresses reactor coolant samples exceeding coolant technical specifications. Although the Tech Spec is applicable for modes 1, 2 and 3 (when ≥ 500 °F), it is appropriate that this EAL be applicable in all modes, as it indicates a potential degradation in the level of safety of the plant.

NEI Reference:

CU5/SU4 –Fuel Clad Degradation

PBNP Basis Reference(s):

1. Tech Spec 3.4.16 – RCS Specific Activity, Unit 1 - Amendment No. 201/ Unit 2 - Amendment No. 206

Differences:

1. CU5/SU4 has been divided into two EALs to improve clarity. Example EAL #1 is addressed in EAL# MU3.1.

Category: A.1 – Reactor Fuel **Sub-category:** Failed Fuel Monitor

Initiating Condition: Fuel Cladding Degradation

EAL:

MU3.1 Unusual Event
Failed Fuel Monitor (RE-109) $\geq$ 24 mRem/hr not due to a planned evolution.

Mode Applicability:

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

Basis:

Elevated letdown line activity represents a potential degradation in the level of safety of the plant and a potential precursor of more serious problems. Coolant activity at this value is well above normal expected values for this monitor. Any planned evolution for which increased values are expected do not apply. Fuel clad failure is a potential degradation of the level of safety and therefore warrants a declaration of an Unusual Event.

NEI Reference:

SU4 –Fuel Clad Degradation

PBNP Basis Reference(s):

1. Calc 96-0073, 2/29/96, (NEPG-86-515)
2. EPIP 10.2, Core Damage Estimation, Step 4.1

Differences:

None

Category: A.1 – Reactor Fuel **Sub-category:** Refueling Accidents & Other Radiation Monitors

Initiating Condition: Uncontrolled level drop in SFP

EAL:

MU4.1 Unusual Event

Spent fuel pool (reactor cavity during refueling) water level cannot be restored and maintained above the spent fuel pool low water level alarm setpoint

AND

Unplanned SFP Area Radiation Monitor readings rise

- o RE-105 SFP Area Low Range Area Radiation Monitor
- o RE-135 SFP Area High Range Area Radiation Monitor

Mode Applicability:

All

Basis:

The low level alarm is actuated by LC-634 at 62'-8" based on maintaining at least 6' of water on a withdrawn fuel assembly. Normal level is 63'-8". The definition of "... cannot be restored and maintained above..." allows the operator to visually observe the low water level condition, if possible, and to attempt water level restoration instructions as long as water level remains above the top of irradiated fuel.

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

While a radiation monitor could detect a rise in dose due to a drop in the water level, it might not be a reliable indication, in and of itself, of whether or not the fuel will be or is uncovered. Elevated radiation monitor indications need to be combined with another indicator (or personnel report) of water loss.

This event escalates to an Alert if irradiated fuel outside the reactor vessel is uncovered via EAL# MA4.2.

NEI Reference:

AU2 – Unexpected Increase in Plant Radiation

PBNP Basis Reference(s):

1. DBD-13 Spent Fuel Pool Cooling and Filtration

Differences:

None

Category: A.1 – Reactor Fuel **Sub-category:** Refueling Accidents & Other Radiation Monitors

Initiating Condition: Radiation monitoring indicating damaged or uncovered irradiated fuel

EAL:

MA4.1 Alert

Confirmed sustained (10 minute average) alarm on any of the following radiation monitors resulting from an uncontrolled fuel handling process indicating damaged or uncovered irradiated fuel:

- o RE-105 SFP Area Low Range Area Radiation High Alarm (≥10 mR/hr)
- o RE-135 SFP Area High Range Area Radiation High Alarm (≥100 mR/hr)
- o 1(2) RE-211 Containment Air Particulate Monitor High Alarm (≥0.5 μCi)
- o 1(2) RE-212B Containment Background Monitor High Alarm (≥100 mR/hr)

Mode Applicability:

All

Basis:

This EAL addresses specific events that have resulted, or may result, in unexpected rises in radiation dose rates within plant buildings and may be a precursor to a radioactivity release to the environment. These events represent a loss of control over radioactive material and represent degradation in the level of safety of the plant. These events escalate from EAL MU4.1 in that fuel activity has been released or is anticipated due to fuel heatup. This EAL applies to spent fuel requiring water coverage and is not intended to address spent fuel which is licensed for dry storage.

When considering escalation, information may come from:

- Radiation monitor readings
- Sampling and surveys
- Dose projections/calculations
- Reports from the scene regarding the extent of damage (e.g., refueling crew, RP technicians)

This EAL is defined by the specific areas where irradiated fuel is located such as the reactor cavity, reactor vessel, or spent fuel pool.

A confirmed "uncontrolled fuel handling process" is defined as any event or activity related to the movement of irradiated fuel which results in unexpected or uncontrolled conditions. This terminology has been specifically added to exclude anticipated rises in area radiation levels as a result of actions performed in accordance with approved procedures during refueling operations.

The bases for the SFP area radiation high alarms and containment air particulate/background monitor high alarms are indicative of a fuel handling accident and are, therefore, appropriate for this EAL. While radiation monitors may detect a rise in dose rate due to a drop in the water level, it might not be a reliable indication of whether or not the fuel is covered.

NEI Reference:

AA2 – Damage to Irradiated Fuel or Loss of Water Level that Has or Will Result in the Uncovering of Irradiated Fuel Outside the Reactor Vessel

PBNP Basis Reference(s):

1. PBNP RMSASRB
2. AOP-8B Irradiated Fuel Handling Accident in Containment
3. AOP-8C Fuel Handling Accident in PAB

Differences:

1. The words "(10 minute average)" were added so that "sustained" would have a value with which it can be related. The 10 minute average is what is commonly used for the Control Room reading.

Category: A.1 – Reactor Fuel **Sub-category:** Refueling Accidents & Other Radiation Monitors

Initiating Condition: Indication of irradiated fuel uncovery

EAL:

MA4.2 Alert Report of visual observation of irradiated fuel uncovered <u>OR</u> Loss of refueling water inventory as indicted by excessive makeup rate or unexpected lowering in refueling water storage tank level

Mode Applicability:

All

Basis:

This EAL addresses specific events that have resulted, or may result, in unexpected rises in radiation dose rates within plant buildings and may be a precursor to a radioactivity release to the environment. These events represent a loss of control over radioactive material and degradation in the level of safety of the plant. These events escalate from EAL MU4.1 in that fuel activity has been released or is anticipated due to fuel heatup. This EAL applies to spent fuel requiring water coverage and is not intended to address spent fuel which is licensed for dry storage.

When considering escalation, information may come from:

- Radiation monitor readings
- Sampling and surveys
- Dose projections/calculations
- Reports from the scene regarding the extent of damage (e.g., refueling crew, RP technicians)

This EAL is defined by the specific areas where irradiated fuel is located such as the reactor cavity, reactor vessel, or spent fuel pool.

There is no remote level indication that water level in the spent fuel pool or refueling cavity has dropped to the level of the fuel other than by visual observation. Since there is no level indicating system in the fuel transfer canal, visual observation of loss of water level would also be required.

NEI Reference:

AA2 – Damage to Irradiated Fuel or Loss of Water Level that Has or Will Result in the Uncovering of Irradiated Fuel Outside the Reactor Vessel

PBNP Basis Reference(s):

None

Differences:

1. No specific water level indication is specified since no remote level indication exists.

A.2 RCS Leakage

The reactor vessel provides a volume for the coolant that covers the reactor core. The reactor vessel and associated pressure piping (reactor coolant system) together provide a barrier to limit the release of radioactive material should the reactor fuel cladding integrity fail.

Excessive (> Technical Specification) RCS leakage indications are utilized to indicate potential pipe cracks that may propagate to an extent threatening fuel cladding, RCS and containment integrity.

Category: A.2 – RCS Leakage **Sub-category:** N/A

Initiating Condition: RCS Leakage

EAL:

MU5.1 Unusual Event
Unidentified or pressure boundary leakage ≥10 gpm
OR
Identified leakage ≥25 gpm

Mode Applicability:

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

Basis:

The conditions of this EAL may be a precursor of more serious conditions and, as a result, is considered to be a potential degradation of the level of safety of the plant. Positive indications in the control room of Reactor Coolant System (RCS) leakage to the containment are provided by equipment which permits continuous monitoring of containment air activity and humidity, and of runoff from the air recirculation units and containment floor drains to containment Sump A. This equipment provides indication of normal background radiation, which is indicative of a basic level of leakage from primary systems and components. Any rise in the observed parameters is an indication of change within the containment, and the equipment provided is capable of monitoring this change. The 10 gpm value for the unidentified leakage and pressure boundary leakage was selected because it is quantifiable with normal Control Room leak detection methods. OI 55 provides instructions for calculating primary system leak rate by water inventory balances for off normal events and for operations troubleshooting. The 25 gpm value for identified leakage is set at a higher value because of the significance of identified leakage in comparison to unidentified or pressure boundary leakage. RCS leakage at these thresholds is well above the Tech Spec limits and is indicative of unsuccessful mitigation by the LCO Action Requirements.

NEI Reference:

CU1/SU5 –RCS Leakage

PBNP Basis Reference(s):

1. OP4A, Filling and Venting Reactor Coolant System, Step 5.6
2. TS 3.4.13, RCS Operational Leakage limits
3. OI-55, Primary Leak Rate Calculation
4. OM 3.19, Reactor Coolant System Leakage Determination

Differences:

None

A.3 Radioactivity Release / Area Radiation

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.

There are two basic indications of radioactivity release rates and one for area radiation levels which warrant emergency classifications.

Effluent Monitors

Direct indication of effluent radiation monitoring systems provides a rapid assessment mechanism to determine releases in excess of classifiable limits.

Dose Projections / Environmental Measurements / Release Rates

Projected offsite doses (based on effluent monitor readings), actual offsite field measurements or measured release rates via sampling indicate doses or dose rates above classifiable limits.

Area Radiation Level

Sustained (10 minute average) general area radiation levels in excess of those indicating loss of control of radioactive materials or those levels which may preclude access to vital plant areas also warrant emergency classification.

Category: A.3 – Radioactivity Release / Area Radiation

Sub-category: Effluent Monitors

Initiating Condition: Any unplanned release of gaseous or liquid radioactivity to the environment that exceeds two times the radiological effluent technical specifications for 60 minutes or longer

EAL:

RU1.1 Unusual Event

Loss of control of radioactive materials as indicated by a valid reading on any monitors listed in Table R-1 column "UE" for ≥ 60 min. unless sample analysis can confirm release rates ≤ 2 x ODCM limits within this time period

Table R-1 Effluent Monitor Classification Thresholds

Monitor	GE	SE	Alert	UE
1(2)RE 212	—	—	5.46E-2 μCi/cc	5.46E-4 μCi/cc
1(2)RE 305	—	—	5.46E-2 μCi/cc	5.46E-4 μCi/cc
1(2)RE 307	1.44E1 μCi/cc	1.44E0 μCi/cc	—	—
1(2)RE 309	1.44E1 μCi/cc	1.44E0 μCi/cc	—	—
RE 214	—	—	2.04E-2 μCi/cc	2.04E-4 μCi/cc
RE 315	—	—	2.04E-2 μCi/cc	2.04E-4 μCi/cc
RE 317	2.63E0 μCi/cc	2.63E-1 μCi/cc	—	—
RE 319	2.63E0 μCi/cc	2.63E-1 μCi/cc	—	—
1(2)RE 215	—	—	5.42E+2 μCi/cc	5.42E0 μCi/cc
RE 225	—	—	2.72E+2 μCi/cc	2.72E0 μCi/cc
RE 226	8.65E+3 μCi/cc	8.65E+2 μCi/cc	—	—
RE 221	—	—	3.16E-2 μCi/cc	3.16E-4 μCi/cc
RE 325	—	—	3.16E-2 μCi/cc	3.16E-4 μCi/cc
RE 327	4.34E0 μCi/cc	4.34E-1 μCi/cc	—	—
RE 224	—	—	4.18E-1 μCi/cc	4.18E-3 μCi/cc
1(2)RE 231/232 1(2)SG A/B	—	—	—	—
1 ARV	6.69E-1 μCi/cc	6.69E-2 μCi/cc	N/A	N/A
1 SRV	2.48E-1 μCi/cc	2.48E-2 μCi/cc	N/A	N/A
2 SRV	1.24E-1 μCi/cc	1.24E-2 μCi/cc	N/A	N/A
3 SRV	8.25E-2 μCi/cc	8.25E-3 μCi/cc	N/A	N/A
4 SRV	6.20E-2 μCi/cc	6.20E-3 μCi/cc	N/A	N/A
1(2)RE 229	N/A	N/A	5.56E-3 μCi/cc	5.56E-5 μCi/cc
RE 230*	N/A	N/A	7.40E-2 μCi/cc	7.40E-4 μCi/cc

* with Waste Water Effluent discharge not isolated

Mode Applicability:

All

Basis:

Valid means that a radiation monitor reading has been confirmed by operators to be correct. Unplanned releases in excess of two times the site technical specifications that continue for 60 minutes or longer represent an uncontrolled situation and hence, a potential degradation in the level of safety. The final integrated dose (which is very low in the Unusual Event emergency class) is not the primary concern here; it is the degradation in plant control implied by the fact that the release was not terminated within 60 minutes. Therefore, it is not intended that the release be averaged over 60 minutes. For example, a release of 4 times T/S for 30 minutes does not exceed this initiating condition. Further, the Emergency Director should not wait until 60 minutes has elapsed, but should declare the event as soon as it is determined that the release duration will likely exceed 60 minutes and cannot be terminated.

The values shown for each monitor under column "UE" are approximately two times the calculated alarm setpoints (ODCM release limits) as specified in the RMSASRB choosing the highest values for variable conditions. In accordance with the requirements of 10 CFR 20.1001 and 20.2402 and Technical Specifications stated in Section 5 of the Radiological Effluent Control Manual, the alarm or trip setpoint for effluent monitors shall be established to annunciate at radiation levels which would result in an unrestricted area concentration equal to or less than the applicable maximum effluent concentration (MEC) for a single radionuclide. The appropriate detailed response to an effluent alarm is described in the PBNP RMS Alarm Set Point and Response Book.

NEI Reference:

AU1 – Any unplanned release of gaseous or liquid radioactivity to the environment that exceeds two times the radiological effluent technical specifications for 60 minutes or longer

PBNP Basis Reference(s):

1. PBNP ODCM Tables 2-1 and 2-2, Figures 2-1 and 2-2 and Table 3.9-2
2. EPIP 1.3 Dose Assessment and Protective Action Recommendations
3. RMS Alarm Setpoint and Response Book (RMSASRB)
4. STPT 13.4, Radiation Monitoring System: Effluent Monitors

Differences:

1. Deleted NEI 99-01 Example EALs #4 and #5 because the plant is not equipped with perimeter radiation monitoring and real-time dose assessment. These thresholds are properly addressed by the radiation monitors listed in Table R-1 and manual dose assessment capabilities.

Category: A.3 – Radioactivity Release / Area Radiation

Sub-category: Effluent Monitors

Initiating Condition: Any unplanned release of gaseous or liquid radioactivity to the environment that exceeds 200 times the radiological effluent technical specifications for 15 minutes or longer

EAL:

RA1.1 Alert

Loss of control of radioactive materials as indicated by a valid reading on any monitors listed in Table R-1 column "Alert" for ≥ 15 min. unless sample analysis can confirm release rates ≤ 200 x ODCM limits within this time period

Table R-1 Effluent Monitor Classification Thresholds

Monitor	GE	SE	Alert	UE
1(2)RE 212	—	—	5.46E-2 μCi/cc	5.46E-4 μCi/cc
1(2)RE 305	—	—	5.46E-2 μCi/cc	5.46E-4 μCi/cc
1(2)RE 307	1.44E1 μCi/cc	1.44E0 μCi/cc	—	—
1(2)RE 309	1.44E1 μCi/cc	1.44E0 μCi/cc	—	—
RE 214	—	—	2.04E-2 μCi/cc	2.04E-4 μCi/cc
RE 315	—	—	2.04E-2 μCi/cc	2.04E-4 μCi/cc
RE 317	2.63E0 μCi/cc	2.63E-1 μCi/cc	—	—
RE 319	2.63E0 μCi/cc	2.63E-1 μCi/cc	—	—
1(2)RE 215	—	—	5.42E+2 μCi/cc	5.42E0 μCi/cc
RE 225	—	—	2.72E+2 μCi/cc	2.72E0 μCi/cc
RE 226	8.65E+3 μCi/cc	8.65E+2 μCi/cc	—	—
RE 221	—	—	3.16E-2 μCi/cc	3.16E-4 μCi/cc
RE 325	—	—	3.16E-2 μCi/cc	3.16E-4 μCi/cc
RE 327	4.34E0 μCi/cc	4.34E-1 μCi/cc	—	—
RE 224	—	—	4.18E-1 μCi/cc	4.18E-3 μCi/cc
1(2)RE 231/232 1(2)SG A/B	—	—	—	—
1 ARV	6.69E-1 μCi/cc	6.69E-2 μCi/cc	N/A	N/A
1 SRV	2.48E-1 μCi/cc	2.48E-2 μCi/cc	N/A	N/A
2 SRV	1.24E-1 μCi/cc	1.24E-2 μCi/cc	N/A	N/A
3 SRV	8.25E-2 μCi/cc	8.25E-3 μCi/cc	N/A	N/A
4 SRV	6.20E-2 μCi/cc	6.20E-3 μCi/cc	N/A	N/A
1(2)RE 229	N/A	N/A	5.56E-3 μCi/cc	5.56E-5 μCi/cc
RE 230*	N/A	N/A	7.40E-2 μCi/cc	7.40E-4 μCi/cc

* with Waste Water Effluent discharge not isolated

Mode Applicability:

All

Basis:

This EAL addresses a potential or actual lowering in the level of safety of the plant as indicated by a radiological release that exceeds, by a factor of 200, regulatory commitments for an extended period of time. PBNP incorporates features intended to control the release of radioactive effluents to the environment. Additionally, there are administrative controls established to prevent unintentional releases, or control and monitor intentional releases. These controls are located in the Offsite Dose Calculation Manual (ODCM). The occurrence of extended, uncontrolled radioactive releases to the environment is indicative of degradation in these features and/or controls.

The Emergency Director should not wait until 15 minutes has elapsed, but should declare the event as soon as it is determined that the release duration will likely exceed 15 minutes and cannot be terminated. Also, if an ongoing release is detected and the starting time for that release is unknown, the Emergency Director should, in the absence of data to the contrary, assume that the release has exceeded 15 minutes.

This event escalates from the Unusual Event by escalating the magnitude of the release by a factor of 100.

Valid means that a radiation monitor reading has been confirmed by the operators to be correct.

NEI Reference:

AA1 – Any unplanned release of gaseous or liquid radioactivity to the environment that exceeds 200 times the radiological effluent technical specifications for 15 minutes or longer

PBNP Basis Reference(s):

1. PBNP ODCM Tables 2-1 and 2-2 and Figures 2-1 and 2-2
2. EPIP 1.3 Dose Assessment and Protective Action Recommendations
3. RMS Alarm Setpoint and Response Book (RMSASRB)
4. STPT 13.4, Radiation Monitoring System: Effluent Monitors

Differences:

1. Deleted NEI 99-01 Example EALs #4 and #5 because the plant is not equipped with perimeter radiation monitoring and real-time dose assessment. These thresholds are properly addressed by the radiation monitors listed in Table R-1 and manual dose assessment capabilities.

Category: A.3 – Radioactivity Release / Area Radiation

Sub-category: Effluent Monitors

Initiating Condition: Offsite dose resulting from an actual or imminent release of gaseous radioactivity exceeds 100 mRem TEDE or 500 mRem thyroid CDE for the actual or projected duration of the release

EAL:

RS1.1 Site Emergency

A valid reading on any monitors listed in Table R-1 column "SE" for ≥ 15 min. unless dose assessment can confirm releases are below Table R-2 column "SE" within this time period

Table R-1 Effluent Monitor Classification Thresholds

Monitor	GE	SE	Alert	UE
1(2)RE 212	—	—	5.46E-2 μCi/cc	5.46E-4 μCi/cc
1(2)RE 305	—	—	5.46E-2 μCi/cc	5.46E-4 μCi/cc
1(2)RE 307	1.44E1 μCi/cc	1.44E0 μCi/cc	—	—
1(2)RE 309	1.44E1 μCi/cc	1.44E0 μCi/cc	—	—
RE 214	—	—	2.04E-2 μCi/cc	2.04E-4 μCi/cc
RE 315	—	—	2.04E-2 μCi/cc	2.04E-4 μCi/cc
RE 317	2.63E0 μCi/cc	2.63E-1 μCi/cc	—	—
RE 319	2.63E0 μCi/cc	2.63E-1 μCi/cc	—	—
1(2)RE 215	—	—	5.42E+2 μCi/cc	5.42E0 μCi/cc
RE 225	—	—	2.72E+2 μCi/cc	2.72E0 μCi/cc
RE 226	8.65E+3 μCi/cc	8.65E+2 μCi/cc	—	—
RE 221	—	—	3.16E-2 μCi/cc	3.16E-4 μCi/cc
RE 325	—	—	3.16E-2 μCi/cc	3.16E-4 μCi/cc
RE 327	4.34E0 μCi/cc	4.34E-1 μCi/cc	—	—
RE 224	—	—	4.18E-1 μCi/cc	4.18E-3 μCi/cc
1(2)RE 231/232 1(2)SG A/B	—	—	—	—
1 ARV	6.69E-1 μCi/cc	6.69E-2 μCi/cc	N/A	N/A
1 SRV	2.48E-1 μCi/cc	2.48E-2 μCi/cc	N/A	N/A
2 SRV	1.24E-1 μCi/cc	1.24E-2 μCi/cc	N/A	N/A
3 SRV	8.25E-2 μCi/cc	8.25E-3 μCi/cc	N/A	N/A
4 SRV	6.20E-2 μCi/cc	6.20E-3 μCi/cc	N/A	N/A
1(2)RE 229	N/A	N/A	5.56E-3 μCi/cc	5.56E-5 μCi/cc
RE 230*	N/A	N/A	7.40E-2 μCi/cc	7.40E-4 μCi/cc

* with Waste Water Effluent discharge not isolated

Table R-2 Dose Projection / Env. Measurement Classification Thresholds			
	GE	SE	ALERT
TEDE	1000 mRem	100 mRem	10mRem
CDE Thyroid	5000 mRem	500 mRem	N/A
External exposure rate	1000 mRem/hr	100 mRem/hr	10 mRem/hr
Thyroid exposure rate (for 1 hr of inhalation)	5000 mRem/hr	500 mRem/hr	N/A

Mode Applicability:

All

Basis:

This EAL addresses radioactivity releases that result in doses at or beyond the site boundary that exceed a fraction (10%) of the EPA Protective Action Guides (PAGs). Releases of this magnitude are associated with the failure of plant systems needed for the protection of the public. While these failures are addressed by other EALs, this EAL provides appropriate diversity and addresses events which may not be able to be classified on the basis of plant status alone, e.g., fuel handling accident in spent fuel building.

The Table R-2 TEDE dose is set at 10% of the EPA PAG, while the 500 mRem thyroid CDE was established in consideration of the 1:5 ratio of the EPA PAG for TEDE and thyroid CDE.

The Emergency Director should not wait until 15 minutes has elapsed, but should declare the event as soon as it is determined that the release duration has or will likely exceed 15 minutes.

The Table R-1 column "SE" effluent monitor readings have been determined using WEDAP by back calculating from the dose values specified in Table R-2. The back calculations were performed using default assumptions and based on annual average meteorology. With the exception of RE 231 and RE 232 (Steamline Vent) the source term was based on LOCA/GAP release in containment with filtration where applicable.

Since dose assessment is based on actual meteorology whereas the monitor reading EALs are not, the results from these assessments may indicate that the classification is not warranted, or may indicate that a higher classification is warranted. For this reason, emergency implementing procedures call for the timely performance of dose assessments using actual meteorology and release information. If the results of these dose assessments are available when the classification is made (e.g., initiated at a lower classification level), the dose assessment results override the monitor readings listed in Table R-1.

NEI Reference:

AS1 – Offsite dose resulting from an actual or imminent release of gaseous radioactivity exceeds 100 mRem TEDE or 500 mRem thyroid CDE for the actual or projected duration of the release

PBNP Basis Reference(s):

1. WEDAP Sensitivity Runs
2. EPIP 1.3 Dose Assessment and Protective Action Recommendations
3. FSAR Table 2.6-3 Stability Index Distribution
4. FSAR Table 2.6-4 Site Atmospheric Stability Analysis Annual Average 13 month Data
5. FSAR Figure 2.6-2 Stability Class Distribution in Percent of Total Observed
6. DBD-T-46 Section 3.1 Station Blackout

Differences:

1. Deleted NEI 99-01 Example EAL #3 because the plant is not equipped with perimeter radiation monitoring. This threshold is properly addressed by the radiation monitors listed in Table R-1 and manual dose assessment capabilities.

Category: A.3 – Radioactivity Release / Area Radiation

Sub-category: Effluent Monitors

Initiating Condition: Offsite dose resulting from an actual or imminent release of gaseous radioactivity exceeds 1000 mRem TEDE or 5000 mRem thyroid CDE for the actual or projected duration of the release using actual meteorology

EAL:

RG1.1 General Emergency

A valid reading on any monitors listed in Table R-1 column "GE" for ≥ 15 min. unless dose assessment can confirm releases are below Table R-2 column "GE" within this time period

Table R-1 Effluent Monitor Classification Thresholds

Monitor	GE	SE	Alert	UE
1(2)RE 212	—	—	5.46E-2 μCi/cc	5.46E-4 μCi/cc
1(2)RE 305	—	—	5.46E-2 μCi/cc	5.46E-4 μCi/cc
1(2)RE 307	1.44E1 μCi/cc	1.44E0 μCi/cc	—	—
1(2)RE 309	1.44E1 μCi/cc	1.44E0 μCi/cc	—	—
RE 214	—	—	2.04E-2 μCi/cc	2.04E-4 μCi/cc
RE 315	—	—	2.04E-2 μCi/cc	2.04E-4 μCi/cc
RE 317	2.63E0 μCi/cc	2.63E-1 μCi/cc	—	—
RE 319	2.63E0 μCi/cc	2.63E-1 μCi/cc	—	—
1(2)RE 215	—	—	5.42E+2 μCi/cc	5.42E0 μCi/cc
RE 225	—	—	2.72E+2 μCi/cc	2.72E0 μCi/cc
RE 226	8.65E+3 μCi/cc	8.65E+2 μCi/cc	—	—
RE 221	—	—	3.16E-2 μCi/cc	3.16E-4 μCi/cc
RE 325	—	—	3.16E-2 μCi/cc	3.16E-4 μCi/cc
RE 327	4.34E0 μCi/cc	4.34E-1 μCi/cc	—	—
RE 224	—	—	4.18E-1 μCi/cc	4.18E-3 μCi/cc
1(2)RE 231/232 1(2)SG A/B	—	—	—	—
1 ARV	6.69E-1 μCi/cc	6.69E-2 μCi/cc	N/A	N/A
1 SRV	2.48E-1 μCi/cc	2.48E-2 μCi/cc	N/A	N/A
2 SRV	1.24E-1 μCi/cc	1.24E-2 μCi/cc	N/A	N/A
3 SRV	8.25E-2 μCi/cc	8.25E-3 μCi/cc	N/A	N/A
4 SRV	6.20E-2 μCi/cc	6.20E-3 μCi/cc	N/A	N/A
1(2)RE 229	N/A	N/A	5.56E-3 μCi/cc	5.56E-5 μCi/cc
RE 230*	N/A	N/A	7.40E-2 μCi/cc	7.40E-4 μCi/cc

* with Waste Water Effluent discharge not isolated

Table R-2 Dose Projection / Env. Measurement Classification Thresholds			
	GE	SE	ALERT
TEDE	1000 mRem	100 mRem	10mRem
CDE Thyroid	5000 mRem	500 mRem	N/A
External exposure rate	1000 mRem/hr	100 mRem/hr	10 mRem/hr
Thyroid exposure rate (for 1 hr of inhalation)	5000 mRem/hr	500 mRem/hr	N/A

Mode Applicability:

All

Basis:

This EAL addresses radioactivity releases that result in doses at or beyond the site boundary that exceed the EPA Protective Action Guides (PAGs). Public protective actions will be necessary. Releases of this magnitude are associated with the failure of plant systems needed for the protection of the public and likely involve fuel damage. While these failures are addressed by other EALs, this EAL provides appropriate diversity and addresses events which may not be able to be classified on the basis of plant status alone. It is important to note that, for the more severe accidents, the release may be unmonitored or there may be large uncertainties associated with the source term and/or meteorology.

The Table R-2 TEDE dose is set at the EPA PAG, while the 5000 mR thyroid CDE was established in consideration of the 1:5 ratio of the EPA PAG for TEDE and thyroid CDE.

The Emergency Director should not wait until 15 minutes has elapsed, but should declare the event as soon as it is determined that the release duration has or will likely exceed 15 minutes.

The Table R-1 column "GE" effluent monitor readings have been determined using WEDAP by back calculating from the dose values specified in Table R-2. The back calculations were performed using default assumptions and based on annual average meteorology. With the exception of RE 231 and RE 232 (Steamline Vent) the source term was based on LOCA/GAP release in containment with filtration where applicable.

Since dose assessment is based on actual meteorology, whereas the monitor reading EALs are not, the results from these assessments may indicate that the classification is not warranted, or may indicate that a higher classification is warranted. For this reason, emergency implementing procedures call for the timely performance of dose assessments using actual meteorology and release information. If the results of these dose assessments are available when the classification is made (e.g., initiated at a lower classification level), the dose assessment results override the monitor readings listed in Table R-1.

NEI Reference:

AG1 – Offsite dose resulting from an actual or imminent release of gaseous radioactivity exceeds 1000 mRem TEDE or 5000 mRem thyroid CDE for the actual or projected duration of the release using actual meteorology

PBNP Basis Reference(s):

1. WEDAP Sensitivity Runs
2. EPIP 1.3 Dose Assessment and Protective Action Recommendations
3. FSAR Table 2.6-3 Stability Index Distribution
4. FSAR Table 2.6-4 Site Atmospheric Stability Analysis Annual Average 13 month Data
5. FSAR Figure 2.6-2 Stability Class Distribution in Percent of Total Observed
6. DBD-T-46 Section 3.1 Station Blackout

Differences:

1. Deleted NEI 99-01 Example EAL #3 because the plant is not equipped with perimeter radiation monitoring. This threshold is properly addressed by the radiation monitors listed in Table R-1 and manual dose assessment capabilities.

Category: A.3 – Radioactivity Release / Area Radiation

Sub-category: Dose Projections / Environmental Measurements / Release Rates

Initiating Condition: Any unplanned release of gaseous or liquid radioactivity to the environment that exceeds two times the radiological effluent technical specifications for 60 minutes or longer

EAL:

RU2.1 Unusual Event
An unplanned gaseous or liquid release with rates $\geq$ 2 x ODCM limits for $\geq$ 60 min.

Mode Applicability:

All

Basis:

Unplanned releases (without a discharge permit or exceeding the limits of a discharge permit) in excess of two times the site Offsite Dose Calculation Manual (ODCM) limits that continue for 60 minutes or longer represent an uncontrolled situation and hence, a potential degradation in the level of safety. The final integrated dose (which is very low in the Unusual Event emergency class) is not the primary concern here; it is the degradation in plant control implied by the fact that the release was not isolated within 60 minutes. Therefore, it is not intended that the release be averaged over 60 minutes. For example, a release of 4 times T/S for 30 minutes does not exceed this initiating condition. Further, the Emergency Director should not wait until 60 minutes has elapsed, but should declare the event as soon as it is determined that the release duration has or will likely exceed 60 minutes.

NEI Reference:

AU1 – Any unplanned release of gaseous or liquid radioactivity to the environment that exceeds two times the radiological effluent technical specifications for 60 minutes or longer

PBNP Basis Reference(s):

1. PBNP ODCM

Differences:

1. Deleted NEI 99-01 Example EALs #4 and #5 because the plant is not equipped with perimeter radiation monitoring and real-time dose assessment. These thresholds are properly addressed by the radiation monitors listed in Table R-1 and manual dose assessment capabilities.

Category: A.3 – Radioactivity Release / Area Radiation

Sub-category: Dose Projections / Environmental Measurements / Release Rates

Initiating Condition: Any unplanned release of gaseous or liquid radioactivity to the environment that exceeds 200 times the radiological effluent technical specifications for 15 minutes or longer

EAL:

RA2.1 Alert
An unplanned gaseous or liquid release with rates $\geq$ 200 x ODCM limits for $\geq$ 15 min.

Mode Applicability:

All

Basis:

Confirmed sample analyses of unplanned releases (without or exceeding the limits of a discharge permit) in excess of two hundred times the site Offsite Dose Calculation Manual (ODCM) limits that continue for 15 minutes or longer represent an uncontrolled situation and hence, an actual or potential substantial degradation in the level of safety. This event escalates from the Unusual Event by raising the magnitude of the release by a factor of 100 over the Unusual Event level (i.e., 200 times ODCM). Prorating the 500 mRem/yr basis of the 10CFR20 non-occupational MPC limits for both time (8766 hr/yr) and the 200 multiplier, the associated site boundary dose rate would be approximately 10 mRem/hr. The required release duration was reduced to 15 minutes in recognition of the raised severity.

NEI Reference:

AA1 – Any unplanned release of gaseous or liquid radioactivity to the environment that exceeds 200 times the radiological effluent technical specifications for 15 minutes or longer

PBNP Basis Reference(s):

1. PBNP ODCM Tables 2-1 and 2-2, Figures 2-1 and 2-2 and Table 3.9-2
2. EPIP 1.3 Dose Assessment and Protective Action Recommendations

Differences:

1. Deleted NEI 99-01 Example EALs #4 and #5 because the plant is not equipped with perimeter radiation monitoring and real-time dose assessment. These thresholds are properly addressed by the radiation monitors listed in Table R-1 and manual dose assessment capabilities.

Category: A.3 – Radioactivity Release / Area Radiation

Sub-category: Dose Projections / Environmental Measurements / Release Rates

Initiating Condition: Any unplanned release of gaseous or liquid radioactivity to the environment that exceeds 200 times the radiological effluent technical specifications for 15 minutes or longer

EAL:

RA2.2 Alert

Dose projections or field surveys resulting from an unplanned actual or imminent release which indicate doses / dose rates ≥ Table R-2 column "Alert" at the site boundary or beyond.

Table R-2 Dose Projection / Env. Measurement Classification Thresholds

	GE	SE	ALERT
TEDE	1000 mRem	100 mRem	10mRem
CDE Thyroid	5000 mRem	500 mRem	N/A
External exposure rate	1000 mRem/hr	100 mRem/hr	10 mRem/hr
Thyroid exposure rate (for 1 hr of inhalation)	5000 mRem/hr	500 mRem/hr	N/A

Mode Applicability:

All

Basis:

Offsite integrated doses in excess of 10 mRem TEDE or dose rates in excess of 10 mRem/hr TEDE represent an uncontrolled situation and hence, an actual or potential substantial degradation in the level of safety. This event escalates from the Unusual Event by raising the magnitude of the release by a factor of 100 over the Unusual Event level (i.e., 200 times Technical Specifications). Prorating the 500 mRem/yr basis of 10CFR20 for both time (8766 hr/yr) and the 200 multiplier, the associated site boundary dose rate would be 10 mRem/hr.

The 'site boundary' is defined by an approximately 1 mile radius around the site Protected Area.

NEI Reference:

AA1 – Any unplanned release of gaseous or liquid radioactivity to the environment that exceeds 200 times the radiological effluent technical specifications for 15 minutes or longer

PBNP Basis Reference(s):

1. PBNP ODCM Tables 2-1 and 2-2, Figures 2-1 and 2-2 and Table 3.9-2
2. EPIP 1.3 Dose Assessment and Protective Action Recommendations

Differences:

1. Deleted NEI 99-01 Example EALs #4 and #5 because the plant is not equipped with perimeter radiation monitoring and real-time dose assessment. These thresholds are properly addressed by the radiation monitors listed in Table R-1 and manual dose assessment capabilities.

Category: A.3 – Radioactivity Release / Area Radiation

Sub-category: Dose Projections / Environmental Measurements / Release Rates

Initiating Condition: Offsite dose resulting from an actual or imminent release of gaseous radioactivity exceeds 100 mRem TEDE or 500 mRem thyroid CDE for the actual or projected duration of the release

EAL:

RS2.1 Site Emergency

Dose projections or field surveys resulting from actual or imminent release which indicate doses / dose rates ≥ Table R-2 column "SE" at the site boundary or beyond

Table R-2 Dose Projection / Env. Measurement Classification Thresholds

	GE	SE	ALERT
TEDE	1000 mRem	100 mRem	10mRem
CDE Thyroid	5000 mRem	500 mRem	N/A
External exposure rate	1000 mRem/hr	100 mRem/hr	10 mRem/hr
Thyroid exposure rate (for 1 hr of inhalation)	5000 mRem/hr	500 mRem/hr	N/A

Mode Applicability:

All

Basis:

The 100 mRem integrated TEDE dose in this EAL is based on the 10CFR20 annual average population exposure and is indicative of an actual or likely major failure of plant functions needed for the protection of the public. This value also provides a desirable gradient (one order of magnitude) between the Alert, Site Emergency and General Emergency classes. Exposures less than this limit are not consistent with the Site Emergency class description. The 500 mRem integrated CDE thyroid dose was established in consideration of the 1:5 ratio of the EPA Protective Action Guides for TEDE and thyroid exposure.

In establishing the dose rate emergency action levels, a duration of one hour is assumed. Therefore, the dose rate EALs are based on a site boundary dose rate of 100 mRem/hr TEDE or 500 mRem/hr CDE thyroid, whichever is more limiting. Actual meteorology is specifically identified since it gives the most accurate dose assessment. Actual meteorology (including forecasts) should be used whenever possible. The terminology used in Table R-2 "External exposure rate" is intended to equate to the CEDE rate specified in EPIP 1.3 Dose Assessment and Protective Action Recommendations. The term "Thyroid exposure rate (for one hour of inhalation)" equates to the CDE thyroid exposure rate specified in EPIP 1.3 Dose Assessment and Protective Action Recommendations.

The 'site boundary' is defined by an approximately 1 mile radius around the site Protected Area.

NEI Reference:

AS1 – Offsite dose resulting from an actual or imminent release of gaseous radioactivity exceeds 100 mRem TEDE or 500 mRem thyroid CDE for the actual or projected duration of the release

PBNP Basis Reference(s):

1. EPIP 1.3 Dose Assessment and Protective Action Recommendations

Differences:

1. Deleted NEI 99-01 Example EAL #3 because the plant is not equipped with perimeter radiation monitoring. This threshold is properly addressed by the radiation monitors listed in Table R-1 and manual dose assessment capabilities.

Category: A.3 – Radioactivity Release / Area Radiation

Sub-category: Dose Projections / Environmental Measurements / Release Rates

Initiating Condition: Offsite dose resulting from an actual or imminent release of gaseous radioactivity exceeds 1000 mRem TEDE or 5000 mRem thyroid CDE for the actual or projected duration of the release using actual meteorology

EAL:

RG2.1 General Emergency

Dose projections or field surveys resulting from actual or imminent release which indicate doses / dose rates ≥ Table R-2 column "GE" at the site boundary or beyond.

Table R-2 Dose Projection / Env. Measurement Classification Thresholds

	GE	SE	ALERT
TEDE	1000 mRem	100 mRem	10mRem
CDE Thyroid	5000 mRem	500 mRem	N/A
External exposure rate	1000 mRem/hr	100 mRem/hr	10 mRem/hr
Thyroid exposure rate (for 1 hr of inhalation)	5000 mRem/hr	500 mRem/hr	N/A

Mode Applicability:

All

Basis:

The General Emergency values of Table R-2 are based on the boundary dose resulting from an actual or imminent release of gaseous radioactivity that exceeds 1000 mRem TEDE or 5000 mRem CDE thyroid for the actual or projected duration of the release. The 1000 mRem TEDE and the 5000 mRem CDE thyroid integrated dose are based on the EPA protective action guidance which indicates that public protective actions are indicated if the dose exceeds 1 rem TEDE or 5 rem CDE thyroid. This is consistent with the emergency class description for a General Emergency in that it is indicative of substantial core degradation or melting and loss of containment integrity. This level constitutes the upper level of the desirable gradient for the Site Emergency.

Actual meteorology is specifically identified since it gives the most accurate dose assessment. Actual meteorology (including forecasts) should be used whenever possible. In establishing the dose rate emergency action levels, a duration of one hour is assumed. Therefore, the dose rate EALs are based on a site boundary dose rate of 1000 mRem/hr TEDE or 5000 mRem/hr CDE thyroid, whichever is more limiting. The terminology used in Table R-2 "External exposure rate" is intended to equate to the CEDE rate specified in EPIP 1.3 Dose Assessment and Protective Action Recommendations. The term "Thyroid exposure rate (for one hour of inhalation)" equates to the CDE thyroid exposure rate specified in EPIP 1.3 Dose Assessment and Protective Action Recommendations.

The 'site boundary' is defined by an approximately 1 mile radius around the site Protected Area.

NEI Reference:

AG1 – Offsite dose resulting from an actual or imminent release of gaseous radioactivity exceeds 1000 mR TEDE or 5000 mR thyroid CDE for the actual or projected duration of the release using actual meteorology

PBNP Basis Reference(s):

1. EPIP 1.3 Dose Assessment and Protective Action Recommendations
2. FSAR Volume 1 Figure 2.2-3 Site Topography Map

Differences:

1. Deleted NEI 99-01 Example EALs #4 and #5 because the plant is not equipped with perimeter radiation monitoring and real-time dose assessment. These thresholds are properly addressed by the radiation monitors listed in Table R-1 and manual dose assessment capabilities.

Category: A.3 – Radioactivity Release / Area Radiation

Sub-category: Area Radiation Levels

Initiating Condition: Unexpected rise in plant radiation

EAL:

RU3.1 Unusual Event
Any sustained (10 minute average) direct Area Rad Monitor readings ≥ 100 x alarm or offscale high not resulting from a planned event or evolution

Mode Applicability:

All

Basis:

Valid elevated area radiation levels usually have long lead times relative to the potential for radiological release beyond the site boundary, thus impact to public health and safety is very low.

This EAL addresses rises in radiation levels inside the plant not due to planned events or evolutions. These radiation levels represent a degradation in the control of radioactive material and a potential degradation in the level of safety of the plant. Area radiation levels above 100 times the alarm setpoint have been selected because they are readily identifiable on Area Rad Monitor instrumentation. Since Area Rad Monitor setpoints are nominally set approximately one decade over normal levels, 100 times the alarm setpoint provides an appropriate threshold for emergency classification. 100 times the alarm setpoint is, therefore, approximately 1000 times the normal level. For those Area Rad Monitors whose upper range limit is less than 100 times the alarm setpoint, a value of offscale high is used. This EAL escalates to an Alert, if the elevated radiation levels impair the level of safe plant operation.

NEI Reference:

AU2 – Unexpected increase in plant radiation

PBNP Basis Reference(s):

1. PBNP RMSASRB

Differences:

1. The words "(10 minute average)" were added so that "sustained" would have a value with which it can be related.

Category: A.3 – Radioactivity Release / Area Radiation

Sub-category: Area Radiation Levels

Initiating Condition: Release of radioactive material or rises in radiation levels within the facility that impedes operation of systems required to maintain safe operations or to establish or maintain cold shutdown

EAL:

RA3.1 Alert

Sustained (10 minute average) area radiation levels $\geq$ 15 mR/hr in **EITHER**:

Control Room (RE 101)

OR

Central Alarm Station (by survey)

OR

Secondary Alarm Station (by survey)

Mode Applicability:

All

Basis:

This EAL addresses elevated radiation levels that impede necessary access to operating stations requiring continuous occupancy to maintain safe plant operation or perform a safe plant shutdown. Areas requiring continuous occupancy include the Control Room, the central alarm station (CAS) and the secondary alarm station (SAS). The CAS and SAS have no installed radiation monitoring capability. The value of 15 mR/hr is derived from the General Design Criteria (GDC) 19 value of 5 rem in 30 days with adjustment for expected occupancy times. Although Section III.D.3 of NUREG-0737, "Clarification of TMI Action Plan Requirements", provides that the 15 mR/hr value can be averaged over the 30 days, the value is used here without averaging. A 30 day duration implies an event potentially more significant than an Alert.

This EAL is not intended to apply to anticipated temporary radiation rises due to planned events or evolutions (e.g., radwaste container movement, depleted resin transfers, etc.).

It is the impaired ability to operate the plant that results in the actual or potential substantial degradation of the level of safety of the plant. The cause or magnitude of the rise in radiation levels is not a concern of this EAL. The Emergency Director must consider the source or cause of the elevated radiation levels and determine if any other EALs may be involved.

NEI Reference:

AA3 – Release of radioactive material or increases in radiation levels within the facility that impedes operation of systems required to maintain safe operations or to establish or maintain cold shutdown

PBNP Basis Reference(s):

1. GDC 19
2. NUREG-0737, "Clarification of TMI Action Plan Requirements", Section III.D.3
3. PBNP RMSASRB

Differences:

1. The words "(10 minute average)" were added so that "sustained" would have a value with which it can be related.

Category: A.3 – Radioactivity Release / Area Radiation

Sub-category: Area Radiation Levels

Initiating Condition: Release of radioactive material or rises in radiation levels within the facility that impedes operation of systems required to maintain safe operations or to establish or maintain cold shutdown

EAL:

RA3.2 Alert
Sustained (10 minute average) abnormal area radiation levels $\geq$ 12 R/hr in any Table H-1 Safe Shutdown Area
AND
Access to affected area is required for safe operation or shutdown

Mode Applicability:

All

Basis:

This EAL addresses elevated radiation levels in areas requiring infrequent access in order to maintain safe plant operation or perform a safe plant shutdown. Area radiation levels at or above 12 R/hr are indicative of radiation fields which may limit personnel access or adversely affect equipment whose operation may be needed to assure adequate core cooling or shutdown the reactor. The basis of the 12 R/hr value is as follows:

> The PBNP annual administrative personnel exposure limit is 2 Rem/Year. Assuming an emergency worker is at his administrative limit, any emergency worker needing access to a plant area for the safe shutdown of the plant could receive up to an additional 3 Rem without exceeding the legal 10CFR20 annual exposure limit of 5 Rem and thus the need for emergency exposure authorization. Assuming that an activity required to be performed in the plant would, on average, require a 15 minute stay time in that area, an area exposure rate of 12 R/hr would not unduly restrict access to areas necessary for safe plant shutdown.

It is the impaired ability to operate the plant that results in the actual or potential substantial degradation of the level of safety of the plant. The cause or magnitude of the rise in radiation levels is not a concern of this EAL. The Emergency Director must consider the source or cause of the elevated radiation levels and determine if any other EAL may be involved.

This EAL is not meant to apply to rises in the containment radiation monitors as these are events that are addressed in other EALs. Nor is it intended to apply to anticipated temporary radiation rises due to planned evolutions or events (e.g., radwaste container movement, deplete resin transfers, etc.).

NEI Reference:

AA3 – Release of radioactive material or increases in radiation levels within the facility that impedes operation of systems required to maintain safe operations or to establish or maintain cold shutdown

PBNP Basis Reference(s):

1. EPIP-5.1 Personnel Emergency Dose Authorization

Differences:

1. Radiation monitors are not specified in the EAL wording because portable monitoring devices may be used to determine area accessibility. It would then be possible to erroneously exclude information gained from portable monitor surveys when interpreting the EAL.

2. The plant EAL requires access to the area. The NEI example EAL does not specify that the area be accessed. Since the areas of concern are infrequently accessed and the associated radiation level is based on personnel dose limits, it is therefore appropriate to state in the EAL that personnel must be in the area in order to require the emergency declaration under this EAL.

3. The words "(10 minute average)" were added so that "sustained" would have a value with which it can be related.

A.4 Control Room Evacuation

This category includes 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.

Category: A.4 – Control Room Evacuation **Sub-category:** N/A

Initiating Condition: Control Room Evacuation Has Been Initiated

EAL:

HA5.1 Alert
Entry into AOP-10 Control Room Inaccessibility due to Control Room Evacuation

Mode Applicability:

All

Basis:

With the Control Room evacuated, additional support, monitoring and direction through the Technical Support Center and/or other emergency operations centers are necessary. The AOP-10 series of procedures provide specific instructions for evacuating the Control Room/Building and establishing plant control in alternate locations. Inability to establish plant control from outside the Control Room will escalate this event to a Site Emergency via HS5.1.

NEI Reference:

HA5 – Control Room Evacuation Has Been Initiated

PBNP Basis Reference(s):

1. AOP-10 Control Room Inaccessibility
2. AOP-10A Safe Shutdown - Local Control
3. AOP-10B Safe to Cold Shutdown in Local Control

Differences:

None

Category: A.4 – Control Room Evacuation **Sub-category:** N/A

Initiating Condition: Control Room evacuation has been initiated and plant control cannot be established

EAL:

HS5.1 Site Emergency Control Room evacuation <u>AND</u> Transfer of reactivity, RCS inventory and secondary heat removal control functions cannot be established per AOP-10A Safe Shutdown - Local Control in ≤ 15 min.

Mode Applicability:

All

Basis:

This EAL indicates that expeditious transfer of safety systems has not occurred but fission product barrier damage may not yet be indicated. The intent of this EAL is to capture events in which control of the plant cannot be reestablished in a timely manner.

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 is placed on components and instruments that supply protection for and information about safety functions. 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). In Cold Shutdown and Refuel modes, operator concern is directed toward maintaining core cooling such as is discussed in Generic Letter 88-17, "Loss of Decay Heat Removal." In Power Operation, and Hot Shutdown modes, operator concern is primarily directed toward maintaining critical safety functions and thereby assuring fission product barrier integrity.

The AOP-10 series of procedures provide specific instructions for evacuating the Control Room/Building and establishing plant control in alternate locations.

NEI Reference:

HS2 – Control Room evacuation has been initiated and plant control cannot be established

PBNP Basis Reference(s):

1. AOP-10 Control Room Inaccessibility
2. AOP-10A Safe Shutdown - Local Control
3. AOP-10B Safe to Cold Shutdown in Local Control

Differences:

1. None

A.5 Communication Loss

Certain events that degrade plant operator ability to effectively communicate with essential personnel within or external to the plant warrant emergency classification. Loss of communication equipment is in this category.

Category: A.5 – Communication Loss **Sub-category:** N/A

Initiating Condition: Unplanned loss of all onsite or offsite communications capabilities

EAL:

MU6.1 Unusual Event
Loss of all communications capability affecting the ability to **EITHER**:
Perform routine operations
OR
Notify offsite agencies or personnel

Mode Applicability:

All

Basis:

This EAL addresses loss of communications capability that either prevents the plant operations staff from performing routine tasks necessary for onsite plant operations or inhibits the ability to communicate problems with offsite authorities. The loss of offsite communications ability encompasses the loss of all means of communications with offsite authorities and is expected to be significantly more comprehensive than the condition addressed by 10CFR50.72.

The availability of one method of ordinary offsite communications is sufficient to inform state and local authorities of plant problems. This EAL is applicable only when extraordinary means are being utilized to make communications possible (e.g., relaying of information from radio transmissions, individuals being sent to offsite locations, etc.).

Onsite/offsite communications include one or more of the systems listed in Table M-2.

Table M-2 Communications Systems		
System	**Onsite**	**Offsite**
Gai-tronics	X	
Security Radio	X	
Internal Commercial PBX system	X	
Portable radios via two radio base stations and four radio desk sets	X	
Two-Digit Dial-Select phone system	X	
Sound power phones	X	
Emergency Notification System (ENS)		X
Health Physics Network (HPN)		X
Operations Control Counterpart Link (OCCL)		X
Management Counterpart Link (MCL)		X
Protective Measures Counterpart Link (PMCL)		X
Reactor Safety Counterpart Link (RSCL)		X
Nuclear Accident Reporting System (NARS)		X
PBX System		X
General Telephone Lines		X
Manitowoc City Sheriff's Department FM Radio		X

NEI Reference:

CU6 / SU6 – Unplanned loss of all onsite or offsite communications capabilities

PBNP Basis Reference(s):

1. EPMP 2.1, Testing of Communications Equipment
2. EPMP 2.1A, Monthly Communications Test

Differences:

None

A.6 Hazards

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

The events of this category have been grouped into the following subcategories:

Security Threats

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

Fire or Explosion

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 vital equipment.

Vehicle Crash/Toxic and Flammable Gas

Events addressed in this subcategory are non-naturally occurring events that can cause damage to plant facilities and include aircraft crashes, missile impacts, toxic or flammable gas leaks, or explosions from any source.

Natural Events

Natural events include hurricanes, earthquakes or tornados that have potential to cause plant structure or equipment damage of sufficient magnitude to threaten personnel or plant safety.

Category: A.6 – Hazards **Sub-category:** Security Threats

Initiating Condition: Confirmed security event which indicates a potential degradation in the level of safety of the plant

EAL:

HU1.1 Unusual Event
Indication of attempted sabotage, hostage/extortion, civil disturbance or strike action onsite OR Notification of any credible site-specific threat by the Security Shift Supervisor or outside agency (NRC, military or law enforcement)

Mode Applicability:

All

Basis:

This EAL is based on the PBNP Security and Safeguards Contingency Plan. Security events which do not represent a potential degradation in the level of safety of the plant are reported under 10 CFR 73.71 or in some cases under 10 CFR 50.72.

The second condition is included to ensure the appropriate notifications for the security threat are made in a timely manner. The determination of "credible" is made through the use of information found in the Security And Safeguards Contingency Plan. Only the plant or site to which the specific threat is made need declare the Unusual Event. Threats made that are ambiguous or are not unit-specific (e.g. "the PBNP site") may be conservatively interpreted to include both the units. This would result in an emergency classification at both Unit 1 and Unit 2. LOW Threat Severity is defined as: The threat of physical attack to the plant represents a potential degradation of the level of safety to the plant.

Reference is made to the Security Shift Supervisor because this individual is the designated on-site person who is 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 plant Security And Safeguards Contingency Plan.

Intrusion into the site Protected Area by an adversary would result in escalation to an Alert under EAL# HA1.1.

NEI Reference:

HU4 – Confirmed security event which indicates a potential degradation in the level of safety of the plant

PBNP Basis Reference(s):

1. NRC Safeguards Advisory 10/6/01
2. PBNP Security And Safeguards Contingency Plan
3. Letter from Mr. B. A. Boger (NRC) to Ms. Lynette Hendricks (NEI) dated 2/4/02
4. NMC fleet Security Threat Assessment Policy, SE 0018

Differences:

1. This EAL threshold has been written to conform with IC HU4 of NEI 99-01 as amended and endorsed by the NRC in a letter from Mr. B. A. Boger to Ms. Lynette Hendricks (NEI) dated 2/4/02

Category: A.6 – Hazards **Sub-category:** Security Threats

Initiating Condition: Confirmed security event in a site Protected Area

EAL:

HA1.1 Alert
Intrusion into the site Protected Area by an adversary indicated by notification by the Security Shift Supervisor to implement AOP-29 for a PA intrusion.

Mode Applicability:

All

Basis:

An adversary is an armed or suspected to be armed intruder whose intent is to commit sabotage, disrupt station operations or otherwise commit a crime on station property. A confirmed intrusion report is satisfied if physical evidence indicates the presence of an adversary within the Protected Area (i.e., confirmed explosive device).

The Security And Safeguards Contingency Plan identifies numerous events/conditions that constitute a threat/compromise to station security. Only those events that involve actual or potential substantial degradation to the level of safety of the plant need to be considered.

Intrusion into a Vital Area by an adversary would result in escalation to a Site Emergency under EAL# HS1.1.

Reference is made to the Security Shift Supervisor because this individual is the designated on-site person 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 PBNP Security And Safeguards Contingency Plan.

NEI Reference:

HA4 – Confirmed security event in a plant Protected Area

PBNP Basis Reference(s):

1. Security And Safeguards Contingency Plan
2. AOP-29, Security Threat
3. NMC fleet Security Threat Assessment Policy, SE 0018

Differences:

None

Category: A.6 – Hazards **Sub-category:** Security Threats

Initiating Condition: Confirmed security event in a plant Vital Area

EAL:

HS1.1 Site Emergency
Intrusion into a Vital Area by an adversary indicated by notification by the Security Shift Supervisor to implement AOP-29 for Vital Area intrusion.

Mode Applicability:

All

Basis:

An adversary is an armed or suspected to be armed intruder whose intent is to commit sabotage, disrupt station operations or otherwise commit a crime on station property. A confirmed intrusion report is satisfied if physical evidence indicates the presence of an adversary within the security Vital Area (i.e., confirmed explosive device).

Consideration is given to the following events when evaluating an event against the criteria of the site Security And Safeguards Contingency Plan: sabotage, bomb threat and hostage/extortion. The Security And Safeguards Contingency Plan identifies numerous events/conditions that constitute a threat/compromise to a station security. Only events that involve actual or likely major failures of plant functions needed for protection of the public need to be considered.

Loss of plant control would result in escalation to a General Emergency per EAL # HG1.1.

Reference is made to the Security Shift Supervisor because this individual is the designated on-site person 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 PBNP Security And Safeguards Contingency Plan.

NEI Reference:

HS1 – Confirmed security event in a plant Vital Area

PBNP Basis Reference(s):

1. Security And Safeguards Contingency Plan
2. NMC fleet Security Threat Assessment Policy, SE 0018

Differences:

None

Category: A.6 – Hazards **Sub-category:** Security Threats

Initiating Condition: Security event resulting in loss of physical control of the facility

EAL:

HG1.1 General Emergency

An adversary has taken control of plant equipment such that plant personnel are unable to operate equipment required to maintain safety functions:

Reactivity control

RCS inventory

Secondary heat removal

Spent Fuel Pool integrity

Mode Applicability:

All

Basis:

This EAL encompasses conditions under which an adversary has taken physical control of plant vital areas (containing vital equipment or controls) required to maintain safety functions and control of that equipment cannot be transferred to and operated from another location. These safety functions are:

- Reactivity control (ability to shut down the reactor and keep it shutdown)
- RCS inventory (ability to cool the core), and
- Secondary heat removal (ability to maintain a heat sink)

If control of the plant equipment necessary to maintain safety functions can be transferred to another location, the EAL threshold is not met. Loss of physical control of the Control Room or remote shutdown capability alone may not prevent the ability to maintain safety functions.

This EAL also addresses loss of physical control of spent fuel pool cooling systems if imminent damage of fuel in the spent fuel pool is likely.

NEI Reference:

HG1 – Security event resulting in loss of physical control of the facility

PBNP Basis Reference(s):

1. Security And Safeguards Contingency Plan
2. NMC fleet Security Threat Assessment Policy, SE 0018

Differences:

1. Added the list of safety functions as specified in the basis discussion to improve clarity and understanding. This change was identified during EAL validation exercises.

Category: A.6 – Hazards **Sub-category:** Fire or Explosion

Initiating Condition: Fire within Protected Area boundary not extinguished within 15 minutes of detection

EAL:

HU2.1 Unusual Event
Confirmed fire in the Protected Area not extinguished in ≤ 15 min. of Control Room notification.

Mode Applicability:

All

Basis:

The purpose of this EAL is to address the magnitude and extent of fires that may be potentially significant precursors to damage to safety systems. As used here, a confirmed fire is a fire that has been identified through visual observation and report by plant personnel, or sensor alarm indication. The 15-minute period begins when a credible report is received that a fire is occurring or a valid fire detection system alarm is received. Validation of a fire detection system alarm includes actions that can be taken within the control room or other nearby location to ensure that the alarm is not spurious. A validated alarm is assumed to be an indication of a fire unless personnel dispatched to the scene disprove the alarm within the 15-minute period. In other words, a personnel report from the scene may be used to disprove a validated alarm if the report is received within 15 minutes of the alarm. The report, however, shall not be required to validate the alarm.

The intent of the 15-minute period is to size the fire and discriminate against small fires that are readily extinguished (e.g., smoldering waste paper basket

This excludes fires within administration buildings, waste paper basket fires and other small fires of no safety consequence.

EAL# HA2.1 provides escalation to the Alert classification.

NEI Reference:

HU2 – Fire within Protected Area boundary not extinguished within 15 minutes of detection

PBNP Basis Reference(s):

1. PBNP FSAR Table 3.3-1
2. Bechtel Drawing C-3 Plant Areas

Differences:

1. None.

Category: A.6 – Hazards **Sub-category:** Fire or Explosion

Initiating Condition: Natural or destructive phenomena affecting the Protected Area

EAL:

HU2.2 Unusual Event
Report by plant personnel of an explosion within Protected Area resulting in visible damage to permanent structures or equipment

Mode Applicability:

All

Basis:

For this EAL, only those explosions of sufficient force to visibly damage permanent structures or equipment within the Protected Area should be considered. An explosion is a rapid, violent, unconfined combustion or a catastrophic failure of pressurized equipment that imparts significant energy to nearby structures or equipment. No attempt is made in this EAL to assess the actual magnitude of the damage. The occurrence of the explosion with reports of evidence of damage (e.g., deformation, scorching, etc.) is sufficient for declaration. The Emergency Director also needs to consider any security aspects of the explosion.

NEI Reference:

HU1 – Natural or destructive phenomena affecting the Protected Area

PBNP Basis Reference(s):

1. Bechtel Drawing C-3 Plant Areas

Differences:

1. This EAL implements NEI IC HU1 Example EAL #4. IC HU1 Example EALs are implemented in separate plant EALs to improve clarity and readability.

Category: A.6 – Hazards **Sub-category:** Fire or Explosion

Initiating Condition: Fire or explosion affecting the operability of plant safety systems required to establish or maintain safe shutdown

EAL:

HA2.1 Alert

Fire or explosion in any Table H-1 Safe Shutdown Area, which results in EITHER:

Visible damage to plant equipment or structures needed for safe shutdown

OR

Affected safety system performance is degraded indicating damage to a safety system

Table H-1 Safe Shutdown Areas
• 1(2) Containment Building • Primary Auxiliary Building • Turbine Building • Control Building • Diesel Generator Building • Gas Turbine Building • Circ Water Pump House

Mode Applicability:

All

Basis:

Table H-1 lists areas that contain systems and components required for the safe shutdown functions of the plant. The PBNP safe shutdown analyses were consulted for equipment and plant areas required for the applicable mode. An explosion is a rapid, violent, unconfined combustion or a catastrophic failure of pressurized equipment that imparts significant energy to nearby structures or equipment.

Explosions of sufficient force are those that cause visible damage to permanent structures or equipment required for safe operation, or result in degraded performance of safety systems without visible damage within the identified plant areas. No attempt is made to assess the actual magnitude of the damage.

The wording of this EAL does not imply that a quantitative assessment of safety system performance should be performed; rather that observation that degraded safety system parameters is a result of the event. Either a physical or functional determination of degraded performance is sufficient to classify this event. The declaration of an Alert and the activation of the TSC provide the Emergency Director with the resources needed to perform damage assessments. The Emergency Director also needs to consider the security aspects of the explosions.

NEI Reference:

HA2 – Fire or explosion affecting the operability of plant safety systems required to establish or maintain safe shutdown

PBNP Basis Reference(s):

1. PSA Section 8.0 Fire Hazards Analysis Table 8.1.3-1 Safe Shutdown Systems

Differences:

None

Category: A.6 – Hazards **Sub-category:** Vehicle Crash/Toxic and Flammable Gas

Initiating Condition: Natural or destructive phenomena affecting the Protected Area

EAL:

HU3.1 Unusual Event
Vehicle crash into plant structures or systems within the Protected Area

Mode Applicability:

All

Basis:

This EAL addresses crashes of vehicle types large enough to cause significant damage to plant structures containing functions and systems required for safe shutdown of the plant. If a crash is confirmed to affect a plant Vital Area, the event may escalate to the Alert classification under EAL HA3.1.

NEI Reference:

HU1 – Natural or destructive phenomena affecting the Protected Area

PBNP Basis Reference(s):

1. Bechtel Drawing C-3 Plant Area

Differences:

1. This EAL implements NEI IC HU1 Example EAL #3. IC HU1 Example EALs are implemented in separate plant EALs to improve clarity and readability.

Category: A.6 – Hazards **Sub-category:** Vehicle Crash/Toxic and Flammable Gas

Initiating Condition: Release of toxic or flammable gases deemed detrimental to normal operation of the plant

EAL:

HU3.2 Unusual Event
Report or detection of toxic or flammable gases that could enter or have entered within the Protected Area in amounts that could affect the health of plant personnel or safe plant operation **OR** Report by local, county or state officials for evacuation or sheltering of site personnel based on an offsite event

Mode Applicability:

All

Basis:

This EAL is based on the existence of uncontrolled releases of toxic or flammable gas affecting normal plant operations or the health of plant personnel. The release may have originated within the Protected Area, or it may have originated offsite and subsequently drifted inside the Protected Area. Offsite events (e.g., tanker truck accident releasing toxic gases, etc.) resulting in the plant being within the evacuation area should also be considered in this EAL because of the adverse affect on normal plant operations.

It is intended that releases of toxic or flammable gases are of sufficient quantity and the release point of such gases is such that normal plant operations would be affected. This would preclude small or incidental releases, or releases that do not impact structures needed for plant operation. The EAL is not intended to require significant assessment or quantification. The EAL assumes an uncontrolled process that has the potential to affect plant operations or personnel safety

Should the release affect plant Vital Areas, escalation to an Alert would be based on EAL# HA3.2. Should an explosion or fire occur due to flammable gas within an affected plant area, an Alert may be appropriate based on EAL# HA2.1.

NEI Reference:

HU3 – Release of toxic or flammable gases deemed detrimental to normal operation of the plant

PBNP Basis Reference(s):

1. PBNP FSAR Table 3.3-1

Differences:

None

Category: A.6 – Hazards **Sub-category:** Vehicle Crash/Toxic and Flammable Gas

Initiating Condition: Natural or destructive phenomena affecting the plant Vital area

EAL:

HA3.1 Alert
Vehicle crash which precludes personnel access to or damages equipment in one or more Table H-1 Safe Shutdown Areas

Table H-1 Safe Shutdown Areas
• 1(2) Containment Building • Primary Auxiliary Building • Turbine Building • Control Building • Diesel Generator Building • Gas Turbine Building • Circ Water Pump House

Mode Applicability:

All

Basis:

Personnel access to safe shutdown areas may be an important factor in monitoring and controlling equipment operability. This EAL addresses vehicle crashes that preclude personnel access to safe shutdown areas or may have resulted in the area being subjected to forces beyond design limits. The initial report should not be interpreted as mandating a lengthy damage assessment prior to classification. No attempt is made in this EAL to assess the actual magnitude of the damage.

This EAL addresses crashes of vehicle types large enough to cause significant damage to plant structures containing functions and systems required for safe shutdown of the plant.

NEI Reference:

HA1 – Natural and destructive phenomena affecting the plant Vital Area

PBNP Basis Reference(s):

1. PSA Section 8.0 Fire Hazards Analysis Table 8.1.3-1 Safe Shutdown Systems

Differences:

1. This EAL implements NEI IC HA1 Example EAL #3. IC HA1 Example EALs are implemented in separate plant EALs to improve clarity and readability.
2. This EAL expands the NEI IC HA1 Example EAL #3 by addition of precluding access to the area. This is more conservative in that damage cannot be assessed in an inaccessible area.

Category: A.6 – Hazards **Sub-category:** Vehicle Crash/Toxic and Flammable Gas

Initiating Condition: Release of toxic or flammable gases within or contiguous to a Vital Area which jeopardizes operation of systems required to establish or maintain safe shutdown

EAL:

HA3.2 Alert

Report or detection of toxic or flammable gases within any Table H-1 Safe Shutdown Area in concentrations that EITHER:

Will be immediately life threatening to plant personnel

OR

Exceed the lower flammability limit

Table H-1 Safe Shutdown Areas
• 1(2) Containment Building • Primary auxiliary building • Turbine Building • Control Building • Diesel Generator Building • Gas Turbine Building • Circ Water Pump House

Mode Applicability:

All

Basis:

This EAL is based on toxic or flammable gases that have entered a plant structure in concentrations that are unsafe for plant personnel and, therefore, preclude access to equipment necessary for the safe operation of the plant. This EAL applies to buildings and areas contiguous to safe shutdown areas or other significant buildings or areas. It is appropriate that more frequent monitoring be done to ascertain whether consequential damage has occurred.

The first condition is met if measurement of toxic gas concentration results in an atmosphere that is immediately dangerous to life and health (IDLH) within a Safe Shutdown Area or any area or building contiguous to Safe Shutdown Area. Exposure to an IDLH atmosphere will result in immediate harm to unprotected personnel, and would preclude access to any such affected areas.

The second condition is met when the flammable gas concentration in a Safe Shutdown Area or any building or area contiguous to a Safe Shutdown Area exceed the lower flammability limit. Flammable gasses, such as hydrogen and acetylene, are routinely used to maintain plant systems (hydrogen) or to repair equipment/components (acetylene - used in welding). This condition addresses concentrations at which gases can ignite/support combustion. An uncontrolled release of flammable gasses within a facility structure has the potential to affect safe operation of the plant by limiting either operator or equipment operations due to the potential for ignition and resulting equipment damage/personnel injury. Once it has been determined that an uncontrolled release is occurring, then sampling must be done to determine if the concentration of the released gas is within this range.

NEI Reference:

HA3 – Release of toxic or flammable gases within or contiguous to a Vital Area which jeopardizes operation of systems required to establish or maintain safe shutdown

PBNP Basis Reference(s):

1. PSA Section 8.0 Fire Hazards Analysis Table 8.1.3-1 Safe Shutdown Systems

Differences:

None

Category: A.6 – Hazards **Sub-category:** Natural Events

Initiating Condition: Natural or destructive phenomena affecting the Protected Area

EAL:

HU4.1 Unusual Event

Activation of 2 or more seismic monitors (SEI 6210 through 6213)

AND

Verified by:

- Actual ground shaking

OR

- By contacting the U.S. Geological Survey National Earthquake Information Center

Mode Applicability:

All

Basis:

PBNP seismic monitors actuates at 0.01 g. Seismic monitors are located in the following areas:

SEI 6210 #3 Warehouse

SEI 6211 Unit 1 Façade

SEI 6212 Drum Prep. Room

SEI 6213 El 8' between vital switchgear room and AFW Tunnel

An earthquake "felt" and reported to the Control Room serves as verification. A call to the National Earthquake Center will verify that an earthquake has occurred but will not provide ground acceleration data. Damage to some portions of the site may occur as a result of the felt earthquake but it should not affect the ability of safety functions to operate. This event escalates to an Alert under EAL HA4.1 if the earthquake adversely affects plant safety functions.

NEI Reference:

HU1 – Natural and destructive phenomena affecting the Protected Area

PBNP Basis Reference(s):

1. AOP-28 Seismic Event
2. FSAR Volume 1 Section 2.9 Seismology
3. STPT 22.1 Seismic Event Monitoring
4. EPRI document, "Guidelines for Nuclear Plant Response to an Earthquake", dated October 1989

Differences:

1. This EAL implements NEI IC HU1 Example EAL #1. IC HU1 Example EALs are implemented in separate plant EALs to improve clarity and readability.

Category: A.6 – Hazards **Sub-category:** Natural Events

Initiating Condition: Natural or destructive phenomena affecting the Protected Area

EAL:

HU4.2 Unusual Event Sustained winds $\geq$ 75 mph onsite **<u>OR</u>** Report by plant personnel of tornado striking within plant Protected Area

Mode Applicability:

All

Basis:

This EAL is based on the assumption that a tornado striking (touching down) or hurricane force winds ($\geq$ 75 mph) within the Protected Area may have potentially damaged plant structures containing functions or systems required for safe shutdown of the plant. If such damage is confirmed visually or by other in-plant indications, the event may be escalated to an Alert under EAL # HA4.2.

NEI Reference:

HU1 – Natural or destructive phenomena affecting the Protected Area

PBNP Basis Reference(s):

1. FSAR Volume 3 Page 5.1-37 Wind and Tornado Forces
2. PSA Section 9 Notebook 9.1

Differences:

1. Included hurricane force winds ($\geq$ 75 mph) vs. design basis winds as specified in NEI 99-01 to provide a gradient to the Alert threshold which is based on design basis wind speed of 108 mph.
2. This EAL implements NEI IC HU1 Example EAL #2. IC HU1 Example EALs are implemented in separate plant EALs to improve clarity and readability.

Category: A.6 – Hazards **Sub-category:** Natural Events

Initiating Condition: Natural or destructive phenomena affecting the Protected Area

EAL:

HU4.3 Unusual Event

Uncontrolled flooding in the auxiliary building caused by rupture of the SW header

<u>OR</u>

Uncontrolled flooding in the water intake structure caused by rupture of a circulating water system expansion joint or fire water main.

Mode Applicability:

All

Basis:

This EAL addresses the effect of flooding caused by internal events such as component failures, equipment misalignment, or outage activity mishaps. The auxiliary building and water intake structure are the vulnerable areas indicated in the IPE that contain systems required for safe shutdown of the plant that are not designed to be wetted or submerged. Escalation of the emergency classification is based on the damage caused or by access restrictions that prevent necessary plant operations or systems monitoring via # HA4.3.

NEI Reference:

HU1 – Natural or destructive phenomena affecting the Protected Area

PBNP Basis Reference(s):

1. PSA Section 7.3 Plant Flood Design Basis
2. PBNP Individual Plant Examination (IPE) for internal events and internal flood.

Differences:

1. This EAL implements NEI IC HU1 Example EAL #6. IC HU1 Example EALs are implemented in separate plant EALs to improve clarity and readability.

Category: A.6 – Hazards **Sub-category:** Natural Events

Initiating Condition: Natural or destructive phenomena affecting the plant Vital Area

EAL:

HA4.1 Alert
Two or more seismic monitors (SEI 6210 through 6213) indicate ground acceleration EITHER:
$\geq$ 0.06 g horizontal
OR
$\geq$ 0.04 g vertical

Mode Applicability:

All

Basis:

This EAL addresses events that may have resulted in a plant Vital Area being subjected to forces beyond design limits and thus damage may be assumed to have occurred to plant safety systems. The initial report should not be interpreted as mandating a lengthy damage assessment prior to classification. No attempt is made in this EAL to assess the actual magnitude of the damage.

This EAL is based on the FSAR operating basis earthquake (OBE) of 0.06 g horizontal or 0.04 g vertical acceleration. Seismic events of this magnitude can cause damage to plant structures, systems or equipment and therefore represent a potential substantial degradation of the plant.

Seismic monitors are located in the following areas:

SEI 6210 #3 Warehouse

SEI 6211 Unit 1 Façade

SEI 6212 Drum Prep. Room

SEI 6213 El 8' between vital switchgear room and AFW Tunnel

NEI Reference:

HA1 – Natural and destructive phenomena affecting the plant Vital Area

PBNP Basis Reference(s):

1. AOP-28 Seismic Event
2. FSAR Volume 1 Section 2.9 Seismology
3. STPT 22.1 Seismic Event Monitoring
4. EPRI document, Guidelines for Nuclear Plant Response to an Earthquake, dated October 1989

Differences:

1. This EAL implements NEI IC HA1 Example EAL #1. IC HA1 Example EALs are implemented in separate plant EALs to improve clarity and readability.

Category: A.6 – Hazards **Sub-category:** Natural Events

Initiating Condition: Natural or destructive phenomena affecting the plant Vital Area

EAL:

HA4.2 Alert
Sustained (15 minute average) winds $\geq$ 108 mph onsite
OR
Tornado strikes any Table H-1 Safe Shutdown Area,

Table H-1 Safe Shutdown Areas
• 1(2) Containment Building • Primary Auxiliary Building • Turbine Building • Control Building • Diesel Generator Building • Gas Turbine Building • Circ Water Pump House

Mode Applicability:

All

Basis:

Sustained wind speed is measured as the 15 minute average wind speed. This EAL addresses events that may have resulted in a plant Vital Area being subjected to forces beyond design limits and thus damage may be assumed to have occurred to plant structures, systems or equipment. The initial report should not be interpreted as mandating a lengthy damage assessment prior to classification. No attempt is made in this EAL to assess the actual magnitude of the damage.

This EAL is based on the FSAR design basis sustained wind speed of 108 mph. Wind loads of this magnitude can cause damage to safety functions.

NEI Reference:

HA1 – Natural and destructive phenomena affecting the plant Vital Area

PBNP Basis Reference(s):

1. FSAR Volume 3 Page 5.1-37 Wind and Tornado Forces
2. PSA Section 9 Notebook 9.1

Differences:

1. This EAL implements NEI IC HA1 Example EAL #2. IC HA1 Example EALs are implemented in separate plant EALs to improve clarity and readability.

2. NEI IC HA1 Example EAL #2 specifies that this event result in "visible damage" to plant structures or equipment therein. The phrase has been deleted from the wording of the plant EAL because the specified thresholds are design limits and, by definition, represent the level above which damage can be expected. In addition, during high wind conditions or tornado strikes, it may not be possible to accurately assess "visible damage." The significance here is not that a particular system or structure was damaged, but rather, that the event was of sufficient magnitude to cause degradation.

3. The words "(15 minute average)" were added so that "sustained" would have a value with which it can be related.

Category: A.6 – Hazards **Sub-category:** Natural Events

Initiating Condition: Natural or destructive phenomena affecting the plant Vital Area

EAL:

HA4.3 Alert
Uncontrolled flooding that results in degraded safety system performance or that creates industrial safety hazards that precludes access necessary to operate or monitor safety equipment in EITHER:
The auxiliary building caused by rupture of the SW header
OR
The water intake structure caused by rupture of a circulating water system expansion joint or fire water main

Mode Applicability:

All

Basis:

This EAL addresses the inability to operate or monitor safety equipment represents a potential for substantial degradation of the level of safety of the plant. This flooding may have been caused by internal events such as component failures, equipment misalignment, or outage activity mishaps. The auxiliary building and water intake structure are those areas identified in the IPE that contain systems required for safe shutdown of the plant, that are not designed to be wetted or submerged.

NEI Reference:

HA1 – Natural and destructive phenomena affecting the plant Vital Area

PBNP Basis Reference(s):

1. PSA Section 7 .3 Plant Flood Design Basis - Component Vulnerability and Table 7.7-1
2. PBNP Individual Plant Examination (IPE) for internal events and internal flood.

Differences:

1. This EAL implements NEI IC HA1 Example EAL #5. IC HA1 Example EALs are implemented in separate plant EALs to improve clarity and readability.

A.7 Other

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 Shift Manager or Emergency Director the latitude to classify emergency conditions consistent with the established classification criteria based upon their judgment.

Category: A.7 – Other **Sub-category:** N/A

Initiating Condition: Emergency Director Judgment

EAL:

HU6.1 Unusual Event
Any event, in the judgment of the Emergency Director, that could lead to or has led to a potential degradation of the level of safety of the plant.

Mode Applicability:

All

Basis:

This EAL addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist which are believed by the Emergency Director to fall under the Unusual Event emergency class.

From a broad perspective, one area that may warrant Emergency Director judgment is related to likely or actual breakdown of site-specific event mitigating actions. Examples to consider include inadequate emergency response procedures, transient response either unexpected or not understood, failure or unavailability of emergency systems during an accident in excess of that assumed in accident analysis, or insufficient availability of equipment and/or support personnel.

NEI Reference:

HU5 – Other conditions existing which in the judgment of the Emergency Director warrant declaration of an Unusual Event

PBNP Basis Reference(s):

None

Differences:

None

Category: A.7 – Other **Sub-category:** N/A

Initiating Condition: Emergency Director Judgment

EAL:

HA6.1 Alert Any event in the judgment of the Emergency Director, that could cause or has caused actual substantial degradation of the level of safety of the plant. Any releases are expected to be limited to small fractions of EPA Protective Action Guides.

Mode Applicability:

All

Basis:

This EAL addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist which are believed by the Emergency Director to fall under the Alert emergency class.

NEI Reference:

HA6 – Other conditions existing which in the judgment of the Emergency Director warrant declaration of an alert.

PBNP Basis Reference(s):

1. EPA 400, Manual of Protective Action Guides And Protective Actions For Nuclear Incidents

Differences:

None

Category: A.7 – Other **Sub-category:** N/A

Initiating Condition: Emergency Director Judgment

EAL:

HS6.1 Site Emergency

Any event in the judgment of the Emergency Director is in progress which indicate actual or likely failures of plant systems needed to protect the public. Any releases are not expected to result in exposures which exceed EPA Protective Action Guides beyond the site boundary.

Mode Applicability:

All

Basis:

This EAL addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist which are believed by the Emergency Director to fall under the emergency class description for Site Emergency.

NEI Reference:

HS3 – Other conditions existing which in the judgment of the Emergency Director warrant declaration of Site Emergency

PBNP Basis Reference(s):

1. EPA 400, Manual of Protective Action Guides And Protective Actions For Nuclear Incidents

Differences:

None

Category: A.7 – Other **Sub-category:** N/A

Initiating Condition: Emergency Director Judgment

EAL:

HG6.1 General Emergency Any event in the judgment of the Emergency Director is in progress which indicates actual or imminent core damage and the potential for a large release of radioactive material in excess of EPA Protective Action Guides outside the site boundary.

Mode Applicability:

All

Basis:

This EAL addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist which are believed by the Emergency Director to fall under the General Emergency class.

Releases can reasonably be expected to exceed EPA PAG plume exposure levels outside the site boundary.

NEI Reference:

HG2 – Other conditions existing which in the judgment of the Emergency Director warrant declaration of General Emergency

PBNP Basis Reference(s):

EPA 400, Manual of Protective Action Guides And Protective Actions For Nuclear Incidents

Differences:

1. The NEI phrase "...with potential for loss of containment integrity" has been deleted from the plant EAL wording because it is highly unlikely that an offsite radioactivity release of this magnitude can occur without loss of the Containment barrier.

2. The NEI phrase "...offsite for more than the immediate site area" has been replaced with "outside the site boundary" to improve clarity and understanding. Since the exposure levels offsite are the concern of the NEI EAL, the plant EAL wording is appropriate.

A.8 ISFSI Events

The events of this category have been grouped into the following subcategories:

Loss of Cask Confinement

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

Security Events

An Unusual Event is declared on the basis of the occurrence of any security event that leads to a potential loss of level of safety of the ISFSI.

Category: A.8 – ISFSI Events **Sub-category:** Loss of Cask Confinement

Initiating Condition: Damage to a loaded cask confinement boundary

EAL:

IU1.1 Unusual Event
Loss of cask confinement boundary as indicated by exceeding any of the following external surface dose rates on any loaded Dry Storage Cask:
o ≥ 100 mR/hr at the cask side
o ≥ 200 mR/hr at the top of the cask
o ≥ 350 mR/hr at the cask air inlet
o ≥ 100 mR/hr at the cask air outlet

Mode Applicability:

All

Basis:

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

The specified surface dose rates are based on the ISFSI Safety Analysis Report (SAR) design criteria referenced in the cask Certificate of Compliance and the related NRC Safety Evaluation Report. This EAL addresses responses to a dropped cask, a tipped over cask, explosion, missile damage, fire damage or natural phenomena affecting a cask (e.g., seismic event, tornado, etc.).

NEI Reference:

E-HU1 – Damage to a loaded cask confinement boundary

PBNP Basis Reference(s):

1. Conditions for Cask Use and Technical Specifications Certificate of Compliance for the Dry Cask Storage System
2. Technical Specification 1.2.4 of the VSC-24 Certificate of Compliance
3. AOP-8G Ventilated Storage Cask (VSC) Drop or Tipover

Differences:

1. The NEI 99-01 example EAL wording specifies a list of natural phenomena events affecting a loaded cask confinement boundary. The plant EAL identifies radiation levels that might result from such natural phenomena. As explained in the second paragraph of the EAL basis, the listed radiation levels address the spectrum of events (natural and man-made) that might lead to emergency classification under the NEI EAL.

2. The NEI 99-01 example EAL mode applicability is given as "N/A". Since all possible operating modes are listed in the plant EAL, operating mode applicability is irrelevant to event classification and is therefore not applicable. "All" is given in the plant EAL for consistency with other EALs.

Category: A.8 – ISFSI Events **Sub-category:** Security

Initiating Condition: Confirmed security event with potential loss of level of safety of the ISFSI

EAL:

IU2.1 Unusual Event
Report by Security Shift Supervisor of a security concern within the ISFSI

Mode Applicability:

All

Basis:

This EAL is based on the PBNP Safeguards Contingency Plan. Security events that do not represent a potential degradation in the level of safety of the ISFSI are reported under 10 CFR 73.71 or in some cases under 10 CFR 50.72.

Reference is made to the Security Shift Supervision because this individual is the designated on-site person 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 Safeguards Contingency Plan

NEI Reference:

E-HU2 – Confirmed security event with potential loss of level of safety of the ISFSI

PBNP Basis Reference(s):

None

Differences:

1. The NEI 99-01 example EAL mode applicability is given as "N/A". Since all possible operating modes are listed in the plant EAL, operating mode applicability is irrelevant to event classification and is therefore not applicable. "All" is given in the plant EAL for consistency with other EALs.

H.1 ATWS

This category addresses events related to failure of the Reactor Protection System (RPS) to initiate and complete reactor trips. Orange or Red paths in this Critical Safety Function Status Tree (CSFST) indicate losses of reactivity control that may pose a threat to fuel cladding and RCS integrity.

Category: H.1 – ATWS **Sub-category:** N/A

Initiating Condition: Failure of reactor protection system instrumentation to complete or initiate an automatic reactor trip once a Reactor Protection System setpoint has been exceeded and manual trip was successful

EAL:

MA7.1 Alert
Any failure of the Reactor Protection System to generate an automatic trip signal and reduce power range to ≤ 5%.
AND
Manual trip is successful

Mode Applicability:

1- Power Operation, 2-Startup

Basis:

This EAL indicates failure of the automatic protection system to trip the reactor. This condition is a potential substantial degradation of a safety system in that a front line automatic protection system did not function in response to a plant transient and thus the plant safety has been compromised, and design limits of the fuel may have been exceeded. An Alert is indicated (even if manual trip is successful) because conditions exist that lead to challenge of Fuel Cladding or Reactor Coolant System barrier integrity. Reactor Protection System trip setpoint signal being exceeded, rather than limiting safety system setpoint being exceeded, is specified here because the automatic protection system is the issue.

Following a successful reactor trip, nuclear power promptly drops to only a few percent of nominal, and then decays away to a level some 8 decades less. Reactor power levels resulting from radioactive fission product decay are never more than a few percent of nominal power and also lower in time. Heat removal safety systems are sized to remove only decay heat and not significant core power. Reactor power levels at or above 5% (in a core that is supposed to be shutdown) are considered an extreme challenge to the Fuel Cladding barrier and warrant a Critical Safety Function Status Tree (CSFST) RED priority.

The setpoint has been chosen because it is clearly readable on the power range meters. Reactor power levels in the power range are indicated on N-41, 42, 43 and 44.

Following any automatic reactor trip signal, plant procedures prescribe operator insertion of redundant manual trip signals to ensure reactor shutdown is achieved. A successful manual trip is any set of actions by the reactor operator(s) at the Main Control Panel that causes control rods to be rapidly inserted into the core and brings the reactor subcritical. Failure of the manual trip would escalate the event to a Site Emergency (EAL# MS7.1).

NEI Reference:

SA2 – Failure of reactor protection system instrumentation to complete or initiate an automatic reactor trip once a Reactor Protection System setpoint has been exceeded and manual trip was successful

PBNP Basis Reference(s):

1. CSP-ST.0, Critical Safety Function Status Trees, Figure 1
2. BG-CSP-ST.0, CRITICAL SAFETY FUNCTION STATUS TREES

Differences:

1. None.

Category: H.1 – ATWS **Sub-category:** N/A

Initiating Condition: Failure of Reactor Protection System instrumentation to complete or initiate an automatic reactor trip once a Reactor Protection System setpoint has been exceeded and manual trip was not successful

EAL:

MS7.1 Site Emergency
Conditions requiring entry into Critical Safety Function - Subcriticality-RED path (CSP-S.1)

Mode Applicability:

1- Power Operation, 2-Startup

Basis:

Critical Safety Function Status Tree (CSFST) Subcriticality-RED path is entered based on failure of power range indication to lower below 5% following a reactor trip. Reactor power levels in the power range are indicated on N-41, 42, 43 and 44. This addresses any manual trip or automatic trip signal followed by a manual trip that fails to shut down the reactor to an extent that the reactor is producing more heat load for which the safety systems were designed. A manual trip is any set of actions by the reactor operator(s) at the main control board which causes control rods to be rapidly inserted into the core and brings power below that percent power (5%) associated with the ability of the safety systems to remove heat and continue to lower. Automatic and manual trips are not considered successful if action away from the main control board is required to trip the reactor.

Under these conditions, the reactor is producing more heat than the maximum decay heat load for which the safety systems are designed. Emergency boration is thus required and there is an actual major failure of a system intended for protection of the public. 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 Cladding and Reactor Coolant System barriers and warrants declaration of a Site Emergency.

Escalation of this event to a General Emergency would be via EAL# MG7.1 or other EAL categories.

NEI Reference:

SS2 – Failure of Reactor Protection System instrumentation to complete or initiate an automatic reactor scram once a Reactor Protection System setpoint has been exceeded and manual scram was not successful

PBNP Basis Reference(s):

1. CSP-ST.0, Critical Safety Function Status Trees
2. BG-CSP-ST.0, CRITICAL SAFETY FUNCTION STATUS TREES
3. CSP-S.1, Response to Nuclear Power Generation/ATWS

Differences:

1. The added words "Conditions requiring…" provide clarification that classification is based upon the condition defined in the CSFST as opposed to when the transition is made into the CSFST within the EOP network.
2. The NEI EAL phrase "…and manual scram was not successful" has been deleted because entry into CSP-S.1, Response to Nuclear Power Generation/ATWS, is required when manual trip is not effective.

Category: H.1 – ATWS **Sub-category:** N/A

Initiating Condition: Failure of the Reactor Protection System to complete an automatic trip and manual trip was not successful and there is indication of an extreme challenge to the ability to cool the core

EAL:

MG7.1 **General Emergency**

Conditions requiring entry into Subcriticality-RED path (CSP-S.1) currently exist

AND

Conditions requiring entry into **EITHER**:

Core Cooling-RED path (CSP-C.1)

OR

Heat Sink-RED path (CSP-H.1)

Mode Applicability:

1- Power Operation, 2-Startup

Basis:

Critical Safety Function Status Tree (CSFST) Subcriticality-RED path is entered based on failure of power range indication to lower below 5% following a reactor trip. Reactor power levels in the power range are indicated on N-41, 42, 43 and 44. This addresses any manual trip or automatic trip signal followed by a manual trip that fails to shut down the reactor to an extent that the reactor is producing more heat load for which the safety systems were designed. A manual trip is any set of actions by the reactor operator(s) at the main control board which causes control rods to be rapidly inserted into the core and brings power below that percent power (5%) associated with the ability of the safety systems to remove decay heat.

Core Cooling-RED path is entered if:

- Core exit thermocouples are equal to or greater than 1200°F, or
- Core exit thermocouples are less than 1200°F but equal to or greater than 700°F and all of the following:
  - RCS subcooling based on core exit thermocouples is equal to or less than [80°F] 35°F
  - No RCP is running
  - RVLIS NR equal to or less than 25 ft

Either set of conditions indicates significant core exit superheating and core uncovery. This is considered a loss of the Fuel Cladding barrier.

Heat Sink-RED path is entered if narrow range level in any steam generator (S/G) is equal to or less than [51%] 29% and total feedwater flow to S/Gs is equal to or less than 200 gpm. The combination of these two conditions indicates the ultimate heat sink function is under extreme challenge. Heat Sink-RED therefore addresses loss of functions required for hot shutdown with the reactor at pressure and temperature and thus a challenge of the Fuel Cladding and RCS barriers.

The combination of these conditions (reactor power greater than 5% and either Core Cooling-RED path or Heat Sink-RED path) indicates the ultimate heat sink function is under extreme challenge. A major consideration is the inability to initially remove heat during the early stages of this core melt sequence.

In the event this challenge occurs at a time when the reactor has not been brought below the power associated with safety system design power (5%), a core melt sequence may exist and rapid degradation of the fuel cladding could begin. To permit maximum offsite intervention time, the General Emergency declaration is therefore appropriate in anticipation of an inevitable General Emergency declaration due to loss and challenge of fission product barriers.

CSFST setpoints enclosed in brackets (e.g., [51%], etc.) are used under adverse containment conditions.

NEI Reference:

SG2 – Failure of the Reactor Protection System to complete an automatic trip and manual trip was not successful and there is indication of an extreme challenge to the ability to cool the core

PBNP Basis Reference(s):

1. CSP-ST.0, Critical Safety Function Status Trees, Figures 1, 2 and 3
2. CSP-S.1, Response to Nuclear Power Generation/ATWS
3. CSP-C.1, Response to Inadequate Core Cooling
4. CSP-H.1, Response to Loss of Secondary Heat Sink

Differences:

1. The added words "Conditions requiring…" provide clarification that classification is based upon the condition defined in the CSFST as opposed to when the transition is made into the CSFST within the EOP network.
2. Added the words "…currently exist" to emphasize that the EAL classification is not applicable if exit from CSP-S.1 is delayed after a successful reactor trip (i.e., entry to CSP-S.1 is not the EAL threshold; the conditions that require use of CSP-S.1 are the threshold).

H.2 Loss of AC Power Sources

Loss of vital 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 losses of onsite and/or offsite AC power sources including station blackout events.

Category: H.2 – Loss of AC Power Sources **Sub-category:** N/A

Initiating Condition: Loss of all offsite power to essential busses for ≥ 15 minutes

EAL:

MU8.1 Unusual Event
Unplanned loss of offsite AC power to both safety-related 4160 VAC buses 1(2)-A05 and 1(2)-A06 for ≥15 min.

Mode Applicability:

All

Basis:

Prolonged loss of all offsite AC power reduces required redundancy and potentially degrades the level of safety of the plant by rendering the plant more vulnerable to a complete loss of AC power (station blackout).

The fifteen-minute interval was selected as a threshold to exclude transient power losses. If neither of the unit safety-related buses are energized by an offsite source within 15 minutes, an Unusual Event is declared under this EAL.

"Unplanned" loss of offsite power excludes scheduled maintenance and testing activities for which contingency plans have been established.

This EAL is the hot conditions equivalent of the cold conditions loss of offsite power EAL# MU8.1.

NEI Reference:

SU1 – Loss of all offsite power to essential busses for greater than 15 minutes

PBNP Basis Reference(s):

1. DBD-22, 4160 VAC System, Figure 1-1 & Section 5
2. DBD-18, 13.8 KVAC System, Section 3.3.0
3. ECA 0.0
4. FSAR Section 8, Electrical Systems
5. AOP-14A

Differences:

1. Added "unplanned" loss to exclude scheduled maintenance and testing activities for which contingency plans have been established.
2. The NEI example EAL condition "Loss of power to (site-specific) transformers for greater than 15 minutes" has been changed to "Unplanned loss of offsite power to both safety-related...buses...for ≥ 15 min." The PBNP wording focuses the classification on the loss of offsite power rather than the status of one or more transformers that may or may not be powering the essential buses. This simplifies the EAL wording and concisely meets the intent of the NEI IC.
3. The NEI example EAL condition "...and At least (site-specific) emergency generators are supplying power to emergency busses" has been deleted because a failure of onsite sources to repower a safety-related bus would require declaration of an Alert under EAL# MA8.1 instead of an Unusual Event. The operability of emergency generators is, therefore, irrelevant to classification under this NEI IC.

Category: H.2 – Loss of AC Power Sources **Sub-category:** N/A

Initiating Condition: AC power capability to essential busses reduced to a single power source for greater than 15 minutes such that any additional single failure would result in station blackout.

EAL:

MA8.1 Alert

AC power capability to safety-related 4160 VAC buses 1(2)-A05 and 1(2)-A06 reduced to only one of the following sources for ≥15 min. (one source away from station blackout):

- o A single emergency diesel generator (G01, G02, G03 or G04)
- o LVSAT 1(2)-X04
- o UAT 1(2)-X02
- o Cross-tying with the opposite unit power supply

Mode Applicability:

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

Basis:

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 station blackout. Note that the time required to effect a backfeed to the UAT is likely longer than the fifteen-minute interval. If off-normal plant conditions have already established the backfeed, however, its power to the safety-related buses may be considered an offsite power source. The subsequent loss of the single remaining power source escalates the event to a Site Emergency (EAL# MS8.1).

The fifteen-minute interval was selected as a threshold to exclude transient power losses. If multiple sources fail to energize the unit safety-related buses within 15 minutes, an Alert is declared under this EAL.

"Unplanned" loss of offsite power excludes scheduled maintenance and testing activities for which contingency plans have been established.

NEI Reference:

SA5 – AC power capability to essential busses reduced to a single power source for greater than 15 minutes such that any additional single failure would result in station blackout

PBNP Basis Reference(s):

1. DBD-22, 4160 VAC System, Figure 1-1 & Section 5
2. DBD-18, 13.8 KVAC System, Section 3.3.0
3. ECA 0.0
4. FSAR Section 8, Electrical Systems
5. AOP-14A

Differences:

None

Category: H.2 – Loss of AC Power Sources **Sub-category:** N/A

Initiating Condition: Loss of all offsite power and loss of all onsite AC power to essential busses

EAL:

MS8.1 Site Emergency
Loss of all AC power to safety-related 4160 VAC buses 1(2)-A05 and 1(2)-A06 for $\geq$15 min.

Mode Applicability:

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

Basis:

Loss of all AC power compromises all plant safety systems requiring electrical power. This EAL is indicated by the loss of all offsite and onsite AC power to the safety-related 4160 VAC buses. Prolonged loss of all AC power will cause core uncovery and loss of containment integrity; thus, this event can escalate to a General Emergency (EAL# MG8.1). The fifteen-minute interval was selected as a threshold to exclude transient power losses.

This EAL is the hot conditions equivalent of the cold conditions loss of all AC power EAL MA8.2.

NEI Reference:

SS1 – Loss of all offsite power and loss of all onsite AC power to essential busses

PBNP Basis Reference(s):

1. DBD-22, 4160 VAC System, Figure 1-1 & Section 5
2. DBD-18, 13.8 KVAC System, Section 3.3.0
3. ECA 0.0
4. FSAR Section 8, Electrical Systems
5. AOP-14A

Differences:

1. The NEI example EAL condition "Loss of power to (site-specific) transformers…" has been changed to "Loss of all AC power to safety-related 4160 VAC buses…" The plant EAL wording focuses the classification on the loss of power rather than the status of one or more transformers that may or may not be powering the essential buses. This simplifies the EAL wording and concisely meets the intent of the NEI IC.

2. The NEI example EAL conditions "…Failure of (site-specific) emergency generators to supply power to emergency busses AND Failure to restore power to at least one emergency bus within (site-specific) minutes from the time of loss of both offsite and onsite AC power" has been deleted. The operability of emergency generators and onsite and offsite power sources is encompassed by the plant EAL wording "Loss of all AC power…"

Category: H.2 – Loss of AC Power Sources **Sub-category:** N/A

Initiating Condition: Prolonged loss of all offsite power and prolonged loss of all onsite AC power to essential busses

EAL:

MG8.1 General Emergency

Loss of all AC power to safety-related 4160 VAC buses 1(2)-A05 and 1(2)-A06

AND EITHER:

Power restoration to any safety-related 4160 VAC bus or 480 VAC bus is not likely in $\leq$4 hours

OR

Conditions require entry into Core Cooling-RED path (CSP-C.1) or Core Cooling-ORANGE path (CSP-C.2)

Mode Applicability:

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

Basis:

Loss of all AC power compromises all plant safety systems requiring electrical power including RHR, ECCS, Containment Heat Removal and the Ultimate Heat Sink. Prolonged loss of all AC power will lead to loss of Fuel Cladding, RCS and Containment barriers. The four-hour interval to restore AC power is based on the blackout coping analysis performed in conformance with 10 CFR 50.63 and Regulatory Guide 1.155, "Station Blackout." Although this EAL may be viewed as redundant to the Fission Product Barrier EALs, its inclusion is necessary to better assure timely recognition and emergency response.

The likelihood of restoring at least one safety-related bus should be based on a realistic appraisal of the situation since a delay in an upgrade decision based on only a chance of mitigating the event could result in a loss of valuable time in preparing and implementing public protective actions. In addition, under these conditions, fission product barrier monitoring capability may be degraded.

Although it may be difficult to predict when power can be restored, it is necessary to give the Emergency Director a reasonable idea of how quickly to declare a General Emergency based on two major considerations:

1. Are there any present indications that core cooling is already degraded to the point that loss or challenge of fission product barriers is imminent?

2. If there are no present indications of such core cooling degradation, how likely is it that power can be restored in time to assure that a loss of two barriers with a challenge of the third barrier can be prevented?

Thus, indication of continuing core cooling degradation must be based on fission product barrier monitoring with particular emphasis on Emergency Director judgment as it relates to imminent loss or challenge of fission product barriers and degraded ability to monitor fission product barriers.

Either set of conditions indicates significant core exit superheating and core uncovery. This is considered a loss of the Fuel Cladding barrier.

- Critical Safety Function Status Tree (CSFST) setpoints enclosed in brackets (e.g., [120 ft], etc.) are used under adverse containment conditions.

NEI Reference:

SG1 – Prolonged loss of all offsite power and prolonged loss of all onsite AC power to essential busses

PBNP Basis Reference(s):

1. DBD-T-46, Section 3.1
2. 10 CFR 50.63 and Regulatory Guide 1.155, Station Blackout
3. DBD-22, 4160 VAC System, Figure 1-1 & Section 5
4. DBD-18, 13.8 KVAC System, Section 3.3.0
5. ECA 0.0
6. FSAR Section 8, Electrical Systems
7. AOP-14A
8. CSP-C.1, Response to Inadequate Core Cooling
9. CSP-C.2, Response to Degraded Core Cooling

Differences:

1. The NEI example EAL condition "Loss of power to (site-specific) transformers…" has been changed to "Loss of all AC power to safety-related 4160 VAC buses…" The plant EAL wording focuses the classification on the loss of power rather than the status of one or more transformers that may or may not be powering the essential buses. This simplifies the EAL wording and concisely meets the intent of the NEI IC.

2. The NEI example EAL conditions "…Failure of (site-specific) emergency generators to supply power to emergency busses" has been deleted. The operability of emergency generators and onsite and offsite power sources is encompassed by the plant EAL wording "Loss of all AC power…"

H.3 Loss of DC Power Sources

Loss of vital 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 involves total losses of vital plant 125 VDC power sources while in hot conditions.

Category: H.3 – Loss of DC Power Sources **Sub-category:** N/A

Initiating Condition: Loss of all vital DC power

EAL:

MS9.1 Site Emergency
≤105 VDC on 125 VDC buses D-01, D-02, D-03 and D-04 for ≥15 min. due to unplanned activities

Mode Applicability:

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

Basis:

Loss of all DC power compromises ability to monitor and control plant safety functions. Prolonged loss of all DC power will cause core uncovery and loss of containment integrity when there is significant decay heat and sensible heat in the reactor system. Fifteen minutes was selected as a threshold to exclude transient or momentary power losses.

The safety-related station batteries have been sized to carry their expected shutdown loads following a plant trip/LOCA and loss of offsite power or following a station blackout for a period of one hour without battery terminal voltage falling below 105 volts.

This EAL is the hot conditions equivalent of the cold conditions loss of DC power EAL# MU9.1.

NEI Reference:

SS3 – Loss of all vital DC power

PBNP Basis Reference(s):

1. FSAR Section 8.7
2. 0-SOP-DC-001/2/3/4 Section 3.8

Differences:

None

H.4 Equipment Failures

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

The events of this category have been grouped into the following event types:

Technical Specifications

Only one EAL falls into this subcategory. It is related to the failure of the plant to be brought to the required plant operating condition required by technical specifications.

Turbine Failures

Turbine rotating component failures can result in seal damage and subsequent release of flammable gases or penetration of the turbine casing by turbine components that can threaten plant and personnel safety.

Loss of Indications / Alarm Capability

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

Category: H.4 – Equipment Failures **Sub-category:** Technical Specifications

Initiating Condition: Inability to reach required shutdown within Technical Specification limits

EAL:

MU10.1	**Unusual Event**
Plant is not brought to required operating mode within Technical Specifications LCO required action completion time.	

Mode Applicability:

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

Basis:

Limiting Conditions of Operation (LCOs) require the plant to be brought to a prescribed shutdown mode when the Technical Specification configuration cannot be restored. Depending on the circumstances, this may or may not be an emergency or precursor to a more severe condition. In any case, the initiation of plant shutdown required by the Technical Specification requires a one-hour report under 10CFR50.72 (b) non-emergency events. The plant is within its safety envelope when being shut down within the allowable action statement time in the Technical Specifications. An immediate declaration of an Unusual Event is required when the plant is not brought to the required operating mode within the allowable action statement time in the Technical Specifications. Declaration of an Unusual Event is based on the time at which the LCO-specified action completion period elapses under Technical Specifications and is not related to how long a condition may have existed. Other Technical Specification shutdowns that involve precursors to more serious events are addressed by other EALs.

NEI Reference:

SU2 – Inability to reach required shutdown within Technical Specification limits

PBNP Basis Reference(s):

1. PBNP Technical Specifications

Differences:

None

Category: H.4 – Equipment Failures **Sub-category:** Turbine Failures

Initiating Condition: Natural or destructive phenomena affecting the Protected Area (turbine)

EAL:

MU11.1 Unusual Event
Report of main turbine failure requiring turbine trip resulting in:
Damage to turbine-generator seals .
OR
Casing penetration

Mode Applicability:

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

Basis:

This EAL is intended to address main turbine rotating component failures of sufficient magnitude to cause observable damage to the turbine casing or to the seals of the turbine generator. Of major concern is the potential for significant leakage of combustible fluids (lubricating oils) and gases (hydrogen cooling) to the plant environs. It is not the intent of this EAL to classify minor operational leakage. This EAL is consistent with the definition of an Unusual Event while maintaining the anticipatory nature desired and recognizing the risk to non-safety related equipment.

NEI Reference:

HU1 – Natural and destructive phenomena affecting the Protected Area

PBNP Basis Reference(s):

1. ARP 1(2) C33 1-2 Hydrogen Pressure High-Low Alarm
2. ARP 1(2)C33 1-3 Hydrogen Supply Pressure Low Alarm
3. AOP-5A Loss of Condenser Vacuum

Differences:

1. This EAL implements NEI IC HU1 Example EAL #5. IC HU1 Example EALs are implemented in separate plant EALs to improve clarity and readability.
2. Added the phrase "...requiring turbine trip..." to the EAL wording to distinguish between turbine-related failures of low magnitude that do not meet the intent of the NEI example EAL (e.g., generator seal damage observed after generator purge, etc.).
3. Deleted mode applicability for modes 5, 6 and defueled because there are no turbine operations for which a casing/seal failure would be of concern to a safety system while in these modes.

Category: H.4 – Equipment Failures **Sub-category:** Turbine Failures

Initiating Condition: Natural or destructive phenomena affecting the plant Vital Area (turbine)

EAL:

MA11.1 **Alert**
Turbine failure generated missiles resulting in visible damage to or penetrating any Table H-1 Safe Shutdown Area structure or system

Table H-1 Safe Shutdown Areas
• 1(2) Containment Building • Primary Auxiliary Building • Turbine Building • Control Building • Diesel Generator Building • Gas Turbine Building • Circ Water Pump House

Mode Applicability:

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

Basis:

This EAL addresses the threat to safety-related equipment imposed by missiles generated by main turbine rotating component failures. This EAL is consistent with the definition of an ALERT in that, if missiles have damaged or penetrated areas containing safety-related equipment, the potential exists for substantial degradation of the level of safety of the plant.

NEI Reference:

HA1 – Natural or destructive phenomena affecting the plant Vital Area

PBNP Basis Reference(s):

1. PSA Section 8.0 Fire Hazards Analysis Table 8.1.3-1 Safe Shutdown Systems
2. PBNP FSAR Section 14.1.12 Likelihood of T-G Unit Overspeed
3. WSTG-4-NP, Analysis of the Probability of the Generation of Missiles from Fully Integral Nuclear Low Pressure Rotors, 1984

Differences:

1. This EAL implements NEI IC HA1 Example EAL #4. IC HA1 Example EALs are implemented in separate plant EALs to improve clarity and readability.

2. Deleted mode applicability for modes 5, 6 and defueled because there are no turbine operations that can generate turbine failure missiles while in these modes.

Category: H.4 – Equipment Failures **Sub-category:** Loss of Indications/Alarms

Initiating Condition: Unplanned loss of most or all safety system annunciation or indication in the control room for greater than 15 minutes

EAL:

MU12.1	**Unusual Event**
Unplanned loss of annunciators or indicators on any 2 Control Room panels C01, C02, 1C03, 2C03, 1C04, 2C04, 1C20, or 2C20 for $\geq$15 min.	

Mode Applicability:

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

Basis:

This EAL recognizes the difficulty associated with monitoring changing plant conditions without the use of a major portion of the annunciation or indication equipment. The availability of computer based indication equipment is considered (PPCS).

"Unplanned" loss of annunciators or indicators excludes the audible feature of the annunciator, scheduled maintenance and testing activities.

If safety system annunciators or indications are lost, an elevated risk exists that a degraded plant condition may be undetected.

Plant design provides redundant safety system indication powered from separate uninterruptible power supplies. While failure of a large portion of annunciators is more likely than a failure of a large portion of indications, failure of indications is included in this EAL due to difficulty associated with assessment of plant conditions. The loss of several safety system indicators should remain a function of the specific system or component operability status and will be addressed by the applicable Technical Specification.

The fifteen-minute interval offers time to recover from transient or momentary power losses. If a transient is in progress during the loss of annunciation or indication, the event escalates to an Alert classification.

NEI Reference:

SU3 – Unplanned loss of most or all safety system annunciation or indication in the control room for greater than 15 minutes

PBNP Basis Reference(s):

1. FSAR Section 7.6
2. OM 1.1, Conduct of Plant Operations, Attachment 2

Differences:

None

Category: H.4 – Equipment Failures **Sub-category:** Loss of Indications/Alarms

Initiating Condition: Unplanned loss of most or all safety system annunciation or indication in control room with either (1) a significant transient in progress, or (2) compensatory non-alarming indicators are unavailable

EAL:

MA12.1 **Alert**

Unplanned loss of annunciators or indicators on any 2 Control Room panels C01, C02, 1C03, 2C03, 1C04, 2C04, 1C20, or 2C20 for $\geq$15 min.

AND EITHER:

A significant transient is in progress

OR

PPCS is unavailable

Mode Applicability:

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

Basis:

This EAL recognizes the difficulty associated with monitoring changing plant conditions without the use of a major portion of the annunciation or indication equipment during a transient. The availability of computer based indication equipment is considered (i.e., PPCS).

"Unplanned" loss of annunciators or indicators does not include scheduled maintenance and testing activities.

If safety system annunciators or indications are lost, an elevated risk exists that a degraded plant condition may be undetected.

While failure of a large portion of annunciators is more likely than a failure of a large portion of indications, failure of indications is included in this EAL due to difficulty associated with assessment of plant conditions.

The loss of several safety system indicators should remain a function of the specific system or component operability status and will be addressed by the applicable Technical Specification. "Significant transient" includes response to automatic or manually initiated functions such as trips, runbacks involving greater than 25% thermal power change, or ECCS injections.

If the operating crew cannot monitor the transient in progress, the Alert escalates to a Site Emergency via MS12.1.

NEI Reference:

SA4 – Unplanned loss of most or all safety system annunciation or indication in control room with either (1) a significant transient in progress, or (2) compensatory non-alarming indicators are unavailable

PBNP Basis Reference(s):

1. FSAR Section 7.6
2. OM 1.1, Conduct of Plant Operations, Attachment 2

Differences:

None

Category: H.4 – Equipment Failures **Sub-category:** Loss of Indications/Alarms

Initiating Condition: Inability to monitor a significant transient in progress

EAL:

MS12.1 Site Emergency

Unplanned loss of annunciators or indicators on any 2 Control Room panels C01, C02, 1C03, 2C03, 1C04, 2C04, 1C20, or 2C20 for ≥15 min.

AND

PPCS is unavailable

AND

Complete loss of ability to monitor all critical safety function status

AND

A significant transient is in progress

Mode Applicability:

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

Basis:

This EAL recognizes the inability of the Control Room staff to monitor the plant response to a transient. A Site Emergency exists if the Control Room staff cannot monitor safety functions needed for protection of the public.

If safety system annunciators or indications are lost, an elevated risk exists that a degraded plant condition may be undetected.

"Significant transient" includes response to automatic or manually initiated functions such as trips, runbacks involving greater than 25% thermal power change, or ECCS injections

Indications needed to monitor critical safety functions necessary for protection of the public must include Control Room indications, computer generated indications (PPCS) and dedicated annunciation capability. The specific indications should be those used to determine such functions as the ability to shut down the reactor, maintain the core cooled and in a coolable geometry, remove heat from the core, and maintain the reactor coolant system and containment intact.

Planned actions are included in the EAL since a loss of instrumentation of this magnitude is of such significance during a transient that the cause of the loss is not an ameliorating factor.

NEI Reference:

SS6– Inability to monitor a significant transient in progress

PBNP Basis Reference(s):

1. FSAR Section 7.6
2. OM 1.1, Conduct of Plant Operations, Attachment 2

Differences:

None

H.5 Fission Product Barriers

EALs defined 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. Reactor Fuel Cladding (FC): The zirconium tubes which house the ceramic uranium oxide pellets along with the end plugs which are welded into each end of the fuel rods comprise the fuel cladding.

B. Reactor Coolant System (RCS): The reactor vessel shell, vessel head, vessel nozzles and penetrations and all primary systems directly connected to the reactor vessel up to the first containment isolation valve comprise the RCS.

C. Containment (PC): The vapor containment structure and all isolation valves required to maintain containment integrity under accident conditions comprise the containment barrier.

The EALs in this category require evaluation of the loss and challenge thresholds listed in the fission product barrier matrix of Attachment 2. The number of barriers that are lost or potentially lost and the following criteria determine the appropriate emergency classification level:

Unusual Event:
Any loss or challenge of containment
Alert:
Any loss or any challenge of either fuel cladding or RCS
Site Emergency:
Loss or challenge of any two barriers
General Emergency:
Loss of any two barriers with loss or challenge of a third

Category: H.5 – Fission Product Barriers **Sub-category:** N/A

Initiating Condition: Any loss or challenge of Containment

EAL:

FU1.1 Unusual Event
Any loss or challenge of Containment (Table F-1, page 172).

Mode Applicability:

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

Basis:

Fuel Cladding, RCS and Containment comprise the fission product barriers. Table F-1 lists the fission product barrier thresholds, bases, references, and the reasons for any intent differences between the threshold wording and the wording suggested in NEI 99-01.

Fuel Cladding and RCS barriers are weighted more heavily than the Containment barrier. Unlike the Fuel Cladding and RCS barriers, the loss of either of which results in an Alert (EAL# FA1.1), loss of the Containment barrier in and of itself does not result in the relocation of radioactive materials or the potential for degradation of core cooling capability. However, loss or challenge of the Containment barrier in combination with the loss or challenge of either the Fuel Cladding or RCS barrier results in declaration of a Site Emergency. (EAL# FS1.1).

NEI Reference:

FU1 - Table 5-F-4 – Any loss or challenge of containment

PBNP Basis Reference(s):

None

Differences:

None

Category: H.5 – Fission Product Barriers **Sub-category:** N/A

Initiating Condition: Any loss or any challenge of either Fuel Cladding or RCS

EAL:

FA1.1 Alert
Any loss or challenge of Fuel Cladding or RCS (Table F-1, pages 170 and 171).

Mode Applicability:

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

Basis:

Fuel Cladding, RCS and Containment comprise the fission product barriers. Table F-1 lists the fission product barrier thresholds, bases, references, and the reasons for any intent differences between the threshold wording and the wording suggested in NEI 99-01.

At the Alert classification level, Fuel Cladding and RCS barriers are weighted more heavily than the Containment barrier. Unlike the Containment barrier, loss or challenge of either the Fuel Cladding or RCS barrier may result in the relocation of radioactive materials or degradation of core cooling capability. Note that the loss or challenge of Containment barrier in combination with loss or challenge of either Fuel Cladding or RCS barrier results in declaration of a Site Emergency (EAL# FS1.1).

NEI Reference:

FA1 - Table 5-F-4 – Any loss or any challenge of either Fuel Cladding or RCS

PBNP Basis Reference(s):

None

Differences:

None

Category: H.5 – Fission Product Barriers **Sub-category:** N/A

Initiating Condition: Loss or challenge of any two barriers

EAL:

FS1.1 Site Emergency
Loss or challenge of any two barriers (Table F-1, pages 170, 171 and 172).

Mode Applicability:

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

Basis:

Fuel Cladding, RCS and Containment comprise the fission product barriers. Table F-1 lists the fission product barrier thresholds, bases, references, and the reasons for any intent differences between the threshold wording and the wording suggested in NEI 99-01.

At the Site Emergency classification level, each barrier is weighted equally. Sixteen unique combinations of barrier losses and challenges can satisfy this EAL condition.

NEI Reference:

FS1 - Table 5-F-4 – Loss or challenge of any two barriers
SS4– Loss of heat removal capability

PBNP Basis Reference(s):

None

Differences:

1. Setpoints for loss of core cooling and heat sink required by NEI IC SS4 are identified in the CSFSTs, and are included in the FPB matrix. They represent a loss or challenge of FC and RCS. This by definition is a Site Emergency.

Category: H.5 – Fission Product Barriers **Sub-category:** N/A

Initiating Condition: Loss of any two barriers with loss or challenge of a third

EAL:

FG1.1 General Emergency

Loss of any two barriers with a loss or challenge of a third (Table F-1, pages 170, 171 and 172).

Mode Applicability:

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

Basis:

Fuel Cladding, RCS and Containment comprise the fission product barriers. Table F-1 lists the fission product barrier thresholds, bases, references, and the reasons for any intent differences between the threshold wording and the wording suggested in NEI 99-01.

NEI Reference:

FG1 - Table 5-F-4 – Loss of any two barriers with loss or challenge of a third

PBNP Basis Reference(s):

None

Differences:

None

C.1 Reactor Coolant System (RCS)

The Reactor Vessel provides a volume for the coolant that covers the reactor core. The Reactor Vessel and associated pressure piping (reactor coolant system) together provide a barrier to limit the release of radioactive material should the reactor fuel cladding integrity fail.

In addition to Category H.5 Fission Product Barriers, there are three RCS related parameters that are indicative of conditions which warrant classification while in one or more cold (<200°F) conditions:

RCS Temperature

Uncontrolled or inadvertent temperature rises are indicative of a potential loss of safety functions. Loss of Reactor Vessel temperature or level indications are also indicative of a potential loss of safety functions.

RCS Pressure

Rapid heatup and repressurization of the RCS during cold shutdown or refuel modes are indicative of a potential loss of safety functions.

RCS Level

Reactor Vessel or RCS water level is also directly related to the status of adequate core cooling and therefore fuel cladding integrity. Loss of Reactor Vessel and RCS inventory events while in cold shutdown or refueling modes are addressed in the category.

Category: C.1 – RCS **Sub-category:** RCS Temperature

Initiating Condition: Unplanned loss of decay heat removal capability with irradiated fuel in the reactor vessel

EAL:

MU13.1	**Unusual Event**
An unplanned event results in RCS temperature $\geq$200°F	
<u>OR</u>	
Loss of all RCS temperature and Reactor Vessel level indication for $\geq$15 min.	

Mode Applicability:

5- Cold Shutdown, 6-Refuel

Basis:

This EAL is an Unusual Event because it may be a precursor of more serious conditions and, as a result, is considered to be a potential degradation of the level of safety of the plant. **NEI Reference:**

CU4 – Unplanned loss of decay heat removal capability with irradiated fuel in the reactor vessel

PBNP Basis Reference(s):

1. Tech Specs Table 1.1-1, Unit 1 – Amendment No. 201/Unit 2 – Amendment No. 206
2. DBD-9, Reactor Coolant System, Sections 3.23.1 to 3.23.4, 3.24.1, 3.24.2, 3.25.1 and 3.25.2
3. OI 105, RECS Heatup/Cooldown Plotting
4. OP4D Part 3, Reactor Cavity and Reactor Coolant System, Table 1
5. DBD-27
6. DBD-T-44

Differences:

None

Category: C.1 – RCS **Sub-category:** RCS Temperature

Initiating Condition: Inability to maintain plant in cold shutdown with irradiated fuel in the reactor vessel

EAL:

MA13.1	**Alert**
An unplanned event results in RCS temperature exceeding 200°F for ≥ Table M-1 duration*	

*If an RCS heat removal system is in operation within this time frame and RCS temperature is being reduced, this EAL is <u>not</u> applicable.

Table M-1 RCS Reheat Duration Thresholds	
Containment and RCS Barrier Status	Duration
RCS intact	60 min.*
Containment closure established **<u>AND EITHER</u>**: RCS <u>not</u> intact **<u>OR</u>** RCS reduced inventory	20 min.*
Containment closure <u>not</u> established **<u>AND</u>** RCS <u>not</u> intact	0 min.

Mode Applicability:

5- Cold Shutdown, 6-Refuel

Basis:

This EAL is based on concerns raised by Generic Letter 88-17, "Loss of Decay Heat Removal." A number of phenomena such as pressurization, vortexing, steam generator U-tube draining, RCS level differences when operating at a mid-loop condition, decay heat removal system design, and level instrumentation problems can lead to conditions in which decay heat removal is lost and core uncovery can occur.

NRC analyses show that sequences that can cause core uncovery in 15 to 20 minutes and severe core damage within an hour after decay heat removal is lost.

The first threshold in Table M-1 addresses complete loss of functions required for core cooling for greater than sixty minutes during Refuel and Cold Shutdown modes when RCS integrity is established (irrespective of the status of Containment Closure). As in the second and third thresholds, RCS integrity should be considered to be in place 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). The status of containment closure in this threshold is immaterial given that the RCS is providing a high-pressure barrier to fission product release to the environment. The sixty-minute interval should allow sufficient time to restore cooling without a substantial degradation in plant safety.

Containment closure is the action taken to secure containment and its assorted structures, systems and components as a functional barrier to fission product release under existing plant conditions. Containment closure is initiated per the SEPs or Shift Manager direction if plant conditions change that could raise the risk of a fission product release as a result of a loss of decay heat removal. Containment closure requires that, upon a loss of decay heat removal, any open penetration which is listed on CL 1E, Containment Closure Checklist, must be closed or capable of being closed prior to RCS bulk boiling. This checklist is maintained any time that the RCS is <200°F and containment operability is not maintained.

Containment closure should not be confused with refueling containment integrity as defined in technical specifications.

The second threshold in Table M-1 addresses the complete loss of functions required for core cooling for greater than twenty minutes during Refuel and Cold Shutdown modes when containment closure is established but RCS integrity is not established or RCS inventory is reduced (e.g., mid loop operation). As in the third threshold, RCS integrity should be assumed to be in place 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).

The allowed twenty-minute interval is included to allow operator action to restore the heat removal function, if possible. The allowed time frame is consistent with the guidance provided by Generic Letter 88-17, "Loss of Decay Heat Removal" (discussed later in this basis) and is believed to be conservative given that a low pressure Containment barrier to fission product release is established. The asterisk highlights the note at the top of the table. The note indicates that the second threshold is not applicable if actions are successful in restoring an RCS heat removal system to operation and RCS temperature is being reduced within the twenty-minute interval.

The third threshold in Table M-1 addresses complete loss of functions required for core cooling during Refuel and Cold Shutdown modes when neither containment closure nor RCS integrity are established. RCS integrity is in place 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). No delay time is allowed for the third condition because the evaporated reactor coolant that may be released into the Containment during this heatup condition could also be directly released to the environment.

Escalation to a Site Emergency would be via EAL # MS15.1, MS15.2 or MS15.3 should boiling result in significant Reactor Vessel level loss leading to core uncovery.

NEI Reference:

CA4 – Inability to maintain plant in cold shutdown with irradiated fuel in the reactor vessel

PBNP Basis Reference(s):

1. Tech Specs Table 1.1-1, Unit 1 – Amendment No. 201/Unit 2 – Amendment No. 206
2. Tech Specs B 3.6.1, Containment, Unit 1 – Amendment No. 201/Unit 2 – Amendment No. 206
3. CL 1E, Containment Closure Checklist
4. OP 4F, Reactor Coolant System Reduced Inventory Requirements

Differences:

None

Category: C.1 – RCS **Sub-category:** RCS Pressure

Initiating Condition: Inability to maintain plant in cold shutdown with irradiated fuel in the reactor vessel

EAL:

MA14.1 **Alert**
Unplanned RCS pressure rise ≥10 psig due to loss of decay heat removal

Mode Applicability:

5- Cold Shutdown, 6-Refuel

Basis:

This EAL is not applicable during solid plant conditions. The pressure rise of 10 psig infers an RCS temperature in excess of the Technical Specification cold shutdown limit (200°F) for which EAL# MA13.1 would permit up to sixty minutes to restore RCS cooling before declaration of an Alert. This EAL therefore covers situations in which it is determined that, due to high decay heat loads, the time provided to reestablish temperature control should be less than sixty minutes.

This EAL is based on concerns raised by Generic Letter 88-17, "Loss of Decay Heat Removal." A number of phenomena such as pressurization, vortexing, steam generator U-tube draining, RCS level differences when operating at a mid-loop condition, decay heat removal system design, and level instrumentation problems can lead to conditions in which decay heat removal is lost and core uncovery can occur. NRC analyses show that sequences that can cause core uncovery in 15 to 20 minutes and severe core damage within an hour after decay heat removal is lost.

Escalation to a Site Emergency would be via EAL # MS15.1, MS15.2 or MS15.3 should boiling result in significant Reactor Vessel level loss leading to core uncovery.

NEI Reference:

CA4 – Inability to maintain plant in cold shutdown with irradiated fuel in the reactor vessel

PBNP Basis Reference(s):

1. Tech Specs Table 1.1-1, Unit 1 – Amendment No. 201/Unit 2 – Amendment No. 206
2. OP-1A, Cold Shutdown to Hot Standby, Step 5.3.2

Differences:

None

Category: C.1 – RCS **Sub-category:** RCS Level

Initiating Condition: Unplanned loss of RCS inventory with irradiated fuel in the Reactor Vessel

EAL:

MU15.1 Unusual Event

Unplanned RCS level lowering below 77.1% (1 foot below RPV flange) for ≥15 min.

OR

If Reactor Vessel level cannot be monitored, loss of RPV inventory as indicated by unexplained Containment Sump A level rise

Mode Applicability:

6-Refuel

Basis:

This EAL is an Unusual Event because it may be a precursor of more serious conditions and, as result, is considered to be a potential degradation of the level of safety of the plant. Refueling operations that lower RCS water level significantly below the Reactor Vessel flange are carefully planned and procedurally controlled. An unplanned event that results in water level lowering below the Reactor Vessel flange warrants declaration of an Unusual Event due to the reduced RCS inventory that is available to keep the core covered. The fifteen-minute interval was chosen because it is reasonable to assume that level can be restored within this time frame using one or more of the redundant means of refill that should be available. If level cannot be restored in this time frame, a more serious condition may exist.

The first condition involves a lowering in RCS level below normal that continues for fifteen minutes due to an unplanned event. This EAL is not applicable to drops in flooded reactor cavity level (covered by lowering spent fuel pool water level in EAL# MU4.1) until such time as the level lowers to the level of the vessel flange. If level continues to lower and reaches the bottom inside diameter of the RCS loop (33 ft 2-7/8 in. elev. or 0%/0 in.), escalation to the Alert level via EAL# MA15.1 would be appropriate.

If the level lowering is accompanied by RCS heatup, escalation to the Alert level via EAL# MA13.1 may also be appropriate.

In the second condition of this EAL, all level indication would be unavailable and, the Reactor Vessel inventory loss must be detected by sump level changes. OI 55 provides instructions for calculating primary system leak rate by water inventory balances for off normal events and for operations troubleshooting. Containment Sump A is equipped with a high level alarm (80%). Sump level rises 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.

NEI Reference:

CU2 – Unplanned loss of RCS inventory with irradiated fuel in the reactor vessel

PBNP Basis Reference(s):

1. OP4D Part 3, Reactor Cavity and Reactor Coolant System, Table 1
2. OI-55, PRIMARY LEAK RATE CALCULATION
3. OM 3.19, REACTOR COOLANT SYSTEM LEAKAGE DETERMINATION
4. DBD-33, CONTAINMENT STRUCTURES AND PENETRATIONS DESIGN BASIS DOCUMENT
5. ARB C01 B 1-4, UNIT 1 CONTAINMENT SUMP A LEVEL HIGH
6. STPT 12.1, Waste Disposal System, R2v. 8
7. FSAR Section 7.6

Differences:

None

Category: C.1 – RCS **Sub-category:** RCS Level

Initiating Condition: Loss of reactor vessel inventory with irradiated fuel in the Reactor Vessel

EAL:

MA15.1	**Alert**

Loss of RCS or Reactor Vessel inventory as indicated by **EITHER**:

LI-447 and LI-447A $\leq$ 0% when aligned

OR

If RCS or Reactor Vessel level cannot be monitored for $\geq$15 min., loss of inventory as indicated by unexplained Containment Sump A level rise

Mode Applicability:

5-Cold Shutdown, 6-Refuel

Basis:

This EAL serves as a precursor to a loss of ability to adequately cool the fuel. 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 level lowering and potential core uncovery. The LI-447 and LI-447A threshold corresponds to the bottom inside diameter of the RCS loop. The bottom inside diameter of the RCS loop is the level equal to the bottom of the Reactor Vessel loop penetration, not the low point of the loop. This level was chosen because remote RCS level indication may be lost and loss of suction to decay heat removal systems has occurred. The inability to restore and maintain level after reaching this setpoint infers a failure of the RCS barrier.

If all level indication were to be lost during a loss of RCS inventory event, the operators would need to determine that Reactor Vessel inventory loss was occurring by observing sump level changes. OI 55 provides instructions for calculating primary system leak rate by water inventory balances for off normal events and for operations troubleshooting.

Sump level rises 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.

The 15-minute interval for the loss of level indication was chosen because it is half of the Site Emergency EAL duration. The interval allows this EAL to be an effective precursor to the Site Emergency EAL# MS15.2. Significant fuel damage is not expected to occur until the core has been uncovered for greater than one hour. Therefore this EAL meets the definition for an Alert emergency.

NEI Reference:

CA1, CA2 – Loss of reactor vessel inventory with irradiated fuel in the reactor vessel

PBNP Basis Reference(s):

1. OP4D Part 3, Reactor Cavity and Reactor Coolant System, Table 1
2. OI-55, PRIMARY LEAK RATE CALCULATION
3. OM 3.19, REACTOR COOLANT SYSTEM LEAKAGE DETERMINATION
4. Volian Enterprises Calculation WEP-STP-25
5. PBNP FSAR 4.0 Reactor Coolant System Design Basis, Table 4.1-6

Differences:

1. NEI 99-01 ICs CA1 and CA2 address loss of inventory events when level in the RCS or RPV can and cannot be monitored. The ICs have been combined in one plant EAL to improve clarity and understandability.

Category: C.1 – RCS **Sub-category:** RCS Level

Initiating Condition: Loss of reactor vessel inventory affecting core decay heat removal capability with irradiated fuel in the Reactor Vessel

EAL:

MS15.1 Site Emergency

With containment closure <u>not</u> established, RVLIS NR ≤[33 ft] 30 ft

<u>OR</u>

With containment closure established, RVLIS NR ≤[30 ft] 27 ft

Mode Applicability:

5-Cold Shutdown, 6-Refuel

Basis:

Under the conditions specified by this EAL, continued lowering in Reactor Vessel 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 level associated without containment closure corresponds to six inches below the bottom inside diameter of the RCS loop. The level associated with containment closure not established corresponds to the top of active fuel. 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 level lowering and potential core uncovery. The inability to restore and maintain level after reaching this setpoint infers a loss of the RCS barrier and challenge of the Fuel Cladding barrier.

- Setpoints enclosed in brackets (e.g., [33 ft], etc.) are used under adverse containment conditions.

Containment closure is the action taken to secure containment and its assorted structures, systems and components as a functional barrier to fission product release under existing plant conditions.

Containment closure is initiated per the SEPs or Shift Manager direction if plant conditions change that could raise the risk of a fission product release as a result of a loss of decay heat removal. Containment closure requires that, upon a loss of decay heat removal, any open penetration which is listed on CL 1E, Containment Closure Checklist, must be closed or capable of being closed prior to RCS bulk boiling. This checklist is maintained any time that the RCS is <200°F and containment operability is not maintained.

Containment closure should not be confused with refueling containment integrity as defined in technical specifications.

NEI Reference:

CS1, CS2 – Loss of reactor vessel inventory affecting core decay heat removal capability with irradiated fuel in the reactor vessel

PBNP Basis Reference(s):

1. Volian Enterprises Calculation WEP-SPT-25
2. PBNP FSAR 4.0 Reactor Coolant System Design Basis, Table 4.1-6
3. CSP-ST.0 Unit 1(2) Critical Safety Function Status Trees, Figure 2
4. Tech Specs B 3.6.1, Containment, Unit 1 – Amendment No. 201/Unit 2 – Amendment No. 206
5. CL 1E, Containment Closure Checklist

Differences:

1. NEI IC CS1 and CS2 have been implemented in EALs MS15.1, MS15.2 and MS15.3. MS15.1 addresses conditions in which Reactor Vessel water level can be monitored; EALs MS15.2 and MS15.3 for conditions in which level cannot be monitored. These changes improve clarity, accuracy and timeliness of EAL classification but do not affect the intent of the NEI ICs.

2. The use of alternate level values under adverse containment conditions is explained in 2nd paragraph of the EAL basis. This is not a difference from NEI; it is simply the site-specific level.

Category: C.1 – RCS **Sub-category:** RCS Level

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

EAL:

MS15.2 Site Emergency
Reactor Vessel level cannot be monitored for ≥30 min.
AND
A loss of Reactor Vessel inventory as indicated by **EITHER**:
Unexplained Containment Sump A level rise
OR
Erratic Source Range Monitor indication

Mode Applicability:

5-Cold Shutdown

Basis:

Under the conditions specified by this EAL, continued lowering in Reactor Vessel 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.

Declaration is therefore associated simply with the lowering inventory trend rather than indications of actual core uncovery. Note that the heatup threat could be lower for Cold Shutdown conditions if the entry into Cold Shutdown was following a refueling.

In the Cold Shutdown mode, normal RCS level indication (e.g., RVLIS) may be unavailable and, the Reactor Vessel inventory loss must be detected by sump level changes. OI 55 provides instructions for calculating primary system leak rate by water inventory balances for off normal events and for operations troubleshooting.

Post-TMI studies indicated that the installed nuclear instrumentation will operate erratically when the core is uncovered and that Source Range Monitors (NIS N-31 and N-32) can be used as a tool for making such determinations.

Analysis indicates that core damage may occur within an hour following continued core uncovery, therefore, the thirty-minute interval was conservatively chosen.

The thirty-minute interval allows sufficient time for actions to be performed to recover needed cooling equipment and is considered to be conservative given that level is being monitored via EAL# MA15.1 and MS15.1. Escalation to a General Emergency is via EAL# MG15.1.

NEI Reference:

CS1 – Loss of reactor vessel inventory affecting core decay heat removal capability

PBNP Basis Reference(s):

1. OI-55, PRIMARY LEAK RATE CALCULATION
2. OM 3.19, REACTOR COOLANT SYSTEM LEAKAGE DETERMINATION
3. OP 1B, Reactor Startup
4. Generic Letter 88-17, Loss of Decay Heat Removal
5. SECY 91-283, Evaluation of Shutdown and Low Power Risk Issues
6. NUREG-1449, Shutdown and Low-Power Operation at Commercial Nuclear Power Plants in the United States
7. NUMARC 91-06, Guidelines for Industry Actions to Assess Shutdown Management.

Differences:

1. NEI IC CS1 and CS2 have been implemented in EALs MS15.1, MS15.2 and MS15.3. MS15.1 addresses conditions in which Reactor Vessel water level can be monitored; EALs MS15.2 and MS15.3 for conditions in which level cannot be monitored. These changes improve clarity, accuracy and timeliness of EAL classification but do not affect the intent of the NEI ICs.

2. The NEI IC does not specify the use of SRM indication for loss of inventory. SRM indication is not affected by the status of containment closure and is a valid alternate indication of inventory loss when core uncovery is threatened.

Category: C.1 – RCS **Sub-category:** RCS Level

Initiating Condition: Loss of reactor vessel inventory affecting core decay heat removal capability with irradiated fuel in the Reactor Vessel

EAL:

MS15.3 Site Emergency

Reactor Vessel level cannot be monitored

<u>AND</u>

Indication of core uncovery as evidenced by one or more of the following:

- o Containment High Range Radiation Monitor reading $\geq$10 R/hr
- o Erratic Source Range Monitor indication
- o Unexplained Containment Sump A level increase

Mode Applicability:

6-Refuel

Basis:

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

Analysis indicates that core damage may occur within an hour following continued core uncovery therefore, the thirty-minute interval was conservatively chosen.

In Refuel mode, normal RCS level indication (e.g., RVLIS) may be unavailable but alternate means of level indication are normally installed (including visual observation) to assure that the ability to monitor level will not be interrupted.

If all means of level monitoring are not available, however, the Reactor Vessel inventory loss may be detected by the following indirect methods:

- 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 on-scale Containment High Range Monitor indication and possible alarm. The 10 R/hr setpoint has been selected to be well above that expected under normal plant conditions.
- Post-TMI studies indicated that the installed nuclear instrumentation will operate erratically when the core is uncovered and Source Range Monitors (NIS N-31 and N-32) can be used as a tool for making such determinations.
- Sump level changes may be indicative of a loss of RCS inventory. Sump level rises 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.

The effluent release is not expected with containment closure established; thus, declaration of a Site Emergency is warranted under the EAL conditions specified. Escalation to a General Emergency is via EAL # MG15.1.

NEI Reference:

CS2 – Loss of reactor vessel inventory affecting core decay heat removal capability with irradiated fuel in the reactor vessel

PBNP Basis Reference(s):

1. Eng Eval 2001-28, Containment High Radiation Channel Check Tolerance, 10/5/01
2. EPIP 10.2, CORE DAMAGE ESTIMATION, Section 4.1
3. OI-55, PRIMARY LEAK RATE CALCULATION
4. OM 3.19, REACTOR COOLANT SYSTEM LEAKAGE DETERMINATION
5. OP 1B, Reactor Startup, Step 5.1
6. Generic Letter 88-17, Loss of Decay Heat Removal
7. SECY 91-283, Evaluation of Shutdown and Low Power Risk Issues
8. NUREG-1449, Shutdown and Low-Power Operation at Commercial Nuclear Power Plants in the United States
9. NUMARC 91-06, Guidelines for Industry Actions to Assess Shutdown Management.

Differences:

1. NEI IC CS1 and CS2 have been implemented in EALs MS15.1, MS15.2 and MS15.3. MS15.1 addresses conditions in which Reactor Vessel water level can be monitored; EALs MS15.2 and MS15.3 for conditions in which level cannot be monitored. These changes improve clarity, accuracy and timeliness of EAL classification but do not affect the intent of the NEI ICs.

Category: C.1 – RCS **Sub-category:** RCS Level

Initiating Condition: Loss of Reactor Vessel inventory affecting fuel cladding integrity with containment challenged and irradiated fuel in the Reactor Vessel

EAL:

MG15.1 General Emergency

1. Core uncovery for ≥30 min.

 as indicated by EITHER of the following:

 RVLIS NR ≤[30 ft] 27 ft

 OR

 One or more of the following when Reactor Vessel water level cannot be monitored:

 - Containment High Range Radiation Monitor reading ≥10 R/hr
 - Erratic Source Range Monitor indication
 - Unexplained Containment Sump A level rise

AND

2. Containment challenged as indicated by one or more of the following:

 - Containment closure not established
 - Hydrogen concentration in containment ≥ 6%
 - Containment pressure ≥ 60 psig

Mode Applicability:

5-Cold Shutdown, 6-Refuel

Basis:

This EAL represents the inability to restore and maintain Reactor Vessel level to above the top of active fuel. Fuel damage is probable if core submergence cannot be restored as available decay heat will cause boiling and further lowers the vessel level.

Setpoints enclosed in brackets (e.g., [30 ft], etc.) are used under adverse containment conditions.

This EAL is based on 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. A number of variables, (e.g., mid-loop, reduced level/flange level, head in place, or cavity flooded, RCS venting strategy, decay heat removal system design, vortexing pre-disposition, steam generator U-tube draining, etc.) can have a significant impact on heat removal capability challenging the Fuel Cladding barrier. Analysis in the above references indicates that core damage may occur within an hour following continued core uncovery, therefore, the thirty-minute interval was conservatively chosen.

If all means of level monitoring are not available, the Reactor Vessel inventory loss may be detected by the following indirect methods:

- 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 on-scale Containment High Range Monitor indication and possible alarm. The 10 R/hr setpoint has been selected to be well above that expected under normal plant conditions.
- Post-TMI studies indicated that the installed nuclear instrumentation will operate erratically when the core is uncovered.
- Sump level changes may be indicative of a loss of RCS inventory. OI 55 provides instructions for calculating primary system leak rate by water inventory balances for off normal events and for operations troubleshooting. Sump level rises 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.

Three conditions are associated a challenge to containment integrity:

- When hydrogen and oxygen concentrations reach or exceed the deflagration limits (equal to or greater than 6% hydrogen), loss of the containment barrier is possible. To generate such levels of combustible gas, loss of the Fuel Cladding and RCS barriers must also have occurred.
- The containment design pressure (60 psig) is well in excess of that expected from the design basis loss of coolant accident. The threshold is indicative of a loss of both RCS and fuel clad boundaries in that it is not possible to reach this condition without severe core degradation.
- Containment closure is the action taken to secure containment and its assorted structures, systems and components as a functional barrier to fission product release under existing plant conditions. Containment closure is initiated per the SEPs or Shift Manager direction if plant conditions change that could raise the risk of a fission product release as a result of a loss of decay heat removal. Containment closure requires that, upon a loss of decay heat removal, any open penetration which is listed on CL 1E, Containment Closure Checklist, must be closed or capable of being closed prior to RCS bulk boiling. This checklist is maintained any time that the RCS is <200°F and containment operability is not maintained.

Containment closure should not be confused with refueling containment integrity as defined in technical specifications.

The General Emergency is declared on the occurrence of the loss or challenge of function of all three fission product barriers. Based on the above discussion, RCS barrier failure resulting in core uncovery for 30 minutes or more may cause fuel cladding failure. With the containment breached or challenged, the potential for unmonitored fission product release to the environment is high. This is consistent with the definition of a General Emergency.

NEI Reference:

CG1 – Loss of reactor vessel inventory affecting fuel clad integrity with containment challenged with irradiated fuel in the reactor vessel

PBNP Basis Reference(s):

1. Eng Eval 2001-28, Containment High Radiation Channel Check Tolerance, 10/5/01
2. EPIP 10.2, CORE DAMAGE ESTIMATION, Section 4.1
3. 01-55, PRIMARY LEAK RATE CALCULATION
4. OM 3.19, REACTOR COOLANT SYSTEM LEAKAGE DETERMINATION
5. OP 1B, Reactor Startup, Step 5.1
6. Volian Enterprises Calculation WEP-SPT-25
7. Tech Specs B 3.6.1, Containment, Unit 1 – Amendment No. 201/Unit 2 – Amendment No. 206
8. CSP-C.I UNIT 1 RED, CRITICAL SAFETY PROCEDURE SAFETY RELATED RESPONSE TO INADEQUATE CORE COOLING, Step 11
9. BG-CSP-Z.1, Response to High Containment Pressure, Step 11
10. EPIP 10.3, POST-ACCIDENT CONTAINMENT HYDROGEN REDUCTION
11. FSAR pg 5.1.35
12. BG-CSP-ST.0, CSFST, Step F.0.5
13. CL 1E, Containment Closure Checklist

Differences:

None

C.2 Loss of AC Power Sources

Loss of vital 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 losses of onsite and/or offsite AC power sources including station blackout events while in cold (<200 °F) condition.

Category: C.2 – Loss of AC Power Sources **Sub-category:** N/A

Initiating Condition: Loss of all offsite power and loss of all onsite ac power to essential busses

EAL:

Alert
Loss of all AC power to safety-related 4160 VAC buses 1(2)-A05 and 1(2)-A06 for $\geq$15 min.

Mode Applicability:

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

Basis:

Prolonged loss of all AC power compromises all plant safety systems requiring electrical power. This EAL is indicated by the loss of all offsite and onsite AC power to the safety-related 4160 VAC buses. The fifteen-minute interval was selected as a threshold to exclude transient power losses and to provide time to restore power prior to declaration.

This EAL is the cold conditions equivalent of the hot conditions loss of all AC power EAL # MS8.1.

NEI Reference:

CA3 – Loss of all offsite power and loss of all onsite ac power to essential busses

PBNP Basis Reference(s):

1. DBD-22, 4160 VAC System Figure 1-1 & Section 5
2. DBD-18, 13.8 KVAC System, Section 3.3.0
3. ECA 0.0
4. FSAR Section 8, Electrical Systems
5. AOP-14A

Differences:

1. The NEI example EAL condition "Loss of power to (site-specific) transformers..." has been changed to "Loss of all AC power to safety-related 4160 VAC buses..." The plant EAL wording focuses the classification on the loss of power rather than the status of one or more transformers that may or may not be powering the essential buses. This simplifies the EAL wording and concisely meets the intent of the NEI IC.

2. The NEI example EAL conditions "...Failure of (site-specific) emergency generators to supply power to emergency busses AND Failure to restore power to at least one emergency bus within (site-specific) minutes from the time of loss of both offsite and onsite AC power" has been deleted. The operability of emergency generators and onsite and offsite power sources is encompassed by the plant EAL wording "Loss of all AC power..."

C.3 Loss of DC Power Sources

Loss of vital 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 involves total losses of vital plant 125 VDC power sources while in cold (<200°F) conditions.

Category: C.3 – Loss of DC Power Sources **Sub-category:** N/A

Initiating Condition: Unplanned loss of required DC power for greater than 15 minutes

EAL:

MU9.1 Unusual Event
$\leq$105 VDC on 125 VDC buses D-01, D-02, D-03 and D-04 for $\geq$15 min. due to unplanned activities

Mode Applicability:

5-Cold Shutdown, 6-Refuel

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 safety-related station batteries have been sized to carry their expected shutdown loads following a plant trip/LOCA and loss of offsite power or following a station blackout for a period of one hour without battery terminal voltage falling below 105 volts. The fifteen-minute interval was selected as a threshold to exclude transient or momentary power losses.

Loss of DC power to any AC bus creates the following conditions:

- Associated breakers cannot be electrically opened or closed remotely or locally.
- Electrical protection/interlock tripping of associated breakers is rendered inoperable including undervoltage stripping. The one exception is the 480 V individual breaker overloads which remain operable.
- All associated breaker positions remain as-is.

This EAL is the cold conditions equivalent of the hot conditions loss of DC power EAL# MS9.1.

NEI Reference:

CU7 – Unplanned loss of required DC power for greater than 15 minutes

PBNP Basis Reference(s):

1. FSAR Section 8.7
2. 0-SOP-DC-001/2/3/4 Section 3.8

Differences:

None

Attachment 1

Table F-1 - Fission Product Barrier Loss/Challenge Matrix and Technical Basis

Fuel Cladding

Loss	Challenge
1. Conditions requiring entry into Core Cooling-RED path (CSP-C.1)	1. Conditions requiring entry into Core Cooling-ORANGE path (CSP-C.2)
2. Coolant activity ≥300 μCi/gm I-131 equivalent	2. Conditions requiring entry into Heat Sink-RED path (CSP-H.1)
3. CET readings ≥1200°F (Core Cooling-RED path, CSP-C.1)	3. CET readings ≥700°F
4. Containment rad monitor reading ≥17 R/hr	4. RVLIS NR ≤25 ft with no RCPs running
5. Failed Fuel Monitor (RE-109) reading ≥120 mRem/hr	5. Emergency Director Judgment
6. Emergency Director Judgment	

Attachment 1

Table F-1 - Fission Product Barrier Loss/Challenge Matrix and Technical Basis

RCS

Loss	Challenge
1. RCS subcooling based on core exit thermocouples ≤[80°F] 35°F due to RCS leakage	1. Conditions requiring entry into RCS Integrity-RED path (CSP-P.1)
2. SGTR in excess of available charging pumps	2. Conditions requiring entry into Heat Sink-RED path (CSP-H.1)
3. Containment rad monitor reading ≥3.0 R/hr	3. Unisolable leak exceeding 60 gpm
4. Emergency Director Judgment	4. Emergency Director Judgment

Attachment 1

Table F-1 - Fission Product Barrier Loss/Challenge Matrix and Technical Basis

Containment

Loss	Challenge
1. Rapid unexplained containment pressure drop following initial rise	1. Conditions requiring entry into Containment-RED path (CSP-Z.1)
2. Containment pressure or sump level response not consistent with LOCA conditions	2. Containment pressure ≥60 psig and rising (Containment-RED path, CSP-Z.1)
3. Ruptured S/G is also faulted outside of containment	3. Hydrogen concentration in containment ≥6%
4. Primary-to-secondary leakage ≥10 gpm with non-isolable steam release from affected S/G to the environment	4. Containment pressure ≥25 psig with less than one train of containment spray and two containment accident fan cooler units operating
5. Containment isolation required and containment isolation or ventilation valve(s) not closed when required **AND** Radiological release pathway to the environment exists	5. CET readings ≥1200°F (Core Cooling-RED path, CSP-C.1) **AND** Restoration procedures not effective within 15 min.
6. Inability to isolate any primary system discharging outside containment **AND** Radiological release pathway to the environment exists	6. CET readings ≥700°F with RVLIS NR <25 ft and no RCPs running (Core Cooling-RED path, CSP-C.1) **AND** Restoration procedures not effective within 15 min.
7. Emergency Director Judgment	7. Containment radiation ≥15,900 R/hr
	8. Emergency Director Judgment

Bases

Fuel Cladding Challenge

1. **Conditions requiring entry into Core Cooling-ORANGE path (CSP-C.2)**

Core Cooling-ORANGE path is entered if Core Exit Thermocouples are reading less than 1200°F and RCS subcooling based on core exit thermocouples is equal to or less than [80°F] 35°F and any of the following:

- With two RCPs running, RVLIS WR is equal to or less than [120 ft] 110 ft
- With one RCP running, RVLIS WR is equal to or less than [100 ft] 90 ft
- With no RCP running either:
  - Core exit thermocouples are equal to or greater than 700°F and RVLIS NR is greater than 25 ft
  - Core exit thermocouples are less than 700°F and RVLIS NR is equal to or less than 25 ft

Any or these conditions indicate subcooling has been lost and that some fuel cladding damage may potentially occur. Critical Safety Function Status Tree (CSFST) setpoints enclosed in brackets (e.g., [120 ft], etc.) are used under adverse containment conditions. Adverse containment conditions are defined as:

- Containment pressure is equal to or greater than 10 psig.
- Containment radiation is currently greater than or equal to 1E5 R/hr.
- Integrated dose is greater than 1E5 R or unknown.

NEI Reference: PWR FC-PL1 – Critical Safety Function Status Tree (CSFST) Core Cooling-Orange OR Heat Sink-Red

PBNP References:

1. CSP-ST.0 Unit 1(2) Critical Safety Function Status Trees, Figure 2
2. CSP-C.2, Response to Degraded Core Cooling

2. **Conditions requiring entry into Heat Sink-RED path (CSP-H.1)**

Heat Sink-Red path is entered if narrow range level in any steam generator (S/G) is equal to or less than [51%] 29% and total feedwater flow to both S/Gs is equal to or less than 200 gpm.

The combination of these two conditions indicates the ultimate heat sink function is under extreme challenge. This condition addresses loss of functions required for hot shutdown with the reactor at pressure and temperature and thus a challenge of the Fuel Cladding barrier. Critical Safety Function Status Tree (CSFST) setpoints enclosed in brackets (e.g., [51%], etc.) are used under adverse containment conditions. Adverse containment conditions are defined as either:

- Containment pressure is equal to or greater than 10 psig.
- Containment radiation is currently greater than or equal to 1E5 R/hr.
- Integrated dose is greater than 1E5 R or unknown.

NEI Reference: PWR FC-PL1 – CSFST Core Cooling-Orange OR Heat Sink-Red

PBNP References:

1. CSP-ST.0 Unit 1(2) Critical Safety Function Status Trees, Figure 2
2. CSP-H.1, Response to Loss of Secondary Heat Sink

3. **CET readings ≥700°F**

Core exit thermocouple (CET) readings are included in addition to the Critical Safety Functions (CSFs) to include conditions when the CSFs may not be in use (initiation after SI is blocked). CET readings greater than 700°F corresponds to the temperature reading for Core Cooling-ORANGE path in Fuel Cladding barrier Challenge #1. This temperature indicates subcooling has been lost and that some *cladding* damage may occur.

NEI Reference: PWR FC-PL3 – Core Exit Thermocouple Readings GREATER THAN (site-specific) degree F

PBNP References:

1. CSP-ST.0 Unit 1(2) Critical Safety Function Status Trees, Figure 2

4. **RVLIS NR ≤25 ft with no RCPs running**

RVLIS narrow range equal to or less than 25 ft with no RCPs running corresponds to a collapsed liquid level 3.5 feet above the bottom of the active fuel with core exit temperature greater than 700°F, including allowance for normal channel accuracy. This water level is an indication of inadequate coolant inventory and is used in the Core Cooling-ORANGE path and indicates subcooling has been lost and that some fuel cladding damage may occur.

NEI Reference: PWR FC-PL4 – Reactor Vessel Water Level LESS than (site-specific) value

PBNP References:

1. CSP-ST.0 Unit 1(2) Critical Safety Function Status Trees, Figure 2
2. Volian Enterprises Calculation No. WEP-SPT-25

5. **Emergency Director Judgment**

Emergency Director judgment addresses any other factors that are to be used in determining whether the fuel cladding is potentially lost. In addition, the inability to monitor the fuel cladding integrity should also be considered in this threshold as a factor in judging that the fuel cladding may be considered challenged.

NEI Reference: PWR FC-PL7 – Emergency Director Judgment

PBNP References:

None

Fuel Cladding Loss

1. **Conditions requiring entry into Core Cooling-RED path (CSP-C.1)**

Core Cooling-RED path is entered if:

- Core exit thermocouples are equal to or greater than 1200°F, or
- core exit thermocouples are less than 700°F and all of the following:
  - RCS subcooling based on core exit thermocouples is equal to or less than [80°F] 35°F
  - No RCP is running
  - RVLIS NR equal to or less than 25 ft

Either set of conditions indicates significant core exit superheating and core uncovery. This is considered a loss of the Fuel Cladding barrier. Critical Safety Function Status Tree (CSFST) setpoints enclosed in brackets (e.g., [80°F], etc.) are used under adverse containment conditions. Adverse containment conditions are defined as:

- Containment pressure is equal to or greater than 10 psig.

- Containment radiation is currently greater than or equal to 1E5 R/hr.
- Integrated dose is greater than 1E5 R or unknown.

NEI Reference: PWR FC-L1 – CSFST Core Cooling-Red

PBNP References:

1. CSP-ST.0 Unit 1(2) Critical Safety Function Status Trees, Figure 2
2. CSP-C.1, Response to Inadequate Core Cooling

2. **Coolant activity ≥300 µCi/gm I-131 equivalent**

Elevated reactor coolant activity represents a potential degradation in the level of safety of the plant and a potential precursor of more serious problems. 300 µCi/gm Dose Equivalent I-131 is well above that expected for iodine spikes and corresponds to about 2% to 5% fuel cladding damage. When reactor coolant activity reaches this level, significant cladding heating has occurred and thus the Fuel Cladding barrier is considered lost.

NEI Reference: PWR FC-L2 – Primary Coolant Activity GREATER THAN (site-specific) Value

PBNP References:

1. NEI 99-01, Revision 4, pg 5-F-4

3. **CET readings ≥1200°F (Core Cooling-RED path, CSP-C.1)**

Core exit Thermocouple (CET) readings equal to or greater than 1200°F indicate significant core exit superheating and core uncovery. This is considered a loss of the Fuel Cladding barrier.

NEI Reference: PWR FC-PL3 – Core Exit Thermocouple Readings GREATER THAN (site-specific) degree F

PBNP References:

1. CSP-ST.0 Unit 1(2) Critical Safety Function Status Trees, Figure 2
2. CSP-C.1, Response to Inadequate Core Cooling

4. **Containment rad monitor reading ≥17 R/hr**

A containment radiation monitor reading greater than 17 R/hr is a value which indicates 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 concentration of 300 μCi/cc dose equivalent I-131 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 (approximately 2-5 % cladding failure depending on core inventory and RCS volume). This value is higher than that specified for RCS barrier Loss #3.

It is important to recognize that the radiation monitor may be sensitive to shine from the Reactor Vessel or RCS piping. Monitors used for this fission product barrier loss threshold are the containment high-range area monitors:

- 1(2) RM-126
- 1(2) RM-127
- 1(2) RM-128

NEI Reference: PWR FC-L5 – Containment rad monitor reading GREATER THAN (site-specific) R/hr

PBNP References:

1. PBF 1608, Calculation 2004-0006
2. SAMG SAG-5, Reduce Fission Product Releases, Attachment D

5. **Failed Fuel Monitor (RE-109) reading $\geq$120 mRem/hr**

Fuel cladding damage in the range of 2% - 5% is generally considered the threshold for the loss of the Fuel Cladding barrier. Calc 96-0073 indicates 2,400 mRem/hr on 1(2) RE-106 corresponds to 100% fuel cladding damage. Five percent fuel cladding damage is therefore one-twentieth of the one hundred percent value or 120 mRem/hr.

NEI Reference: PWR FC-L6 – Other (Site-Specific) Indications of fuel clad barrier loss

PBNP References:

1. Calc 96-0073, 2/29/96, (NEPG-86-515)

6. **Emergency Director Judgment**

Emergency Director judgment addresses any other factors that are to be used in determining whether the fuel cladding is lost. In addition, the inability to monitor the fuel cladding integrity should also be considered in this threshold as a factor in judging that the fuel cladding may be considered lost.

NEI Reference: PWR FC-PL7 – Emergency Director Judgment

PBNP References:

None

RCS Challenge

1. **Conditions requiring entry into RCS Integrity-RED path (CSP-P.1)**

RCS Integrity-Red path is entered if:

- Temperature drop in both cold legs is equal to or greater than 100°F, and
- Temperatures in both cold legs are equal to or less than 285°F.

The combination of these two conditions indicates the RCS barrier is under significant challenge and should be considered a challenge of RCS barrier.

NEI Reference: PWR RCS-PL1 – CSFST RCS Integrity-Red OR Heat Sink-Red

PBNP References:

1. CSP-ST.0 Unit 1(2) Critical Safety Function Status Trees, Figure 4
2. CSP-P.1, Response to Imminent Pressurized Thermal Shock Condition

2. **Conditions requiring entry into Heat Sink-RED path (CSP-H.1)**

Heat Sink-Red path is entered if narrow range level in any S/G is equal to or less than [51%] 29% and total feedwater flow to S/Gs is equal to or less than 200 gpm. The combination of these two conditions indicates the ultimate heat sink function is under extreme challenge. This condition addresses loss of functions required for hot shutdown with the reactor at pressure and temperature and thus a challenge of the RCS barrier.

Critical Safety Function Status Tree (CSFST) setpoints enclosed in brackets (e.g., [51%], etc.) are used under adverse containment conditions. Adverse containment conditions are defined as:

- Containment pressure is equal to or greater than 10 psig.
- Containment radiation is currently greater than or equal to 1E5 R/hr.
- Integrated dose is greater than 1E5 R or unknown.

NEI Reference: PWR RCS-PL1 – CSFST RCS Integrity-Red OR Heat Sink-Red

PBNP References:

1. CSP-ST.0 Unit 1(2) Critical Safety Function Status Trees, Figure 3

3. **Unisolable leak exceeding 60 gpm**

This threshold is based on the inability to maintain normal liquid inventory within the RCS by normal operation of the Chemical and Volume Control System, which is considered as one centrifugal charging pump discharging to the charging header. The need for a second charging pump would be indicative of a substantial RCS leak. 60 gpm is the minimum operability flow rate for each charging pump.

NEI Reference: PWR RCS-PL2 – RCS Leak Rate: Unisolable leak exceeding the capacity of one charging pump in the normal charging mode

PBNP References:

1. DBD-04, Chemical and Volume Control System, Section 3.9

4. **Emergency Director Judgment**

The Emergency Director Judgment RCS challenge addresses any event-specific factors that may be indicative of a challenge to the RCS barrier. The inability to monitor RCS integrity should also be considered as a factor in judging that the RCS barrier may be considered potentially lost.

NEI Reference: PWR RCS-PL6 – Emergency Director Judgment

PBNP References:

None

RCS Loss

1. **RCS subcooling based on core exit thermocouples ≤[80°F] 35°F due to RCS leakage**

This threshold addresses conditions in which leakage from the RCS is greater than available inventory control capacity such that a loss of subcooling has occurred. The loss of subcooling is the fundamental indication that the inventory control systems are inadequate in maintaining RCS pressure and inventory against the mass loss through the leak.

NEI Reference: PWR RCS-L2 – RCS Leak Rate GREATER THAN available makeup capacity as indicated by a loss of RCS subcooling

PBNP References:

1. CSP-ST.0, Unit 1(2) Critical Safety Function Status Trees, Figure 2
2. BG-CSP-ST.0 Step ST-2

2. **SGTR in excess of available charging pumps**

In conjunction with Containment barrier Loss #3 and the Fuel Cladding barrier thresholds, this threshold is intended to address the full spectrum of Steam Generator Tube Rupture (SGTR) events. To meet this threshold, the leakage must be large enough to cause actuation of ECCS (SI). ECCS (SI) actuation is caused by:

- PZR Low Pressure (equal to or less than 1735 psig)
- Steam Line Low Pressure (equal to or less than 530 psig)
- Containment High Pressure (equal to or greater than 5 psig)

140 gpm is the design maximum capacity of all charging pumps.

NEI Reference: PWR RCS-L3 – Steam generator tube rupture that results in an ECCS (SI) Actuation

PBNP References:

1. EOP-0, REACTOR TRIP OR SAFETY INJECTION
2. DBD-04, Chemical and Volume Control System

3. **Containment rad monitor reading ≥3.0 R/hr**

The containment radiation monitor reading is a value that indicates the release of reactor coolant to the containment. The reading is calculated assuming the instantaneous release and dispersal of the reactor coolant noble gas and iodine inventory associated with normal operating concentrations (i.e., within Technical Specifications) into the containment atmosphere. The reading is less than that specified for Fuel Cladding barrier Loss #4 because no damage to the fuel cladding is assumed. Only leakage from the RCS is assumed for this barrier loss threshold.

It is important to recognize that the radiation monitor may be sensitive to shine from the Reactor Vessel or RCS piping. Monitors used for this fission product barrier loss threshold are the containment high-range area monitors:

- 1(2) RM-126
- 1(2) RM-127
- 1(2) RM-128

NEI Reference: PWR RCS-L4 – Containment rad monitor reading GREATER THAN (site-specific) R/hr

PBNP References:

1. PBF 1608, Calculation 2004-0006
2. SAMG SAG-5, Reduce Fission Product Releases, Attachment D

4. **Emergency Director Judgment**

Emergency Director judgment addresses any other factors that are to be used in determining whether the RCS is lost. In addition, the inability to monitor the RCS integrity should also be considered in this threshold as a factor in judging that the RCS may be considered lost.

NEI Reference: PWR RCS-L6 – Emergency Director Judgment

PBNP References:

None

Containment Challenge

1. **Conditions requiring entry into Containment-RED path (CSP-Z.1)**

Containment-Red path is entered if containment pressure is equal to or greater than 60 psig. This pressure is the containment design pressure and is well in excess of that expected from the design basis loss of coolant accident. This threshold is indicative of a loss of both RCS and Fuel Cladding barriers in that it is not possible to reach this condition without severe core degradation (metal-water reaction) or failure to trip in combination with RCS breach. This combination of conditions would be expected to require the declaration of a General Emergency.

NEI Reference: PWR PC-PL1 – CSFST Containment-Red

PBNP References:

1. CSP-ST.0, Unit 1(2) Critical Safety Function Status Trees, Figure 5
2. BG-CSP-ST.0 Step ST-5
3. CSP-Z.1, Response to High Containment Pressure

2. **Containment pressure ≥60 psig and rising (Containment-RED path, CSP-Z.1)**

This threshold is the containment design pressure and is well in excess of that expected from the design basis loss of coolant accident. The threshold is indicative of a loss of both RCS and Fuel Cladding barriers in that it is not possible to reach this condition without severe core degradation (metal-water reaction) or failure to trip in combination with RCS breach. This condition would be expected to require the declaration of a General Emergency.

NEI Reference: PWR PC-PL2 – Containment Pressure: (Site-specific) PSIG and increasing

PBNP References:

1. FSAR pg 5.1.35
2. BG-CSP-ST.0, CSFST, Step F.0.5
3. CSP-Z.1, Response to High Containment Pressure

3. **Hydrogen concentration in containment ≥6%**

If hydrogen concentration reaches or exceeds 6% in an oxygen rich environment, an explosive mixture exists. If the combustible mixture ignites inside containment, loss of the Containment barrier could occur. To generate such levels of combustible gas, loss of the Fuel Cladding and RCS barriers must also have occurred. Since this threshold is also indicative of loss of both Fuel Cladding and RCS barriers with the challenge of the Containment barrier, it therefore will likely warrant declaration of a General Emergency.

NEI Reference: PWR PC-PL2 – Containment Pressure: Explosive mixture exists

PBNP References:

1. CSP-C.I UNIT 1 RED, CRITICAL SAFETY PROCEDURE SAFETY RELATED RESPONSE TO INADEQUATE CORE COOLING, Step 11
2. BG-CSP-Z.1, Response to High Containment Pressure, Step 11
3. EPIP 10.3, POST-ACCIDENT CONTAINMENT HYDROGEN REDUCTION

4. **Containment pressure ≥25 psig with less than one train of containment spray and two containment accident fan cooler units operating**

This threshold represents a challenge of containment in that the containment heat removal/depressurization equipment (but not including containment venting strategies) is either lost or performing in a degraded manner. One train of containment spray and two containment accident fan cooler units is defined to be one full train of depressurization equipment . This equipment will provide 100% of the required cooling capacity during post-accident conditions. Each containment spray system consists of a spray pump, spray header, nozzles, valves, piping, instruments, and controls to ensure an operable flow path capable of taking suction from the RWST upon an ESF actuation signal. Each containment accident fan cooler unit consists of cooling coils, accident backdraft damper, accident fan, service water outlet valves, and controls necessary to ensure an operable service water flow path. The containment pressure setpoint (25 psig) is the pressure at which the equipment should have actuated and began performing its function.

NEI Reference: PWR PC-PL2 – Containment Pressure: Pressure greater than containment depressurization actuation setpoint with less than one full train of depressurization equipment operating

PBNP References:

1. CSP-ST.0 Unit 1(2) Critical Safety Function Status Trees, Figure 5
2. BG-CSP-ST.0 Step ST-5
3. TS B 3.6.6, pgs B 3.6.6-4 & -5, 10/20/02

5. **CET readings ≥1200°F (Core Cooling-RED path, CSP-C.1)**

AND

Restoration procedures not effective within 15 min.

This threshold indicates significant core exit superheating and core uncovery and is considered a loss of the Fuel Cladding barrier. It must also be assumed that the loss of RCS inventory is a result of a loss of the RCS barrier. These conditions, if not mitigated, will likely lead to core melt which will in turn result in a challenge of containment.

Severe accident analyses (e. g., NUREG-1150) have concluded that function restoration procedures can arrest core degradation within the Reactor Vessel in a significant fraction of the core damage scenarios, and that the likelihood of containment failure is very small in these events. Given this, it is appropriate to provide a reasonable period to allow function restoration procedures to arrest the core melt sequence. Whether or not procedures will be effective should be apparent within 15 minutes. The Emergency Director should make the declaration as soon as it is determined that the procedures have not been, or will not be effective.

For the purpose of this threshold the term 'effective' with regards to functional restoration procedures means that the specified criterion no longer exists.

NEI Reference: PWR PC-PL3 – Core exit thermocouples in excess of 1200 degrees and restoration procedures not effective within 15 minutes; or, core exit thermocouples in excess of 700 degrees with reactor vessel level below top of active fuel and restoration procedures not effective within 15 minutes

PBNP References:

1. CSP-ST.0 Unit 1(2) Critical Safety Function Status Trees, Figure 2
2. CSP-C.1, Response to Inadequate Core Cooling

6. **CET readings ≥700°F with RVLIS NR ≤25 ft and no RCPs running (Core Cooling-RED path, CSP-C.1)**

   <u>AND</u>

   Restoration procedures not effective within 15 min.

This threshold indicates significant core exit superheating and core uncovery. It must be assumed that the loss of RCS inventory is a result of a loss of the RCS barrier. These conditions, if not mitigated, will likely lead to core melt which will in turn result in a challenge of containment.

Severe accident analyses (e. g., NUREG-1150) have concluded that function restoration procedures can arrest core degradation within the Reactor Vessel in a significant fraction of the core damage scenarios, and that the likelihood of containment failure is very small in these events. Given this, it is appropriate to provide a reasonable period to allow function restoration procedures to arrest the core melt sequence. Whether or not procedures will be effective should be apparent within 15 minutes. The Emergency Director should make the declaration as soon as it is determined that the procedures have not been, or will not be effective.

For the purpose of this threshold the term 'effective' with regards to functional restoration procedures means that the specified criterion no longer exists.

NEI Reference: PWR PC-PL3 – Core exit thermocouples in excess of 1200 degrees and restoration procedures not effective within 15 minutes; or, core exit thermocouples in excess of 700 degrees with reactor vessel level below top of active fuel and restoration procedures not effective within 15 minutes

PBNP References:

1. CSP-ST.0 Unit 1(2) Critical Safety Function Status Trees, Figure 2
2. CSP-C.1, Response to Inadequate Core Cooling

7. **Containment radiation ≥15,900 R/hr**

The containment radiation monitor reading is a value that indicates significant fuel damage well in excess of that required for loss of the RCS barrier and the Fuel Cladding barrier. NUREG-1228 "Source Estimations During Incident Response to Severe Nuclear Power Plant Accidents" states that such readings do not exist when the amount of cladding damage is less than 20%. A major release of radioactivity requiring offsite protective actions from core damage is not possible unless a major failure into the reactor coolant has occurred. 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 challenge of the Containment barrier. The reading is higher than that specified for Fuel Cladding barrier Loss #4 and RCS barrier Loss #3. Containment radiation readings at or above the Containment barrier challenge threshold, therefore, signify a loss of two fission product barriers and challenge of a third, indicating the need to upgrade the emergency classification to a General Emergency.

It is important to recognize that the radiation monitor may be sensitive to shine from the Reactor Vessel or RCS piping. Monitors used for this fission product barrier loss threshold are the containment high-range area monitors:

- 1(2) RM-126
- 1(2) RM-127
- 1(2) RM-128

NEI Reference: PWR PC-PL6 – Containment rad monitor reading GREATER THAN (site-specific) R/hr

PBNP References:

1. PBF 1608, Calculation 2004-0006
2. SAMG SAG-5, Reduce Fission Product Releases, Attachment D

8. **Emergency Director Judgment**

Emergency Director judgment addresses any other factors that are to be used in determining whether the containment is potentially lost. In addition, the inability to monitor containment integrity should also be considered in this threshold as a factor in judging that the containment may be considered potentially lost.

NEI Reference: PWR PC-PL8 – Emergency Director Judgment

PBNP References:

None

Containment Loss

1. **Rapid unexplained containment pressure drop following initial rise**

Rapid unexplained loss of pressure (i.e., not attributable to containment spray operation, running containment accident cooling units or condensation effects) following an initial pressure rise indicates a loss of both RCS and containment integrity. FSAR Figure 14.3.2-1 illustrates containment pressure response for a bounding LOCA. Containment pressure peaks at approximately 34 psia.

NEI Reference: PWR PC-L2 – Containment pressure

PBNP References:

1. FSAR Figure 14.3.2-1
2. FSAR Tables 14.3.2-1 through 14.3.2-3
3. FSAR 14.3.1, Small Break Loss of Coolant Accident Analysis
4. FSAR 14.3.2, Large Break Loss-Of-Coolant Accident Analysis

2. **Containment pressure or sump level response not consistent with LOCA conditions**

This threshold addresses unexpected changes occurring in containment pressure or sump level that are not explainable due to operator actions or automatic system actions. Containment pressure and sump levels should rise as a result of the mass and energy release into containment from a LOCA. Thus, sump level or containment pressure not rising indicates containment bypass and a loss of containment integrity.

FSAR Figure 14.3.2-1 illustrates containment pressure response for a bounding LOCA. Containment pressure peaks at approximately 34 psia.

NE Reference I: PWR PC-L2 – Containment pressure

PBNP References:

1. FSAR Figure 14.3.2-1
2. FSAR Tables 14.3.2-1 through 14.3.2-3
3. FSAR 14.3.1, Small Break Loss of Coolant Accident Analysis
4. FSAR 14.3.2, Large Break Loss-Of-Coolant Accident Analysis

3. Ruptured S/G is also faulted outside of containment

This "loss" threshold recognizes that S/G tube leakage can represent a bypass of the containment barrier as well as a loss of the RCS barrier. The "loss" threshold addresses the condition in which a ruptured steam generator (S/G) is also faulted. This condition represents a bypass of the RCS and Containment barriers. In conjunction with RCS barrier Loss #2, this would always result in the declaration of a Site Emergency.

A faulted S/G means the existence of secondary side leakage that results in an uncontrolled lowering in steam generator pressure or the steam generator being completely depressurized. A ruptured S/G means the existence of primary-to-secondary leakage of a magnitude sufficient to require or cause a reactor trip and safety injection. Confirmation should be based on diagnostic activities consistent with EOP-0, Reactor Trip or Safety Injection.

The inclusion of thresholds that use Emergency Procedure terms like "ruptured" and "faulted" facilitates the classification process.

NEI Reference: PWR PC-L4 – SG Secondary Side Release with P-to-S Leakage

PBNP References:

1. EOP-0, Reactor Trip or Safety Injection

4. **Primary-to-secondary leakage ≥10 gpm with non-isolable steam release from affected S/G to the environment**

This "loss" threshold recognizes that S/G tube leakage can represent a bypass of the containment barrier as well as a loss of the RCS barrier. This condition represents a bypass of the RCS and Containment barriers. In conjunction with RCS barrier Loss #2, this would always result in the declaration of a Site Emergency.

The "loss" threshold addresses S/G tube leaks that exceed 10 gpm in conjunction with a non-isolable release path to the environment from the affected steam generator. The threshold for establishing the non-isolable secondary side release is intended to be a prolonged release of radioactivity from the affected steam generator directly to the environment. This could be expected to occur when the main condenser is unavailable to accept the contaminated steam (i.e., SGTR with concurrent loss of offsite power and the ruptured steam generator is required for plant cooldown or a stuck open relief valve). If the main condenser is available, there may be releases via air ejectors, gland seal exhausters, and other similar controlled, and often monitored, pathways. These pathways do not meet the intent of a non-isolable release path to the environment. These minor releases are assessed using radiological effluent EAL thresholds.

A pressure boundary leakage of 10 gpm is also used as the threshold in EAL MU5.1, RCS Leakage. For smaller breaks, not exceeding the normal charging capacity threshold in RCS barrier Challenge #3 or not resulting in ECCS actuation in RCS barrier Loss #2, this threshold results in the declaration of an Unusual Event. For larger breaks, RCS barrier Challenge #3 and RCS barrier Loss #2 would result in an Alert. For S/G tube ruptures (SGTRs) which may involve more than one steam generator or unisolable secondary line breaks, this threshold would occur in conjunction with RCS barrier Loss #2 and would result in a Site Emergency. Escalation to General Emergency would be based on the challenge of the Fuel Cladding barrier.

There is some redundancy in the Containment loss thresholds #3 and #4. This was recognized during the development process. The inclusion of thresholds that use Emergency Procedure terms like "ruptured" and "faulted" facilitates the classification process.

NEI Reference: PWR PC-L4 – SG Secondary Side Release with P-to-S Leakage

PBNP References:

1. EOP-0, Reactor Trip or Safety Injection

5. **Containment isolation required and containment isolation or ventilation valve(s) not closed when required**

   <u>AND</u>

   Radiological release pathway to the environment exists

   This threshold addresses incomplete containment isolation that allows direct release to the environment. It represents a loss of both the RCS and Containment barriers and therefore warrants declaration of a Site Emergency. Failure of containment isolation or containment ventilation isolation valves to isolate when required addresses incomplete containment isolation that allows direct release to the environment. It represents a loss of both the RCS and Containment barriers.

   NEI Reference: PWR PC-L5 – CNMT Isolation Valves Status After CNMT Isolation

   PBNP References:

   1. CSP-Z.1, Attachment B, Containment Isolation Valves

6. **Inability to isolate any primary system discharging outside containment**

   <u>AND</u>

   Radiological release pathway to the environment exists

   This threshold addresses primary systems (either direct or indirect) that are not considered in Containment loss #5. If the primary system cannot be isolated, a loss of both the RCS and the Containment barriers results. No leakage threshold is specified since leaks outside containment, particularly under dynamic conditions, are difficult to quantify and may manifest themselves with diverse symptoms. Symptoms of a primary system discharging outside containment may be indicated via mass balance, lowering RCS inventory without corresponding containment response, or area temperatures and radiation levels outside containment. It is for this reason that Emergency Director judgment should be used in evaluating this criterion. However, it is intended that the magnitude of the leak associated with this EAL be consistent with RCS barrier Challenge #3 of 60 gpm or greater.

   Inability to isolate means that the leak cannot be isolated from the main control board.

   NEI Reference: PWR PC-L5 – CNMT Isolation Valves Status After CNMT Isolation

   PBNP References:

   1. CSP-Z.1, Attachment B, Containment Isolation Valves

7. Emergency Director Judgment

Emergency Director judgment addresses any other factors that are to be used in determining whether the Containment barrier is lost. The inability to monitor the containment integrity should also be considered in this threshold as a factor in judging that the Containment barrier may be considered lost.

NEI Reference: PWR PC-L8 – Emergency Director Judgment

PBNP References:

None

Differences

Fuel Cladding Challenge

1. Added words "Conditions requiring…" Provides clarification that classification is based upon the condition defined in the CSFST as opposed to when the transition is made into the CSFST within the EOP network.

   Divided NEI 99-01 Fuel Cladding Challenge #1 threshold into two separate thresholds to improve clarity.

2. Added words "Conditions requiring…" Provides clarification that classification is based upon the condition defined in the CSFST as opposed to when the transition is made into the CSFST within the EOP network.

   Divided NEI 99-01 Fuel Cladding Challenge #1 threshold into two separate thresholds to improve clarity.

3. None
4. None
5. None

Fuel Cladding Loss

1. Added words "Conditions requiring…" Provides clarification that classification is based upon the condition defined in the CSFST as opposed to when the transition is made into the CSFST within the EOP network.
2. None
3. Added reference to Core Cooling-RED path for clarification.
4. None
5. None
6. None

RCS Challenge

1. Added words "Conditions requiring…" Provides clarification that classification is based upon the condition defined in the CSFST as opposed to when the transition is made into the CSFST within the EOP network.

   Divided NEI 99-01 RCS Challenge #1 threshold into two separate thresholds to improve clarity.

2. Added words "Conditions requiring…" Provides clarification that classification is based upon the condition defined in the CSFST as opposed to when the transition is made into the CSFST within the EOP network.

   Divided NEI 99-01 RCS Challenge #1 threshold into two separate thresholds to improve clarity.

3. Added the capacity of one charging pump to improve clarity.

4. None

<u>RCS Loss</u>

1. Replaced "RCS Leakage GREATER THAN available makeup capacity as indicated by a loss of…" with "due to RCS leakage" to improve clarity.

   Included method of determining RCS subcooling to improve clarity and consistency with CSFST wording.

2. None

3. None

4. None

<u>Containment Challenge</u>

1. Added words "Conditions requiring…" Provides clarification that classification is based upon the condition defined in the CSFST as opposed to when the transition is made into the CSFST within the EOP network.

2. Divided the three conditions in the NEI 99-01 Containment barrier challenge into three thresholds to improve clarity

   Added reference to Containment-RED path to improve clarity.

3. Divided the three conditions in the NEI 99-01 Containment barrier challenge into three thresholds to improve clarity.

Specified the primary combustible gas that constitutes the explosive mixture and the limiting gas concentration to improve clarity.

4. Divided the three conditions in the NEI 99-01 Containment barrier challenge into three thresholds to improve clarity.

   Changed the NEI threshold "...with less than one full train of depressurization equipment operating" to "...with less than one train of containment spray and two containment accident fan cooler units operating" to clarify the PBNP definition of one full train of depressurization equipment.

5. Divided this NEI threshold into two Containment barrier challenge thresholds to simplify logic and improve readability.

   Added reference to associated CSFST for clarification.

6. Divided this NEI threshold into two Containment barrier challenge thresholds to simplify logic and improve readability.

   Added reference to associated CSFST for clarification.

7. None

8. None

<u>Containment Loss</u>

1. None

2. None

3. Divided this NEI threshold into two Containment barrier loss thresholds to simplify logic and improve readability.

4. Divided this NEI threshold into two Containment barrier loss thresholds to simplify logic and improve readability.

5. Implemented the NEI threshold "Valve(s) not closed AND downstream pathway to the environment exists" in two Containment loss threshold (#5 and #6) to improve readability and simplify logic. This threshold "Containment isolation required and containment isolation or ventilation valve(s) not closed when required AND Radiological release pathway to the environment exists" specifically addresses possible radiological release pathways associated with the containment isolation and ventilation system.

6. Added the Containment loss threshold "Inability to isolate any primary system discharging outside containment AND radiological release pathway to the environment exists" to address other possible release pathways that are not addressed by Containment loss #5.

7. None

Actuate

To put into operation; to move to action; commonly used to refer to automated, multi-faceted operations. "Actuate ECCS."

Adversary

As applied to security EALs, an armed or suspected to be armed intruder whose intent is to commit sabotage, disrupt Station operations or otherwise commit a crime on station property.

Alert

Events are in process or have occurred which involve an actual or potential substantial degradation of the level of safety of the plant. Any releases are expected to be limited to small fractions of the EPA Protective Action Guide exposure levels.

Available

The state or condition of being ready and able to be used (placed into operation) to accomplish the stated (or implied) action or function. As applied to a system, this requires the operability of necessary support systems (electrical power supplies, cooling water, lubrication, etc.).

Can/Cannot be determined (</>)

The current value or status of an identified parameter relative to that specified can/cannot be ascertained using all available indications (direct and indirect, singly or in combination).

Can/Cannot be maintained above/below (</>)

The value of the identified parameter(s) is/is not able to be kept above /below specified limits. This determination includes making an evaluation that considers both current and future system performance in relation to the current value and trend of the parameter(s). Neither implies that the parameter must actually exceed the limit before the action is taken nor that the action must be taken before the limit is reached.

Can/Cannot be restored above/below (</>)

The value of the identified parameter(s) is/is not able to be returned to above/below specified limits after having passed those limits. This determination includes making an evaluation that considers both current and future systems performances in relation to the current value and trend of the parameter(s). It does not imply any specific time interval but does not permit prolonged operation beyond a limit without taking the specified action.

As applied to loss of electrical power sources (ex.: Power cannot be restored to any vital bus in ≤4 hrs) the specified power source cannot be returned to service within the specified time. This determination includes making an evaluation that considers both current and future restoration capabilities. It implies that the declaration should be made as soon as the determination is made that the power source cannot be restored within the specified time.

Close

To position a valve or damper so as to prevent flow of the process fluid.

To make an electrical connection to supply power.

Confirm / Confirmation

To validate, through visual observation or physical inspection, that an assumed condition is as expected or required, without taking action to alter the "As found" configuration.

Containment Closure

Containment closure is the action taken to secure containment and its assorted structures, systems and components as a functional barrier to fission product release under existing plant conditions. Containment closure is initiated per the SEPs or Shift Manager direction if plant conditions change that could raise the risk of a fission product release as a result of a loss of decay heat removal. Containment closure requires that, upon a loss of decay heat removal, any open penetration which is listed on CL 1E, Containment Closure Checklist, must be closed or capable of being closed prior to RCS bulk boiling. This checklist is maintained any time that the RCS is <200°F and containment operability is not maintained.

Contiguous

Being in actual contact; touching along a boundary or at a point

Control

Take action, as necessary, to maintain the value of a specified parameter within applicable limits; to fix or adjust the time, amount, or rate of; to regulate or restrict.

Deviation

Instances where the guidance reference IC/EAL (99-01) differs in wording from proposed revision and is altered in intent, such that classification of event could be specifically different between guidance reference and licensee proposed EAL.

Difference

Instances where the guidance reference IC/EAL (99-01) differ in wording but agree in meaning and intent

Discharge

Removal of a fluid/gas from a volume or system.

Enter

To go into.

Establish

To perform actions necessary to meet a stated condition. "Establish communication with the Control Room."

Evacuate

To remove the contents of; to remove personnel from an area.

Exceeds

To go or be beyond a stated or implied limit, measure, or degree.

Exist

To have being with respect to understood limitations or conditions.

Failure

A state of inability to perform a normal function.

Fission Product Barriers (FPB)

Multiple physical barriers any one of which, if maintained intact, precludes the release of significant amounts of radioactive fission products to the environment. The FPBs are the Reactor Fuel Cladding (FC), Reactor Coolant System (RCS) and Containment (PC).

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. Releases can be reasonably expected to exceed EPA Protective Action Guide exposure levels offsite for more than the immediate site area.

If

Logic term which indicates that taking the action prescribed is contingent upon the current existence of the stated condition(s). If the identified conditions do not exist, the prescribed action is not to be taken and execution of operator actions must proceed promptly in accordance with subsequent instructions.

Indicate

To point out or point to; to display the value of a process variable; to be a sign or symbol.

Initiate

The act of placing equipment or a system into service, either manually or automatically. Activation of a function or protective feature (i.e. initiate a manual trip).

Injection

The act of forcing a fluid into a volume or vessel.

Inoperable

Not able to perform its intended function

Intrusion

The act of entering without authorization

Loss

Failure of operability or lack of access to.

Lower

To become progressively less in size, amount, number, or intensity.

Maintain

Take action, as necessary, to keep the value of the specified parameter within the applicable limits.

Monitor

Observe and evaluate at a frequency sufficient to remain apprised of the value, trend, and rate of change of the specified parameter.

Notify

To give notice of or report the occurrence of; to make known to; to inform specified personnel; to advise; to communicate; to contact; to relay.

Open

To position a valve or damper so as to allow flow of the process fluid.

To break an electrical connection which removes a power supply from an electrical device.

To make available for entry or passage by turning back, removing, or clearing away.

Operable

Able to perform its intended function

Perform

To carry out an action; to accomplish; to affect; to reach an objective.

Primary System

The pipes, valves, and other equipment which connect directly to the Reactor Vessel or reactor coolant system such that a reduction in Reactor Vessel pressure will effect a lowering in the steam or water being discharged through an unisolated break in the system.

Remove

To change the location or position of.

Report

To describe as being in a specific state.

Require

To demand as necessary or essential.

Restore

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

Rise

Describes an increase in a parameter as the result of an operator or automatic action. To become progressively greater in size, amount, number or intensity.

Safe Plant Shutdown

Hot or cold shutdown (reactor subcritical) with control of coolant inventory and decay heat removal

Safe Shutdown System

All cables, components, panels, power supplies, etc., necessary for a system to perform a safe shutdown function. Safe shutdown functions include: reactivity control, reactor coolant makeup, reactor heat removal, process system monitoring for variables necessary to control these functions and supporting functions such as component cooling, lubrication, etc., necessary for the operation of safe shutdown equipment.

Sample

To perform an analysis on a specified media to determine its properties.

Shut down

To perform operations necessary to cause equipment to cease or suspend operation; to stop. "Shut down unnecessary equipment."

Site Emergency

Events are in process or have occurred which involve actual or likely major failures of plant functions needed for protection of the public. Any releases are not expected to result in exposure levels which exceed EPA Protective Action Guide exposure levels except near the site boundary.

Site Boundary

Per dose assessment methodology, the site boundary is approximately a one-mile radius around the site Protected Area.

Sustained

Prolonged. Not intermittent or of transitory nature

Transient

Events of off-normal nature such as; trips, runbacks involving $\geq$25% thermal power changes, or ECCS injections .

Trip

To de-energize a pump or fan motor; to position a breaker so as to interrupt or prevent the flow of current in the associated circuit; to manually activate a semi-automatic feature.

Unavailable

Not able to perform its intended function

Uncontrolled

An evolution lacking control but is not the result of operator action.

Unplanned

Not as an expected result of deliberate action.

Until

Indicates that the associated prescribed action is to proceed only so long as the identified condition does not exist.

Unusual Event

Events are in process or have occurred which indicate a potential degradation of the level of safety of the plant. No releases of radioactive material requiring offsite response or monitoring are expected unless further degradation of safety systems occurs.

Valid

Supported or corroborated on a sound basis.

Vent

To open an effluent (exhaust) flowpath from an enclosed volume; to reduce pressure in an enclosed volume.

Verify

To confirm a condition and take action to establish that condition if required. "Verify reactor trip."

Vital Area

Any plant area which contains vital equipment.

Attachment 3 – Deviations

Deviations:

None

NEI 99-01 IC	PBNP EAL(s)
AU1	RU1.1, RU2.1
AU2	MU4.1, RU3.1
AA1	RA1.1, RA2.1, RA2.2
AA2	MA4.1, MA4.2
AA3	RA3.1, RA3.2
AS1	RS1.1, RG1.1, RS2.1
AG1	RG1.1, RG2.1
CU1	MU5.1
CU2	MU15.1
CU3	MU8.1
CU4	MU13.1
CU5	MU2.1
CU6	MU6.1
CU7	MU9.1
CU8	MU1.1
CA1	MA15.1
CA2	MA15.1
CA3	MA8.2
CA4	MA13.1, MA14.1
CS1	MS15.1, MS15.2
CS2	MS15.1, MS15.3
CG1	MG15.1
E-AU1	N/A

NEI 99-01 IC	PBNP EAL(s)
E-HU1	IU1.1
E-HU2	IU2.1
FU1	FU1.1
FA1	FA1.1
FS1	FS1.1
FG1	FG1.1
HU1	HU2.2, HU3.1, HU4.1, HU4.2, HU4.3, MU11.1
HU2	HU2.1
HU3	HU3.2
HU4	HU1.1
HU5	HU6.1
HA1	HA3.1, HA4.1, HA4.2, HA4.3, MA11.1
HA2	HA2.1
HA3	HA3.1
HA4	HA1.1
HA5	HA5.1
HA6	HA6.1
HS1	HS1.1
HS2	HS5.1
HS3	HS6.1
HG1	HG1.1
HG2	HG6.1
SU1	MU8.1
SU2	MU10.1
SU3	MU12.1

NEI 99-01 IC	PBNP EAL(s)
SU4	MU2.1, MU3.1
SU5	MU5.1
SU6	MU6.1
SU7 – Deleted	N/A
SU8	MU1.1
SA1 – Deleted	N/A
SA2	MA7.1
SA3 – Deleted	N/A
SA4	MA12.1
SA5	MA8.1
SS1	MS8.1
SS2	MS7.1
SS3	MS9.1
SS4	FS1.1
SS5 – Deleted	N/A
SS6	MS12.1
SG1	MG8.1
SG2	MG7.1

Attachment 2 – Word List

Actuate

To put into operation; to move to action; commonly used to refer to automated, multi-faceted operations. "Actuate ECCS."

Adversary

As applied to security EALs, an armed or suspected to be armed intruder whose intent is to commit sabotage, disrupt Station operations or otherwise commit a crime on station property.

Alert

Events are in process or have occurred which involve an actual or potential substantial degradation of the level of safety of the plant. Any releases are expected to be limited to small fractions of the EPA Protective Action Guide exposure levels.

Available

The state or condition of being ready and able to be used (placed into operation) to accomplish the stated (or implied) action or function. As applied to a system, this requires the operability of necessary support systems (electrical power supplies, cooling water, lubrication, etc.).

Can/Cannot be determined (</>)

The current value or status of an identified parameter relative to that specified can/cannot be ascertained using all available indications (direct and indirect, singly or in combination).

Can/Cannot be maintained above/below (</>)

The value of the identified parameter(s) is/is not able to be kept above /below specified limits. This determination includes making an evaluation that considers both current and future system performance in relation to the current value and trend of the parameter(s). Neither implies that the parameter must actually exceed the limit before the action is taken nor that the action must be taken before the limit is reached.

Can/Cannot be restored above/below (</>)

The value of the identified parameter(s) is/is not able to be returned to above/below specified limits after having passed those limits. This determination includes making an evaluation that considers both current and future systems performances in relation to the current value and trend of the parameter(s). It does not imply any specific time interval but does not permit prolonged operation beyond a limit without taking the specified action.

As applied to loss of electrical power sources (ex.: Power cannot be restored to any vital bus in ≤4 hrs) the specified power source cannot be returned to service within the specified time. This determination includes making an evaluation that considers both current and future restoration capabilities. It implies that the declaration should be made as soon as the determination is made that the power source cannot be restored within the specified time.

Close

To position a valve or damper so as to prevent flow of the process fluid.

To make an electrical connection to supply power.

Confirm / Confirmation

To validate, through visual observation or physical inspection, that an assumed condition is as expected or required, without taking action to alter the "As found" configuration.

Containment Closure

Containment closure is the action taken to secure containment and its assorted structures, systems and components as a functional barrier to fission product release under existing plant conditions. Containment closure is initiated per the SEPs or Shift Manager direction if plant conditions change that could raise the risk of a fission product release as a result of a loss of decay heat removal. Containment closure requires that, upon a loss of decay heat removal, any open penetration which is listed on CL 1E, Containment Closure Checklist, must be closed or capable of being closed prior to RCS bulk boiling. This checklist is maintained any time that the RCS is <200°F and containment operability is not maintained.

Contiguous

Being in actual contact; touching along a boundary or at a point

Control

Take action, as necessary, to maintain the value of a specified parameter within applicable limits; to fix or adjust the time, amount, or rate of; to regulate or restrict.

Deviation

Instances where the guidance reference IC/EAL (99-01) differs in wording from proposed revision and is altered in intent, such that classification of event could be specifically different between guidance reference and licensee proposed EAL.

Difference

Instances where the guidance reference IC/EAL (99-01) differ in wording but agree in meaning and intent

Discharge

Removal of a fluid/gas from a volume or system.

Enter

To go into.

Establish

To perform actions necessary to meet a stated condition. "Establish communication with the Control Room."

Evacuate

To remove the contents of; to remove personnel from an area.

Exceeds

To go or be beyond a stated or implied limit, measure, or degree.

Exist

To have being with respect to understood limitations or conditions.

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A state of inability to perform a normal function.

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To break an electrical connection which removes a power supply from an electrical device.

To make available for entry or passage by turning back, removing, or clearing away.

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To carry out an action; to accomplish; to affect; to reach an objective.

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To change the location or position of.

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To describe as being in a specific state.

Require

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Per dose assessment methodology, the site boundary is approximately a one-mile radius around the site Protected Area.

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Unplanned

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Until

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Unusual Event

Events are in process or have occurred which indicate a potential degradation of the level of safety of the plant. No releases of radioactive material requiring offsite response or monitoring are expected unless further degradation of safety systems occurs.

Valid

Supported or corroborated on a sound basis.

Vent

To open an effluent (exhaust) flowpath from an enclosed volume; to reduce pressure in an enclosed volume.

Verify

To confirm a condition and take action to establish that condition if required. "Verify reactor trip."

Vital Area

Any plant area which contains vital equipment.

Attachment 3 – Deviations

Deviations:

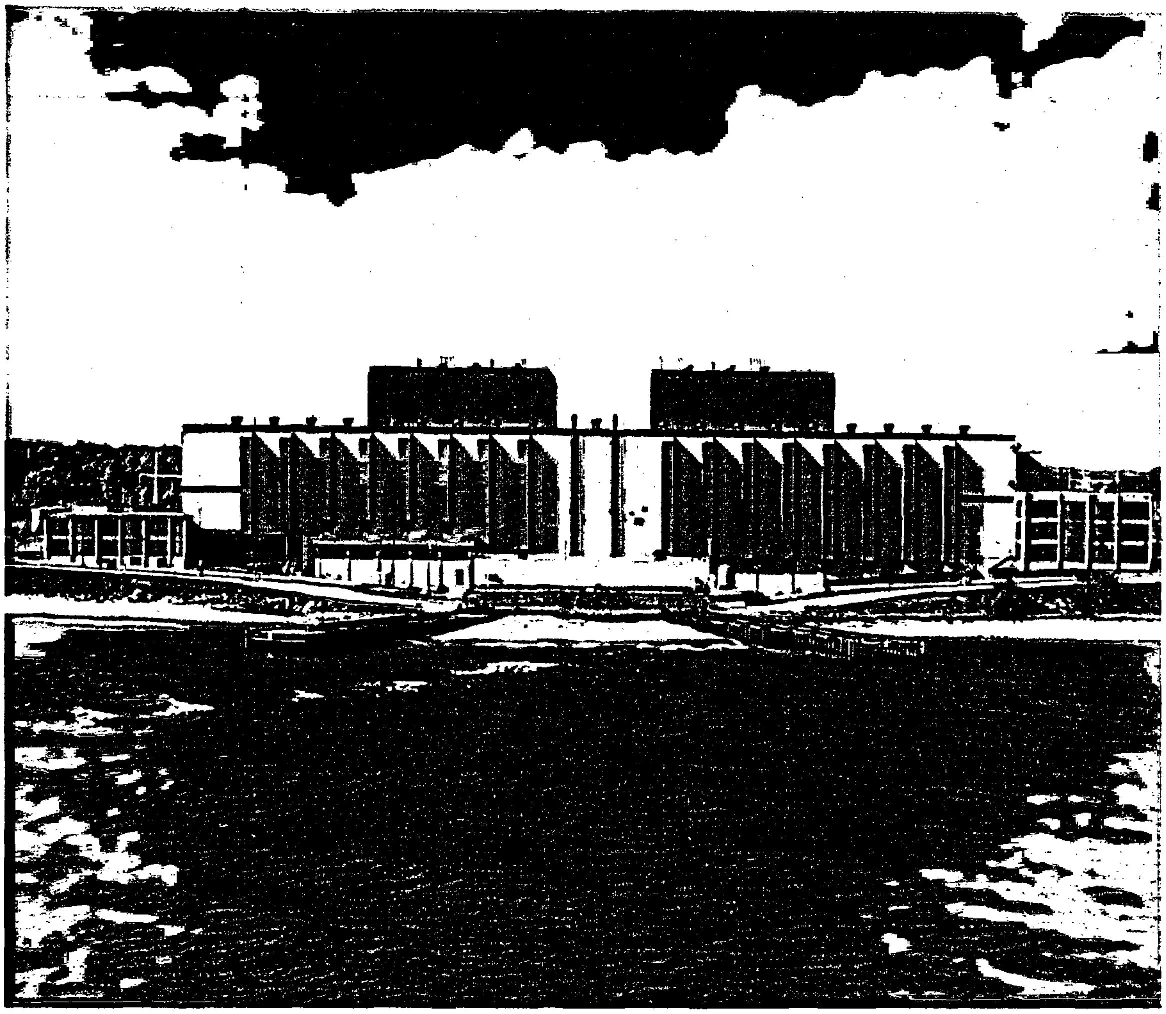
None

NEI 99-01 IC	PBNP EAL(s)
AU1	RU1.1, RU2.1
AU2	MU4.1, RU3.1
AA1	RA1.1, RA2.1, RA2.2
AA2	MA4.1, MA4.2
AA3	RA3.1, RA3.2
AS1	RS1.1, RG1.1, RS2.1
AG1	RG1.1, RG2.1
CU1	MU5.1
CU2	MU15.1
CU3	MU8.1
CU4	MU13.1
CU5	MU2.1
CU6	MU6.1
CU7	MU9.1
CU8	MU1.1
CA1	MA15.1
CA2	MA15.1
CA3	MA8.2
CA4	MA13.1, MA14.1
CS1	MS15.1, MS15.2
CS2	MS15.1, MS15.3
CG1	MG15.1
E-AU1	N/A

NEI 99-01 IC	PBNP EAL(s)
E-HU1	IU1.1
E-HU2	IU2.1
FU1	FU1.1
FA1	FA1.1
FS1	FS1.1
FG1	FG1.1
HU1	HU2.2, HU3.1, HU4.1, HU4.2, HU4.3, MU11.1
HU2	HU2.1
HU3	HU3.2
HU4	HU1.1
HU5	HU6.1
HA1	HA3.1, HA4.1, HA4.2, HA4.3, MA11.1
HA2	HA2.1
HA3	HA3.1
HA4	HA1.1
HA5	HA5.1
HA6	HA6.1
HS1	HS1.1
HS2	HS5.1
HS3	HS6.1
HG1	HG1.1
HG2	HG6.1
SU1	MU8.1
SU2	MU10.1
SU3	MU12.1

NEI 99-01 IC	PBNP EAL(s)
SU4	MU2.1, MU3.1
SU5	MU5.1
SU6	MU6.1
SU7 – Deleted	N/A
SU8	MU1.1
SA1 – Deleted	N/A
SA2	MA7.1
SA3 – Deleted	N/A
SA4	MA12.1
SA5	MA8.1
SS1	MS8.1
SS2	MS7.1
SS3	MS9.1
SS4	FS1.1
SS5 – Deleted	N/A
SS6	MS12.1
SG1	MG8.1
SG2	MG7.1

ENCLOSURE IV



POINT BEACH EAL
RESOURCE
MATERIAL

NEI IC and Example EALs		Example EAL No.	Plant EAL	Comment	Response
	Category A - Abnormal Rad Levels/Radiological Effluent				o = Comment resolution x = Re
AU1	**Any UNPLANNED Release of Gaseous or Liquid Radio-activity to the Environment that Exceeds Two Times the Radio-logical Effluent Technical Specifications for 60 Minutes or Longer**				
	VALID reading on any effluent monitor that exceeds two times the alarm setpoint established by a current radioactivity discharge permit for 60 minutes or longer.	1	A.3.1.1, A.3.2.1	Validation simulator scenario #2: Some REs may still read high because the filter is saturated even though flow through the sample line has stopped.	MCD: This is one reason why the term "valid" modifies the reading. Such a condition, would lead to invalid RE readings.
	VALID reading on one or more of the following radiation monitors that exceeds the reading shown for 60 minutes or longer: (site-specific list)	2	A.3.1.1, A.3.2.1		
	Confirmed sample analyses for gaseous or liquid releases indicates concentrations or release rates, with a release duration of 60 minutes or longer, in excess of two times (site-specific technical specifications).	3	A.3.1.1, A.3.2.1		
	VALID reading on perimeter radiation monitoring system greater than 0.10 mR/hr above normal background sustained for 60 minutes or longer [for sites having telemetered perimeter monitors].	4	A.3.1.1, A.3.2.1	EKB verification comment #4 (1.3): Examples 4 and 5 not represented. Difference is not identified.	MCD: Add difference in EAL TB A.3.1.1 and A.3.2.1 that PBNP is not equipped with perimeter rad monitoring and real-time dose assessment.
	VALID indication on automatic real-time dose assessment capability greater than (site-specific value) for 60 minutes or longer [for sites having such capability].	5	A.3.1.1, A.3.2.1	EKB verification comment #4 (1.3): Examples 4 and 5 not represented. Difference is not identified.	MCD: Add difference in EAL TB A.3.1.1 and A.3.2.1 that PBNP is not equipped with perimeter rad monitoring and real-time dose assessment.
AU2	**Unexpected Increase in Plant Radiation**				
	a. VALID (site-specific) indication of uncontrolled water level decrease in the reactor refueling cavity, spent fuel pool, or fuel transfer canal with all irradiated fuel assemblies remaining covered by water. AND b. Unplanned VALID (site-specific) Direct Area Radiation Monitor reading increases	1	A.1.4.1, A.3.3.1		
	Unplanned VALID Direct Area Radiation Monitor readings increases by a factor of 1000 over normal* levels. *Normal levels can be considered as the highest reading in the past twenty-four hours excluding the current peak value.	2	A.1.4.1, A.3.3.1	EKB verification comment #5 (1.9): A.3.3.1 -- it is implied but not explicitly stated that 100 times the alarm setpoint is equal to 1000 times the normal levels as specified by AU2 example 2.	MCD: Add sentence to 2nd para of EAL TB basis discussion for A.3.3.1 that 100 X alarm = 1000 X normal.

	NEI IC and Example EALs	Example EAL No.	Plant EAL	Comment	Response
AA1	**Any UNPLANNED Release of Gaseous or Liquid Radioactivity to the Environment that Exceeds 200 Times the Radiological Effluent Technical Specifications for 15 Minutes or Longer**				
	VALID reading on any effluent monitor that exceeds 200 times the alarm setpoint established by a current radioactivity discharge permit for 15 minutes or longer.	1	A.3.1.2, A.3.2.2, A.3.2.3		
	VALID reading on one or more of the following radiation monitors that exceeds the reading shown for 15 minutes or longer: (site-specific list)	2	A.3.1.2, A.3.2.2, A.3.2.3		
	Confirmed sample analyses for gaseous or liquid releases indicates concentrations or release rates, with a release duration of 15 minutes or longer, in excess of 200 times (site-specific technical specifications).	3	A.3.1.2, A.3.2.2, A.3.2.3	Verification CR walkthrough: Should "dose rates" be "closed-window dose rates"?	MCD: No. Dose rates will be by whatever method used in the plant dose assessment. Explain difference in EAL TB.
	VALID reading on perimeter radiation monitoring system greater than 10.0 mR/hr above normal background sustained for 15 minutes or longer [for sites having telemetered perimeter monitors].	4	None	NA for PBNP	NA for PBNP
	VALID indication on automatic real-time dose assessment capability greater than (site-specific value) for 15 minutes or longer [for sites having such capability].	5	A.3.1.2, A.3.2.2, A.3.2.3	EKB verification comment #6 (1.7): Example 5 not represented. Difference is not identified.	MCD: Should this comment address Example 4 as well as 5? Add difference in EAL TB for A.3.1.2, A.3.2.2, A.3.2.3 that PBNP is not equipped with perimeter rad monitoring and real-time dose assessment.
AA2	**Damage to Irradiated Fuel or Loss of Water Level that Has or Will Result in the Uncovering of Irradiated Fuel Outside the Reactor Vessel**				
	A VALID (site-specific) alarm or reading on one or more of the following radiation monitors: (site-specific monitors) Refuel Floor Area Radiation Monitor Fuel Handling Building Ventilation Monitor Refueling Bridge Area Radiation Monitor	1	A.1.4.2, A.1.4.3		
	Water level less than (site-specific) feet for the reactor refueling cavity, spent fuel pool and fuel transfer canal that will result in irradiated fuel uncovering.	2	A.1.4.2, A.1.4.3		
AA3	**Release of Radioactive Material or Increases in Radiation Levels Within the Facility That Impedes Operation of Systems Required to Maintain Safe Operations or to Establish or Maintain Cold Shutdown**				

	NEI IC and Example EALs	Example EAL No.	Plant EAL	Comment	Response
	VALID (site-specific) radiation monitor readings GREATER THAN 15 mR/hr in areas requiring continuous occupancy to maintain plant safety functions: (Site-specific) list	1	A.3.3.2, A.3.3.3		
	VALID (site-specific) radiation monitor readings GREATER THAN <site specific> values in areas requiring infrequent access to maintain plant safety functions. (Site-specific) list	2	A.3.3.2, A.3.3.3	EKB verification comment #8 (1.7): A.3.3.3 seems to have unjustified differences: 1. No site specific list of areas is provided. 2. Example 2 specifies rad monitor readings. 3. AA3 does not specify access actually required.	MCD: Add differences to EAL TB for A.3.3.3: 1. List of areas is not necessary because the areas needed for safe operation and safe shutdown are common knowledge. 2. Rad monitors are not specified because portable monitoring devices may be used to determine area accessibility and would therefore be excluded from consideration if the EAL wording were limited to designated radiation monitors. 3. Explain in difference that access is required in order for infrequent access for maintaining plant safety functions to occur.
AS1	**Offsite Dose Resulting from an Actual or Imminent Release of Gaseous Radioactivity Exceeds 100 mR TEDE or 500 mR Thyroid CDE for the Actual or Projected Duration of the Release**				
	VALID reading on one or more of the following radiation monitors that exceeds or is expected to exceed the reading shown for 15 minutes or longer: (Site-specific) list	1	A.3.1.3, A.3.1.4, A.3.2.4	EKB verification comment #9 (1.3, 1.4, 1.6): A.3.1.4 does not represent AS1, and is not referenced on page.	MCD: Agree. No changes needed to A.3.1.4.
				EKB verification comment #10 (1.3, 1.4, 1.6): A.3.1.4 should be referenced in Table as representing AG1 (example 1).	MCD: Add reference to A.3.1.4 to EAL crossreference table in EAL TB Attachment 2.
	Dose assessment using actual meteorology indicates doses greater than 100 mR TEDE or 500 mR thyroid CDE at or beyond the site boundary.	2	A.3.1.3, A.3.1.4, A.3.2.4	Need to define site boundary as the one mile radius perimeter	MCD: Per dose assessment methodology, site boundary is set at the one mile radius permiter. Add this defnition to the EAL TB word list.
	A VALID reading sustained for 15 minutes or longer on perimeter radiation monitoring system greater than 100 mR/hr. [for sites having telemetered perimeter monitors]	3	None	EKB verification comment #9 (1.3, 1.4, 1.6): Example 3 is not represented.	MCD: Add difference in EAL TB for A.3.1.3. A.3.1.4 and A.3.2.4 that PBNP is not e[illegible]ed with perimeter rad monitoring.
	Field survey results indicate closed window dose rates exceeding 100 mR/hr expected to continue for more than one hour; or analyses of field survey samples indicate thyroid CDE of 500 mR for one hour of inhalation, at or beyond the site boundary.	4	A.3.1.3, A.3.1.4, A.3.2.4	EKB verification comment #9 (1.3, 1.4, 1.6): A.3.2.4 does not specify "closed window dose rates."	MCD: Per dose assessment methodology, site boundary is set at the one mile radius permiter. Add this defnition to the EAL TB word list.
AG1	**Offsite Dose Resulting from an Actual or Imminent Release of Gaseous Radioactivity Exceeds 1000 mR TEDE or 5000 mR Thyroid CDE for the Actual or Projected Duration of the Release Using Actual Meteorology**				

	NEI IC and Example EALs	Example EAL No.	Plant EAL	Comment	Response
	VALID reading on one or more of the following radiation monitors that exceeds or expected to exceed the reading shown for 15 minutes or longer: (Site-specific) list	1	A.3.2.5		
	Dose assessment using actual meteorology indicates doses greater than 1000 mR TEDE or 5000 mR thyroid CDE at or beyond the site boundary.	2	A.3.2.5		
	A VALID reading sustained for 15 minutes or longer on perimeter radiation monitoring system greater than 1000 mR/hr. [for sites having telemetered perimeter monitors]	3	None	EKB verification comment #10 (1.3, 1.4, 1.6): Example 3 not represented.	MCD: Per dose assessment methodology, site boundary is set at the one mile radius permiter. Add this defnition to the EAL TB word list.
	Field survey results indicate closed window dose rates exceeding 1000 mR/hr expected to continue for more than one hour; or analyses of field survey samples indicate thyroid CDE of 5000 mR for one hour of inhalation, at or beyond site boundary.	4	A.3.2.5	EKB verification comment #10 (1.3, 1.4, 1.6): A.3.2.5 does not specify "closed window dose rates."	MCD: Add difference in EAL TB for A.3.2.5 that PBNP is not equipped with perimeter rad monitoring.
	Category C - Cold Shutdown / Refueling System Malfunction				
CU1	**RCS Leakage**				
	Unidentified or pressure boundary leakage greater than 10 gpm.	1			
	Identified leakage greater than 25 gpm.	2			
CU2	**Unplanned Loss of RCS Inventory with Irradiated Fuel in the RPV**				
	UNPLANNED RCS level decrease below the RPV flange for > 15 minutes	1	C.1.3.1		
	Loss of RPV inventory as indicated by unexplained {site-specific} sump and tank level increase AND RPV level cannot be monitored	2	C.1.3.1	EKB verification CR walkthrough comment #72: RPV is not standard acronym for plant. Reactor Vessel is used.	MCD: Do global search of EAL TB and WC and replace RPV with Reactor Vessel.
CU3	**Loss of All Offsite Power to Essential Busses for Greater Than 15 Minutes**				

	NEI IC and Example EALs	Example EAL No.	Plant EAL	Comment	Response
	Loss of power to (site-specific) transformers for greater than 15 minutes. AND At least (site-specific) emergency generators are supplying power to emergency busses.	1			
CU4	**Unplanned Loss of Decay Heat Removal Capability with Irradiated Fuel in the RPV**				
	An UNPLANNED event results in RCS temperature exceeding the Technical Specification cold shutdown temperature limit	1			
	Loss of all RCS temperature and RPV level indication for > 15 minutes	2			
CU5	**Fuel Clad Degradation**				
	(Site-specific) radiation monitor readings indicating fuel clad degradation greater than Technical Specification allowable limits	1	A.1.2.1	EKB verification comment #11 (1.3): Example 1 is not represented.	MCD: Add difference to EAL TB for A.1.2.1 that CU5 has been divided into two EALs for clarity. Example EAL #1 is addressed in EAL A.1.3.1.
				EKB verification comment #41 (2.3): Matrix does not have all applicable modes identified. (Missing 1 and 2)	MCD: Add modes 1 and 2 to WC.
	(Site-specific) coolant sample activity value indicating fuel clad degradation greater than Technical Specification allowable limits.	2			
CU6	**UNPLANNED Loss of All Onsite or Offsite Communications Capabilities**				
	Loss of all (site-specific list) onsite communications capability affecting the ability to perform routine operations.	1	A.5.1.1	EKB verification comment #12 (1.9): Table A.5-1 is not referenced in the EAL, only in discussion. This is inconsistent with use of Tables elsewhere.	MCD: No changes required. Communication systems are well known by EDs. Table A.5-1 is not needed in the EAL wording and is included in the basis discussion for completeness and reference by those less familiar with the communication systems.
				Validation training: Should Table A.5-1 appear on the WC? Is referencing in the EAL TB adequate?	MCD: No EAL TB reference is adequate.
				EKB verification comment #42 (2.3): Matrix incorrectly has applicable to Mode D.	MCD: Delete WC mode D.
	Loss of all (site-specific list) offsite communications capability	2	A.5.1.1	EKB verification comment #12 (1.9): Table A.5-1 is not referenced in the EAL, only in discussion. This is inconsistent with use of Tables elsewhere.	MCD: No changes required. Communication systems are well known by EDs. Table A.5-1 is not needed in the EAL wording and is included in the basis discussion for completeness and reference by those less familiar with the communication systems.

	NEI IC and Example EALs	Example EAL No.	Plant EAL	Comment	Response
CU7	**Unplanned Loss of Required DC Power for Greater than 15 Minutes**				
	UNPLANNED Loss of Vital DC power to required DC busses based on (site-specific) bus voltage indications. AND Failure to restore power to at least one required DC bus within 15 minutes from the time of loss.	1	C.3.1.1	EKB verification comment #43 (2.2): IC statement does not match TB.	MCD: Change WC to add "for >15 min."
				Validation scenario 1: Why is 15 min. for loss of all DC required?	MCD: Provides latitude to not classify if DC loss was monentary/intermittent loss and subsequently restored.
CU8	**Inadvertent Criticality**				
	An UNPLANNED extended positive period observed on nuclear instrumentation.	1	None	BWR only. Not applicable to PBNP.	None
	An UNPLANNED sustained positive startup rate observed on nuclear instrumentation.	2	A.1.1.1		
CA1	**Loss of RCS Inventory**				
	Loss of RCS inventory as indicated by RPV level less than {site-specific level}. (low-low ECCS actuation setpoint) (BWR) (bottom ID of the RCS loop) (PWR)	1	C.1.3.2	EKB verification comment #13 (1.9, 1.7): 1. Presentation of RVLIS water levels in parentheses is confusing. No discussion is provided on the presentation used. 2. Combining CA1 and CA2 not justified or mentioned as a difference. 3. The use of alternate level values under adverse containment conditions is not specified in CA1and not listed as a difference.	MCD: 1. Remove parentheses and connect LI-447/447A and RVLIS with "or". 2. Add difference to EAL TB for combining CA1 and CA2. 3. The use of alternate level values under adverse containment conditions is explained in 7th para of EAL TB basis. This is not a difference from NEI; it is simply the site-specific level.
				Verification CR walkthrough: Change RPV to Reactor Vessel.	MCD: Do search on entire WC and EAL TB for RPV and replace with Reactor Vessel.
				EKB Verification CR walkthrough comment #73: The low end of the RVLIS NR indication is 0%. Less than 0% cannot be interpreted off of the indication. LI-447/447A cannot read below 0%. Change threshold to offscale low.	MCD: Change EAL TB and WC as suggested.
				Validation training: Change "LI-447/LI-447A" to LI-447 and LI-447A.	MCD: Do global search and replace and change EAL TB and WC as suggested.
				EKB verifrication CR walkthrough comment #74 The logic term 'either' needs to be underlined.	MCD: Do global search of EAL TB and WC and make sure either is underlined and bold.
	Loss of RCS inventory as indicated by unexplained {site-specific} sump and tank level increase AND RCS level cannot be monitored for > 15 minutes	2	C.1.3.2	EKB verification CR walkthrough comment #75: The containment drain system consists only of a sump – there is no 'tank'.	MCD: Delete tanks. Do global search of EAL TB and WC on "sump and tank" and replace with sump.

	NEI IC and Example EALs	Example EAL No.	Plant EAL	Comment	Response
				Validation training: If in Mode 6 and don't have RV level monitoring capability, a sump level rise will meet criterion for both a UE and Alert.	MCD: Change second condition of C.1.3.2 to read "If RCS or Reactor Vessel level cannot be monitored for greater than 15 min., loss of inventory as indicated by unexplained sump level increase."
CA2	**Loss of RPV Inventory with Irradiated Fuel in the RPV**				
	Loss of RPV inventory as indicated by RPV level less than {site-specific level}. (low-low ECCS actuation setpoint) (BWR) (bottom ID of the RCS loop) (PWR)	1	C.1.3.2	EKB verification comment #14 (1.9, 1.7): 1. Presentation of RVLIS water levels in parentheses is confusing. No discussion is provided on the presentation used. 2. Combining CA1 and CA2 not justified or mentioned as a difference. 3. The use of alternate level values under adverse containment conditions is not specified in CA1and not listed as a difference.	MCD: 1. Remove parentheses and connect LI-447/447A and RVLIS with "or". 2. Add EAL TB difference for combining CA1 and CA2. 3. The use of alternate level values under adverse containment conditions is explained in 7th para of basis. This is not a difference from NEI; it is simply the site-specific level.
	Loss of RPV inventory as indicated by unexplained {site-specific} sump and tank level increase AND RPV level cannot be monitored for > 15 minutes	2	C.1.3.2		
CA3	**Loss of All Offsite Power and Loss of All Onsite AC Power to Essential Busses**				
	Loss of power to (site-specific) transformers. AND Failure of (site-specific) emergency generators to supply power to emergency busses. AND Failure to restore power to at least one emergency bus within 15 minutes from the time of loss of both offsite and onsite AC power.	1	C.2.1.2	EKB verification comment #15 (1.9, 1.7): Differences are not justified: 1. Site specific transformers are specified in CA3. 2. Failure to restore power to one bus within 15 minutes is not specified. Similar differences are justified in other EALs, so level of justification is inconsistent.	MCD: Add EAL TB differences and justifications as suggested for consistency with other EALs.
				EKB verification comment #44 (2.3): Matrix has incorrect mode applicabilities. Per TB should be 5, 6, and D.	MCD: Change WC to include only modes 5, 6, and D.
CA4	**Inability to Maintain Plant in Cold Shutdown with Irradiated Fuel in the RPV**		Table C.1-1	Validation training: What is definition of reduced inventory? Make sure EAL TB explains this. PBNP wording that meets EAL intent is "RCS reduced inventory". Use this in EAL wording.	MCD: Change EAL TB and EAL table wording as suggested.
	With CONTAINMENT CLOSURE and RCS integrity not established an UNPLANNED event results in RCS temperature exceeding the Technical Specification cold shutdown temperature limit.	1	C.1.1.2, C.1.2.1	EKB verification comment #16 (1.4): The note only applies to the first and second thresholds per CA4, not all thresholds as represented.	MCD: Change WC Table C.1-1 so astrisk to note only applies for 20 min. and 60 min. thresholds.

	NEI IC and Example EALs	Example EAL No.	Plant EAL	Comment	Response
	With CONTAINMENT CLOSURE established and RCS integrity not established or RCS inventory reduced an UNPLANNED event results in RCS temperature exceeding the Technical Specification cold shutdown temperature limit for greater than 20 minutes.	2	C.1.1.2, C.1.2.1	EKB verification comment #16 (1.4): The note only applies to the first and second thresholds per CA4, not all thresholds as represented.	MCD: Change WC Table C.1-1 so astrisk to note only applies for 20 min. and 60 min. thresholds.
				EKB verification comment #45 (2.2): C.1.1.2 - Matrix Table C.1-1 does not have footnote and has asterisks in first two thresholds, TB does not. See comment on NEI to TB verification for this also.	MCD: Add missing footnote to WC table C.1-1.
	An UNPLANNED event results in RCS temperature exceeding the Technical Specification cold shutdown temperature limit for greater than 60 minutes or results in an RCS pressure increase of greater than {site specific} psig.	3	C.1.1.2, C.1.2.1	EKB verification comment #16 (1.4): Per the CA4 discussion, the first threshold time of 60 minutes applies if the RCS is intact regardless of the containment closure status.	MCD: Delete "Containment Closure established AND..." from first threshold of Table C.1-1 in WC and EAL TB.
				Validation training: What is an unplanned pressure increase? If start a RCP, presure will go up but not sure how much. Never plan to exceed LTOP. If had letdown valve fail, would cause Alert. Should add to EAL wording that the pressure increase is "due to temperature increase." Would prefer EAL wording change "...due to loss of decay heat removal."	MCD: Change EAL TB and EAL wording as suggested.
CS1	**Loss of RPV Inventory Affecting Core Decay Heat Removal Capability**				
	With CONTAINMENT CLOSURE not established: RPV inventory as indicated by RPV level less than {site-specific level} (6" below the low-low ECCS actuation setpoint) (BWR) (6" below the bottom ID of the RCS loop) (PWR) OR RPV level cannot be monitored for > 30 minutes with a loss of RPV inventory as indicated by unexplained {site-specific} sump and tank level increase	1	C.1.3.3, C.1.3.4	EKB verification comment #17 (1.7): The use of alternate level values under adverse containment conditions is not specified in CS1 and not listed as a difference. (C.1.3.3)	MCD: The use of alternate level values under adverse containment conditions is explained in 4th para of basis. This is not a difference from NEI; it is simply the site-specific level.
				EKB verification CR walkthrough comment #77: The containment drain system consists only of a sump – there is no 'tank'.	MCD: Delete tanks. Do global search of EAL TB and WC on "sump and tank" and replace with sump.

	NEI IC and Example EALs	Example EAL No.	Plant EAL	Comment	Response
	With CONTAINMENT CLOSURE established: RPV inventory as indicated by RPV level less than TOAF OR RPV level cannot be monitored for > 30 minutes with a loss of RPV inventory as indicated by either: Unexplained {site-specific} sump and tank level increase Erratic Source Range Monitor Indication	2	C.1.3.3, C.1.3.4	EKB verification comment #17 (1.7): 1. The use of alternate level values under adverse containment conditions is not specified in CS1 and not listed as a difference. (C.1.3.3) 2. Erratic SRM indication does not apply with containment closure not established as specified by CS1 example 1. (C.1.3.4)	MCD: 1. The use of alternate level values under adverse containment conditions is explained in 4th para of EAL basis. This is not a difference from NEI; it is simply the site-specific level. 2. SRM indication does not know if containment closure is established or not and, therefore, should be an alternate indication of reduced vessel inventory. Add difference to EAL TB for C.1.3.4 explaining this.
				Verification CR walkthrough: Add to EAL TB that SRM countrate can be indicated by the audible SRM countrate monitor.	MCD: Change EAL TB as suggested.
				EKB verification CR walkthrough comment #76: RPV is not standard acronym for plant. Reactor Vessel is used.	MCD: Do global search of EAL TB and WC and replace RPV with Reactor Vessel.
CS2	**Loss of RPV Inventory Affecting Core Decay Heat Removal Capability with Irradiated Fuel in the RPV**				
	With CONTAINMENT CLOSURE not established: RPV inventory as indicated by RPV level less than {site-specific level} (6" below the low-low ECCS actuation setpoint) (BWR) (6" below the bottom ID of the RCS loop) (PWR) OR RPV level cannot be monitored with Indication of core uncovery as evidenced by one or more of the following: Containment High Range Radiation Monitor	1	C.1.3.3, C.1.3.5	EKB verification comment #18 (1.7): The use of alternate level values under adverse containment conditions is not specified in CS2 and not listed as a difference. (C.1.3.3)	MCD: The use of alternate level values under adverse containment conditions is explained in the basis. This is not a difference from NEI; it is simply the site-specific level.
				EKB verification CR walkthrough comment #78: The containment drain system consists only of a sump – there is no 'tank'.	MCD: Delete tanks. Do global search of EAL TB and WC on "sump and tank" and replace with sump.
				EKB verification CR walkthrough comment #76: RPV is not standard acronym for plant. Reactor Vessel is used.	MCD: Do global search of EAL TB and WC and replace RPV with Reactor Vessel.
	With CONTAINMENT CLOSURE established RPV inventory as indicated by RPV level less than TOAF OR RPV level cannot be monitored with Indication of core uncovery as evidenced by one or more of the following: Containment High Range Radiation Monitor reading > {site-specific} setpoint Erratic Source Range Monitor Indication Other {site-specific} indications	2	C.1.3.3, C.1.3.5	EKB verification comment #18 (1.7): The use of alternate level values under adverse containment conditions is not specified in CS2 and not listed as a difference. (C.1.3.3)	MCD: The use of alternate level values under adverse containment conditions is explained in the basis. This is not a difference from NEI; it is simply the site-specific level.

	NEI IC and Example EALs	Example EAL No.	Plant EAL	Comment	Response
CG1	**Loss of RPV Inventory Affecting Fuel Clad Integrity with Containment Challenged with Irradiated Fuel in the RPV**	1+2+3			
	Loss of RPV inventory as indicated by unexplained {site-specific} sump and tank level increase	1	C.1.3.6	EKB verification CR walkthrough comment #79: The logic statement is very cumbersome and could lead to confusion.	MCD: Validation team reviewed this EAL and could not develop a less complex way of presenting this EAL. No change needed.
	RPV Level: less than TOAF for > 30 minutes OR cannot be monitored with Indication of core uncovery for > 30 minutes as evidenced by one or more of the following: Containment High Range Radiation Monitor reading > {site-specific} setpoint Erratic Source Range Monitor Indication Other {site-specific} indications	2	C.1.3.6	EKB verification comment #19 (1.7): The use of alternate level values under adverse containment conditions is not specified in CG1 and not listed as a difference.	MCD: The use of alternate level values under adverse containment conditions is explained in the basis. This is not a difference from NEI; it is simply the site-specific level.
	{Site specific} indication of CONTAINMENT challenged as indicated by one or more of the following: Explosive mixture inside containment Pressure above {site specific} value CONTAINMENT CLOSURE not established Secondary Containment radiation monitors above {site specific} value (BWR only)	3	C.1.3.6	Validation training: Put containment closure first in list and underline "not".	MCD: Move Containment Closure to top of list as suggested.
				EKB verification CR walkthrough comment #78: The containment drain system consists only of a sump – there is no 'tank'.	MCD: Delete tanks. Do global search of EAL TB and WC on "sump and tank" and replace with sump.
				EKB verification CR walkthrough comment #76: RPV is not standard acronym for plant. Reactor Vessel is used.	MCD: Do global search of EAL TB and WC and replace RPV with Reactor Vessel.
	Category D - Defueled Station Malfunction			[Applicable to Defueled plants only]	[Applicable to Defueled plants only]
	Category E - Events Related to Independent Spent Fuel Storage Installations (ISFSI)				
E-HU1	**Damage to a loaded cask CONFINEMENT BOUNDARY.**			EKB verification comment #46 (2.1): Matrix sub category designation does not match TB.	MCD: Change WC subcategory titles to agree with EAL TB.

	NEI IC and Example EALs	Example EAL No.	Plant EAL	Comment	Response
	Natural phenomena events affecting a loaded cask CONFINEMENT BOUNDARY. (site-specific list)	1	A.8.1.1	EKB verification comment #21 (1.7, 1.2): 1. Use of rad levels versus the specified conditions is discussed in basis but not listed as differences. 2. Operating modes are specified as N/A in E-HU1.	MCD: 1. Add EAL TB difference explaining the use of rad levels in place of conditions in E-HU1. 2. Add EAL TB difference explaining that all operating modes listed in A.8.1.1 is equivalent to the NEI "N/A."
	Accident conditions affecting a loaded cask CONFINEMENT BOUNDARY. (site-specific list)	2	A.8.1.1	Validation training: When are casks monitored for radiation?	CKW: Believe HP does periodic surveys unless another event requires checking the status of the casks.
	Any condition in the opinion of the Emergency Director that indicates loss of loaded fuel storage cask CONFINEMENT BOUNDARY.	3	A.8.1.1		
E-HU2	**Confirmed Security Event with potential loss of level of safety of the ISFSI.**				
	Security Event as determined from (site-specific) Security Plan and reported by the (site-specific) security shift supervision.	1	A.8.1.2	EKB verification comment #22 (1.2): Operating modes are specified as N/A in E-HU2.	MCD: Add EAL TB \difference explaining that all operating modes listed in A.8.1.2 is equivalent to the NEI "N/A."
	Category F - Fission Product Barrier Degradation				
		NA	H.5.1.3	EKB verification comment #25 (1.1): "Any" is not specified in FS1 at beginning of sentence. This confuses the logic since it is not the loss of any barrier, but the loss of any two barriers.	MCD: Delete "Any" from beginning of EAL wording to remove confusion.
		NA	H.5.1.4	EKB verification comment #26 (1.1): FG1 specifies "loss of any two barriers." The 'any' is dropped in H.5.1.4. While it is explained in the discussion, use of this term clarifies the equal weighting of all barriers at this level.	MCD: Change to "loss of any two barriers..."
PWR FC	**Fuel Clad (FC) Barrier**		H.5.1.1, H.5.1.2, H.5.1.4	EKB verification comment #47, 48, 49 (2.2):IC statement does not match TB.	MCD: Change WC IC statement to agree with TB.
			N/A	EKB verification comment #50 (2.4): Loss and Potential Loss Columns are reversed from TB.	MCD: Change EAL TB to agree with WC.
			Table H.5-1 EAL TB Att. 2	Validation checklist 4 (12): Consider deleteting from the FPB Table H.5-1 the Orange or Red Path entry criteria; use the parameter thresholds and parenthetically reference the procedure that the path points to.	MCD: For any threshold of a CSFST, add parenthetical reference of the procedure the path points to instead of the CSFST figure.
			Table H.5-1	Validation training: Background color in table heading overwhelms this category.	MCD: Remove color. Leave background white.

	NEI IC and Example EALs	Example EAL No.	Plant EAL	Comment	Response
				Validation training: Consider numbering loss and potential loss thresholds instead of boxes; makes communications easier. Hollow bullets at PBNP mean ORs; solid bullets mean AND. Consider breaking up all OR FPB thresholds into separately numbered thresholds to simplify logic.	MCD: Number loss/potential loss indicators in EAL table and TB Attachment 2. Use open bullets instead of dashes in EAL wording that has lists of several options. Break up FPB thresholds: 5th PC loss, 3rd PC loss, 4th PC loss.
			Table H.5-1	Validation simulator scenario 2: Consider deleteing thresholds that say "conditions requiring entry to..." and put a procedure reference in the trhesholds with corresponding CSFST parameters.	MCD: No. For any threshold of a CSFST, add parenthetical reference of the procedure the path points to instead of the CSFST figure.
1	**Critical Safety Function Status**				
	Core-Cooling Red	1	H.5.1.1, H.5.1.2, H.5.1.3, H.5.1.4		
	Core Cooling-Orange OR Heat Sink-Red	1	H.5.1.1, H.5.1.2, H.5.1.3, H.5.1.4		
2	**Primary Coolant Activity Level**				
	Coolant Activity GREATER THAN (site-specific) Value	1	H.5.1.1, H.5.1.2, H.5.1.3, H.5.1.4		
	NA	1	None		
3	**Core Exit Thermocouple Readings**				
	GREATER THAN (site-specific) degree F	1	H.5.1.1, H.5.1.2, H.5.1.3, H.5.1.4		
	GREATER THAN (site-specific) degree F	1	H.5.1.1, H.5.1.2, H.5.1.3, H.5.1.4		
4	**Reactor Vessel Water Level**				
	NA	1	None		
	Level LESS than (site-specific) value	1	H.5.1.1, H.5.1.2, H.5.1.3, H.5.1.4		
5	**Containment Radiation Monitoring**				
	Containment rad monitor reading GREATER THAN (site-specific) R/hr	1	H.5.1.1, H.5.1.2, H.5.1.3, H.5.1.4	EKB verification comment #23, 24, 25, 26 (1.7, 1.9): Could not verify Attachment 2 FC Loss containment rad monitor reading because it was not supplied at time of verification.	MCD: Verify at later date.

NEI IC and Example EALs		Example EAL No.	Plant EAL	Comment	Response
			H.5.1.1, H.5.1.2, H.5.1.3, H.5.1.4	EKB verification CR walkthrough comment #70: Table H.5-1 Containment high radiation monitor indication is a logarithmic scale. Values are not specified yet so verification against scale cannot be done. Want to capture comment that indication specified must be readable on the log scale.	
	NA	1	None		
6	**Other (Site-Specific) Indications**				
	(Site specific) as applicable	1	None		
	(Site specific) as applicable	1	None		
7	**Emergency Director Judgment**				
	Any condition in the opinion of the Emergency Director that indicates Loss or Potential Loss of the Fuel Clad Barrier	1	H.5.1.1, H.5.1.2, H.5.1.3, H.5.1.4		
PWR RCS	**Reactor Coolant System (RCS) Barrier**				
1	**Critical Safety Function Status**				
	NA	1	None		
	RCS Integrity-Red OR Heat Sink-Red	1	H.5.1.1, H.5.1.2, H.5.1.3, H.5.1.4		
2	**RCS Leak Rate**				
	GREATER THAN available makeup capacity as indicated by a loss of RCS subcooling	1	H.5.1.1, H.5.1.2, H.5.1.3, H.5.1.4		
	Unisolable leak exceeding the capacity of one charging pump in the normal charging mode	1	H.5.1.1, H.5.1.2, H.5.1.3, H.5.1.4	Validation training: Just use the leak rate number rounded to 60 gpm to avoid confusion on numbers of available charging pumps.	MCD: Change as suggested and ensure EAL TB basis discussion is appropriate for new wording.
3	**SG Tube Rupture**				
	SGTR that results in an ECCS (SI) Actuation	1	H.5.1.1, H.5.1.2, H.5.1.3, H.5.1.4	Validation training: Could be confusion if SI actuation caused manually or for some other reason than SGTR. Consider changing to SGTR in excess of available charging pumps and explain in EAL TB that 140 gpm is the design maximum of all charging pumps.	MCD: Change EAL wording and TB as suggested. MCD: would need reference for 140 gpm; could be in DBD. Need to check.
	NA	1	None		
4	**Containment Radiation Monitoring**				

	NEI IC and Example EALs	Example EAL No.	Plant EAL	Comment	Response
	Containment rad monitor reading GREATER THAN (site-specific) R/hr	1	H.5.1.1, H.5.1.2, H.5.1.3, H.5.1.4	EKB verification comment #23, 24, 25, 26 (1.7, 1.9): 2. Could not verify Attachment 2 RCS Loss containment rad monitor reading because it was not supplied at time of verification.	MCD: Verify at later date.
			H.5.1.1, H.5.1.2, H.5.1.3, H.5.1.4	EKB verification CR walkthrough comment #70: Table H.5-1 Containment high radiation monitor indication is a logarithmic scale. Values are not specified yet so verification against scale cannot be done. Want to capture comment that indication specified must be readable on the log scale.	
	NA	1	None		
5	**Other (Site-Specific) Indications**				
	(Site specific) as applicable	1	H.5.1.1, H.5.1.2, H.5.1.3, H.5.1.4		
	(Site specific) as applicable	1	H.5.1.1, H.5.1.2, H.5.1.3, H.5.1.4		
6	**Emergency Director Judgment**				
	Any condition in the opinion of the Emergency Director that indicates Loss or Potential Loss of the RCS Barrier	1	H.5.1.1, H.5.1.2, H.5.1.3, H.5.1.4		
PWR PC	**Containment (PC) Barrier**				
1	**Critical Safety Function Status**				
	NA	1	None		
	Containment-Red	1	H.5.1.1, H.5.1.2, H.5.1.3, H.5.1.4		
2	**Containment Pressure**				
	Rapid unexplained decrease following initial increase	1	H.5.1.1, H.5.1.2, H.5.1.3, H.5.1.4		
	Containment pressure or sump level response not consistent with LOCA conditions	2	H.5.1.1, H.5.1.2, H.5.1.3, H.5.1.4	Validation training: What is response not consistent with LOCA conditions.	MCD: Explained in EAL TB.
	(Site-specific) PSIG and increasing	1	H.5.1.1, H.5.1.2, H.5.1.3, H.5.1.4		

	NEI IC and Example EALs	Example EAL No.	Plant EAL	Comment	Response
	Explosive mixture exists	2	H.5.1.1, H.5.1.2, H.5.1.3, H.5.1.4	EKB verification comment #23, 24, 25, 26 (1.7, 1.9): Explosive mixture does not list 6% hydrogen in table. In other EAL (C.1.3.6), it is. This is inconsistent.	MCD: 6. Change the 3rd PC potential loss from "Explosive mixture exists in containment" to "Hydrogen concentration in containment ≥6%" to remove inconsistency.
	Pressure greater than containment depressurization actuation setpoint with less than one full train of depressurization equipment operating	3	H.5.1.1, H.5.1.2, H.5.1.3, H.5.1.4	Verification CR walkthrough: Spell out in the EAL wording that one full train of depressurization equipment consists of one train of containment spray and two containment accident fan cooler units.	MCD: Revise EAL wording and EAL TB as suggested.
			H.5.1.1, H.5.1.2, H.5.1.3, H.5.1.4	EKB verification CR walkthrough comment #71: Table H.5-1 PC potential loss 4 – cannot readily find a definition of "one full train of depressurization equipment".	MCD: Spell out in the EAL wording that one full train of depressurization equipment consists of one train of containment spray and two containment accident fan cooler units.
3	**Core Exit Themocouple Reading**				
	NA	1	None		
	Core exit thermocouples in excess of 1200 degrees and restoration procedures not effective within 15 minutes; or, core exit thermocouples in excess of 700 degrees with reactor vessel level below top of active fuel and restoration procedures not effective within 15 minutes	1	H.5.1.1, H.5.1.2, H.5.1.3, H.5.1.4	Validation simulator scenario #2: After breaking out this into two thresholds to clarify and/or logic, reference that CETS are Orange Path, etc.	MCD: Change as suggested (for 700F and 25 ft).
4	**SG Secondary Side Release with P-to-S Leakage**				
	RUPTURED S/G is also FAULTED outside of containment	1	H.5.1.1, H.5.1.2, H.5.1.3, H.5.1.4		
	Primary-to-Secondary leakrate greater than 10 gpm with nonisolable steam release from affected S/G to the environment	2	H.5.1.1, H.5.1.2, H.5.1.3, H.5.1.4	Validation training: WC 3rd Containment Loss - break into two thresholds to avoid OR logic. For leak less than rupture (10 gpm), if greater than 10 gpm, have a SGTR, therefore 1st threshold is always subset of second. Is it needed? Leave as separate thresholds.	MCD: Break into two separate thresholds.
				EKB verification CR walkthrough comment #80: Table H.5-1 PC loss 4 – the logic statement is very cumbersome and could lead to confusion.	MCD: Break into two separate thresholds.
	NA	1	None		
5	**CNMT Isolation Valves Status After CNMT Isolation**				
	Valve(s) not closed AND downstream pathway to the environment exists	1	H.5.1.1, H.5.1.2, H.5.1.3, H.5.1.4	EKB verification comment #23, 24, 25, 26 (1.7, 1.9): Containment Loss 4 – added criteria "Inability to isolate any primary system discharging outside containment" not listed as difference.	MCD: Add EAL TB difference.

	NEI IC and Example EALs	Example EAL No.	Plant EAL	Comment	Response
			H.5.1.1, H.5.1.2, H.5.1.3, H.5.1.4	EKB verification comment #23, 24, 25, 26 (1.7, 1.9): Could not verify definition of one full train of depressurization equipment because it was not supplied at time of verification. (Containment Potential Loss 4)	MCD: Verified during CR verification walkthrough.
	NA	1	None		
6	**Significant Radioactive Inventory in Containment**				
	NA	1	None		
	Containment rad monitor reading GREATER THAN (site-specific) R/hr	1	H.5.1.1, H.5.1.2, H.5.1.3, H.5.1.4	EKB verification comment #23, 24, 25, 26 (1.7, 1.9): Could not verify Attachment 2 Containment Potential Loss containment rad monitor reading because it was not supplied at time of verification.	MCD: Verify at later date.
			H.5.1.1, H.5.1.2, H.5.1.3, H.5.1.4	EKB verification CR walkthrough comment #70: Table H.5-1 Containment high radiation monitor indication is a logarithmic scale. Values are not specified yet so verification against scale cannot be done. Want to capture comment that indication specified must be readable on the log scale.	
7	**Other (Site-Specific) Indications**				
	(Site specific) as applicable	1	None		
	(Site specific) as applicable	1	None		
8	**Emergency Director Judgment**				
	Any condition in the opinion of the Emergency Director that indicates Loss or Potential Loss of the Containment barrier	1	H.5.1.1, H.5.1.2, H.5.1.3, H.5.1.4		
	Category H - Hazards and Other Conditions Affecting Plant Safety				
HU1	**Natural and Destructive Phenomena Affecting the PROTECTED AREA**		All A.6 EALs	EKB verification comment #27 (1.8): 2. A.6.2.2 – As required by checklist item 1.8, partial implementation of HU1 not identified/justified. Reference does not identify HU1.4. This comment applies to all other HU1 derived EALs in this section, with each section not referencing the appropriate example number.	MCD: For clarity of these EALs in the EAL TB, add example EAL no. to the NEI reference and add a difference explaining reason for implementing HU1 in multiple EALs.
		NA	A.6.2.2, A.6.3.1, A.6.4.1, A.6.4.2,	EKB verification comment #51 (2.5): See comment on H.4.2.1 mode applicability in NEI to TB verification comments.	MCD: No WC change. See response on H.4.2.1 mode applicability in NEI to TB verification comments.

	NEI IC and Example EALs	Example EAL No.	Plant EAL	Comment	Response
	(Site-Specific) method indicates felt earthquake.	1	A.6.4.1	EKB verification comment #27 (1.8): 2. A.6.2.2 – As required by checklist item 1.8, partial implementation of HU1 not identified/justified. Reference does not identify HU1.4. This comment applies to all other HU1 derived EALs in this section, with each section not referencing the appropriate example number. Validation training: seismic instrument modification may affect wording of this EAL.	MCD: For clarity of these EALs in the EAL TB, add example EAL no. to the NEI reference and add a difference explaining reason for implementing HU1 in multiple EALs.
	Report by plant personnel of tornado or high winds greater than (site-specific) mph striking within PROTECTED AREA boundary.	2	A.6.4.2	Validation comment: What does "sustained" mean? PPCS has capability of giving a "sustained" reading. Done currently for AOP setpoint at 35 mph.	Pat Schwartz took action to follow up on use of PPCS function to read sustained 108 mph. Are there any other thresholds that should use this function?
	Vehicle crash into plant structures or systems within PROTECTED AREA boundary.	3	A.6.3.1		
	Report by plant personnel of an unanticipated EXPLOSION within PROTECTED AREA boundary resulting in VISIBLE DAMAGE to permanent structure or equipment.	4	A.6.2.2	EKB verification comment #27 (1.7): A.6.2.2 – Deletion of "unanticipated" as specified by HU1 is not listed as difference.	MCD: Would there ever be an "anticipated" explosion causing visible damage to a plant structure? Easier to add "unanticipated" to the EAL A.6.2.2 wording.
	Report of turbine failure resulting in casing penetration or damage to turbine or generator seals.	5	H.4.2.1	EKB verification comment #27 (1.7): H.4.2.1 – Criteria added "failure requiring turbine trip" not identified as a difference.	MCD: Add difference to EAL TB for H.4.2.1.
				EKB verification comment #27 (1.2): H.4.2.1 – Mode applicability does not indicate 5, 6, or D as specified by HU1. Not identified as a difference.	MCD: Add difference in EAL TB for EAL H.4.2.1 explaining that there are no turbine operations for which a casing/seal failure would be of concern to a safety system while in modes 5, 6 and D.
	Uncontrolled flooding in (site-specific) areas of the plant that has the potential to affect safety related equipment needed for the current operating mode.	6	A.6.4.3	Validation training: How does one know if forebay water level is above 8 ft? Forebay floor level is at 8 ft. If operator gets his feet wet, it's greater than 8 feet. Should EAL wording be changed to lake level above forebay floor level?	PBNP to pursue best way to identify forebay level at 8 ft.
			A.6.4.3	EKB verification CR walkthrough comment #69: Cannot determine specified water levels (8 feet and 9 feet respectively) on the control room indications.	PBNP to pursue best way to identify forebay level at 8 ft.
	(Site-Specific) occurrences affecting the PROTECTED AREA.	7			
HU2	**FIRE Within PROTECTED AREA Boundary Not Extinguished Within 15 Minutes of Detection**				

	NEI IC and Example EALs	Example EAL No.	Plant EAL	Comment	Response
	FIRE in buildings or areas contiguous to any of the following (site-specific) areas not extinguished within 15 minutes of control room notification or verification of a control room alarm: (Site-specific) list	1	A.6.2.1	EKB verification comment #28 (3.1, 1.5): 1. Syntax not correct in EAL statement. 2. Discussion does not agree with EAL statement. Discussion refers to "notification" which is not used in the EAL statement, and discussion uses "verify" while the statement uses "confirmed". This could cause confusion. 3. Could not verify Table A.6-1 accurate. No references listed were supplied for verification.	MCD: 1. Add comma after "Table A.6-1" in the EAL wording. Also, underline the word "not." 2. Revise EAL TB basis discussion to eliminate possible confusion. 3. PBNP personnel should verify.
HU3	**Release of Toxic or Flammable Gases Deemed Detrimental to Normal Operation of the Plant**				
	Report or detection of toxic or flammable gases that have or could enter normally occupied areas of the site in amounts that can affect NORMAL PLANT OPERATIONS.	1	A.6.3.2		
	Report by Local, County or State Officials for evacuation or sheltering of site personnel based on an offsite event.	2	A.6.3.2	EKB verification comment #29 (1.7): HU3 does not specify "potential" evacuation or sheltering. This is not identified as a difference.	MCD: Delete "potential" from EAL wording.
HU4	**Confirmed Security Event Which Indicates a Potential Degradation in the Level of Safety of the Plant**				
	Security events as determined from (site-specific) Safeguards Contingency Plan and reported by the (site-specific) security shift supervision	1	A.6.1.1		
	A credible site specific security threat notification.	2	A.6.1.1		
HU5	**Other Conditions Existing Which in the Judgment of the Emergency Director Warrant Declaration of a NOUE**				
	Other conditions exist which in the judgment of the Emergency Director indicate that events are in process or have occurred which indicate a potential degradation of the level of safety of the plant. No releases of radioactive material requiring offsite response or monitoring are expected unless further degradation of safety systems occurs.	1	A.7.1.1		
HA1	**Natural and Destructive Phenomena Affecting the Plant VITAL AREA**	NA	All HA1 EALs	EKB verification comment #30 (1.8): As required by checklist item 1.8, partial implementation of HU1 not identified/justified. Reference does not identify individual examples. This comment applies to all HA1 derived EALs in this section, with each section not referencing the appropriate example number.	MCD: Add EAL TB differences explaining why EALs for HA1 example EALs are implemented in several EALs.

NEI IC and Example EALs	Example EAL No.	Plant EAL	Comment	Response
	NA	A.6.3.3, A.6.4.4, A.6.4.5, A.6.4.6, H.4.2.2	EKB verification comment #52 (2.5): See comment on H.4.2.2 mode applicability in NEI to TB verification comments.	MCD: No WC change. See response on H.4.2.2 mode applicability in NEI to TB verification comments.
(Site-Specific) method indicates Seismic Event greater than Operating Basis Earthquake (OBE).	1	A.6.4.4	EKB verification comment #30 (1.7): A.6.4.4 – HA1 does not specify criteria that earthquake be felt or the consensus of operators (unlike discussion for the UE). If reach OBE, requires classification regardless of being felt.	MCD: Delete from EAL A.6.6.4 wording criteria that earthquake be felt or the consensus of operators. Modify EAL TB basis discussion accordingly.
			Validation training: seismic instrument modification may affect wording of this EAL.	
			EKB verification CR walkthrough comment #67: The procedure (AOP-28) references an 'OBE' and not the numerical values listed in the EAL.	
Tornado or high winds greater than (site-specific) mph within PROTECTED AREA boundary and resulting in VISIBLE DAMAGE to any of the following plant structures / equipment or Control Room indication of degraded performance of those systems. · Reactor Building · Intake Building · Ultimate Heat Sink · Refueling Water Storage Tank · Diesel Generator Building · Turbine Building · Condensate Storage Tank · Control Room · Other (Site-Specific) Structures.	2	A.6.4.5	EKB verification comment #30 (1.7): A.6.4.5 – HA1 specifies "and resulting in visible damage". Not identified as a difference.	MCD: Identify as difference in EAL TB and explain that such winds/tornados by definition exceed design basis loads and will result in visible damage.
			EKB verification comment #30 (1.7): Unable to verify safe shutdown systems.	MCD: PBNP personnel should verify these systems.
			EKB verification CR walkthrough comment #68: Cannot verify the upper end (maximum indicated) of the wind speed indication.	MCD: During validation scenarios on the simulator, PBNP personnel indicated 108 mph is readable. No changes required.
Vehicle crash within PROTECTED AREA boundary and resulting in VISIBLE DAMAGE to any of the following plant structures or equipment therein or control indication of degraded performance of those systems: · Reactor Building · Intake Building · Ultimate Heat Sink · Refueling Water Storage Tank · Diesel Generator Building · Turbine Building · Condensate Storage Tank · Control Room · Other (Site-Specific) Structures.	3	A.6.3.3	EKB verification comment #30 (1.7): HA1 does not specify "or precludes access to." Not identified as a difference.	MCD: Added the missing phrase to the EAL wording prior to validation.
			EKB verification comment #30 (1.7): Unable to verify safe shutdown systems.	MCD: PBNP personnel should verify these systems.

	NEI IC and Example EALs	Example EAL No.	Plant EAL	Comment	Response
	Turbine failure-generated missiles result in any VISIBLE DAMAGE to or penetration of any of the following plant areas: (site-specific) list.	4	H.4.2.2	EKB verification comment #30 (1.2): H.4.2.2 – HA1 specifies applicable in All Modes. Not identified as a difference.	MCD: Add EAL TB difference explaining that there are no turbine operations for which a casing/seal failure would be of concern to a safety system while in modes 5, 6 and D.
	Uncontrolled flooding in (site-specific) areas of the plant that results in degraded safety system performance as indicated in the control room or that creates industrial safety hazards (e.g., electric shock) that precludes access necessary to operate or monitor safety equipment.	5	A.6.4.6	EKB verification comment #30 (1.7): A.6.4.6 – HA1 specifies actual flooding, not the potential based on high water levels. Not specified as a difference.	MCD: Identify as difference in EAL TB and explain that such lake levels by definition exceed design basis and will result in plant flooding.
			A.6.4.6	EKB verification CR walkthrough comment #69: Cannot determine specified water levels (8 feet and 9 feet respectively) on the control room indications.	PBNP to pursue best way to identify forebay level at 8 ft.
	(Site-Specific) occurrences within PROTECTED AREA boundary and resulting in VISIBLE DAMAGE to plant structures containing equipment necessary for safe shutdown, or has caused damage as evidenced by control room indication of degraded performance of those systems.	6	None		
HA2	**FIRE or EXPLOSION Affecting the Operability of Plant Safety Systems Required to Establish or Maintain Safe Shutdown**				
	FIRE or EXPLOSION in any of the following (site-specific) areas: (Site-specific) list AND Affected system parameter indications show degraded performance or plant personnel report VISIBLE DAMAGE to permanent structures or equipment within the specified area.	1	A.6.2.3		
HA3	**Release of Toxic or Flammable Gases Within or Contiguous to a VITAL AREA Which Jeopardizes Operation of Systems Required to Establish or Maintain Safe Shutdown**				
	Report or detection of toxic gases within or contiguous to a VITAL AREA; in concentrations that may be unsafe to plant personnel AND personnel are NOT able to access the area for the safe operation of the plant.	1	A.6.3.4		
	Report or detection of gases in concentration greater than the LOWER FLAMMABILITY LIMIT within or contiguous to a VITAL AREA.	2	A.6.3.4		
HA4	**Confirmed Security Event in a Plant PROTECTED AREA**				

	NEI IC and Example EALs	Example EAL No.	Plant EAL	Comment	Response
	INTRUSION into the plant PROTECTED AREA by a HOSTILE FORCE.	1	A.6.1.2	EKB verification comment #53: Needs site specific information. Validation checklist 2 (10): Verify use of Protected Area is appropriate. May need to be changed to Exclusion Area. Pat Schwartz noted that this was an issue in drafting the current interim security EALs.	MCD: PBNP personnel should verify when they provide input. Pat Schwartz has taken action to resolve this comment.
	Other security events as determined from (site-specific) Safeguards Contingency Plan and reported by the (site-specific) security shift supervision	2	A.6.1.2	EKB verification comment #30: Unable to verify second criteria of EAL. Not specified in verification copy. This was noted during validation as well.	MCD: PBNP personnel should verify second criterion when they provide requested site-specific input.
HA5	**Control Room Evacuation Has Been Initiated**				
	Entry into (site-specific) procedure for control room evacuation.	1	A.4.1.1	Validation training: Reference to AOP-10A may not be correct for all conditions requiring control room evacuation. For example, a fire in the relay room may require control room evacuation but only AOP-10B is used instead of 10A. Should procedure reference in the EAL wording be changed? deleted?	MCD: Change A.4.1.1 EAL wording to "Control Room evacuation initiated." Reference in TB AOP-10.
HA6	**Other Conditions Existing Which in the Judgment of the Emergency Director Warrant Declaration of an Alert**				
	Other conditions exist which in the judgment of the Emergency Director indicate that events are in process or have occurred which involve actual or likely potential substantial degradation of the level of safety of the plant. Any releases are expected to be limited to small fractions of the EPA Protective Action Guideline exposure levels.	1	A.7.1.2	EKB verification comment #31: HA6 specifies "any releases are expected to be limited to small fractions of...". Not identified as a difference.	MCD: Change EAL wording to NEI wording of this sentence.
HS1	**Confirmed Security Event in a Plant VITAL AREA**				
	INTRUSION into the plant VITAL AREA by a HOSTILE FORCE.	1	A.6.1.3	EKB verification comment #54: Needs site specific information. This was noted during validation as well. Validation checklist #2 (10): Clarify in the EAL TB that the advisary is intruding into the Vital Area not just anyone entering the Vital Area by mistake. Classification need not be made if the intrusion is not an adversary.	MCD: PBNP personnel should verify when they provide input. MCD: Change TB discussion as suggested.
	Other security events as determined from (site-specific) Safeguards Contingency Plan and reported by the (site-specific) security shift supervision	2	None	EKB verification comment #32: Unable to verify second criteria of EAL. Not specified in verification copy.	MCD: PBNP personnel should verify second criterion when they provide requested site-specific input.
HS2	**Control Room Evacuation Has Been Initiated and Plant Control Cannot Be Established**				

	NEI IC and Example EALs	Example EAL No.	Plant EAL	Comment	Response
	Control room evacuation has been initiated. AND Control of the plant cannot be established per (site-specific) procedure within (site-specific) minutes.	1	A.4.1.2	EKB verification comment #55 (2.2): Matrix time frame different than TB. TB specifies≤ 15 minutes.	MCD: Change WC to ≤ 15 min.
				Validation training: Refrence to AOP-10A may not be correct for all conditions requiring control room evacuation. For example, a fire in the relay room may require control room evacuation but only AOP-10B is used instead of 10A. Should procedure reference in the EAL wording be changed? deleted?	MCD: Change A.4.1.2 to "Control Room evacuation AND transfer of plant control cannot be established in less than or equal to 15 min."
				Verification CR walkthrough comment #66: The wording in the step is ambiguous; looking at the procedures, it is difficult to define "local control". Plant control verbiage is ambiguous - change to transfer of control ranther than plant control has been established.	MCD: Change A.4.1.2 to "Control Room evacuation AND transfer of plant control cannot be established in less than or equal to 15 min."
HS3	**Other Conditions Existing Which in the Judgment of the Emergency Director Warrant Declaration of Site Area Emergency**				
	Other conditions exist which in the judgment of the Emergency Director indicate that events are in process or have occurred which involve actual or likely major failures of plant functions needed for protection of the public. Any releases are not expected to result in exposure levels which exceed EPA Protective Action Guideline exposure levels beyond the site boundary.	1	A.7.1.3	EKB verification comment #33: There is an inconsistency with HA6 since this EAL uses the EPA PAG statement specified in HS3, but A.7.1.2 does not use the statement as specified in HA6.	MCD: Change EAL wording to NEI wording of this sentence.
HG1	**Security Event Resulting in Loss Of Physical Control of the Facility**				
	A HOSTILE FORCE has taken control of plant equipment such that plant personnel are unable to operate equipment required to maintain safety functions.	1	A.6.1.4	EKB verification comment #56 (2.2): TB specifies functions, matrix function.	MCD: Change WC to "functions."
				Validation checklist 2 (11): Need to specify the safety functions. ED was not sure of the scope. EAL TB mentions reactivity, etc. Consider listing in the EAL wording.	MCD: Change WC to "An adversary has taken control of plant equipment such that plant personnel are unable to operate equipment required to maintain safety functions: Reactivity control, RCS inventory, Secondary heat removal."
HG2	**Other Conditions Existing Which in the Judgment of the Emergency Director Warrant Declaration of General Emergency**				

	NEI IC and Example EALs	Example EAL No.	Plant EAL	Comment	Response
	Other conditions exist which in the judgment of the Emergency Director indicate that events are in process or have occurred which involve actual or imminent substantial core degradation or melting with potential for loss of containment integrity. Releases can be reasonably expected to exceed EPA Protective Action Guideline exposure levels offsite for more than the immediate site area.	1	A.7.1.4	EKB verification comment #34 (1.7): Wording different from HG2 in several parts: 1. Does not use potential for loss of containment as specified in HG2 2. Does not use the phrase "more than immediate area" as specified by HG2. 3. Includes shift supervisor in addition to emergency director. These are not identified as differences.	MCD: 1. Add EAL TB difference explaining that cannot get a large rad release of this magnitude offsite without loss of Containment. 2. Since the exposure levels offsite are of concern, the EAL wording "beyond the site boundary" is appropriate. Explain as a difference in the EAL TB. 3. Delete "Shift Supervisor" from EAL wording.
	Category S - System Malfunction				
SU1	**Loss of All Offsite Power to Essential Busses for Greater Than 15 Minutes**				
	Loss of power to (site-specific) transformers for greater than 15 minutes. AND At least (site-specific) emergency generators are supplying power to emergency busses.	1	H.2.1.1		
SU2	**Inability to Reach Required Shutdown Within Technical Specification Limits**				
	Plant is not brought to required operating mode within (site-specific) Technical Specifications LCO Action Statement Time.	1	H.4.1.1		
SU3	**UNPLANNED Loss of Most or All Safety System Annunciation or Indication in The Control Room for Greater Than 15 Minutes**				
	UNPLANNED loss of most or all (site-specific) annunciators or indicators associated with safety systems for greater than 15 minutes.	1	H.4.3.1	Validation training: Don't put "(CO2)" in parentheses. It is not unit specific.	MCD: Remove parentheses and delimit with comma.
SU4	**Fuel Clad Degradation**				
	(Site-specific) radiation monitor readings indicating fuel clad degradation greater than Technical Specification allowable limits.	1	A.1.2.1	EKB verification comment #57 (2.3): A.1.2.1 - Matrix does not reflect applicability modes 1 and 2.	MCD: Change WC A.1.2.1 to include modes 1 and 2.
	(Site-specific) coolant sample activity value indicating fuel clad degradation greater than Technical Specification allowable limits.	2	A.1.3.1		
SU5	**RCS Leakage** Unidentified or pressure boundary leakage greater than 10 gpm.	1	A.2.1.1		
	Identified leakage greater than 25 gpm.	2	A.2.1.1		
SU6	**UNPLANNED Loss of All Onsite or Offsite Communications Capabilities.**				

	NEI IC and Example EALs	Example EAL No.	Plant EAL	Comment	Response
	Loss of all (site-specific list) onsite communications capability affecting the ability to perform routine operations.	1	A.5.1.1	EKB verification comment #35: Table A.5-1 is not referenced in the EAL, only in discussion. This is inconsistent with use/display of tables in other EALs.	MCD: No changes required. Communication systems are well known by EDs. Table A.5-1 is not needed in the EAL wording and is included in the basis discussion for completeness and reference by those less familiar with the communication systems.
				EKB verification comment #58 (2.3): Matrix incorrectly reflects mode D applicability.	MCD: Change WC to delete mode D applicability.
	Loss of all (site-specific list) offsite communications capability.	2	A.5.1.1	EKB verification comment #35: Table A.5-1 is not referenced in the EAL, only in discussion. This is inconsistent with use/display of tables in other EALs.	MCD: No changes required. Communication systems are well known by EDs. Table A.5-1 is not needed in the EAL wording and is included in the basis discussion for completeness and reference by those less familiar with the communication systems.
SU8	**Inadvertent Criticality**				
	An UNPLANNED extended positive period observed on nuclear instrumentation.	1	None	This example EAL is applicable to BWR plants only.	
	An UNPLANNED sustained positive startup rate observed on nuclear instrumentation.	2	A.1.1.1		
SA2	**Failure of Reactor Protection System Instrumentation to Com-plete or Initiate an Automatic Reactor Scram Once a Reactor Protection System Setpoint Has Been Exceeded and Manual Scram Was Successful**				
	Indication(s) exist that indicate that reactor protection system setpoint was exceeded and automatic scram did not occur, and a successful manual scram occurred.	1	H.1.1.1	Validation training: Don't need the added condition "AND manual trip is successful." This is confusing since the escalation to the SAE is not necessarily the mutually exclusive opposite of this condition.	MCD: Delete "AND manual trip is successful" from the EAL wording and explain difference in the EAL TB.
SA4	**UNPLANNED Loss of Most or All Safety System Annunciation or Indication in Control Room With Either (1) a SIGNIFICANT TRANSIENT in Progress, or (2) Compensatory Non-Alarming Indicators are Unavailable**				
	UNPLANNED loss of most or all (site-specific) annunciators or indicators associated with safety systems for greater than 15 minutes. AND Either of the following: (a or b) a. A SIGNIFICANT TRANSIENT is in progress. OR b. Compensatory non-alarming indications are unavailable.	1	H.4.3.2	EKB verification comment #34 (1.5): The basis discussion implies there are more than one compensatory indications (e.g., PPCS, etc.), but the EAL only specifies PPCS.	MCD: Change EAL TB basis discussion so that it does not imply there are more than one compensatory indications.

	NEI IC and Example EALs	Example EAL No.	Plant EAL	Comment	Response
SA5	**AC power capability to essential busses reduced to a single power source for greater than 15 minutes such that any additional single failure would result in station blackout**				
	AC power capability to site-specific essential busses reduced to a single power source for greater than 15 minutes AND Any additional single failure will result in station blackout.	1	H.2.1.2	EKB verification comment #37 (1.7, 1.9): 1. The second criterion specified by SA5 is not used in the EAL. This is not identified as a difference. 2. It is not clear in the EAL that GO5 (the gas turbine generator) is included.	MCD: 1. Add EAL TB difference explaining that the listed power sources represent all possible power sources. The loss of an additional source, therefore, would cause a SBO. 2. The EAL wording specifies the LVSATs. G05 can only provide power to the plant through the LVSATs. Per discussion with Ops, it is not necessary to identify G05 in the EAL wording if LVSATs are there.
				Validation training: Instead of "any DG" try using "a single DG".	MCD: Change EAL wording as suggested. Indicate DG Ids in EAL TB.
				Validation training: Consider introducing this EAL with wording such as "One source away from a station blackout as indicated by AC power capability to safety related buses... reduced to...	MCD: Change EAL wording so that "(one source away from station blackout)" appears ahead of the list.
SS1	**Loss of All Offsite Power and Loss of All Onsite AC Power to Essential Busses**				
	Loss of power to (site-specific) transformers. AND Failure of (site-specific) emergency generators to supply power to emergency busses. AND Failure to restore power to at least one emergency bus within (site-specific) minutes from the time of loss of both offsite and onsite AC power.	1	H.2.1.3	EKB verification comment #38 (1.7):The differences are not identified. Note that in other electrical EALs they are (i.e., busses specified instead of transformers), This is inconsistent level of justification.	MCD: Add EAL TB differences consistent with other EALs.
				EKB verification comment #59 (2.3):Matrix incorrectly does not specify applicability in Mode 4.	MCD: Change WC to include mode 4 applicability.
SS2	**Failure of Reactor Protection System Instrumentation to Com-plete or Initiate an Automatic Reactor Scram Once a Reactor Protection System Setpoint Has Been Exceeded and Manual Scram Was NOT Successful**				
	Indication(s) exist that automatic and manual scram were not successful.	1	H.1.1.2	EKB verification comment #60 (2.3): Matrix incorrectly specifies applicability in Mode 3.	MCD: Change WC to delete mode 3 applicability.
				Validation training: CSFST figure references are confusing. Should cite in parentheses the procedure that the CSFST path points to.	MCD: Same resolution as specified above for Table H.5-1.
SS3	**Loss of All Vital DC Power**				

	NEI IC and Example EALs	Example EAL No.	Plant EAL	Comment	Response
	Loss of All Vital DC Power based on (site-specific) bus voltage indications for greater than 15 minutes.	1	H.3.1.1	Validation scenario 1: Why is 15 min. for loss of all DC required?	MCD: Provides latitude to not classify if DC loss was monentary/intermittent loss and subsequently restored.
SS4	**Complete Loss of Heat Removal Capability**				
	Loss of core cooling and heat sink (PWR).	1	H.5.1.3	EKB verification comment #39 (1.9): Justification is not supplied as to how the FPB loss/potential loss matrix satisfies this IC.	MCD: Setpoints for loss of core cooling and heat sink are identified in the CSFSTs, and are included in the FPB matrix. They represent a loss or potential loss of FC and RCS. This by definition is a SAE. Add this explanation in the EAL TB (under H.5.1.3).
	Heat Capacity Temperature Limit Curve exceeded (BWR).	1 (2)	None		
SS6	**Inability to Monitor a SIGNIFICANT TRANSIENT in Progress.**				
	Loss of most or all (site-specific) annunciators associated with safety systems. AND Compensatory non-alarming indications are unavailable. AND Indications needed to monitor (site-specific) safety functions are unavailable. AND SIGNIFICANT TRANSIENT in progress.	1	H.4.3.3		
SG1	**Prolonged Loss of All Offsite Power and Prolonged Loss of All Onsite AC Power to Essential Busses**				
	Loss of power to (site-specific) transformers. AND Failure of (site-specific) emergency diesel generators to supply power to emergency busses. AND Either of the following: (a or b) a. Restoration of at least one emergency bus within (site-specific) hours is not likely OR b. (Site-Specific) Indication of continuing degradation of core cooling based on Fission Product Barrier monitoring.	1	H.2.1.4	EKB verification comment #40 (1.7): The differences are not identified. Note that in other electrical EALs they are (i.e., busses specified instead of transformers), This is inconsistent level of justification.	MCD: Add EAL TB differences consistent with other EALs.
				EKB verification comment #61 (2.3): Matrix incorrectly does not specify applicability in Mode 4.	MCD: Change WC to include mode 4 applicability.

	NEI IC and Example EALs	Example EAL No.	Plant EAL	Comment	Response
				Validation simulator scenario 1: One success path to restore safety related 480 VAC is to backfeed from the unaffected unit. (See ECA00.) Can do this in less than 4 hours but not in less than 15 min.; so only applies to GE.	MCD: Change second condition to "Power restoration to any safety-related 4160 VAC bus or 480 VAC bus is not likely in <4 hours". Explain in TB how 480 VAC buses can be backfed from unaffected unit.
SG2	**Failure of the Reactor Protection System to Complete an Auto-matic Scram and Manual Scram was NOT Successful and There is Indication of an Extreme Challenge to the Ability to Cool the Core.**				
	Indications exist that automatic and manual scram were not successful. AND Either of the following: (a or b) a. Indication(s) exists that the core cooling is extremely challenged. OR b. Indication(s) exists that heat removal is extremely challenged.	1	H.1.1.3	EKB verification comment #62 (2.3): Matrix incorrectly specifies applicability in Mode 3.	MCD: Change WC to delete mode 3 applicability.
				Validation training: What if you get the reactor tripped but have not yet exited the Red Path but not get Core Cooling Red. Is GE needed?	CKW: NEI does not intend to classify after the trip is successful. Note that after a successful trip the operating mode is no longer 1/2 but now 3 and the EAL no longer applies. Need to explain this in the EAL TB and reinforce in training. Also, change the EAL wording to "Conditions for into Subcriticality-Red path (...) currently exist."
NA	**General**	NA	NA	EKB verification comment #63 (5.4): Table A.3-1 does not use N/A for all non-applicable spaces.	CKW: Leave table as is.
				EKB verification comment #64 (7.4): T.S. not used as abbreviation for Technical Specification in WC: 1. H.4 sub-category header 2. In H.4.1.1	CKW: T.S. is not the appropriate abbreviation. Leave as is.
				Validation checklist 1 & 3 (5): Some team members thought change to emphasize mode numbers would improve use. For example, increase the box and font size for applicable modes and shade the box background the same as the EAL group. Leave non-applicable mode boxes the same size without shading or numbers.	MCD: No mis-classifications were observed during validation scenarios. Will attempt to improve readability of mode applicability bar by adjusting shading of non-applicable modes in the mode bar.
				Validation checklist 1 (14): Enhance category/subcategory headings so they are more visible and easier to read.	MCD: Change as suggested.

NEI IC and Example EALs	Example EAL No.	Plant EAL	Comment	Response
			Validation checklist (2): Look at addition of Control Building and applicability of Turbine Building in Tables A.6-1 and A.6-2. Current tables don't reference the Control Building that houses the main control room, relay rooms, swgr rooms, etc. that are safety related. Not sure there is anything in the Turbine Building that is needed for safe shutdown.	CKW: Add Control Building to both tables.

No.	Input	Value(s)	Reference	Notes
AU1.1	List of liquid effluent monitors and readings corresponding to 2 x T.S.			This list should include instrument name and numbers for those monitored liquid release pathways where routine or non-routine releases potentially occur
AU1.2	List of gaseous effluent monitors and readings corresponding to 2 x T.S.			This list should include instrument name and numbers for those monitored gaseous release pathways where routine or non-routine releases potentially occur.
AU1.3	Gaseous or liquid sample analysis corresponding to 2 x T.S.			
AU1.4	Telemetered perimeter monitors			Applicable only to plants with such monitoring
AU1.5	Automatic real-time dose assessment capability			Applicable only to plants with such capability
AU2.1	Indication of uncontrolled water level decrease in the reactor refueling cavity, spent fuel pool, or fuel transfer canal with all irradiated fuel assemblies remaining covered by water			
AU2.2	Area Radiation Monitor reading increases indicative of unexpected increases in radiation dose rates within plant buildings			
AU2.3	Source for normal Area Radiation Monitor levels (i.e., the highest reading in the past twenty-four hours excluding the current peak value)			
AA1.1	Gaseous and Liquid effluent radiation monitor names, id nos. and ranges			This list should include instrument name and numbers for those monitored gaseous and liquid release pathways where routine or non-
AA1.2	Gaseous or liquid releases indicating concentrations or release rates in excess of 200 times site-specific technical specifications			These values should represent 200 x ODCM release limits
AA1.3	Telemetered perimeter monitor names, id nos. and ranges			Applicable only to plants with such monitoring
AA1.4	Automatic real-time dose assessment capability greater than site-specific value			Applicable only to plants with such capability

No.	Input	Value(s)	Reference	Notes
AA2.1	Site-specific alarm or reading on one or more of the following radiation monitors: 1. Refuel Floor Area Radiation Monitor (name, id no. and range) 2. Fuel Handling Building Ventilation Monitor (name, id no. and range) 3. Refueling Bridge Area Radiation Monitor (name, id no. and range)			
AA2.2	Water level less than (site-specific) feet that will result in irradiated fuel uncovering in: 1. Reactor refueling cavity 2. Spent fuel pool 3. *Fuel transfer canal*			
AA3.1	Site-specific radiation monitor readings and areas requiring continuous occupancy to maintain plant safety functions (list monitors, ability to read >15 mR/hr and areas)			Typically, areas requiring continuous occupancy include the CR and CAS/SAS
AA3.2	Site-specific radiation monitor readings GREATER THAN site specific values in areas requiring infrequent access to maintain plant safety functions (list monitors, values and areas)			Typically areas requiring infrequent access to maintain plant safety functions include plant vital areas
AS1.1	Radiation monitors used to indicate offsite dose resulting from an actual or imminent release of gaseous radioactivity that exceeds 100 mR TEDE or 500 mR thyroid CDE for the actual or projected duration of the release (list monitor *names, id nos. and ranges)*			
AS1.2	Method of performing dose assessment			
AS1.3	Description of the "site boundary"			
AS1.4	Telemetered perimeter monitor names, id nos. and ranges			Applicable only to plants with such monitoring

No.	Input	Value(s)	Reference	Notes
AS1.5	Method of acquiring field survey results (e.g., procedure no.)			
AG1.1	Radiation monitors used to indicate offsite dose resulting from an actual or imminent release of gaseous radioactivity that exceeds 1000 mR TEDE or 5000 mR thyroid CDE for the actual or projected duration of the release using actual meteorology (list monitor names, id nos. and ranges)			
AG1.2	Method of performing dose assessment			
AG1.3	Description of the "site boundary"			
AG1.4	Telemetered perimeter monitor names, id nos. and ranges			Applicable only to plants with such monitoring
AG1.5	Method of acquiring field survey results (e.g., procedure no.)			
CU1.1	Method of determining unidentified or pressure boundary leakage greater than 10 gpm			
CU1.2	Method of determining identified leakage greater than 25 gpm			
CU2.1	Method of determining water level decrease to below the RPV flange (instrument name, no. range, reading)			
CU2.2	Method of determining that RPV water level cannot be monitored (e.g., EOP decision/action)			
CU3.1	Site-specific transformers that provide offsite power to essential busses (list of transformer names and id nos. & list of essential bus names and id nos.)			
CU3.2	Site-specific emergency generators capable of supplying power to emergency busses (list of emergency generator names and id nos. & emergency bus names and id nos.)			
CU4.1	Technical Specification cold shutdown temperature limit			
CU4.2	Method of determining RCS temperature (instrument name and id nos.)			

No.	Input	Value(s)	Reference	Notes
CU4.3	Method of determining RPV water level (instrument name and id nos.)			
CU5.1	Site-specific radiation monitor readings indicating fuel clad degradation greater than Technical Specification allowable limits			
CU5.2	Site-specific coolant sample activity value indicating fuel clad degradation greater than Technical Specification allowable limits			
CU6.1	Site-specific list of onsite communications capability			
CU6.2	Site-specific list of offsite communications capability			
CU7.1	Vital DC busses (name, id nos.)			
CU7.2	Voltage indicative of a loss of vital DC busses			
CU8.1	BWR nuclear instrumentation that indicates period (name, id no.)			
CU8.2	PWR nuclear instrumentation that indicates startup rate (name, id no.)			
CA1.1	BWR RPV water level corresponding to the low-low ECCS actuation setpoint (BWR)			
CA1.2	PWR level corresponding to the bottom ID of the RCS loop			
CA1.3	Sumps and tanks (names, id nos., level indicating ranges) used to determine a loss of RCS inventory			
CA1.4	Method of determining RPV water level (instrument name and id nos.)			
CA2.1	BWR RPV water level corresponding to the low-low ECCS actuation setpoint (BWR)			
CA2.2	PWR level corresponding to the bottom ID of the RCS loop			
CA2.3	Sumps and tanks (names, id nos., level indicating ranges) used to determine a loss of RCS inventory			

No.	Input	Value(s)	Reference	Notes
CA2.4	Method of determining that RPV water level cannot be monitored (e.g., EOP decision/action)			
CA3.1	Site-specific transformers that provide offsite and onsite power to essential busses (list of transformer names and id nos. & list of essential bus names and id nos.)			
CA3.2	Site-specific emergency generators capable of supplying power to emergency busses (list of emergency generator names and id nos. & emergency bus names and id nos.)			
CA4.1	Definition of CONTAINMENT CLOSURE			Condition in which EITHER Containment operable OR Containment is intact
CA4.2	Technical Specification cold shutdown temperature limit			
CA4.3	Lowest RCS pressure that the site can read on installed Control Board instrumentation that is equal to or greater than 10 psig			
CS1.1	Definition of CONTAINMENT CLOSURE			Condition in which EITHER Containment operable OR Containment is intact
CS1.2	BWR RPV water level corresponding to 6 in. below the low-low ECCS actuation setpoint			
CS1.3	PWR RPV water level corresponding to 6 in. below the bottom ID of the RCS loop			
CS1.4	Method of determining that RPV water level cannot be monitored (e.g., EOP decision/action)			
CS1.5	Sumps and tanks (names, id nos., level indicating ranges) used to determine a loss of RCS inventory			
CS1.6	RPV water level corresponding to TOAF			
CS1.7	Source Range Monitors (names, id nos.)			

No.	Input	Value(s)	Reference	Notes
CS2.1	Definition of CONTAINMENT CLOSURE			Condition in which EITHER Containment operable OR Containment is intact
CS2.2	BWR RPV water level corresponding to 6 in. below the low-low ECCS actuation setpoint			
CS2.3	PWR RPV water level corresponding to 6 in. below the bottom ID of the RCS loop			
CS2.4	Method of determining that RPV water level cannot be monitored (e.g., EOP decision/action)			
CS2.5	Containment High Range Radiation Monitor reading indicative of core uncovery			
CS2.6	Source Range Monitors (names, id nos.)			
CS2.7	Other indications of core uncovery			
CS2.8	RPV water level corresponding to TOAF			
CG1.1	Sumps and tanks (names, id nos., level indicating ranges) used to determine a loss of RCS inventory			
CG1.2	RPV water level corresponding to TOAF			
CG1.3	RPV water level corresponding to TOAF			
CG1.4	Containment High Range Radiation Monitor reading indicative of core uncovery			
CG1.5	Source Range Monitors (names, id nos.)			
CG1.6	Other indications of core uncovery			
CG1.7	Method of determining explosive mixtures are inside containment			
CG1.8	Containment pressure indicative of CONTAINMENT challenged			

No.	Input	Value(s)	Reference	Notes
CG1.9	Definition of CONTAINMENT CLOSURE			Condition in which EITHER Containment operable OR Containment is intact
CG1.10	BWR Secondary Containment radiation monitors indicative of CONTAINMENT challenged			
Cat D	[Applicable to Defueled plants only]			[Applicable to Defueled plants only]
E-HU1.1	Definition of cask CONFINEMENT BOUNDARY			[Applicable to Dry Syorage (ISFSI) installations only]
E-HU1.2	List of natural phenomena events affecting a loaded cask CONFINEMENT BOUNDARY			[Applicable to Dry Syorage (ISFSI) installations only]
E-HU1.3	List of accident conditions affecting a loaded cask CONFINEMENT BOUNDARY			[Applicable to Dry Syorage (ISFSI) installations only]
E-HU2.1	Site-specific Security Plan			[Applicable to Dry Syorage (ISFSI) installations only]
E-HU2.2	Site-specific security shift supervision			[Applicable to Dry Syorage (ISFSI) installations only]
BWR FC-L1	Coolant activity indicative of loss of fuel clad barrier			Tbl 5-F-2
BWR FC-PL1	NA			Tbl 5-F-2
BWR FC-L2	RPV water level indicative of potential loss of fuel clad barrier			Tbl 5-F-2
BWR FC-PL2	RPV water level indicative of loss of fuel clad barrier			Tbl 5-F-2
BWR FC-L3	Drywell radiation monitor reading indicative of loss of fuel clad barrier			Tbl 5-F-2
BWR FC-PL3	NA			Tbl 5-F-2
BWR FC-L4	Other indications of loss of fuel clad barrier			Tbl 5-F-2
BWR FC-PL4	Other indications of potential loss of fuel clad barrier			Tbl 5-F-2
BWR RCS-L1	Drywell pressure indicative of loss of RCS barrier			Tbl 5-F-2

No.	Input	Value(s)	Reference	Notes
BWR RCS-PL1	NA			Tbl 5-F-2
BWR RCS-L2	RPV water level indicative of loss of RCS barrier			Tbl 5-F-2
BWR RCS-PL2	NA			Tbl 5-F-2
BWR RCS-L3	Site-specific indication of an unisolable main steam line break			Tbl 5-F-2
BWR RCS-PL3.1	Method of determining RCS leakage inside the drywell greater than 50 gpm			Tbl 5-F-2
BWR RCS-PL3.2	Area temperature alarms and area radiation alarms indicative of unisolable primary system leakage outside drywell			Tbl 5-F-2
BWR RCS-L4	Drywell radiation monitor reading indicative of loss of RCS barrier			Tbl 5-F-2
BWR RCS-PL4	NA			Tbl 5-F-2
BWR RCS-L5	Other indications of loss of RCS barrier			Tbl 5-F-2
BWR RCS-PL5	Other indications of potential loss of RCS barrier			Tbl 5-F-2
BWR PC-L1	Drywell pressure response for LOCA conditions			Tbl 5-F-2
BWR PC-PL1.1	Drywell pressure indicative of potential loss of PC barrier			Tbl 5-F-2
BWR PC-PL1.2	Explosive mixtures indicative of potential loss of PC barrier			Tbl 5-F-2
BWR PC-L2	NA			Tbl 5-F-2
BWR PC-PL2	Conditions requiring primary containment flooding			Tbl 5-F-2
BWR PC-L3.1	EOPs requiring intentional primary containment venting			Tbl 5-F-2
BWR PC-L3.2	Area temperature alarms and area radiation alarms indicative of unisolable primary system leakage outside drywell			Tbl 5-F-2

No.	Input	Value(s)	Reference	Notes
BWR PC-PL3	NA			Tbl 5-F-2
BWR PC-L4	NA			Tbl 5-F-2
BWR PC-PL4	Drywell radiation monitor reading indicative of potential loss of PC barrier			Tbl 5-F-2
BWR PC-L5	Other indications of loss of PC barrier			Tbl 5-F-2
BWR PC-PL5	Other indications of potential loss of PC barrier			Tbl 5-F-2
PWR FC-L1	CSFST for Core Cooling-Red			Tbl 5-F-4
PWR FC-PL1	CSFSTs for Core Cooling-Orange and Heat Sink-Red			Tbl 5-F-4
PWR FC-L2	Primary coolant activity indicative of loss of fuel clad barrier			Tbl 5-F-4
PWR FC-PL2	NA			Tbl 5-F-4
PWR FC-L3	Core exit thermocouple reading indicative of loss of fuel clad barrier			Tbl 5-F-4
PWR FC-PL3	Core exit thermocouple reading indicative of potential loss of fuel clad barrier			Tbl 5-F-4
PWR FC-L4	NA			Tbl 5-F-4
PWR FC-PL4	Reactor vessel water level indicative of potential loss of fuel clad barrier			Tbl 5-F-4
PWR FC-L5	Containment radiation monitor reading indicative of loss of fuel clad barrier			Tbl 5-F-4
PWR FC-PL5	NA			Tbl 5-F-4
PWR FC-L6	Other indications of loss of fuel clad barrier			Tbl 5-F-4
PWR FC-PL6	Other indications of potential loss of fuel clad barrier			Tbl 5-F-4
PWR RCS-L1	NA			Tbl 5-F-4

No.	Input	Value(s)	Reference	Notes
PWR RCS-PL1	CSFSTs for RCS Integrity-Red and Heat Sink-Red			Tbl 5-F-4
PWR RCS-L2	RCS leak rate greater than available makeup capacity as indicated by a loss of RCS subcooling			Tbl 5-F-4
PWR RCS-PL2	Capacity of one charging pump in the normal charging mode			Tbl 5-F-4
PWR RCS-L3	ECCS (SI) actuation			Tbl 5-F-4
PWR RCS-PL3	NA			Tbl 5-F-4
PWR RCS-L4	Containment radiation monitor reading indicative of loss of RCS barrier			Tbl 5-F-4
PWR RCS-PL4	NA			Tbl 5-F-4
PWR RCS-L5	Other indications of loss of RCS barrier			Tbl 5-F-4
PWR RCS-PL5	Other indications of potential loss of RCS barrier			Tbl 5-F-4
PWR PC-L1	NA			Tbl 5-F-4
PWR PC-PL1	CSFST for Containment-Red			Tbl 5-F-4
PWR PC-L2.1	Containment pressure response for LOCA conditions			Tbl 5-F-4
PWR PC-L2.2	Sump level response for LOCA conditions			Tbl 5-F-4
PWR PC-PL2.1	Containment pressure indicative of potential loss of containment barrier			Tbl 5-F-4
PWR PC-PL2.2	Explosive mixtures indicative of potential loss of containment barrier			Tbl 5-F-4
PWR PC-PL2.3	Containment depressurization actuation setpoint			Tbl 5-F-4
PWR PC-L3	NA			Tbl 5-F-4

No.	Input	Value(s)	Reference	Notes
PWR PC-PL3	Reactor vessel level corresponding to top of active fuel			Tbl 5-F-4
PWR PC-L4	None			Tbl 5-F-4
PWR PC-PL4	NA			Tbl 5-F-4
PWR PC-L5	None			Tbl 5-F-4
PWR PC-PL5	NA			Tbl 5-F-4
PWR PC-L6	NA			Tbl 5-F-4
PWR PC-PL6	Containment radiation monitor reading indicative potential loss of containment			Tbl 5-F-4
PWR PC-L7	Other indications of loss of containment barrier			Tbl 5-F-4
PWR PC-PL7	Other indications of potential loss of containment barrier			Tbl 5-F-4
HU1.1	Method of sensing earthquakes			
HU1.2	Velocity of high winds considered in the design-basis per FSAR			
HU1.3	Description of PROTECTED AREA boundary			
HU1.4	Areas of the plant susceptible to uncontrolled flooding that has the potential to affect safety related equipment			
HU1.5	Other occurrences of natural and destructive phenomena affecting the PROTECTED AREA (list)			
HU2.1	Areas within the PROTECTED AREA boundary susceptible to fire (list)			
HU2.2	Description of PROTECTED AREA boundary			

No.	Input	Value(s)	Reference	Notes
HU3	Normally occupied areas of the site in which toxic or flammable gases could enter in amounts that can affect NORMAL PLANT OPERATIONS			
HU4.1	Site-specific Security Plan			Plan name
HU4.2	Site-specific security shift supervision			Title
HU5	None			
HA1.1	Plant Vital Areas (list)			
HA1.2	Method used to indicate Seismic Event greater than Operating Basis Earthquake (OBE)			
HA1.3	Velocity of high winds considered in the design-basis per FSAR			
HA1.4	Plant structures/equipment within the PROTECTED AREA boundary susceptible to tornado or high winds (list)			
HA1.5	Plant areas containing safety-related equipment (including their controls and their power supplies) that may be susceptible to turbine failure-generated missiles (list)			
HA1.6	Other site-specific phenomena such as hurricane, flood, or seiche within PROTECTED AREA boundary and resulting in VISIBLE DAMAGE to plant structures containing equipment necessary for safe shutdown, or has caused damage as evidenced by control room indication of degraded performance of those systems.			
HA2.1	Site-specific areas containing functions and systems required for the safe shutdown of the plant (list)			
HA3.1	Plant Vital Areas (list)			
HA4.1	Definition of plant PROTECTED AREA			
HA4.2	Site-specific Safeguards Contingency Plan			Plan name

No.	Input	Value(s)	Reference	Notes
HA4.3	Site-specific security shift supervision			Title
HA5.1	Procedure for control room evacuation			
HA6	None			
HS1.1	Plant Vital Areas (list)			
HS1.2	Site-specific Safeguards Contingency Plan			Plan name
HS1.3	Site-specific security shift supervision			Title
HS2	Procedure for control of the plant after control room evacuation has been initiated			
HS2.1	Time for transfer of safety systems after initiation of control room evacuation (to be based on analysis or assessments as to how quickly control must be reestablished without core uncovering and/or core damage; should not exceed 15 minutes without justification)			
HS3	None			
HG1.1	Equipment required to maintain safety functions after a security event results in loss of physical control of the facility			
HG2	None			
SU1.1	Site-specific transformers that provide offsite power to essential busses (list of transformer names and id nos. & list of essential bus names and id nos.)			
SU1.2	Site-specific emergency generators capable of supplying power to emergency busses (list of emergency generator names and id nos. & emergency bus names and id nos.)			
SU2.1	Title of plant Technical Specifications			Title

No.	Input	Value(s)	Reference	Notes
SU3.1	Annunciators and indicators associated with safety systems			
SU4.1	Radiation monitor readings indicating fuel clad degradation greater than Technical Specification allowable limits			
SU4.2	Coolant sample activity value indicating fuel clad degradation greater than Technical Specification allowable limits			
SU5	Method of determining unidentified or pressure boundary leakage greater than 10 gpm and identified leakage greater than 25 gpm			
SU6.1	Site-specific list of onsite communications capability			
SU6.2	Site-specific list of offsite communications capability			
SU8.1	BWR nuclear instrumentation that indicates period (name, id no.)			
SU8.2	PWR nuclear instrumentation that indicates startup rate (name, id no.)			
SA2	Indication(s) that reactor protection system setpoint was exceeded and automatic scram did not occur			
SA4.1	Annunciators and indicators associated with safety systems			
SA4.2	Definition of a SIGNIFICANT TRANSIENT			
SA4.3	Compensatory non-alarming indications (i.e., computer based information such as SPDS)			
SA5.1	Essential bus names and id nos.			
SA5.2	AC power capability to essential busses			
SA5.3	Definition of station blackout			

No.	Input	Value(s)	Reference	Notes
SS1.1	Site-specific transformers that provide offsite power to essential busses (list of transformer names and id nos. & list of essential bus names and id nos.)			
SS1.2	Site-specific emergency generators capable of supplying power to emergency busses (list of emergency generator names and id nos. & emergency bus names and id nos.)			
SS1.3	Maximum allowable time to restore power to at least one emergency bus after loss of both offsite and onsite AC power (duration should be selected to exclude transient or momentary power losses, but should not exceed 15 minutes)			
SS2	None			
SS3.1	Vital DC busses (name, id nos.)			
SS3.2	Voltage indicative of a loss of vital DC busses			
SS4.1	PWR functions (including ultimate heat sink) required for hot shutdown with the reactor at pressure and temperature (excluding reactivity control)			
SS4.2	BWR Heat Capacity Temperature Limit			
SS6.1	Annunciators associated with safety systems			
SS6.2	Compensatory non-alarming indications (i.e., computer based information such as SPDS)			
SS6.3	Safety functions such as the ability to shut down the reactor, maintain the core cooled, to maintain the reactor coolant system intact, and to maintain containment intact			
SS6.4	Definition of a SIGNIFICANT TRANSIENT			

No.	Input	Value(s)	Reference	Notes
SG1.1	Site-specific transformers that provide offsite and onsite power to essential busses (list of transformer names and id nos. & list of essential bus names and id nos.)			
SG1.2	Site-specific emergency generators capable of supplying power to emergency busses (list of emergency generator names and id nos. & emergency bus names and id nos.)			
SG1.3	Time to restore AC power based on the site blackout coping analysis performed in conformance with 10 CFR 50.63 and Regulatory Guide 1.155, "Station Blackout"			
SG1.4	Indication of continuing degradation of core cooling based on Fission Product Barrier monitoring			
SG2.1	Indication(s) that the core cooling is extremely challenged			
SG2.2	Indication(s) that heat removal is extremely challenged			

EAL Submittal Cross Reference Document

Common difference in number scheme. PBNP utilized a scheme with different letters as a human performance improvement tool. As Hot/Cold/All EALS are distinct by their location on the matrices, S/C/A denotations were not used. EALS are described by source M – System Malfunction, H – Hazards and Other, F – Fission Product Barrier, R – Abnormal Radiation (Radiological). This avoided confusion with the classification designator of U – Unusual Event, A – Alert, S – Site Area Emergency, and G – General Emergency. In all cases the term Potential Loss has been replaced by the common Westinghouse PWR term of Challenge.

EAL	99-01 EAL	Site EAL	Difference	Deviation
1	CU8/SU8	MU1.1	None	None
2	CU5/SU4	MU2.1	Divided into two EALS	None
3	SU4	MU3.1	None	None
4	AU2	MU4.1	None	None
5	AA2	MA4.1	Defined "sustained"	None
6	AA2	MA4.2	No specific water level indication exists	None
7	CU1/SU5	MU5.1	None	None
8	AU1	RU1.1	Deleted NEI EALs 4/5 – no perimeter rad monitoring equipment	None
9	AA1	RA1.1	Deleted NEI EALs 4/5 – no perimeter rad monitoring equipment	None
10	AS1	RS1.1	Deleted NEI EALs 4/5 – no perimeter rad monitoring equipment	None
11	AG1	RG1.1	Deleted NEI EALs 4/5 – no perimeter rad monitoring equipment	None
12	AU1	RU2.1	Deleted NEI EALs 4/5 – no perimeter rad monitoring equipment	None
13	AA1	RA2.1	Deleted NEI EALs 4/5 – no perimeter rad monitoring equipment	None
14	AA1	RA2.2	Deleted NEI EALs 4/5 – no perimeter rad monitoring equipment	None

EAL	99-01 EAL	Site EAL	Difference	Deviation
15	AS1	RS2.1	Deleted NEI EALs 4/5 – no perimeter rad monitoring equipment	None
16	AG1	RG2.1	Deleted NEI EALs 4/5 – no perimeter rad monitoring equipment	None
17	AU2	RU3.1	Defined "sustained"	None
18	AA3	RA3.1	Defined "sustained"	None
19	AA3	RA3.2	- Defined "sustained" - Defined specific areas to be accessed to maintain safe operations	None
20	HA5	HA5.1	None	None
21	HS2	HS5.1	None	None
22	CU6/SU6	MU6.1	None	None
23	HU4	HU1.1	Threshold written to conform to IC HU4 of NEI 99-01 as amended	None
24	HA4	HA1.1	None	None
25	HS1	HS1.1	None	None
26	HG1	HG1.1	Added list of safety functions	None
27	HU2	HU2.1	None	None
28	HU1	HU2.2	Separated HU1 Example	None
29	HA2	HA2.1	None	None
30	HU1	HU3.1	Separated HU1 Example	None
31	HU3	HU3.2	None	None
32	HA1	HA3.1	- Separated HA1 Example - Addition of precluding access to area as a conservative measure	None
33	HA3	HA3.2	None	None
34	HU1	HU4.1	Separated HU1 Example	None
35	HU1	HU4.2	- Separated HU1 Example - Included hurricane force winds	None

EAL	99-01 EAL	Site EAL	Difference	Deviation
36	HU1	HU4.3	Separated HU1 example #6	None
37	HA1	HA4.1	Separated HA1 example #1	None
38	HA1	HA4.2	- Separated HU1 Example - Defined "sustained"	None
39	HA1	HA4.3	Separated HA1 example #5	None
40	HU5	HU6.1	None	None
41	HA6	HA6.1	None	None
42	HS3	HS6.1	None	None
43	HG2	HG6.1	- Added "outside the site boundary"	None
44	E-HU1	IU1.1	- Listed resulting radiation levels resulting from natural phenomena	None
45	E-HU2	IU2.1	- Mode applicability listed as "N/A"	None
46	SA2	MA7.1	None	None
47	SS2	MS7.1	- Added wording for site terminology - Deleted "manual scram not successful" as this is a condition for entry into CSP-S.1	None
48	SG2	MG7.1	- Added wording for site terminology	None
49	SU1	MU8.1	- Added "unplanned" - Simplified wording	None
50	SA5	MA8.1	None	None
51	SS1	MS8.1	-Simplified wording	None
52	SG1	MG8.1	-Simplified wording	None
53	SS3	MS9.1	None	None
54	SU2	MU10.1	None	None
55	HU1	MU11.1	- Separated HU1 example #5	None
56	HA1	MA11.1	- Separated HU1 example #4	None
57	SU3	MU12.1	None	None
58	SA4	MA12.1	None	None
59	SS6	MS12.1	None	None
60	FU1	FU1.1	None	None
61	FA1	FA1.1	None	None
62	FS1/SS4	FS1.1	- Setpoints identified in CSFSTs	None
63	FG1	FG1.1	None	None
64	CU4	MU13.1	None	None
65	CA4	MA13.1	None	None
66	CA4	MA14.1	None	None
67	CU2	MU15.1	None	None

EAL	99-01 EAL	Site EAL	Difference	Deviation
68	CA1/CA2	MA15.1	- IC combined	None
69	CS1/CS2	MS15.1	- IC combined	None
70	CS1	MS15.2	- IC combined	None
71	CS2	MS15.3	- IC combined	None
72	CG1	MG15.1	None	None
73	CA3	MA8.2	- Simplified wording	None
74	CU7	MU9.1	None	None
75	Fuel Cladding Challenge - 1	Fuel Cladding Challenge - 1	- Added wording for site terminology	None
76	Fuel Cladding Challenge - 2	Fuel Cladding Challenge - 2	- Added wording for site terminology	None
77	Fuel Cladding Challenge - 3	Fuel Cladding Challenge - 3	None	None
78	Fuel Cladding Challenge - 4	Fuel Cladding Challenge - 4	None	None
79	Fuel Cladding Challenge - 5	Fuel Cladding Challenge - 5	None	None
80	Fuel Cladding Loss - 1	Fuel Cladding Loss - 1	- Added words site terminology	None
81	Fuel Cladding Loss - 2	Fuel Cladding Loss - 2	None	None
82	Fuel Cladding Loss - 3	Fuel Cladding Loss - 3	- Added reference	None
83	Fuel Cladding Loss - 4	Fuel Cladding Loss - 4	None	None
84	Fuel Cladding Loss - 5	Fuel Cladding Loss - 5	None	None
85	Fuel Cladding Loss - 6	Fuel Cladding Loss - 6	None	None
86	RCS Challenge -1	RCS Challenge -1	- Added reference	None
87	RCS Challenge -2	RCS Challenge -2	- Added reference	None
88	RCS Challenge -3	RCS Challenge -3	- Added reference	None
89	RCS Challenge -4	RCS Challenge -4	None	None
90	RCS Loss - 1	RCS Loss - 1	- Added wording for site terminology	None
91	RCS Loss - 2	RCS Loss - 2	None	None
92	RCS Loss - 3	RCS Loss - 3	None	None
93	RCS Loss - 4	RCS Loss - 4	None	None
94	Containment Challenge - 1	Containment Challenge - 1	- Added wording for site terminology	None
95	Containment Challenge - 2	Containment Challenge - 2	- Used 3 thresholds	None
96	Containment Challenge - 3	Containment Challenge - 3	- Used 3 thresholds	None
97	Containment Challenge – 4	Containment Challenge – 4	- Used 3 thresholds	None
98	Containment Challenge – 5	Containment Challenge – 5	- Used 2 thresholds	None
99	Containment Challenge – 6	Containment Challenge – 6	- Used 2 thresholds	None
100	Containment Challenge – 7	Containment Challenge – 7	None	None
101	Containment	Containment	None	None

EAL	99-01 EAL	Site EAL	Difference	Deviation
	Challenge - 8	Challenge - 8		
102	Containment Loss - 1	Containment Loss - 1	None	None
103	Containment Loss – 2	Containment Loss – 2	None	None
104	Containment Loss – 3	Containment Loss – 3	- Used 2 thresholds	None
105	Containment Loss – 4	Containment Loss – 4	- Used 2 thresholds	None
106	Containment Loss – 5	Containment Loss – 5	- Used 2 thresholds	None
107	Containment Loss – 6	Containment Loss – 6	- Added threshold to address other release pathways.	None
108	Containment Loss - 7	Containment Loss - 7	None	None

Previous PBNP EAL Numbering Scheme

Applicable Under ALL Conditions (Left Side1 and Side 2)

Category	Subcategory	Classification			
		General Emergency	ite Area Emergen	Alert	Unusual Event
A.1.0 Reactor Fuel	A.1.1 Inadvertent Criticality				A.1.1.1 (CU8, SU8) Inadvertent Criticality
	A.1.2 Coolant Activity				A.1.2.1 (CU5, SU4) > T.S.
	A.1.3 Failed Fuel Detector				A.1.3.1 (SU5, SU4) > T.S.
	A.1.4 Refueling Accidents & Other Radiation Monitors			A.1.4.2 (AA2.1) RadMon. Ind. Fuel Damage or Uncovery A.1.4.3 (AA2) Visual Obsv. - Irrad. Fuel Uncovery	A.1.4.1 (AU2.1) SFP Low Level
A.2.0 RCS Leakage					A.2.1.1 (CU1, SU5) > 10 gpm UL/>25 gpm IL
A.3.0 Radioactivity Release / Area Radiation	A.3.1 Effluent Monitors	A.3.1.4 (AG1.1) > PAG	A.3.1.3 (AS1.1) > 1/10 PAG	A.3.1.2 (AA1.1/2) > 200 x T.S.	A.3.1.1 (AU1.1/2) > 2 x T.S.
	A.3.2 Dose Proj / Env. Measurements	A.3.2.5 (AG1.2, AG1.4) > PAG	A.3.2.4 (AS1.2, AS 1.4) > 1/10 PAG	A.3.2.2 (AA1.3) Sample > 200 x T.S. A.3.2.3 (AA1.5) Dose Proj./Env. Measurement > 10/mR/hr	A.3.2.1 (AU1.3) Sample > 2 x T.S.
	A.3.3 Area Radiation Level			A.3.3.2 (AA3.1) > 15 mR/hr CR or CAS A.3.3.3 (AA3.2) Abnormal rad. access	A.3.3.1 (AU2.2) Area Rad > 1000 X norm
A.4.0 Control Room Evacuation			A.4.1.2 (HS2) SD outside CR	A.4.1.1 (HA5) CR inaccessible	
A.5.0 Communication					A.5.1.1 (CU6, SU6) Comm. loss
A.6.0 Hazards	A.6.1 Security Threats	A.6.1.4 (HG1) Adversary + Loss of	A.6.1.3 (HS1) Intrusion to Vital	A.6.1.2 (HA4) Intrusion by adversary	A.6.1.1 (HU4.1/2) Bomb/Credible Threat
	A.6.2 Fire or Explosion			A.6.2.3 (HA2) Fire/explosion + visible	A.6.2.1 (HU2) Fire in Protected Area A.6.2.2 (HU1.4) Explosion in Protected Area
	A.6.3 Man-made Events			A.6.3.3 (HA1.3) Vehicle Crash causing damage to Vital Area A.6.3.4 (HA3) Toxic/flam gas in vital area	A.6.3.1 (HU1.3) Vehicle crash in Protected Area A.6.3.2 (HU3) Toxic/flammable gas
	A.6.4 Natural Events			A.6.4.4 (HA1.1) Earthquake > OBE A.6.4.5 (HA1.2) Tornado/High winds causing damage to Vital Area A.6.4.6 (HA1.5/6) Internal/External Flooding damaging Vital Area	A.6.4.1 (HU1.1) Earthquake A.6.4.2 (HU1.2) Tornado/High Winds A.6.4.3 (HU1.6/7) Internal/External flooding
A.7.0 Others		A.7.1.4 (HG2) ED Judgment	A.7.1.3 (HS3) ED Judgment	A.7.1.2 (HA6) ED Judgment	A.7.1.1 (HU5) ED Judgment
A.8.0 ISFSI Events	A.8.1 Loss of Cask Confinemnt				A.8.1.1 (E-HU1.1/2/3) Loss of cask confinement boundary
	A.8.2 Security Events				A.8 2.1 (E-HU2) Security Event

Previous PBNP EAL Numbering Scheme

Applicable Under HOT Conditions [≥ 200 °F] (Right Side 1)

Category	Subcategory	Classification: General Emergency	Site Area Emergency	Alert	Unusual Event
H1.0 ATWS		H.1.1.3 (SG2) Failure to trip w/ loss core cool	H.1.1.2 (SS2) Failure auto/manual trip	H.1.1.1 (SA2) Failure auto trip	
H2.0 Loss of AC Power Sources		H.2.1.4 (SG1) Prolonged AC loss	H.2.1.3 (SS1) Loss all AC to emerg buses	H.2.1.2 (SA5) One source to emerg buses	H.2.1.1 (SU1) Loss offsite AC
H3.0 Loss of DC Power Sources			H.3.1.1 (SS3) Loss all DC		
H4..0 Equipment Failures	H.4.1 Technical Specifications				H.4.1.1 (SU2) Inability to S/D per TS
	H.4.2 Turbine Failures			H.4.2.2 (HA1.4) Turbine missiles	H.4.2.1 (HU1.5) TG failure
	H.4.3 Loss of Indications/Alarms		H.4.3.3 (SS6) Loss annun. + transient + no monitor	H.4.3.2 (SA4) Loss annun. + transient	H.4.3.1 (SU3) Loss annunciator
	H.4.4 Loss of Heat Removal Capability		H.4.4.1 (SS4) Loss core cooling and heat sink		
H5.0 Fission Product Barriers		H.5.1.4 (FG1) L of 2 barriers w/ L/PL of 3rd	H.5.1.3 (FS1) L/PL 2 barriers	H.5.1.2 (FA1) L/PL FC or RCS	H.5.1.1 (FU1) L/PL Containment

Fission Product Barrier Matrix

Fuel Clad Potential Loss	Fuel Clad Loss	RCS Potential Loss	RCS Loss	Containment Potential Loss	Containment Loss
PWR FC-PL1	PWR FC-L1	PWR RCS-PL1		PWR PC-PL1	
	PWR FC-L2	PWR RCS-PL2	PWR RCS-L2	PWR PC-PL2.1	PWR PC-L2.1
PWR FC-PL3	PWR FC-L3		PWR RCS-L3	PWR PC-PL2.2	PWR PC-L2.2
PWR FC-PL4			PWR RCS-L4	PWR PC-PL2.3	
	PWR FC-L5	PWR RCS-PL5	PWR RCS-L5		PWR PC-PL3
PWR FC-PL6	PWR FC-L6			PWR PC-PL6	
				PWR PC-PL7	PWR PC-L7

Applicable Under COLD Conditions [< 200 °F] (Right Side 2)					
Category	Subcategory	Classification			
		General Emergency	Site Area Emergency	Alert	Unusual Event
C1.0 Reactor Coolant System	C.1.1 RCS Temperature			C.1.1.2 (CA4) > 200 °F extended	C.1.1.1 (CU4) > 200 °F or loss of ind.
	C.1.2 RCS Pressure			C.1.2.1 (CA4.3) > 10 psig increase	
	C.1.3 RCS Level	C.1.3.6 (CG1) Severe loss of inventory and containment	C.1.3.3 (CS1.1.a, CS1.2a, CS2.1.a, CS2.2.a) RPV level C.1.3.4 (CS1.1b, CS1.2.b) Cannot monitor - CSD C.1.3.5 (CS2.1.b, CS2.2.b) Cannot monitor - Refuel	C.1.3.2 (CA1, CA2) Loss of RCS inventory	C.1.3.1 (CU2) < flange or leak cannot be monitored
C2.0 Loss of AC Power Sources				C.2.1.2 (CA3) Loss all AC to emerg buses	C.2.1.1 (CU3) Loss offsite AC
C3.0 Loss of DC Power Sources					C.3.1.1 (CU7) Loss all DC

Current PBNP EAL Numbering Scheme

Applicable Under ALL Conditions (Left Side1 and Side 2)					
Category	**Subcategory**	**Classification**			
		General Emergency	Site Area Emergency	Alert	Unusual Event
Reactor Fuel	Inadvertent Criticality				MU1.1 (CU8, SU8) Inadvertent Criticality
	Coolant Activity				MU2.1 (CU5, SU4) > T.S.
	Failed Fuel Detector				MU3.1(SU5, SU4) > T.S.
	Refueling Accidents & Other Radiation Monitors			MA4.1 (AA2.1) RadMon. Ind. Fuel Damage or Uncovery MA4.2 (AA2) Visual Obsv. - Irrad. Fuel Uncovery	MU4.1 (AU2.1) SFP Low Level
RCS Leakage					MU5.1 (CU1, SU5) > 10 gpm UL/>25 gpm IL
Radioactivity Release / Area Radiation	Effluent Monitors	RG1.1(AG1.1) > PAG	RS1.1 (AS1.1) > 1/10 PAG	RA1.1 (AA1.1/2) > 200 x T.S.	RU1.1 (AU1.1/2) > 2 x T.S.
	Dose Proj / Env. Measurements	RG2.1 (AG1.2, AG1.4) > PAG	RS2.1 (AS1.2, AS 1.4) > 1/10 PAG	RA2.1 (AA1.3) Sample > 200 x T.S. RA2.2 (AA1.5) Dose Proj./Env. Measurement > 10/mR/hr	RU2.1 (AU1.3) Sample > 2 x T.S.
	Area Radiation Level			RA3.1 (AA3.1) > 15 mR/hr CR or CAS RA3.2(AA3.2) Abnormal rad, access	RU3.1 (AU2.2) Area Rad > 1000 X norm
Control Room Evacuation			HS5.1 (HS2) SD outside CR fails	HA5.1 (HA5) CR Inaccessible	
Communication Loss					MU6.1 (CU6, SU6) Comm. loss
Hazards	Security Threats	HG1.1 (HG1) Adversary + Loss of control	HS1.1 (HS1) Intrusion to Vital Area	HA1.1 (HA4) Intrusion by adversary	HU1.1 (HU4.1/2) Bomb/Credible Threat
	Fire or Explosion			HA2.1(HA2) Fire/explosion + visible	HU2.1 (HU2) Fire in Protected Area HU2.2 (HU1.4) Explosion in Protected Area
	Man-made Events			HA3.1 (HA1.3) Vehicle Crash causing damage to Vital Area HA3.1 (HA3) Toxic/flam gas in vital	HU3.1 (HU1.3) Vehicle crash in Protected Area HU3.2 (HU3) Toxic/flammable gas
	Natural Events			HA4.1 (HA1.1) Earthquake > OBE HA4.2 (HA1.2) Tornado/High winds causing damage to Vital HA4.3 (HA1.5/6) Internal/External Flooding damaging Vital	HU4.1(HU1.1) Earthquake HU4.2 (HU1.2) Tornado/High Winds HU4.3 (HU1.6/7) Internal/External flooding
Others		HG6.1 (HG2) ED Judgment	HS6.1 (HS3) ED Judgment	HA6.1 (HA6) ED Judgment	HU6.1 (HU5) ED Judgment
ISFSI Events	Loss of Cask Confinemnt				IU1.1 (E-HU1.1/2/3) Loss of cask confinement boundary
	Security Events				IU2.1 (E-HU2) Security Event

Applicable Under HOT Conditions [≥ 200 °F] (Right Side 1)					
Category	Subcategory	Classification			
		General Emergency	Site Area Emergency	Alert	Unusual Event
ATWS		MG7.1 (SG2) Failure to trip w/ loss core	MS7.1 (SS2) Failure auto/manual trip	MA7.1 (SA2) Failure auto trip	
Loss of AC Power Sources		MG8.1 (SG1) Prolonged AC loss	MS8.1 (SS1) Loss all AC to emerg buses	MA8.1 (SA5) One source to emerg buses	MU8.1 (SU1) Loss offsite AC
Loss of DC Power Sources			MS9.1 (SS3) Loss all DC		
Equipment Failures	Technical Specifications				MU10.1 (SU2) Inability to S/D per TS
	Turbine Failures			MA11.1 (HA1.4) Turbine missiles	MU11.1 (HU1.6) TG failure
	Loss of Indications/Alarms		MS12.1 (SS6) Loss annun. + transient + no monitor	MA12.1 (SA4) Loss annun. + transient	MU12.1 (SU3) Loss annunciator
	Loss of Heat Removal Capability		H.4.4.1 (SS4) Loss core cooling and heat sink		
Fission Product Barriers		FG1.1 (FG1) L of 2 barriers w/ L/PL of 3rd	FS1.1 (FS1) L/PL 2 barriers	FA1.1 (FA1) L/PL FC or RCS	FU1.1 (FU1) L/PL Containment

Fission Product Barrier Matrix					
Fuel Clad Potential Loss	Fuel Clad Loss	RCS Potential Loss	RCS Loss	Containment Potential Loss	Containment Loss
PWR FC-PL1	PWR FC-L1	PWR RCS-PL1		PWR PC-PL1	
	PWR FC-L2	PWR RCS-PL2	PWR RCS-L2	PWR PC-PL2.1	PWR PC-L2.1
PWR FC-PL3	PWR FC-L3		PWR RCS-L3	PWR PC-PL2.2	PWR PC-L2.2
PWR FC-PL4			PWR RCS-L4	PWR PC-PL2.3	
	PWR FC-L5	PWR RCS-PL5	PWR RCS-L5		PWR PC-PL3
PWR FC-PL6	PWR FC-L6			PWR PC-PL6	
				PWR PC-PL7	PWR PC-L7

Applicable Under COLD Conditions [< 200 °F] (Right Side 2)					
Category	**Subcategory**	**Classification**			
		General Emergency	**Site Area Emergency**	**Alert**	**Unusual Event**
Reactor Coolant System (RCS)	RCS Temperature			MA13.1(CA4) > 200 °F extended	MU13.1 (CU4) > 200 °F or loss of ind.
	RCS Pressure			MA14.1 (CA4.3) > 10 psig increase	
	RCS Level	MG15.1 (CG1) Severe loss of inventory and containment	MS15.1 (CS1.1.a, CS1.2a, CS2.1.a, CS2.2.a) RPV level MS15.2 (CS1.1b, CS1.2.b) Cannot monitor - CSD MS15.3 (CS2.1.b, CS2.2.b) Cannot monitor - Refuel	MA15.1 (CA1, CA2) Loss of RCS inventory	MU15.1 (CU2) < flange or leak cannot be monitored
Loss of AC Power Sources				MA8.2 (CA3) Loss all AC to emerg buses	MU8.1 (CU3) Loss offsite AC
Loss of DC Power Sources					MU9.1 (CU7) Loss all DC

STATE OF WISCONSIN \ DEPARTMENT OF MILITARY AFFAIRS
WISCONSIN EMERGENCY MANAGEMENT

2400 WRIGHT STREET
P.O. BOX 7865
MADISON, WISCONSIN 53708-7865

June 7, 2004

Monica Ray
Emergency Preparedness Manager
Point Beach Nuclear Plant
6610 Nuclear Road
PO Box 7865
Two Rivers, WI 54241

Re: Review of "EPIP 1.2, Emergency Classification".

Dear Ms. Ray,

Teri Engelhart and Bill Clare participated in the May 26 telephone conference discussion regarding the proposed changes to Point Beach Nuclear Plant's Emergency Action Levels (EALs).

10 CFR 50, Appendix E, states "...emergency action levels shall be discussed and agreed on by the applicant and State and local government authorities and approved by the NRC."

We have reviewed EPIP 1.2 Emergency Classification and concur with the proposed changes. We understand that the change to the new classification methodology may result in different and/or lower classifications than the current NUREG 0654 Emergency Action Level scheme.

We also agree to provide appropriate notification to the site in the event that an offsite hazard may require protection of personnel onsite, in support of the Hazard classification category.

If you have any questions or if I can be of further assistance, please contact me.

Sincerely,

Stephen Peterson
Director, Bureau of Planning & Preparedness

Cc: Edward Gleason

May 21, 2004

Monica Ray
Emergency Preparedness Manager
Point Beach Nuclear Plant
6610 Nuclear Road
Two Rivers, WI 54241

REVIEW OF EPIP 1.2, EMERGENCY CLASSIFICATION

Dear Ms. Ray:

I have reviewed EPIP 1.2, Emergency Classification, and agree with the proposed changes. I understand that the change to the new classification methodology may result in different and/or lower classifications than the current NUREG 0654 Emergency Action Level scheme.

I also agree to provide appropriate notification to the site in the event that an offsite hazard may require protection of personnel onsite, in support of the Hazard classification category.

Paul Schmidt
Mr. Paul Schmidt, Radiation Protection Section

5-27-04
Date

May 21, 2004

Monica Ray
Emergency Preparedness Manager
Point Beach Nuclear Plant
6610 Nuclear Road
Two Rivers, WI 54241

REVIEW OF EPIP 1.2, EMERGENCY CLASSIFICATION

Dear Ms. Ray:

I have reviewed EPIP 1.2, Emergency Classification, and agree with the proposed changes. I understand that the change to the new classification methodology may result in different and/or lower classifications than the current NUREG 0654 Emergency Action Level scheme.

I also agree to provide appropriate notification to the site in the event that an offsite hazard may require protection of personnel onsite, in support of the Hazard classification category.

Lori Hucek 5-26-04

Ms. Lori Hucek, Kewaunee County Emergency Management Date

May 21, 2004

Monica Ray
Emergency Preparedness Manager
Point Beach Nuclear Plant
6610 Nuclear Road
Two Rivers, WI 54241

REVIEW OF EPIP 1.2, EMERGENCY CLASSIFICATION

Dear Ms. Ray:

I have reviewed EPIP 1.2, Emergency Classification, and agree with the proposed changes. I understand that the change to the new classification methodology may result in different and/or lower classifications than the current NUREG 0654 Emergency Action Level scheme.

I also agree to provide appropriate notification to the site in the event that an offsite hazard may require protection of personnel onsite, in support of the Hazard classification category.

Nancy H. Crowley　　　　5-26-04

Nancy Crowley, Manitowoc County Emergency Management　　　　Date

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2. AOP 8B
3. AOP 8C
4. AOP-8G Ventilated Storage Cask (VSC) Drop or Tipover
5. AOP-10 Control Room Inaccessibility
6. AOP-10A Safe Shutdown – Local Control
7. AOP-10B Safe to Cold Shutdown in Local Control
8. AOP-14A
9. AOP-28 Seismic Event
10. AOP-29, Security Threat
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12. ARP 1(2)C33 1-2 Hydrogen Pressure High-Low alarm
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19. CSP-Z.1, Response to High Containment Pressure
20. CSP-Z.1, Attachment B, Containment Isolation Valves
21. BG-CSP-ST.0, CRITICAL SAFETY FUNCTION STATUS TREES
22. BG-CSP-ST.0, CSFST, Step F.0.5
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28. DBD-9, Reactor Coolant System, Sections 3.23.1 to 3.23.4, 3.24.1, 3.24.2, 3.25.1 and 3.25.2
29. DBD-13
30. DBD-18, 13.8 KVAC System, Section 3.3.0
31. DBD-22, 4160 VAC System, Figure 1-1 & Section 5
32. DBD-27
33. DBD-33, CONTAINMENT STRUCTURES AND PENETRATIONS DESIGN BASIS DOCUMENT
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38. EPIP 1.3 Dose Assessment and Protective Action Recommendations
39. EPMP 2.1, Testing of Communications Equipment
40. EPMP 2.1A, Monthly Communications Test
41. EPIP 10.2, CORE DAMAGE ESTIMATION, Section 4.1
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<u>**CD #1**</u> (continued)

43. FSAR Figure 2.6-2 Stability Class Distribution in Percent of Total Observed.
44. FSAR 4.0 Reactor Coolant System Design Basis, Table 4.1-6
45. FSAR pg 5.1.35
46. FSAR Section 7.6
47. FSAR Section 8, Electrical Systems
48. FSAR Section 8.7
49. FSAR Section 14.1.12 Likelihood of T-G Unit Overspeed
50. FSAR Table 2.6-3 Stability Index Distribution
51. FSAR Table 2.6-4 Site Atmospheric Stability Analysis Annual Average 13 month data
52. FSAR Table 3.3-1
53. FSAR Volume 1 Section 2.9 Seismology
54. FSAR Volume 3 Page 5.1-37 Wind and Tornado Forces
55. ODCM Tables 2-1 and 2-2, Figures 2-1 and 2-2 and Table 3.9-2
56. OI-55, PRIMARY LEAK RATE CALCULATION
57. OI 105, RECS Heatup/Cooldown Plotting
58. OM 1.1, Conduct of Plant Operations, Attachment 2
59. OM 3.19, REACTOR COOLANT SYSTEM LEAKAGE DETERMINATION
60. OP-1A, Cold Shutdown to Hot Standby, Step 5.3.2
61. OP 1B, Reactor Startup
62. OP 4A
63. OP4D Part 3, Reactor Cavity and Reactor Coolant System, Table 1
64. OP 4F, Reactor Coolant System Reduced Inventory Requirements
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68. STPT 12.1, Waste Disposal System, Rev. 8
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71. TS Table 1.1-1, Unit 1 – Amendment No. 201/Unit 2 – Amendment No. 206
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75. ISFSI Technical Specification 1.2.4 of the VSC-24 Certificate of Compliance

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