

Attachment III to IPN-95-068

**Indian Point 3 Emergency Action Levels,  
Technical Bases Document**

Revision 0  
June 15, 1995

New York Power Authority  
Indian Point 3 Nuclear Power Plant  
Docket 50-286

9506220141 950615  
PDR ADOCK 05000286  
F PDR

Table of Contents

<u>Section</u>	<u>Subject</u>
i	Introduction
1.0	CSFST Status
2.0	Reactor Fuel
3.0	Reactor Coolant System
4.0	Containment
5.0	Radioactivity Release / Area Radiation
6.0	Electrical Failures
7.0	Equipment Failures
8.0	Hazards
9.0	Other
A1	Definitions
A2	Fission Product Barrier Loss/Potential Loss Matrix
A3	Numarc Reference

## Introduction

### PURPOSE

The purpose of this document is to provide an explanation and rationale for each of the Indian Point 3 (IP-3) emergency action levels (EALs). It is also intended to facilitate the review process of the IP-3 EALs and provide historical documentation for future reference. Additionally, this document is intended to be utilized by those individuals responsible for implementation of the event classification manual as a technical reference and aid in EAL interpretation.

### DISCUSSION

EALs are the plant-specific indications, conditions or instrument readings which are utilized to classify emergency conditions defined in the IP-3 Emergency Plan.

The revised EALs were derived from the Initiating Conditions and example EALs given in the IP-3 Plant-Specific EAL Guideline (PEG). The PEG is the IP-3 interpretation of the NUMARC/NESP-007, "Methodology for Developing of Emergency Action Levels". The PEG identifies deletions from the NUMARC methodology by striking out words and phrases that are not applicable to IP-3; additions are identified by underlining new words and phrases. The source of documents for PEG changes from NUMARC methodology are listed in the references section of the PEG.

While EALs are site specific, an objective of the EAL revision project was to ensure conformity and consistency between the New York State nuclear power plant sites to the extent possible.

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

The primary fission product barriers are:

- A. Reactor Fuel Cladding: The fuel cladding is comprised of 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.
- B. Reactor Coolant System (RCS): The RCS is comprised of 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.
- C. Containment: The containment is comprised of the vapor containment structure and all isolation valves required to maintain containment integrity under accident conditions.

## Introduction

The following criteria serves as the bases for event classification related to fission product barrier loss:

### Unusual Event:

Any loss or potential loss of containment

### Alert:

Any loss or any potential loss of either fuel clad or RCS

### Site Area Emergency:

Any loss of both fuel clad and RCS

or

Any potential loss of both fuel clad and RCS

or

Any potential loss of either fuel clad or RCS with a loss of any additional barrier

### General Emergency:

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

Those EALs which reference one or more of the fission product barrier IC designators (FC, RCS and PC) in the PEG Reference section of the technical bases are derived from the Fission Product Barrier Analysis. The analysis entailed an evaluation of every combination of the plant specific barrier loss/potential loss indicators applied to the above criteria.

Where possible, the EALs have been made consistent with and utilize the conditions defined in the IP-3 Critical Safety Function Status Trees (CSFSTs). While the symptoms that drive operator actions specified in the CSFSTs are not indicative of all 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 PEG Initiating Conditions, they have been utilized as an EAL. This allows for 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 (EOPs) entry or execution. The EALs can be utilized independently or in conjunction with the EOPs.

To the extent possible, the EALs are symptom based. That is, the action level is defined by values of key plant operating parameters which 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

## Introduction

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.

The EALs are grouped into nine categories to simplify their presentation and to promote a rapid understanding by their users. These categories are:

1. CSFST Status
2. Reactor Fuel
3. Reactor Coolant System
4. Containment
5. Radioactivity Release / Area Radiation
6. Electrical Failures
7. Equipment Failures
8. Hazards
9. Other

Categories 1 through 5 are primarily symptom based. The symptoms are indicative of actual or potential degradation of either fission product barriers or personnel safety.

Categories 6, 7 and 8 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 which have affected or may affect plant safety.

Category 9 provides the Emergency Director (Shift Manager) the latitude to classify and declare emergencies based on plant symptoms or events which in his judgment warrant classification. This judgment includes evaluation of loss or potential loss of one or more fission product barriers warranting emergency classification consistent with the NUMARC barrier loss criteria.

Categories are further divided into one or more subcategories depending on the types and number of plant conditions that dictate emergency classifications. For example, the Electrical Failures category has two subcategories whose values can be indicative of losses of electrical power sources: loss of AC power sources and loss of DC power sources. An EAL may or may not exist for each sub category at all four classification levels. Similarly, more than one EAL may exist for a sub category in a given emergency classification when appropriate (i.e. no EAL at the General Emergency level but three EALs at the Unusual Event level).

For each EAL, the following information is provided:

- Classification: Unusual Event, Alert, Site Area Emergency, or General Emergency
- Operating Mode Applicability: One or more of the following plant operating conditions are listed: Power Operation, Hot Shutdown, Cold Shutdown, Refuel and Defueled

### Introduction

- EAL: Description of the condition or set of conditions which comprise the EAL
- Basis: Description of the rationale for the EAL
- PEG Reference: PEG IC(s) and example EAL(s) from which the EAL is derived
- Basis Reference(s): Source documentation from which the EAL is derived

The identified operating modes are defined as follows (note: the source of these definitions is the IP-3 Technical Specification Section 1.2).

#### Power Operations

When the reactor is critical and the neutron flux power range instrumentation indicates greater than 2 % of rated power.

#### Hot Shutdown

When the reactor is subcritical, by an amount greater than or equal to the margin as specified in Technical Specification 3.10 and  $T_{avg}$  is  $> 200$  °F but  $\leq 555$  °F.

#### Cold Shutdown

When the reactor is subcritical by at least 1 %  $\Delta k/k$  and  $T_{avg}$  is  $\leq 200$  °F.

#### Refuel

When the reactor is subcritical by at least 5 %  $\Delta k/k$  and  $T_{avg}$  is  $\leq 140$  °F and core alterations are being made with the head completely unbolted.

#### Defueled

When the reactor vessel contains no irradiated fuel.

These operating modes correlate to the NUMARC-007 and PEG identified operating modes as follows:

<u>NUMARC-007</u>	<u>Technical Bases</u>
Power Operations	Power Operations
Startup/Hot standby	Power Operation
Hot Shutdown	Hot Shutdown
Cold Shutdown	Cold Shutdown
Refuel	Refuel
Defueled	Defueled
All	All

## Section 1.0 CSFST Status

### 1.0 CSFST STATUS

Plant Emergency Operating Procedures (EOPs) are designed to maintain and/or restore a set of critical safety functions which are prioritized for restoration efforts during accident conditions. By monitoring the critical safety functions status, the impact of multiple events can be inherently addressed.

The critical safety functions are monitored through the use of Critical Safety Function Status Trees (CSFSTs). When certain plant parameters exceed threshold values specified by the CSFST, the plant operator is directed to one or more functional restoration and/or EOPs in an attempt to restore those parameters to within acceptable limits. The following CSFSTs are utilized to be indicative of failures or potential failures of one or more fission product barriers:

- Subcriticality: Orange or Red paths in this CSFST indicate losses of reactivity control which may pose a threat to fuel clad and RCS integrity.
- Core Cooling: Orange or Red paths in this CSFST indicate losses of core subcooling and thus pose a direct threat to the integrity of the reactor fuel clad.
- Heat Sink: The Red path of this CSFST is indicative of a loss of ability to remove decay heat from the core and thus poses a direct threat to fuel clad integrity.
- Integrity: The Red path of this CSFST is indicative of a direct threat to RCS barrier integrity.
- Containment: Red path of this CSFST is indicative to a loss of RCS barrier and direct threat to the containment barrier integrity.

## Section 1.0 CSFST Status

### 1.0 CSFST Status 1.1 Subcriticality

#### 1.1.1 Alert

Any failure of an automatic trip signal to reduce power range < 5%  
AND  
Manual trip is successful

#### NUMARC IC:

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 while in power operations or hot standby

#### FPB loss/potential loss:

N/A

#### Mode Applicability:

Power Operations, Hot Shutdown

#### Basis:

A manual trip is any set of actions by the reactor operator(s) at the reactor control console which causes "control rods to be rapidly inserted into the core and brings power below that percent power associated with the ability of the safety systems to remove heat and continue to decrease."

This condition indicates failure of the automatic protection systems to trip the reactor. Failure of the manual trip to the extent requiring emergency boration requires declaration of a Site Area Emergency.

If this EAL is reached with no adverse consequences the following guidance applies:

The Emergency Director shall declare the event, but may choose to not fully implement the response activities of the Emergency Plan (e.g. emergency response facility staffing).

This guidance is a conservative departure from the following NUMARC guidance regarding this event:

"If an emergency condition no longer exists, there is no reason to declare an emergency. The NRC shall be notified after discovery within 1 hour, meeting 10CFR50.72 reporting criteria. State and local authorities should also be notified as soon as practical, or in accordance with arrangements made in advance.



**Section 1.0 CSFST Status**

**PEG Reference:**

SA2.1

**Basis Reference(s):**

1. CSFST F-0.1, Subcriticality
2. "Methodology for Development of Emergency Action Levels NUMARC/NESP-007  
Revision 2 - Questions and Answers, June 1993

## Section 1.0 CSFST Status

### 1.0 CSFST Status 1.1 Subcriticality

#### 1.1.2 Site Area Emergency

RED path in F-0.1 SUBCRITICALITY  
AND  
Emergency boration is required

#### NUMARC IC:

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 scram trip was not successful.

#### FPB loss/potential loss:

N/A

#### Mode Applicability:

Power Operations, Hot Shutdown

#### Basis:

CSFST Subcriticality - RED path is entered based on failure of power range indication to decrease below 5% following a reactor trip. This portion of the EAL addresses any manual trip or automatic trip signal followed by a manual trip which 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 reactor control console which causes "control rods to be rapidly inserted into the core and brings power below that percent power associated with the ability of the safety systems to remove heat and continue to decrease."

This condition indicates failure of both the automatic and manual protection systems to trip the reactor to an extent that emergency boration is required. 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 fuel clad and RCS integrity and thus warrants declaration of a Site Area Emergency.

#### PEG Reference:

SS2.1  
SS4.1

Section 1.0 CSFST Status

Basis Reference(s):

1. CSFST F-0.1, Subcriticality
2. FR-S.1, Response to Nuclear Generation/ATWS
3. "Methodology for Development of Emergency Action Levels NUMARC/NESP-007  
Revision 2 - Questions and Answers", June 1993

## Section 1.0 CSFST Status

### 1.0 CSFST Status 1.1 Subcriticality

#### 1.1.3 General Emergency

RED path in F-0.1, SUBCRITICALITY  
AND

Actual or imminent entry into either:

RED path in F-0.2, CORE COOLING

OR

RED path in F-0.3, HEAT SINK

#### NUMARC IC:

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.

#### FPB loss/potential loss:

N/A

#### Mode Applicability:

Power Operations, Hot Shutdown

#### Basis:

CSFST Subcriticality - RED path is entered based on  $\geq 5\%$  reactor power following a reactor trip.

CSFST Core Cooling - RED path is entered based on either:

- Core exit thermocouples  $> 1200$  °F

OR

- Core exit thermocouples  $> 700$  °F

AND

- RVLIS level  $< 39\%$  w/ no RCPs (TAF)

CSFST Heat Sink - RED path is entered based on both:

- all S/G's narrow range level  $< 6\%$  (16% adv. cmnt.)

AND

- Total feedwater flow to S/Gs  $< 355$  gpm

The combination of these conditions (reactor power  $\geq 5\%$  and Heat Sink-RED or Core Cooling RED path) indicates the ultimate heat sink function is under extreme challenge. Additionally, the efforts to bring the reactor subcritical have been unsuccessful and, as a result, the reactor is producing more heat

## Section 1.0 CSFST Status

load for which the safety systems were designed. This situation could be the precursor for a core melt sequence.

A major consideration is the inability to initially remove heat during the early stages of this sequence. If emergency feedwater flow is insufficient to remove the amount of heat required by design from at least one steam generator, an extreme challenge should be considered to exist. This equates to a HEAT Sink RED condition. If CETs indicate  $> 1200$  °F or are  $> 700$  °F with RVLIS  $<$  top of active fuel a condition indicative of severe challenge to heat removal also exists.

In the event this challenge exists at a time when the reactor has not been brought below the power associated with safety system design power (5%) a core melt sequence is considered to exist. In this situation, core degradation can occur rapidly. For this reason, the General Emergency declaration is intended to be anticipatory of the fission product barrier matrix declaration to permit maximum offsite intervention time.

PEG Reference:

SG2.1

Basis Reference(s):

1. CSFST F-0.3, Heat Sink
2. CSFST F-0.1, Subcriticality
3. CSFST F-0.2, Core Cooling
4. FR-S.1, Response to Reactor Restart/ATWS
5. FR-S.2, Response to Loss of Core Shutdown

Section 1.0 CSFST Status

1.0 CSFST Status 1.2 Core Cooling

1.2.1 Site Area Emergency

ORANGE or RED path in F-0.2, CORE COOLING

NUMARC IC:

Complete loss of function needed to achieve or maintain hot shutdown with reactor coolant > 200 °F.

FPB loss/potential loss:

Fuel clad potential loss, RCS loss

Mode Applicability:

Power Operations, Hot Shutdown

Basis:

CSFST Core Cooling - ORANGE path is entered based on either:

- Core exit thermocouples > 700 °F
- OR
- RVLIS level < 39% w/ no RCPs (TAF)

Either condition indicates subcooling has been lost and that some clad damage may occur. It must also be assumed that the loss of RCS inventory is a result of a loss of RCS barrier. Therefore a Site Area Emergency is warranted based upon the potential loss of fuel clad with loss of RCS barriers.

PEG Reference:

FC1.2  
FC3.2  
FC4.1  
SS4.1

Basis Reference(s):

1. CSFST F-0.2, Core Cooling

## Section 1.0 CSFST Status

### 1.0 CSFST Status 1.2 Core Cooling

#### 1.2.2 General Emergency

RED path in F-0.2, CORE COOLING

AND

Functional restoration procedures not effective within 15 min.

NUMARC IC:

N/A

FPB loss/potential loss:

Fuel clad loss, RCS loss, Containment potential loss

Mode Applicability:

Power Operations, Hot Shutdown

Basis:

CSFST Core Cooling - RED path is entered based on either:

- Core exit thermocouples > 1200 °F

OR

- Core exit thermocouples > 700 °F

AND

- RVLIS level < 39% w/ no RCPs (TAF)

Either condition indicates significant core exit superheating and core uncover and is considered a loss of the Fuel Clad Barrier. It must also be assumed that the loss of RCS inventory is a result of a loss of RCS barrier. These conditions, if not mitigated, will likely lead to core melt which will in turn result in a potential loss of containment. Therefore, declaration of a General Emergency is warranted.

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.

### Section 1.0 CSFST Status

For the purpose of this EAL the term 'effective' with regards to functional restoration procedures means that the CSFST Core Cooling - RED path entry criterion no longer exists.

**PEG Reference:**

FC1.1  
SG2.1 (Core Cooling)  
PC6.1  
PC6.2

**Basis Reference(s):**

1. CSFST F-0.2, Core Cooling



Section 1.0 CSFST Status

1.0 CSFST Status 1.3 Heat Sink

1.3.1 Site Area Emergency

RED path in F-0.3, HEAT SINK

AND

Heat sink is required

NUMARC IC:

Complete loss of function needed to achieve or maintain hot shutdown with reactor coolant > 200 °F.

FPB loss/potential loss:

Fuel clad potential loss, RCS potential loss

Mode Applicability:

Power Operations, Hot Shutdown

Basis:

CSFST Heat Sink - RED path is entered based on both:

- all S/G's narrow range level < 6% (16% adv. cnmt.)

AND

- Total feedwater flow to S/Gs < 355 gpm

The combination of these two conditions indicates the ultimate heat sink function is under extreme challenge. This EAL addresses loss of functions required for hot shutdown with the reactor at pressure and temperature. Under these conditions, there is an actual major failure of a system intended for protection of the public with potential for multiple fission product barrier loss. Therefore, declaration of a Site Area Emergency is warranted.

PEG Reference:

FC1.3  
RCS1.2  
SS4.1

Basis Reference(s):

1. CSFST F-0.3, Heat Sink

Section 1.0 CSFST Status

1.0 CSFST Status 1.4 Integrity

1.4.1 Alert

RED path on F-0.4, INTEGRITY

NUMARC IC:

N/A

FPB loss/potential loss:

RCS potential loss

Mode Applicability:

Power Operations, Hot Shutdown

Basis:

CSFST Integrity - RED path is entered based on both:

- exceeding RCS cooldown rate of 100 °F/hr
- AND
- all RCS cold leg temperatures to the left of the RCS Pressure/RCS Cold Leg Temperature Curve

The combination of these two conditions indicates the RCS barrier is under significant challenge and should be considered a potential loss of RCS barrier. Any loss or potential loss of RCS barrier warrants declaration of an Alert.

PEG Reference:

RCS1.1

Basis Reference(s):

1. CSFST F-0.4, Integrity

Section 1.0 CSFST Status

1.0 CSFST Status 1.5 Containment

1.5.1 General Emergency

RED path F-0.5, CONTAINMENT resulting from loss of coolant

NUMARC IC:

N/A

FPB loss/potential loss:

Fuel clad loss, RCS loss, Containment potential loss

Mode Applicability:

Power Operations, Hot Shutdown

Basis:

CSFST Containment - RED path is entered based on exceeding containment design pressure of 47 psig. This pressure is well in excess of that expected from the design basis loss of coolant accident. This is indicative of a loss of both RCS and fuel clad boundaries in that it is not possible to reach this condition without also being in a Heat Sink-RED or Core Cooling-RED CSFST. The source of energy must be the result of severe degradation of core cooling or loss of heat sink. Since containment pressures at or approaching design levels is also a potential loss of containment, this combination of conditions requires the declaration of a General Emergency.

PEG Reference:

PC1.1

Basis Reference(s):

1. CSFST F-0.5, Containment

## Section 2.0 Reactor Fuel

### 2.0 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.

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 inplant from reactor coolant process streams. If other fission product barriers were to fail, these radioactive fission products can pose significant offsite radiological consequences.

The following parameters/indicators are indicative of possible fuel failures:

- Coolant Activity: During normal operation, reactor coolant fission product activity is very low. Small concentrations of fission products in the coolant are primarily from the fission of tramp uranium in the fuel cladding or minor perforations in the cladding itself. Any significant increase from these base-line levels is indicative of fuel failures.
- Containment Radiation Monitors: Although not a direct indication or measurement of fuel damage, exceeding predetermined limits on containment high range radiation monitors under LOCA conditions is indicative possible fuel failures.
- Refueling Accidents or 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.

## Section 2.0 Reactor Fuel

### 2.0 Reactor Fuel 2.1 Coolant Activity

#### 2.1.1 Unusual Event

Coolant sample activity:

> 1.0  $\mu\text{Ci/cc}$  dose equivalent I-131

OR

> 100/(E Bar)  $\mu\text{Ci/cc}$  for all noble gases with half-lives > 10 min.

NUMARC IC:

Fuel clad degradation

FPB loss/potential loss:

N/A

Mode Applicability:

All

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.

PEG Reference:

SU4.2

Basis Reference(s):

1. Technical Specifications para. 3.1.D.1

Section 2.0 Reactor Fuel

2.0 Reactor Fuel 2.1 Coolant Activity

2.1.2 Alert

Coolant activity > 300  $\mu\text{Ci}/\text{cc}$  I-131 equivalent

NUMARC IC:

N/A

FPB loss/potential loss:

Fuel clad loss

Mode Applicability:

Power operation, hot shutdown

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 amount of coolant activity corresponds to about 2% to 5% fuel clad damage. When reactor coolant activity reaches this level, significant clad heating has occurred and thus the fuel clad barrier is considered lost. Therefore, declaration of an Alert is warranted.

A site specific evaluation of coolant activity associated with 5% clad failures was performed. The calculation was based upon WOG core damage assessment source terms and made the conservative assumption that the I-131 equivalent activity is 2 x I-131 source term (2 x 2.4E5 Ci). Based on a 90,000 gal. RCS volume @ 579 °F, the resulting coolant concentration was calculated as 102.3  $\mu\text{Ci}/\text{cc}$ . Since the assumptions and source of the NUMARC number is unknown, there is no way to know how these two numbers compare. It has been decided to use the value provided by NUMARC.

PEG Reference:

FC2.1

Basis Reference(s):

Letter from D. Gaynor to R. Ferraro 7/27/93 "EAL Technical Basis 2.1.2"

## Section 2.0 Reactor Fuel

### 2.0 Reactor Fuel 2.1 Coolant Activity

#### 2.1.3 Site Area Emergency

Coolant activity > 300  $\mu\text{Ci/cc}$  I-131 equivalent and any of the following:

- RED path on F-0.4, INTEGRITY
- Primary system leakage > 75 gpm
- RCS subcooling < SI initiation setpoint
- > 0.06  $\mu\text{Ci/cc}$  on R-11 and R-12 due to RCS leakage

NUMARC IC:

N/A

FPB loss/potential loss:

Fuel clad loss, RCS potential loss/loss

Mode Applicability:

Power operation, hot shutdown

Basis:

This EAL addresses combinations of fuel clad loss with RCS loss and potential loss indicators.

300  $\mu\text{Ci/cc}$  I-131 equivalent coolant activity corresponds to about 2% to 5% fuel clad damage. When reactor coolant activity reaches this level, significant clad heating has occurred and thus the fuel clad barrier is considered lost. This condition in combination with any of the following RCS loss/potential loss indicators warrants declaration of a Site Area Emergency:

RED path on F-0.4, INTEGRITY: RED path indicates an extreme challenge to the safety function derived from appropriate instrument readings, and indicates a potential loss of RCS barrier.

Primary system leakage exceeding capacity (> 75 gpm) of a single charging pump: This EAL is based on the inability to maintain normal liquid inventory within the Reactor Coolant System (RCS) when RCS leakage exceeds the capacity of one charging pump. 75 gpm is the minimum operability flow rate for each charging pump.

RCS subcooling < SI initiation setpoint: This loss of RCS addresses conditions where leakage from the RCS is greater than available

## Section 2.0 Reactor Fuel

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.

> 0.06  $\mu\text{Ci/cc}$  on R-11 and R-12 due to RCS leakage:> 0.06  $\mu\text{Ci/cc}$  on R-11/R-12 due to RCS leakage indicates the release of reactor coolant to the containment. The indication assumes the instantaneous release and dispersal of the reactor coolant noble gas and iodine inventory associated with normal operating concentrations (i. e., within T/S) into the containment atmosphere. This EAL is indicative of a RCS leak only.

### PEG Reference:

FC2.1 + RCS1.1, RCS2.1, RCS2.2 and RCS4.1

### Basis Reference(s):

1. Letter from D. Gaynor to R. Ferraro 7/27/93 "EAL Technical Basis 2.1.2"
2. CSFST F-0.4, Integrity
3. System Description No. 3, CVCS
4. IP2 PT-Q33
5. E-0, Reactor Trip Or Safety Injection



Section 2.0 Reactor Fuel

2.0 Reactor Fuel 2.2 Containment Radiation

2.2.1 Alert

> 0.06  $\mu\text{Ci/cc}$  on R-11 or R-12 due to RCS leakage

NUMARC IC:

N/A

FPB loss/potential loss:

RCS loss

Mode Applicability:

Power operation, hot shutdown

Basis:

>0.06  $\mu\text{Ci/cc}$  on R-11/12 with confirmation by coolant sample of concentrations in excess of Technical Specifications indicates the release of reactor coolant to the containment. The indication was derived assuming the instantaneous release and dispersal of the reactor coolant noble gas and iodine inventory associated with normal operating concentrations (i. e., within T/S) into the containment atmosphere. This EAL is indicative of a RCS leak only. If R-25/ R-26 readings increase to that specified by Reactor Fuel EAL 2.2.2, significant fuel damage would also be indicated.

PEG Reference:

RCS4.1

Basis Reference(s):

1. None

## Section 2.0 Reactor Fuel

### 2.0 Reactor Fuel 2.2 Containment Radiation

#### 2.2.2 Site Area Emergency

Containment radiation monitor R-25 or R-26 > 17 R/hr

**NUMARC IC:**

N/A

**FPB loss/potential loss:**

Fuel clad loss, RCS loss

**Mode Applicability:**

Power operation, hot shutdown

**Basis:**

The 17 R/hr reading is a value which indicates the release of reactor coolant, with elevated activity indicative of fuel damage, into the containment. The reading is calculated assuming the instantaneous release and dispersal of the reactor coolant noble gas and iodine inventory associated with a concentration of 300  $\mu\text{Ci/gm}$  dose equivalent I-131 into the containment atmosphere. Reactor coolant concentrations of this magnitude are several times larger than the maximum concentrations allowed within technical specifications and are therefore indicative of fuel damage (approximately 5 % clad failure depending on core inventory and RCS volume). This value is higher than that specified in EAL 2.2.1 which would be indicative of only the RCS barrier. Thus, this EAL indicates a loss of both the fuel clad barrier and a loss of RCS barrier warranting declaration of a Site Area Emergency.

**PEG Reference:**

FC5.1

**Basis Reference(s):**

1. Letter from DA Smith

Section 2.0 Reactor Fuel

2.0 Reactor Fuel 2.2 Containment Radiation

2.2.3 General Emergency

Containment radiation monitor R-25 or R-26 > 68 R/hr

NUMARC IC:

N/A

FPB loss/potential loss:

Fuel clad loss, RCS loss, Containment potential loss

Mode Applicability:

Power operation, hot shutdown

Basis:

The 68 R/hr reading is a value which indicates significant fuel damage (20 % clad failure) well in excess of the EALs associated with both loss of fuel clad and loss of RCS barriers. A major release of radioactivity requiring offsite protective actions from core damage is not possible unless a major failure of fuel cladding allows radioactive material to be released from the core into the reactor coolant. Regardless of whether containment is challenged, this amount of activity in containment, if released, could have such severe consequences that it is prudent to treat this as a potential loss of containment, such that a General Emergency declaration is warranted. NUREG-1228 "Source Estimations During Incident Response to Severe Nuclear Power Plant Accidents," indicates that such conditions do not exist when the amount of clad damage is less than 20%.

PEG Reference:

PC5.1

Basis Reference(s):

1. Letter from DA Smith

## Section 2.0 Reactor Fuel

### 2.0 Reactor Fuel 2.3 Refueling Accidents or Other Radiation Monitors

#### 2.3.1 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

#### NUMARC IC:

Unexpected increase in plant radiation or airborne concentration.

#### FPB loss/potential loss:

N/A

#### Mode Applicability:

All

#### Basis:

In light of Reactor Cavity Seal failure, incidents at two different PWRs and loss of water in the Spent Fuel Pit/Fuel Transfer Canal at a BWR all occurring since 1984, explicit coverage of these types of events via EALs 2.3.1 and 2.3.3 is appropriate given their potential for increased doses to plant staff. Classification as an Unusual Event is warranted as a precursor to a more serious event.

The spent fuel pool low water level alarm setpoint is actuated by LC-650. Water level restoration instructions for loss of refueling cavity water level during refueling are performed in accordance with ONOP-RP-3. 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 RPV and spent fuel pool.

Section 2.0 Reactor Fuel

PEG Reference:

AU2.1

Basis Reference(s):

1. ONOP-SFP-1, Loss Of SFP Cooling
2. ONOP RP-3, Loss Of Refueling Cavity Water Level During Refueling

## Section 2.0 Reactor Fuel

### 2.0 Reactor Fuel 2.3 Refueling Accidents or Other Radiation Monitors

#### 2.3.2 Alert

Confirmed sustained alarm on any of the following radiation monitors resulting from an uncontrolled fuel handling process:

- R-2 or R-7 Vapor Containment Area Monitors
- R-5 Fuel Storage Building Area Monitor
- R-25 or 26 Vapor Containment High Radiation Area Monitors
- R-12 Containment Gas Activity

#### NUMARC IC:

Major damage to irradiated fuel or loss of water level that has or will result in the uncovering of irradiated fuel outside the reactor vessel.

#### FPB loss/potential loss:

N/A

#### Mode Applicability:

All

#### Basis:

NUREG-0818, "Emergency Action Levels for Light Water Reactors," forms the basis for this EAL. This EAL is defined by the specific area where irradiated fuel is located such as reactor cavity, reactor vessel, or spent fuel pool.

NUREG/CR-4982, "Severe Accident in Spent Fuel Pools in Support of Generic Safety Issue 82," July 1987, indicates that even if corrective actions are not taken, no prompt fatalities are predicted, and that risk of injury is low. In addition, NRC Information Notice No. 90-08, "KR-85 Hazards from Decayed Fuel" presents the following in its discussion:

"In the event of a serious accident involving decayed spent fuel, protective actions would be needed for personnel on site, while offsite doses (assuming an exclusion area radius of one mile from the plant site) would be well below the Environmental Protection Agency's Protective Action Guides. Accordingly, it is important to be able to properly survey and monitor for Kr-85 in the event of an accident with decayed spent fuel."

## Section 2.0 Reactor Fuel

An "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 increases in area radiation levels as a result of actions performed in accordance with approved procedures during refueling operations.

Thus, an Alert Classification for this event is appropriate. Escalation, if appropriate, would occur via Emergency Director judgment in EAL Category 9.0.

### PEG Reference:

AA2.1

### Basis Reference(s):

1. ONOP RP-3, Loss Of Refueling Cavity Water Level During Refueling
2. System Description No. 12.0, Radiation Monitoring System
3. System Description No. 17, Fuel and Core Component Handling System, page 17/18
4. SOP-RM-10, Radiation Setpoint Control Program, effective 12/2/92
5. NUREG/CR-4982 "Severe Accident in Spent Fuel Pools in Support of Generic Safety Issue 82"
6. NRC Information Notice No. 90-08, "KR-85 Hazards from Decayed Fuel"

## Section 2.0 Reactor Fuel

### 2.0 Reactor Fuel 2.3 Refueling Accidents or Other Radiation Monitors

#### 2.3.3 Alert

Report of visual observation of irradiated fuel uncovered

#### NUMARC IC:

Major damage to irradiated fuel or loss of water level that has or will result in the uncovering of irradiated fuel outside the reactor vessel.

#### FPB loss/potential loss:

N/A

#### Mode Applicability:

All

#### Basis:

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

There is no 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.

Sufficient time exists to take corrective actions for these conditions and there is little potential for substantial fuel damage. NUREG/CR-4982 "Severe Accident in Spent Fuel Pools in Support of Generic Safety Issue 82" indicates that even if corrective actions are not taken, no prompt fatalities are predicted and the risk of injury is low. In addition, NRC Information Notice No. 90-08, "KR-85 Hazards from Decayed Fuel" presents the following in its discussion:

"In the event of a serious accident involving decayed spent fuel, protective actions would be needed for personnel on site, while offsite doses (assuming an exclusion area radius of one mile from the plant site) would be well below the Environmental Protection Agency's Protective Action Guides. Accordingly, it is important to be able to properly survey and monitor for Kr-85 in the event of an accident with decayed spent fuel."



## Section 2.0 Reactor Fuel

Thus, an Alert Classification for this event is appropriate. Escalation, if appropriate, would occur via radioactivity release category 5.0 or Emergency Director judgment in EAL Category 9.0.

This EAL applies to spent fuel requiring water coverage and is not intended to address spent fuel which is licensed for dry storage.

### PEG Reference:

AA2.2

### Basis Reference(s):

1. ONOP RP-3, Loss Of Refueling Cavity Water Level During Refueling
2. System Description No. 17, Fuel and Core Component Handling System, page 17/18
3. NUREG/CR-4982 "Severe Accident in Spent Fuel Pools in Support of Generic Safety Issue 82"
4. NRC Information Notice No. 90-08, "KR-85 Hazards from Decayed Fuel"

## Section 3.0 Reactor Coolant

### 3.0 REACTOR COOLANT SYSTEM (RCS)

The reactor vessel provides a volume for the coolant which 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.

There are three RCS parameters which are indicative of conditions which may pose a threat to RCS or fuel cladding integrity:

- RCS Leakage: Excessive (> Technical Specification) RCS leakage indications are utilized to indicate potential pipe cracks which may propagate to an extent threatening fuel clad, RCS and containment integrity. RCS leakage of a degree requiring ECCS to maintain RCS inventory poses a direct threat to fuel clad integrity. Reactor vessel water level is also directly related to the status of adequate core cooling, and therefore fuel cladding integrity.
- Primary to Secondary Leakage: A subset of RCS leakage, excessive primary to secondary leakage in conjunction with unisolable secondary releases to environment may result in losses of containment integrity as well as threaten fuel clad integrity for more severe SG tube ruptures.
- RCS Subcooling: A loss of RCS subcooling is a fundamental indication that the inventory control systems are inadequate in maintaining RCS pressure and inventory against mass loss through a leak.

Section 3.0 Reactor Coolant

3.0 Reactor Coolant System 3.1 RCS Leakage

3.1.1 Unusual Event

Unidentified or pressure boundary leakage > 10 gpm  
OR  
Identified leakage > 25 gpm

NUMARC IC:

RCS leakage when greater than 200 °F

FPB loss/potential loss:

N/A

Mode Applicability:

Power operation, hot 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. The 10 gpm value for the unidentified leakage and pressure boundary leakage was selected because it is observable with normal Control Room indications. Smaller values must be determined through time-consuming surveillance tests (e. g., mass balances). 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.

Only operating modes in which there is fuel in the reactor coolant system and the system is pressurized are specified.

PEG Reference:

SU5.1

Basis Reference(s):

None

Section 3.0 Reactor Coolant

3.0 Reactor Coolant System 3.1 RCS Leakage

3.1.2 Alert

Primary system leakage > 75 gpm

NUMARC IC:

N/A

FPB loss/potential loss:

RCS potential loss

Mode Applicability:

Power operation, hot shutdown

Basis:

This EAL is based on the inability to maintain normal liquid inventory within the Reactor Coolant System (RCS) by normal operation of the Chemical and Volume Control System which is considered as one positive displacement charging pump discharging to the charging header. 75 gpm is the minimum operability flow rate for the charging pumps.

PEG Reference:

RCS2.2

Basis Reference(s):

1. System Description No. 3, CVCS
2. IP2 PT-Q33

## Section 3.0 Reactor Coolant

### 3.0 Reactor Coolant System 3.1 RCS Leakage

#### 3.1.3 Site Area Emergency

RVLIS cannot be maintained > 39% with no RCPs running

OR

With the reactor vessel head removed, it is reported that water level in the reactor vessel is dropping in an uncontrolled manner and core uncover is likely

#### NUMARC IC:

Loss of reactor vessel water level has or will uncover fuel in the reactor vessel.

#### FPB loss/potential loss:

Fuel clad potential loss, RCS loss

#### Mode Applicability:

Power Operations, Hot Shutdown, Cold Shutdown, Refuel

#### Basis:

The reactor vessel water level used in this EAL is the top of active fuel (TAF). This value corresponds to the level which is used in CSFSTs to indicate challenge to core cooling and loss of the fuel clad barrier. This is the minimum water level to assure core cooling without further degradation of the clad. Severe core damage can occur and reactor coolant system pressure boundary integrity may not be assured if reactor vessel water level is not maintained above that corresponding to RVLIS at 39%. RVLIS dynamic range indications are not utilized in this EAL since the RCPs would not be running under conditions where vessel level is approaching TAF.

Thus, declaration of a Site Area Emergency is warranted under the conditions specified by this EAL. Escalation to a General Emergency would be via radioactivity release category 5.0.

#### PEG Reference:

SS5.1  
FC4.1  
SS4.1

Section 3.0 Reactor Coolant

Basis Reference(s):

1. FR-C.1 "Response to Inadequate Core Cooling
2. ONOP-RHR-1, Loss Of Residual Heat Removal Flow
3. ONOP-RHR-2, Loss Of Residual Heat Removal With The RCS Drained Or  
At Midloop

Section 3.0 Reactor Coolant

3.0 Reactor Coolant System 3.2 Primary to Secondary  
Leakage

3.2.1 Unusual Event

Unisolable release of secondary side to atmosphere from the affected steam generator(s) with primary to secondary leakage > 0.3 gpm in any steam generator

NUMARC IC:

N/A

FPB loss/potential loss:

Containment loss

Mode Applicability:

Power operation, hot shutdown

Basis:

This EAL addresses SG tube leaks indicative of a loss of containment. Unisolable secondary side releases to atmosphere include feed line or steam line breaks as well as stuck open safety or atmospheric relief valves that cannot be isolated once isolation has been directed by the EOPs. A steam generator which is required to be used for plant cooldown would also be covered under this EAL. For small leaks, not exceeding the normal charging capacity threshold in RCS leakage EAL 3.1.2, this EAL results in an Unusual Event. For larger leaks, RCS leakage EAL 3.2.2 would result in a Site Area Emergency. For SG tube ruptures which may involve multiple steam generators or unisolable secondary line breaks, SG tube rupture EAL 4.2.1 would also result in a Site Area Emergency.

PEG Reference:

PC4.1

Basis Reference(s):

1. Technical Specifications, Amendment No. 121, paragraph 3.1.F.8, page 3.1-31

## Section 3.0 Reactor Coolant

### 3.0 Reactor Coolant System 3.2 Primary to Secondary Leakage

#### 3.2.2 Site Area Emergency

Unisolable release of secondary side to atmosphere from the affected steam generator(s) with primary to secondary leakage > 75 gpm

**NUMARC IC:**

N/A

**FPB loss/potential loss:**

RCS potential loss, Containment loss

**Mode Applicability:**

Power operation, hot shutdown

**Basis:**

This EAL addresses SG tube leaks indicative of a loss of both RCS and containment barriers. Unisolable secondary side releases to atmosphere include feed line or steam line breaks as well as stuck open safety or atmospheric relief valves that cannot be isolated once isolation has been directed by the EOPs. A steam generator which is required to be used for plant cooldown would also be covered under this EAL. Primary to secondary leakage > 75 gpm is based on the inability to maintain normal liquid inventory within the Reactor Coolant System (RCS) when RCS leakage exceeds the capacity of one charging pump. 75 gpm is the minimum operability flow rate for each charging pump. For primary to secondary leakage > 75 gpm in the absence of secondary to atmosphere release, an Alert would be declared based on EAL 3.1.2.

This EAL represents the loss of both RCS and containment barriers and therefore warrants declaration of a Site Area Emergency.

**PEG Reference:**

PC4.1 + RCS2.2



Section 3.0 Reactor Coolant

Basis Reference(s):

1. E-3 "Steam Generator Tube Rupture"
2. Technical Specifications, Amendment No. 121, paragraph 3.1.F.8, page 3.1-31
3. IP2 PT-Q33
4. System Description No. 3, CVCS

## Section 3.0 Reactor Coolant

### 3.0 Reactor Coolant System 3.2 Primary to Secondary Leakage

#### 3.2.3 Site Area Emergency

Unisolable release of secondary side to atmosphere from the affected steam generator(s) with primary to secondary leakage > 0.3 gpm in any steam generator

AND

Coolant activity > 300  $\mu\text{Ci/cc}$  of I-131

NUMARC IC:

N/A

FPB loss/potential loss:

Fuel clad loss, Containment loss

Mode Applicability:

Power operation, hot shutdown

Basis:

This EAL addresses SG tube leaks indicative of a loss of containment in conjunction with a loss of fuel cladding. Unisolable secondary side releases to atmosphere include feed line or steam line breaks as well as stuck open safety or atmospheric relief valves that cannot be isolated once isolation has been directed by the EOPs. A steam generator which is required to be used for plant cooldown would also be covered under this EAL.

A coolant activity > 300  $\mu\text{Ci/cc}$  of I-131 indicates a loss of fuel cladding. Refer to EAL #2.1.2 basis

This condition represents a loss of both primary containment with the loss of fuel cladding and thus warrants declaration of a Site Area Emergency.

PEG Reference:

PC4.1 + FC2.1

Section 3.0 Reactor Coolant

**Basis Reference(s):**

1. Technical Specifications Section 3.1.F

Section 3.0 Reactor Coolant

3.0 Reactor Coolant System 3.3 RCS Subcooling

3.3.1 Alert

RCS subcooling < SI initiation setpoint

NUMARC IC:

N/A

FPB loss/potential loss:

RCS loss

Mode Applicability:

Power operation, hot shutdown

Basis:

This EAL addresses conditions where 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.

Loss of the RCS barrier warrants declaration of an Alert.

PEG Reference:

RCS2.1

Basis Reference(s):

1. E-0, Reactor Trip Or Safety Injection

## Section 4.0 Containment

### 4.0 CONTAINMENT

The containment structure is an atmospheric vapor containment system. It forms a fission product barrier designed to contain the radioactive fission products generated from any postulated accident so as to preclude exceeding offsite exposure limits.

The containment structure is a low leakage system housing the reactor vessel, the reactor coolant piping, steam generators and other branch connections of the reactor primary system. The containment is equipped with isolation valves for systems which penetrate the containment boundary. These valves automatically actuate to isolate systems under emergency conditions.

There are three containment parameters which are indicative of conditions which may pose a threat to containment integrity or indicate degradation of RCS or reactor fuel clad integrity.

- Containment Integrity Status: Abnormally high containment pressure or failure of containment cooling systems following a LOCA are indicative of potential losses of the containment barrier integrity.

The existence of an unisolable containment isolation (CI) or containment ventilation isolation (CVI) line break outside containment constitutes a loss of containment integrity as well as a loss of RCS boundary. Inconsistent containment response to a known LOCA is also indicative of containment loss in conjunction with RCS barrier breach. Should a loss of fuel cladding integrity occur under either of these conditions, the potential for release of large amounts of radioactive materials to the environment exists.

- Steam Generator Tube Rupture with Secondary Release: SG tube ruptures in conjunction with a secondary system line break resulting in release to the environment constitutes losses of both RCS and containment integrity.

Primary to secondary leakage in excess of Technical Specifications in conjunction with fuel clad damage and secondary system leakage to the environment constitutes losses of fuel clad, RCS and containment integrity. This condition provides the potential for release of large amounts of radioactive materials to the environment.

- Combustible Gas Concentrations: The existence of combustible gas concentrations in containment pose a severe threat to containment integrity and are indicative of severely degraded reactor core and RCS conditions.

Section 4.0 Containment

## Section 4.0 Containment

### 4.0 Containment 4.1 Containment Integrity Status

#### 4.1.1 Unusual Event

Both doors open on a VC airlock for > 4 hrs.

OR

Inability to close containment pressure relief or purge valves which results in a radiological release pathway to the environment for > 4 hrs

OR

Any Phase "A" or Phase "B" or containment ventilation isolation valve(s) not closed when required which results in a radiological release pathway to the environment

NUMARC IC:

N/A

FPB loss/potential loss:

Containment loss

Mode Applicability:

Power operation, hot shutdown

Basis:

This EAL addresses an indication that unambiguously indicates loss of the containment barrier under conditions when containment integrity is required.

It is important to note however, that loss of containment due to both airlock doors being open is event dependent. Upon recognition, shift personnel would rapidly respond in an attempt to reestablish containment integrity. If the doors cannot be reclosed, any loss of the RCS barrier that occurs with the doors open would appear as an inconsistent LOCA response. Therefore, this event is not used as a definitive indicator of loss of the primary containment barrier for purposes of defining higher classification EALs. Rather it is left to the Emergency Director's judgment whether such a loss has occurred.

The condition " Inability to close containment pressure relief or purge valves which results in a radiological release pathway to the environment for > 4 hrs." was added to address loss of containment boundary as a result of failure to isolate the containment vent path following routine containment venting. The condition "Any Phase "A" or

#### Section 4.0 Containment

Phase "B" or containment ventilation isolation valve(s) not closed when required which results in a radiological release pathway to the environment" was added to address CIS isolation failures which are not initiated as a result of RCS boundary breach such as resulting from severely faulted SGs.

**PEG Reference:**

PC7.1

**Basis Reference(s):**

Tech Spec. 3.6.A.1.D and 3.6.A.3"



Section 4.0 Containment

4.0 Containment 4.1 Containment Integrity Status

4.1.2 Site Area Emergency

Rapid uncontrolled decrease in containment pressure following initial increase

OR

Loss of primary coolant inside containment with containment pressure or sump level response not consistent with LOCA conditions

NUMARC IC:

N/A

FPB loss/potential loss:

RCS loss, Containment loss

Mode Applicability:

Power operation, hot shutdown

Basis:

Rapid unexplained loss of pressure (i. e., not attributable to containment spray or Fan Cooling Units or condensation effects) following an initial pressure increase indicates a loss of both RCS and containment integrity. Containment pressure and sump levels should increase as a result of the mass and energy release into containment from a LOCA. Thus, sump level or pressure not increasing indicates containment bypass (V-sequence) and a loss of containment integrity.

This EAL indicates loss of both RCS and containment and therefore warrants declaration of a Site Area Emergency.

PEG Reference:

PC2.1

PC2.2

Basis Reference(s):

None

## Section 4.0 Containment

### 4.0 Containment 4.1 Containment Integrity Status

#### 4.1.3 Site Area Emergency

Either:

Any Phase "A" or Phase "B" or CVI valve(s) not closed when required following confirmed LOCA

OR

Inability to isolate any primary system discharging outside containment

AND

Radiological release to the environment exists as a result

NUMARC IC:

N/A

FPB loss/potential loss:

RCS loss, Containment loss

Mode Applicability:

Power operation, hot shutdown

Basis:

This EAL is intended to address incomplete containment isolation that allows direct release to the environment. It represents a loss of both the RCS and containment barrier and therefore warrants declaration of a Site Area Emergency.

Failure of Phase "A" or Phase "B" or CVI valves to isolate is intended to address incomplete containment isolation that allows direct release to the environment. It represents a loss of both the RCS and containment barrier.

"Inability to isolate any primary system discharging outside containment" is intended to address other primary systems, either direct or indirect, which the inability to isolate indicate loss of both RCS and containment. 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, decreasing RCS inventory without corresponding containment response, or area temperatures and radiation levels outside containment.

#### Section 4.0 Containment

It is for this reason that Shift Manager/Emergency Director judgment is intended to be used in evaluating this criteria. However, it is intended that the magnitude of the leak associated with this EAL be consistent with the RCS barrier loss threshold of 75 gpm or greater.

**PEG Reference:**

PC3.1

**Basis Reference(s):**

1. Technical Specification 3.6.A.1.1 and 3.6.A.1.A

Section 4.0 Containment

4.0 Containment 4.1 Containment Integrity Status

4.1.4 General Emergency

Confirmed phase B isolation signal following confirmed LOCA with less than minimum containment cooling safeguards equipment operating, Table 4.3

AND

Any indicators of fuel clad loss, Table 4.1

Table 4.3 Minimum Containment Cooling Safeguards Equipment	
Fan Cooler Units Operating Required	Spray Pumps
< 3	2
3	1
5	0

Table 4.1 Fuel Clad Loss Indicators	
1.	Coolant activity > 300 $\mu\text{Ci/cc}$ dose equivalent of I-131
2.	Containment radiation monitor R-25/R-26 reading > 17 R/hr
3.	RED path in F-0.2, CORE COOLING

NUMARC IC:

N/A

FPB loss/potential loss:

Fuel clad loss, RCS loss, Containment potential loss

Mode Applicability:

Power operation, hot shutdown

## Section 4.0 Containment

### Basis:

This EAL represents a potential loss of containment in conjunction with losses of both RCS and fuel clad.

A potential loss of containment is considered to exist in that a containment heat removal/depressurization system (e. g., containment sprays, Fan Cooler Units, but not including containment venting strategies) is either lost or performing in a degraded manner, as indicated by containment pressure greater than the setpoint at which the equipment was supposed to have actuated.

RCS is also assumed to be lost in this condition due to the high containment pressure.

Table 4.1 presents fuel clad loss indicators which represent 2 - 5% clad failures. Refer to EAL #'s 2.1.2 and 2.2.2 for bases of these indicators.

### PEG Reference:

PC2.5 + FC2.1, FC5.1

### Basis Reference(s):

1. Technical Specifications para. 5.2
2. FSAR Appendix 5A.
3. System Description No. 10.3, Containment Air Recirculation Cooling And Filtration System
4. System Description No. 10.2, Containment Spray System
5. EOP E-0, for Phase "A" and "B" isolations signals
6. Technical Specification 3.6.B-2
7. ECA 1.1, Loss of Emergency Coolant Recirculation

Section 4.0 Containment

4.0 Containment 4.1 Containment Integrity Status

4.1.5 General Emergency

Either:

Rapid uncontrolled decrease in containment pressure following initial increase

OR

Loss of primary coolant inside containment with containment pressure or sump level response not consistent with LOCA conditions

AND

Any indicators of fuel clad damage, Table 4.2

Table 4.2 Fuel Clad Damage Indicators

- |    |  |
|----|--|
| 1. | ORANGE or RED path in F-0.2, CORE COOLING                    |
| 2. | RED path in F-0.3, HEAT SINK                                 |
|    | AND  |
|    | Heat sink is required  |
| 3. | Coolant activity > 300 $\mu$ CI/cc of I-131                  |
| 4. | Containment radiation monitor R-25 or R-26 reading > 17 R/hr |

NUMARC IC:

N/A

FPB loss/potential loss:

Fuel clad potential loss/loss, RCS loss, Containment loss

Mode Applicability:

Power operation, hot shutdown

## Section 4.0 Containment

### Basis:

This EAL indicates loss of both RCS and containment with loss or potential loss of the fuel cladding and therefore warrants declaration of a General Emergency.

Rapid unexplained loss of pressure (i. e., not attributable to containment spray or Fan Cooling Units or condensation effects) following an initial pressure increase indicates a loss of both RCS and containment integrity. Containment pressure and sump levels should increase as a result of the mass and energy release into containment from a LOCA. Thus, sump level or pressure not increasing indicates containment bypass (V-sequence) and a loss of containment integrity.

Table 4.2 presents fuel clad loss and potential loss indicators:

- ORANGE path in F-0.2, Core Cooling: Refer to EAL #1.1.1 basis
- RED path in F-0.3, Heat Sink: Refer to EAL #1.2.1 basis
- Coolant activity > 300  $\mu\text{Ci/cc}$  of I-131: Refer to EAL #2.1.2 basis
- Containment rad monitor reading > 17 R/hr: Refer to EAL #2.2.2 basis

### PEG Reference:

PC2.1/PC2.2 + FC1.2, FC1.3, FC2.1, FC3.2, FC4.1, and FC5.1

### Basis Reference(s):

1. F-0.2, Rev. 3, CORE COOLING, 2/10/89
2. F-0.3, Rev. 3, HEAT SINK, 4/16/91

Section 4.0 Containment

4.0 Containment 4.1 Containment Integrity Status

4.1.6 General Emergency

Either:

Any Phase "A" or Phase "B" or CVI valve(s) not closed when required following confirmed LOCA

OR

Inability to isolate any primary system discharging outside containment

AND

Radiological release to the environment exists as a result

AND

Any indicators of fuel clad damage, Table 4.2

Table 4.2 Fuel Clad Damage Indicators

- |    |  |
|----|--|
| 1. | ORANGE or RED path in F-0.2, CORE COOLING                    |
| 2. | RED path in F-0.3, HEAT SINK                                 |
|    | AND  |
|    | Heat sink is required  |
| 3. | Coolant activity > 300 $\mu$ CI/cc of I-131                  |
| 4. | Containment radiation monitor R-25 or R-26 reading > 17 R/hr |

NUMARC IC:

N/A

FPB loss/potential loss:

Fuel clad loss/potential loss, RCS loss, Containment loss

Mode Applicability:

Power operation, hot shutdown



## Section 4.0 Containment

### Basis:

This EAL indicates loss of both RCS and containment with loss or potential loss of the fuel cladding and therefore warrants declaration of a General Emergency.

Failure of Phase "A" or Phase "B" or CVI valves to isolate is intended to address incomplete containment isolation that allows direct release to the environment. It represents a loss of both the RCS and containment barrier.

"Inability to isolate any primary system discharging outside containment" is intended to address other primary systems, either direct or indirect, which the inability to isolate indicate loss of both RCS and containment. 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, decreasing RCS inventory without corresponding containment response, or area temperatures and radiation levels outside containment. It is for this reason that Shift Manager/Emergency Director judgment is intended to be used in evaluating this criteria. However, it is intended that the magnitude of the leak associated with this EAL be consistent with the RCS barrier loss threshold of 75 gpm or greater.

Table 4.2 presents fuel clad loss and potential loss indicators:

- ORANGE path in F-0.2, Core Cooling: Refer to EAL #1.1.1 basis
- RED path in F-0.3, Heat Sink: Refer to EAL #1.2.1 basis
- Coolant activity > 300  $\mu\text{Ci}/\text{cc}$  of I-131: Refer to EAL #2.1.2 basis
- Containment rad monitor reading > 17 R/hr: Refer to EAL #2.2.2 basis

### PEG Reference:

PC3.1 + FC1.2, FC1.3, FC2.1, FC3.2, FC4.1, and FC5.1

### Basis Reference(s):

1. System Description No. 10.7, Containment Isolation System
2. Technical Specification 3.6.A.1.A and 3.6.A.1.B
3. F-0.2, Rev. 3, CORE COOLING, 2/10/89
4. F-0.3, Rev. 3, HEAT SINK, 4/16/91

## Section 4.0 Containment

### 4.0 Containment 4.2 SG Tube Rupture w/ Secondary Release

#### 4.2.1 Site Area Emergency

Unisolable secondary side line break with SG tube rupture as identified in E-3 "Steam Generator Tube Rupture"

NUMARC IC:

N/A

FPB loss/potential loss:

RCS loss, Containment loss

Mode Applicability:

Power operation, hot shutdown

Basis:

This EAL is intended to address the full spectrum of Steam Generator (SG) tube rupture events in conjunction with a loss of containment due to a significant secondary line break. This EAL addresses ruptured SG(s) with an unisolable secondary line break corresponding to the loss of 2 of 3 fission product barriers (RCS barrier and containment barrier). This allows the direct release of radioactive fission and activation products to the environment. Resultant offsite dose rates are a function of many variables. Examples include: coolant activity, actual leak rate, SG carry over, iodine partitioning, and meteorology.

The indications utilized should be consistent with the diagnostic activities of the emergency operating procedures (EOPs), if available. This should include indication of reduction in primary coolant inventory, increased secondary radiation levels, and an uncontrolled or complete depressurization of the ruptured SG. Secondary radiation increases should be observed via radiation monitoring of condenser air ejector discharge, SG blowdown, main steam, and/or SG sampling system. Determination of the "uncontrolled" depressurization of the ruptured SG should be based on indication that the pressure decrease in the ruptured steam generator is not a function of operator action. This should prevent declaration based on a depressurization that results from an EOP induced cooldown of the RCS that does not involve the prolonged release of contaminated secondary coolant from the affected SG to the environment. This EAL encompasses steam breaks, feed breaks, and stuck open safety or relief valves.

**Section 4.0 Containment**

**PEG Reference:**

RCS3.1

**Basis Reference(s):**

1. E-3 "Steam Generator Tube Rupture"
2. E-0, Reactor Trip Or Safety Injection
3. ONOP SG-1, Steam Generator Tube Leak

Section 4.0 Containment

4.0 Containment 4.2 SG Tube Rupture w/ Secondary Release

4.2.2 General Emergency

Unisolable secondary side line break with SG tube rupture as identified in E-3 "Steam Generator Tube Rupture"

AND

Any indicators of fuel clad damage, Table 4.2

Table 4.2 Fuel Clad Damage Indicators

- |    |  |
|----|--|
| 1. | ORANGE or RED path in F-0.2, CORE COOLING                    |
| 2. | RED path in F-0.3, HEAT SINK                                 |
|    | AND  |
|    | Heat sink is required  |
| 3. | Coolant activity > 300 $\mu$ CI/cc of I-131                  |
| 4. | Containment radiation monitor R-25 or R-26 reading > 17 R/hr |

NUMARC IC:

N/A

FPB loss/potential loss:

Fuel clad loss/potential loss, RCS loss, Containment loss

Mode Applicability:

Power operation, hot shutdown

Basis:

This EAL is intended to address the full spectrum of Steam Generator (SG) tube rupture events in conjunction with a loss of containment due to a significant secondary line break with actual or potential loss of the fuel clad integrity. This EAL addresses ruptured SG(s) with an unisolable secondary line break corresponding to the loss of 2 of 3 fission product barriers (RCS barrier and containment barrier) with the actual or potential loss of the third (fuel cladding). This allows the

## Section 4.0 Containment

direct release of radioactive fission and activation products to the environment. Resultant offsite dose rates are a function of many variables. Examples include: coolant activity, actual leak rate, SG carry over, iodine partitioning, and meteorology.

The indications utilized should be consistent with the diagnostic activities of the emergency operating procedures (EOPs), if available. This should include indication of reduction in primary coolant inventory, increased secondary radiation levels, and an uncontrolled or complete depressurization of the ruptured SG. Secondary radiation increases should be observed via radiation monitoring of condenser air ejector discharge, SG blowdown, main steam, and/or SG sampling system. Determination of the "uncontrolled" depressurization of the ruptured SG should be based on indication that the pressure decrease in the ruptured steam generator is not a function of operator action. This should prevent declaration based on a depressurization that results from an EOP induced cooldown of the RCS that does not involve the prolonged release of contaminated secondary coolant from the affected SG to the environment. This EAL encompasses steam breaks, feed breaks, and stuck open safety or relief valves.

Table 4.2 presents fuel clad loss and potential loss indicators:

- ORANGE path in F-0.2, Core Cooling: Refer to EAL #1.1.1 basis
- RED path in F-0.3, Heat Sink: Refer to EAL #1.2.1 basis
- Coolant activity > 300  $\mu\text{Ci/cc}$  of I-131: Refer to EAL #2.1.2 basis
- Containment rad monitor reading > 17 R/hr: Refer to EAL #2.2.2 basis

This condition represents a loss of both RCS and primary containment with the loss or potential loss of fuel cladding and thus warrants declaration of a General Emergency.

### PEG Reference:

RCS 3.1 + FC1.2, FC1.3, FC2.1, FC3.2, FC4.1, and FC5.1

### Basis Reference(s):

1. Technical Specifications, Amendment No. 121, paragraph 3.1.F.8, page 3.1-31
2. F-0.2, Rev. 3, CORE COOLING, 2/10/89
3. F-0.3, Rev. 3, HEAT SINK, 4/16/91

Section 4.0 Containment

4.0 Containment 4.3 Combustible Gas Concentrations

4.3.1 General Emergency

≥ 4% hydrogen concentration in containment

NUMARC IC:

N/A

FPB loss/potential loss:

Fuel clad loss, RCS loss, Containment potential loss

Mode Applicability:

Power operation, hot shutdown

Basis:

Existence of an explosive mixture (4 % hydrogen) means a hydrogen and oxygen concentration of at least the lower deflagration limit curve exists.

When hydrogen and oxygen concentrations reach or exceed the deflagration limits, imminent loss of the containment barrier exists. To generate such levels of combustible gas, loss of the fuel clad and RCS barriers must have occurred.

This EAL represents loss of both fuel clad and RCS with the potential loss of containment and therefore warrants declaration of a General Emergency.

PEG Reference:

PC2.4

Basis Reference(s):

1. SOP CB-7 "Hydrogen Recombiner Operation"

## Section 5.0 Radioactivity Release / Area Radiation

### 5.0 RADIOACTIVITY RELEASE / AREA RADIATION

Many EALs are based on actual or potential degradation of fission product barriers because of the increased potential for offsite radioactivity release. Degradation of fission product barriers though, is not always apparent via non-radiological symptoms. Therefore, direct indication of increased 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. Increased 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: Projected offsite doses (based on effluent monitor readings) or actual offsite field measurements indicating doses or dose rates above classifiable limits.
- Area Radiation Level: Sustained 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.

**Section 5.0 Radioactivity Release / Area Radiation**

**5.0 Radioactivity Release / Area Radiation      5.1 Effluent Monitors**

**5.1.1 Unusual Event**

A valid reading on any monitors Table 5.1 column "NUE" for > 60 min. unless sample analysis can confirm release rates < 2 x technical specifications within this time period.

Table 5.1 Effluent Monitor Classification Thresholds				
Monitor	NUW	Alert	SAE	GE
R-27	7.24E4 $\mu$ Ci/sec	3.60 Ci/sec	36.0 Ci/sec	360 Ci/sec
R-14	150,000cpm	N/A	N/A	N/A
R-19	9.50 $\mu$ Ci/sec	475 $\mu$ Ci/cc	N/A	N/A

**NUMARC IC:**

Any unplanned release of gaseous or liquid radioactivity to the environment that exceeds two times the radiological Technical Specifications for 60 minutes or longer.

**FPB loss/potential loss:**

N/A

**Mode Applicability:**

All

**Basis:**

The "value shown" for each monitor is two times the calculated Technical Specification release rates as specified in the ODCM.

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 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.



### Section 5.0 Radioactivity Release / Area Radiation

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.

Monitor indications are calculated on the basis of the methodology of the site Offsite Dose Calculation Manual (ODCM). Annual average meteorology is used.

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

#### PEG Reference:

AU1.1

#### Basis Reference(s):

1. System Description No. 12.0, Radiation Monitoring System
2. IP-1001, "Determining the Magnitude of Release,"
3. Offsite Dose Calculation Manual
4. Facility Operating License No. DPR-59, Appendix A, Radiological Technical Specifications
5. Letter from M. Mozzor to OSSI "IP3 Site Boundary Dose Equal to 2 x TS and 100 x TS"

Section 5.0 Radioactivity Release / Area Radiation

5.0 Radioactivity Release / Area Radiation      5.1 Effluent Monitors

5.1.2 Alert

A valid reading on any monitors Table 5.1 column "Alert" for > 15 min. unless dose assessment can confirm releases are below Table 5.2 column "Alert" within this time period.

Table 5.1 Effluent Monitor Classification Thresholds				
Monitor	NUW	Alert	SAE	GE
R-27	7.24E4 $\mu$ Ci/sec	3.60 Ci/sec	36.0 Ci/sec	360 Ci/sec
R-14	150,000cpm	N/A	N/A	N/A
R-19	9.50 $\mu$ Ci/sec	475 $\mu$ Ci/cc	N/A	N/A

Table 5.2 Dose Projection/Env. Measurement Classification Thresholds			
	Alert	SAE	GE
TEDE	10 mRem	100 mRem	1000 mRem
CDE	N/A	500 mRem/hr	5000 mRem
External Exposure Rate	10 mRem/hr	100 mRem/hr	1000 mRem/hr
Thyroid Exposure Rate (For 1 hr. of inhalation)	N/A	500 mRem/hr	5000 mRem/hr

NUMARC IC:

Any unplanned release of gaseous or liquid radioactivity to the environment that exceeds 200 times radiological Technical Specifications for 15 minutes or longer.

FPB loss/potential loss:

N/A

Mode Applicability:

All

## Section 5.0 Radioactivity Release / Area Radiation

### Basis:

This event escalates from the Unusual Event by escalating the magnitude of the release by a factor of 100. Prorating the 500 mRem/yr criterion for both time (8766 hr/yr) and the 200 multiplier, the associated site boundary dose rate would be 10 mRem/hr. The required release duration was reduced to 15 minutes in recognition of the increased severity.

Monitor indications are calculated on the basis of the methodology of IP-1007, "Determination of the Magnitude of Release and Exposure Rate". Annual average meteorology is used.

As previously stated, the 10 mRem/hr value is based on a proration of 200 times the 500 mRem/yr basis of the 10CFR20 non-occupational MPC limits, rounded down to 10 mRem/hr. The values for the gaseous effluent radiation monitors are based upon not exceeding 10 mRem/hr at the site boundary as a result of the release.

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

### PEG Reference:

AA1.1

### Basis Reference(s):

1. System Description No. 12.0, Radiation Monitoring System
2. IP-1001, "Determining the Magnitude of Release,"
3. Offsite Dose Calculation Manual
4. Facility Operating License No. DPR-59, Appendix A, Radiological Technical Specifications
5. Letter from M. Mozzor to OSSI "IP3 Site Boundary Dose Equal to 2 x TS and 100 x TS"

Section 5.0 Radioactivity Release / Area Radiation

5.0 Radioactivity Release / Area Radiation

5.1 Effluent Monitors

5.1.3 Site Area Emergency

A valid reading on any monitors Table 5.1 column "SAE" for > 15 min. unless dose assessment can confirm releases are below Table 5.2 column "SAE" within this time period.

Table 5.1 Effluent Monitor Classification Thresholds				
Monitor	NUW	Alert	SAE	GE
R-27	7.24E4 $\mu$ Ci/sec	3.60 Ci/sec	36.0 Ci/sec	360 Ci/sec
R-14	150,000cpm	N/A	N/A	N/A
R-19	9.50 $\mu$ Ci/sec	475 $\mu$ Ci/cc	N/A	N/A

Table 5.2 Dose Projection/Env. Measurement Classification Thresholds			
	Alert	SAE	GE
TEDE	10 mRem	100 mRem	1000 mRem
CDE	N/A	500 mRem/hr	5000 mRem
External Exposure Rate	10 mRem/hr	100 mRem/hr	1000 mRem/hr
Thyroid Exposure Rate (For 1 hr. of inhalation)	N/A	500 mRem/hr	5000 mRem/hr

NUMARC IC:

Boundary dose resulting from an actual or imminent release of gaseous radioactivity exceeds 100 mRem TEDE or 500 mRem CDE Thyroid for the actual or projected duration of the release.

FPB loss/potential loss:

N/A

Mode Applicability:

All

## Section 5.0 Radioactivity Release / Area Radiation

### Basis:

The values shown were determined utilizing IP-1001, "Determining the Magnitude of Release" based upon a 100 mRem whole body exposure. These values were determined using annual average meteorology.

The 100 mRem integrated dose is based on the proposed 10CFR20 annual average population exposure. This value also provides a desirable gradient (one order of magnitude) between the Alert, Site Area Emergency, and General Emergency classes. It is deemed that exposures less than this limit are not consistent with the Site Area Emergency class description. The 500 mRem integrated child thyroid dose was established in consideration of the 1:5 ratio of the EPA Protective Action Guidelines for whole body dose to thyroid dose.

Integrated doses are generally not monitored in real-time. In establishing the emergency action levels, a duration of one hour is assumed, based on a site boundary dose of 100 mRem/hour whole body or 500 mRem/hour child thyroid, whichever is more limiting (depends on source term assumptions).

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

### PEG Reference:

AS1.1

### Basis Reference(s):

1. System Description No. 12.0, Radiation Monitoring System
2. IP-1001, "Determining the Magnitude of Release,"
3. Offsite Dose Calculation Manual
4. Facility Operating License No. DPR-59, Appendix A, Radiological Technical Specifications
5. Letter from M. Mozzor to OSSI "IP3 Site Boundary Dose Equal to 2 x TS and 100 x TS"

Section 5.0 Radioactivity Release / Area Radiation

5.0 Radioactivity Release / Area Radiation      5.1 Effluent Monitors

5.1.4 General Emergency

A valid reading on any monitors Table 5.1 column "GE" for > 15 min. unless dose assessment can confirm releases are below Table 5.2 column "GE" within this time period.

Table 5.1 Effluent Monitor Classification Thresholds				
Monitor	NUW	Alert	SAE	GE
R-27	7.24E4 $\mu$ Ci/sec	3.60 Ci/sec	36.0 Ci/sec	360 Ci/sec
R-14	150,000cpm	N/A	N/A	N/A
R-19	9.50 $\mu$ Ci/sec	475 $\mu$ Ci/cc	N/A	N/A

Table 5.2 Dose Projection/Env. Measurement Classification Thresholds			
	Alert	SAE	GE
TEDE	10 mRem	100 mRem	1000 mRem
CDE	N/A	500 mRem/hr	5000 mRem
External Exposure Rate	10 mRem/hr	100 mRem/hr	1000 mRem/hr
Thyroid Exposure Rate (For 1 hr. of inhalation)	N/A	500 mRem/hr	5000 mRem/hr

**NUMARC IC:**

Boundary dose resulting from an actual or imminent release of gaseous radioactivity exceeds 1000 mRem TEDE or 5000 mRem CDE Thyroid for the actual or projected duration of the release using actual meteorology.

**FPB loss/potential loss:**

N/A

**Mode Applicability:**

All

## Section 5.0 Radioactivity Release / Area Radiation

### Basis:

The values shown were determined utilizing IP-1001, "Determining the Magnitude of Release," based upon a 100 mRem whole body exposure. These values were determined using annual average meteorology.

The 1000 mRem whole body and the 5000 mRem child 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 whole body or 5 rem child thyroid. This is consistent with the emergency class description for a General Emergency. This level constitutes the upper level of the desirable gradient for the Site Area Emergency.

Integrated doses are generally not monitored in real-time. In establishing the emergency action levels, a duration of one hour is assumed, based on a site boundary dose of 1000 mRem/hour whole body or 5000 mRem/hour child thyroid, whichever is more limiting (depends on source term assumptions).

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

### PEG Reference:

AG1.1

### Basis Reference(s):

1. System Description No. 12.0, Radiation Monitoring System
2. IP-1001, "Determining the Magnitude of Release,"
3. Offsite Dose Calculation Manual
4. Facility Operating License No. DPR-59, Appendix A, Radiological Technical Specifications
5. Letter from M. Mozzor to OSSI "IP3 Site Boundary Dose Equal to 2 x TS and 100 x TS"

## Section 5.0 Radioactivity Release / Area Radiation

### 5.0 Radioactivity Release / Area Radiation

#### 5.2 Dose Projections/ Environmental Measurements/ Release Rates

##### 5.2.1 Unusual Event

Confirmed sample analyses for gaseous or liquid release rates in excess of 2 x technical specifications limits for > 60 min.

##### NUMARC IC:

Any unplanned release of gaseous or liquid radioactivity to the environment that exceeds two times the radiological Technical Specifications for 60 minutes or longer.

##### FPB loss/potential loss:

N/A

##### Mode Applicability:

All

##### Basis:

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 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

##### PEG Reference:

AU1.2

##### Basis Reference(s):

1. Facility Operating License No. DPR-59, Appendix A, Radiological Technical Specifications



## Section 5.0 Radioactivity Release / Area Radiation

### 5.0 Radioactivity Release / Area Radiation

#### 5.2 Dose Projections/ Environmental Measurements/ Release Rates

##### 5.2.2 Alert

Confirmed sample analyses for gaseous or liquid release rates in excess of 200 x technical specifications limits for > 15 min.

##### NUMARC IC:

Any unplanned release of gaseous or liquid radioactivity to the environment that exceeds 200 times radiological Technical Specifications for 15 minutes or longer.

##### FPB loss/potential loss:

N/A

##### Mode Applicability:

All

##### Basis:

Confirmed sample analyses in excess of two hundred times the site technical specifications that continue for 15 minutes or longer represent an uncontrolled situation and hence, a potential degradation in the level of safety. This event escalates from the Unusual Event by increasing 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 the 10CFR20 non-occupational MPC limits for both time (8766 hr/yr) and the 200 multiplier, the associated site boundary dose rate would be 10 mRem/hr. The required release duration was reduced to 15 minutes in recognition of the increased severity.

##### PEG Reference:

AA1.2

##### Basis Reference(s):

1. Facility Operating License No. DPR-59, Appendix A, Radiological Technical Specifications

**Section 5.0 Radioactivity Release / Area Radiation**

**5.0 Radioactivity Release / Area Radiation**

**5.2 Dose Projections/ Environmental Measurements/ Release Rates**

**5.2.3 Alert**

Dose projections or field surveys resulting from actual or imminent release which indicate doses / dose rates > Table 5.2 column "Alert" at the site boundary or beyond.

Table 5.2 Dose Projection/Env. Measurement Classification Thresholds			
	Alert	SAE	GE
TEDE	10 mRem	100 mRem	1000 mRem
CDE	N/A	500 mRem/hr	5000 mRem
External Exposure Rate	10 mRem/hr	100 mRem/hr	1000 mRem/hr
Thyroid Exposure Rate (For 1 hr. of inhalation)	N/A	500 mRem/hr	5000 mRem/hr

**NUMARC IC:**

Any unplanned release of gaseous or liquid radioactivity to the environment that exceeds 200 times radiological Technical Specifications for 15 minutes or longer

**FPB loss/potential loss:**

N/A

**Mode Applicability:**

All

## Section 5.0 Radioactivity Release / Area Radiation

### 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, a potential degradation in the level of safety. This event escalates from the Unusual Event by increasing 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.

As previously stated, the 10 mRem/hr value is based on a proration of 200 times the 500 mRem/yr basis of 10CFR20, rounded down to 10 mRem/hr. The terminology used in Table 5.2 "External exposure rate" is intended to equate to the TEDE rate specified in IP-1001, "Determining the Magnitude of Release". The term "Thyroid exposure rate (for one hour of inhalation)" equates to the TODE thyroid exposure rate specified in IP-1001, "Determining the Magnitude of Release".

### PEG Reference:

AA1.2

### Basis Reference(s):

1. IP-1001, "Determining the Magnitude of Release"
2. Facility Operating License No. DPR-59, Appendix A, Radiological Technical Specifications

Section 5.0 Radioactivity Release / Area Radiation

5.0 Radioactivity Release / Area Radiation

5.2 Dose Projections/ Environmental Measurements/ Release Rates

5.2.4 Site Area Emergency

Dose projections or field surveys resulting from actual or imminent release which indicate doses / dose rates > Table 5.2 column "SAE" at the site boundary or beyond.

Table 5.2 Dose Projection/Env. Measurement Classification Thresholds			
	Alert	SAE	GE
TEDE	10 mRem	100 mRem	1000 mRem
CDE	N/A	500 mRem/hr	5000 mRem
External Exposure Rate	10 mRem/hr	100 mRem/hr	1000 mRem/hr
Thyroid Exposure Rate (For 1 hr. of inhalation)	N/A	500 mRem/hr	5000 mRem/hr

NUMARC IC:

Boundary dose resulting from an actual or imminent release of gaseous radioactivity exceeds 100 mRem TEDE or 500 mRem CDE Thyroid for the actual or projected duration of the release.

FPB loss/potential loss:

N/A

Mode Applicability:

All

## Section 5.0 Radioactivity Release / Area Radiation

### Basis:

The 100 mRem integrated TEDE dose in this EAL is based on the proposed 10CFR20 annual average population exposure limit. This value also provides a desirable gradient (one order of magnitude) between the Alert, Site Area Emergency, and General Emergency classes. It is deemed that exposures less than this limit are not consistent with the Site Area Emergency class description. The 500 mRem integrated CDE thyroid dose was established in consideration of the 1:5 ratio of the EPA Protective Action Guidelines for whole body to thyroid. 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. The terminology used in Table 5.2 "External exposure rate" is intended to equate to the TEDE rate specified in IP-1001, "Determining the Magnitude of Release". The term "Thyroid exposure rate (for one hour of inhalation)" equates to the TODE thyroid exposure rate specified in IP-1001, "Determining the Magnitude of Release".

### PEG Reference:

AS1.3  
AS1.4

### Basis Reference(s):

1. IP-1001, "Determining the Magnitude of Release"
2. Environmental Technical Specification Requirements, Part II, Radiological and Environmental
3. Facility Operating License No. DPR-59, Appendix A, Radiological Technical Specifications

**Section 5.0 Radioactivity Release / Area Radiation**

**5.0 Radioactivity Release / Area Radiation**

**5.2 Dose Projections/ Environmental Measurements/ Release Rates**

**5.2.5 General Emergency**

Dose projections or field surveys resulting from actual or imminent release which indicate doses / dose rates > Table 5.2 column "GE" at the site boundary or beyond.

Table 5.2 Dose Projection/Env. Measurement Classification Thresholds			
	Alert	SAE	GE
TEDE	10 mRem	100 mRem	1000 mRem
CDE	N/A	500 mRem/hr	5000 mRem
External Exposure Rate	10 mRem/hr	100 mRem/hr	1000 mRem/hr
Thyroid Exposure Rate (For 1 hr. of inhalation)	N/A	500 mRem/hr	5000 mRem/hr

**NUMARC IC:**

Boundary dose resulting from an actual or imminent release of gaseous radioactivity exceeds 1000 mRem TEDE or 5000 mRem CDE Thyroid for the actual or projected duration of the release using actual meteorology.

**FPB loss/potential loss:**

N/A

**Mode Applicability:**

All

**Basis:**

The General Emergency values of Table 5.2 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

### Section 5.0 Radioactivity Release / Area Radiation

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. This level constitutes the upper level of the desirable gradient for the Site Area 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 5.2 "External exposure rate" is intended to equate to the TEDE rate specified in IP-1001, "Determining the Magnitude of Release". The term "Thyroid exposure rate (for one hour of inhalation)" equates to the TODE thyroid exposure rate specified in IP-1001, "Determining the Magnitude of Release".

**PEG Reference:**

AG1.3  
AG1.4

**Basis Reference(s):**

1. IP-1001, "Determining the Magnitude of Release"
2. Facility Operating License No. DPR-59, Appendix A, Radiological Technical Specifications
3. Environmental Technical Specification Requirements, Part II, Radiological and Environmental

## Section 5.0 Radioactivity Release / Area Radiation

### 5.0 Radioactivity Release / Area Radiation

#### 5.3 Area Radiation Levels

##### 5.3.1 Unusual Event

Any sustained direct ARM readings  $> 100 \times$  alarm or offscale high resulting from an uncontrolled process

#### NUMARC IC:

Unexpected increase in plant radiation or airborne concentration.

#### FPB loss/potential loss:

N/A

#### 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 unplanned increases in radiation levels inside the plant. 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 ARM instrumentation. Since ARM setpoints are nominally set one decade over normal levels, 100 times the alarm setpoint provides an appropriate threshold for emergency classification. For those ARMs whose upper range limit are less than 100 times the alarm setpoint, a value of offscale high is used. This EAL escalates to an Alert, if the increases impair the level of safe plant operation.

#### PEG Reference:

AU2.4

#### Basis Reference(s):

None



## Section 5.0 Radioactivity Release / Area Radiation

### 5.0 Radioactivity Release / Area Radiation

#### 5.3 Area Radiation Levels

##### 5.3.2 Alert

Sustained area radiation levels > 15 mR/hr in either:

Control Room

OR

Central Alarm Station and Secondary Alarm Station

#### NUMARC IC:

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.

#### FPB loss/potential loss:

N/A

#### Mode Applicability:

All

#### Basis:

This EAL addresses increased 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 security alarm station (SAS). The security alarm stations are included in this EAL because of their importance to permitting access to areas required to assure safe plant operations.

The value of 15 mR/hr is derived from the 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.

It is the impaired ability to operate the plant that results in the actual or potential degradation of the level of safety of the plant. The cause or magnitude of the increase in radiation levels is not a concern of this EAL. The Emergency Director must consider the source or

### Section 5.0 Radioactivity Release / Area Radiation

cause of the increased radiation levels and determine if any other EALs may be involved. For example, a dose rate of 15 mR/hr in the Control Room may be a problem in itself. However, the increase may also be indicative of high dose rates in the containment due to a LOCA. In this latter case, a Site Area Emergency or a General Emergency may be indicated by other EAL categories.

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

**PEG Reference:**

AA3.1

**Basis Reference(s):**

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

Section 5.0 Radioactivity Release / Area Radiation

5.0 Radioactivity Release / Area Radiation

5.3 Area Radiation Levels

5.3.3 Alert

Sustained abnormal area radiation levels > 8 R/hr within any area, Table 5.3

AND

Access is required for safe operation or shutdown

Table 5.3 Plant Areas

- Auxiliary Feedpump Building
- P.A.B.
- Fuel Storage Building
- Control Building
- Service Water Pumps
- Refueling Water Tank
- Diesel Fuel Tank
- Vital Area Access to Containment
- Appendix R Diesel Generator
- Backup Service Water

**NUMARC IC:**

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.

**FPB loss/potential loss:**

N/A

**Mode Applicability:**

All

**Basis:**

This EAL addresses increased 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 8 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 value

### Section 5.0 Radioactivity Release / Area Radiation

is described in NMPC memo File Code NMP31027 "Exposure Guidelines For Unusual/Accident Conditions". The areas selected are consistent with those listed in other EALs and represent those structures which house systems and equipment necessary for the safe operation and shutdown of the plant.

It is the impaired ability to operate the plant that results in the actual or potential degradation of the level of safety of the plant. The cause or magnitude of the increase in radiation levels is not a concern of this EAL. The Emergency Director must consider the source or cause of the increased radiation levels and determine if any other EAL may be involved. For example, a dose rate of 8 R/hr may be a problem in itself. However, the increase may also be indicative of high dose rates in the containment due to a LOCA. In this latter case, a Site Area Emergency or a General Emergency may be indicated by other EAL categories.

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

**PEG Reference:**

AA3.2

**Basis Reference(s):**

1. Niagara Mohawk Power Corporation memo File Code NMP31027 "Exposure Guidelines For Unusual/Accident Conditions", Revision 1, 3/18/93

## Section 6.0 Electrical Failures

### 6.0 ELECTRICAL FAILURES

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.

The events of this category have been grouped into the following two loss of electrical power types:

- Loss of AC Power Sources: This category includes losses of onsite and/or offsite AC power sources including station blackout events.
- Loss of DC Power Sources: This category involves total losses of vital plant 125 vdc power sources.

Section 6.0 Electrical Failures

6.0 Electrical Failures      6.1 Loss of AC Power Sources

6.1.1 Unusual Event

Loss of power to all Station Transformers 5, 2, 3, 6 for > 15 min. from all of the following offsite sources:

- Unit Auxiliary transformer
- Station Auxiliary transformer
- 13W92 and 13W93 feeders

NUMARC IC:

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

FPB loss/potential loss:

N/A

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

PEG Reference:

SU1.1

Basis Reference(s):

1. System Description No. 27.1, Electrical Systems

Section 6.0 Electrical Failures

6.0 Electrical Failures      6.1 Loss of AC Power Sources

6.1.2 Alert

Loss of all safeguard bus AC power > 15 min.

**NUMARC IC:**

Loss of all offsite power and loss of all onsite AC power to essential busses during cold shutdown, refueling or defueled mode.

**FPB loss/potential loss:**

N/A

**Mode Applicability:**

Cold Shutdown, Refueling, Defueled

**Basis:**

Loss of all AC power compromises all plant safety systems requiring electric power. This EAL is indicated by: loss of all offsite AND onsite AC power to buses 2A, 3A, 5A AND 6A for greater than 15 minutes. When in cold shutdown, refueling, or defueled mode the event can be classified as an Alert, because of the significantly reduced decay heat, lower temperature and pressure, increasing the time to restore one of the emergency busses, relative to that specified for the Site Area Emergency EAL. Escalating to the Site Area Emergency, if appropriate, is by Abnormal Rad Levels/Radiological Effluent, or Emergency Director Judgment ICs. Fifteen minutes was selected as a threshold to exclude transient or momentary power losses.

**PEG Reference:**

SA1.1

**Basis Reference(s):**

1. System Description No. 27.1, Electrical Systems
2. ONOP EL-4, Loss Of Offsite Power

## Section 6.0 Electrical Failures

### 6.0 Electrical Failures      6.1 Loss of AC Power Sources

#### 6.1.3 Alert

Available safeguard bus AC power reduced to only one of the following for > 15 min.:

- 480V EDG 31
- 480V EDG 32
- 480V EDG 33
- Appendix R Diesel
- Unit Auxiliary transformer
- Station Auxiliary transformer
- 13W92 and 13W93 feeders

#### NUMARC IC:

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 with reactor coolant > 200 °F.

#### FPB loss/potential loss:

N/A

#### Mode Applicability:

Power operation, hot shutdown

#### Basis:

The condition indicated by this EAL is the degradation of the offsite power with a concurrent failure of all but one emergency generator to supply power to its emergency bus. Another related condition could be the loss of all offsite power and loss of onsite emergency diesels with only one train of emergency busses being fed from the unit main generator, or the loss of onsite emergency diesels with only one train of emergency busses being fed from offsite power. The subsequent loss of this single power source would escalate the event to a Site Area Emergency.

#### PEG Reference:

SA5.1



Section 6.0 Electrical Failures

Basis Reference(s):

1. System Description No. 27.1, Electrical Systems
2. ONOP EL-4, Loss Of Offsite Power

## Section 6.0 Electrical Failures

### 6.0 Electrical Failures      6.1 Loss of AC Power Sources

#### 6.1.4 Site Area Emergency

Loss of all safeguard bus AC power > 15 min.

#### NUMARC IC:

Loss of all offsite power and loss of all onsite AC power to essential busses with reactor coolant > 200 °F.

#### FPB loss/potential loss:

N/A

#### Mode Applicability:

Power operation, hot shutdown

#### Basis:

Loss of all AC power compromises all plant safety systems requiring electric power. This EAL is indicated by: loss of all offsite AND onsite AC power to buses 2A, 3A, 5A AND 6A for greater than 15 minutes. Prolonged loss of all AC power will cause core uncover and loss of containment integrity, thus this event can escalate to a General Emergency. The time duration should be selected to exclude transient or momentary power losses, but should not exceed 15 minutes.

#### PEG Reference:

SS1.1

#### Basis Reference(s):

1. System Description No. 27.1, Electrical Systems
2. ONOP EL-4, Loss Of Offsite Power

## Section 6.0 Electrical Failures

### 6.0 Electrical Failures      6.1 Loss of AC Power Sources

#### 6.1.5 General Emergency

Loss of all safeguard bus AC power

AND either:

Power restoration to any emergency bus is not likely in  $\leq 4$  hrs.

OR

Actual or imminent entry into ORANGE or RED path on F-0.2, "CORE COOLING"

NUMARC IC:

Prolonged loss of all offsite power and prolonged loss of all onsite AC power with reactor coolant  $> 200$  °F.

FPB loss/potential loss:

N/A

Mode Applicability:

Power operation, hot shutdown

Basis:

Loss of all AC power compromises all plant safety systems requiring electric power. Prolonged loss of all AC power will lead to loss of fuel clad, RCS, and containment. Although this EAL may be viewed as redundant to the RPV Water Level EALs, its inclusion is necessary to better assure timely recognition and emergency response.

This EAL is specified to assure that in the unlikely event of prolonged station blackout, timely recognition of the seriousness of the event occurs and that declaration of a General Emergency occurs as early as is appropriate, based on a reasonable assessment of the event trajectory.

The likelihood of restoring at least one emergency 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

## Section 6.0 Electrical Failures

when power can be restored, the Emergency Director should 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 Potential Loss 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 potential loss 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 potential loss of fission product barriers and degraded ability to monitor fission product barriers.

The time to restore AC power is based on site blackout coping analysis performed in conformance with 10CFR50.63 and Regulatory Guide 1.155, "Station Blackout", with appropriate allowance for offsite emergency response.

### PEG Reference:

SG1.1

### Basis Reference(s):

1. F-0.2, "CORE COOLING,"
2. System Description No. 27.1, "Electrical Systems"
3. ECA-0.0, Loss Of All AC Power
4. Letter IPN-92-006 of 1/29/92, Beedle to NRC, subject IP-3 Station Blackout Rule, Response to Safety Evaluation Recommendations

## Section 6.0 Electrical Failures

### 6.0 Electrical Failures      6.2 Loss of DC Power Sources

#### 6.2.1 Unusual Event

< 105 vdc bus voltage indications for > 15 min. on the switchable voltmeter for all of the following panels:

- 31
- 32
- 33
- 34

#### NUMARC IC:

Unplanned loss of required DC power during cold shutdown or refueling mode for greater than 15 minutes.

#### FPB loss/potential loss:

N/A

#### Mode Applicability:

Cold Shutdown, Refueling

#### 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 bus voltage is based on the minimum bus voltage necessary for the operation of safety related equipment. This voltage value incorporates a margin of at least 15 minutes of operation before the onset of inability to operate loads.

#### PEG Reference:

SU7.1

#### Basis Reference(s):

1. System Description No. 27.1, Electrical Systems

**Section 6.0 Electrical Failures**

2. ONOP-EL-5, Loss Of A DC Bus

## Section 6.0 Electrical Failures

### 6.0 Electrical Failures      6.2 Loss of DC Power Sources

#### 6.2.2 Site Area Emergency

< 105 vdc bus voltage indications for > 15 min. on the switchable voltmeter for all of the following panels:

- 31
- 32
- 33
- 34

#### NUMARC IC:

Loss of all vital DC power with reactor coolant > 200 °F.

#### FPB loss/potential loss:

N/A

#### Mode Applicability:

Power operation, 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 uncovering and loss of containment integrity when there is significant decay heat and sensible heat in the reactor system. Escalation to a General Emergency would occur by other EAL categories. Fifteen minutes was selected as a threshold to exclude transient or momentary power losses.

The bus voltage is based on the minimum bus voltage necessary for the operation of safety related equipment. This voltage value incorporates a margin of at least 15 minutes of operation before the onset of inability to operate loads.

#### PEG Reference:

SS3.1

#### Basis Reference(s):

**Section 6.0 Electrical Failures**

1. System Description No. 27.1, Electrical Systems
2. ONOP-EL-5, Loss Of A DC Bus



## Section 7.0 Equipment Failures

### 7.0 EQUIPMENT FAILURES

Numerous plant system related equipment failure events which warrant emergency classification, based upon their potential to pose actual or potential threats to plant safety, have been identified in this category.

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

- Technical Specifications: Only one EAL falls under this event type related to the failure of the plant to be brought to the required plant operating condition required by technical specifications.
- System Failures or Control Room Evacuation: This category includes events which are indicative of losses of operability of safety systems such as ECCS, isolation functions, Control Room habitability or cold and hot shutdown capabilities.
- Loss of Indication, Alarm, or Communication Capability: Certain events which degrade the plant operators ability to effectively assess plant conditions or communicate with essential personnel within or external to the plant warrant emergency classification. Under this event type are losses of annunciators and/or communication equipment.

## Section 7.0 Equipment Failures

### 7.0 Equipment Failures      7.1 Technical Specification Requirements

#### 7.1.1 Unusual Event

Plant is not brought to required operating mode within Technical Specifications LCO Action Statement Time.

#### NUMARC IC:

Inability to reach required shutdown within Technical Specification Limits.

#### FPB loss/potential loss:

N/A

#### Mode Applicability:

Power operation, hot shutdown

#### Basis:

Limiting Conditions of Operation (LCOs) require the plant to be brought to a required shutdown mode when the Technical Specification required 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 site 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 Notification 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 statement time period elapses under the site Technical Specifications and is not related to how long a condition may have existed. Other required Technical Specification shutdowns that involve precursors to more serious events are addressed by other EALs.

#### PEG Reference:

SU2.1

**Section 7.0 Equipment Failures**

**Basis Reference(s):**

1. Technical Specifications, Section 3.0

Section 7.0 Equipment Failures

7.0 Equipment Failures      7.2 System Failures or Control Room  
Evacuation

7.2.1 Unusual Event

Report of main turbine failure requiring turbine trip resulting in:  
Damage to turbine generator seals  
OR  
Casing penetration

NUMARC IC:

Natural and destructive phenomena affecting the protected area.

FPB loss/potential loss:

N/A

Mode Applicability:

Power Operations

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. Actual fires and flammable gas build up are appropriately classified through other EALs. 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.

PEG Reference:

HU1.6

Basis Reference(s):

None

## Section 7.0 Equipment Failures

### 7.0 Equipment Failures      7.2 System Failures or Control Room Evacuation

#### 7.2.2 Alert

Turbine failure generated missiles which causes or potentially causes any required safety related system or structure to become inoperable

#### NUMARC IC:

Natural and destructive phenomena affecting the plant vital area.

#### FPB loss/potential loss:

N/A

#### Mode Applicability:

Power Operations, Hot Shutdown

#### Basis:

This EAL addresses the threat to safety related equipment imposed by missiles generated by main turbine rotating component failures. The involved equipment included: Service Water System, Condensate Storage Tank and Piping, Refueling Water Storage Tank and Piping, Shield Wall area, and Electrical Penetration Area. 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.

#### PEG Reference:

HA1.6

#### Basis Reference(s):

1. ONOP-TG-2, Rev. 2, TURBINE MISSILE GENERATION, 2/9/90

Section 7.0 Equipment Failures

7.0 Equipment Failures      7.2 System Failures or Control Room  
Evacuation

7.2.3 Alert

Entry into ONOP-FP-1A, "Safe Shutdown From Outside the Control Room"

NUMARC IC:

Control room evacuation has been initiated.

FPB loss/potential loss:

N/A

Mode Applicability:

All

Basis:

With the Control Room evacuated, additional support, monitoring and direction through the Technical Support Center and/or other emergency operations center is necessary. Inability to establish plant control from outside the Control Room will escalate this event to a Site Area Emergency.

PEG Reference:

HA5.1

Basis Reference(s):

1. ONOP-FP-1A, Safe Shutdown From Outside The Control Room

Section 7.0 Equipment Failures

7.0 Equipment Failures      7.2 System Failures or Control Room  
Evacuation

7.2.4 Alert

Reactor coolant temperature cannot be maintained < 200 °F

NUMARC IC:

Inability to maintain plant in cold shutdown.

FPB loss/potential loss:

N/A

Mode Applicability:

Cold Shutdown, Refueling

Basis:

This EAL addresses complete loss of functions required for core cooling during refueling and cold shutdown modes. Escalation to Site Area Emergency or General Emergency would be through other EALs.

A reactor coolant temperature increase that approaches or exceeds the cold shutdown technical specification limit warrants declaration of an Alert irrespective of the availability of technical specification required functions to maintain cold shutdown. The concern of this EAL is the loss of ability to maintain the plant in cold shutdown which is defined by reactor coolant temperature and not the operability of equipment which supports removal of heat from the reactor.

PEG Reference:

SA3.1

Basis Reference(s):

1. ONOP-RHR-1, LOSS OF RESIDUAL HEAT REMOVAL FLOW
2. Technical Specifications, para. 3.1.A.1.d
3. Technical Specifications,, para. 3.10.1.1

Section 7.0 Equipment Failures

7.0 Equipment Failures      7.2 System Failures or Control Room  
Evacuation

7.2.5 Site Area Emergency

Control Room evacuation

AND

Plant control cannot be established per ONOP-FP-1A, "Safe Shutdown From Outside the Control Room" in  $\leq 30$  min.

**NUMARC IC:**

Control room evacuation has been initiated and control of core cooling cannot be established.

**FPB loss/potential loss:**

N/A

**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 time interval for transfer is based on analysis or assessments as to how quickly control must be reestablished without core uncovering and/or core damage. The 30 minute time interval is a departure from the 15 minute interval specified in NUMARC EALS. This is based on actual observed times for operations crews to establish safe shutdown per ONOP-FP-1A when drills were run in support of Nuclear Safety Evaluation 95-3-098FP, "Update to Appendix R Safe Shutdown Procedures".

In cold shutdown and refueling 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.

**PEG Reference:**

HS2.1

**Basis Reference(s):**



Section 7.0 Equipment Failures

1. ONOP-FP-1A, Safe Shutdown from Outside the Control Room
2. Generic Letter 88-17, "Loss of Decay Heat Removal."
3. Nuclear Safety Evaluation 95-3-098FP, "Update to Appendix R Safe Shutdown Procedures."

Section 7.0 Equipment Failures

7.0 Equipment Failures      7.3 Loss of Indications /Alarms /  
 Communication Capability

7.3.1 Unusual Event

Unplanned loss of most safety system annunciators or indications on Control Room Panels, Table 7.3 for > 15 min.

AND

Increased surveillance is required for safe plant operation

Table 7.3 Vital Control Room Panels						
SAF	SBF-1	SBF-2	SCF	SDF	SEF	SFF
SGF	SHF	SJF	SKF	SLF	SMF	SNF
SOF	FAF	FBF	FCF	FDF	---	---

NUMARC IC:

Unplanned loss of most or all safety system annunciation or indication in the control room for greater than 15 minutes with reactor coolant temperature > 200 °F.

FPB loss/potential loss:

N/A

Mode Applicability:

Power operation, 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. Recognition of the availability of computer based indication equipment is considered.

"Unplanned" loss of annunciators or indicators excludes scheduled maintenance and testing activities.

It is not intended that plant personnel perform a detailed count of the instrumentation lost but the use of judgment by the Shift Manager as the threshold for determining the severity of the plant conditions. This judgment is supported by the specific opinion of the Shift Manager that

## Section 7.0 Equipment Failures

additional operating personnel will be required to provide increased monitoring of system operation to safely operate the plant.

It is further recognized that most plant designs provide redundant safety system indication powered from separate uninterruptable power supplies. While failure of a large portion of annunciators is more likely than a failure of a large portion of indications, the concern is included in this EAL due to difficulty associated with assessment of plant conditions. The loss of specific, or several, safety system indicators should remain a function of that specific system or component operability status. This will be addressed by their specific Technical Specification. The initiation of a Technical Specification imposed plant shutdown related to the instrument loss will be reported via 10CFR50.72. If the shutdown is not in compliance with the Technical Specification action, the Unusual Event is based on EAL 7.1.1, Inability to Reach Required Shutdown Within Technical Specification Limits.

Annunciators or indicators for this EAL must include those identified in the Abnormal Operating procedures, in the Emergency Operating Procedures, and in other EALs (e. g., area, process, and/or effluent rad monitors, etc.).

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

Due to the limited number of safety systems in operation during cold shutdown, refueling, and defueled modes, this EAL is not applicable during these modes of operation.

This Unusual Event will be escalated to an Alert if a transient is in progress during the loss of annunciation or indication.

### PEG Reference:

SU3.1

### Basis Reference(s):

None

## Section 7.0 Equipment Failures

### 7.0 Equipment Failures      7.3 Loss of Indications /Alarms / Communication Capability

#### 7.3.2 Unusual Event

Loss of all communications capability affecting the ability to either:  
Perform routine operations (phones, sound powered phone systems, page  
party system, and radios/walkie talkies)

OR

Notify offsite agencies or personnel (ENS, Bell lines, FAX  
transmissions, and dedicated phone systems)

#### NUMARC IC:

Unplanned loss of all onsite or offsite communications capabilities.

#### FPB loss/potential loss:

N/A

#### Mode Applicability:

All

#### Basis:

The purpose of this EAL is to recognize a loss of communications capability that either defeats the plant operations staff ability to perform routine tasks necessary for plant operations or the ability to communicate problems with offsite authorities. The loss of offsite communications ability is expected to be significantly more comprehensive than the condition addressed by 10CFR50.72.

The onsite communications loss must encompass the loss of all means of routine communications (i. e., phones, sound powered phone systems, page party system, and radios/walkie talkies).

The offsite communications loss must encompass the loss of all means of communications with offsite authorities. This should include ENS, Bell lines, FAX transmissions, and dedicated phone systems. This EAL is intended to be used only when extraordinary means are being utilized to make communications possible (relaying of information from radio transmissions, individuals being sent to offsite locations, etc.).

Section 7.0 Equipment Failures

PEG Reference:

SU6.1

Basis Reference(s):

None

Section 7.0 Equipment Failures

7.0 Equipment Failures    7.3 Loss of Indications /Alarms /  
 Communication Capability

7.3.3 Alert

Unplanned loss of most safety system annunciators or indications on Control Room Panels, Table 7.3 for > 15 min.

AND

Increased surveillance is required for safe plant operation

AND either:

A significant plant transient in progress

OR

CFMS and QSPDS are unavailable

Table 7.3 Vital Control Room Panels						
SAF	SBF-1	SBF-2	SCF	SDF	SEF	SFF
SGF	SHF	SJF	SKF	SLF	SMF	SNF
SOF	FAF	FBF	FCF	FDF	---	---

NUMARC IC:

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 with reactor coolant > 200 °F.

FPB loss/potential loss:

N/A

Mode Applicability:

Power operation, 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. Recognition of the availability of computer based indication equipment is considered (CFMS, QSPDS, etc.).

### Section 7.0 Equipment Failures

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

It is not intended that plant personnel perform a detailed count of the instrumentation lost but the use of judgment by the Shift Manager as the threshold for determining the severity of the plant conditions. This judgment is supported by the specific opinion of the Shift Manager that additional operating personnel will be required to provide increased monitoring of system operation to safely operate the plant.

It is further recognized that most plant designs provide 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, the concern is included in this EAL due to difficulty associated with assessment of plant conditions. The loss of specific, or several, safety system indicators should remain a function of that specific system or component operability status. This will be addressed by the specific Technical Specification. The initiation of a Technical Specification imposed plant shutdown related to the instrument loss will be reported via 10CFR50.72.

Annunciators or indicators for this EAL includes those identified in the Abnormal Operating Procedures, in the Emergency Operating Procedures, and in other EALs (e. g., area, process, and/or effluent rad monitors, etc.).

"Significant transient" includes response to automatic or manually initiated functions such as trips, runbacks involving greater than 25% thermal power change, ECCS injections, or thermal power oscillations of 10% or greater.

If both a major portion of the annunciation system and all computer monitoring are unavailable to the extent that the additional operating personnel are required to monitor indications, the Alert is required.

Due to the limited number of safety systems in operation during cold shutdown, refueling and defueled modes, no EAL is indicated during these modes of operation.

This Alert will be escalated to a Site Area Emergency if the operating crew cannot monitor the transient in progress.

**PEG Reference:**

SA4.1

**Basis Reference(s):**

None

Section 7.0 Equipment Failures

7.0 Equipment Failures      7.3 Loss of Indications /Alarms /  
 Communication Capability

7.3.4 Site Area Emergency

Loss of most safety system annunciators or indications on Control Room Panels, Table 7.3

AND

Loss of CFMS, QSPDS and other control room indicators needed to monitor critical safety function status

AND

A significant plant transient in progress

Table 7.3 Vital Control Room Panels						
SAF	SBF-1	SBF-2	SCF	SDF	SEF	SFF
SGF	SHF	SJF	SKF	SLF	SMF	SNF
SOF	FAF	FBF	FCF	fdf	---	---

NUMARC IC:

Inability to monitor a significant transient in progress with reactor coolant > 200 °F.

FPB loss/potential loss:

N/A

Mode Applicability:

Power operation, hot shutdown

Basis:

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

Annunciators for this EAL should be limited to include those identified in the Abnormal Operating Procedures, in the CSFST's and Emergency Operating Procedures, and in other EALs (e. g., rad monitors, etc.).

"Significant transient" includes response to automatic or manually



### Section 7.0 Equipment Failures

initiated functions such as scrams, runbacks involving greater than 25% thermal power change, ECCS injections, or thermal power oscillations of 10% or greater.

Indications needed to monitor critical safety functions necessary for protection of the public must include Control Room indications, computer generated indications 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, to remove heat from the core, to maintain the reactor coolant system intact, and to maintain containment intact.

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

**PEG Reference:**

SS6.1

**Basis Reference(s):**

None

## Section 8.0 Hazards

### 8.0 Hazards

Hazards are those non-plant system related events which can directly or indirectly impact plant operation or reactor plant and personnel safety.

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

- Security Threats: This category includes unauthorized entry attempts into the Protected Area as well as bomb threats and sabotage attempts. Also addressed are 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.
- Man-made Events: Man-made events are those non-naturally occurring events which can cause damage to plant facilities such as aircraft crashes, missile impacts, toxic or flammable gas leaks or explosions from whatever source.
- Natural Events: Events such as hurricanes, earthquakes or tornados which have potential to cause damage to plant structures or equipment significant enough to threaten personnel or plant safety.

Section 8.0 Hazards

8.0 Hazards

8.1 Security Threats

8.1.1 Unusual Event

Bomb device or other indication of attempted sabotage discovered within plant Protected Area but outside Plant Vital Areas, Table 8.2.

OR

Any security event which represents a potential degradation in the level of safety of the plant.

NUMARC IC:

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

FPB loss/potential loss:

N/A

Mode Applicability:

All

Basis:

This EAL is based on the IP-3 Security Contingency Plan. Security events which do not represent at least a potential degradation in the level of safety of the plant, are reported under 10CFR73.71 or in some cases under 10CFR50.72.

The plant Protected Area boundary is within the security isolation zone and is defined in the security plan. Bomb devices discovered within the plant vital area would result in EAL escalation.

Section 8.0 Hazards

Table 8.2 Plant Areas

- Auxiliary Feedpump Building
- P.A.B.
- CAS/SAS
- Fuel Storage Building
- Control Building
- Service Water Pumps
- Refueling Water Tank
- EDG Rooms
- Diesel Fuel Tank
- Vital Area Access to Containment
- Appendix R Diesel Generator
- Backup Service Water

**PEG Reference:**

HU4.1  
HU4.2

**Basis Reference(s):**

1. IP-3 Security Contingency Plan
2. Request For Unescorted Access - Part II, list of Vital Areas

Section 8.0 Hazards

8.0 Hazards

8.1 Security Threats

8.1.2 Alert

Intrusion into plant Protected Area by an adversary.

OR

Any security event which represents an actual substantial degradation of the level of safety of the plant.

NUMARC IC:

Security event in a plant protected area.

FPB loss/potential loss:

N/A

Mode Applicability:

All

Basis:

This class of security events represents an escalated threat to plant safety above that contained in the Unusual Event. For the purposes of this EAL, the intrusion by armed or suspected to be armed unauthorized personnel inside the Protected Area boundary can be considered a significant security threat. Intrusion into a vital area by similar personnel will escalate this event to a Site Area Emergency.

PEG Reference:

HA4.1

HA4.2

Basis Reference(s):

1. IP-3 Security Contingency Plan
2. Request For Unescorted Access - Part II, list of Vital Areas

Section 8.0 Hazards

8.0 Hazards

8.1 Security Threats

8.1.3 Site Area Emergency

Intrusion into a plant security vital area by an adversary.

OR

Any security event which represents actual or likely failures of plant systems needed to protect the public.

NUMARC IC:

Security event in a plant vital area.

FPB loss/potential loss:

N/A

Mode Applicability:

All

Basis:

This class of security events represents an escalated threat to plant safety above that contained in the Alert in that unauthorized personnel have progressed from the Protected Area to the vital area.

PEG Reference:

HS1.1  
HS1.2

Basis Reference(s):

1. IP-3 Security Contingency Plan
2. Request For Unescorted Access - Part II, list of Vital Areas

Section 8.0 Hazards

8.0 Hazards

8.1 Security Threats

8.1.4 General Emergency

Security event which results in:

Loss of plant control from the Control Room

OR

Loss of remote shutdown capability

NUMARC IC:

Security event resulting in loss of ability to reach and maintain cold shutdown.

FPB loss/potential loss:

N/A

Mode Applicability:

All

Basis:

This EAL encompasses conditions under which unauthorized personnel have taken physical control of vital areas required to reach and maintain safe shutdown.

PEG Reference:

HG1.1

HG1.2

Basis Reference(s):

1. IP-3 Security Contingency Plan
2. Request For Unescorted Access - Part II, list of Vital Areas

Section 8.0 Hazards

8.0 Hazards

8.2 Fire or Explosion

8.2.1 Unusual Event

Confirmed fire in or contiguous to any plant area, Table 8.2 not extinguished in  $\leq 15$  min. of Control Room notification:

Table 8.2 Plant Areas
<ul style="list-style-type: none"><li>● Auxiliary Feedpump Building</li><li>● P.A.B.</li><li>● CAS/SAS</li><li>● Fuel Storage Building</li><li>● Control Building</li><li>● Service Water Pumps</li><li>● Refueling Water Tank</li><li>● EDG Rooms</li><li>● Diesel Fuel Tank</li><li>● Vital Area Access to Containment</li><li>● Appendix R Diesel Generator</li><li>● Backup Service Water</li></ul>

NUMARC IC:

Fire within protected area boundary not extinguished within 15 minutes of detection.

FPB loss/potential loss:

N/A

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. This excludes such items as fires within administration buildings, waste-basket fires, and other small fires of no safety consequence. The term "contiguous" is intended to mean those areas which are in actual contact with or touching along a boundary of the listed areas.



**Section 8.0 Hazards**

**PEG Reference:**

HU2.1

**Basis Reference(s):**

1. Request For Unescorted Access - Part II, list of Vital Areas

Section 8.0 Hazards

8.0 Hazards

8.2 Fire or Explosion

8.2.2 Unusual Event

Report by plant personnel of an explosion within Protected Area boundary resulting in visible damage to non-vital permanent structures or equipment

NUMARC IC:

Natural and destructive phenomena affecting the protected area.

FPB loss/potential loss:

N/A

Mode Applicability:

All

Basis:

The Protected Area boundary is within the security isolation zone and is defined in the site security plan.

For this EAL, only those explosions of sufficient force to damage permanent structures or equipment within the Protected Area should be considered. As used here, an explosion is a rapid, violent, unconfined combustion, or a catastrophic failure of pressurized equipment, that potentially imparts significant energy to near by structures and materials. 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) is sufficient for declaration. The Emergency Director also needs to consider any security aspects of the explosion.

PEG Reference:

HU1.5

Basis Reference(s):

1. Site Plot Plan

Section 8.0 Hazards

8.0 Hazards

8.2 Fire or Explosion

8.2.3 Alert

Fire or explosion in any plant area, Table 8.2, which causes or potentially causes any required safety related system or structure to become inoperable

Table 8.2 Plant Areas

- Auxiliary Feedpump Building
- P.A.B.
- CAS/SAS
- Fuel Storage Building
- Control Building
- Service Water Pumps
- Refueling Water Tank
- EDG Rooms
- Diesel Fuel Tank
- Vital Area Access to Containment
- Appendix R Diesel Generator
- Backup Service Water

NUMARC IC:

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

FPB loss/potential loss:

N/A

Mode Applicability:

All

Basis:

The listed areas contain functions and systems required for the safe shutdown of the plant. The IP-3 safe shutdown analysis was consulted for equipment and plant areas required for the applicable mode.

With regard to explosions, only those explosions of sufficient force to damage permanent structures or equipment required for safe operation within the identified plant areas should be considered. As used here,

### Section 8.0 Hazards

an explosion is a rapid, violent, unconfined combustion, or a catastrophic failure of pressurized equipment, that potentially imparts significant energy to nearby structures and materials. No attempt is made in this EAL to assess the actual magnitude of the damage. The declaration of an Alert and the activation of the TSC will provide the Emergency Director with the resources needed to perform damage assessments. The Emergency Director also needs to consider any security aspects of the explosions.

**PEG Reference:**

HA2.1

**Basis Reference(s):**

1. Request For Unescorted Access - Part II, list of Vital Areas

Section 8.0 Hazards

8.0 Hazards

8.3 Man-Made Events

8.3.1 Unusual Event

Vehicle crash into or projectile which impacts plant structures or systems within Protected Area boundary

NUMARC IC:

Natural and destructive phenomena affecting the protected area.

FPB loss/potential loss:

N/A

Mode Applicability:

All

Basis:

The Protected Area boundary is within the security isolation zone and is defined in the site security plan.

This EAL addresses such items as plane, helicopter, train, barge, car or truck crash, or impact of other projectiles that may potentially damage plant structures containing functions and systems required for safe shutdown of the plant. If the crash is confirmed to affect a plant vital area, the event may be escalated to Alert.

PEG Reference:

HU1.4

Basis Reference(s):

1. Site Plot Plan

Section 8.0 Hazards

8.0 Hazards

8.3 Man-Made Events

8.3.2 Unusual Event

Report or detection of toxic or flammable gases that could enter or have entered within the Protected Area boundary in amounts that could affect the health of plant personnel or safe plant operation

OR

Report by local, county or state officials, or Unit 2, for potential evacuation of site personnel based on offsite event

NUMARC IC:

Release of toxic or flammable gases deemed detrimental to safe operation of the plant.

FPB loss/potential loss:

N/A

Mode Applicability:

All

Basis:

This EAL is based on releases in concentrations within the site boundary that will affect the health of plant personnel or affecting the safe operation of the plant with the plant being within the evacuation area of an offsite event (i. e., tanker truck accident releasing toxic gases, etc.). The evacuation area is as determined from the DOT Evacuation Tables for Selected Hazardous Materials, in the DOT Emergency Response Guide for Hazardous Materials.

Should an explosion occur within a specified plant area, an Alert would be declared based on EAL 8.2.2.

PEG Reference:

HU3.1  
HU3.2

Basis Reference(s):

None

Section 8.0 Hazards

8.0 Hazards

8.3 Man-Made Events

8.3.3 Alert

Vehicle crash or projectile impact which causes or potentially causes any required safety related system or structure to become inoperable, Table 8.2

Table 8.2 Plant Areas
<ul style="list-style-type: none"><li>● Auxiliary Feedpump Building</li><li>● P.A.B.</li><li>● CAS/SAS</li><li>● Fuel Storage Building</li><li>● Control Building</li><li>● Service Water Pumps</li><li>● Refueling Water Tank</li><li>● EDG Rooms</li><li>● Diesel Fuel Tank</li><li>● Vital Area Access to Containment</li><li>● Appendix R Diesel Generator</li><li>● Backup Service Water</li></ul>

NUMARC IC:

Natural and destructive phenomena affecting the plant vital area.

FPB loss/potential loss:

N/A

Mode Applicability:

All

**Section 8.0 Hazards**

**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 addresses such items as plane, helicopter, train, barge, car or truck crash, or impact of projectiles into a plant vital area.

**PEG Reference:**

HA1.5

**Basis Reference(s):**

1. Request For Unescorted Access - Part II, list of Vital Areas



Section 8.0 Hazards

8.0 Hazards

8.3 Man-Made Events

8.3.4 Alert

Report or detection of toxic or flammable gases within a plant area, Table 8.2, in concentrations that will be life threatening to plant personnel or preclude access to equipment (even when using personal protective equipment) needed for safe plant operation

Table 8.2 Plant Areas

- Auxiliary Feedpump Building
- P.A.B.
- CAS/SAS
- Fuel Storage Building
- Control Building
- Service Water Pumps
- Refueling Water Tank
- EDG Rooms
- Diesel Fuel Tank
- Vital Area Access to Containment
- Appendix R Diesel Generator
- Backup Service Water

NUMARC IC:

Release of toxic or flammable gases within a facility structure which jeopardizes operation of systems required to maintain safe operations or to establish or maintain cold shutdown.

FPB loss/potential loss:

N/A

Mode Applicability:

All

Section 8.0 Hazards

**Basis:**

This EAL is based on gases that have entered a plant structure precluding access to equipment necessary for the safe operation of the plant. This EAL applies to buildings and areas contiguous to plant vital areas or other significant buildings or areas. The intent of this EAL is not to include buildings (i. e., warehouses) or other areas that are not contiguous or immediately adjacent to plant vital areas. It is appropriate that increased monitoring be done to ascertain whether consequential damage has occurred.

**PEG Reference:**

HA3.1  
HA3.2

**Basis Reference(s):**

1. FSAR Section 12.3

Section 8.0 Hazards

8.0 Hazards

8.4 Natural Events

8.4.1 Unusual Event

Earthquake felt inplant based upon a consensus of Control Room Operators on duty

AND either

Kinematics Strong Motion Accelerographs in the VC produce an alarm in the Control Room

OR

At least one amber Peak Shock Annunciator is lit

NUMARC IC:

Natural and destructive phenomena affecting the protected area.

FPB loss/potential loss:

N/A

Mode Applicability:

All

Basis:

Unit 3 seismic instrumentation actuates at 0.01 g.

Damage to some portions of the site may occur but it should not affect ability of safety functions to operate. Methods of detection can be based on instrumentation validated by a reliable source, operator assessment, or indication received from outside agencies. As defined in the EPRI-sponsored "Guidelines for Nuclear Plant Response to an Earthquake", dated October 1989, a "felt earthquake" is:

"An earthquake of sufficient intensity such that: (a) the inventory ground motion is felt at the nuclear plant site and recognized as an earthquake based on a consensus of Control Room operators on duty at the time, and (b) for plants with operable seismic instrumentation, the seismic switches of the plant are activated. For most plants with seismic instrumentation, the seismic switches are set at an acceleration of about 0.01 g."

PEG Reference:

**Section 8.0 Hazards**

HU1.1

**Basis Reference(s):**

1. System Description No. 31, Seismic Monitoring
2. FSAR Update, page 16.1-7, General Seismic Design Criteria and Damping Values
3. EPRI document, "Guidelines for Nuclear Plant Response to an Earthquake", dated October 1989

**Section 8.0 Hazards**

**8.0 Hazards**

**8.4 Natural Events**

**8.4.2 Unusual Event**

Report by plant personnel of tornado within plant Protected Area boundary

**NUMARC IC:**

Natural and destructive phenomena affecting the protected area.

**FPB loss/potential loss:**

N/A

**Mode Applicability:**

All

**Basis:**

This EAL is based on the assumption that a tornado striking (touching down) within the Protected Area boundary 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 Alert.

**PEG Reference:**

HU1.2

**Basis Reference(s):**

1. FSAR Update, para. 16.2, Tornado Design Criteria

**Section 8.0 Hazards**

**8.0 Hazards**

**8.4 Natural Events**

**8.4.3 Unusual Event**

River level  $\geq$  14.5' ( $\emptyset$  MSL)

OR

Intake structure level  $<$  -4.5' ( $\emptyset$  MSL)

**NUMARC IC:**

Natural and destructive phenomena affecting the protected area.

**FPB loss/potential loss:**

N/A

**Mode Applicability:**

All

**Basis:**

This covers high and low river water level conditions that could be precursors of more serious events. River water level  $\geq$  14.5 ft. corresponds to the maximum anticipated river runup level. Intake structure level  $<$  -4.5 ft. corresponds to the minimum level to support design service water flow rate.

**PEG Reference:**

HU1.7

**Basis Reference(s):**

1. FSAR Section 2.5
2. ONOP-RW-3, Plant Flooding

Section 8.0 Hazards

8.0 Hazards

8.4 Natural Events

8.4.4 Alert

Earthquake felt inplant based upon a consensus of Control Room Operators on duty

AND

Kinematics Strong Motion Accelerographs in the VC produce an alarm in the Control Room

AND

Amber and red Peak Shock Annunciators indicate seismic activity

NUMARC IC:

Natural and destructive phenomena affecting the plant vital area.

FPB loss/potential loss:

N/A

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 design basis operating earthquake of 0.08 g. Seismic events of this magnitude can cause damage to plant safety functions.

PEG Reference:

HA1.1

Basis Reference(s):

1. System Description No. 31, Seismic Monitoring

**Section 8.0 Hazards**

2. FSAR Update, page 16.1-7, General Seismic Design Criteria and Damping Values
3. EPRI document, "Guidelines for Nuclear Plant Response to an Earthquake", dated October 1989



Section 8.0 Hazards

8.0 Hazards

8.4 Natural Events

8.4.5 Alert

Sustained winds > 90 mph

OR

Tornado strikes a plant vital area, Table 8.2

Table 8.2 Plant Areas
<ul style="list-style-type: none"><li>● Auxiliary Feedpump Building</li><li>● P.A.B.</li><li>● CAS/SAS</li><li>● Fuel Storage Building</li><li>● Control Building</li><li>● Service Water Pumps</li><li>● Refueling Water Tank</li><li>● EDG Rooms</li><li>● Diesel Fuel Tank</li><li>● Vital Area Access to Containment</li><li>● Appendix R Diesel Generator</li><li>● Backup Service Water</li></ul>

NUMARC IC:

Natural and destructive phenomena affecting the plant vital area.

FPB loss/potential loss:

N/A

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.

**Section 8.0 Hazards**

This EAL is based on the FSAR design basis of 90 mph. Wind loads of this magnitude can cause damage to safety functions.

**PEG Reference:**

HA1.2

**Basis Reference(s):**

1. FSAR Update, para. 16.2, Tornado Design Criteria
2. FSAR Update, chapter 1.3, General Design Criteria

Section 8.0 Hazards

8.0 Hazards

8.4 Natural Events

8.4.6 Alert

Assessment by the Control Room personnel that a natural event has occurred which causes or potentially causes any required safety related system or structure to become inoperable, Table 8.2

Table 8.2 Plant Areas
<ul style="list-style-type: none"><li>● Auxiliary Feedpump Building</li><li>● P.A.B.</li><li>● CAS/SAS</li><li>● Fuel Storage Building</li><li>● Control Building</li><li>● Service Water Pumps</li><li>● Refueling Water Tank</li><li>● EDG Rooms</li><li>● Diesel Fuel Tank</li><li>● Vital Area Access to Containment</li><li>● Appendix R Diesel Generator</li><li>● Backup Service Water</li></ul>

NUMARC IC:

Natural and destructive phenomena affecting the plant vital area.

FPB loss/potential loss:

N/A

Mode Applicability:

All

Section 8.0 Hazards

**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 specifies areas in which structures containing systems and functions required for safe shutdown of the plant are located.

**PEG Reference:**

HA1.3

**Basis Reference(s):**

None

Section 8.0 Hazards

8.0 Hazards

8.4 Natural Events

8.4.7 Alert

River level  $\geq$  15' ( $\emptyset$  MSL)

OR

Intake structure level resulting in a loss of service water flow

NUMARC IC:

Natural and destructive phenomena affecting the plant vital area.

FPB loss/potential loss:

N/A

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 covers high and low lake water level conditions that exceed levels which threaten vital equipment. A river level  $>$  15 ft. corresponds to FSAR defined critical flood level which would threaten vital equipment. Service Water Bay level below that which results in a loss of service water flow would result in a loss of cooling water to numerous vital components.

PEG Reference:

HA1.7

Section 8.0 Hazards

Basis Reference(s):

1. FSAR Section 2.5
2. ONOP-RW-3, Plant Flooding
3. Tech Specs Section 3.12, River Level

Section 9.0 Other

9.0 OTHER

The EALs defined in categories 1.0 through 8.0 specify the predetermined symptoms or events which are indicative of emergency or potential emergency conditions, and which 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.

Section 9.0 Other

9.0 Other

9.1.1 Unusual Event

Any event, as determined by the Shift Manager or Emergency Director, that could lead to or has led to a potential degradation of the level of safety of the plant.

NUMARC IC:

Emergency Director Judgment

FPB loss/potential loss:

N/A

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.

PEG Reference:

HU5.1

Basis Reference(s):

None



Section 9.0 Other

9.0 Other

9.1.2 Unusual Event

Any event, as determined by the Shift Manager or Emergency Director, that could lead to or has led to a loss or potential loss of containment, Attachment 2.

NUMARC IC:

N/A

FPB loss/potential loss:

Containment loss/potential loss

Mode Applicability:

Power operation, hot shutdown

Basis:

This EAL addresses any other factors that are to be used by the Emergency Director in determining whether the containment barrier is lost or potentially lost. In addition, the inability to monitor the barrier should also be incorporated in this EAL as a factor in Emergency Director judgment that the barrier may be considered lost or potentially lost.

PEG Reference:

PC8.1

Basis Reference(s):

None

Section 9.0 Other

9.0 Other

9.1.3 Alert

Any event, as determined by the Shift Manager or Emergency Director, that could cause or has caused actual substantial degradation of the level of safety of the plant.

NUMARC IC:

Emergency Director Judgment

FPB loss/potential loss:

N/A

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.

PEG Reference:

HA6.1

Basis Reference(s):

None

Section 9.0 Other

9.0 Other

9.1.4 Alert

Any event, as determined by the Shift Manager or Emergency Director, that could lead or has led to a loss or potential loss of either fuel clad or RCS barrier, Attachment 2.

NUMARC IC:

N/A

FPB loss/potential loss:

Loss or potential loss of either fuel clad or RCS barrier

Mode Applicability:

Power operation, hot shutdown

Basis:

This EAL addresses any other factors that are to be used by the Emergency Director in determining whether the fuel clad or RCS barriers are lost or potentially lost. In addition, the inability to monitor the barriers should also be considered in this EAL as a factor in Emergency Director judgment that the barriers may be considered lost or potentially lost.

PEG Reference:

FC7.1  
RCS6.1

Basis Reference(s):

None

**Section 9.0 Other**

**9.0 Other**

**9.1.5 Site Area Emergency**

As determined by the Shift Manager or Emergency Director, events are 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 PAGs.

**NUMARC IC:**

Emergency Director Judgment

**FPB loss/potential loss:**

N/A

**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 Area Emergency.

**PEG Reference:**

HS3.1

**Basis Reference(s):**

None

Section 9.0 Other

9.0 Other

9.1.6 Site Area Emergency

Any event, as determined by the Shift Manager or Emergency Director, that could lead or has led to either:

Loss or potential loss of both fuel clad and RCS barrier, Attachment 2

OR

Loss or potential loss of either fuel clad or RCS barrier in conjunction with a loss of containment, Attachment 2

NUMARC IC:

N/A

FPB loss/potential loss:

Loss or potential loss of both fuel clad and RCS barrier

OR

Loss or potential loss of either fuel clad or RCS barrier in conjunction with a loss of containment

Mode Applicability:

Power operation, hot shutdown

Basis:

This EAL addresses unanticipated conditions affecting fission product barriers which are not addressed explicitly elsewhere. Declaration of an emergency is warranted because conditions exist which are believed by the Emergency Director to fall under the emergency class description for Site Area Emergency.

PEG Reference:

FC7.1  
RCS6.1  
PC8.1

Basis Reference(s):

None

Section 9.0 Other

9.0 Other

9.1.7 General Emergency

As determined by the Shift Manager or Emergency Director, events are in progress which indicate actual or imminent core damage and the potential for a large release of radioactive material in excess of EPA PAGs outside the site boundary.

NUMARC IC:

Emergency Director Judgment

FPB loss/potential loss:

N/A

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.

PEG Reference:

HG2.1

Basis Reference(s):

None

Section 9.0 Other

9.0 Other

9.1.8 General Emergency

Any event, as determined by the Shift Manager or Emergency Director, that could lead or has led to a loss of any two fission product barriers and loss or potential loss of the third, Attachment 2.

NUMARC IC:

N/A

FPB loss/potential loss:

Loss of any two fission product barriers and loss or potential loss of the third

Mode Applicability:

Power operation, hot shutdown

Basis:

This EAL addresses unanticipated conditions affecting fission product barriers which are not addressed explicitly elsewhere. Declaration of an emergency is warranted because conditions exist which are believed by the Emergency Director to fall under the emergency class description for the General Emergency class.

PEG Reference:

FC7.1  
RCS6.1  
PC8.1

Basis Reference(s):

None

## Attachment 1 - Definitions

### 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 Guideline 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.



Attachment 1 - Definitions

**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). 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  $\leq 4$  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. 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.

**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.

**Decrease**

To become progressively less in size, amount, number, or intensity.

**Attachment 1 - Definitions**

**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.

**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 Guideline 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.

Attachment 1 - Definitions

**Increase**

To become progressively greater in size, amount, number or intensity.

**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 it's intended function

**Intrusion**

The act of entering without authorization

**Loss**

Failure of operability or lack of access to.

**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.

## Attachment 1 - Definitions

### 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 it's 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 coolant system pressure will effect a decrease 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

### Attachment 1 - Definitions

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.

#### 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 Area Emergency

Events are in process or have occurred which involve actual or likely major failures of plant functions needed for protection of the public. Any releases are not expected to result in exposure levels which exceed EPA Protective Action Guideline exposure levels except near the site boundary.

#### Sustained

Prolonged. Not intermittent or of transitory nature

#### 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.

To take action to cause shutdown of the reactor by rapidly inserting a control rod or control rods (PWR).

#### Uncontrolled

An evolution lacking control but is not the result of operator action.

**Attachment 1 - Definitions**

**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, verify SI pumps running."

Attachment 2

**Fission Product Barrier Loss/Potential Loss Matrix**  
 (Those thresholds for which loss or potential is determined to be imminent, classify as though the threshold(s) has been exceeded)

Fuel Cladding

Potential Loss	Loss
ORANGE path in F-0.2, CORE COOLING RED path in F-0.3, HEAT SINK Core Exit Thermocouple Readings > 700 °F RVLIS ≤ 39% with no RCPs running Emergency Director Judgement	RED path in F-0.2, CORE COOLING Coolant activity > 300 µCi/cc I-131 equivalent Core Exit Thermocouple Readings > 1200 °F Containment radiation monitor R-25 or R-26 > 17 R/hr Emergency Director Judgement

RCS

Potential Loss	Loss
RED path on F-0.4, INTEGRITY RED path on F-0.3, HEAT SINK Primary system leakage > 75 GPM Emergency Director Judgement	> 0.06 µCi/cc on R-11/R-12 due to RCS leakage Unisolable secondary side line break with SG tube rupture as identified in E-3 "Steam Generator Tube Rupture" Rapid rise on R-11 and R-12 due to RCS leakage????????? Emergency Director Judgement

Attachment 2

**Fission Product Barrier Loss/Potential Loss Matrix**  
 (Those thresholds for which loss or potential is determined to be imminent, classify as though the threshold(s) has been exceeded)

Containment

Potential Loss	Loss								
<p>RED path F-0.5, CONTAINMENT</p> <p>Either:</p> <p>Core exit Thermocouples &gt; 1200 F            OR            Core exit Thermocouples &gt; 700 F with RVLIS &lt; 39% with no RCPs running</p> <p>AND</p> <p>Restoration procedures not effective within 15 minutes</p> <p>Confirmed phase "B" isolation signal following confirmed LOCA with less than minimum containment safeguards equipment operating</p> <table border="0"> <tr> <td><u>Fan Cooler Units Oper.</u></td> <td><u>Spray Pumps Req'd</u></td> </tr> <tr> <td>&lt; 3</td> <td>2</td> </tr> <tr> <td>3</td> <td>1</td> </tr> <tr> <td>5</td> <td>0</td> </tr> </table> <p>Containment pressure 47 psig and increasing</p> <p>≥ 4 % hydrogen concentration monitor R-25/R-26 reading &gt; 68 R/hr</p> <p>Emergency Director Judgement</p>	<u>Fan Cooler Units Oper.</u>	<u>Spray Pumps Req'd</u>	< 3	2	3	1	5	0	<p>Rapid uncontrolled decrease in containment pressure following initial increase due to RCS failure</p> <p>Either:</p> <p>Any Phase "A" or Phase "B" or CVI valve(s) not closed when required following confirmed LOCA            OR            Inability to isolate any primary system discharging outside containment</p> <p>AND</p> <p>Radiological release to the environment exists as a result</p> <p>Both doors open on a VC airlock for &gt; 4 hrs.            OR            Inability to close containment pressure relief or purge valves which results in a radiological release pathway to the environment for &gt; 4 hrs.            OR            Any Phase "A" or Phase "B" or CVI valve(s) not closed when required which results in a radiological release pathway to the environment</p> <p>Unisolable release of secondary side to atmosphere from the affected steam generator(s) with primary to secondary leakage &gt; 0.3 GPM in any steam generator</p> <p>Loss of primary coolant inside containment with containment pressure or sump level response not consistent with LOCA conditions</p> <p>Emergency Director Judgement</p>
<u>Fan Cooler Units Oper.</u>	<u>Spray Pumps Req'd</u>								
< 3	2								
3	1								
5	0								



ATTACHMENT 3

NUMARC REFERENCE

1.1.1	SA2	5.3.2	AA3
1.1.2	SS2	5.3.3	AA3
1.1.3	SG2	6.1.1	SU1
1.2.1	fpl/fl,rl	6.1.2	SA1
	SS4	6.1.3	SA5
1.2.2	fl,rl,cpl	6.1.4	SS1
1.3.1	fpl,rpl,SS4	6.1.5	SG1
1.4.1	rpl	6.2.1	SU7
1.5.1	fl,rl,cpl	6.2.2	SS3
2.1.1	SU4	7.1.1	SU2
2.1.2	fl	7.2.1	HU1
2.1.3	fl,rpl/rl	7.2.2	HA1
2.2.1	rl	7.2.3	HA5
2.2.2	fl,rl	7.2.4	SA3
2.2.3	fl,rl,cpl	7.2.5	HS2
2.3.1	AU2	7.3.1	SU3
2.3.2	AA2	7.3.2	SU6
2.3.3	AA2	7.3.3	SA4
3.1.1	SU5	7.3.4	SS6
3.1.2	rpl	8.1.1	HU4
3.1.3	fpl,rl,SS5	8.1.2	HA4
3.2.1	cl	8.1.3	HS1
3.2.2	rpl,cl	8.1.4	HG1
3.2.3	fl,cl	8.2.1	HU2
3.3.1	rl	8.2.2	HU1
4.1.1	cl	8.2.3	HA2
4.1.2	rl,cl	8.3.1	HU1
4.1.3	rl,cl	8.3.2	HU3
4.1.4	fl,rl,cpl	8.3.3	HA1
4.1.5	fpl/fl	8.3.4	HA3
	rl,cl	8.4.1	HU1
4.1.6	fpl/fl	8.4.2	HU1
	rl,cl	8.4.3	HU1
4.2.1	rl,cl	8.4.4	HA1
4.2.2	fpl/fl	8.4.5	HA1
	rl,cl	8.4.6	HA1
4.3.1	fl,rl,cpl	8.4.7	HA1
5.1.1	AU1		
5.1.2	AA1		
5.1.3	AS1		
5.1.4	AG1		
5.2.1	AU1		
5.2.2	AA1		
5.2.3	AA1		
5.2.4	AS1		
5.2.5	AG1		
5.3.1	AU2		