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PRC|SECG-SECT.03.2 (BASIS)|000	1	A	1	H	28328
PRC|SECG-SECT.03.3 (BASIS)|000	2	A	1	H	28370
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PRC|SECG-SECT.09.2 (BASIS)|000	1	A	1	H	28580
PRC|SECG-SECT.09.3 (BASIS)|000	1	A	1	H	28622
PRC|SECG-SECT.09.4 (BASIS)|000	1	A	1	H	28664
PRC|SECG-SECT.09.5 (BASIS)|000	1	A	1	H	28706
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HOPE CREEK GENERATING STATION
EVENT CLASSIFICATION GUIDE TECHNICAL BASIS
December 29, 1999

CHANGE PAGES FOR
REVISION #04

The Table of Contents forms a general guide to the current revision of each section and attachment of the Salem ECG Technical Basis. The changes that are made in this TOC Revision #04 are shown below.

1. Check that your revision packet is complete.
2. Add the revised documents.
3. Remove and recycle the outdated material listed below.

ADD			REMOVE		
Pages	Description	Rev.	Pages	Description	Rev.
ALL	TOC	4	ALL	TOC	3
All	Section 1.0	1	All	Section 1.0	0
All	Section 3.1	1	All	Section 3.1	0
All	Section 3.2	1	All	Section 3.2	0
All	Section 3.3	2	All	Section 3.3	1
All	Section 5.0	1	All	Section 5.0	0
All	Section 7.1	1	All	Section 7.1	0
All	Section 8.1	1	All	Section 8.1	0
All	Section 8.2	1	All	Section 8.2	0
All	Section 9.2	1	All	Section 9.2	0
All	Section 9.3	1	All	Section 9.3	0
All	Section 9.4	1	All	Section 9.4	0
All	Section 9.5	1	All	Section 9.5	0
All	Section 9.7	1	All	Section 9.7	0
All	Section 9.8	1	All	Section 9.8	0

Summary of significant changes:

1. 1.1.1.c - Added list of other indications that may be used to confirm a valid Letdown Line Monitor alarm.
2. 3.2.2.a - Clarified what constitutes a RCS leak.
3. 3.3.3.b - Clarified definition of a valid containment isolation.
4. 3.3.3.a - Clarified definition of unisolable as applied to a faulted steam generator outside of the control room.

5. 3.3.4.a - Removed confusing explanation and reference to NRC Inspection report NESP-007, PC7.
6. 5.1.3 - Clarified why Mode 2 applicable to ATWS EAL.
7. 5.1.4, 7.1.4.a and 8.1.3.c - Added clarification that Critical Function Status Trees (CFSTs) are not to be used in EAL classification until the CFSTs are implemented.
8. 8.2.1 - added reference to RAL if lose annunciators for <15 min.
9. 9.2.1, 9.2.2, 9.3.2, 9.7.2 - Clarified definition of a ``Safety System''.
10. 9.4.1.b - Clarified definition of uncontrolled release in the case of a Cardox discharge.
11. 9.8.1.b, 9.8.2 - Clarified definition of a vehicle crash.

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SALEM ECG TECHNICAL BASIS
TABLE OF CONTENTS/SIGNATURE PAGE

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2.0	RCS Challenge	00	2	01/21/97
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	3.2 RCS Barrier	01	16	12/29/99
	3.3 Containment Barrier	02	24	12/29/99
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SALEM ECG TECHNICAL BASIS
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SIGNATURE PAGE

Prepared By: William L Detwiler Rev 0. — 12-20-99
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Manager - CA, EP, & IT — Date

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Manager - Quality Assurance
(If Applicable) — Date

SORC Review and Station Approvals

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Mtg. No. Salem Chairman

N/A
General Manager - Salem Operations

NA
Date

NA
Date

Effective Date of this Revision: 12/29/99
Date

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1.0 Fuel Clad Challenge

1.1 RCS Activity

UNUSUAL EVENT - 1.1.1.a/1.1.1.b

IC Fuel Clad Degradation

EAL

Reactor Coolant Activity > **1 µCi/gm Dose Equivalent I-131** for > **48 Hours**

OR

Reactor Coolant Activity (Dose Equivalent Iodine) **exceeds limits** of Technical Specification Figure 3.4-1

MODE - 1, 2, 3, 4, 5, 6

BASIS

Coolant Iodine activity **in excess** of Technical Specifications is considered to be a challenge to the fuel clad barrier. The Technical Specification Iodine limit reflects a degrading or degraded core condition. This level is above any possible short duration Iodine spikes under normal conditions.

Barrier Analysis

This event does not reach the threshold for the loss of Fuel Clad Barrier, but does affect that barrier.

ESCALATION CRITERIA

This event will be escalated to an Alert when Reactor Coolant activity exceeds 300 µCi/gm Dose Equivalent I-131 per EAL Section 3.1.2.

DISCUSSION

An Unusual Event is only warranted when actual fuel clad damage is the cause of the elevated coolant sample (as determined by RCS sample analysis confirmation. The Technical Specification limit on RCS Activity of 100/ $\bar{E}$µCi/gm was not included in this EAL because it specifically excludes Iodine Activity.

DEVIATION

NUMARC requires this EAL to be applicable in all Modes of operation. Since there is no fuel in the Reactor vessel in Mode "Defueled", this EAL is not Applicable.

REFERENCES

NUMARC NESP-007, SU4.2
Technical Specification Section 3.4.8 - Unit 1
Technical Specification Section 3.4.9 - Unit 2

1.0 Fuel Clad Challenge

1.1 RCS Activity

UNUSUAL EVENT - 1.1.1.c

IC Fuel Clad Degradation

EAL

Valid Letdown Line Monitor **in Alarm** (1R31A or 2R31)

MODE - 1, 2, 3, 4, 5, 6

BASIS

The letdown monitoring system (1-R31A and 2-R31) detects the RCS radiation concentration that is attributable to the fission products that are produced in the reactor and escapes to the coolant. This indicator of elevated coolant activity would be one of the first indicators of a degrading core, and is considered to be a precursor of more serious problems. **"Valid"** means confirmed by other indications on related or redundant instrumentation, such as increased RMS reading on RCS filter, seal return filter or low range containment monitors.

Barrier Analysis

This event does not reach the threshold for the loss of the Fuel Clad Barrier, but does affect this barrier.

ESCALATION CRITERIA

This event will be escalated to an Alert when RCS activity exceeds 300 μCi/gm Dose Equivalent Iodine 131 per EAL Section 3.1.2.

DISCUSSION

A **valid** Letdown Line Monitor alarm may indicate that the failed fuel level has reached 1% due to an increased number of failed fuel elements or a fuel gap activity release. Sample results are not required prior to classification; however, other radiation monitors should be used to confirm this alarm to prevent inaccurate classification based on an instrument malfunction.

Other indication that may be used to confirm a valid Letdown Line Monitor alarm:

- 1(2) R4 Charging Pump Room
- 1(2) R26 Reactor Coolant Filter
- 1(2) R28 Spent Fuel Pool Filter
- 1(2) R33 Ion Exchange Filter
- Containment Area Rad Monitors

DEVIATION

NUMARC requires this EAL to be applicable in all Modes of operation. Since there is no fuel in the Reactor vessel in Mode "Defueled", this EAL is not Applicable.

REFERENCES

SGS-UFSAR Section 11.4
NUMARC NESP-007, SU4.1
OP-AB.RC-0002(Q
Salem U1/U2 Radiation Monitoring System Manual

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3.0 Fission Product Barriers

3.1 Fuel Clad Barrier

3.1.2 PRIMARY COOLANT IODINE CONCENTRATION

IC Loss ~~of Fuel Clad Barrier~~ = 4 POINTS

EAL

Reactor Coolant Activity > 300 μCi/gm Dose Equivalent I-131

MODE - 1, 2, 3, 4

BASIS

A reactor coolant sample activity of greater than 300 μCi/gm Dose Equivalent Iodine-131 (DEI-131) was determined to indicate significant clad heating or mechanical stress and is indicative of the loss of the fuel clad barrier. This concentration is well above that expected for iodine spikes and corresponds to approximately 2.5% clad damage.

Barrier Analysis

Fuel Clad Barrier has been lost.

ESCALATION CRITERIA

This event will be classified and/or escalated based on the potential loss or loss of additional barriers per EAL Section 3.0.

DISCUSSION

The actual value of 300 μCi/gm Dose Equivalent Iodine-131 (DEI-131) was determined based upon an engineering calculation which is not included with this EAL. This calculation was prepared by the Nuclear Fuels Group and is on file with Emergency Preparedness under file title DS1.6-0098 "Verification of Emergency Action Levels for Event Classification" date 1/26/95.

DEVIATION

None

REFERENCES

NUMARC NESP-007, FC2
Reg. Guide 1.109, Table E-9
SGS-USFAR, Table 11.1-1
SGS-USFAR, Table 11.1-7
OP-AB.RC-0002(Q)
Calculation by Nuclear Fuels Group file title DS1.6-0098 "Verification of Emergency Action Levels for Event Classification" date 1/26/95.

3.0 Fission Product Barriers

3.1 Fuel Clad Barrier

3.1.3 CORE EXIT THERMOCOUPLES (CETS)

3.1.3.a

IC Potential Loss of Fuel Clad Barrier = 3 POINTS

EAL

5 or more CETs > 700 °F

MODE - 1, 2, 3, 4,

BASIS

The threshold value chosen is from the EOP-CFST-1 Core Cooling Status Tree and indicates a loss of core subcooling which could lead to clad damage.

Barrier Analysis

Fuel Clad Barrier has been potentially lost.

ESCALATION CRITERIA

This event will be classified and/or escalated based upon the potential loss or loss of additional barriers per EAL Section 3.0.

DISCUSSION

Symptom based criteria from the EOP Critical Safety Function Tree (CFST) monitoring are integrated into this EAL. The CFSTs are contained as a tab to the ECG. Use of Core Exit Thermocouple (CET) temperature to indicate loss of subcooling is equivalent to the CFST Core Cooling status codes.

DEVIATION

Salem Generating Station replaced the CFST "Orange Path" color designation with "Purple Path" due to the limitations imposed by the SPDS CRT's color gun configuration.

REFERENCES

NUMARC NESP-007, FC3
EOP-CFST-1
EOP-TRIP-1
EOP-Setpoint Doc (G.03)

3.0 Fission Product Barriers

3.1 Fuel Clad Barrier

3.1.3 CORE EXIT THERMOCOUPLES (CETS)

3.1.3.b

IC Loss of Fuel Clad Barrier =4 POINTS

EAL

5 or more CETs > 1200 ^{o}F

MODE - 1, 2, 3, 4

BASIS

Five Core Exit Thermocouple (CET) temperatures >1200 ^{o}F indicates a significant superheating of the reactor coolant.

Barrier Analysis

Fuel Clad Barrier has been lost.

ESCALATION CRITERIA

This event will be classified and/or escalated based on the potential loss or loss of additional barriers per EAL Section 3.0.

DISCUSSION

Symptom based criteria from the Emergency Operating Procedures Critical Safety Function Tree (CFST) Monitoring are integrated into this EAL. The CFSTs are contained as a tab to the ECG. The EAL threshold of >1200 ^{o}F is equivalent to CFST Core Cooling RED Path.

DEVIATION

None

REFERENCES

NUMARC NESP-007, FC3
EOP-CFST-1
EOP-TRIP-1
EOP-Setpoint Doc (G.04)

3.0 Fission Product Barriers

3.1 Fuel Clad Barrier

3.1.4 RX VESSEL LEVEL INDICATION SYSTEM (RVLIS)

3.1.4.a

IC Potential Loss of Fuel Clad Barrier = 3 POINTS

EAL

RVLIS Full Range < 39%

MODE - 1, 2, 3, 4

BASIS

The threshold value of RVLIS Full Range < 39% is chosen from the EOP-CFST-1 Core Cooling Status Tree. This value approximates the "Top of Active Fuel" which is a water level at which clad damage may be expected to occur.

Barrier Analysis

Fuel Clad Barrier has been potentially lost.

ESCALATION CRITERIA

This event will be classified and/or escalated based upon the potential loss or loss of additional barriers per EAL Section 3.0.

DISCUSSION

Symptom based criteria from the EOP Critical Safety Function Tree (CSFT) monitoring are integrated into this EAL. The CFSTs are contained as a tab to the ECG. Use of RVLIS to indicate reactor vessel water level is more specific than the CFST Core Cooling status codes. Full Range RVLIS indicates reactor vessel water level with no RCPs running. The intent of this EAL is to provide a RVLIS level which approximates core uncovery. The actual RVLIS level which indicates "Top of Active Fuel" is somewhat higher than 39%; however, 39% was adopted to be consistent with the CFST value.

DEVIATION

Salem Generating Station replaced the CFST "Orange Path" color designation with "Purple Path" due to the limitations imposed by the SPDS CRT's color gun configuration.

REFERENCES

NUMARC NESP-007, FC4
EOP-CFST-1
EOP-TRIP-1
EOP-Setpoint Doc (G.03)

3.0 Fission Product Barriers

3.1 Fuel Clad Barrier

3.1.4 RX VESSEL LEVEL INDICATION SYSTEM (RVLIS)

3.1.4.b

IC Potential Loss of Fuel Clad Barrier = 3 POINTS

EAL

RVLIS Dynamic Range Indicates ANY one of the following:

- 4 RCPs I/S < 44%
- 3 RCPs I/S < 30%
- 2 RCPs I/S < 20%
- 1 RCP I/S < 13%

MODE - 1, 2, 3, 4

BASIS

The threshold values for RVLIS Dynamic Range levels with various combinations of RCPs is chosen from the EOP-CFST-1 Core Cooling Status Tree. These values correspond to a 50% void fraction which may result in clad damage.

Barrier Analysis

Fuel Clad Barrier has been potentially lost.

ESCALATION CRITERIA

This event will be classified and/or escalated based upon the potential loss or loss of additional barriers per EAL Section 3.0.

DISCUSSION

Symptom based criteria from the EOP Critical Safety Function Tree (CSFT) monitoring are integrated into this EAL. The CFSTs are contained as a tab to the ECG. Use of RVLIS to indicate reactor vessel water level is more specific than the CFST Core Cooling Purple Path status codes. Dynamic Range RVLIS indicates reactor vessel water level when at least 1 RCP is

running. The intent of this EAL is to provide a RVLIS level which approximates a 50% RCS void fraction. With this void fraction, a loss of all operating RCPs could lead to core uncovery.

DEVIATION

Salem Generating Station replaced the CFST "Orange Path" color designation with "Purple Path" due to the limitations imposed by the SPDS CRT's color gun configuration.

REFERENCES

NUMARC NESP-007, FC4
EOP-CFST-1
EOP-TRIP-1
EOP-Setpoint Doc (L.01)

3.0 Fission Product Barriers

3.1 Fuel Clad Barrier

3.1.5 CONTAINMENT RADIATION LEVELS

IC Loss of Fuel Clad Barrier = 4 POINTS

EAL

R44A or R44B > 300 R/hr

MODE - 1, 2, 3, 4

BASIS

The reading of 300 R/hr on the containment high range monitor (R44A or R44B) indicates the loss of the Fuel Clad fission product barrier. The reading was calculated assuming an instantaneous release of the Reactor Coolant volume into the Primary Containment at an RCS Activity of 300 μCi/gm Dose Equivalent Iodine 131. This value is much larger than Technical Specification allowed Iodine spikes and corresponds to fuel clad damage of approximately 2.5%.

Barrier Analysis

Fuel Clad and RCS Barriers have been lost.

ESCALATION CRITERIA

This event will be classified and/or escalated based upon the loss or potential loss of the Primary Containment barrier per EAL Section 3.0

DISCUSSION

This calculation is based upon a concentration of 300 μCi/gm Dose Equivalent Iodine 131 as it relates to R44 measured Dose Rate values. This calculation was prepared by the Nuclear Fuels Group and is on file with Emergency Preparedness under file title DS1.6-0098 "Verification of Emergency Action Levels for Event Classification" date 1/26/95.

DEVIATION

None

REFERENCES

NUMARC NESP-007, FC5
Calculation by Nuclear Fuels file title DS1.6-0098 "Verification of Emergency Action Levels for Event Classification

3.0 Fission Product Barriers

3.1 Fuel Clad Barrier

3.1.6 EMERGENCY COORDINATOR JUDGMENT

3.1.6.a/ 3.1.6.b

IC Potential Loss (= 3 POINTS) or Loss of Fuel Clad Barrier (= 4 POINTS)

EAL

ANY condition, in the opinion of the EC, that indicates EITHER a Potential Loss OR Loss of the Fuel Clad Barrier

MODE - 1, 2, 3, 4

BASIS

This EAL allows the Emergency Coordinator (EC) to address any factor not otherwise covered in the Fission Product Barrier Table to determine that the Fuel Clad barrier has been lost or potentially lost. A complete loss in the ability to monitor the Fuel Clad barrier should be considered a "Potential Loss" of that barrier.

Barrier Analysis

The Fuel Clad Barrier has been lost or potentially lost.

ESCALATION CRITERIA

This event will be classified and/or escalated based on the loss or potential loss of additional barriers per EAL section 3.0.

DISCUSSION

None

DEVIATION

None

REFERENCES

NUMARC NESP-007, FC7

3.0 Fission Product Barriers

3.1 Fuel Clad Barrier

3.1.1 CRITICAL SAFETY STATUS

3.1.1.a

IC Potential Loss of Fuel Clad Barrier = 3 POINTS

EAL

CORE COOLING PURPLE PATH

MODE - 1, 2, 3, 4

BASIS

Core Cooling PURPLE Path, as verified by EOP-CFST-1, indicates that subcooling has been lost and that some clad damage may occur.

Barrier Analysis

Fuel Clad Barrier has been potentially lost.

ESCALATION CRITERIA

This event will be classified and/or escalated based on the potential loss or loss of additional barriers per EAL Section 3.0.

DISCUSSION

Symptom based criteria from the Emergency Operating Procedures Critical Safety Function Tree (CFST) Monitoring are integrated into this EAL. The CFSTs are contained as a tab to the ECG. The intent of using confirmed CFST status in this EAL is to simplify the identification of the EAL threshold criteria monitored in the Control Room. CFST status will not be used for event classification until the Control Room Staff has implemented the CFSTs.

DEVIATION

Salem Generating Station replaced the CFST "Orange Path" color designation with "Purple Path" due to the limitations imposed by the SPDS CRT's color gun configuration.

REFERENCES .

NUMARC NESP-007, FC1
EOP-CFST-1
EOP-TRIP-1

3.0 Fission Product Barriers

3.1 Fuel Clad Barrier

3.1.1 CRITICAL SAFETY FUNCTION STATUS

3.1.1.b

IC Potential Loss of Fuel Clad Barrier =3 POINTS

EAL

HEAT SINK RED PATH

MODE - 1, 2, 3, 4

BASIS

Heat Sink RED Path, as verified by EOP-CFST-1, indicates that Steam Generator dryout could occur. A loss of Heat Sink poses an extreme challenge to the Fuel Clad. A barrier loss classification should not be made if the Heat Sink RED Path is the result of procedurally required Auxiliary Feedwater flow control.

Barrier Analysis

Fuel Clad and RCS Barriers have been potentially lost.

ESCALATION CRITERIA

This event will be classified and/or escalated based on the potential loss or loss of additional barriers per EAL Section 3.0.

DISCUSSION

Symptom based criteria from the Emergency Operating Procedures Critical Safety Function Tree (CFST) Monitoring are integrated into this EAL. The CFSTs are contained as a tab to the ECG. The intent of using confirmed CFST status in this EAL is to simplify the identification of the EAL threshold criteria monitored in the Control Room. CFST status will not be used for event classification until the Control Room Staff has implemented the CFSTs.

DEVIATION

None

REFERENCES

NUMARC NESP-007, FC1
EOP-CFST-1
EOP-TRIP-1
FRHS-1

3.0 Fission Product Barriers

3.1 Fuel Clad Barrier

3.1.1 CRITICAL SAFETY FUNCTION STATUS

3.1.1.c

IC Loss of Fuel Clad Barrier =4 POINTS

EAL

CORE COOLING RED PATH

MODE - 1, 2, 3, 4

BASIS

Core Cooling RED Path, as verified by EOP-CFST-1, is definitive indication that the heat transfer from the fuel to the coolant has degraded leading to a fuel clad heatup, significant superheating and core uncovery.

Barrier Analysis

Fuel Clad Barrier has been lost and the Primary Containment Barrier has been potentially lost.

ESCALATION CRITERIA

This event will be classified and/or escalated based on the potential loss or loss of additional barriers per EAL Section 3.0.

DISCUSSION

Symptom based criteria from the Emergency Operating Procedures Critical Safety Function Tree (CFST) Monitoring are integrated into this EAL. The CFSTs are contained as a tab to the ECG. The intent of using confirmed CFST status in this EAL is to simplify the identification of the EAL threshold criteria monitored in the Control Room. CFST status will not be used for event classification until the Control Room Staff has implemented the CFSTs.

DEVIATION

None

REFERENCES

NUMARC NESP-007, FC1
EOP-CFST-1
EOP-TRIP-1
FRCC-1

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3.0 Fission Product Barriers

3.2 RCS Barrier

3.2.1 ~~CRITICAL SAFETY~~ FUNCTION STATUS

3.2.1.a

IC Potential Loss of RCS Barrier = 3 POINTS

EAL

THERMAL SHOCK RED PATH

MODE - 1, 2, 3, 4

BASIS

Thermal Shock RED Path, as verified by EOP-CFST-1, indicates an excessive RCS cooldown has occurred and that RCS pressure and temperature conditions have resulted in significant Pressurized Thermal Shock concerns.

Barrier Analysis

RCS Barrier has been potentially lost.

ESCALATION CRITERIA

This event will be classified and/or escalated based on the potential loss or loss of additional barriers per EAL Section 3.0.

DISCUSSION

Symptom based criteria from the Emergency Operating Procedures Critical Safety Function Tree (CFST) Monitoring are integrated into this EAL. The CFSTs are contained as a tab to the ECG. The intent of using confirmed CFST status in this EAL is to simplify the identification of the EAL threshold criteria monitored in the Control Room. CFST status will not be used for event classification until the Control Room Staff has implemented the CFSTs.

DEVIATION

None

REFERENCES

NUMARC NESP-007, RC1
EOP-CFST-1
EOP-TRIP-1

3.0 Fission Product Barriers

3.2 RCS Barrier

3.2.1 CRITICAL SAFETY FUNCTION STATUS

3.2.1.b

IC Potential Loss of RCS Barrier =3 POINTS

EAL

HEAT SINK RED PATH

MODE - 1, 2, 3, 4

BASIS

Heat Sink RED Path, as verified by EOP-CFST-1, indicates that Steam Generator dryout could occur. A loss of Heat Sink poses an extreme heat removal challenge to the RCS. A barrier loss classification should not be made if the Heat Sink RED Path is the result of procedurally required Auxiliary Feedwater flow control.

Barrier Analysis

Fuel Clad and RCS Barriers have been potentially lost.

ESCALATION CRITERIA

This event will be classified and/or escalated based on the potential loss or loss of additional barriers per EAL Section 3.0.

DISCUSSION

Symptom based criteria from the Emergency Operating Procedures Critical Safety Function Tree (CFST) Monitoring are integrated into this EAL. The CFSTs are contained as a tab to the ECG. The intent of using confirmed CFST status in this EAL is to simplify the identification of the EAL threshold criteria monitored in the Control Room. CFST status will not be used for event classification until the Control Room Staff has implemented the CFSTs.

DEVIATION

None

REFERENCES

NUMARC NESP-007, RC1
EOP-CFST-1
EOP-TRIP-1
FRHS-1

3.0 Fission Product Barriers

3.2 RCS Barrier

3.2.2 RCS LEAK RATE

3.2.2.a

IC Potential Loss of RCS Barrier = 4 POINTS

EAL

One Centrifugal Charging Pump CANNOT maintain PZR level > **17%** (as a result of RCS leakage).

MODE - 1, 2, 3, 4

BASIS

RCS leakage which results in an inability to maintain Pressurizer (PZR) or VCT Level with a normal charging lineup with minimum letdown flow using one Centrifugal Charging Pump is indicative of an RCS inventory loss which would require initiation of Safety Injection (SI) and entry into EOP-TRIP-1 from OP-AB.RC-0001(Q), Reactor Coolant System Leak.

Non-RCS leakage events (such as steam/ feedwater system breaks) where no mass is lost from the RCS should not be classified under this EAL.

Barrier Analysis

RCS Barrier has been potentially lost.

ESCALATION CRITERIA

This event will be classified and/or escalated based on the potential loss or loss of additional barriers per EAL Section 3.0.

DISCUSSION

Significant leakage from the RCS will result in implementation of OP-AB.RC-0001(Q). Actions required by this procedure will result in one Centrifugal Charging Pump in service, discharging to the charging header, and Letdown reduced to a minimum. If Pressurizer Level cannot be maintained stable or rising with this lineup established, or if VCT level cannot be maintained, a

manual Safety Injection will be initiated. This EAL assumes that any event that would result in significant RCS mass loss will result in at least an ALERT declaration.

DEVIATION

None

REFERENCES

NUMARC NESP-007, RC2
EOP-TRIP-1
EOP-FRCE-1
EOP- Setpoint Doc (D.02)
OP-AB.RC-0001(Q)

3.0 Fission Product Barriers

3.2 RCS Barrier

3.2.2 RCS LEAK RATE

3.2.2.b

IC Loss of RCS Barrier = 4 POINTS

EAL

Subcooling is 0 ^{o}F as a result of RCS leakage

MODE - 1, 2, 3, 4

BASIS

This EAL attempts to classify a "Loss" of the RCS Barrier due to LOCA conditions. Non-RCS leakage events (such as steam/feedwater system breaks) where no mass is lost from the RCS should not be classified under this EAL. Subcooling equal to 0 ^{o}F is indication that leakage from the RCS boundary is greater than the available inventory control capacity. The loss of subcooling signifies that the inventory control systems are inadequate to maintain RCS pressure and inventory against the mass loss through the leak.

Loss of subcooling due to, or as a result of, EOP directed operator actions do <u>not</u> require classification under this EAL.

Barrier Analysis

RCS Barrier has been lost.

ESCALATION CRITERIA

This event will be classified and/or escalated based on the potential loss or loss of additional barriers per EAL section 3.0.

DISCUSSION

Symptom based criteria from the Emergency Operating Procedures Critical Safety Function Status Tree (CFST) Monitoring are integrated into this EAL. The CFSTs are contained as a tab

to the ECG. The intent of using CFST status in this EAL is to simplify the identification of the EAL threshold criteria monitored in the control room.

The EAL threshold of 0 °F is reached by CFST Core Cooling YELLOW or Continuous Action Summary (CAS) monitoring. It is not intended to use this EAL for Primary to Secondary leakage events since adequate injection capability should exist for all ranges of these events including Steam Generator Tube Rupture (SGTR).

EOP directed actions resulting in deliberate subcooling reduction (e.g. during SGTR saturated recovery), steam/feedwater line breaks, or momentary reductions below 0°F that are recoverable (e.g. SI flow reduction sequence) should not be classified under this EAL.

DEVIATION

None

REFERENCES

NUMARC NESP-007, RC2
EOP-CFST-1
EOP-TRIP-1
EOP-Setpoint Doc (R.01)

3.0 Fission Product Barriers

3.2 RCS Barrier

3.2.3 STEAM GENERATOR TUBE RUPTURE

3.2.3.a

IC Potential Loss of RCS Barrier = 3 POINTS

EAL

One Centrifugal Charging Pump CANNOT maintain PZR level > **17%** (as a result of a SGTR) AND Control Room has determined that an SGTR has occurred

MODE - 1, 2, 3, 4

BASIS

This EAL is indicative of a Loss of RCS from a Steam Generator Tube Rupture (SGTR). Non-RCS leakage events (such as steam/feedwater system breaks) where no mass is lost from the RCS should not be classified under this EAL. The threshold values for determining a SGTR are those used in the EOP network. Inability to maintain Pressurizer (PZR) Level with a normal charging lineup is indicative of a SGTR that would require initiation of SI and entry into EOP-TRIP-1.

Barrier Analysis

RCS Barrier has been potentially lost.

ESCALATION CRITERIA

This event will be classified and/or escalated based on the potential loss or loss of additional barriers per EAL Section 3.0.

DISCUSSION

It is understood that this EAL is redundant to the RCS leakage EAL. Inclusion of this EAL ensures that significant SG tube leakage will be classified consistent with RCS leakage. Known SG tube leakage will result in implementation of OP-AB.SG-0001(Q). Actions required by this procedure may result in a manual Safety Injection initiation and entry into the EOP network. This EAL assumes that any SGTR that results in significant RCS mass loss will result in at least an ALERT classification.

For Ruptured SGs that are also faulted, further evaluation of the Containment Barrier is required. For faults that occur inside of Containment, this "Potential Loss" EAL will serve as the correct classification as long as no Containment challenges occur. For faults which occur outside the Containment, the RCS SGTR "Loss" EAL must also be considered.

DEVIATION

None

REFERENCES

NUMARC NESP-007, RC3
EOP-SGTR-1
S1(2).OP-AB.SG-0001(Q)
EOP-Setpoint Doc (D.02)

3.0 Fission Product Barriers

3.2 RCS Barrier

3.2.3 STEAM GENERATOR TUBE RUPTURE

3.2.3.b

IC Loss of RCS Barrier = 4 POINTS

EAL

One Centrifugal Charging Pump CANNOT maintain PZR level **>17%** (as a result of a SGTR) AND Ruptured Steam Generator pressure is **dropping in an uncontrolled manner or completely depressurized** AND **Prolonged, direct secondary leakage to the environment** (e.g. steam breaks, feed breaks, stuck open safety or relief valves) NOTE: SEE 3.3.4.b

MODE - 1, 2, 3, 4

BASIS

This EAL is indicative of a loss of RCS inventory due to a Steam Generator Tube Rupture (SGTR) and the Ruptured SG is also Faulted outside Containment. The threshold values for determining that a SGTR exist are those used in the EOP network. This condition results in a prolonged, direct release of radioactive fission and activation products to the environment.

This EAL does not include SG depressurization events that are a direct result of EOP directed operator action. The term "**dropping in an uncontrolled manner**" is defined consistent with the EOP definition of a Faulted S/G. A "**prolonged**" release is defined as an unisolable rupture (steam breaks, feed breaks, stuck open safety or relief valves excluding minor valve leakage) of a steam or feed line outside of Containment, or a stuck open relief valve on the ruptured SG.

The term "**direct secondary leakage to the environment**" is intended to include all flowpaths of contaminated secondary coolant to the environment either directly or via systems which exhaust to the Plant Vent (e.g.; leakage to the Auxiliary Building ventilation system) with the following

exception: If the EOPs require steaming the ruptured SG to the main condenser, the condenser off-gas (R15) pathway is excluded from this EAL provided the release is both controlled and monitored.

Barrier Analysis

RCS and Containment Barriers have been lost.

ESCALATION CRITERIA

This event will be classified and/or escalated based on the potential loss or loss of the Fuel Clad Barrier per EAL Section 3.1.

DISCUSSION

This "Loss" EAL addresses Ruptured SGs with an unisolable fault outside of Containment. This EAL is used in conjunction with the Containment Barrier Bypass "Loss" EAL and will always result in a loss of the Containment Barrier. Ruptured SGs that are faulted inside the Containment are excluded from this EAL. This EAL excludes classification based on a depressurization that results from an EOP induced cooldown of the RCS that does not involve prolonged release of contaminated secondary coolant from the affected SG to the environment. Releases which reach the environment via the Plant Vent should also be classified under this EAL.

DEVIATIONS

None

REFERENCES

NUMARC NESP-007, RC3
EOP-SGTR-1
S1(2).OP-AB.SG-0001(Q)
EOP-Setpoint Doc (D.02)

3.0 Fission Product Barriers

3.2 RCS Barrier

3.2.4 CONTAINMENT RADIATION LEVELS

IC Loss of RCS Barrier = 4 POINTS

EAL

Valid Containment Radiation level which exceeds ANY one of the following Containment Rad Monitor values: • R2 > 1 R/hr • R44A > 10 R/hr • R44B > 10 R/hr

MODE - 1, 2, 3, 4

BASIS

A reading of >1 R/hr on 130' Containment Area Rad Monitor R2 is the preferred method of classification under this EAL. The measurement scales on R2 range from 0.1 mR/hr to 10 R/hr thus providing reasonable accuracy for this threshold value.

The term "**valid**" was added specifically for the Containment High Range R44 detectors as they are log scale detectors scaled only in R/hr and are extremely inaccurate at this low value. This reading is less than that specified for the loss of Fuel Clad Barrier since this EAL attempts to identify RCS leakage assuming RCS activity at the Technical Specification limit.

Classification under this EAL should not be made based upon crud burst evolutions or other non-RCS leakage events.

Barrier Analysis

RCS Barrier has been lost.

ESCALATION CRITERIA

This event will be classified and/or escalated based on the loss or potential loss of additional barriers per EAL Section 3.0.

DISCUSSION

The R44A/B detectors were included in this EAL to ensure that classification of an RCS "loss" would occur for events which result in significant R/hr readings on these high range detectors which "over scale" the R2 detector. It is understood that these detectors are incapable of accurately reading 1 R/hr due to their log function (with 1 R/hr being the setpoint for coming "off the lower peg"). Therefore the EAL threshold value for these monitors has been increased to 10 R/hr which corresponds to the upper range of the R2 monitor.

The threshold value of 1 R/hr for the R2 monitor was calculated assuming an instantaneous release of the Reactor Coolant volume into the Primary Containment at a coolant concentration of 1.0 μCi/gm Dose Equivalent I-131 (Technical Specification limit). This calculation was prepared by the Nuclear Fuels Group and is on file with Emergency Preparedness under file title DS1.6-00XX "Verification of Emergency Action Levels for Event Classification" dated 1/26/95. This RAD monitor value is to be used as a backup indication to other systems designed to measure RCS leakage.

DEVIATION

None

REFERENCES

NUMARC NESP-007, RC4
Calculation by Nuclear Fuels Group file title DS1.6-00XX "Verification of Emergency Action Levels for Event Classification" dated 1/26/95.

3.0 Fission Product Barriers

3.2 RCS Barrier

3.2.5 EMERGENCY COORDINATOR JUDGMENT

3.2.5.a/ 3.2.5.b

IC Potential Loss (= 3 POINTS) or Loss of RCS Barrier (= 4 POINTS)

EAL

ANY condition, in the opinion of the EC, that indicates EITHER a Potential Loss OR Loss of the RCS Barrier

MODE - 1, 2, 3, 4

BASIS

This EAL allows the Emergency Coordinator (EC) to address any factor not otherwise covered in the Fission Product Barrier Table to determine that the RCS barrier has been lost or potentially lost. A complete loss in the ability to monitor the RCS barrier should be considered a "Potential Loss" of that barrier.

Barrier Analysis

The RCS Barrier has been potentially lost or lost.

ESCALATION CRITERIA

This event will be classified and/or escalated based on the potential loss or loss of additional barriers per EAL Section 3.0.

DISCUSSION

None

DEVIATION

None

REFERENCES

NUMARC NESP-007, RC6

PSE&G
CONTROL
COPY #SECG0101

3.0 Fission Product Barriers

3.3 Containment Barrier

3.3.1 CRITICAL SAFETY FUNCTION STATUS

3.3.1.a

IC Potential Loss of Containment Barrier = 1 POINT

EAL

CNTMT ENVIRONMENT RED PATH

MODE - 1, 2, 3, 4

BASIS

Containment Environment RED Path, as verified by EOP-CFST-1, results from RCS barrier loss or a faulted S/G inside Containment and signifies that breach of the Primary Containment is imminent. For this condition, all Containment isolations, as well as automatic Containment Spray and CFCU "low speed" operation should be initiated before this threshold is reached.

Barrier Analysis

Containment Barrier has been potentially lost.

ESCALATION CRITERIA

This event will be classified and/or escalated based on the potential loss or loss of additional barriers per EAL Section 3.0.

DISCUSSION

Symptom based criteria from the Emergency Operating Procedures Critical Safety Function Tree (CFST) Monitoring are integrated into this EAL. The CFSTs are contained as a tab to the ECG. The intent of using confirmed CFST status in this EAL is to simplify the identification of the EAL threshold criteria monitored in the Control Room.

Although the yield strength of the Primary Containment may be much higher that 47 psig, for the purposes of event classification, the barrier is considered potentially lost at that value. Thus, this EAL is primarily a discriminator between a Site Area Emergency and a General Emergency,

representing a potential loss of the third barrier. CFST status will not be used for event classification until the Control Room Staff has implemented the CFSTs.

DEVIATION

None

REFERENCES

NUMARC NESP-007, PC1
EOP-CFST-1
EOP-TRIP-1
EOP-FRCE-1

3.0 Fission Product Barriers

3.3 Containment Barrier

3.3.1 CRITICAL SAFETY FUNCTION STATUS

3.3.1.b

IC Potential Loss of Containment Barrier =1 POINT

EAL

CORE COOLING RED PATH for > 15 minutes

MODE - 1, 2, 3, 4

BASIS

Core Cooling RED Path, as verified by EOP-CFST-1, represents an imminent melt sequence which if not corrected could lead to Reactor Vessel failure and potential for Containment failure. The 15 minutes is used as a threshold for indicating that operator actions have not been effective in restoring core cooling.

Barrier Analysis

Fuel Clad Barrier has been lost, RCS and the Containment Barriers have been potentially lost.

ESCALATION CRITERIA

This event will be classified and/or escalated based on the loss of an additional barrier per EAL Section 3.0.

DISCUSSION

Symptom based criteria from the Emergency Operating Procedures Critical Safety Function Tree (CFST) Monitoring are integrated into this EAL. The CFSTs are contained as a tab to the ECG. The intent of using confirmed CFST status in this EAL is to simplify the identification of the EAL threshold criteria monitored in the Control Room.

Severe accident analysis has concluded that functional restoration procedures can arrest core degradation within the Reactor Vessel in a significant fraction of the scenarios, and that the

likelihood of Containment failure in these scenarios is small. It is appropriate, therefore, to allow a reasonable period of time for the functional restoration procedures to arrest the core melt sequence. It should be apparent within 15 minutes if the procedures will be effective. The Emergency Coordinator should make the classification as soon as it is determined that the procedures have been, or will be, ineffective. CFST status will not be used for event classification until the Control Room Staff has implemented the CFSTs.

DEVIATION

None

REFERENCES

NUMARC NESP-007, PC6
EOP-CFST-1
EOP-TRIP-1

3.0 Fission Product Barriers

3.3 Containment Barrier

3.3.2 CONTAINMENT PRESSURE

3.3.2.a

IC Potential Loss of Containment Barrier = 1 POINT

EAL

Containment H_2 > 4 %

MODE - 1, 2, 3, 4

BASIS

Hydrogen gas can be present in the Containment at the threshold level only as a result of an inadequate core cooling accident, substantial zirc-water reaction, and a breach of the RCS. Containment H_2 level above 4% signifies that an explosive mixture may exist.

Barrier Analysis

Containment Barrier has been potentially lost.

ESCALATION CRITERIA

This event will be classified and/or escalated based on the potential loss or loss of additional barriers per EAL Section 3.0.

DISCUSSION

A 4% mixture of H_2 with normal Containment atmosphere represents the deflagration lower limit. Any subsequent ignition and burn of this level mixture releases a substantial amount of energy that must be absorbed by the Containment structure, which is already under stress due to the Loss of the RCS Barrier.

DEVIATION

None

REFERENCES

NUMARC, NESP-007, PC2
EOP-TRIP-1
EOP-FRCE-1
EOP-Setpoint Doc (T.18)

3.0 Fission Product Barriers

3.3 Containment Barrier

3.3.2 CONTAINMENT PRESSURE

3.3.2.b

IC Potential Loss of Containment Barrier = 1 POINT

EAL

CNTMT Press. > 15 psig with EITHER one of the following: • No CNTMT Spray AND < 5 CFCUs Running in "Low Speed" • One CNTMT Spray Train I/S AND < 3 CFCUs Running in "Low Speed"

MODE - 1, 2, 3, 4

BASIS

Containment (CNTMT) pressure increase to > 15 psig (the CNTMT Spray initiation setpoint) indicates a major release of energy to the Containment. Failure of ALL Containment Spray with <5 Containment Fan Coil Units (CFCUs) running in "low speed", or only one train of Containment Spray in service with <3 CFCUs running in "low speed", indicates a condition where systems designed for containment heat removal and depressurization do not have the capacity to maintain Containment pressure below the structural design limit. The threshold value for available Containment Depressurization and Cooling Systems is based upon system design basis for maintaining Containment integrity.

Barrier Analysis

Containment Barrier has been potentially lost.

ESCALATION CRITERIA

This event will be classified and/or escalated based on the potential loss or loss of additional barriers per EAL Section 3.0.

DISCUSSION

The CFCUs and the Containment Spray system are redundant to each other in providing post accident cooling of the Containment atmosphere. With less than the minimum combination of sub-systems stated in the EAL threshold value, the ability to remove energy from the Containment atmosphere is severely impaired. Containment pressure >15 psig with a loss of Containment Cooling and Depressurization systems represents a potential loss of the Containment barrier.

DEVIATION

None

REFERENCES

NUMARC, NESP-007, PC2
EOP-TRIP-1
EOP-FRCE-1
EOP-Setpoint Doc (T.02)
Technical Specification Section 3.6.2

3.0 Fission Product Barriers

3.3 Containment Barrier

3.3.2 CONTAINMENT PRESSURE

3.3.2.c

IC Loss of Containment Barrier = 2 POINTS

EAL

A Rapid Unexplained Containment Pressure **Drop** following an initial **Rise** to > 4 psig

MODE - 1, 2, 3, 4

BASIS

Containment pressure increase to > 4 psig (the containment pressure Safety Injection initiation setpoint) indicates a major release of energy to the Containment. These releases can only be provided by a large release of either primary or secondary coolant into the Containment. For the cases that primary coolant provides the source of energy, a loss of the RCS barrier has also occurred. A rapid unexplained loss of Containment pressure following an initial pressure rise indicates a loss of Containment integrity.

Unexplained means that the pressure **drop** is not as a result of operator actions taken to reduce Containment pressure. The term **rapid** was added as an attempt to quantify the size of the Containment breach.

Emergency Coordinator judgment should be used to determine if this EAL applies for rapid, unexplained Containment pressure drops following initial rises to less than the 4 psig threshold.

Barrier Analysis

Containment Barrier has been lost.

ESCALATION CRITERIA

This event will be classified and/or escalated based on the potential loss or loss of additional barriers per EAL Section 3.0.

DISCUSSION

The threshold value of 4 psig was selected to be consistent with the Safety Injection and Adverse Containment criteria. For those cases where secondary coolant provides the source of energy, a faulted Steam Generator is possible. This requires actions in EOP-LOSC-1 to isolate the Main Steam lines to maintain intact Steam Generators for an RCS Heat Sink, minimize Containment Pressure, and to minimize RCS cooldown.

DEVIATION

None

REFERENCES

NUMARC NESP-007, PC2
EOP-TRIP-1
EOP-LOSC-1
Technical Specification Table 3.3-4

3.0 Fission Product Barriers

3.3 Containment Barrier

3.3.3 CONTAINMENT ISOLATION

3.3.3.a

IC Potential Loss of Containment Barrier = 1 POINT

EAL

CNTMT Sump Level > **78% (75% adverse)**

MODE - 1, 2, 3, 4

BASIS

The Containment (CNTMT) Sump threshold of 78% (75% adverse) is based upon containment flooding concerns, and is consistent with the CFST level requiring implementation of EOP-FRCE-2. An indicated level greater than this value indicates that water has been introduced into the Containment from other sources. Potential flooding of critical system components and instrumentation required for responding to an accident or performing an orderly shutdown may be affected. Thus the Containment and associated systems may not be capable of performing their function as a fission product barrier.

Barrier Analysis

Containment Barrier has been potentially lost.

ESCALATION CRITERIA

This event will be classified and/or escalated based on the potential loss or loss of additional barriers per EAL Section 3.0.

DISCUSSION

Symptom based criteria from the Emergency Operating Procedures Critical Safety Function Tree (CFST) Monitoring are integrated into this EAL. The CFSTs are contained as a tab to the ECG. The intent of using CFST status in this EAL is to simplify the identification of the EAL threshold criteria monitored in the Control Room. The EAL threshold of >78% (75% adverse) CNTMT sump level is consistent with the CFST criteria.

DEVIATION

None

REFERENCES

NUMARC NESP-007, PC7
EOP-TRIP-1
EOP-FRCE-1
EOP-FRCE-2
EOP-Setpoint Doc (T.07, T.08)

3.0 Fission Product Barriers

3.3 Containment Barrier

3.3.3 CONTAINMENT ISOLATION

3.3.3.b

IC Loss of Containment Barrier = 2 POINTS

EAL

Valid CNTMT ϕA, ϕB or CNTMT Vent Isol Signal
AND
Flow path from CNTMT to the environment

MODE - 1, 2, 3, 4

BASIS

A valid Containment (CNTMT) Isolation Signal represents a situation that requires closure of selected Containment Isolation valves to maintain containment integrity under abnormal conditions. The lines required to be isolated under these conditions connect potentially contaminated systems or Containment volume with systems outside the Containment.

Classification under this EAL is not required if manual closure attempts from Control Room are successful in the event that the automatic isolation signal fails. The term "**valid**" is defined as an actual condition which requires a CNTMT isolation due to instrumentation setpoints being exceeded.

The term "**to the environment**" is intended to include ANY **flow path** to the environment either directly or via systems which exhaust to the Plant Vent (e.g.; leakage to the Auxiliary Building ventilation system).

Barrier Analysis

Containment Barrier has been lost.

ESCALATION CRITERIA

This event will be classified and/or escalated based on the potential loss or loss of additional barriers per EAL Section 3.0.

DISCUSSION

Technical Specification 3.6.3 "Containment Isolation Valves" was used to determine the signals required for Containment isolation. Any reference to Main Steam Isolation or Steam Generator Blowdown Isolation is covered under the Containment Bypass "potential loss" EAL.

DEVIATION

None

REFERENCES

NUMARC NESP-007, PC3
EOP-TRIP-1
OP-AR.ZZ-0003(Q)
SGS Technical Specifications

3.0 Fission Product Barriers

3.3 Containment Barrier

3.3.4 RCS LINE BREAK/CONTAINMENT BYPASS

3.3.4.a

IC Potential Loss of Containment Barrier = 1 POINT

EAL

Unisolable, Faulted Steam Generator <u>OUTSIDE</u> of containment as indicated by S/G pressure dropping in an uncontrolled manner or completely depressurized **<u>AND</u>** Affected S/G tubes are intact

MODE - 1, 2, 3, 4

BASIS

S/Gs which have unisolable faults outside of containment will require feed isolation and secondary side dryout in order to stop the resultant excessive RCS cooldown rate. This subsequent dryout will result in significant thermal stress and differential pressures across the tube sheet and greater risk of a SGTR on an already faulted S/G. As such, this event is considered to be a precursor to a more serious event and will lead to at least an Unusual Event classification.

This EAL excludes S/G depressurization events that are a direct result of EOP directed operator action. The term **"dropping in an uncontrolled manner or completely depressurized"** is defined consistent with the EOP definition of a Faulted S/G. **"Unisolable"** is defined as a condition where isolation is not possible from the Control Room such as a pipe rupture with no accessible isolation valves, a stuck open safety or relief valve, etc. (excluding minor valve leakage).

Barrier Analysis

Containment Barrier has been potentially lost.

ESCALATION CRITERIA

This event will be classified and/or escalated based on the potential loss or loss of additional barriers per EAL Section 3.0.

DISCUSSION

This EAL was added to the Fission Product Barrier Table 3.0 as a Containment Bypass "Potential Loss" to ensure that all unisolable steam or feedwater break events, where the fault is outside of the Containment are at least classified as an Unusual Event. The "potential loss" category (1 point) was selected to ensure that further challenges to other Fission Product Barriers result in Emergency Classifications consistent with current philosophy.

The Containment Barrier section was selected since Technical Specifications Section 3.6.3 "Containment Isolation Valves" require both Main Steam Isolation and Steam Generator Blowdown Isolation. The Containment Bypass sub-section was selected based upon the leakage being non-radioactive steam or feedwater with concerns for RCS integrity appropriately classified under the RCS Barrier section.

Steam generator tube ruptures are not considered a potential loss of containment barrier by definition. A SGTR would, by itself, be a potential loss of the RCS barrier.

DEVIATION

This EAL was added due to a Containment Bypass concern.

REFERENCES

NUMARC NESP-007, PC7
EOP-TRIP-1
EOP-LOSC-1
OP-AB.STM-0001(Q)

3.0 Fission Product Barriers

3.3 Containment Barrier

3.3.4 RCS LINE BREAK/CONTAINMENT BYPASS

3.3.4.b

IC Loss of Containment Barrier =2 POINTS

EAL

Primary to Secondary Leakage > Tech Spec Limits AND **Prolonged, direct secondary leakage to the environment**

MODE - 1, 2, 3, 4

BASIS

Primary to Secondary leakage greater than Technical Specifications along with indication of prolonged secondary side leakage outside the Containment indicates a Steam Generator (S/G) tube leak that is discharging directly to the environment. "**Prolonged**" is defined as an unisolable rupture (excluding minor valve leakage) of a steam or feed line outside of Containment, or a stuck open safety or relief valve on a secondary system connected to the steam side of the leaking S/G.

The term "**direct secondary leakage to the environment**" is intended to include all flow paths of contaminated secondary coolant to the environment either directly or via systems which exhaust to the Plant Vent (e.g.; leakage to the Auxiliary Building ventilation system) with the following exception: If the procedure in effect requires steaming the leaking S/G to the main condenser, the Condenser Air Ejector (R15) pathway is excluded from this EAL provided the release is both controlled and monitored.

For Steam Generator Tube Rupture (SGTR), this EAL is used in conjunction with the RCS Barrier SGTR EALs to ensure proper classification if the Ruptured S/G is also faulted outside of Containment.

Barrier Analysis

Containment Barrier has been lost.

ESCALATION CRITERIA

This event will be classified and/or escalated based on the potential loss or loss of additional barriers per EAL Section 3.0.

DISCUSSION

The primary intent of this EAL is to ensure, in conjunction with the RCS Barrier "Loss" SGTR EAL, that Ruptured S/Gs that are also faulted outside of Containment, are classified as at least a Site Area Emergency. The threshold for establishing the bypass of Containment was intended to be a prolonged release of radioactivity from the Ruptured S/G directly to the environment.

The secondary purpose of this EAL is to classify S/G tube leak events which exceed Technical Specification limits, but do not exceed the RCS Barrier SGTR thresholds. If a prolonged release occurs from a S/G during a leak, only an Unusual Event would be declared based on the "Loss" of the containment barrier.

DEVIATION

None

REFERENCES

NUMARC NESP-007, PC4

3.0 Fission Product Barriers

3.3 Containment Barrier

3.3.4 RCS LINE BREAK/CONTAINMENT BYPASS

3.3.4.c

IC Loss of Containment Barrier =2 POINTS

EAL

LOCA conditions AND CNTMT Press. OR Sump Level NOT rising as expected

MODE - 1, 2, 3, 4

BASIS

The threshold conditions require that a Loss of Coolant Accident (LOCA) is known to be occurring. Such events are accompanied by release of energy and inventory from the RCS to the Containment (CNTMT), and should result in pressure and sump level rise in the Containment. Failure of CNTMT Pressure or Sump Level indications to rise as expected following a known LOCA is an indication of a Containment Bypass situation.

Barrier Analysis

Containment and RCS Barriers have been lost.

ESCALATION CRITERIA

This event will be classified and/or escalated based on the potential loss or loss of the Fuel Clad Barrier per EAL Section 3.1.

DISCUSSION

A LOCA is expected to result in CNTMT pressure rise to > 4 psig. This leak rate should result in the accumulation of RCS inventory in the CNTMT Sump as well as a CNTMT SUMP PMP START OHA as the level rises. A lack of expected CNTMT Sump level response or CNTMT pressure not rising indicates that the Containment Barrier has been bypassed.

DEVIATION

None

REFERENCES

NUMARC NESP-007, PC2
EOP-TRIP-1
EOP-LOCA-6, LOCA Outside Containment
OP-AR.ZZ-0003(Q)

3.0 Fission Product Barriers

3.3 Containment Barrier

3.3.5 CONTAINMENT RADIATION LEVELS

IC Potential Loss of Containment Barrier = 1 POINT

EAL

R44A or R44B > 2000 R/hr

MODE - 1, 2, 3, 4

BASIS

A Containment High Range Monitor (R44) reading in excess of 2000 R/hr indicates significant Fuel Clad damage, well in excess of that corresponding to a loss of the RCS and Fuel Clad barriers. The value corresponds to a release of approximately 20% of the gap region. Regardless of whether Containment is challenged, this amount of activity in Containment, if released, could have severe consequences and it is prudent to treat this as a potential loss of the Containment Barrier.

Barrier Analysis

Containment Barrier has been potentially lost, the Fuel Clad and RCS Barriers have been lost.

ESCALATION CRITERIA

N/A

DISCUSSION

This calculation is based upon a calculation of 20% Clad Damage as it relates to R44 measured Dose Rate values. This calculation was prepared by the Nuclear Fuels Group and is on file with Emergency Preparedness under file title DS1.6-00XX "Verification of Emergency Action Levels for Event Classification" date 1/26/95.

DEVIATION

None

REFERENCES

NUMARC NESP-007, PC5
NUREG-1228 - Source Term Estimation During Incident Response to Severe Nuclear Power Plant Accidents
Calculation by Nuclear Fuels file title DS1.6-00XX "Verification of Emergency Action Levels for Event Classification

3.0 Fission Product Barriers

3.3 Containment Barrier

3.3.6 EMERGENCY COORDINATOR JUDGMENT

3.3.6.a/ 3.3.6.b

IC Potential Loss (= 1 POINT) or Loss of Containment Barrier (= 2 POINTS)

EAL

ANY condition, in the opinion of the EC, that indicates EITHER a Potential Loss OR Loss of the Containment Barrier

MODE - 1, 2, 3, 4

BASIS

This EAL allows the Emergency Coordinator (EC) to address any factor not otherwise covered in the Fission Product Barrier Table to determine that the Containment barrier has been lost or potentially lost. A complete loss in the ability to monitor the Containment barrier should be considered a "Potential Loss" of that barrier

Barrier Analysis

Containment Barrier has been lost or potentially lost.

ESCALATION CRITERIA

This event will be classified and/or escalated based on the loss or potential loss of additional barriers per EAL Section 3.0.

DISCUSSION

None

DEVIATION

None

REFERENCES

NUMARC NESP-007, PC8

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CONTROL
COPY #SEGG-0101

5.0 Failure to Trip

5.1 ATWT

ALERT - 5.1.2.a/5.1.2.b

IC Failure of the RPS to Successfully Complete a Reactor Trip (Automatic or Manual)

EAL

EITHER one of the following conditions are met:

- Reactor Protection System Trip Setpoint Exceeded AND an Automatic Reactor Trip is NOT **Confirmed**
- ANY Manually Initiated Reactor Trip **from the Control Room** is NOT **Confirmed**

MODE - 1, 2, 3

BASIS

This condition indicates failure of the Reactor Protection System to trip the Reactor, either automatically or on manual demand. This condition is more than a potential degradation of a safety system in that a front line protection system did not function in response to a plant transient and thus the plant safety has been compromised, and design limits of the fuel or Reactor Vessel may have been exceeded. An Alert is indicated because conditions exist that could lead to a potential loss of the fuel clad or RCS barriers.

The term "**from the Control Room**" is defined as any action taken by the NCOs in the Control Room Area which results in a rapid insertion of Control Rods into the core. The term for expressing an unsuccessful trip as "NOT **confirmed**" is defined as listed in the EOP network. Confirmed Manual reactor trip is not considered successful if actions away from the Control Room Area (e.g. dispatch of an NEO to locally open the Reactor Trip Breakers) were required to trip the reactor.

ANY unsuccessful Manual attempt to trip the reactor will still be classified under this EAL regardless of the success of additional manual attempts. Any single manual attempt failure will constitute a major breakdown of a system designed to directly protect the health and safety of the General Public.

Barrier Analysis

This event does not reach the threshold for the loss of Fuel Clad or RCS Barriers, but conditions exist that could lead to a potential loss of those barriers.

ESCALATION CRITERIA

For the case in which the manual trip from the control room is not successful with Reactor Power $\geq$ 5%, this event would be escalated to a Site Area Emergency.

DISCUSSION

Entry into EOP-FRSM-1 may be required if the manual Reactor Trip from the console "Trip Handle" or P-9 is not successful. Additional control console actions taken in EOP-TRIP-1, such as opening the Reactor Trip or opening 2E6D or 2G6D breakers to deenergize the Rod Drive MG Sets, would constitute a successful manual reactor trip from the Control Room. Manual trip is any action by the reactor operator at the controls which causes the control rods to be rapidly inserted into the core and bring the reactor subcritical.

The threshold value of 5% reactor power for escalation criteria was selected to be consistent with EOP-FRSM-1 entry criteria. Under these low power conditions, the reactor is providing less heat than the maximum decay heat load for which the safety systems are designed.

DEVIATION

NUMARC EAL SA2 suggests that an Alert classification be based on an automatic RPS trip failure followed by a successful manual trip from the control room, with EAL SS2 escalating to a Site Area Emergency if the manual trip fails. In addition, EAL SS2 basis indicates that the SAE threshold should be such that following the automatic and manual trip failure, the reactor is producing more heat than the maximum for which the safety systems were designed. The EOPs indicate that this heat load is $\geq$5%.

The Salem Alert threshold was chosen so that unsuccessful manually initiated RPS trips from the control room, as well as unsuccessful automatically initiated trips via RPS would be classified at the Alert level. This will cover those situations which require a manual reactor trip under conditions where an automatic trip signal may not have been generated. In either case, failure of RPS to perform its intended function when demanded is indicated.

The Salem SAE threshold was chosen to include either automatic or manual failure (for the reasons stated above), with resulting power $\geq$5% as suggested in NUMARC EAL SS2 bases.

By defining an unsuccessful trip as Reactor Trip NOT confirmed (as defined in the EOP network), partial trips that result in power levels < 5% would be classified as an Alert, whether automatically or manually initiated.

REFERENCES

NUMARC NESP-007, SA2
EOP-TRIP-1, Reactor Trip or Safety Injection
EOP-CFST-1, Critical Safety Function Trees

5.0 Failure to Trip

5.1 ATWT

SITE AREA EMERGENCY - 5.1.3

IC Failure of the RPS to Successfully Complete a Reactor Trip (Automatic or Manual) and Reactor Power is Above 5%

EAL

EITHER one of the following conditions are met:

- Reactor Protection System Trip Setpoint Exceeded AND an Automatic Reactor Trip is NOT Confirmed
- ANY Manually Initiated Reactor Trip **from the Control Room** is NOT **Confirmed**

AND

ALL Reactor Trip attempts **from the Control Room** DID NOT **reduce (and maintain)** Reactor Power to < 5%

MODE - 1, 2

BASIS

Failure to trip events should not be classified under this EAL before manual trips have been attempted. Automatic and manual trips are not considered successful if action away from the reactor control console were required to trip the reactor. Under these conditions, the reactor is producing more heat than the maximum decay heat load for which the safety systems are designed. A Site Area Emergency is indicated because conditions exist that could lead to imminent loss or potential loss of both the fuel clad and RCS barriers.

The term "**from the Control Room**" is defined as any action taken by the NCOs in the Control Room Area which result a rapid insertion of Control Rods into the core. The term "**reduce (and maintain)**" was included to ensure that return to power events are still classified under this EAL. Although this EAL may be viewed as redundant to the Fission Product Barrier Table EALs, its inclusion is necessary to better assure timely recognition and emergency response.

Barrier Analysis

This event does not reach the threshold for the loss of Fuel Clad or RCS Barriers, but conditions exist that could lead to a potential (perhaps imminent) loss of those barriers.

ESCALATION CRITERIA

For the case in which an adequate heat sink is not available, this event would be escalated to a General Emergency per EAL Section 5.1.4.

DISCUSSION

Entry into EOP-FRSM-1 will be required if the manual trip from the console "trip handle" or P-9 is not successful. EOP-FRSM-1 requires an Equipment Operator to locally open the Reactor Trip Breakers and trip the Rod Drive MG Sets. Since this action is outside the control room, a successful remote Reactor Trip will require classification under this EAL. The threshold value of 5% reactor power was selected to be consistent with CFST EOP-FRSM-1 entry criteria. Mode 2 is included in this EAL to include events which result in a return to > 5% reactor power from some lower value.

DEVIATION

NUMARC EAL SA2 suggests that an Alert classification be based on an automatic RPS trip failure followed by a successful manual trip from the control room, with EAL SS2 escalating to a Site Area Emergency if the manual trip fails. In addition, EAL SS2 basis indicates that the SAE threshold should be such that following the automatic and manual trip failure, the reactor is producing more heat than the maximum for which the safety systems were designed. The EOPs indicate that this heat load is >5%.

The Salem Alert threshold was chosen so that unsuccessful manually initiated RPS trips from the control room, as well as unsuccessful automatically initiated trips via RPS would be classified at the Alert level. This will cover those situations which require a manual reactor trip under conditions where an automatic trip signal may not have been generated. In either case, failure of RPS to perform its intended function when demanded is indicated.

The Salem SAE threshold was chosen to include either automatic or manual failure (for the reasons stated above), with resulting power ≥5% as suggested in NUMARC EAL SS2 bases.

By defining an unsuccessful trip as Reactor Trip NOT **confirmed** (as defined in the EOP network), partial trips that result in power levels < 5% would be classified as an Alert, whether automatically or manually initiated.

REFERENCES

NUMARC NESP-007, SS2
EOP-TRIP-1, Reactor Trip or Safety Injection
EOP-CFST-1, Critical Safety Function Trees

5.0 Failure to Trip

5.1 ATWT

GENERAL EMERGENCY - 5.1.4

IC Failure of the RPS to Complete an Automatic Trip and Manual Trip was Not successful and There is Indication of an Extreme Challenge to the Ability to Cool the Core

EAL

EITHER one of the following conditions are met:

- Reactor Protection System Trip Setpoint Exceeded AND an Automatic Reactor Trip is NOT **Confirmed**
- ANY Manually Initiated Reactor Trip **from the Control Room** is NOT **Confirmed**

AND

ALL Reactor Trip attempts **from the Control Room** DID NOT **reduce (and maintain)** Reactor Power to **< 5%**

AND

EITHER one of the following conditions exist:

- **CORE COOLING RED PATH**
- **HEAT SINK RED PATH**

MODE - 1, 2

BASIS

Automatic or manual trips are not considered successful if actions away from the reactor control console were required to trip the reactor. These conditions indicate a fundamental failure of the automatic and manual trip protection of the Reactor Protection System, and are indicative of heat generation significantly greater than the Heat Removal capabilities. The potential for rapid core degradation exists. The General Emergency declaration is intended to be anticipatory of fission product barrier failure and permits maximum offsite intervention time.

Barrier Analysis

If threshold for this EAL is met, Table 3.0 Fission Product Barriers for Loss of the Fuel Clad (Core Cooling RED) and/or Potential Loss of the RCS (Heat Sink RED) Barriers may have been exceeded.

ESCALATION CRITERIA

N/A

DISCUSSION

Entry into EOP-FRSM-1 will be required if the manual trip from the console "trip handle" or P-9 is not successful. EOP-FRSM-1 requires an Equipment Operator to locally open the Reactor Trip Breakers and trip the Rod Drive MG Sets. Since this action is outside the control room, a successful remote Reactor Trip will require classification under this EAL. The threshold value of 5% reactor power was selected to be consistent with CFST EOP-FRSM-1 entry criteria. For events which result in a return to >5% reactor power from some lower value, classification under this EAL would be required.

If actions taken in EOP-FRSM-1 are ineffective, further CFST monitoring is utilized to determine when the additional thresholds are exceeded. Further degradation is indicated by the occurrence of valid CFST Core Cooling RED, or Heat Sink RED. These conditions are indicative of a loss or potential loss of the heat sink for core cooling. CFST status will not be used for event classification until the Control Room Staff has implemented the CFSTs.

DEVIATION

None

REFERENCES

NUMARC NESP-007, SG2
EOP-TRIP-1, Reactor Trip or Safety Injection
EOP-CFST-1, Critical Safety Function Trees
EOP-FRSM-1, Response to Nuclear Power Generation
EOP-FRHS-1, Loss of Secondary Heat Sink

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7.0 Electrical Power

7.1 Loss of AC Power Capabilities

UNUSUAL EVENT - 7.1.1

IC Loss of All Offsite Power to Vital Buses for Greater Than 15 Minutes

EAL

Loss of 13KV Offsite Power **Availability to** ALL **4KV Vital Buses** as evidenced by a **loss of function** of

- BOTH Station Power Transformers 13 (23) and 14 (24)

AND

> 15 minutes have elapsed

MODE - All

BASIS

Loss of Station Power Transformers 13(23) and 14(24) will result in a loss of offsite power to all 4KV Vital Busses for Unit 1 (Unit 2). The intent of this EAL is to identify a loss of off-site 500 KV or 13 KV power availability such that the 13(23) and 14(24) Station Power Transformers are unable to provide power to the 4KV Vital Buses.

Events which result in all available 4KV Vital Buses being supplied by their respective Diesel Generator with off-site power available should not be classified under this EAL (e.g.; all available 4KV vital buses in blackout loading during shutdown conditions due to inadvertent SEC Mode 2 "Blackout" loading with off-site power available).

Prolonged loss of AC power reduces redundancy and potentially degrades the level of safety by increasing plant vulnerability to a complete loss of AC power. 15 minutes was chosen to exclude transient or momentary power losses. Resetting of the 15 minute "clock" should not occur until a reliable source of power has been restored to the vital bus.

The term Power **Availability to** ALL **4KV Vital Busses** is defined as the ability to restore off-site power to the Vital Bus (not just an open breaker which can reenergize the vital bus from an offsite source). The term **loss of function** is defined as the inability of these transformers to provide reliable offsite power due to transformer failure or other problems associated with equipment/power lines normally available.

Barrier Analysis
None

ESCALATION CRITERIA

This event will be escalated to the Alert classification level on loss of power to two 4KV Vital Buses.

DISCUSSION

All Emergency Operating Procedures, except EOP-LOPA-1, are written assuming that at least two 4KV Vital Busses have power available. Two 4KV Vital Buses are required to ensure that at least one full train of ESF equipment is available. In Modes 1 and 2, a loss of all offsite power will result in or require a reactor trip and transition into the EOP Network. For Modes 3 and 4, OP-AB.LOOP procedures provide additional guidance.

DEVIATION

None

REFERENCES

NUMARC NESP-007, SU1
EOP-TRIP-1
EOP-LOPA-1
OP-AB.LOOP-0001(Q)
OP-AB.LOOP-0002(Q)
OP-AB.4KV-0001(Q)
OP-AB.4KV-0002(Q)
OP-AB.4KV-0003(Q)
SGS 1(2) Technical Specifications Section 3/4.8

7.0 Electrical Power

7.1 Loss of AC Power Capabilities

ALERT - 7.1.2.a

IC AC power capability to vital buses reduced to a single power source for greater than 15 minutes such that any additional single failure would result in station blackout

EAL

Loss of 4KV Vital Bus Power Sources (Offsite and Onsite) which results in the **availability** of only **one** 4KV Vital Bus Power Source (Offsite or Onsite) AND **> 15 minutes** have elapsed

MODE - 1, 2, 3, 4

BASIS

The condition indicated by this EAL is the degradation of offsite and onsite power systems supply to the 4KV Vital Buses, with two separate concerns. First, this EAL declares an Alert for conditions such that any additional, single power source failure would result in a loss of power to ALL 4KV Vital Buses. Second, an Alert would also be declared for < 2 4KV Vital Buses energized to be consistent with EOP-LOPA-1 entry conditions. At least 2 4KV Vital Buses are required to ensure one full train of ESF equipment is available for plant control. These conditions reduce redundancy and potentially degrade the level of safety by increasing plant vulnerability to a complete loss of Vital AC power. **Availability** means that the power source can be aligned to provide power to the bus within 15 minutes or is currently supplying power to at least one Vital Bus. Fifteen (15) minutes was chosen to exclude transient or momentary power losses. Resetting of the 15 minute "clock" should not occur until a reliable source of power has been restored to the vital bus.

Barrier Analysis

None

ESCALATION CRITERIA

This event will be escalated to the Site Area Emergency classification level on loss of power to all 4KV Vital Buses for >15 minutes.

DISCUSSION

The intent of this EAL is to classify events strictly as they relate to 4KV Vital Bus power availability. For the purposes of the EAL, availability of Diesel Generators that have not been challenged to start during degradation of AC power sources to the 4KV Vital Buses should be based on meeting Technical Specification action requirements for loss of offsite AC power sources. There are two separate conditions addressed by this EAL.

The first condition is directly related to the Initiating Condition, and is precautionary in classifying the event as an Alert if a single failure of one power source could result in a total loss of all 4KV Vital power. Should such a loss actually occur, it would result in classification at the Site Area Emergency Level after 15 minutes if no other power sources are available. Examples of this condition are:

1) Failure of the 13(23) Station Power Transformer with all Diesel Generators inoperable; or
2) loss of all offsite power with a failure of two Diesel Generators (results in only one 4KV Vital Bus energized by its associated Diesel Generator).

The second condition is unique to Salem Generating Station due to the three 4KV Vital Bus vs. two trains of ESF equipment arrangement. Two energized 4KV Vital Buses are required to ensure the availability of one full train of ESF equipment. This threshold is consistent with EOP-LOPA-1 entry conditions used in the EOP Network.

DEVIATION

None

REFERENCES

NUMARC NESP-007, SA5
EOP-TRIP-1
EOP-LOPA-1
OP-AB.LOOP-0001(Q)
OP-AB.LOOP-0002(Q)
OP-AB.4KV-0001(Q)
OP-AB.4KV-0002(Q)
OP-AB.4KV-0003(Q)
SGS 1(2) Technical Specifications Section 3/4.8

7.0 Electrical Power

7.1 Loss of AC Power Capabilities

ALERT - 7.1.2.b

IC Loss of All Offsite Power and All Onsite AC Power to 4 KV Vital Buses While the Plant is in Cold Shutdown , Refueling or Defueled Mode

EAL

Loss of power to ALL 4KV Vital Buses AND > 15 minutes have elapsed

MODE - 5, 6, Defueled

BASIS

Loss of all AC power compromises all plant safety systems requiring electric power including RHR, ECCS, Containment Fan Coil Unit, Spent Fuel Pool Cooling and Service Water. When in cold shutdown, refueling, or defueled modes, this event can be classified as an Alert. This is because of the significantly reduced decay heat load with lower temperatures and pressures. Fifteen (15) minutes was chosen to exclude transient or momentary power losses. Resetting of the 15 minute "clock" should not occur until a reliable source of power has been restored to the vital bus.

Barrier Analysis

None

ESCALATION CRITERIA

Escalation to a Site Area Emergency would occur on Radiological Release (EAL Section 6.0), or on the long term inability to remove Decay Heat (EAL Section 8.0).

DISCUSSION

In Modes 5, or 6, OP-AB.LOOP-0001(Q) provides guidance for maintaining plant control regardless of power remaining to the 4KV Vital Buses.

It is assumed that the plant will be maintained in a Cold Shutdown condition. If the plant is not able to be maintained in this mode, then escalation to Site Area Emergency would be appropriate based on Loss of Decay Heat Removal Capability EALs in Section 8.0.

DEVIATION

None

REFERENCES

NUMARC NESP-007, SA1
OP-AB.LOOP-0001(Q)
OP-AB.4KV-0001(Q)
OP-AB.4KV-0002(Q)
OP-AB.4KV-0003(Q)
SGS 1(2) Technical Specifications Section 3/4.8

7.0 Electrical Power

7.1 Loss of AC Power Capabilities

SITE AREA EMERGENCY - 7.1.3

IC Loss of All Offsite Power and All Onsite AC Power to Vital AC Buses

EAL

Loss of power to **All** 4KV Vital Buses AND **> 15 minutes** have elapsed

MODE - 1, 2, 3, 4

BASIS

Loss of power to Station Power Transformers 13 and 14 (23 and 24) will result in a loss of all offsite power to all 4KV Vital Buses for Unit 1 (Unit 2). With a failure of the Emergency Diesels to energize the 4KV Vital Buses, all plant safety system functions are compromised. Prolonged loss of AC power will cause core uncovery and loss of Containment integrity. The high potential decay heat loads in these modes warrants classification at the Site Area Emergency level. Fifteen minutes is chosen as a threshold to exclude transient or momentary power losses. Resetting of the 15 minute "clock" should not occur until a reliable source of power has been restored to the vital bus.

Barrier Analysis

Prolonged loss of all AC power has the potential for causing a potential loss or loss of the Fission Product Barriers.

ESCALATION CRITERIA

Escalation to General Emergency classification level will be via fission product barrier loss, or prolonged loss of offsite and onsite AC power.

DISCUSSION

All Emergency Operating Procedures except EOP-LOPA-1 are written assuming that at least two 4KV Vital Buses have power available. In Modes 1 and 2, a loss of all offsite power will result in or require a reactor trip. The threshold for this EAL is consistent with actions required by EOP-LOPA-1 to maintain the RCS Barrier, performing a rapid plant cooldown and depressurizing in order to minimize the potential of Reactor Coolant Pump seal failure, while continuing attempts to restore 4KV Vital Bus power. In Mode 3, operation within OP-AB.LOOP-0002(Q) is allowed without transition to EOP-TRIP-1 and EOP-LOPA-1. In Mode 4, OP-AB.LOOP-0001(Q) provide guidance for maintaining plant control regardless of the status of the 4KV Vital Buses.

DEVIATION

None

REFERENCES

NUMARC NESP-007, SS1
Station Blackout Coping Studies
EOP-TRIP-1
EOP-LOPA-1
OP-AB.LOOP-0002(Q)
OP-AB.4KV-0001(Q)
OP-AB.4KV-0002(Q)
OP-AB.4KV-0003(Q)
SGS 1(2) Technical Specifications Section 3/4.8

7.0 Electrical Power

7.1 Loss of AC Power Capabilities

GENERAL EMERGENCY - 7.1.4.a/7.1.4.b/7.1.4.c

IC Prolonged Loss of All Offsite Power and Prolonged Loss of All Onsite AC Power to Vital AC Buses

EAL

Loss of power to **ALL** 4KV Vital Buses

AND

> 15 minutes have elapsed

AND

ANY one of the following:

- Restoration of Power to **at least one** 4KV Vital Bus within **2 hours** is NOT likely
- CFST **CORE COOLING RED PATH**
- CFST **HEAT SINK RED PATH**

MODE - 1, 2, 3, 4

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. Restoration of at least one 4KV Vital Bus within 2 hours is based on the station blackout coping analysis, and may still lead to core damage. Prudence in timely Protective Action Recommendation is necessary since core damage may occur even if AC power is restored.

CFST Core Cooling RED Path and Heat Sink RED Path provide indication of the loss or potential loss of fission product barriers. Because plant control strategies are limited with a prolonged loss of all AC power, these should be considered to indicate a loss of the fuel clad barrier, and a potential loss of the RCS or Primary Containment barriers. These threshold conditions are used to provide the Emergency Coordinator criteria for declaring a General Emergency based on degrading fission product barriers.

Barrier Analysis

Prolonged loss of all AC power has the potential for causing a potential loss or loss of the Fission Product Barriers.

ESCALATION CRITERIA

N/A

DISCUSSION

This EAL is based on a station blackout occurring while the unit is in mode 1,2, 3 or 4 and power not being restored for >2 hours.

The status and availability of DC power may limit or prevent restoration activities. When prolonged powering of inverters and DC loads has occurred without AC power available for the battery chargers, DC voltage will degrade. This degradation of DC power may limit monitoring and assessment capabilities as instrumentation and control power may not be available. Since monitoring of overall plant conditions will be difficult with no AC power, CFST indications for determining barrier loss are used.

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

1. Are there any present indications that core cooling is already degraded to the point that loss or 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?

It is estimated that several hours are required to fully evacuate the 10 mile EPZ. Taking into consideration the above factors, declaring a General Emergency leaves sufficient time for the offsite authorities to implement Protective Actions well before a radioactive release would occur while providing sufficient time for on-site and off-site mitigation activities to restore AC power. CFST status will not be used for event classification until the Control Room Staff has implemented the CFSTs.

DEVIATION

None

REFERENCES

NUMARC NESP-007, SG1
Station Blackout Coping Studies
EOP-TRIP-1
EOP-LOPA-1
OP-AB.LOOP-0002(Q)
OP-AB.4KV-0001(Q)
OP-AB.4KV-0002(Q)
OP-AB.4KV-0003(Q)
SGS 1(2) Technical Specifications Section 3/4.8

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8.0 System Malfunctions

8.1 Loss of Heat Removal Capability

ALERT - 8.1.2

IC Inability to Maintain the Plant in Cold Shutdown

EAL

An Unplanned, Complete loss of ALL systems providing Decay Heat Removal functions

AND

EITHER one of the following occur:

- RCS Temperature has risen to > **200°F**
(Excluding a < 15 minutes rise > **200°F** with a **heat removal function** restored)
- An UNCONTROLLED temperature rise is RAPIDLY approaching **200°F**
(with NO **heat removal functions** restored)

MODE -5, 6

BASIS

The intent of this EAL is to declare an Alert prior to boiling in the core when **ALL** RHR capability is lost in Cold Shutdown or Refueling. The specification of a temperature rise, rather than specific equipment failures, recognizes the potential for long heatup times providing adequate time for restoration of some form of alternate cooling.

The term "ALL **systems providing Decay Heat Removal functions**" is intended to represent a **complete loss** of functions providing core cooling during the Cold Shutdown and Refueling Modes including available injection pathways. The term **"Unplanned"** is included to preclude the declaration of an emergency for circumstances in which the RHR System is intentionally removed from service. This EAL allows actions taken in the appropriate OP-AB.RHR procedures to re-establish RHR Cooling or provide for alternate methods of decay heat removal, such as Hot Leg Injection, with the intent of maintaining RCS temperature below 200°F. For loss of "in-service" RHR events with alternate cooling methods available, actions taken to provide for alternate DHR functions may require time to implement.

If the event results in RCS temperature momentarily (not to exceed 15 minutes) rising above 200°F with heat removal capability restored, Emergency Coordinator judgment will be required

to determine whether heat removal systems are adequate to prevent boiling in the core and restoration of RCS temperature control. **Momentary (not to exceed 15 minutes) unplanned excursions above 200°F, when alternate decay heat removal capabilities exist, should not be classified under this EAL.** NRC analysis has shown that specific sequences can result in core uncovery within 15 to 20 minutes and severe core damage within an hour after decay heat removal capability has been lost.

Barrier Analysis

None

ESCALATION CRITERIA

This event would be escalated to a Site Area Emergency if RCS temperatures cannot be restored to below 350°F, or if the core becomes uncovered.

DISCUSSION

Separate criteria was included in this EAL for the 200°F limit in order to recognize additional methods available to provide core cooling. A loss of Technical Specification components alone is not intended to be classified under this EAL. The same is true for momentary unplanned excursions above 200°F when an alternate cooling method is available and functioning to lower RCS temperature below 200°F, thus representing successful implementation of the loss of RHR Abnormal Operating Procedure network. The EAL guidance related to uncontrolled temperature rise is necessary to preserve the anticipatory philosophy of NUREG-0654 for events starting from much lower than the Cold Shutdown temperature limit. With Core Exit Thermocouple indications available, this classification can be easily made in a timely manner. Wide range Hot or RHR System temperature indications are not considered accurate as they are dependent on RHR System flow. Reference to the Abnormal Procedures may be required for determining heatup rate when the CETs are disconnected for refueling operations or otherwise unavailable. Use of these curves provides sufficient detail to determine core heat up rate. This EAL satisfies the concerns of Generic Letter 88-17.

DEVIATION

None

REFERENCES

NUMARC NESP-007, SA3
NUMARC Questions and Answers, June 1993, "System Malfunction Question #6b"
OP-AB.RHR-0001(Q)
OP-AB.RHR-0002(Q)
Generic Letter 88-17

8.0 System Malfunctions

8.1 Loss of Heat Removal Capability

SITE AREA EMERGENCY - 8.1.3.a

IC Complete Loss of Functions Needed to Achieve or Maintain the Plant in Hot Shutdown

EAL

An Unplanned, Complete loss of ALL systems providing Decay Heat Removal functions

AND

EITHER one of the following occur:

- RCS Temperature has risen to > **200°F**
(Excluding a < 15 minutes rise > **200°F** with a **heat removal function** restored)
- An UNCONTROLLED temperature rise is RAPIDLY approaching **200°F**
(with NO **heat removal functions** restored)

AND

Actions required by OP-AB.RHR have NOT maintained RCS temperature < **350°F**

MODE - 4 on RHR Cooling, 5, 6

BASIS

This EAL is a direct result of a loss of RHR event and takes advantage of the various RCS cooling options offered by the Abnormal Operating procedures for a loss of RHR capabilities. Should this loss of RHR cooling event result in an RCS heatup to >350 F, this EAL will allow classification based upon a significant loss of plant control and work in conjunction with the Fission Product Barrier Table or Radiological Releases/Occurrences EALs.

Barrier Analysis

None

ESCALATION CRITERIA

This event would be escalated to a General Emergency on loss of Fission Product Barriers or abnormal radiological releases.

DISCUSSION

This EAL works in conjunction with EALs 8.1.2 and 8.1.3.d, depending upon the initial plant conditions. When in Modes 5 or 6 and RHR capability is lost (EAL 8.1.2), OP-AB.RHR-0001 and -0002 provide guidance on controlling the RCS temperature rise by various methods including injection or steaming of the Secondary plant. When a cooldown from Mode 3 into Mode 4 is required, EAL 8.1.3.d provides threshold values for a loss of Heat Sink event until RHR cooling can be established.

DEVIATION

None

REFERENCES

NUMARC NESP-007, SS4
EOP-CFST-1
OP-AB.RHR-0001(Q)
OP-AB.RHR-0002(Q)

8.0 System Malfunctions

8.1 Loss of Heat Removal Capability

SITE AREA EMERGENCY - 8.1.3.b

IC Loss of Reactor Vessel Level that has or will Uncover Fuel in the Reactor Vessel

EAL

RVLIS Full Range < 57%

MODE - 5, 6

BASIS

This EAL is an extension of the Loss of Decay Heat Removal Capabilities EAL Alert classification as well as guidance for Modes 5 & 6 LOCA conditions. This EAL addresses loss of inventory events such that the active fuel will be uncovered. The threshold value of RVLIS Full Range <57% is chosen from the EOP SET DOC for Top of Active Fuel level with no flow.

Barrier Analysis

None

ESCALATION CRITERIA

This event would be escalated to a General Emergency on loss of Fission Product Barriers or abnormal radiological releases.

DISCUSSION

This EAL addresses the effects of prolonged core boiling following a loss of decay heat removal or Mode 5/6 LOCA conditions. Full Range RVLIS indicates reactor vessel water level with no RCPs running. The intent of this EAL is to provide a RVLIS level which approximates core uncovery.

DEVIATION

None

REFERENCES

NUMARC NESP-007, SS5
EOP Setpoint Doc - K.02

8.0 System Malfunctions

8.1 Loss of Heat Removal Capability

SITE AREA EMERGENCY - 8.1.3.c

IC Complete Loss of Functions Needed to Achieve or Maintain the Plant in Hot Shutdown

EAL

HEAT SINK RED PATH

MODE - 1, 2, 3, & 4 with RHR in Injection Mode

BASIS

This EAL addresses complete loss of a function required to reach Hot Shutdown conditions while operating in Mode 1, 2, 3, or Mode 4 with both trains of RHR aligned for injection. The ability to place the plant in Mode 3 from any "at Power" condition represents the loss of Reactivity Control which is adequately addressed in Section 5.0, ATWS. CFST Heat Sink RED PATH will limit the ability of the Control Room crew to place the plant in a Hot Shutdown condition due the inability to remove heat from the RCS. This represents an actual loss of functions intended for protection of the public and is consistent with the Fission Product Barrier Table threshold values; thus declaration of a Site Area Emergency is warranted. This EAL works in conjunction with EAL 8.1.3.a for events which occur while the plant is in on RHR cooling.

Barrier Analysis

Fuel Clad and RCS Barriers have been potentially lost.

ESCALATION CRITERIA

Escalation to a General Emergency would be based on loss of Fission Product Barriers or Radiological Releases.

DISCUSSION

Symptom based criteria from the Emergency Operating Procedures Critical Safety Function Tree (CFST) Monitoring program. The CFSTs are contained as a tab to the ECG. The intent of using

CFST status is to simplify the identification of the threshold criteria. CFST status will not be used for event classification until the Control Room Staff has implemented the CFSTs.

DEVIATION

None

REFERENCES

NUMARC NESP-007, SS4
EOP-CFST-1

8.0 System Malfunctions

8.1 Loss of Heat Removal Capability

SITE AREA EMERGENCY - 8.1.3.d

IC Complete Loss of Functions Needed to Achieve or Maintain the Plant in Hot Shutdown

EAL

ALL Turbine Stop Valve Closed (MS 28)
AND
LOSS of ALL Steam Dump Valves (TB 10, 20, 30, 40)
AND
LOSS of ALL MS10 (Steam Generator Power-Operated Relief Valves) Valve Control (BOTH Auto AND Manual)
AND
>15 minutes have elapsed

MODE - 1, 2, 3, and 4 with RHR in Injection Mode

BASIS

This EAL addresses complete loss of a function required to reach Hot Shutdown conditions while operating in Mode 1, 2, 3, or Mode 4 with both trains of RHR aligned for injection. The inability to place the plant in Mode 3 from any "at Power" condition represents the loss of Reactivity Control which is adequately addressed in Section 5.0, ATWS. A total loss of Steam Generator heat removal capability will limit the ability of the Control Room crew to place the plant in a Hot Shutdown condition due to the inability to remove heat from the RCS. The 15 minute threshold value was added to allow for restoration of unavailable systems. This represents an actual loss of functions intended for protection of the public; thus declaration of a Site Area Emergency is warranted. This EAL works in conjunction with EAL 8.1.3.a for events which occur while the plant is in on RHR cooling.

Barrier Analysis

N/A

ESCALATION CRITERIA

Escalation to a General Emergency would be based on loss of Fission Product Barriers or Radiological Releases.

DISCUSSION

This EAL attempts to identify a condition where all secondary heat removal capabilities have been lost due to inability of the Steam Generators to transfer heat either to the atmosphere or the Main Condenser. This loss of heat removal capabilities will result in an inability to cooldown the RCS to a Hot Shutdown condition.

DEVIATION

None

REFERENCES

NUMARC NESP-007, SS4

PSE&G
CONTROL
COPY # SEGG0101

8.0 System Malfunctions

8.2 Loss of Overhead Annunciators

UNUSUAL EVENT - 8.2.1

IC Unplanned Loss of Most or All Annunciation or Indication in the Control Room for Greater Than 15 minutes

EAL

Unplanned loss of > 75% of Control Room Overhead Annunciators

AND

EITHER one of the following:

- 15 minutes have elapsed since the loss of OHAs
- A significant transient is in progress

MODE - 1, 2, 3, 4

BASIS

A unplanned loss of most or all Control Room Overhead Annunciators without a plant transient in MODES 1, 2, 3, or 4 for greater than 15 minutes warrants a heightened awareness by Control Room Operators. Quantification of >75 is left to the discretion of the Senior Nuclear Shift Supervisor (SNSS), and is considered approximately 75%. It is not intended that a detailed count be performed, but that a rough approximation be used to determine the severity of the loss.

OP-AB.ANN-0001(Q) details increased monitoring and surveillance requirements as well as alternate indicators. 15 minutes is used as a threshold to exclude transient or momentary power losses. The 15 minutes clock starts when the annunciators have been lost, or are determined to have been lost. If upon time of discovery it is determined that the annunciators have been lost for at least 15 minutes prior to discovery, classification should be made under this EAL regardless of time required for restoration. If it is determined that the annunciators were lost for at least 15 minutes with the annunciators available at the time of discovery, classification is not required under this EAL, but a review of the "After The Fact" RAL should be completed.

Unplanned loss of annunciators excludes scheduled maintenance and testing activities.

A significant transient is left to the determination of the SNSS/EC, but as a minimum, plant transients for this EAL should include:

- Reactor Trips (Manual and Automatic)
- Load Rejections > 25% Thermal Power
- ECCS Injections
- Thermal Power Oscillation > 10%

Barrier Analysis

None

ESCALATION CRITERIA

This event will be escalated to an Alert if a transient is in progress or if alternate indications become unavailable and 15 minutes have elapsed since the loss of OHAs.

DISCUSSION

This EAL is not required in Modes 5 or 6 due to the limited number of safety systems required for operation.

In judging the severity of the annunciator loss, consideration should be given to those annunciators needed by the operating staff for operation in abnormal and emergency operating procedures.

For short term loss of OHAs with no transient (<15 min.) reportable level (RAL) #11.7.1.c should be considered.

DEVIATION

An EAL threshold for declaring an UE has been added if a significant transient is in progress when the loss of annunciators occurs, as requested by the NJ-BNE. These two independent events occurring at the same time warrants an expeditious notification and not waiting the 15 minutes for the Unusual Event declaration.

REFERENCES

NUMARC NESP-007, SU3
OP-AB.ANN-0001(Q)

8.0 System Malfunctions

8.2 Loss of Overhead Annunicators

ALERT - 8.2.2.a/8.2.2.b

IC Unplanned Loss of Most or All Control Room Annunciators and a Significant Transient is in Progress or Compensatory Indicators are Unavailable

EAL

Unplanned loss of > **75%** of Control Room Overhead Annunciators

AND

EITHER one of the following:

- Alternate Indications are NOT AVAILABLE per OP-AB.ANN-0001(Q)
- A **significant transient** is in progress

AND

15 minutes have elapsed since the loss of OHAs

MODE - 1, 2, 3, 4

BASIS

A unplanned loss of most or all Control Room Overhead annunciators without a plant transient in MODES 1, 2, 3, or 4 for greater than 15 minutes warrants a heightened awareness by Control Room Operators. Quantification of "most" is left to the discretion of the Senior Nuclear Shift Supervisor (SNSS), and is considered approximately 75%. It is not intended that a detailed count be performed, but that a rough approximation be used to determine the severity of the loss.

OP-AB.ANN-0001(Q) details increased monitoring and surveillance requirements as well as alternate indicators. 15 minutes is used as a threshold to exclude transient or momentary power losses. The 15 minutes clock starts when the annunciators have been lost, or are determined to have been lost. If upon time of discovery it is determined that the annunciators have been lost for at least 15 minutes prior to discovery, classification must be made under this EAL regardless of time required for restoration. If it is determined that the annunciators were lost for at least 15 minutes with the annunciators available at the time of discovery, classification is not required under this EAL, but a review of the "After The Fact" RAL should be completed.

Unplanned loss of annunciators excludes scheduled maintenance and testing activities.

A significant transient is left to the determination of the SNSS/EC; but, as a minimum, plant transients for this EAL should include:

- Reactor Trips (Manual and Automatic)
- Load Rejections > 25% Thermal Power
- ECCS Injections
- Thermal Power Oscillation > 10%

Barrier Analysis

None

ESCALATION CRITERIA

This event will be escalated to a Site Area Emergency with a failure of alternate indications and a plant transient in progress.

DISCUSSION

Without Control Room annunciators, it may be difficult to monitor conditions associated with normal plant operations. During a transient event such as those listed in the EAL, the difficulty becomes more acute.

This EAL is not required in Modes 5 or 6 due to the limited number of safety systems required for operation.

DEVIATION

None

REFERENCES

NUMARC NESP-007, SA4
OP-AB.ANN-0001(Q)

8.0 System Malfunctions

8.2 Loss of Overhead Annunciators

SITE AREA EMERGENCY - 8.2.3

IC Inability to Monitor a Significant Transient in Progress

EAL

Loss of > 75% of Control Room Overhead Annunciators

AND

A significant transient is in progress

AND

Alternate Indications are NOT AVAILABLE per OP-AB.ANN-0001(Q)

AND

Control Room indications are NOT AVAILABLE to monitor ANY one of the following:

- RCS Status
- Reactivity Control
- ECCS
- Secondary Systems (SGs, AFW)
- Containment Parameters

MODE - 1, 2, 3, 4

BASIS

A loss (planned or unplanned) of most or all Control Room Overhead Annunciators with a plant transient in MODES 1, 2, 3, or 4 for any amount of time warrants a heightened awareness by Control Room Operators. Quantification of >75% left to the discretion of the Senior Nuclear Shift Supervisor (SNSS), and is considered approximately 75%. It is not intended that a detailed count be performed, but that a rough approximation be used to determine the severity of the loss.

A significant transient is left to the determination of the SNSS/EC, but as a minimum, plant transients for this EAL should include:

- Reactor Trips (Manual and Automatic)
- Load Rejections > 25% Thermal Power
- ECCS Injection
- Thermal Power Oscillations $\geq$ 10%

The list of systems requiring Control Room monitoring ability (e.g.; RCS, Reactivity Control, ECCS, etc.) was included to ensure all safety functions (including the ability to shut down the reactor, maintain core cooling, maintain the RCS intact, provide for a heat sink, and maintain an intact Containment) can be determined by some form of Control Room instrumentation. OP-AB.ANN-0001(Q), Loss of Overhead Annunciator System, details increased monitoring and surveillance requirements as well as alternate indicators.

Barrier Analysis

None

ESCALATION CRITERIA

This event would be escalated to a General Emergency based on the loss of Fission Product Barriers or abnormal radiological releases.

DISCUSSION

Without Control Room Overhead Annunciators, it may be difficult to monitor conditions associated with normal plant operations. During significant transient events such as those listed in the EAL, the difficulty becomes more acute. Compounding these, a concurrent loss of Control Room backup monitoring will further hinder Operations staff decision making needed to respond to the transient.

DEVIATION

None

REFERENCES

NUMARC NESP-007, SS6
OP-AB.ANN-0001(Q)

PSE&G
CONTROL
COPY #SECG-0101

9.0 Hazards - Internal/External

9.2 Fire

UNUSUAL ~~EVENT - 9.2.1~~

IC Fire Within the Protected Area Boundary Not Extinguished Within 15 Minutes of Detection

EAL

Valid Fire Alarm is received in the Control Room OR
Report of a fire from personnel at the scene

AND

Fire is within ANY one of the following Plant Structures (EXCLUDING small fires that have NO potential to affect Safety Systems or Protected Area Permanent Plant Structures)

- Auxiliary Building
- Service Water Intake Structure
- Control Point Area
- Inner/Outer Penetration Areas
- Containment
- Fuel Handling Building
- Service Building
- RWST, PWST, and AFWST Area
- Turbine Building

AND

Fire is NOT extinguished within 15 minutes of EITHER one of the following:

- Receipt of a Valid Fire Alarm
- Report of a fire from the scene

MODE - All

BASIS

Fires classified under this EAL include those of a magnitude and extent that may be a potential precursor to damage to Safety Systems, and hence have safety significance. This EAL

includes Plant Vital Structures and also structures and areas that are adjoining to Plant Vital Structures, due to the potential for a fire to spread from a non-safety related structure to an adjoining safety related structure.

A fire alarm received in the Control Room is considered to be **Valid** when the alarm is substantiated by the receipt of related independent alarms (fire, temperature, deluge, etc.) in the Control Room or by visual confirmation if only a single detector is alarming.

This EAL EXCLUDES such items as fires in Plant Structures other then those listed in the EAL, waste-basket fires, and other small fires of no safety significance based on the judgment of the SNSS that NO potential to affect a **Safety System** exists. Emergency Coordinator judgment must be exercised to determine if a fire within a Plant Structure is of any safety significance.

The 15 minute clock starts upon receipt of a **Valid** Fire Alarm or report of a fire from personnel at the scene. 15 minutes was determined to be a reasonable time limit for small fires to be extinguished. A **Safety System** is defined as any system required to maintain safe operation or to establish or maintain cold shutdown.

Fire is defined as combustion characterized by the generation heat and smoke. Sources of smoke such as overheated electrical equipment and slipping drive belts, for example, do not constitute fires. Observation of a flame is preferred but is NOT required if large quantities of smoke and heat are observed.

Barrier Analysis

N/A

ESCALATION CRITERIA

Emergency Classification will escalate to an Alert if the fire damages more than one plant Safety System or damages any Plant Vital Structures.

DISCUSSION

The presence of a fire within the specified areas must be evaluated to determine the potential impact on **Safety Systems**, even if initial reports are that the fire is effecting a non-safety related portion of the plant, but has the potential to spread.

Excluded or non-vital structures include:
Unit 3
Main or Aux Guard House

Circulating Water Structure
Main, Aux, and Switchyard Transformers
B-building
A-building
Onsite Trailers
Salem Admin. Building
Onsite Warehouses
Nuclear Services Building

DEVIATION

None

REFERENCES

NUMARC NESP-007, HU2
M10-FRS-I-0001, Control Room Fire Response
NUMARC Q & A, JUNE 1993

9.0 Hazards - Internal/External

9.2 Fire

ALERT - 9.2.2

IC Fire Affecting the Operability of Plant Safety Systems Required to Establish or Maintain Safe Shutdown

EAL

Fire within ANY one of the following Plant Vital Structures:

- Auxiliary Building
- Service Water Intake Structure
- Control Point Area
- Inner/Outer Penetration Areas
- Containment
- Fuel Handling Building
- Service Building
- RWST, PWST, and AFWST Area

AND

The Fire is of a magnitude that it SPECIFICALLY results in Damage to ANY one of the following:

- TWO OR MORE Trains of a Safety System
- MORE THAN ONE Safety System
- Any Plant Vital Structure which renders the structure incapable of performing its Design Function

AND

Damaged Safety System(s) or Plant Vital Structure is required for the present MODE of operation

MODE - All

BASIS

The primary concern in this EAL is the magnitude of the explosion and the effects on Safety System required for the present MODE of Operation. Specific system degradation is

addressed in the System Malfunction EALs. A detailed assessment of system damage is not required prior to classification. The term "Damage" is defined as evidence that the explosion has caused component malfunction (pump trip, breaker trip, etc.) that may have resulted in the equipment/structure being INOPERABLE or otherwise incapable of performing it's design function. A Safety System is defined as any system required to maintain safe operation or to establish or maintain Cold Shutdown. In those cases where it is believed that the explosion may have caused damage to Safety Systems, (damage to two or more trains of a single safety system or damage to two or more separate safety systems) then an Alert declaration is warranted, since the full extent of the damage may not be known. For Plant Vital Structure damage, classification is required under this EAL if the structure houses or otherwise supports Safety Systems required for the present MODE of Operation, and EC judgement concludes that the structure may not be capable of performing it's design functions.

For example, a fire that has been confirmed to be localized to a single piece of equipment, like a 4KV Breaker, with no potential to spread to adjacent equipment, does not warrant classification as an Alert. In the event, however, that the fire has spread or is believed to be spreading to other 4KV Breakers for component(s) required for the present MODE of Operation, then an Alert is warranted.

Fire is defined as combustion characterized by the generation heat and smoke. Sources of smoke such as overheated electrical equipment and slipping drive belts, for example, do not constitute fires. Observation of a flame is preferred but is NOT required if large quantities of smoke and heat are observed.

Barrier Analysis

N/A

ESCALATION CRITERIA

This event will be escalated based on further damage to plant safety systems, loss of fission product barriers, or abnormal radiological releases. The EC may use Emergency Coordinator Discretion and escalate the classification to SAE based on the nature of the fire.

DISCUSSION

No lengthy and time consuming assessment of damage is required prior to classification. In this EAL, no attempt is made to quantify the magnitude of the damage to any Safety System but instead an attempt is made to identify any damage in order to quantify the magnitude and extent of the fire. In short, if the fire is big enough that it has damaged MORE THAN ONE Safety System, or more than one train of a safety system, then the fire is big enough to justify an Alert declaration.

Damage to Plant Vital Structures must be to the extent that EC judgment must be used to determine if the structure is still capable of performing its design function. Electrical failures (such as shorts, grounds, arcing, etc.) should be evaluated for the possibility of a fire. Any security aspects of this event should be considered under EAL sections covering Security Events.

DEVIATION

None

REFERENCES

NUMARC NESP-007, HA2
M10-FRS-I-001, Control Room Fire Response

PSE&G
CONTROL
COPY #SECG0101

9.0 Hazards - Internal/External

9.3 Explosion

UNUSUAL EVENT - 9.3.1

IC Natural and Destructive Phenomena Affecting the Protected Area

EAL

Confirmed Explosion within the Protected Area AND Report of visible damage to Plant equipment or Protected Area Permanent Plant Structures

MODE - All

BASIS

Occurrence of this event within the Protected Area, that causes visible damage to plant equipment or Protected Area Permanent Plant Structures warrant declaration as an Unusual Event under this EAL. Confirmed Explosions outside the Protected Area should not be classified under this EAL. No attempt should be made to assess the magnitude of the damage. The confirmed occurrence of the explosion with a report of any damage (deformation/scorching) is sufficient for declaration. A **confirmed explosion** is defined as visual evidence that a rapid, unconfined combustion, or a catastrophic failure of pressurized equipment that imparts energy of sufficient force to damage permanent plant structures, systems or components, has occurred.

Barrier Analysis

N/A

ESCALATION CRITERIA

This event will be escalated to Alert if the explosion damages more than one safety system or damages any plant vital structure as per EAL 9.3.2.

DISCUSSION

Electrical failures (such as shorts, grounds, arcing, etc.) should not be considered an explosion; however, they should be evaluated for the possibility of a fire. Any security aspects of this event should be considered under EAL sections covering Security Events.

DEVIATION

None

REFERENCES

NUMARC NESP-007, HU1.5
M10-FRS-I-0001, Control Room Fire Response

9.0 Hazards - Internal/External

9.3 Explosion

ALERT - 9.3.2

IC Explosion Affecting the Operability of Plant Safety Systems Required to Establish or Maintain Safe Shutdown

EAL

Confirmed Explosion within ANY one of the following Plant Vital Structures:

- Auxiliary Building
- Service Water Intake Structure
- Control Point Area
- Inner/Outer Penetration Areas
- Containment
- Fuel Handling Building
- Service Building
- RWST, PWST, and AFWST Area

AND

The Explosion is of a magnitude that it SPECIFICALLY results in **Damage** to ANY one of the following:

- TWO OR MORE Trains of a **Safety System**
- MORE THAN ONE **Safety System**
- Any Plant Vital Structure which renders the structure incapable of performing its Design Function

AND

Damaged Safety System(s) or Plant Vital Structure is required for the present MODE of operation

MODE - All

BASIS

The primary concern in this EAL is the magnitude of the explosion and the effects on **Safety System** required for the present MODE of Operation. Specific system degradation is addressed in the System Malfunction EALs. A detailed assessment of system damage is not required prior to classification. The term "**Damage**" is defined as evidence that the explosion

has caused component malfunction (pump trip, breaker trip, etc.) that may have resulted in the equipment/structure being INOPERABLE or otherwise incapable of performing it's design function. A Safety System is defined as any system required to maintain safe operation or to establish or maintain Cold Shutdown. In those cases where it is believed that the explosion may have caused damage to Safety Systems, (damage to two or more trains of a single safety system or damage to two or more separate safety systems) then an Alert declaration is warranted, since the full extent of the damage may not be known. For Plant Vital Structure damage, classification is required under this EAL if the structure houses or otherwise supports Safety Systems required for the present MODE of Operation, and EC judgement concludes that the structure may not be capable of performing it's design functions.

A **confirmed explosion** is defined as visual evidence that a rapid, unconfined combustion, or a catastrophic failure of pressurized equipment that imparts energy of sufficient force to damage or potentially damage permanent plant structures, systems or components.

Barrier Analysis

N/A

ESCALATION CRITERIA

This event will be escalated based on further damage to plant safety systems, loss of fission product barriers, or abnormal radiological releases. The EC may use Emergency Coordinator Discretion and escalate the classification to SAE based on the nature of the explosion.

DISCUSSION

No lengthy and time consuming assessment of damage is required prior to classification. In this EAL, no attempt is made to quantify the magnitude of the damage to any Safety System, but instead an attempt is made to identify any damage in order to quantify the magnitude and extent of the explosion. In short, if the explosion is big enough that it has damaged MORE THAN ONE safety system, or more than one train of a Safety System, then the explosion is big enough to justify an Alert declaration.

Damage to Plant Vital Structures must be to the extent that EC judgment must be used to determine if the structure is still capable of performing its design function. Electrical failures (such as shorts, grounds, arcing, etc.) should not be considered an explosion; however, they should be evaluated for the possibility of a fire. Any security aspects of this event should be considered under EAL sections covering Security Events.

DEVIATION

None

REFERENCES

NUMARC NESP-007, HA2
M10-FRS-I-001, Control Room Fire Response

PSE&G
CONTROL
COPY # SECG0101

9.0 Hazards - Internal/External

9.4 Toxic/ Flammable Gases

UNUSUAL EVENT - 9.4.1.a

IC Release of Toxic or Flammable Gases Deemed Detrimental to Safe Operation of the Plant

EAL

Notification by Local, County, or State Officials for the potential need to <u>EVACUATE</u> non-essential personnel due to an Offsite Toxic Gas release <u>AND</u> SNSS deems evacuation of non-essential personnel is required

MODE - All

BASIS

Notification by Local, County, or State Officials for the potential need to EVACUATE non-essential personnel due to an Offsite Toxic Gas release, along with SNSS concurrence that such action is appropriate warrants declaration of an Unusual Event, since a release that has occurred offsite, may have an impact on routine plant operations. An offsite event (such as a tanker accident or a barge accident) may place the Protected Area within the evacuation area. The evacuation is determined from the DOT Evacuation Tables for Selected Hazardous Materials in the DOT Emergency Response Guide for Hazardous Materials.

A Toxic Gas is considered to be any substance that is dangerous to life or limb by reason of inhalation or skin contact. A Toxic Gas release is considered to be a threat to plant personnel if concentrations are high enough to endanger the health of those personnel.

Barrier Analysis

N/A

ESCALATION CRITERIA

Emergency Classification will escalate to an Alert if the Toxic Gas enters either a Plant Vital Area or an area contiguous to a Plant Vital Area.

DISCUSSION

None

DEVIATION

None

REFERENCES

NUMARC NESP-007, HU3.2
SC.OP-AB.CR-0003(Q)

9.0 Hazards - Internal/External

9.4 Toxic/ Flammable Gases

UNUSUAL EVENT - 9.4.1.b

IC Release of Toxic or Flammable Gases Deemed Detrimental to Safe Operation of the Plant

EAL

Uncontrolled Toxic Gas release within the Protected Area in ANY area which does not normally require an atmospheric survey or Respiratory Protection for entry AND Routine Plant Operations are IMPEDED based on EITHER one of the following: • **Access restrictions** caused by the **uncontrolled** release • Personnel injuries have occurred as a result of the release

MODE - All

BASIS

An **uncontrolled Toxic Gas** release within the Protected Area, in high enough concentrations, will adversely affect the health and safety of plant personnel, along with the safe operation of the plant. This EAL specifically addresses those areas within the Protected Area that do not normally require an atmospheric survey or Respiratory Protection for entry, since the atmosphere in an area that does require an atmospheric survey or Respiratory Protection does not meet the intent of this EAL.

Releases classified under this EAL include those that originate both onsite and offsite. A **Toxic Gas** is considered to be any substance that is dangerous to life or limb by reason of inhalation or skin contact. **Uncontrolled Toxic Gas** releases are considered to be those releases that can not be isolated / confined to a single compartment or area, or are not as the result of a designed plant safety feature.

For example, an **uncontrolled release** of chlorine/ammonia into the Turbine Building warrants declaration of an Unusual Event. A Cardox discharge inside any area that contains this safety feature (i.e. Diesel Room) does not warrant Unusual Event declaration, unless personnel injuries have occurred as a direct result of the discharge.

A Toxic Gas release is considered to be IMPEDING normal plant operations if concentrations are high enough to restrict routine operator movements. Access restrictions includes those conditions where access is only possible with appropriate personnel protection equipment, since this equipment restricts normal vision and mobility.

Barrier Analysis

N/A

ESCALATION CRITERIA

Emergency Classification will escalate to an Alert if the Toxic Gas enters either a Plant Vital Area or an area adjoining to a Plant Vital Area.

DISCUSSION

This EAL should not be construed to include confined spaces that must be ventilated prior to entry or situations involving Site Protection personnel who are using respiratory equipment during the performance of their duties unless it also affects personnel not involved with Site Protection activities. These areas include ALL Confined Spaces. In addition, those situations that require personnel to wear respiratory protection equipment as the result of airborne contamination as required by Radiation Protection personnel do not meet the intent of this EAL.

An offsite event (such as a tanker accident or a barge accident) may place the Protected Area within the evacuation area. The need for an evacuation is determined from the DOT Evacuation Tables for Selected Hazardous Materials in the DOT Emergency Response Guide for Hazardous Materials.

DEVIATION

None

REFERENCES

NUMARC NESP-007, HU3.1
SC.OP-AB.CR-0003(Q)

9.0 Hazards - Internal/External

9.4 Toxic/ Flammable Gases

UNUSUAL EVENT - 9.4.1.c

IC Release of Toxic or Flammable Gases Deemed Detrimental to Safe Operation of the Plant

EAL

Uncontrolled Flammable Gas release within the Protected Area that RESULTS in Flammable Gas concentrations EXCEEDING **25% of the LEL** AND Routine Plant Operations are IMPEDED based on EITHER one of the following: • **Access restrictions** caused by the **uncontrolled** release • Personnel injuries have occurred as a result of the release

MODE - All

BASIS

An **uncontrolled Flammable Gas** release within the Protected Area, in high enough concentrations, will adversely affect the health and safety of plant personnel, along with the safe operation of the plant. This EAL specifically addresses those conditions where a Flammable Gas concentration EXCEEDING **25% of the LEL** (Lower Explosive Limit) exists anywhere within the Protected Area. Releases classified under this EAL include those that originate both onsite and offsite.

A **Flammable Gas** is considered to be any substance that can result in an ignition, sustained burn or detonation. **Uncontrolled Flammable Gas** releases are considered to be those releases that can not be isolated / confined to a single compartment or area.

For example, an **uncontrolled release** of hydrogen into the Turbine Building in concentration exceeding 25% of the LEL warrants declaration of an Unusual Event. In comparison, a controlled release of Hydrogen during Generator purging or Hydrogen Tank trailer purging does not warrant event declaration, as these evolutions are controlled.

Flammable Gas release is considered to be IMPEDING normal plant operations if concentrations are high enough to restrict routine operator movements. **Access restrictions**

includes those conditions where access is only possible with appropriate personnel protection equipment, since this equipment restricts normal vision and mobility.

Barrier Analysis

N/A

ESCALATION CRITERIA

Emergency Classification will escalate to an Alert if the Flammable Gas enter either a Plant Vital Area or an area adjoining to a Plant Vital Area.

DISCUSSION

For Hydrogen Gas, the explosive limit is 4%. Hence, a threshold of 25% of the LEL equates to 1% Hydrogen. This EAL should not be construed to include those controlled evolutions that may discharge a Flammable Gas within the Protected Area, but present no danger to plant safety, since the evolution is planned and controlled..

An offsite event (such as a tanker accident or a barge accident) may place the Protected Area within the evacuation area. The need for an evacuation is determined from the DOT Evacuation Tables for Selected Hazardous Materials in the DOT Emergency Response Guide for Hazardous Materials.

DEVIATION

None

REFERENCES

NUMARC NESP-007, HU3.1
SC.OP-AB.CR-0003(Q)

9.0 Hazards - Internal/External

9.4 Toxic/ Flammable Gases

ALERT - 9.4.2.a

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 Conditions

EAL

Uncontrolled Toxic Gas release within ANY one of the following Plant Vital Structures

- Auxiliary Building
- Service Water Intake Structure
- Control Point Area
- Inner/Outer Penetration Area
- Containment
- Fuel Handling Building
- Service Building
- RWST, PWST, and AFWST Area

AND

Toxic Gas concentrations result in ANY one of the following:

- An IDLH atmosphere
- Plant personnel report severe adverse health reactions, including burning eyes, nose, throat, or dizziness
- The Threshold Limit Value (TLV) being EXCEEDED

AND

Plant personnel are unable to perform actions necessary to complete a Safe Shutdown of the plant without appropriate personnel protection equipment

MODE - All

BASIS

An **uncontrolled Toxic Gas** release entering any of the plant structures listed in the EAL, that threatens the ability of plant personnel to perform actions required for safe shutdown of the

plant, warrants declaration of an Alert. The EAL threshold includes those conditions that present a significant challenge to plant personnel. This EAL specifically addresses only those plant structures that either contain safe shutdown equipment or are contiguous to those areas. Release classified under this EAL include those that originate both onsite and offsite. A **Toxic Gas** is considered to be any substance that is dangerous to life or limb by reason of inhalation or skin contact. **Uncontrolled Toxic Gas** releases are considered to be those releases that can not be isolated / confined to a single compartment or area, or are not as the result of a designed plant safety feature.

Barrier Analysis

N/A

ESCALATION CRITERIA

Emergency Classification will be escalated based on further damage to plant safety systems, loss of fission product barriers, or abnormal radiological releases. The EC may use Emergency Coordinator Discretion and escalate the classification to SAE based on the nature of the toxic gas release.

DISCUSSION

Access is considered impeded if the Toxic Gas concentrations are life threatening, i.e. require the use of personnel protective equipment. Use of protective equipment also limits the mobility and vision. The cause or magnitude of the gas concentration is not the major concern in this EAL, but rather that access required to an area that may be impeded. An IDLH atmosphere is any atmosphere that is determined to be Immediately Dangerous to Life and Health.

This EAL should not be construed to include confined spaces that must be ventilated prior to entry or situations involving Site Protection personnel who are using respiratory equipment during the performance of their duties unless it also affects personnel not involved with Site Protection activates. In addition, those situations that require personnel to wear respiratory protection equipment as the result of airborne contamination as required by Radiation Protection personnel do not meet the intent of this EAL.

An offsite event (such as a tanker accident or a barge accident) may place the Protected Area within the evacuation area. The need for the evacuation is determined from the DOT Evacuation Tables for Selected Hazardous Materials in the DOT Emergency Response Guide for Hazardous Materials.

DEVIATION

None

REFERENCES

NUMARC NESP-007, HA3.1
SC.OP-AB.ZZ-0003(Q)

9.0 Hazards - Internal/External

9.4 Toxic/ Flammable Gases

ALERT - 9.4.2.b

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 Conditions

EAL

Uncontrolled Flammable Gas release within ANY one of the following Plant Vital Structures

- Auxiliary Building
- Service Water Intake Structure
- Control Point Area
- Inner/Outer Penetration Area
- Containment
- Fuel Handling Building
- Service Building
- RWST, PWST, and AFWST Area

AND

Flammable Gas concentrations EXCEED **50% of the LEL**

AND

Plant personnel are unable to perform actions necessary to complete a Safe Shutdown of the plant without appropriate personnel protection equipment

MODE - All

BASIS

An **uncontrolled Flammable Gas** release entering any of the Plant Structures listed in the EAL, that threatens the ability of plant personnel to perform actions required for safe shutdown of the plant, warrants declaration of an Alert. The EAL threshold includes those conditions that present a significant challenge to plant personnel. This EAL specifically

addresses only those Plant Structures that either contain safe shutdown equipment or are contiguous to those areas. Releases classified under this EAL include those that originate both onsite and offsite.

A **Flammable Gas** is considered to be any substance that is capable of being easily ignited or burning quickly. **Uncontrolled Flammable Gas** releases are considered to be those releases that can not be isolated / confined to a single compartment or area, or are not as the result of a designed plant safety feature. For example, an **uncontrolled release** of hydrogen into the Auxiliary Building in concentration exceeding 50% of the LEL (Lower Explosive Limit) warrants declaration of an Alert. In comparison, a controlled release of Hydrogen during Generator purging does not warrant event declaration, as this evolution is controlled.

Barrier Analysis

N/A

ESCALATION CRITERIA

Emergency Classification will be escalated based on subsequent damage to plant safety systems, loss of fission product barriers, or abnormal radiological releases. The EC may discretion and escalate the classification to SAE based on the nature of the flammable gas release.

DISCUSSION

For Hydrogen Gas, the explosive limit is 4%. Hence, a threshold of 50% of the LEL equates to 2% Hydrogen. This EAL should not be construed to include those controlled evolutions that may discharge a Flammable Gas within the Protected Area, but present no danger to plant safety, since the evolution is planned and controlled.

An offsite event (such as a tanker accident or a barge accident) may place the Protected Area within the evacuation area. The need for an evacuation is determined from the DOT Evacuation Tables for Selected Hazardous Materials in the DOT Emergency Response Guide for Hazardous Materials.

DEVIATION

None

REFERENCES

NUMARC NESP-007, HA3.2
SC.OP-AB.ZZ-0003(Q)

PSE&G
CONTROL
COPY # SECG0101

9.0 Hazards - Internal/External

9.5 Seismic Events

UNUSUAL ~~EVENT - 9.5.1~~.a/9.5.1.b

IC Natural and Destructive Phenomena Affecting the Protected Area

EAL

EITHER one of the following conditions:
- Seismic Event felt by personnel within the Protected Area
- **Valid** actuation of the Seismic Trigger **(>0.01g)** has occurred as verified by the SMA-3 Event Indicator (flag) being White on the Seismic Monitor System cabinet in the # 1 CR Equipment Room

MODE - All

BASIS

An earthquake of this magnitude is not expected to affect the capability of plant safety functions. A seismic event recording a magnitude of >0.01g is the threshold level at which the Seismic Monitoring System would monitor the event. The actual value can be determined by engineering evaluation of the acceleration of gravity as read on the seismic recorder, information provided by Hope Creek station, or confirmation by the National Earthquake Center.

The Overhead Annunciator , "SEIS RCDR SYS ACT" will alert operators to this event and the seismic monitoring instrumentation would begin to monitor the event. This value is well below the Operating Basis Earthquake of 0.1g.

Barrier Analysis

None

ESCALATION CRITERIA

Escalation of this event would occur if actuation of the Hope Creek Seismic Switch (>0.1g) has occurred. Call the Hope Creek SNSS to request this information.

DISCUSSION

An earthquake of this magnitude is not expected to affect the capability of plant safety functions.

For further information, the National Earthquake Center can be contacted at (303) 273-8500. An approximate relationship between acceleration of gravity and magnitude is as follows:

An Acceleration of:	is approx. equal to a Richter Scale Magnitude of:
0.01g	4.0
0.02g	4.5
0.1g	5.5
0.2g	6.5

DEVIATION

None

REFERENCES

NUMARC NESP-007, HU1.1
UFSAR, Section 7.7.2.12, Seismic Monitoring Instrumentation

9.0 Hazards - Internal/External

9.5 Seismic Events

ALERT - 9.5.2

IC Natural and Destructive Phenomena Affecting the Plant Vital Area

EAL

Valid Actuation of the Hope Creek Seismic Switch (> **0.1g**) has occurred as verified by the Hope Creek SNSS

MODE - All

BASIS

The Operating Basis Earthquake of **0.1g** has been exceeded for both Salem and Hope Creek. At this level, plant safety systems are designed to remain functional and within design stress and deformation limits. Thus, an earthquake of this magnitude is not expected to affect the capability of plant safety functions required to shut down the plant and place it in a cold shutdown condition.

The actual value can be determine by engineering evaluation of the acceleration of gravity as read on the seismic recorder, information provided by Hope Creek station, or confirmation by the National Earthquake Center. The Overhead Annunciator , "SEIS RCDR SYS ACT" will alert operators to this event and the seismic monitoring instrumentation would begin to monitor the event.

Barrier Analysis

N/A

ESCALATION CRITERIA

Escalation of this event would occur if the seismic event caused additional damage to plant safety systems, loss of fission product barriers, or abnormal radiological releases. The EC may use discretion and escalate the classification to SAE based on the nature of the event.

DISCUSSION

The Overhead Annunciator , "SEIS RCDR SYS ACT" will alert operators to this event and the seismic monitoring instrumentation would begin to monitor the event. If analysis of the event indicates that the threshold value has been exceeded, immediate plant shutdown is required to evaluated possible equipment damage. This threshold value is well below the Design Basis Earthquake of 0.2g that is the maximum seismic event that is expected to occur based on local geological and seismological factors.

For further information, the National Earthquake Center can be contacted at (303) 273-8500. An approximate relationship between acceleration of gravity and magnitude is as follows:

An Acceleration of:	is approx. equal to a Richter Scale Magnitude of:
0.01g	4.0
0.02g	4.5
0.1g	5.5
0.2g	6.5

DEVIATION

None

REFERENCES

NUMARC NESP-007, HA1.1
UFSAR, Section 7.7.2.12, Seismic Monitoring Instrumentation

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COPY # SECG0101

9.0 Hazards - Internal/External

9.7 Flooding

UNUSUAL EVENT - 9.7.1

IC Internal Flooding in Excess of Sump Handling Capability Affecting Safety Related Areas of the Plant

EAL

Severe Flooding of Safety System Areas <u>HAS ENDANGERED</u> safety related equipment per OP-AB.ZZ-0002

MODE - All

BASIS

This EAL addresses conditions where severe flooding is occurring in areas that affect safety related equipment. **Endangered** means that a determination has been made that the flooding is severe enough to jeopardize safe operation of Safety related equipment.

Barrier Analysis

None

ESCALATION CRITERIA

This event will be escalated to an Alert based upon the loss of vital equipment due to flooding.

DISCUSSION

Severe flooding can occur from several sources including the Circulating Water System, Service Water System, Demineralized Water, Component Cooling Water, Fire Protection and Refueling Water Storage Tank.

Flooding is detailed in these areas by visual report from staff or by confirmation of sump alarms. OP-AB.ZZ-0002(Q) directs the operators to determine the exact location and severity of flooding. Attachments in this procedure delineates the affected plant areas, potential source(s) of water, affected vital equipment, flood rate and time to submerge vital equipment.

DEVIATION

None

REFERENCES

NUMARC NESP-007, HU1.7
OP-AB.ZZ-0002(Q), Flooding

9.0 Hazards - Internal/External

9.7 Flooding

ALERT - 9.7.2

IC Internal Flooding Affecting the Operability of Plant Safety Systems Required to Establish or Maintain Safe Shutdown

EAL

Visual Observation of Flooding within ANY one of the following Plant Vital Structures:

- Auxiliary Building
- Service Water Intake Structure
- Fuel Handling Building
- Service Building
- Containment

AND

The Flooding is of a magnitude that it SPECIFICALLY results in Damage to ANY one of the following:

- TWO OR MORE Trains of a Safety System
- MORE THAN ONE Safety System
- Any of the above listed Plant Vital Structures which renders the structure incapable of performing its Design Function

AND

Damaged Safety System(s) or Plant Vital Structure is required for the present MODE of operation

MODE - All

BASIS

The primary concern in this EAL is the magnitude of the explosion and the effects on Safety System required for the present MODE of Operation. Specific system degradation is addressed in the System Malfunction EALs. A detailed assessment of system damage is not required prior to classification. The term "Damage" is defined as evidence that the explosion has caused component malfunction (pump trip, breaker trip, etc.) that may have resulted in the

equipment/structure being INOPERABLE or otherwise incapable of performing it's design function. A Safety System is defined as any system required to maintain safe operation or to establish or maintain Cold Shutdown. In those cases where it is believed that the explosion may have caused damage to Safety Systems, (damage to two or more trains of a single safety system or damage to two or more separate safety systems) then an Alert declaration is warranted, since the full extent of the damage may not be known. For Plant Vital Structure damage, classification is required under this EAL if the structure houses or otherwise supports Safety Systems required for the present MODE of Operation, and EC judgement concludes that the structure may not be capable of performing it's design functions.

Barrier Analysis

None

ESCALATION CRITERIA

This event will be escalated based upon the consequences of the loss of vital equipment as covered in various other EAL sections. The EC may use Emergency Coordinator Discretion and escalate the classification to SAE based on the nature of the flooding.

DISCUSSION

Severe flooding can occur from several sources including the Circulating Water System, Service Water System, Demineralized Water, Component Cooling Water, Fire Protection and Refueling Water Storage Tank.

Flooding is detailed in these areas by visual report from staff or by confirmation of sump alarms. OP-AB.ZZ-0002(Q) directs the operators to determine the exact location and severity of flooding. Attachments of this procedure delineates the affected plant areas, potential source(s) of water, affected vital equipment, flood rate and time to submerge vital equipment.

DEVIATION

None

REFERENCES

NUMARC NESP-007, HA1.7
OP-AB.ZZ-0002(Q), Flooding

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9.0 Hazards - Internal/External

9.8 Turbine Failure / Vehicle Crash / Missile Impact

UNUSUAL EVENT - 9.8.1.a

IC Natural and Destructive Phenomena Affecting Certain Structures Within the Protected Area

EAL

Catastrophic damage to the Main Turbine as evidenced by EITHER one of the following: • Main Turbine casing penetration • Main Turbine/Generator Damage potentially releasing Lube Oil or Hydrogen Gas to the Turbine Building

MODE - All

BASIS

Turbine failure of sufficient magnitude to cause damage to the turbine casing or generator seals increases the potential for leakage of combustible/explosive gases and of combustible liquids to the Turbine Building or damage to plant systems due to missiles. The presence of H_2 gas in sufficient quantities may present a flammable/explosive hazard. Oil may also be present which may contribute to the flammability hazard.

Barrier Analysis

N/A

ESCALATION CRITERIA

This event will be escalated to an Alert based upon damage done by missiles generated by the failure.

DISCUSSION

Turbine rotating component failures may also result in other direct damage to plant systems and components. Damage may rupture the turbine lubricating oil system, which would release flammable liquids to the Turbine Building. Potential rupture of the condenser and condenser tubes may cause flooding in the lower levels of the Turbine Building. This damage should be readily observable.

Escape of hydrogen gas from the generator due to a loss of seal oil pumps or turbine lube oil without a turbine rotating component failure should not be classified under this event.

DEVIATION

None

REFERENCES

NUMARC NESP-007, HU1.6
EOP-TRIP-1

9.0 Hazards - Internal/External

9.8 Turbine Failure / Vehicle Crash / Missile Impact

UNUSUAL EVENT - 9.8.1.b

IC Natural and Destructive Phenomena Affecting Certain Structures Within the Protected Area

EAL

Vehicle Crash / Missile Impact with or within ANY one of the following Plant Vital Structures:

- Auxiliary Building
- Service Water Intake Structure
- Inner/Outer Penetration Areas
- Containment
- Fuel Handling Building
- Service Building
- RWST, PWST, and AFWST Area

MODE - All

BASIS

A **Vehicle Crash / Missile Impact** with or within a listed Plant Vital Structure represents a potential challenge to plant safety. Events classified under this EAL include those of a magnitude and extent that may be a potential precursor to damage to **Safety Systems**, and hence has safety significance. **Vehicle Crash** includes Aircraft, Helicopters, Ships, Barges, Trucks, Autos, or any other vehicle types of sufficient momentum to potentially damage the structure. Minor contacts (not crashes) by onsite vehicles such as trucks, autos, forklifts, etc are excluded from classification under this EAL. **Missile Impact** includes flying objects from either offsite and onsite, rotating equipment or turbine failure causing turbine casing penetration.

Barrier Analysis

None

ESCALATION CRITERIA

This event will be escalated to Alert if the crash or missile impact causes damage to Plant Vital Structures.

DISCUSSION

Any security aspects of this event should be considered under EAL sections covering Security Events.

DEVIATION

None

REFERENCES

NUMARC NESP-007, HU1.4
NUMARC Questions and Answers, June 1993, "Hazards Question #6"

9.0 Hazards - Internal/External

9.8 Turbine Failure / Vehicle Crash / Missile Impact

ALERT - 9.8.2

IC Natural and Destructive Phenomena Affecting Certain Structures Within the Plant Vital Area

EAL

Vehicle Crash / Missile Impact with or within ANY one of the following Plant Vital Structures:

- Auxiliary Building
- Service Water Intake Structure
- Inner/Outer Penetration Areas
- Containment
- Fuel Handling Building
- Service Building
- RWST, PWST, and AFWST Area

AND

The **Vehicle Crash / Missile Impact** is of a magnitude that it SPECIFICALLY results in **Damage** to ANY one of the Following:

- TWO OR MORE Trains of a **Safety System**
- MORE THAN ONE Safety System
- ANY of the above Plant Vital Structures which renders the structure incapable of performing its Design Function

AND

Damaged Safety System(s) or Plant Vital Structure is required for the present MODE of operation

MODE - All

BASIS

The primary concern in this EAL is the magnitude of the vehicle crashes / missile impact and the effects on **safety systems** required for the present MODE of operation. Specific system degradation is addressed in the System Malfunction EALs. A detailed assessment of system **damage** is not required prior to classification. **Vehicle Crash** includes Aircraft, Helicopters,

Ships, Barges, Trucks, Autos, or any other vehicle types of sufficient momentum to potentially damage the structure. Minor contacts (not crashes) by onsite vehicles such as trucks, autos, forklifts, etc are excluded from classification under this EAL. **Missile Impact** includes flying objects from either offsite and onsite, rotating equipment or turbine failure causing turbine casing penetration.

The term "**Damage**" is defined as evidence that the vehicle crash / missile impact has caused component malfunction (pump trip, breaker trip, etc.) that may have resulted in the equipment/structure being INOPERABLE or otherwise incapable of performing it's design function.

A **Safety System** is defined as any system required to maintain safe operation or to establish or maintain cold shutdown. In those cases where it is believed that the vehicle crash / missile impact may have caused damage to Safety Systems, then an Alert declaration is warranted, since the full extent of the damage may not be known. For Plant Vital Structure **damage**, classification is required under this EAL if the structure houses or otherwise supports safety systems required for the present MODE of operation.

Barrier Analysis

N/A

ESCALATION CRITERIA

This event will be escalated based on further damage to plant safety systems, fission product barriers, or abnormal radiation releases in other EAL sections. The EC may use discretion and escalate the classification to SAE based on the nature of the damage.

DISCUSSION

No lengthy or time-consuming assessment of damage is required prior to classification. In this EAL, no attempt is made to quantify the magnitude of the damage to any safety system but instead an attempt is made to identify any damage in order to quantify the magnitude and extent of the vehicle crashes / missile impact.

In short, if the vehicle crash / missile impact is big enough that it has damaged more than one safety system, or more than one train of a safety system, then the vehicle crash / missile impact is big enough to justify an Alert declaration. Damage to Plant Vital Structures must be to the extent that EC judgment must be used to determine if the structure is still capable of performing its design function. Any security aspects of this event should be considered under EAL sections covering Security Events.

DEVIATION

None

REFERENCES

NUMARC NESP-007, HA1.5 and HA1.6
NUMARC Questions and Answers, June 1993, "Hazards Question #6"