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PRC SECG-SECT.05 (BASIS) 000	2	A	1	H	94869
PRC SECG-SECT.07.1 (BASIS) 000	2	A	1	H	94909
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SALEM GENERATING STATION
 EVENT CLASSIFICATION GUIDE TECHNICAL BASIS
 January 16, 2001

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CHANGE PAGES FOR
 REVISION #08

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 #08 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 Remove and recycle the outdated material listed below.

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All	EAL Section 5.0	02	All	EAL Section 5.0	01
All	EAL Section 7.1	02	All	EAL Section 7.1	01
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SALEM ECG TECHNICAL BASIS
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Effective Date of this Revision: 01/16/01
Date

3.0 Fission Product Barriers

3.2 RCS Barrier

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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

EAL - 3.2.1.a
Rev. 02

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 = 3 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

EAL - 3.2.2.a

Rev. 02

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 °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 °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 not 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

EAL - 3.2.2.b
Rev. 02

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

EAL - 3.2.3.a
Rev. 02

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.

EAL - 3.2.3.b

Rev. 02

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.

EAL - 3.2.4
Rev. 02

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 $\mu\text{Ci/gm}$ 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

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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 that 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.

EAL - 5.1.2.a/5.1.2.b

Rev. 02

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 that 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 that 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 that result in 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.

EAL - 5.1.3
Rev. 02

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 that 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, 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.

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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 path or Heat Sink RED path. The Core Cooling RED path is indicative of a loss of core cooling and the Heat Sink RED path of a potential loss of core cooling. CFST status will not be used for event classification until the Control Room Staff has implemented the CFSTs.

If the Heat Sink RED path is due to a procedurally directed action then classification under this EAL is not required. EOP-FRSM-1 directs the operators to minimize feedwater flow to the steam generators in order to minimize cooldown and control reactivity. A heat sink red path is generated as a result of this operator action. However, actual loss of control of the heat sink does not occur due to these actions. In addition the heat sink red path is precursor to a loss of core cooling and is backed up by the core cooling red path. Declaration of a General Emergency is not justified if the heat sink red path is a result of procedurally directed actions.

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

7.0 Electrical Power

7.1 Loss of AC Power Capabilities

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CONTROL
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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.

EAL - 7.1.1
Rev. 02

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 < TWO 4KV Vital Buses energized to be consistent with EOP-LOPA-1 entry conditions. At least TWO 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

EAL - 7.1.2.a
Rev. 02

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

EAL - 7.1.2.a
Rev. 02

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.

EAL - 7.1.2.b
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It is assumed that the plant will be maintained in a Cold Shutdown condition. If the plant cannot 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 uncover 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.

EAL - 7.1.3
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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) provides 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.

For the purposes of this event classification, the CFST should be monitored and validated. 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

EAL - 7.1.4.a/7.1.4.b/7.1.4.c

Rev. 02

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

9.0 Hazards - Internal/External

9.2 Fire

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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

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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 than those listed in the EAL, wastebasket 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 fire and the effects on **Safety System** required for the present **MODE** of Operation. Specific system degradation is addressed in the

EAL - 9.2.2

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System Malfunction EALs. A detailed assessment of system damage is not required prior to classification. The term “**Damage**” is defined as evidence that the fire 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 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.

When considering two or more trains of a Safety System or more than one Safety System affected by the fire; only Safety Systems or trains that are affected by the event should be considered. Safety Systems or Safety System components that were previously removed from service or previously inoperable prior to the event or are later removed from service or become inoperable for reasons unrelated to the magnitude of the fire should **not** be considered under this EAL classification even if Technical Specifications may apply.

For example: Twelve hours ago, the 21 Safety Injection Pump was declared inoperable due excessive vibrations. While in Mode 1, a fire in the Auxiliary Building, near the 22 Safety Injection Pump, damaged the 22 Safety Injection Pump but did not affect any other Safety System or Safety System component. Although from a technical specification viewpoint both trains of Safety Injection are inoperable, from an EAL viewpoint, the fire was **not** of a magnitude that it specifically resulted in damage to two of more trains of a safety system. This event would meet the EAL criteria for an Unusual Event (UE) but not the criteria for an Alert.

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

EAL - 9.2.2

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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

9.0 Hazards - Internal/External

9.3 Explosion

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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 an 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

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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 judgment concludes that the structure may not be capable of performing it's design functions.

When considering two or more trains of a Safety System or more than one Safety System affected by the explosion; only Safety Systems or trains that are affected by the event should be considered. Safety Systems or Safety System components that were previously removed from service or previously inoperable prior to the event or are later removed from service or become inoperable for reasons unrelated to the magnitude of the explosion should **not** be considered under this EAL classification even if Technical Specifications may apply.

For example: Twelve hours ago, the 21 Safety Injection Pump was declared inoperable due excessive vibrations. While in Mode 1, an explosion in the Auxiliary Building, near the 22 Safety Injection Pump, damaged the 22 Safety Injection Pump but did not affect any other Safety System or Safety System component. Although from a technical specification viewpoint both trains of Safety Injection are inoperable, from an EAL viewpoint, the explosion was **not** of a magnitude that it specifically resulted in damage to two of more trains of a safety system. This event would meet the EAL criteria for an Unusual Event (UE) but not the criteria for an Alert.

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

9.0 Hazards - Internal/External

9.6 High Winds

UNUSUAL EVENT - 9.6.1.a/9.6.1.b

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IC Natural and Destructive Phenomena Affecting the Protected Area

EAL

Report of a Tornado TOUCHING DOWN within the Protected Area

OR

Sustained wind speeds > 75 MPH for 15 minutes, from ANY elevation of the Met Tower

MODE - All

BASIS

This EAL addresses either a tornado reported onsite or sustained, high winds being detected onsite. A tornado touching down within the Protected Area or sustained wind speeds in excess of 75 MPH are of sufficient velocity to have the potential to cause damage to Plant Vital Structures. These conditions are indicative of unstable weather conditions and represent a potential degradation in the level of safety of the plant. "Sustained" wind speed means winds in excess of the threshold value for greater than 15 minutes.

Barrier Analysis

None

ESCALATION CRITERIA

This event will be escalated to an Alert if the tornado or high winds cause damage to Plant Vital Structures. If it is determined that the abnormal weather condition results in a loss of shutdown cooling, then the event will be escalated based on the Loss of Decay Heat Removal Capability.

DISCUSSION

These conditions are indicative of unstable weather conditions and represent a potential degradation in the level of safety of the plant. The windspeed threshold is well below the

EAL - 9.6.1.a/9.6.1.b

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structure design basis of 108 mph, and is set slightly above the threshold value used to characterize Category Level 1 Hurricane force winds (74 mph). Setting this threshold value at > 75 mph ensures site accessibility for emergency response.

NOTE: The Wind Speed indication from the Met Tower instrumentation is full scale at 100 mph.

The National Weather Service can be contacted for further information about existing or projected Adverse Weather Conditions:

Wilmington	(302) 573-6142
Mount Holly	(609) 261-6604
Mount Holly	(609) 261-6602

DEVIATION

None

REFERENCES

NUMARC NESP-007, HU1.2 and HU1.7
OP-AB.ZZ-0001(Q), Severe Weather
SGS UFSAR, Sections 2.3, 3.3

9.0 Hazards - Internal/External

9.6 High Winds

ALERT - 9.6.2

IC Natural and Destructive Phenomena Affecting the Plant Vital Area

EAL

EITHER one of the following:

- Report of a Tornado TOUCHING DOWN within the Protected Area
- **Sustained** wind speeds > 75 MPH for 15 minutes, from ANY elevation of the Met Tower

AND

The Wind Speed 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**
- Rendering ANY of the following structures incapable of performing its Design Function:
 - 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

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

MODE - All

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BASIS

The primary concern in this EAL is the magnitude of the high winds and the effects on safety functions. 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 high winds have caused component malfunction (pump trip, breaker trip, etc.) or a report of visible deformation 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 high winds 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 safe shutdown of the Plant.

When considering two or more trains of a Safety System or more than one Safety System affected by the high winds; only Safety Systems or trains that are affected by the event should be considered. Safety Systems or Safety System components that were previously removed from service or previously inoperable prior to the event or are later removed from service or become inoperable for reasons unrelated to the magnitude of the high winds should **not** be considered under this EAL classification even if Technical Specifications may apply.

For example: Twelve hours ago, the 26 Service Water Pump was declared inoperable due excessive vibrations. While in Mode 1, a tornado touched down and the high winds damaged the traveling screens to the 21, 22 and 23 Service Water Pumps, but did not affect any other Safety System or Safety System component. Although from a technical specification viewpoint both trains of Service Water have been affected, from an EAL viewpoint, the high winds were **not** of a magnitude that it specifically resulted in damage to two of more trains of a safety system. This event would meet the EAL criteria for an Unusual Event (UE) but not the criteria for an Alert.

It is not intended that a lengthy engineering analysis be performed to determine if damage has affected structural design but EC judgment must determine whether to exclude minor exterior damage that does not affect the structural design capability. The value of 75 MPH is below the design basis wind speed of 108 MPH determined for Salem Generating Station.

"**Sustained**" wind speed means winds in excess of the threshold value for greater than 15 minutes.

Barrier Analysis

None

ESCALATION CRITERIA

This event will be escalated to higher classifications based upon damage consequences covered under various other EAL sections. The EC may use Emergency Coordinator Discretion and escalate the classification to SAE based on the nature of the winds.

DISCUSSION

With damage to these areas confirmed, an actual degradation in the level of plant safety has occurred. EC judgment must be used to discriminate between minor "cosmetic" and "design function" structural damage.

NOTE: The Wind Speed indication from the Met Tower instrumentation is full scale at 100 mph.

The National Weather Service can be contacted for further information about existing or projected Adverse Weather Conditions:

Wilmington	(302) 573-6142
Mount Holly	(609) 261-6604
Mount Holly	(609) 261-6602

DEVIATION

None

REFERENCES

NUMARC NESP-007, HA1.2 and HA1.3
OP-AB.ZZ-0001(Q), Severe Weather
SGS UFSAR, Sections 2.3, 3.3

9.0 Hazards - Internal/External

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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 HAS ENDANGERED 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 flooding has caused component malfunction (pump trip, breaker trip, etc.) that may have resulted in the

EAL - 9.7.2

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equipment/structure being **INOPERABLE** or otherwise incapable of performing its 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 flooding 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) 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 judgment concludes that the structure may not be capable of performing its design functions.

When considering two or more trains of a Safety System or more than one Safety System affected by flooding; only Safety Systems or trains that are affected by the event should be considered. Safety Systems or Safety System components that were previously removed from service or previously inoperable prior to the event or are later removed from service or become inoperable for reasons unrelated to the magnitude of the flooding should **not** be considered under this EAL classification even if Technical Specifications may apply.

For example: Twelve hours ago, the 21 Safety Injection Pump was declared inoperable due excessive vibrations. While in Mode 1, flooding in the Auxiliary Building, near the 22 Safety Injection Pump, damaged the 22 Safety Injection Pump but did not affect any other Safety System or Safety System component. Although from a technical specification viewpoint both trains of Safety Injection are inoperable, from an EAL viewpoint, the flooding was **not** of a magnitude that it specifically resulted in damage to two of more trains of a safety system. This event would meet the EAL criteria for an Unusual Event (UE) but not the criteria for an Alert.

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

9.0 Hazards - Internal/External

9.8 Turbine Failure / Vehicle Crash / Missile Impact

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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 H₂ 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.

EAL - 9.8.1.a
Rev. 02

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 or onsite, rotating equipment or turbine failure causing turbine casing penetration.

Barrier Analysis

None

ESCALATION CRITERIA

EAL - 9.8.1.b
Rev. 02

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

EAL - 9.8.2

Rev. 02

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 or 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**, (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.

When considering two or more trains of a Safety System or more than one Safety System affected by the vehicle crash/missile impact; only Safety Systems or trains that are affected by the event should be considered. Safety Systems or Safety System components that were previously removed from service or previously inoperable prior to the event or are later removed from service or become inoperable for reasons unrelated to the magnitude of the vehicle crash/missile impact should **not** be considered under this EAL classification even if Technical Specifications may apply.

For example: Twelve hours ago, the 21 Safety Injection Pump was declared inoperable due excessive vibrations. While in Mode 1, a missile impact in the Auxiliary Building, damaged the 22 Safety Injection Pump but did not affect any other Safety System or Safety System component. Although from a technical specification viewpoint both trains of Safety Injection are inoperable, from an EAL viewpoint, the missile impact was not of a magnitude that it specifically resulted in damage to two or more trains of a safety system. This event would meet the EAL criteria for an Unusual Event (UE) but not the criteria for an Alert.

Barrier Analysis

N/A

ESCALATION CRITERIA

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Rev. 02

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"

9.0 Hazards - Internal/External

9.9 River Level

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UNUSUAL EVENT - 9.9.1.a

IC Natural and Destructive Phenomena Affecting the Protected Area

EAL

River Level > 99.5'

MODE - All

BASIS

This EAL indicates river level conditions that can threaten the level of safety of the plant due to flooding.

Barrier Analysis

N/A

ESCALATION CRITERIA

This event will be escalated based on damage to plant safety systems, loss of fission product barriers, or abnormal radiological releases in other EAL sections.

DISCUSSION

River level greater than 99.5' is indication of impending site flood conditions. Flood protection measures are required by Salem Technical Specifications and procedure at 99.5'(+10.5'MSL). At this river level precautionary actions are taken, including filling outside tanks and ensuring that perimeter flood doors are closed. These actions ensure that the facility flood protection features are in place prior to a river level that would necessitate their use. Hope Creek performs these actions at 95.0' (+6.0'MSL).

The High river level threshold is below the river level that would require a plant shutdown. Technical Specification actions required by a River Level of >100.5' includes placing the plant in at least Hot Standby within the next 6 hours and in Cold Shutdown within the next 30 hours. This is based on the river level at which facility flood protection features provide

protection to safety related equipment. Hope Creek required actions are at 99.5' (+10.5'MSL).

The grade level at the Salem station is lower than that for Hope Creek (Salem = 99.5', Hope Creek = 101.5').

The National Weather Service can be contacted for further information about existing or projected Adverse Weather Conditions:

Mount Holly	(609) 261-6604
Mount Holly	(609) 261-6602

DEVIATION

None

REFERENCES

NUMARC NESP-007, HU1.7
OP-AB.CW-0001 (Q)
OP-AB.ZZ-0001 (Q)
SGS UFSAR, Section 2.4.11.2, Figure 3.4-1
HCGS UFSAR, Section 2.4, Figure 2.4-3

9.0 Hazards - Internal/External

9.9 River Level

UNUSUAL EVENT - 9.9.1.b

IC Natural and Destructive Phenomena Affecting the Protected Area

EAL

River Level < 80.0'

MODE - All

BASIS

This EAL indicates a river level condition that is one foot lower than the historical low water level of 81.0' (-8.0'MSL) (December 31, 1962) and is higher than the Service Water pumps design level.

Barrier Analysis

N/A

ESCALATION CRITERIA

This event will be escalated based on damage to plant safety systems (Service Water pumps, Diesels, Cooling Water pumps, etc.) in the High Winds section, Heat Removal Capabilities, loss of Fission Product Barriers, or abnormal Radiological Releases/Occurrences section.

DISCUSSION

River level less than 80.0' (-9.0'MSL) is indication of approaching loss of the Ultimate Heat Sink. This EAL threshold is set to correspond to river conditions that provide adequate early notification of approaching loss of the Ultimate Heat Sink that could jeopardize the level of safety of the plant due to potential loss of Service Water Intake (Ultimate Heat Sink).

The National Weather Service can be contacted for further information about existing or projected Adverse Weather Conditions:

Mount Holly (609) 261-6604
Mount Holly (609) 261-6602

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DEVIATION

None

REFERENCES

NUMARC NESP-007, HU1.7
OP-AB.CW-0001 (Q)
S1.OP-AB.ZZ-0001 (Q)
S2.OP-AB.ZZ-0001 (Q)
HC Operability Determination 961001148
SGS UFSAR, Section 2.4.11.2, Figure 3.4-1
HCGS UFSAR, Section 2.4, Figure 2.4-3