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ADDI

SALEM GENERATING STATION  
EVENT CLASSIFICATION GUIDE TECHNICAL BASIS  
December 18, 2001

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CHANGE PAGES FOR  
REVISION #10

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 #10 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 Remove and recycle the outdated material listed below.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		
<u>Pages</u>	<u>Description</u>	<u>Rev.</u>	<u>Pages</u>	<u>Description</u>	<u>Rev.</u>
ALL	TOC	10	ALL	TOC	09
All	EAL Section 5.1	03	All	EAL Section 5.1	02
All	EAL Section 8.4	01	All	EAL Section 8.4	00
All	EAL Section 9.4	02	All	EAL Section 9.4	01

**SALEM ECG TECHNICAL BASIS**  
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SALEM ECG TECHNICAL BASIS  
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**REVISION SUMMARY**

Biennial Review Performed: Yes \_\_\_\_\_ No X

TOC has Revision Summary added.

5.1.4 Removed the statement "*If actions taken in EOP-FRSM-1 are ineffective, further CFST monitoring is utilization....*" To eliminate the confusion that this statement can be used to classify later.

8.4.2 Removed the statement "*and placing all Lockout Switches on RP4 in the Valve Operable Position*" to reflect new remote shutdown procedure.

9.4.1.a,b&c Added "*Salem County Office of Emergency Management will notify the fire departments of offsite release concerns from both sides of the river*" to explain who will notify local fire departments. This was a result of recommended actions from NRC Security Advisory.

9.4.1.b&c Added clarifying information concerning small or incidental releases not requiring classification and better definition of access restrictions and personnel injuries related to toxic gas releases. The clarifying information bring the use of this EAL in better alignment with NEI EAL guidance 99-01. This revision was determined not to constitute a decrease in effectiveness of the emergency plan. Specific new basis information included in this revision follows:

*Classification under this EAL is not warranted for small or incidental releases. This EAL assumes an uncontrolled process that has the potential to affect plant operations or personnel safety.*

*A Uncontrolled Toxic Gas release is considered to be IMPEDING normal plant operations if the release results in Access Restrictions or Personnel Injuries.*

*Access Restrictions are those actions that are put-in-place or left-in-place (evacuation of an area, no entry into an area, SCBA required for entry into an area), after an initial assessment of the release conditions is performed by the fire department. Access restrictions do not include short-term precautionary actions put in place prior to or during the initial assessment by the fire department.*

- If the fire department's initial assessment results in implementation of or continuation of access restrictions, then the UE should be declared.*
- If the fire department's initial assessment results in no access restrictions then the event does not warrant UE declaration.*

*This EAL does not require a detailed assessment or quantification. If the initial assessment is delayed, cannot be completed or is inconclusive, and access restrictions are in place then classification of this event should be promptly made.*

*Personnel Injuries are considered any conditions that resulted for the uncontrolled toxic gas release that require transport of an individual(s) to the hospital for further evaluation or treatment. Injury to an individual for a small or incidental gas release (not an uncontrolled toxic gas release) is not included under this EAL. For example, an inhalation injury from a small or incidental release (small amount of localized fuming when a system is opened for maintenance) does not warrant classification under this EAL, however, an injury sustained when a leaking chemical pipe fills an area with hazardous fumes and a worker(s) is overcome and requires hospital evaluation/treatment, would warrant classification under this EAL."*

**SIGNATURE PAGE**

Prepared By: Craig Banner 12/3/01  
(If Editorial Revisions Only, Last Approved Revision) Date

Section/Attachments Revised: Section 9.4, 8.4, 5.1 12/3/01  
(List Non Editorial Only - Section/Attachments) Date

Reviewed By: Raymond Reece (R. Reece) 12/04/2001  
Station Qualified Reviewer Date

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Department Manager Date

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Manager - Licensing Date  
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NA NA  
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NA NA  
Date Date

Effective Date of this Revision: 12/18/01  
Date

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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. 03

## 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. 03

## 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.

EAL - 5.1.4  
Rev. 03

## 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.

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

**8.0 System Malfunctions**

**8.4 Control Room Evacuation**

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**ALERT - 8.4.2**

**IC** Control Room Evacuation has been Initiated

**EAL**

Control Room Evacuation has been initiated

**MODE - All**

**BASIS**

Control Room evacuation represents a serious situation since the degree of plant control at the remote shutdown locations is not as complete as it would be from the Control Room. The intent of this EAL is to declare an Alert when the determination to evacuate the Control Room has been made based on environmental/personnel safety concerns, and physical process of evacuating the Control Room has commenced.

**Barrier Analysis**

None

**ESCALATION CRITERIA**

This event will escalate to a Site Area Emergency if Plant control cannot be established within 15 minutes from outside the Control Room.

**DISCUSSION**

Control Room evacuation requires establishment of plant control from outside the Control Room (local control and Hot Shutdown Panels) and support from the Technical Support Center (TSC) and/or the Emergency Operations Facility (EOF) as necessary.

The establishment of remote system control will bypass many protective trips and interlocks. In addition, much of the instrumentation and assessment tools available in the Control Room will not be available. Operator actions upon deciding that the Control Room should be evacuated include tripping the Reactor and Main Turbine, starting Auxiliary Feed Water Pumps and initiating Main Steam Line Isolation.

#### **DEVIATION**

None

#### **REFERENCES**

NUMARC NESP-007, HA5  
OP-AB.CR-0001 (Q)  
OP-AB.CR-0002 (Q)

## 8.0 System Malfunctions

### 8.4 Control Room Evacuation

#### SITE AREA EMERGENCY - 8.4.3

**IC** Control Room Evacuation has been Initiated and Plant Control Cannot Be Established

**EAL**

Control Room Evacuation has been initiated

**AND**

**Control of the plant CANNOT be established from outside the Control Room within 15 minutes**

**MODE** - All

**BASIS**

Transfer of safety system control has not been performed in an expeditious manner and it is unknown if any damage has occurred to the fission product barriers. During this transitional period the function of monitoring and/or controlling parameters necessary for plant safety may not be occurring and as a result there may be a threat to plant safety. The **15 minute** time limit for transfer of control is based on a reasonable time period for personnel to leave the control room, arrive at the hot shutdown areas, and reestablish plant control to preclude core uncover and/or core damage. The term "**control of the plant**" will require OS judgment in deciding whether sufficient control has been established to maintain core cooling based upon initial reports of equipment status from Hot Shutdown Panel 213.

**Barrier Analysis**

None

**ESCALATION CRITERIA**

This event will escalate based upon loss of Fission Product Barriers or abnormal radiological releases.

EAL - 8.4.3  
Rev. 01

**DISCUSSION**

This EAL is designed to address the conditions where due to environmental/personnel safety concerns Control Room evacuation is required. Additionally, Plant control cannot be established from outside the Control Room within 15 minutes.

**DEVIATION**

None

**REFERENCES**

NUMARC NESP-007, HS2  
OP-AB.CR-0001 (Q)  
OP-AB.CR-0002 (Q)

9.0 Hazards - Internal/External

9.4 Toxic/ Flammable Gases

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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 EVACUATE non-essential personnel due to an Offsite **Toxic Gas** release

AND

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 OS 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. Salem County Office of Emergency Management will notify the fire departments of offsite release concerns from both sides of the river.

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. Classification under this EAL is **not warranted** for small or incidental releases. This EAL assumes an uncontrolled process that has the potential to affect plant operations or personnel safety.

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 cannot be isolated/confined to a single compartment or area, or are not as the result of a designed plant safety feature.

EAL - 9.4.1.b  
Rev. 02

For example, an **uncontrolled release** of chlorine/ammonia into the Turbine Building that requires evacuation 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. An inhalation injury from a small or incidental release (small amount of localized fuming when a system is opened for maintenance) does not warrant classification under this EAL.

A **Uncontrolled Toxic Gas** release is considered to be **IMPEDING** normal plant operations if the release results in **Access Restrictions** or **Personnel Injuries**.

**Access Restrictions** are those actions that are put-in-place or left-in-place (evacuation of an area, no entry into an area, SCBA required for entry into an area), **after an initial assessment** of the release conditions is performed by the fire department. Access restrictions do not include short-term precautionary actions put in place prior to or during the initial assessment by the fire department.

- If the fire department's initial assessment results in implementation of or continuation of access restrictions, then the UE should be declared.
- If the fire department's initial assessment results in no access restrictions then the event does not warrant UE declaration.

This EAL does not require a detailed assessment or quantification. If the initial assessment is delayed, cannot be completed or is inconclusive, and access restrictions are in place then classification of this event should be promptly made.

**Personnel Injuries** are considered any conditions that resulted for the uncontrolled toxic gas release that require transport of an individual(s) to the hospital for further evaluation or treatment. Injury to an individual for a small or incidental gas release (not an uncontrolled toxic gas release) is not included under this EAL. For example, an inhalation injury from a small or incidental release (small amount of localized fuming when a system is opened for maintenance) does not warrant classification under this EAL, however, an injury sustained when a leaking chemical pipe fills an area with hazardous fumes and a worker(s) is overcome and requires hospital evaluation/treatment, would warrant classification under this EAL.

### **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 and safe shutdown could be impeded.

**DISCUSSION**

This EAL should not be construed to include confined spaces that must be ventilated prior to entry or situations involving The fire department personnel who are using respiratory equipment during the performance of their duties unless it also affects personnel not involved with The fire department 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. Salem County Office of Emergency Management will notify the fire departments of offsite release concerns from both sides of the river.

**DEVIATION**

None

**REFERENCES**

NUMARC NESP-007, HU3.1  
NEI 99-01, HU3 - Draft  
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 resulting in Access Restrictions. **Access Restrictions** are those actions that are put-in-place or left-in-place

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(evacuation of an area, no entry into an area, SCBA required for entry into an area), **after an initial assessment** of the release conditions is performed by the fire department. Access restrictions do not include short-term precautionary actions put in place prior to or during the initial assessment by the fire department.

- If fire department's initial assessment results in implementation or continuation of access restrictions, then the UE should be declared.
- If fire department's initial assessment results in no access restrictions required, then the event does not warrant UE declaration.

This EAL does not require a detailed assessment or quantification. If the initial assessment is delayed, cannot be completed or is inconclusive, and access restrictions are in place then classification of this event should be promptly made.

**Personnel Injuries** are considered any conditions that resulted for the **Uncontrolled Flammable Gas** release that require transport of an individual(s) to the hospital for further evaluation or treatment.

### **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. Salem County Office of Emergency Management will notify the fire department of offsite release concerns from both sides of the river.

### **DEVIATION**

None

### **REFERENCES**

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

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## 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

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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 activities. 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

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**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

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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)

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