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**SALEM GENERATING STATION**  
**EVENT CLASSIFICATION GUIDE TECHNICAL BASIS .**  
**October 08, 2003**

**CHANGE PAGES FOR**  
**REVISION #18**

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 #18 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 Remove and recycle the outdated material listed below.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	18	All	TOC	17
All	Section 6.4	01	All	Section 6.4	00

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

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

Updated EAL Basis for 6.4.2.a and 6.4.2.b to correct reference to EALs for other conditions.

**SIGNATURE PAGE**

Prepared By: Craig Banner 09/17/03  
Date

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EP Manager Date

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Manager - Quality Assurance  
(If Applicable) Date

**SORC Review and Station Approvals**

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Mtg. No. Salem Chairman	Vice President - Nuclear Operations
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Date	Date

Effective Date of this Revision: *af*  
~~10/01/03~~ 10/8/03  
Date

## 6.0 Radiological Releases/Occurrences

### 6.4 Irradiated Fuel Event

#### UNUSUAL EVENT - 6.4.1.a

IC **Unplanned increase in Plant Radiation**

EAL

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An **uncontrolled** level drop in the Refueling Cavity as indicated by EITHER one of the following:

- Visual observation
- RVLIS - Refueling Mode

MODE - 6

BASIS

This EAL condition indicates a possible failure of the Refueling Cavity Seal or RHR System that results in inventory loss from the Refueling Cavity when flooded. Coverage of these events is appropriate due to the potential for higher doses to plant staff. These events have a long lead time relative to potential for radiological release outside the site boundary, thus the impact to public health and safety is very low. Classification as an Unusual Event is warranted as a precursor to a more serious event. **Uncontrolled** means that the level drop cannot be terminated, or level cannot be maintained by operator action.

**Barrier Analysis**

N/A

**ESCALATION CRITERIA**

This event will be escalated to an Alert as a result of uncover of a fuel assembly and/or indication of high radiation levels on the refueling floor.

**DISCUSSION**

Design of the Refueling Cavity is such that a liner failure in these volumes is unlikely; however, should such a failure occur, it would come under this EAL. If uncover of fuel elements occur or

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if there is indication of high radiation levels on the refuel floor then the event will be classified as an Alert.

During refueling operations the Reactor Vessel and Refuel Cavity are flooded. During fuel handling operations, the Fuel Transfer Tube will connect the Reactor Cavity and the Spent Fuel Pool. An unexplained lowering of Refuel Cavity level or Spent Fuel Pool level can be an indication that these volumes are draining. A drop in Reactor Cavity and Spent Fuel Pool level may result in a Spent Fuel Pool low level alarm. This alarm would be validated by visual observation of lowering level in the Refuel Cavity/Spent Fuel Pool.

#### **DEVIATION**

NUMARC states that this EAL will be applicable in all modes of operation. In modes other than Mode 6 the Reactor Vessel head will be fully tensioned and there will be no interconnection between the Refueling Cavity and the Spent Fuel Pool. In other modes, a loss of Reactor Vessel inventory is addressed in Section 3. Uncontrolled loss of water level in the Spent Fuel Pool, however, is classified under EAL 6.4.1.b in all modes of operation.

#### **REFERENCES**

NUMARC NESP-007, AU2.1  
OP-AR.ZZ-0003(Q) OHA-C35  
OP-AB.FUEL-0002(Q)



## 6.0 Radiological Releases/Occurrences

### 6.4 Irradiated Fuel Event

#### UNUSUAL EVENT - 6.4.1.b

**IC**    **Unplanned increase in Plant Radiation**

**EAL**

**Valid SFP Low Level alarm - OHA C-35**

**AND**

**Visual observation of an uncontrolled level drop in the Spent Fuel Pool**

**MODE - All**

**BASIS**

These EAL conditions indicate a possible failure of the Spent Fuel Pool Cooling System that results in inventory loss from the Spent Fuel Pool. This EAL also works in conjunction with the loss of Refueling Cavity EAL for Mode 6 operations, with the Spent Fuel Pool and Refueling Cavity connected via the Fuel Transfer Canal.

Coverage of this event is appropriate due to the potential for higher doses to plant staff. This event has a long lead time relative to potential for radiological release outside the site boundary, thus the impact to public health and safety is very low. Classification as an Unusual Event is warranted as a precursor to a more serious event. **Uncontrolled** means that the level drop cannot be terminated, or level cannot be maintained by operator action.

**Barrier Analysis**

N/A

#### **ESCALATION CRITERIA**

Emergency Classification will escalate to an Alert as a result of uncovering of a irradiated fuel as indicated by high radiation levels in the Fuel Handling Building.

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**DISCUSSION**

Design of the Spent Fuel Pool (SFP) is such that a liner failure in this volume is unlikely; however, should such a failure occur, it would be classified under this EAL. Lowering of water level in the SFP to below the level of the spent fuel bundles may result in a rise in the airborne contamination level in the Fuel Handling Building. If uncover of fuel elements occurs or if there is indication of high radiation levels in the Fuel Handling Building, then the event will be classified as an Alert.

This alarm would be validated by visual observation of lowering level in the Spent Fuel Pool. The added requirement for an uncontrolled drop in SFP level with a low level alarm is included to allow normal makeup to recover level for minor level deviations due to evaporation losses, etc.

**DEVIATION**

None

**REFERENCES**

NUMARC NESP-007, AU2.2  
OP-AR.ZZ-0003(Q) OHA-C35  
OP-AB.FUEL-0002(Q)

## 6.0 Radiological Releases/Occurrences

### 6.4 Irradiated Fuel Event

#### ALERT - 6.4.2.a

**IC** Major Damage to Irradiated Fuel or Loss of Water Level that has or will result in the Uncovering of Irradiated Fuel Outside the Reactor Vessel

#### EAL

**Major Damage to Irradiated Fuel reported in the Fuel Handling Bldg.**

#### AND

**Valid High Alarm is received on EITHER one of the following RMS channels:**

- R5
- R32A

#### AND

**Valid High Alarm received from EITHER one of the following RMS channels:**

- R41
- R45

#### MODE - All

#### BASIS

**Major Damage** to an irradiated fuel bundle that results in a High Fuel Handling Building Radiation Monitor alarm coincident with a Plant Vent Effluent Process Radiation Monitor alarm warrants declaration of an Alert, due to the potential for an offsite release exceeding the Technical Specification limit. The intent of this EAL is to classify those events that result in the actual release of fission products from an irradiated Fuel Bundle, due to physical damage. Events that result in higher radiation levels due to shine, as a result of lowered shielding, but do not involve a release of fission products should not be classified under this EAL, but should be classified EAL 6.4.2.c, when those conditions exist.

**Major Damage** is defined as physical damage to an Irradiated Fuel Bundle that results from either dropping or physical contact with other components, such that the magnitude of the

damage specifically results in actuation of an Area Radiation Alarm. Valid is defined as the High alarm occurring as a result of the damage to the irradiated fuel bundle.

#### Barrier Analysis

N/A

#### ESCALATION CRITERIA

Emergency Classification will escalate to a Site Area Emergency when loss of control of radioactive materials causes significant offsite doses.

#### DISCUSSION

The Fuel Handling Building Area Monitors provide an early warning of developing problems which may be related to a damaged fuel bundle. The Plant Vent Exhaust Rad Monitors are Process Monitors and are designed to detect a release of Fission Products. Hence, they are included as part of the EAL threshold, to confirm the magnitude of damage to an irradiated fuel bundle.

#### DEVIATION

None

#### REFERENCES

NUMARC NESP-007, AA2.1  
OP-AR.ZZ-0003(Q) OHA-C35  
OP-AB.FUEL-0002(Q)  
NUREG/CR-4982  
NRC Information Notice no. 90-08  
10CFR50

## 6.0 Radiological Releases/Occurrences

### 6.4 Irradiated Fuel Event

#### ALERT - 6.4.2.b

**IC** Major Damage to Irradiated Fuel or Loss of Water Level that has or will result in the Uncovering of Irradiated Fuel Outside the Reactor Vessel

**EAL**

**Major Damage to Irradiated Fuel reported in the Containment**

**AND**

**Valid High Alarm received on ANY one of the following RMS channels:**

- R2
- R10A
- R10B

**AND**

**Valid High Alarm received from ANY one of the following RMS channels:**

- R11A
- R12A
- R12B

**MODE - All**

**BASIS**

**Major Damage** to an irradiated fuel bundle that result in a High Containment Area Radiation Monitor alarm coincident with a Containment Process Radiation Monitors alarm warrants declaration of an Alert, due to the potential for an offsite release exceeding the Technical Specification limit. The intent of this EAL is to classify those events that result in the potential release of fission products from an irradiated Fuel Bundle, due to physical damage. Events that result in higher radiation levels due to shine, as a result of lowered shielding, but do not involve a release of fission products should not be classified under this EAL, but should be classified EAL 6.4.2.c, when those conditions exist.

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**Major Damage** is defined as physical damage to an Irradiated Fuel Bundle that results from either dropping or physical contact with other components, such that the magnitude of the damage specifically results in actuation of an Area Radiation Alarm. **Valid** is defined as the High alarm occurring as a result of the damage to the irradiated fuel bundle.

**Barrier Analysis**

N/A

**ESCALATION CRITERIA**

Emergency Classification will escalate to a Site Area Emergency when loss of control of radioactive materials causes significant offsite doses.

**DISCUSSION**

The Containment Area Monitors provide an early warning of developing problems which may be related to a damaged fuel bundle. The Containment Rad Monitors are Process Monitors and are designed to detect a release of Fission Products. Hence, they are included as part of the EAL threshold, to confirm the magnitude of damage to an irradiated fuel bundle.

**DEVIATION**

None

**REFERENCES**

NUMARC NESP-007, AA2.1  
OP-AR.ZZ-0003(Q) OHA-C35  
OP-AB.FUEL-0002(Q)  
NUREG/CR-4982  
NRC Information Notice no. 90-08  
EPA 400-R-92-001, Manual of Protective Action Guide and Protective Actions for Nuclear Incidents

## 6.0 Radiological Releases/Occurrences

### 6.4 Irradiated Fuel Event

#### ALERT - 6.4.2.c/6.4.2.d

**IC** Major Damage to Irradiated Fuel or Loss of Water Level that has or will result in the Uncovering of Irradiated Fuel Outside the Reactor Vessel

#### EAL

EITHER one of the following:

- **Unplanned** rise on ANY one of the following Area Rad Monitors or by general area rad survey indicates  $\geq 2000$  mRem/hr
  - R2
  - R5
  - R9
  - R32A
- Visual observation of Irradiated Fuel uncovered

#### MODE - All

#### BASIS

This EAL indicates a possible failure of the Refueling Cavity Seal, RHR System, or Spent Fuel Pool Cooling System that results in inventory loss from the Refueling Cavity when flooded or the Spent Fuel Pool. Design of the Refueling Cavity and Spent Fuel Pool is such that a liner failure in these volumes is unlikely; however, should such a failure occur, it would come under this EAL. Lowering of water level in the Spent Fuel Pool to such a value as to cause Dose Rates to increase to this value will result in evacuation of the local areas. Uncovery of irradiated fuel elements can lead to their fuel clad failure due to loss of cooling.

The term "**unplanned**" is defined as those events which are not associated with a pre-planned evolutions such that radiation levels are increasing for reasons which cannot be immediately explained. The EAL addresses radiation levels which would impede operation of systems required to continue efforts to stop the loss of Refueling water level. Radiation levels could be indicated by ARM or radiological survey. The Dose Rate of 2000 mRem/hr was chosen as a threshold based upon NAP-24 Administrative Dose Limits and Extension criteria which has Senior Radiation Protection Supervisor approval required prior to exceeding 2000 mRem/yr.

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This value is low enough to ensure classification of an Alert before personnel access is severely hampered and high enough to allow any unplanned rise in normal radiation level, by a factor of 1000, to be classified as an Unusual Event per EAL 6.3.1.

Visual observation of irradiated fuel uncovered will result in onsite dose levels changing significantly.

The Area Radiation Monitors included in this EAL are:

- R2 Containment, General Area Low
- R5 Fuel Handling Building Area Fuel Pool
- R9 Fuel Handling Building Fuel Storage Area
- R32A Spent Fuel Handling Crane, Area Monitor

#### **Barrier Analysis**

N/A

#### **ESCALATION CRITERIA**

This event will be escalated to a Site Area Emergency when loss of control of radioactive materials causes significant offsite doses.

#### **DISCUSSION**

It is understood that a drop in Refueling Cavity water level will cause Dose Rates to rise due to the uncovering of irradiated Reactor components other than a spent fuel assembly. However, Dose Rates in excess of 2 Rem/hr indicate a loss of level such that recovery options may be limited and thus an Alert declaration is warranted.

#### **DEVIATION**

None

#### **REFERENCES**

NUMARC NESP-007, AA2.3 and AA2.4  
OP-AR.ZZ-0003(Q) OHA-C35  
OP-AB.FUEL-0002(Q)  
NUREG/CR-4982  
NRC Information Notice no. 90-08