

**PSEG NUCLEAR L.L.C.  
SALEM/OPERATIONS**

**SC.OP-AB.CR-0003(Q) REV. 6**

**CONTROL ROOM HABITABILITY**

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- ◆ Biennial Review Performed: Yes \_\_\_\_ No \_\_\_\_ NA ✓
  - ◆ DCP Packages and Affected Document Numbers incorporated into this revision: None
  - ◆ The following OTSCs were incorporated into this revision: None
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**REVISION SUMMARY:**

- ◆ Step 3.5, changed to read; “EVALUATE the use of Self Contained Breathing Apparatus (SCBA) based on current information and Control Room habitability.” Updated TBD Step 2.4.E to reflect change. [70095766]
- ◆ Step 3.10, changed to read; “EVALUATE the continued use of Self Contained Breathing Apparatus (SCBA) based on current information and Control Room habitability.” Updated TBD Step 2.4.I to reflect change. [70095766]
- ◆ Steps 3.19 and 3.23, changed “FIRE OUTSIDE CONTROL AREA” to “FIRE INSIDE CONTROL AREA”. Procedure enhancement as it aligns with Steps 3.18 and 3.22 which asks “Is the fire in Unit 1 (Unit 2) Control Room Area?” [70103546 / 70108565]

**IMPLEMENTATION REQUIREMENTS**

**Effective Date: July 1, 2010**

**None**

## CONTROL ROOM HABITABILITY

### 1.0 ENTRY CONDITIONS

Date: \_\_\_\_\_ Time: \_\_\_\_\_

- 1.1 Any indication of a toxic gas release or potential release that could affect Control Room habitability, via verbal notification or irritating odor in the Control Room.
- 1.2 Smoke intrusion as a result of a fire inside or outside the Control Room.

### 2.0 IMMEDIATE ACTIONS

None

### 3.0 SUBSEQUENT ACTIONS

\_\_\_ 3.1 **DIRECT** the CRE Boundary Monitor(s) to implement the mitigating actions (preplanned responses) and close all CRE boundary breach(es) IAW SC.OP-SO.CAV-0001(Q), Control Room Envelope Breach.

3.2 Does a toxic gas problem exist?

\_\_\_ YES    \_\_\_ NO ———>    GO TO Step 3.16

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\_\_\_ 3.3 **ISOLATE** the Control Room Envelope (CRE) from the outside source of toxic gas as follows:

\_\_\_ ♦ **PLACE** Unit 1 Control Room Ventilation System in the FIRE OUTSIDE CONTROL AREA Mode, IAW S1.OP-SO.CAV-0001(Q), Control Room Ventilation Operation.

\_\_\_ ♦ **PLACE** the Unit 2 Control Room Ventilation System in the FIRE OUTSIDE CONTROL AREA Mode, IAW S2.OP-SO.CAV-0001(Q), Control Room Ventilation Operation.

\_\_\_ 3.4 When information becomes available, **ANNOUNCE** over the P.A. System as applicable:

“Attention all personnel, a potentially toxic release has occurred at (state location). All unnecessary personnel stand clear.”

\_\_\_ 3.5 **EVALUATE** the use of Self Contained Breathing Apparatus (SCBA) based on current information and Control Room habitability.

**NOTES**

- ◆ IF \_\_ the toxic gas is external (outside) to the Salem Buildings,  
THEN the Turbine and Auxiliary Building Ventilation should be shutdown to prevent possible intrusion of the toxic gas.
- ◆ IF \_\_ the toxic gas is internal to Salem Buildings,  
THEN the Turbine and Auxiliary Building Ventilation should be left in its normal configuration to provide a “Feed and Bleed” means of expelling the toxic gas.

3.6 Is the toxic gas external (outside) the Salem Buildings?

\_\_ YES      \_\_ NO ———>      GO TO Step 3.9

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\_\_ 3.7 **SHUTDOWN** the Turbine Building Ventilation System  
IAW S1.OP-SO.TBV-0001(Q) AND S2.OP-SO.TBV-0001(Q),  
Turbine Building Ventilation Operation.

\_\_ 3.8 **SHUTDOWN** Auxiliary Building Ventilation System:

- \_\_ ◆ **STOP** all Aux Bldg Supply Fans
- \_\_ ◆ **STOP** all Aux Bldg Exhaust Fans
- \_\_ ◆ **REFER** to T/S 3.7.7.1 (Unit 1) & T/S 3.7.7 (Unit 2)

\_\_ 3.9 **NOTIFY** Fire Protection of the following:

- ◆ **COMMUNICATE** the location and nature of toxic release, if known, and that the Control Room Ventilation System has been placed in the FIRE OUTSIDE CONTROL AREA Mode (recirculation) due to evidence of a toxic release,
- ◆ **IMPLEMENT** NC.FP-EO.ZZ-0002(Q), Hazardous Materials Response,
- ◆ Periodically **MONITOR** the Control Room Envelope (CRE) for Control Room habitability.

\_\_ 3.10 **EVALUATE** the continued use of Self Contained Breathing Apparatus (SCBA) based on current information and Control Room habitability.

- \_\_\_ 3.11 **NOTIFY** Hope Creek Control Room that a toxic release is evident.
- \_\_\_ 3.12 **NOTIFY** the SM/CRS to refer to the ECG for notification requirements.
- \_\_\_ 3.13 IF AT ANY TIME Control Room habitability is challenged,  
AND an EACS Intake is clear of the affected area,  
THEN INITIATE ACCIDENT PRESSURIZED on the unit nearest to the toxic gas release  
 IAW S1.OP-SO.CAV-0001(Q) OR S2.OP-SO.CAV-0001(Q).

**NOTE**

SCBA may be used to provide a longer stay time in the Control Room.

- \_\_\_ 3.14 IF the air quality does NOT improve in the Control Room  
THEN EVALUATE Auxiliary Building (84') habitability,  
AND EVACUATE the Control Rooms, as necessary,  
 IAW S1.OP-AB.CR-0001(Q) AND S2.OP-AB.CR-0001(Q), Control Room Evacuation.
- \_\_\_ 3.15 When safe air quality, as determined by Fire Protection, for Control Room habitability  
 can be improved by returning to NORMAL Mode Operation:
  - \_\_\_ 3.15.1 **RETURN** Control Area Ventilation System to NORMAL Mode Operation  
 IAW S1.OP-SO.CAV-0001(Q) AND S2.OP-SO.CAV-0001(Q),  
 Control Room Ventilation Operation.
  - \_\_\_ 3.15.2 **INITIATE** a NOTF to perform charcoal bank sampling due to  
 possible loss of efficiency.

**NOTE**

Control Room Area is defined as the Control Rooms, Electrical Equipment Rooms, Relay Rooms, DC Battery Rooms and Ceiling of 460/230V Switchgear Rooms.

3.16 Is the fire outside the Control Room Area?

\_\_\_ YES \_\_\_ NO ———> GO TO Step 3.18

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\_\_\_ 3.17 **PERFORM** the following:

\_\_\_ 3.17.1 **PLACE** both Unit 1 AND Unit 2 Control Room Ventilation System in the FIRE OUTSIDE CONTROL AREA mode.

\_\_\_ 3.17.2 **NOTIFY** Fire Protection.

\_\_\_ 3.17.3 **NOTIFY** the SM/CRS to refer to the ECG for classification.

\_\_\_ 3.17.4 **NOTIFY** Hope Creek.

\_\_\_ 3.17.5 **GO TO** Step 3.26.

3.18 Is the fire in Unit 1 Control Room Area?

\_\_\_ YES \_\_\_ NO ———> GO TO Step 3.22

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\_\_\_ 3.19 **PLACE** both Unit 1 AND Unit 2 Control Room Ventilation System in the FIRE INSIDE CONTROL AREA mode.

\_\_\_ 3.20 When directed by the Shift Manager,  
**INITIATE** S1.OP-AB.CR-0002(Q), Control Room Evacuation Due To Fire in Control Room, Relay Room, 460/230V Switchgear Room or 4KV Switchgear Room AND Unit 2 personnel **DON** Self Contained Breathing Apparatus (SCBA).

\_\_\_ 3.21 IF smoke challenges the habitability of the Unit 2 Control Room Area,  
THEN Unit 2 **INITIATE** S2.OP-AB.CR-0001(Q), Control Room Evacuation.

3.22 Is the fire in Unit 2 Control Room Area?

\_\_\_ YES    \_\_\_ NO ———>    GO TO Step 3.26

Time



\_\_\_ 3.23 **PLACE** both Unit 1 AND Unit 2 Control Room Ventilation System in the FIRE INSIDE CONTROL AREA mode.

\_\_\_ 3.24 When directed by the Shift Manager, **INITIATE** S2.OP-AB.CR-0002(Q), Control Room Evacuation Due To Fire in Control Room, Relay Room, 460/230V Switchgear Room or 4KV Switchgear Room AND Unit 1 personnel **DON** Self Contained Breathing Apparatus (SCBA).

\_\_\_ 3.25 IF smoke challenges the habitability of the Unit 1 Control Room Area, THEN **INITIATE** S1.OP-AB.CR-0001(Q), Control Room Evacuation.

\_\_\_ 3.26 When it has been determined that Control Room habitability can be improved by returning to the normal ventilation lineup:

\_\_\_ 3.26.1 **RETURN** the Control Area Ventilation System to NORMAL Mode Operation IAW S1.OP-SO.CAV-0001(Q) AND S2.OP-SO.CAV-0001(Q), Control Room Ventilation Operation.

\_\_\_ 3.26.2 **INITIATE** a NOTF to perform charcoal bank sampling due to possible loss of efficiency.

4.0 **COMPLETION AND REVIEW**

- \_\_\_ 4.1 **CIRCLE** the Entry Condition in Section 1.0,  
**OR EXPLAIN** the Entry Condition in Comments Section of Attachment 1.
- \_\_\_ 4.2 **COMPLETE** Attachment 1, Sections 1.0 and 2.0, and  
**FORWARD** this procedure to SM/CRS for review and approval.
- \_\_\_ 4.3 SM/CRS:
  - \_\_\_ 4.3.1 **REVIEW** this procedure with Attachment 1 for completeness and accuracy.
  - \_\_\_ 4.3.2 **COMPLETE** Attachment 1, Section 3.0.
  - \_\_\_ 4.3.3 **FORWARD** completed procedure to Operations Staff.

**END OF PROCEDURE**

**ATTACHMENT 1**  
**(Page 1 of 2)**

## COMPLETION SIGN-OFF SHEET

1.0 **COMMENTS:**

(Include procedure deficiencies and corrective actions. Attach additional pages as necessary.)

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.



ATTACHMENT 2  
(Page 2 of 2)

COMPLETION SIGN-OFF SHEET

2.0 SIGNATURES:

Print	Initials	Signature	Date
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3.0 SM/CRS FINAL REVIEW AND APPROVAL:

This procedure with Attachment 1 is reviewed for completeness and accuracy.  
Entry conditions and all deficiencies, including corrective actions, are clearly recorded in the  
COMMENTS Section above.

Signature: \_\_\_\_\_ Date: \_\_\_\_\_  
SM/CRS

## TOXIC GAS RELEASE TECHNICAL BASES DOCUMENT

### 1.0 REFERENCES

#### 1.1 Technical Documents:

- A. Salem Generating Station Updated Final Safety Analysis Report:
  - ◆ Section 2.2.3.2, Hazardous Chemicals - Onsite
  - ◆ Section 2.2.3.3, Hazardous Chemicals - Offsite
  - ◆ Section 3.11, Environmental Design Of Mechanical And Electrical Equipment
  - ◆ Section 6.4, Habitability Systems
  - ◆ Section 9.4.1, Control Area Air Conditioning System
  - ◆ Section 12.1, Shielding
- B. Technical Specifications:
  - ◆ 3.7.6.1, Control Room Emergency Air Conditioning System (Unit 1 - CREACS)
  - ◆ 3.7.6, Control Room Emergency Air Conditioning System (Unit 2 - CREACS)
  - ◆ 6.18 Control Room Habitability Program (Unit 1 - T/S Amendment 286)
  - ◆ 6.17 Control Room Habitability Program (Unit 2 - T/S Amendment 269)
- C. ECG Section 8, Non-radioactive leak/release
- D. Engineering Evaluation, A-O-ZZ-SEE-0659,  
Use of 15 wt% Ammonium Hydroxide at the Salem Units 1 & 2.
- E. Nuclear Department Letter SCI-92-0231, dated April 2, 1992.

#### 1.2 Procedures

- A. SC.OP-SO.CAV-0001(Q), Control Room Envelope Breach
- B. S1.OP-SO.CAV-0001(Q), Control Room Ventilation Operation
- C. S2.OP-SO.CAV-0001(Q), Control Room Ventilation Operation
- D. S1.OP-SO.ABV-0001(Q), Auxiliary Building Ventilation
- E. S2.OP-SO.ABV-0001(Q), Auxiliary Building Ventilation
- F. S1.OP-SO.TBV-0001(Q), Turbine Building Ventilation
- G. S2.OP-SO.TBV-0001(Q), Turbine Building Ventilation
- H. S1.OP-AB.CR-0001(Q), Control Room Evacuation
- I. S2.OP-AB.CR-0001(Q), Control Room Evacuation
- J. S1.OP-AB.CR-0002(Q), Control Room Evacuation Due To Fire in  
Control Room, Relay Room, 460/230V Switchgear Room or 4KV Switchgear Room
- K. S2.OP-AB.CR-0002(Q), Control Room Evacuation Due To Fire in  
Control Room, Relay Room, 460/230V Switchgear Room or 4KV Switchgear Room

#### 1.3 Conformance Documents

- A. C0477, LER 272/91-038-01, Control Room Habitability Concern  
From Postulated Ammonium Hydroxide Release

## 2.0 DISCUSSION

- 2.1 This procedure is intended to provide the direction necessary to ensure Control Room habitability in the event of a toxic gas release or smoke intrusion.

This discussion is intended to provide information concerning the bases for directed actions and the logic behind the procedure flowpath. It is NOT intended to provide direction in addition to the procedure.

- 2.2 Entry Conditions - Entry into this procedure is based on any indication that a toxic gas release may have occurred or potential release which could affect Control Room habitability. This could be in the form of a verbal notification of a spill that may enter the ventilation intake or the smell of ammonia in the Control Room. According to the UFSAR, ammonia hydroxide is the only chemical on site of sufficient concentration to present a hazard to Control Room habitability. Detection of this chemical can only be determined by smell. A concentration of 5 ppm is considered sufficient for the average person to detect by smell. Entry into this procedure without the presence of ammonia odor in the Control Room is considered conservative and anticipatory since the condition of potentially affecting Control Room habitability is included.

Entry into this procedure also could be the result of smoke or potential smoke intrusion into the Control Room.

- 2.3 Immediate Actions - None

- 2.4 Subsequent Actions -

- A. Step 3.1 addresses occupant exposure to radiological, chemical, or smoke hazards in the Control Room Envelope (CRE). Directs the CRE Boundary Monitor(s) to implement the mitigating actions (preplanned responses) and close all CRE boundary breach(es) IAW SC.OP-SO.CAV-0001(Q), Control Room Envelope Breach.
- B. Step 3.2 determines whether a toxic gas or smoke is the problem.
- C. Step 3.3 places the Control Room ventilation system on recirc. Reg. Guide 1.78 states that the maximum concentration of ammonia that can be tolerated for two minutes without physical incapacitation of an average individual is 100 ppm. It further states that from time of detection (~5 ppm) to incapacitation should be greater than two minutes. The concentration (wt.%) of ammonia hydroxide stored onsite is 15%. This value was chosen in order to limit the concentration that would accumulate in the Control Room such that actions could be taken to place the ventilation system on recirc prior reaching the 100 ppm limit thereby stopping further rises in Control Room concentrations. Therefore, actions to place the Control Rooms on recirc were presented as an action to be completed as soon as possible to ensure isolation prior to achieving 100 ppm and to minimize the buildup in the Control Room.

## 2.4 Subsequent Actions (Continued)

- D. Step 3.4 is worded such that as information becomes available about the nature of the gas, a page announcement can be made to warn site personnel of the danger. If this procedure is entered because ammonia is smelled in the Control Room, this information will not be available until Fire Protection reports their findings to the Control Room.
- E. Step 3.5, evaluates the use of Self Contained Breathing Apparatus (SCBA) based on current information and Control Room habitability.
- F. Step 3.6 determines the location and source of the toxic gas.
- G. Steps 3.7 and 3.8 isolate the Aux and Turbine Bldg to prevent the toxic gas from entering or raising the existing concentration. The exhaust fans are shutdown along with the supply fans. If the supply fans were the only fans that were stopped, the exhaust fans would eventually create a differential pressure between the buildings and the outside environment that the toxic gas would still enter.
- H. Step 3.9 is a notification to Loss Prevention that the Control Rooms have taken protective action due to the possibility of a toxic gas release and if information is available, the nature of the chemical. Also, monitoring of the Control Rooms for habitability may be necessary for oxygen content since makeup air is not available in the recirc mode. Also, habitability based on ammonia concentration is expected to be evaluated and any necessary personnel protective actions taken. It should be noted, that the charcoal filters do not remove ammonia. Therefore, the concentration that exists in the Control Rooms at the time recirc is accomplished is expected to stay relatively constant until ventilation can be restored to normal. It is expected that Loss Prevention will then implement the necessary procedures to respond to the situation.
- I. Step 3.10 is a provisional action step that if the toxic concentration is within allowable limits the SCBA may be removed. Evaluates the continued use of Self Contained Breathing Apparatus (SCBA) based on current information and Control Room habitability.
- J. Step 3.11 ensures that Hope Creek is aware of the possibility that toxic gas may affect them.
- K. Step 3.12 informs the SM/CRS that the ECG applies.
- L. Step 3.13 provides instructions for alternate ventilation path if an EACS suction path is free of the toxic gas.
- M. Step 3.14 provides instructions for shutdown at Hot Shutdown Panel if the Control Room atmosphere becomes uninhabitable.

## 2.4 Subsequent Actions (Continued)

- N. Step 3.15 restores ventilation to normal once it is determined that doing so will improve habitability. This could be done at anytime during the response to the event since concentrations outside may be reduced to levels below the concentration trapped inside when recirculation is established. Additionally, although no adverse effects to the charcoal filters are expected, sampling of the banks is requested to confirm these expectations.
- O. Step 3.16 determines the location of fire.
- P. Step 3.17 provides actions to place the Control Room on recirc and was presented as soon as possible to ensure isolation to minimize buildup of smoke in the Control Room.
- Q. Step 3.18 determines which Control Area has the fire.
- R. Step 3.19 places the ventilation in mode with maximum air supply to Control Room.
- S. Step 3.20 details the procedure necessary to shutdown Unit 1 outside the control area and provides the opportunity, if the smoke is not too severe to maintain operation of Unit 2.
- T. Step 3.21 references the procedure to shutdown Unit 2 if conditions deteriorate.
- U. Step 3.22 determines is the fire is in Unit 2 Control Area.
- V. Step 3.23 places the ventilation in mode with maximum air supply to Control Room.
- W. Step 3.24 provides the instructions for both unit operators.
- X. Step 3.25 references the procedure to shutdown Unit 1 if conditions deteriorate.
- Y. Step 3.26 provides the instructions and references the procedures to return the Control Room Ventilation System to normal for any fire condition.

**END OF DOCUMENT**