10 CFR 50, Appendix E

CP&L

Carolina Power & Light Company
Robinson Nuclear Plant
3581 West Entrance Road
Hartsville SC 29550

Serial: RNP-RA/00-0114

JUN 23 2000

United States Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2
DOCKET NO. 50-261/LICENSE NO. DPR-23

TRANSMITTAL OF EMERGENCY PROCEDURE REVISIONS

Ladies and Gentlemen:

In accordance with 10 CFR 50.4(b)(5) and 10 CFR 50, Appendix E, Carolina Power & Light (CP&L) Company is transmitting the enclosed revisions to Emergency Procedures. A listing of procedure revisions and their effective dates is provided in the enclosure to this letter.

A description of the procedure changes is provided on the "Summary of Changes" page for each Emergency Procedure. Please replace the superseded procedures with the attached revisions.

If you have any questions concerning this matter, please contact Mr. H. K. Chernoff.

Sincerely,

R. L. Warden
Manager - Regulatory Affairs

PMY/pmy
Enclosure
Attachment: Revised Emergency Procedures

c: L. A. Reyes, NRC, Region II (w/Enclosure and 2 copies of Procedures)
R. Subbaratnam, NRC, NRR (w/o Attachments)
NRC Resident Inspector, HBRSEP (w/Enclosure and Procedures)

A045

NRR-037

List of Procedure Revisions and Effective Dates

Procedure	Revision No.	Effective Date
EPTSC-07, "Damage Assessment"	3	5/24/2000
EPRAD-03, "Dose Projections"	8	6/8/2000
EPPRO-01, "Program and Responsibilities"	6	6/13/2000
EPSPA-01, "Evacuation and Accountability"	5	6/13/2000
EPOSC-01, "Operational Support Center Leader"	5	6/16/2000

CP&L

R
Reference
Use

CAROLINA POWER & LIGHT COMPANY
H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2

PLANT OPERATING MANUAL

VOLUME 2
PART 5

EMERGENCY PROCEDURE

EPOSC-01

OPERATIONAL SUPPORT CENTER LEADER

REVISION 5

SUMMARY OF CHANGES

STEP	REASON FOR REVISION
Title Page	Corrected misspelled title.

TABLE OF CONTENTS

OSC LEADER QUICK START GUIDE

NOTE: Blanks are provided for place keeping √'s only, logs are the official record. This is a summary level guide and does not replace the procedure steps.

1. If Dialogic was used for callout, upon arrival at the Facility, notify Dialogic at X 1777. _____
2. Announce your presence and position in the Operational Support Center (OSC). _____
3. Establish communications. _____
4. Set up the OSC per Attachment 8.1.5.1, OSC Activation/Layout _____
5. Initiate accountability. _____
6. Ensure that the Security Watchperson maintains access control. _____
7. Ensure that the facility is being monitored for radiation habitability. _____
8. Instruct personnel to obtain their equipment and prepare for missions. _____
9. Synchronize clocks with ERFIS/EDS. _____
10. Conduct initial status briefing. _____
11. Notify the Site Emergency Coordinator (SEC) of readiness to activate the OSC. _____
12. Refer to procedure steps. _____

8.1 OPERATIONS SUPPORT CENTER LEADER

8.1.1 PURPOSE

1. The purpose of this procedure is to describe the duties and responsibilities of the Operational Support Center (OSC) Leader. Attachments to this procedure describe the organization, activation, and operation of the OSC.

8.1.2 RESPONSIBILITIES

NOTE: In order to augment the staff of the Control Room as soon as practical, activation of the OSC is permitted with partial staffing.

1. The OSC Leader is responsible to the Emergency Repair Director (ERD) when the Technical Support Center (TSC) is activated. The OSC Leader is responsible to the Control Room Site Emergency Coordinator (SEC) prior to the activation of the TSC. General responsibilities include:

   a. Activation of the OSC is required at Alert or higher emergency classification or at a lower level if directed by the SEC.

   b. Coordinating the activities of the OSC and supporting its assigned personnel.

8.1.3 INSTRUCTIONS

NOTE: Initial actions of this procedure can be implemented by the Damage Control Team Leader (DCTL) in the absence of the OSC Team Leader.

1. The OSC staff will be called out if required at an Alert or higher emergency classification.

   a. Activation at a lower level may be directed by the SEC.

8.1.3 (Continued)

2. Upon reporting to the OSC, the OSC Leader shall:

   a. Establish communications with the Control Room or the Emergency Repair Director (ERD) if the TSC is activated, giving the status of OSC augmentation.

      - Use the OSC Tag Board for tracking.

      - Request plant status and any repair missions underway or needed.

   b. Announce his name and position title.

   c. He shall then order all non-emergency response personnel be moved from the main working areas of the OSC.

      - See Attachment 8.1.5.1, OSC Activation/Layout, to ensure that only emergency response personnel are located in the main OSC working areas.

      - This practice may be modified for drill purposes.

   d. Ensure accountability initiated, call Emergency Security Team Leader (ESTL) when complete.

      - Assign the Security Watchperson to establish OSC access control.

      - See Attachment 8.1.5.1, OSC Activation/Layout, for location of the OSC access control desk.

      - The Security Watchperson will maintain Attachment 8.1.5.2, OSC Personnel Log. A radiological control point may be set up at this location if the OSC leader deems it appropriate.

      - Supplies and equipment for this purpose are located in the OSC Command Center desk and file drawers.

NOTE: The Tag Board describes the recommended OSC staff. Other personnel may be assigned to the facility as needed. Not all personnel assigned to the OSC are required to have a tag. If the emergency can be handled with less than the recommended staff, the OSC can be activated.

e. Use Attachment 8.1.5.9, Tag Board/Position Task List, and the Tag Board located at the OSC entrance and Attachment 8.1.5.10, OSC Personnel Roster, to ensure that the OSC organization is properly staffed.

   - Attachment 8.1.5.3, OSC Organization, describes the normal staffing.

f. Place all phones, radios, and status boards according to Attachment 8.1.5.1, OSC Activation/Layout.

   - Communication lines should be checked with the TSC and the Control Room.

   - Communications information is contained in EPNOT-00, Notification and Emergency Communicators, and the ERO Phone Book.

g. Determine the need for additional equipment, supplies, and manpower.

   - Requests should be made through the ERD to the ALM.

h. Upon reaching an adequate staffing level, the OSC Leader (or in his absence, the DCTL) shall declare the facility activated.

   - This must be done by an announcement in the facility and by a call to the ERD.

   - A final personnel accountability check will be made and the ESTL shall be informed of the result.

8.1.3.2 (Continued)

l. Obtain an initial briefing on plant status and emergency operations from the Control Room or ERD, if the TSC has been activated.

- Conduct a detailed briefing for all OSC personnel.

3. The OSC Leader will control, direct, and support assigned personnel as follows:

a. Upon notification of a mission from the ERD, ensure that the personnel and resources necessary for the mission are available.

- Whenever it is determined that an OSC mission is not practical or feasible during the course of a declared emergency, advise the ERD for appropriate action.

b. Conduct frequent status update briefings with OSC staff personnel.

c. Keep the ERD informed of the status of missions/teams.

d. The OSC Leader shall direct the E&RC personnel to establish and monitor habitability in the OSC.

e. Ensure the following positions are functioning as follows:

- The Administrative Assistant shall perform duties specified in Attachment 8.1.5.6, OSC Administrative Assistant Checklist.

- The OSC Storekeeper will perform duties to ensure that OSC personnel have access to tools and spare parts according to Attachment 8.1.5.7, Storekeeper Checklist.

8.1.3.3.e (Continued)

- The Security Watchperson will assist with OSC accountability, perform duties to ensure that OSC personnel have appropriate access to plant areas, and maintain access control for the facility.

- DCTL operations shall be conducted according to EPOSC-02, Damage Control Team Leader.

- If available, an E&RC Supervisor shall direct the Plant Monitoring Teams, Personnel Protection Teams, Decontamination Teams, and Chemistry Teams in accordance with EPOSC-03, Environmental & Radiation Control Team. The E&RC Supervisor may interface directly with the Radiological Control Director in the TSC for communication of E&RC data.

- If an E&RC Supervisor is not available in the RC Technician staff, the OSC Leader shall direct Plant Monitoring, Personnel Protection, Decontamination, and Chemistry Teams in accordance with EPOSC-03, Environmental & Radiation Control Team. A "lead" may be assigned from available RC Technician staff for this function.

4. IF adverse environmental conditions dictate, move the OSC in accordance with Attachment 8.1.5.5, OSC Evacuation and Backup OSC Setup.

   a. Consider evacuation if the actual or anticipated total accumulated dose exceeds 1000 mR.

   b. The decision to evacuate the OSC will be done in conjunction with the ERD and the Radiological Control Director (RCD) in the TSC or the SEC.

      - The SEC will approve relocation of the OSC.

8.1.3.4 (Continued)

c. For plant data:

- Locate the nearest personal computer connected to the site Local Area Network (LAN) and utilize the group available in the Plant View option under the Robinson menu selection. (Choose "File" then "Group" in Plant View).

- Contact ITSD staff to connect an available computer to the modem connection provided.

5. Ensure proper use of communications equipment. Identify yourself by name and the position you hold at the beginning of each transmission.

6. Upon instructions from the ERD or SEC, the OSC Leader shall deactivate the facility by appropriately notifying all OSC personnel and assuring that all equipment and supplies are returned to the appropriate storage location. Review OSC Leader Log for completeness and accuracy.

8.1.4 RECORDS

N/A

8.1.5 ATTACHMENTS

8.1.5.1 OSC Activation/Layout

8.1.5.2 OSC Personnel Log

8.1.5.3 OSC Organization

8.1.5.4 OSC Leader's Checklist

8.1.5.5 OSC Evacuation and Backup OSC Setup

8.1.5.6 OSC Administrative Assistant Checklist

8.1.5.7 Storekeeper Checklist

8.1.5.8 Tag Board/Position Task List

8.1.5.9 OSC Personnel Roster

ATTACHMENT 8.1.5.1
Page 1 of 2
OSC ACTIVATION/LAYOUT

Upon reaching requirement for OSC activation, the following should be performed:

– Set up equipment per Attachment 8.1.5.1, OSC Activation/Layout, Page 2 of 2:
  - OSC Tag Board
  - OSC Status Board
  - Plant Diagram Chart
  - Rearrange tables in Maintenance conference room and break room for OSC use
  - Table for Access Control
  - Telephones (plug into appropriately marked jack for that OSC position).
  - Fax Machine (to be moved from Maintenance first floor library)
  - Emergency Status and OSC Habitability signs
  - Office supplies and Materials for all positions

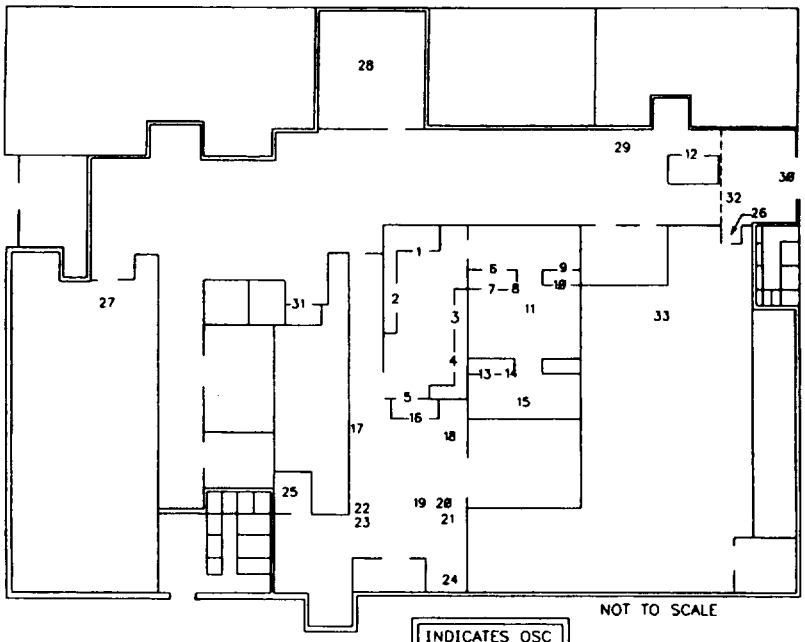
– Establish access control as follows:
  - Place No Exit/Entry signs/barriers at boundary doors and access (doors may be Locked to Prevent entry).
  - Turn elevator key to stop position with elevator on first floor and door open.
  - All OSC personnel sign in on Attachment 8.1.5.2, OSC Personnel Log.
  - Have all non-emergency response personnel leave OSC.
  - All personnel entering or exiting sign in on Attachment 8.1.5.2, OSC Personnel Log, (include destination in space provided when exiting).
  - Do not permit non-emergency response personnel entry into the OSC unless authorized by OSC Leader.

Telephones and supplies are located in the OSC Command Center desk drawers and file cabinet. Setup equipment is also stored in the breakroom closet near vending machines. H.P. Equipment is in H.P. cabinets located in break room as well as in closet next to first floor restrooms.

The OSC Leader will ensure setup. All OSC personnel should be responsible to set up of their own assigned areas with the assistance of other responding OSC personnel.

OSC ACTIVATION/LAYOUT

O&M BUILDING 1st FLOOR



1. OSC Leader (5Ø34)
2. OSC Administrative Assistant (5Ø26)
3. E&RC Leader (5Ø27)
4. E&RC Log Keeper
5. OSC Status Board
6. Damage Control Team Leader (5Ø15)
7. Mechanical Supervisor (5Ø18)
8. I&C/Electrical Supervisor (5Ø19)
9. RC Supervisor (5Ø2Ø)*
10. Alara Supervisor (5Ø23)*
11. Briefing/Debriefing Area
12. Security Watch Person
13. Mechanical Planner (5Ø13)
14. I&C/Electrical Planner (5Ø13)
15. Plant Diagram Board
16. H.P. Lockers

*9 & 10 may be same person.

17. E&RC Status Board
18. Fax Machine (1627)
19. RC Table
20. Chemistry Table/E&C Supervisor (5Ø33)
21. Deleted
22. RWP Status Board
23. RWP Area
24. Dosimetry Table
25. OSC Equipment Storage
26. Access to 2nd Floor via Stairwell (South Door
27. Storekeeper Area
28. DCT Staging/Waiting Area
29. OSC Personnel Tag Board
30. OSC Entrance/Exit
31. H.P. Storage
32. Barrier for Access to 2nd Floor During Drill Exercise
33. I&C Electrical Staging/Waiting Area

ATTACHMENT 8.1.5.2
Page 1 of 1

OSC PERSONNEL LOG

SHEET # _____ Date _____

#	NAME (Please Print)	OSC POSITION	TIME		* LOG OUT DESTINATION
			IN	OUT	
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
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15					
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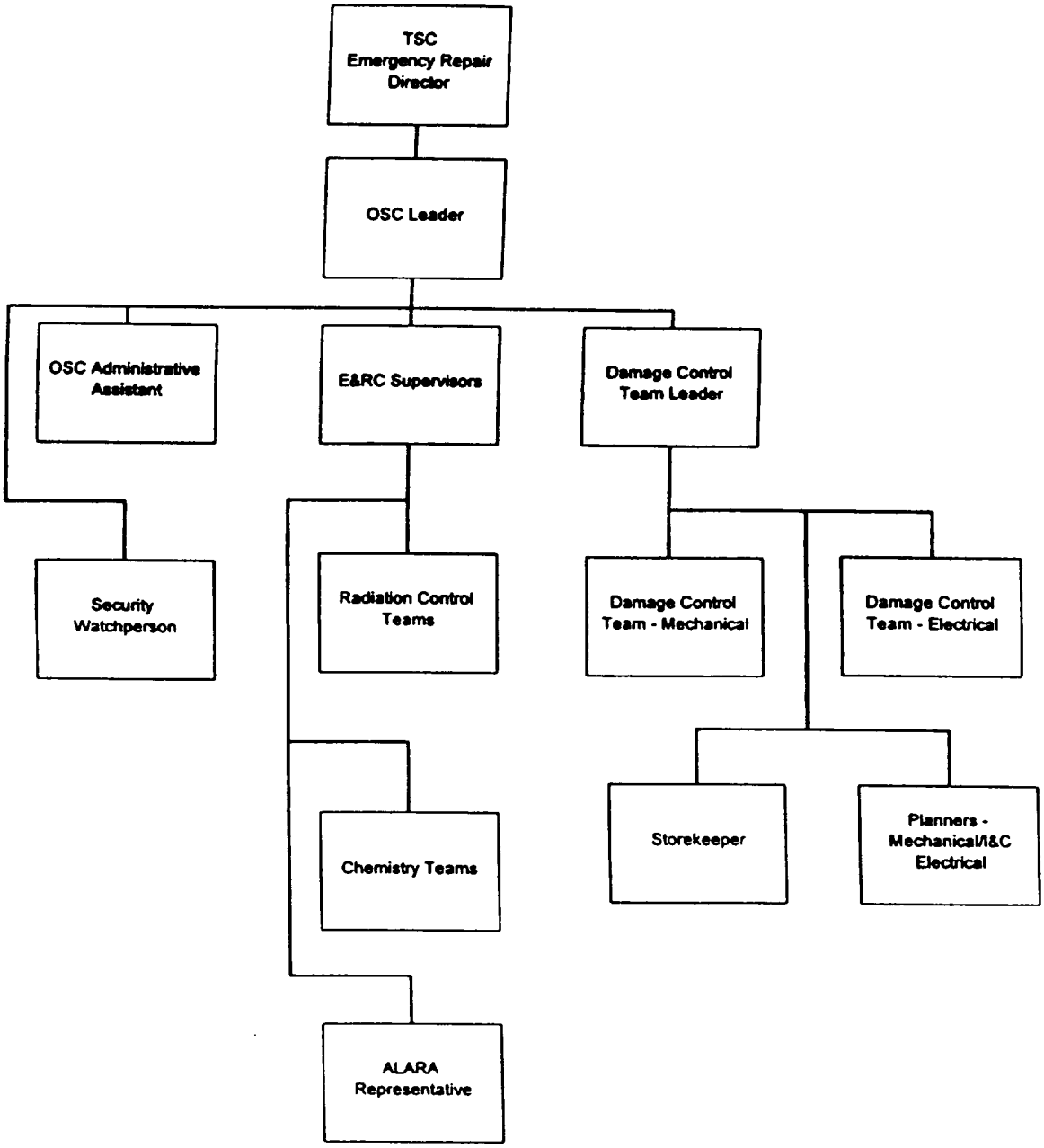
ATTACHMENT 8.1.5.3
Page 1 of 1

OSC ORGANIZATION



ATTACHMENT 8.1.5.4
Page 1 of 2

OSC LEADER'S CHECKLIST

ACTIVATION

- Upon your arrival, announce your presence in the OSC and establish communications with the Control Room, or the ERD if the TSC has been activated giving status of augmentation and requesting missions information.
- The OSC Leader or in his absence, the Damage Control Leader shall declare the facility activated upon reaching an adequate staffing level.
- Order the immediate removal of all non-response personnel from the OSC main working areas.
- Set up the OSC similar to Attachment 8.1.5.1, OSCActivation/Layout Diagram. The OSC boundaries may be modified to better facilitate OSC operations at the discretion of the OSC Leader.
- Set up telephones (phones are located in the OSC Command Center file drawers), placing them according to the marked numbers on the OSC Layout Diagram (phone jacks on walls are also marked).
- Ensure accountability is initiated, call Security Team Leader when complete.
- Ensure that the Security Watchperson maintains access control and the Personnel Log.
- Ensure that the facility is adequately staffed for the emergency at hand, (refer to the Tag Board).
- Ensure that the facility is being monitored for radiological habitability.
- Make requests for additional personnel and equipment as the situation dictates.
- Obtain initial plant status briefing from Control Room and TSC personnel and conduct briefing for OSC personnel. (Emergency Facility Telephone Numbers can be found in the ERO Phone Book.)
- Instruct personnel to obtain their equipment and to prepare for missions (have some Maintenance personnel get into anti-Cs).
- Synchronize clocks to ERFIS/EDS.
- Declare the OSC activated. Announce activation and time activated using the OSC public address system. Report the same to the Emergency Repair Director or SEC.

OSC LEADER'S CHECKLIST

OPERATIONS

- Support overall emergency response efforts
- Ensure the OSC Leader Log, Tag and OSC Status Board are being maintained.
- Ensure Damage Control Teams are preparing for missions.
- Conduct frequent briefings of personnel.

General Briefings:

- Emergency condition/action level.
- Plant status.
- Wind direction and radiation level

Team Specific Briefings/Debriefing will be given by the Team Leaders and Supervisors.

EVACUATION

- Should it become necessary, evacuate the facility according to Attachment 8.1.5.5, OSC Evacuation and Backup OSC Setup.

DEACTIVATION

- Review OSC Log for completeness and accuracy.
- Ensure all logs and Attachments are given to the Emergency Preparedness Staff.
- Ensure proper decontamination is performed if required.
- Ensure all assigned personnel return and inventory their equipment.
- Ensure all lockers for equipment and supplies are locked or sealed.
- Leave the area in a clean condition.
- Give a final deactivation status report to the ERD or the SEC.

ATTACHMENT 8.1.5.5
Page 1 of 1

OSC EVACUATION AND BACKUP OSC SETUP
(UNIT #1 SHOP)

Should adverse environmental conditions dictate, the OSC may be evacuated. The backup OSC is unit #1 Shop. The OSC Leader in conference with the ERD and the RCD, is responsible for making the decision to evacuate and for properly conducting the evacuation and backup OSC setup.

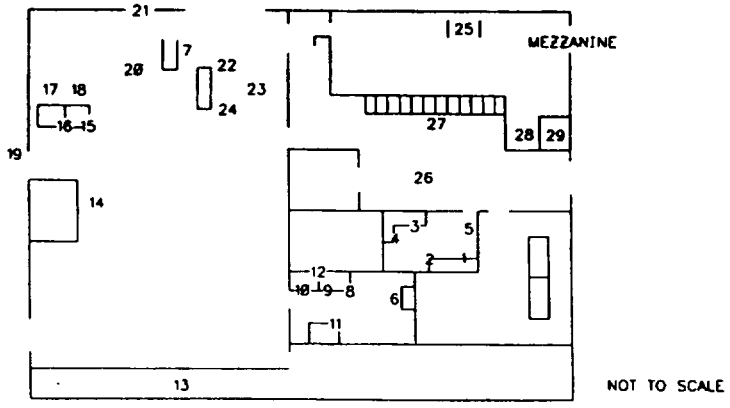
The following supplies and equipment will be maintained in the backup OSC:

- Tag Board, OSC Status Board, E&RC Status Board, Plant Diagram Board, RWP Status Board.
- Telephones (with same phone numbers), SCBAs, H.P. Emergency Kit, Tables, Chairs, POM, Microfiche Machine, Other Necessary Supplies.

NOTE:	Fax can be obtained through A&LM or from unit #1 staff areas.

The following supplies and equipment should be moved from the primary OSC:

- OSC Personnel Log, E&RC LOG, RWPs, Maintenance Radios, & E&RC radios, Necessary equipment/supplies determined necessary for continued operation.



1. OSC Leader (5034)
2. OSC Administrative Assistant (5026)
3. E&RC Leader (5027)
4. E&RC Log Keeper
5. OSC Status Board
6. Damage Control Team Leader (5015)
7. Security Watch Person
8. I&C/Electrical Planner (5013)
9. Mechanical Planner (5013)
10. Mechanical Supervisor (5018)
11. I&C/Electrical Supervisor (5019)
12. Fax Machine (1627)
13. Storekeeper Area
14. OSC Personnel Tag Board
15. Chemistry Table E&C Supervisor (5033)
16. ALARA Supervisor
17. RC Supervisor (5020)
18. RC Table
19. OSC Entrance
20. E&RC Status Board
21. OSC Exit
22. RWP Area
23. RWP Status Board
24. Dosimetry Table
25. Plant Diagram Board
26. DCT Briefing/Debriefing Area
27. DCT Staging/Waiting Area
28. H.P. Locker
29. OSC/H.P. Equipment Storage

OSC ADMINISTRATIVE ASSISTANT CHECKLIST

The OSC Administrative Assistant shall:

- Report to the OSC Leader.
- Assist in facility activation per Attachment 8.1.5.1, OCS Activation/Layout.
- Log all major communications and decisions for the OSC Leader and the OSC Leader's direct staff.
- Assist in briefing the Access Control Clerk as to duties of the position.
- Ensure that the OSC Leader is informed of what tags are remaining on the Tag Board.
- Keep OSC Status Board correct.
- Perform any other tasks as directed by the OSC Leader.
- Help in deactivation activities.

STOREKEEPER CHECKLIST

The Storekeeper shall:

- Report to the Damage Control Team Leader.
- Assist in facility activation per Attachment 8.1.5.1, OSC Activation/Layout.
- Provide necessary tools and parts to perform the mission.
- Perform any other tasks as directed by the OSC Leader.
- Help in deactivation activities.

ATTACHMENT 8.1.5.8
Page 1 of 7

TAG BOARD/POSITION TASK LIST

The following positions represent those used on the OSC Tag Board. Below each position is their respective task list.

It not necessary for all OSC personnel to have a tag. The Tag Board represents the recommended OSC staff.

OSC LEADER	SECURITY WATCHPERSON	OSC ADMINISTRATIVE ASSISTANT
Report to ERD	Report to OSC Leader	Report to OSC Leader
- declare presence	- setup Security desk	- obtain log forms
- evacuate non-responders	- report readiness	- assist in OSC setup
- call Security	- contact OSC Leader on special access	- report readiness
- access control	- assist in accountability	- assist OSC Leader
- staff completely	- setup access desk	- log all major OSC activities/communications
- brief on status	- set up personnel log	- assist in OSC deactivation
- ensure OSC setup	- ensure tag board is being used	
- declare operations	- ensure all other entry points are blocked	
- report attendance	- maintain access control to OSC	
- support TSC operations	- assist in OSC deactivation	
- ensure OSC deactivation		
- oversight and support of Damage Control teams		

TAG BOARD/POSITION TASK LIST

STOREKEEPER	DCT LEADER
Report to Damage Control Team Leader - assist in OSC setup - open tool areas - prepare to issue tools - report readiness - issue tool/equipment to personnel as needed - assist OSC Leader - assist in OSC deactivation	Report to OSC Leader - assist in OSC setup - assemble team members - equip. teams - check team equipment - take attendance - report readiness - perform Damage Control missions as requested by the OSC Leader - give Damage Control Team briefings/debriefings - assist in OSC deactivation

MAINT. PLANNER 1 MECHANICAL	MAINT. PLANNER 2 ELECTRICAL	MAINT. SUPERVISOR MECHANICAL	MAINT. SUPERVISOR I&C ELECTRICAL
Report to DCTL	Report to DCTL	Report to DCTL	Report to DCTL
-assist in OSC setup - prepare work instructions for damage control appropriate to the situation and time available (mechanical emphasis) - assist in OSC deactivation	-assist in OSC setup - prepare work instructions for damage control appropriate to the situation and time available (electrical/I&C emphasis) - assist in OSC deactivation	- assist in OSC setup - assemble team members - equip. teams - check team equip. - report readiness - perform Damage Control Maint./Ops as required by the DCT Leader - give Damage Control Team briefings/ debriefings - assist in OSC deactivation	-assist in OSC setup - assemble team members - equip. teams - check team equip. - report readiness - perform Damage Control Maint./Ops as required by the DCT Leader - give Damage Control Team briefings/ debriefings - assist in OSC deactivation

TAG BOARD/POSITION TASK LIST

MECHANIC 1	MECHANIC 2	MECHANIC 3	MECHANIC 4
Report to Maint. Mech. Supervisor	Report to Maint. Mech. Supervisor	Report to Maint. Mech. Supervisor	Report to Maint. Mech. Supervisor
- assist in OSC setup	- assist in OSC setup	- assist in OSC setup	- assist in OSC setup
- assemble equipment	- assemble equipment	- assemble equipment	- assemble equipment
- check equipment	- check equipment	- check equipment	- check equipment
- report readiness	- report readiness	- report readiness	- report readiness
- perform maint. activities as directed by the DCT Leader	- perform maint. activities as directed by the DCT Leader	- perform maint. activities as directed by the DCT Leader	- perform maint. activities as directed by the DCT Leader
- assist in OSC deactivation	- assist in OSC deactivation	- assist in OSC deactivation	- assist in OSC deactivation

ELECTRICIAN 1	ELECTRICIAN 2	I & C TECH. 1
Report to Maint. Supervisor - I&C/Elec.	Report to Maint. Supervisor - I&C/Elec.	Report to Maint. Supervisor - I&C/Elec.
- assist in OSC setup	- assist in OSC setup	- assist in OSC setup
- assemble equipment	- assemble equipment	- assemble equipment
- check equipment	- check equipment	- check equipment
- report readiness	- report readiness	- report readiness
- perform maint. activities as directed by the DCT Leader	- perform maint. activities as directed by the DCT Leader	- perform maint. activities as directed by the DCT Leader
- assist in OSC deactivation	- assist in OSC deactivation	- assist in OSC deactivation

TAG BOARD/POSITION TASK LIST

I & C TECH. 2	I & C TECH. 3	I & C TECH. 4
Report to Maint. Supervisor - I&C/Elec.	Report to Maint. Supervisor - I&C/Elec.	Report to Maint. Supervisor - I&C/Elec.
- assist in OSC setup	- assist in OSC setup	- assist in OSC setup
- assemble equipment	- assemble equipment	- assemble equipment
- check equipment	- check equipment	- check equipment
- report readiness	- report readiness	- report readiness
- perform maint. activities as directed by the DCT Leader	- perform maint. activities as directed by the DCT Leader	- perform maint. activities as directed by the DCT Leader
- assist in OSC deactivation	- assist in OSC deactivation	- assist in OSC deactivation

RC SUPERVISOR	RC FIELD SUPERVISOR	E&C SUPERVISOR	RC TECH. 1 RCT
Report to OSC Leader	Report to OSC Leader	Report to OSC Leader	Report to EC/RC Supervisor
- assist in OSC setup	- assist in OSC setup	- assist in OSC setup	- assist in OSC setup
- obtain/check equipment	- Coordinate and support the work of team members of the Radiation Control Teams.	- Coordinate and support the work of team members of the Chemistry Teams.	- obtain equipment
- report readiness	- obtain equipment	- obtain equipment	- check equipment
- provide Radiological direction to Damage Control Teams	- check equipment	- check equipment	- report readiness
- interface with ALARA Supervisor	- report readiness	- report readiness	- perform HP work as directed by the E&C/RC Supervisor
- assist in Damage Control Team briefings/ debriefings	- assist in OSC deactivation	- assist in OSC deactivation	- assist in OSC deactivation
- assist in OSC deactivation			

TAG BOARD/POSITION TASK LIST

RC TECH. 2 RCT	RC TECH. 3 RCT	RC TECH. 4 RCT
Report to E&C/RC Supervisor	Report to E&C/RC Supervisor	Report to E&C/RC Supervisor
- assist in OSC setup	- assist in OSC setup	- assist in OSC setup
- obtain equipment	- obtain equipment	- obtain equipment
- check equipment	- check equipment	- check equipment
- report readiness	- report readiness	- report readiness
- perform HP work as directed by the E&C/RC Supervisor	- perform HP work as directed by the E&C/RC Supervisor	- perform HP work as directed by the E&C/RC Supervisor
- assist in OSC deactivation	- assist in OSC deactivation	- assist in OSC deactivation

RC TECH. 5 RCT	RC TECH. 6 RCT	ALARA SUPERVISOR
Report to E&C/RC Supervisor	Report to E&C/RC Supervisor	Report to E&C/RC Supervisor
- assist in OSC setup	- assist in OSC setup	- assist in OSC setup
- obtain equipment	- obtain equipment	- obtain ALARA ref. materials
- check equipment	- check equipment	- report readiness
- report readiness	- report readiness	- perform ALARA reviews of all related RWP work
- perform HP work as directed by the E&C/RC Supervisor	- perform HP work as directed by the E&C/RC Supervisor	- provide radiological direction to Damage Control Teams
- assist in OSC deactivation	- assist in OSC deactivation	- give mission briefings
		- assist in OSC deactivation

TAG BOARD/POSITION TASK LIST

DOSIMETRY TECH.	DOSIMETRY CLERK	E&C/RC LOGKEEPER
Report to E&C/RC Supervisor	Report to E&C/RC Supervisor	Report to E&C/RC Supervisor
- assist in OSC setup	- assist in OSC setup	- assist in OSC setup
- Coordinate and support the work of all team members	- obtain equipment	- obtain log forms
- interface with the E&C/RC Supervisor	- check equipment	- update status
- issue dosimetry	- report readiness	- report readiness
- assist in OSC deactivation	- perform HP work as directed by the E&C/RC Supervisor	- maintain the log for the E&C/RC Team Leader & maintain the E&C/RC Status Brd.
	- issue dosimetry	- Perform any other duties as directed by the E&C/RC Supervisor
	- assist in OSC deactivation	- assist in OSC deactivation

TAG BOARD/POSITION TASK LIST

PASS/CHEM. TECH. #1	PASS/CHEM. TECH. #2
Report to E&C/RC Supervisor	Report to E&C/RC Supervisor
- assist in OSC setup - check equipment - report readiness - perform duties as directed by the E&C/RC Supervisor - assist in OSC deactivation	- assist in OSC setup - check equipment - report readiness - perform duties as directed by the E&C/RC Supervisor - assist in OSC deactivation
PASS/CHEM. TECH. #3	**PASS/CHEM. TECH. #4**
Report to E&C/RC Supervisor	Report to E&C/RC Supervisor
- assist in OSC setup - check equipment - report readiness - perform duties as directed by the E&C/RC Supervisor - assist in OSC deactivation	- assist in OSC setup - check equipment - report readiness - perform duties as directed by the E&C/RC Supervisor - assist in OSC deactivation

ATTACHMENT 8.1.5.9
Page 1 of 1

OSC PERSONNEL ROSTER

NOTE: The positions listed below are recommended for activation purposes, however, partial activation should be considered in order to assist the Control Room as soon as practical.

	NAME (PLEASE PRINT) / TIME
_____ OSC LEADER (A-75)	_____ / _____
_____ E&C TECHNICIAN #1 (B1-45)	_____ / _____
_____ E&C TECHNICIAN #2 (B1-45)	_____ / _____
_____ E&C TECHNICIAN #3 (B1-45)	_____ / _____
_____ E&C TECHNICIAN #4 (B1-75)	_____ / _____
_____ E&C TECHNICIAN #5 (B1-75)	_____ / _____
_____ E&C TECHNICIAN #6 (B1-75)	_____ / _____
_____ RC TECHNICIAN #1 (B1-45)	_____ / _____
_____ RC TECHNICIAN #2 (B1-45)	_____ / _____
_____ RC TECHNICIAN #3 (B1-45)	_____ / _____
_____ RC TECHNICIAN #4 (B1-75)	_____ / _____
_____ RC TECHNICIAN #5 (B1-75)	_____ / _____
_____ RC TECHNICIAN #6 (B1-75)	_____ / _____
_____ DAMAGE CONTROL LDR (A-75)	_____ / _____
_____ MECHANIC #1 (B1-45)	_____ / _____
_____ MECHANIC #2 (B1-45)	_____ / _____
_____ MECHANIC #3 (B1-75)	_____ / _____
_____ MECHANIC #4 (B1-75)	_____ / _____
_____ ELEC./I&C TECH #1 (B1-45)	_____ / _____
_____ ELEC./I&C TECH #2 (B1-45)	_____ / _____
_____ ELEC./I&C TECH #3 (B1-75)	_____ / _____
_____ ELEC./I&C TECH #4 (B1-75)	_____ / _____
_____ OSC STOREKEEPER (A-75)	_____ / _____

****

OSC POSITIONS LISTED BELOW ARE NOT REQUIRED FOR INITIAL OSC ACTIVATION.

****

_____ MECHANICAL PLANNER	_____ / _____
_____ ELEC./I&C PLANNER	_____ / _____
_____ OSC ADMIN. ASSISTANT	_____ / _____
_____ E&RC SUPERVISOR	_____ / _____

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CAROLINA POWER & LIGHT COMPANY
H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2

PLANT OPERATING MANUAL

VOLUME 2
PART 5

EMERGENCY PROCEDURE

EPSPA-01

EVACUATION AND ACCOUNTABILITY

REVISION 5

SUMMARY OF CHANGES

STEP	REASON FOR REVISION
TOC	Deleted Attachment 8.1.5.2 no longer useful.
8.1.3.3a	Clarified assembly locations and combined part b.
8.1.3.3c	Simplified the roll call for evacuated personnel and changed to 8.1.3.3b.
8.1.3.4	Deleted references to Attachment 8.1.5.2. changed title of Attachment 8.1.5.1
8.1.3.5	Clarified 30 minute accountability requirement start time.
8.1.3.5a	Removed the restrictive word "all" from guidance. Until the roll call is completed this is not known. Deleted confusing time requirement. Time requirement previously stated
8.1.3.5b	Clarified guidance for the SSO and OSC leader accountability of personnel assigned to their location.
8.1.3.5c	Clarified accountability criteria for the ESTL.
8.1.3.5d	Added note, for SEC discretionary accountability
8.1.3.6a	Changed 1st to first.
8.1.5	Deleted Attach 8.1.5.2 reference
Attach 8.1.5.1	Corrected name to reflect current terminology.

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8.1.1 PURPOSE

1. This procedure provides instruction for:

   a. Safe and timely evacuation and assembly of personnel within the protected area,

   b. Accountability for personnel evacuated from the protected area, and

   c. Search and rescue operations.

8.1.2 RESPONSIBILITIES

1. The Site Emergency Coordinator (SEC) determines when evacuation is necessary and where it is safe to assemble. For a Site Area or General Emergency a site evacuation is mandatory unless doing so would jeopardize the safety of plant personnel.

2. An Environmental and Radiological Controls (E&RC) Supervisor or Lead Technician assigned by the OSC Leader will ensure the assembly area is radiologically safe.

3. Site personnel are responsible for complying with alarms and public address announcements.

8.1.3 INSTRUCTIONS

1. The Control Room should:

   a. Determine the appropriate upwind location for assembly of evacuated personnel.

   b. Sound the local or site evacuation alarm, as appropriate.

   c. Make a public address announcement with the "VLC" switch in the emergency position.

      - Give affected area(s) and assembly location.

8.1.3.1 (Continued)

d. Repeat alarm and announcement.

e. For Local Evacuation, verify non-essential personnel have evacuated the affected area.

- Contact security to perform a computer roll call of the area, or

- Obtain feedback from responders to the area if an area is evacuated that is not covered by a card reader.

2. Upon a Site Evacuation, ERO personnel should:

a. Report promptly to their respective Emergency Response Facility (ERF).

b. Sign in on the applicable ERF sign-in roster.

3. Upon a Site Evacuation, non-ERO personnel should:

a. Report to the designated assembly area.

- East - parking lot or Building 110 next to Lake Robinson

- West - parking lot or Unit 2 Administrative Building Cafeteria

- Visitors should report with the group they are onsite supporting or visiting.

b. A group supervisor or designee should complete Attachment 8.1.5.1, Emergency Assembly Form, as soon as possible and provide to Security.

8.1.3. (Continued)

4. Upon a Site Evacuation, Security personnel should:

   a. Report to the designated assembly area and distribute Attachment 8.1.5.1, Emergency Assembly Form, to each work group. It may be necessary to assign a person to take the names.

   b. Collect Emergency Assembly Forms after completion.

   c. Deliver the Emergency Assembly Forms to the Emergency Security Team Leader (ESTL).

      – If the Technical Support Center (TSC) is not activated, then report the results to the Control Room.

5. The ESTL shall perform an accountability of personnel inside the protected area within 30 minutes of the declaration of a Site Area Emergency (SAE) or General Emergency (If no SAE has been declared).

   a. After evacuees have exited the protected area, Security shall perform a computer roll call of the protected area and provide the results to the ESTL.

      – If the TSC is not activated, then report the results to the Control Room.

8.1.3.5 (Continued)

b. The Operations Support Center (OSC) Leader and the Superintendent Shift Operations (SSO) shall provide to Security an accountability of all ERO personnel assigned to their facilities as quickly as possible, typically within 15 minutes.

c. Accountability is complete when the ESTL has determined the status of personnel remaining in the protected area. Only the names of missing personnel, not a location, are required to complete accountability.

d. Results of accountability should be reported to the SEC as soon as possible after completion of accountability.

NOTE: An Accountability may be requested at any Emergency Action Level at the discretion of the SEC.

6. If personnel are not accounted for within the protected area, then conduct search and rescue operations from the OSC as follows.

a. Obtain equipment as needed

- protective gear
- First aid kit
- survey meter and dosimetry
- stretcher and blanket

b. Regulatory limits shall be observed for planned radiation exposures to emergency workers unless the:

- Plant General Manager or
- Radiological Control Director (RCD) or the
- SEC in their absence, authorizes the individual to exceed 5 rem TEDE in a year.

8.1.3.6 (Continued)

c. The Emergency Worker Dose Limits are as follows:

Dose Limit Rem TEDE[1]	Activity	Condition
5	All	
10	Protecting valuable property	Lower dose not practicable
25	Lifesaving or protection Of large populations	Lower dose not practicable
>25	Lifesaving or protection of large populations	Only on a voluntary basis to persons fully aware of the risks involved

[1]Doses to the lens of the eye should be limited to three times the stated TEDE value and doses to any other organ (including skin and body extremities) should be limited to ten times the stated TEDE value.

8.1.3.6 (Continued)

d. Lifesaving Actions:

In emergency situations that require personnel to search for and remove injured persons or entry to prevent conditions that would probably injure numbers of people, a planned dose should not exceed 25 rem TEDE to the whole body, 75 rem to the lens of the eye, or 250 rem to any other organ (including skin and body extremities). The following criteria should be considered:

NOTE: For this procedure this guideline applies to the removal of injured persons if the saving of life is possible.

- Declared Pregnant Women shall not take part in these actions.
- Internal exposures should be minimized by respiratory protection and contamination controlled by the use of protective clothing. The use of protective equipment must be consistent with maintaining the total effective dose equivalent ALARA.
- Entry into high radiation areas shall not be permitted unless instrumentation capable of measuring the anticipated radiation levels is provided.
- Each emergency worker entering a high radiation area shall wear self-reading dosimeters capable of measuring the expected exposure to be received.
- Entry into radiation fields of greater than 100 Rem/hour shall not be permitted unless specifically authorized by the Plant General Manager or Radiological Control Director; in their absence, the Site Emergency Coordinator may grant approval.

8.1.3.6 (Continued)

e. Actions Requiring a Dose Exceeding 25 Rem

In emergency situations where a planned dose in excess of 25 Rem TEDE will be required, the following criteria shall be considered:

- Rescue personnel shall be volunteers. Declared Pregnant Women shall not take part in these actions.
- Rescue personnel shall be instructed about the risks involved, including the numerical levels of dose at which acute effects due to radiation will be incurred and numerical estimates of the risk of delayed effects.
- Other things being equal, volunteers above the age of 45 should be selected whenever possible for the purpose of avoiding unnecessary genetic effects.
- Internal exposures should be minimized by respiratory protection and contamination controlled by use of protective clothing. The use of protective equipment must be consistent with maintaining the TEDE ALARA.
- Exposure under these conditions should be limited to once in a lifetime, and shall be included when calculating the future lifetime permissible exposures.
- Entry into high radiation areas shall not be permitted unless instrumentation capable of measuring the anticipated radiation levels in provided.
- Each emergency worker entering a high radiation area shall wear self-reading dosimeters capable of measuring the expected exposure to be received.

8.1.3.6.e (Continued)

- Entry into radiation fields of greater than 100 Rem/hour shall not be permitted unless specifically authorized by the Plant General Manager or RCD; in their absence, the SEC may grant approval.

- Persons receiving doses as indicated above should be counseled to avoid procreation for a period up to a few months.

f. Occupational dose incurred which exceed occupational dose limits shall be included in the individual's planned special exposure account.

g. Conduct search and rescue mission in accordance with planned actions and routes.

h. For each person found

- Analyze injuries and radiological hazard to determine if removal to a lower dose area is required.

- Notify the Unit 2 Control Room if onsite or offsite assistance is necessary. Give best approach if known.

- Administer first aid as necessary, see EPSPA-02, First Aid and Medical Care.

- Record actions taken on attachments in EPSPA-02, First Aid and Medical Care.

8.1.3 (Continued)

7. If a local evacuation of the TSC or Emergency Operations Facility (EOF) is required then:

   a. TSC personnel should report to the Unit 2 Control Room.

      - Directors should take only essential supplies and personnel to the alternate assembly area.

      - Phones and table space are provided along the north wall of the Control Room.

   b. EOF personnel should report to the Forward Emergency Operating Center (FEOC), located in the South Carolina National Guard Armory at 1764 Harry Byrd Highway (Hwy 151), Darlington, South Carolina.

      - As much as possible managers should take necessary supplies to the alternate assembly area.

8. Once accountability is established, personnel shall be controlled such that it is maintained.

8.1.4 **RECORDS**

N/A

8.1.5 **ATTACHMENTS**

8.1.5.1 Emergency Assembly Form

8.1.5.2 Risk Associated with Radiation Exposure

ATTACHMENT 8.1.5.1
Page 1 of 1

EMERGENCY ASSEMBLY FORM

Assembly Area _____

Work Group _____

Name/Date _____

The following personnel have reported to the assembly area.

NAME OF PERSONNEL	NAME OF PERSONNEL

When completed, give this sheet to Security.

RISK ASSOCIATED WITH RADIATION EXPOSURE

APPROXIMATE CANCER RISK TO AVERAGE INDIVIDUALS FROM 25 REM EFFECTIVE DOSE EQUIVALENT DELIVERED PROMPTLY

Age at Exposure (Years)	Appropriate Risk of Premature Death (deaths per 1,000 persons exposed)	Average Years of Life Lost if Premature Death Occurs (Years)
20 to 30	9.1	24
30 to 40	7.2	19
40 to 50	5.3	15
50 to 60	3.5	11

AVERAGE RISK OF DELAYED HEALTH EFFECTS DUE TO ONE REM EXPOSURE

	Whole Body (TEDE)	Thyroid (CDE)
Fatal Cancer	2.8	0.36
Non-Fatal Cancer	2.4	3.2
Genetic Disorders (all generations)	1	-

Effects per Person-Rem per 1000 People

HEALTH EFFECTS ASSOCIATED WITH WHOLE-BODY ABSORBED DOSES RECEIVED WITHIN A FEW HOURS[a]

Whole Body Absorbed Dose (Rad)	Early Fatalities[b] (percent)	Whole Body Absorbed Dose (Rad)	Prodromal Effects[c] (percent affected)
140	5	50	2
200	15	100	15
300	50	150	50
400	85	200	85
460	95	250	98

[a]Risks will be lower for protracted exposure periods.

[b]Supportive medical treatment may increase the dose at which these frequencies occur by approximately 50 percent.

[c]Forewarning symptoms of more serious health effects associated with large doses of radiation.

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H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2

PLANT OPERATING MANUAL

VOLUME 2
PART 5

EMERGENCY PROCEDURE

EPPRO-01

PROGRAM AND RESPONSIBILITIES

REVISION 6

SUMMARY OF CHANGES

STEP #	REVISION COMMENTS
8.1.2.3c	Clarified purpose of Controller/Evaluator failure comments. (pg 1-9)
8.1.4	Revised Inadvertent Siren Activation process. Due to automated phone answering changes.
8.1.13	Added record retention guidance. (CR 11959)
Attach. 8.1.14.1	Corrected Attachment number. (CR 11960)
Attach. 8.1.14.3	Corrected pager distribution list.
Attach. 8.1.14.4	Corrected Company Spokesperson from corporate spokesperson (CR 12183)
Attach. 8.1.14.5	Corrected Company Spokesperson from corporate spokesperson (CR 12183)

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8.1 PROGRAM AND RESPONSIBILITIES

8.1.1 DRILL AND EXERCISE PARTICIPATION:

1. ERO personnel are expected to drill/exercise with their designated team.

   a. If they will be unavailable for the drill it is their responsibility to ensure some one from another team will fill their position.

   b. Relief team personnel will participate in at least one team Drill, Exercise, or Tabletop each year.

   c. Non-Team designated ERO personnel are expected to coordinate with the other persons qualified for their position to ensure the position is staffed for each drill/exercise and that each ERO member participates in at least one Drill per calendar year.

2. ERO personnel filling critical positions shall be observed at least once in a calendar year performing their ERO duties.

3. Unless otherwise directed by Emergency Preparedness (EP), ERO personnel should respond during augmentation for their facility.

   a. Those personnel available to respond should establish 24 hour coverage for the position.

   b. Personnel on night shift may be exempted from augmentation, but should be used to establish 24 hour coverage.

   c. After the rotation is established, personnel may be simulated to be sent home and return to their place of work.

   d. Personnel are required to keep the manager responsible for their accountability informed of their location should an evacuation be conducted at a later time.

8.1.2 DRILLS AND EXERCISES

1. Emergency Response Organization (ERO) personnel will participate in periodic drills at least once each calendar year. Additionally one team, on a rotational basis, will participate in the Graded Exercise. The purpose of conducting drills is to ensure that each team has the skills to successfully deal with a real emergency. The following are the types of drills conducted:

   a. Medical Emergency Drills: Medical emergency drills will be conducted annually. They will involve a simulated contaminated and injured individual. Off-site portions of these drills may be conducted as part of an exercise.

   b. HP/PASS Drills: Health Physics drills, including response to and analysis of simulated elevated airborne and liquid samples and direct radiation measurements, will be conducted semi-annually.

      - At least one of these radiation protection drills will involve the use of the Post Accident Sampling System.

      - These drills may also include the Medical Services drill.

   c. Combined Functional Drills: Combined Functional Drills may include any of the required drills and serve as the primary method of practical training for new ERO members and continuing training for existing members.

2. An Exercise will be conducted as required by 10 CFR, Part 50, Appendix E.

   a. The scenario which will ultimately escalate to at least a Site Area Emergency.

8.1.2.2 (Continued)

b. The scenario will be varied from year to year such that all elements of the Plant, County, and State Plans and emergency organizations are tested within a six (6)-year period.

c. Each Exercise scenario will include a list of performance objectives and a description of the expected responses. Specific tasks that should be evaluated are listed in Attachment 8.1.14.4 and 8.1.14.5, "Drill Objectives" and "Acceptance Criteria" respectively.

- Attachments identify the Emergency Response facility where the activity is most likely to occur, however, the objective may be judged acceptable if performed in an alternate location.

- Credit may be taken for objectives that are satisfactorily completed during real events.

d. An off-hours exercise which starts between 6:00 p.m. and 4:00 a.m. will be conducted once every six (6) years.

e. Advance knowledge of the scenario content and the times of the exercises will be kept to a minimum to ensure a realistic participation by those involved.

3. The EP Staff is responsible for planning and conducting drills and exercises not addressed elsewhere (e.g., Fire Drills are addressed in the Fire Plan). They shall provide:

a. The scenario including objectives for the drill/exercise.

- From time to time "specific objectives" which are in addition to required performance objectives will be added to the Training Exercise Objectives. These may be in response to previous deficiencies, EP TPC items or require that normally simulated items be actually performed. A prompt to consider these items is contained in the pre-drill checklist.

8.1.2.3 (Continued)

- Qualified controller/evaluators to evaluate the drill/exercise.
- As a minimum Controller/Evaluators should be available to evaluate the following:
  - each facility activating,
  - Environmental Monitoring Teams,
  - Mechanical Damage Control Missions (as applicable),
  - Electrical Damage Control Missions (as applicable),
  - Chemistry/Health Physics Missions,
  - Offsite functions to be simulated,
  - any special functions (e.g. fire, injury)

b. A yearly plan for ERO exercises.

c. A critique noting strengths, deficiencies and comments on drill/exercise performance.

- A Strength is an action or activity performed in an above average manner, or in a creative manner to resolve a problem without the violation of a requirement. These are items which all teams should consider adopting.
- Deficiency will consist, for the purpose of critiques, as the action or actions which deviate from an approved or prescribed procedure, standard, specification, regulation or exercise/drill objective. Examples are procedure violation or a Technical Specification violation during the course of a drill or exercise.
- A note worthy item which does not meet the requirement of a Strength or a Deficiency is a comment.
- Critiques will be conducted after each Exercise.

8.1.2.3c (Continued)

- Rough Draft Critiques should be issued for comment, to the ERO teams members, which participated, in seven working days or less. The rough draft critique should be issued unless two teams are playing the same scenario less than two week apart. In this case the seven working day criteria will begin at the end of the second drill.

- The Critique will normally consist of the following:

    1. Cover Letter and Summary
    2. Objectives per facility
    3. Status of Objective (Met or Not Met)
    4. Strengths
    5. Deficiencies
    6. Comments

- The Cover letter will consist of a brief statement containing the date on which the drill(s) was conducted, team(s) that participated, and be signed by the Supervisor of Emergency Preparedness.

- The Summary will be a statement of overall drill performance.

- The objectives may be listed in their entirety in the critique but will also be listed in each section as they pertain to each facility.

- Each objective will be listed in the appropriate section and will be noted depending on whether the Acceptance criteria has been met during the drill.

- Satisfactory completion of an objective by any team will satisfy that requirement for the Site. Any team failure to demonstrate an objective is a deficiency and will be handled as such. At the discretion of EP Supervision failure to demonstrate an objective(s) may require redemonstration.

8.1.2.3c (Continued)

- Controller/Evaluator should justify failures as such in the critiques held after the drill and in the write-up given to Emergency Preparedness.

- Deficiencies will be noted as such and a Condition Report (CR) should be initiated prior to issuing the final copy of the critique. A statement should be included in the critique that a CR has been written.

d. Ensure implementation of comments or changes to Emergency Procedures as identified on EP Improvement Forms or drill critiques.

   - Comments will be screened by the EP staff for applicability.

e. A pre-drill and post-drill review of items needed to prepare for the drill/exercise or return to normal following the drill/exercise (i.e., reset simulator telephones).

f. Follow-up on drill identified deficiencies by initiating Condition Reports (CR) as needed.

8.1.3 EP PROCEDURE MAINTENANCE AND PROGRAM IMPROVEMENTS

1. Procedure improvements may be recommended by completing an Attachment 8.1.14.1, EP Improvement Form, or a DCF as specified in AP-022, Document Change Procedure, and routing it to the Supervisor Emergency Preparedness.

2. Procedure changes to the Robinson Emergency Plan and/or Emergency Procedures will be accomplished as required by AP-022, Document Change Procedure.

    a. Emergency Preparedness will be responsible to maintain the Emergency Action Levels (EAL) and supporting basis documents, as well as the Emergency Procedures.

    b. Documents will be developed and maintained to comply with applicable regulations.

    c. The EAL basis document will be revised to reflect NUREG-0654, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants," or other management directives and policies.

8.1.3.2 (Continued)

d. All Emergency Procedures, EALs, and the Emergency Plan shall receive a 10 CFR 50.54(q) review to ensure the effectiveness of the Emergency Plan is not inadvertently reduced.

3. For each drill or real event, EP improvement forms will be available. A record of items submitted will be maintained by the EP staff.

4. Items reported on EP improvement forms or drill critiques will be screened for entry into the Corrective Action Program.

5. Feedback regarding disposition of items will be provided to the individual who initiated the comment.

   a. This feedback is documented on the improvement form.

8.1.4 INADVERTENT SIREN ACTIVATION

1. Upon receiving a report of an inadvertent siren activation:

   a. If a real emergency or drill/exercise is in progress that involves sounding of the sirens, then direct the callers to tune to an Emergency Alerting System Station listed in the emergency public information distributed by CP&L.

   b. If no event is in progress obtain information requested on attachment 8.1.14.2, Siren System Inadvertent Activation Report and ask the caller if a call back is desired once more information is known.

8.1.4 (Continued)

2. If an inadvertent siren activation has been confirmed, then notify the following:

   a. All County Emergency Operations Center or Warning Points concerning the plant status. This can be accomplished via Selective Signaling or the Bell lines.

      Sirens are located as follows:

      - Chesterfield County - 13 Siren Locations
        Siren #'s - 01, 02, 03, 04, 05, 06, 09, 10, 11, 15, 16, 17, and 45

      - Darlington County - 28 Siren Locations
        Siren #'s - 07, 08, 12, 13, 14, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 30, 31, 32, 33, 34, 36, 37, 38, 39, 41, 42, 43, and 44

      - Lee County - 4 Siren Locations
        Siren #'s - 28, 29, 35, and 40

      Total Sirens - 45 Siren Locations (All Counties)

   b. Notify the Telecommunication Help Desk (8-1-800-800-6200) that an inadvertent siren activation has occurred and request that repair personnel be dispatched to correct the problem. Request a work order Number and a return call when the sirens have been silenced.

   c. Notify Emergency Preparedness by phone or pager. The ERO Phone Book has the necessary information

   d. Notify Robinson Communications of the inadvertent siren activation and request immediate notification if a press release is to be issued. A press release relating to this event is reportable to the NRC. Consult AP-030, NRC Reporting Requirements.

8.1.4 (Continued)

3. When the Unit 2 Control Room is notified that the siren(s) have been silenced ensure that:

   a. Evaluate AP-030, NRC Reporting Requirements, for potential NRC reporting.

   b. Notify the State and County Warning Points concerning the status of the sirens.

   c. Notify Robinson Communications.

4. Forward information gathered and any completed Attachment 8.1.14.2 forms to Emergency Preparedness for retention as appropriate.

8.1.5 EMERGENCY RESPONSE ORGANIZATION BEEPER DISTRIBUTION

1. After qualifying as an ERO member, EP will arrange an ERO beeper for the positions identified in Attachment 8.1.14.3, ERO Beeper Distribution.

2. Beepers are to ensure that the plant has the ability to meet the 30-45 minute response staffing requirements.

3. Plant Public Address, Non-Responding Emergency Communicators, dialogic and/or beepers are used to contact the 60-75 minute staff, and other positions not required by NUREGs.

8.1.6 INTENTIONALLY BLANK

8.1.7 INTENTIONALLY BLANK

8.1.8 INTENTIONALLY BLANK

8.1.9 INTENTIONALLY BLANK

8.1.10 SCENARIO DEVELOPMENT

1. Several months prior to the start of the routine training exercise schedule perform the following:

   a. Identify required objectives to be performed during that year.

   b. Identify any "specific objectives" in addition to the required objectives.

   c. Prior to the final day in the November preceding the year the scenario development team is needed, request EP Management obtain scenario development team members per guidance below.

8.1.10 **SCENARIO DEVELOPMENT** (Continued)

2. The Scenario development team is comprised of:

   a. Core Team (required)

      Emergency Preparedness (2)

      Health Physics

      Mechanical Maintenance

      I&C/Electrical Maintenance

      Operations

      Training (Simulator qualified)

   b. Optional Team (Scenario specific)

      Fire Protection

      Security

      Site Safety Representative

      Engineering

      Chemistry

   c. Preferably team members will have at least a year experience at Robinson.

   d. Team members should be assigned to the development team for the entire year.

   e. Team members should not be on shift to allow for consistent attendance of scenario meetings, training, and exercises/drills.

8.1.10.2 **SCENARIO DEVELOPMENT** (Continued)

f. Team members are expected to:

- attend team development meetings,
- function as a Controller/Evaluator in Exercises as requested,
- maintain all scenario development materials confidential and promptly report to EP any compromise of scenario elements,
- develop scenario materials and mock-ups assigned.

g. Prior to each Biennial Graded Exercise determine the final dates for the submittal of the 90 day Biennial Graded Exercise objective and the 45 day Biennial Graded Exercise scenario to the NRC.

h. Determine which two members of the Emergency Preparedness staff will be the Scenario development representatives for scenario development.

3. NRC Evaluated Exercise preparations should begin as early as possible. Normally scheduled NRC Exercise preparations should begin at least 3 months prior to the submittal date for the complete package.

4. To the extent practical, scenarios should be validated using the following guidance.

a. For NRC Evaluated Exercises, validation should utilize licensed individuals and be performed close to the actual date of the Exercise. This will ensure the simulator model and operator response is similar to expectations. Separate validation by team members is also desirable.

b. For Normal Training Exercises the "Operations" portion of the scenario is validated by training staff. The integrated scenario (operations combined with EP aspects) should be reviewed by the EP scenario development member and Training to verify adequate timing of events for EP purposes.

8.1.10 **SCENARIO DEVELOPMENT** (Continued)

5. To the extent practical, scenarios should contain the following information. The following sections are suggested for all graded and training exercises.

Section 1.0 Introduction

The introduction contains a description of time, date, and type of exercise. It also includes a description of the level of agency involvement and the agencies which will participate. The introduction also includes a description of each section contained in the scenario manual.

Section 2.0 Objectives

This section defines the exercise objectives.

Section 3.0 Scenario

This section describes the postulated sequence of events occurring at the H.B. Robinson Steam Electric Plant Unit 2 (HBRSEP) which will require the HBRSEP Emergency Preparedness Organization and various onsite and offsite organizations to respond. Included in this sections are copies of the exercise messages and pertinent data which will be utilized to control the progress of the exercise scenario.

Subsection 3.1 Messages

This subsection contains copies of the exercise messages which will be utilized to control the progression of the exercise scenario.

Subsection 3.2 Plant Parameters

This subsection contains time related information concerning the postulated plant conditions, which corresponds to the development of the exercise scenario.

Subsection 3.3 Meteorological Information

This subsection contains information and data concerning the postulated meteorological conditions to the site area which will be utilized in the development of the exercise scenario.

8.1.10 **SCENARIO DEVELOPMENT** (Continued)

Subsection 3.4 Radiological and Damage Control Mission Information

This subsection contains information and data concerning the postulated radiological conditions and Damage Control missions. The radiological information is for onsite as well as offsite conditions due to the abnormal conditions of HBRSEP. The missions are for troubleshooting and repair of onsite damaged or out of service plant equipment needed for the operation of HBRSEP.

Section 4 Controller instructions

This section contains information concerning the controller aspects of exercise participants and facilities.

Section 5 Evaluator Instructions

This section contains information concerning the evaluation of exercise participants and facilities.

Section 6 Supplementary Material

This section contains materials to be used by Controller/Evaluators for documenting strengths, deficiencies, and comments to be used in the individual critiques.

8.1.11 **INTENTIONALLY BLANK**

8.1.12 PUBLIC EDUCATION AND INFORMATION

1. Emergency Preparedness and Site Communications shall perform the following actions:

   a. In cooperation with the State of South Carolina, local governments and with corporate CP&L efforts, ensure that public education and information efforts are consistent and complementary.

   b. Ensure that a public information program for persons living in the possible plume exposure Emergency Planning Zone includes the following elements:

      - Brochures or other media containing educational information on emergency preparedness, nuclear power and radiation, and how to contact CP&L for more information.

      - Coordination of speakers to address emergency preparedness when requested

      - Supplying news material for the media

   c. Ensure that the public education program includes the following information:

      - The potential for occurrence of a radiological emergency.

      - How to recognize a radiological emergency notification.

      - What proper, immediate actions (e.g., return to home, close windows and turn on radio) should be taken upon notification.

      - Protective actions to be taken if shelter is prescribed.

      - General procedure to follow if an evacuation is required.

      - General education on radiation.

      - A contact for how to learn more about emergency preparedness.

8.1.13 **RECORDS**

EP records are vital records. Maintenance and testing records are documented per EPPRO-02 and retained per RMP-011. Drill critiques are documented as self assessments per CAP-NGGC-0201.

8.1.14 **ATTACHMENTS**

8.1.14.1 EP Improvement Form

8.1.14.2 Siren System Inadvertent Activation Report

8.1.14.3 ERO Beeper Distribution

8.1.14.4 Drill Objectives

8.1.14.5 Acceptance Criteria

ATTACHMENT 8.1.14.1
Page 1 of 1

EP IMPROVEMENT FORM

DATE:_____ ERO POSITION: _____

NAME: _____

RECOMMENDED CHANGE IS IN REFERENCE TO:

_____ EMERGENCY PLAN _____ EMERGENCY FACILITY

_____ EP-_____ _____ EP TRAINING
(Give Number)

_____ EQUIPMENT _____ OTHER (List) _____

I RECOMMEND THE FOLLOWING CHANGE, ADDITION OR IMPROVEMENT:

(Be specific - list all information)_____

_____

_____

_____

_____

For Emergency Preparedness Use

Id Number:_____ Priority:_____

C/A Assigned to: _____ Due Date:_____

(N/A for priority 3 items)

RESOLUTION _____

_____

_____

_____

_____

ATTACHMENT 8.1.14.1
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SIREN SYSTEM INADVERTENT ACTIVATION REPORT

Date:__/__/__ Time:_____

Fill out as much of the following information as possible:

1. Incident Date:__/__/__ Incident Time:_____

2. Caller's Name:_____ Caller's Phone No.:_____

3. Location of siren(s) (include County and Community of caller):

The siren number is the preferred information. The siren number is located on the siren pole. If the caller cannot provide the siren number, obtain any information which may aid in identifying the siren. For example, request a description of the siren location, a road number, or of the location of the person who is making the report and the direction from which the sound is coming.

Siren Number(s) or Location _____

_____

_____

4. Additional questions: (circle one)

- What noise did the siren make (steady tone, wavering tone, etc.)?
- Is the siren still sounding? (Yes / No)
- For what length of time did the siren sound?
  (1 min / 2 min / 3 min / Continuous / Unknown)
- Is more than one siren sounding? (Yes / No)

5.

Name of Person Receiving Report	Location	Telephone Number
_____	_____	_____

ATTACHMENT 8.1.14.3
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ERO BEEPER DISTRIBUTION

All Team Members in the following positions.

SEC	OSC Leader	AERM
POD	ERM	NRC
TAD	A&LM	EP
ERD	TAM	JIC Director
RCD/RCM	POA	Reactor Engineer
ESTL	EC	Computer Support
Superintendent Shift Operations Desk	DPTL	Company Spokesperson
State/County Communicator		RC Tech Damage Control
RC Tech Facilities (45 min)		En Mon Team (45 min)

Rotational Beeper positions

NRC Communicator	Chemistry/Environmental Monitoring
PI Communicator	Electrical Engineer
Security Lieutenant	
Mechanical Engineer	JIC Technical Spokesperson
Damage Control Leaders	RC Tech Facilities (75 min)
(1) Mechanics	En Mon TL
(1) I&C/Electricians	En Mon Team (75 min)

(1) Normally on shift, beepers available

DRILL OBJECTIVES

	NUREG 0654	OBJECTIVE	CR	TSC	OSC	JIC	EOF	FREQ
1	A.1.e F.1.a	Provide 24 hour per day on shift emergency response personnel as required by the Emergency Plan including the capability of 24 hour per day manning of communications.	X					6yr
2	A.4	Demonstrate ability to staff Emergency Response Facilities (ERF) 24 hours per day.		X	X	X	X	6yr
3	B.5 H.4 B.7 [1]b.2	Demonstrate the ability to augment shift staff and activate ERFs with Emergency Plan Table 5.3.2-1, "Capability for Additions" column for 30-45 min and 60-75 min.		X	X		X	2yr
4	 B.7.a B.7.b B.7.c B.7.d	Demonstrate the ability to augment shift staff with: -Logistics support personnel -Technical support for reentry/recovery operations -Management interface with governmental authorities -Corporate interface with news media		 X		 X	 X X X	2yr

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DRILL OBJECTIVES

	NUREG 0654	OBJECTIVE	CR	TSC	OSC	JIC	EOF	FREQ
5	B.8	Demonstrate the ability to contact Contractors and private organizations for technical assistance.					X	Ann
6	B.9 L.4 [1]b.12	Demonstrate the ability to obtain assistance from law enforcement, medical, and fire-fighting organizations including assistance for contaminated personnel.	X					Ann
7	C.2.b	Demonstrate the ability to provide a representative to the SEOC/FEOC (when activated) and County EOCs.					X	2yr
8	C.3 [1]b.9	Demonstrate the ability to coordinate radiological monitoring and analysis.					X	Ann
9	D.1 I.1 [1]b.4	Demonstrate the ability to identify and properly classify events using appropriate procedures, plant system parameter values, and the EALs.	X	X				Ann
10	E.2 F.1.e [1]b.2	Demonstrate the ability to alert, notify, and mobilize ERO personnel	X	X	X	X	X	Ann
11	E.3 [1]b.5	Demonstrate the ability to make initial emergency notification to State and Chesterfield, Darlington, and Lee County Warning Points or EOCs within 15 minutes following declaration of each emergency classification.	X				X	Ann

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DRILL OBJECTIVES

	NUREG 0654	OBJECTIVE	CR	TSC	OSC	JIC	EOF	FREQ
12	E.4 [1]b.5	Demonstrate the ability to make follow-up notifications to State and Chesterfield, Darlington, and Lee County Warning Points or EOCs within 60 minutes following initial and change of classification notifications.	X				X	Ann
13	E.7 J.7 [1]b.10	Demonstrate the ability to formulate protective action recommendations and transmit to State and County personnel.					X	Ann
14	F.1 F.1.a F.1.b	Demonstrate the ability to communicate with State and County personnel using primary and backup communication systems.	X				X	Ann
15	F.1.c	Demonstrate the provisions to communicate with Federal emergency response organizations.	X	X				Ann
16	F.1.d [1]b.6	Demonstrate the ability to communicate between the CR, TSC, EOF, OSC, and Enmon teams.	X	X	X		X	Ann
17	F.1.f	Demonstrate the ability to communicate with the NRC within 60 minutes following each emergency classification declaration.	X	X				Ann
18	G.3.a G.3.b	Demonstrate the ability to activate the JIC and interface with the news media.				X		2yr

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DRILL OBJECTIVES

	NUREG 0654	OBJECTIVE	CR	TSC	OSC	JIC	EOF	FREQ
19	G.4.a G.4.b [1]b.7	Demonstrate the ability to provide a Company Spokesperson and timely dissemination of information to the news media.				X		2yr
20	G.4.c	Demonstrate the ability to deal with rumors.				X		2yr
21	H.6.a H.6.b I.5	Demonstrate the ability to obtain data from meteorological, hydrologic, seismic, radiological monitors, and sampling devices.	X				X	Ann
22	I.2 [1]b.9	Demonstrate the ability to obtain samples and analyze data from the PASS and other post accident monitoring equipment.			X			Ann
23	I.3.a I.3.b	Demonstrate the ability to determine the source term and magnitude of releases.	X				X	Ann
24	I.8 I.9 J.7	Demonstrate the ability to project dosage to the public, from the ingestion pathway, based on plant and field data.					X	Ann
25	J.1 [1]b.2	Demonstrate the ability to alert and advise individuals who are visitors, contractors, and members of the public onsite.	X					Ann

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DRILL OBJECTIVES

	NUREG 0654	OBJECTIVE	CR	TSC	OSC	JIC	EOF	FREQ
26	J.3 K.7	Demonstrate the ability to evacuate non-essential personnel from site to be monitored and decontaminated at an offsite location.			X		X	6yr
27	J.4	Demonstrate the ability to monitor, decontaminate and evacuate non-essential personnel from site.			X		X	6yr
28	J.5	Demonstrate the ability to account for individuals in the protected area and identify the names of those unaccounted for within 30 minutes.		X				6yr
29	J.6 K.3.a K.3.b	Demonstrate the ability to provide ERO personnel protective clothing, respiratory protection, dosimetry, and radioprotective drugs. This also includes determination of doses received and maintenance of dose records 24 hours per day.	X	X	X		X	2yr
30	K.1 [1]b.11	Demonstrate the ability to establish onsite exposure guidelines consistent with EPA emergency worker and lifesaving activities.		X				Ann
31	L.2	Demonstrate the ability to provide onsite first aid capability.			X			Ann

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DRILL OBJECTIVES

	NUREG 0654	OBJECTIVE	CR	TSC	OSC	JIC	EOF	FREQ
32	M.1 M.2 M.3 M.4	Demonstrate the ability to reassess plant conditions and evaluate recovery/reentry considerations.					X	6yr
33	N.1.b	Demonstrate the ability to augment the ERO, during an Exercise, between 6:00 p.m. and 4:00 a.m. or any weekend hours.	X					6yr
34	N.2.d	Perform Radiological Monitoring Drills which involve collection and analysis of all sample media (e.g., water, vegetation, soil and air), and provisions for communications and record keeping.					X	Ann
35	N.2.b	Perform fire drills which demonstrate the ability of the fire brigade to respond to a fire and interface with offsite fire assistance.	X					6yr
36	N.2.c	Perform medical emergency drills which demonstrate the ability to deal with a medical emergency involving a simulated contaminated individual including participation of offsite medical treatment agencies.	X		X			Ann

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DRILL OBJECTIVES

	NUREG 0654	OBJECTIVE	CR	TSC	OSC	JIC	EOF	FREQ
37	N.2.e (1) [1]b.9	Perform Health Physics Drills which involve response to, and analysis of, simulated elevated airborne and liquid samples and direct radiation measurements in the environment.			X			6mo
38	ACR 94-01156 CA .1	Perform an offsite hazards drill which will involve response to, and analysis of simulated offsite hazards (examples: chlorine, propane, hydrogen, gasoline or some other offsite hazard either natural man made). Samples and measurements as well as protective measures should be taken.	X	X	X		X	Ann
39	N.4	Perform a critique at the conclusion of an exercise to evaluate the ability of organizations to respond as required.	X	X	X	X	X	Ann
40		Demonstrate that NRC identified open items resulting from pervious exercises can be closed.						Ann
41	CR 98-02026	Demonstrate actual use of SCBA's including field change out of spare cylinder.			X			6mon

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ACCEPTANCE CRITERIA

	OBJECTIVE	ACCEPTANCE CRITERIA
1	Provide 24 hour per day on shift emergency response personnel as required by the Emergency Plan including the capability of 24 hour per day manning of communications.	This objective is met as long as the staffing requirements of Technical Specifications, Emergency Plan Table 5.3.2-1 "Minimum Shift Size" column are satisfied.
2	Demonstrate ability to staff ERFs 24 hours per day.	This objective is met when the ERFs are staffed and a shift turnover is complete.
3	Demonstrate the ability to augment shift staff and activate ERFs with Emergency Plan Table 5.3.2-1, "Capability for Additions" column for 30-45 min and 60-75 min.	This objective is met when the staffing requirements of the Emergency Plan Table 5.3.2-1, "Capability for Additions" column is satisfied.
4	Demonstrate the ability to augment shift staff with: -Logistics support personnel -Technical support for reentry/recovery operations -Management interface with governmental authorities -Corporate interface with news media	This objective is met when facilities are capable of being activated
5	Demonstrate the ability to contact Contractors and private organizations for technical assistance.	This objective is met when the ability to contact has been demonstrated. (Actual contact may be simulated.)
6	Demonstrate the ability to obtain assistance from law enforcement, medical, and fire-fighting organizations including assistance for contaminated personnel.	This objective is met when the ability to contact has been demonstrated. (Actual contact may be simulated.)

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ACCEPTANCE CRITERIA

	OBJECTIVE	ACCEPTANCE CRITERIA
7	Demonstrate the ability to provide a representative to the SEOC/FEOC (when activated) and County EOCs.	This objective is met when the facilities are activated and an ERO representative is present.
8	Demonstrate the ability to coordinate radiological monitoring and analysis.	This objective is met when appropriate monitoring and analysis data are received. (May be simulated)
9	Demonstrate the ability to identify and properly classify events using appropriate procedures, plant system parameter values, and the EALs.	This objective is met when events are correctly classified in a timely manner.
10	Demonstrate the ability to alert, notify, and mobilize ERO personnel.	This objective is met when the ERFs are activated.
11	Demonstrate the ability to make initial emergency notification to State and Chesterfield, Darlington, and Lee County Warning Points or EOCs within 15 minutes following declaration of each emergency classification.	This objective is met when initial notifications are accomplished within the required 15 minutes. Time starts at emergency declaration and ends at first contact.
12	Demonstrate the ability to make follow-up notifications to State and Chesterfield, Darlington, and Lee County Warning Points or EOCs within 60 minutes following initial and change of classification notifications.	This objective is met when follow-up notifications are accomplished within the required 60 minutes. Time starts at completion of the previous notification and ends at first contact.

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ACCEPTANCE CRITERIA

	OBJECTIVE	ACCEPTANCE CRITERIA
13	Demonstrate the ability to formulate protective action recommendations and transmit to State and County personnel.	This objective is met when protective action recommendations are transmitted to the State and Counties within 15 minutes following the declaration of a General Emergency.
14	Demonstrate the ability to communicate with State and County personnel using primary and backup communication systems.	This objective is met when communications have been established using the Selective Signaling system and one of the backup systems.
15	Demonstrate the provisions to communicate with Federal emergency response organizations.	This objective is met by agreement letters.
16	Demonstrate the ability to communicate between the CR, TSC, EOF, OSC, and Enmon teams.	This objective is met when none of the other Objectives fail due to communications.
17	Demonstrate the ability to communicate with the NRC within 60 minutes following each emergency classification declaration.	This objective is met when communications are established within the required time. Time starts at emergency declaration and ends at first contact.
18	Demonstrate the ability to activate the JIC and interface with the news media.	This objective is met when the JIC is activated and a press conference conducted.

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ACCEPTANCE CRITERIA

	OBJECTIVE	ACCEPTANCE CRITERIA
19	Demonstrate the ability to provide a Company Spokesperson and timely dissemination of information to the news media.	This objective is met when a Company spokesperson is present and briefings are conducted as appropriate.
20	Demonstrate the ability to deal with rumors.	This objective is met when false information is corrected by responsible personnel.
21	Demonstrate the ability to obtain data from meteorological, hydrologic, seismic, radiological monitors, and sampling devices.	This objective is met when data has been obtained and provided to appropriate personnel.
22	Demonstrate the ability to obtain samples and analyze data from the PASS and other post accident monitoring equipment.	This objective is met when samples have been obtained and accurately analyzed.
23	Demonstrate the ability to determine the source term and magnitude of releases.	This objective is met when source term and release magnitude/dose protection have been accurately determined.
24	Demonstrate the ability to project dosage to the public, from the ingestion pathway, based on plant and field data.	This objective is met when Dose Projection information is included in the General Emergency declaration notification or as a follow-up to the General Emergency notification.

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ACCEPTANCE CRITERIA

	OBJECTIVE	ACCEPTANCE CRITERIA
25	Demonstrate the ability to alert and advise individuals who are visitors, contractors, and members of the public onsite.	This objective is met when individuals receive, understand, and respond as required to notifications provided by alarms and PA.
26	Demonstrate the ability to evacuate non-essential personnel from site to be monitored and decontaminated at an offsite location.	This objective is met when personnel are sent to an offsite location for decontamination. (May be simulated.)
27	Demonstrate the ability to monitor, decontaminate and evacuate non-essential personnel from site.	This objective is met when personnel are able to discuss decontamination procedures.
28	Demonstrate the ability to account for individuals in the protected area and identify the names of those unaccounted for within 30 minutes.	This objective is met when accountability is completed within 30 minutes.
29	Demonstrate the ability to provide ERO personnel protective clothing, respiratory protection, dosimetry, and radioprotective drugs. This also includes determination of doses received and maintenance of dose records 24 hours per day.	This objective is met when adequate supplies are available and dose records are maintained during the drill.

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ACCEPTANCE CRITERIA

	OBJECTIVE	ACCEPTANCE CRITERIA
30	Demonstrate the ability to establish onsite exposure guidelines consistent with EPA emergency worker and lifesaving activities.	This objective is met when emergency worker and lifesaving exposure guidelines are implemented.
31	Demonstrate the ability to provide onsite first aid capability.	This objective is met when First Responders have provided initial treatment and the victims have been delivered to the rescue squad. (Portions may be simulated.)
32	Demonstrate the ability to reassess plant conditions and evaluate recovery/reentry considerations.	This objective is met when a recovery plan and an organization is formulated. (May be simulated.)
33	Demonstrate the ability to augment the ERO, during an Exercise, between 6:00 p.m. and 4:00 a.m. or any weekend hours.	This objective is met when augmentation is successfully completed between the hours of 6:00 p.m. and 4:00 a.m. or any weekend hours.
34	Perform Radiological Monitoring Drills which involve collection and analysis of all sample media (e.g., water, vegetation, soil and air), and provisions for communications and record keeping.	This objective is met when environmental measurement through analysis of water, vegetation, soil, and air sample media have been completed, recorded and communicated.
35	Perform fire drills which demonstrate the ability of the fire brigade to respond to a fire and interface with offsite fire assistance.	This objective is met when the fire brigade arrives at the scene with appropriate equipment and offsite fire assistance is coordinated. (Portions may be simulated.)

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ACCEPTANCE CRITERIA

	OBJECTIVE	ACCEPTANCE CRITERIA
36	Perform medical emergency drills which demonstrate the ability to deal with a medical emergency involving a simulated contaminated individual including participation of offsite medical treatment agencies.	This objective is met when first responders arrive at the scene and offsite assistance is coordinated. (Portions may be simulated.)
37	Perform Health Physics Drills which involve response to, and analysis of, simulated elevated airborne and liquid samples and direct radiation measurements in the environment.	This objective is met when response and analysis is made to simulated elevated airborne and liquid samples and direct radiation measurements in the environment.
38	Perform an offsite hazards drill which will involve response to and analysis of simulated offsite hazards (example chlorine, propane, hydrogen, gasoline or some other offsite hazard either natural or man made). Samples, measurements as well as protective measures should be taken.	This objective is met when an offsite hazard is included in a drill or exercise and protective measures are taken and the hazard is measured for the protective measures.
39	Perform a critique at the conclusion of an exercise to evaluate the ability of organizations to respond as required.	This objective is met when the critique report has been issued.
40	Demonstrate that NRC identified open items resulting from pervious exercises can be closed.	This objective is met by the closure of NRC open items.
41	Demonstrate use of SCBAs including field change out of spare cylinder.	This objective is meet when actual use of SCBA's and change out of cylinder are demonstrated.

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Banntemp

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EFFECTIVE 10/2

CP&L

R
Reference
Use

CAROLINA POWER & LIGHT COMPANY
H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2

PLANT OPERATING MANUAL

VOLUME 2
PART 5

EMERGENCY PROCEDURE

EPRAD-03

DOSE PROJECTIONS

REVISION 8

SUMMARY OF CHANGES

STEP #	REVISION COMMENTS
TOC	Updated page numbers to attachment content change.
1.2.13f Note	Corrected step reference
Attach 8.3.5.5	Added NaOH as a requirement for effective spray.
Attach 8.3.5.6	Reformatted attachment for ease of use and for changes from ESR-96-0046.

TABLE OF CONTENTS

8.3.1 PURPOSE

This procedure provides instruction for performing dose projections in case of possible offsite emergencies from a release of airborne radioactivity.

8.3.2 RESPONSIBILITIES

1. Operations personnel under the direction of the Site Emergency Coordinator are responsible for performing the Control Room portion of this procedure until the Dose Projection Team is activated.

2. The Radiological Control Manager or the Dose Projection Team Leader is responsible for calculating the TEDE and the thyroid CDE, to be used by the Radiological Control Manager and the Emergency Response Manager in determining and evaluating possible off-site consequences from a release of airborne radioactivity.

NOTE: Due to the complexity and branching nature of this procedure a slightly different numbering convention from other Emergency Procedures (EPS) is used.

Additionally, this section contains several Attachments to assist the user that are not specifically referenced in the body of the section.

8.3.3 INSTRUCTIONS

1. USE OF THE DOSE PROJECTION PROGRAM IN THE CONTROL ROOM

   1.1 Accessing The Dose Projection Computer Program.

8.3.3 (Continued)

NOTE: This section represents a systematic approach to access the dose projection computer program. Steps must be followed in order and you must be logged into EDS with an event declared. Any problems in accessing the program must be promptly reported to Information Technology personnel for resolution.

1.1.1 IF the ERFIS terminal to be used is initially aligned to the site LAN, THEN align the terminal to the ERFIS system.

NOTE: Inability to link with the ERFIS host is indicated by the following:

IF initially in ERFIS during the failure

an "ERR11 COMMUNICATIONS TIMED OUT!!!" message on the top line of the man machine interface, and

the EDS icon in the upper right corner will turn red.

IF initially in the site LAN during the failure

Error text on the screen and a login prompt.

1.1.2 IF the ERFIS terminal was in the site LAN at the time of the failure and error text and a login prompt are displayed, THEN proceed to Step 1.1.5 for "local mode" operations.

1.1.3 IF the ERFIS terminal to be used is aligned and linked to ERFIS, THEN dose projection may be accessed by typing the turn on code "hbrdose" in the man-machine interface or alternately, from the main menu select the "EP" Menu, then choose "hbrdose."

1. IF the dose projection program is accessed, THEN proceed to Section 1.2 "Control Room Dose Projection."

2. IF the dose projection program is not accessed, THEN proceed to the next step.

8.3.3 (Continued)

1.1.4 IF the ERFIS terminal to be used is aligned but **not** linked to ERFIS, THEN dose projection **may** still be used, however, radiological and meteorological data must be manually entered.

1. Type the turn on code "hbrdose" in the man-machine interface.

2. Notify Information Technology personnel of problems as soon as practical.

3. IF the dose projection program is accessed, THEN proceed to Section 1.2 "Control Room Dose Projection."

4. IF the dose projection is not accessed, THEN proceed to the next step.

1.1.5 IF the ERFIS terminal to be used can not be aligned to ERFIS, THEN continue in this section to configure the ERFIS terminal for "local mode."

NOTE: As long as the ERFIS terminal has power the following sub-steps should align the terminal to perform dose projection in "local mode." This method will require manual entry of radiological and meteorological data.

1. Reboot the ERFIS terminal by depressing CTRL, ALT, SHIFT, DEL (numeric keypad delete must be used) simultaneously. The computer may take up to 10 seconds to respond to this key sequence.

2. Choose ERFIS/EDS from the System Commander.

3. IF a grey QNX window appears, THEN press the right mouse button to get the menu, choose "exit," and confirm the exit choice. Otherwise skip this step and proceed to the next step.

4. When the cursor is displayed, possibly after various system messages, press "ENTER" if the login prompt is not displayed. A "Login" prompt should appear.

1.1.5 (Continued)

NOTE: The login and password prompts are case sensitive and must be entered in lower case.

5. At the login prompt type "hbrdose" and press "Enter."

6. At the password prompt type "hbrdose" and press "Enter." Hbrdose will automatically start after this step.

7. Do not attempt to print or make electronic notifications in "local mode," as this will further degrade execution of the program.

8. IF "local mode" worked, go to Section 1.2, "Control Room Dose Projection."

   - Contact Information Technology personnel for instructions to return the ERFIS terminal to normal when dose projections are complete.

1.1.6 IF "local mode" did not work on the initial ERFIS terminal, THEN repeat Step 1.1.5 on another ERFIS terminal, and request that Information Technology personnel immediately bring a computer to the Control Room with a current version of the dose projection program installed.

1. Information Technology personnel will provide instructions on accessing the program.

2. Proceed to Section 1.2, "Control Room Dose Projection."

1.2 Control Room Dose Projection:

NOTE: IF at any time the computer locks up while performing the following steps, THEN depress CTRL, ALT, DEL simultaneously, or if that is unsuccessful depress CTRL, ALT, SHIFT, DEL (numeric keypad delete must be used) simultaneously, AND GO TO step 1.1.

1.2.1 With the mouse, left click the Projection menu item.

1.2.2 Left click the Control RM menu item.

NOTE: Within each release pathway, the left mouse button can be used to move the cursor to the desired field. Depressing the left mouse button will also select or deselect any of the monitors.

CAUTION

DO NOT USE radiation monitors that are out-of-service for dose projections. Verify that ERFIS data is correct by comparing it to the control room readouts if the RMS/ERFIS interface multiplexer is in alarm.

When manually entering data in hbrdose do not leave blank spaces between characters, (e.g., use 3,000,000 or 3E6 NOT 3 E6).

1.2.4 CONTAINMENT ⇒ ENVIRONMENT Group

a. IF no monitor in the CONTAINMENT⇒ENVIRONMENT group is in alarm, Make sure that none of the check boxes are selected. You can deselect any monitor by pressing the left mouse button on the desired monitor. Go to step 1.2.5.

1.2.4 (Continued)

NOTE: When performing the following step be aware that R-2 is in units of mR/hr while R-32 A&B are in R/hr.

b. IF R-32A OR R-32B OR R-2 are in alarm, THEN select the alarming monitor that has the highest radiation level AND GO TO step 1.2.4.e.

c. IF R-12 is in alarm and is aligned to the CV, THEN select R-12 AND GO TO Step 1.2.4.e.

d. IF R-12 is in alarm AND is aligned to the plant vent, THEN GO TO Step 1.2.5.

e. IF a bad quality code OR no data is being displayed for the selected monitor, THEN manually enter the reading from the radiation monitor drawer.

NOTE: The default CV release flow of 1.5 CFM is based on the CV design leak rate at design basis CV pressure.

f. IF containment integrity is maintained, THEN go to step 1.2.5.

g. IF containment integrity is not maintained, THEN enter the leakrate that is escaping through an unmonitored pathway in the FLOW field (next to R-32A).

1.2.5 PLANT VENT STACK Group

a. IF no monitors in the PLANT VENT STACK group are in alarm, THEN GO TO Step 1.2.6.

b. IF R-14E is above 50 cpm, THEN select R-14E AND GO TO Step 1.2.5.f.

c. IF R-14D is above 12 cpm, THEN select R-14D AND GO TO Step 1.2.5.f.

d. IF R-14C is in alarm, THEN select R-14C AND GO TO Step 1.2.5.f.

e. IF R-21 is in alarm, THEN select R-21.

f. IF a bad quality code OR no data is being displayed for the selected monitor, THEN manually enter the reading from the radiation monitor drawer.

g. IF R-21 was selected, THEN GO TO Step 1.2.6.

h. IF a good quality code is provided for stack FLOW THEN GO TO Step 1.2.5.i.

i. Select the ventilation units which are operating.

1.2.6 R-12

a. IF R-12 is not in alarm THEN GO TO Step 1.2.7.

b. IF R-12 is aligned to the CV THEN GO TO Step 1.2.7.

c. IF R-14C OR R-14D OR R-14E were selected in Step 1.2.5 THEN GO TO Step 1.2.7.

1.2.6 (Continued)

d. IF R-21 was selected in Step 1.2.5 AND HVE-15 is the only release pathway THEN GO TO Step 1.2.7.

e. Select R-12.

f. IF a bad quality code OR no data is being displayed for R-12, THEN manually enter the reading from the radiation monitor drawer.

NOTE: The groups of HVE units in the PLANT VENT STACK group or Attachment 8.3.5.8, Flow Rates, can be used to determine the following flowrate.

g. Move the cursor to the plant vent stack flow field and enter the flow that is going up the plant vent stack.

1.2.7 LOWER FHB ⇒ ENVIRONMENT Group

a. IF no monitors in the Lower FHB ⇒ ENVIRONMENT group are in alarm, THEN GO TO Step 1.2.8.

b. IF R-20 is in alarm AND has not failed high, THEN select R-20 AND GO TO Step 1.2.7.d.

c. IF R-20 has failed high, THEN select R-30.

d. IF a bad quality code OR no data is being displayed for the selected monitor, THEN manually enter the reading from the radiation monitor drawer.

1.2.8 SECONDARY RELEASE

a. IF NO R-31 monitors are above one mrem/hr, THEN GO TO Step 1.2.9.

b. IF steam/water from the Main Steam Line that has a monitor above one mrem/hr is escaping through a faulted Main Steam System outside containment, THEN GO TO step 1.2.8.d.

c. IF NO PORV's AND NO SRV's are open, THEN GO TO Step 1.2.9.

d. Select PORV/SRV.

e. IF a bad quality code OR no data is being displayed for the selected monitor, THEN manually enter the reading from the radiation monitor drawer.

f. IF the release is due to a Main Steam System fault as described in Step 1.2.8.b., THEN using the Main Steam indications on the RTGB and Attachment 8.3.5.8 to compare flowrates, enter the PORV and SRV combination that would produce the same flow rate as the fault, in the fields below the monitor(s) in alarm, AND GO TO Step 1.2.8.1.i.

g. IF the PORV on the Main Steam Line(s) that has the monitor(s) in alarm are open, THEN enter 1 in the PORV field below the monitor(s)in alarm.

h. IF any SRV's on the Main Steam Line(s) that has the monitor(s) in alarm are open, THEN enter the number open in the SRV field below the monitor(s) in alarm.

i. IF a bad quality code OR no data is being displayed in the SG Press field(s) below the monitor(s) in alarm, THEN manually enter the correct pressure as obtained from control room readouts.

1.2.9 STEAM ⇒ CONDENSER

a. IF R-15 is not in alarm, THEN GO TO Step 1.2.10.

b. IF R-14C OR R-14D OR R-14E were not selected in the Plant Vent Stack group OR R-12 was not selected in Step 1.2.6.f, THEN select Steam ⇒ Condenser.

c. IF R-15 is in alarm and not failed high THEN select STEAM⇒CONDENSER AND go to 1.2.9.d.

d. IF a bad quality code OR no data is being displayed for R-15, THEN manually enter the reading from the radiation monitor drawer.

e. IF only one vacuum pump is running, THEN select 310 CFM flow AND GO TO Step 1.2.10.

f. IF two vacuum pumps are running, THEN select 610 CFM flow.

1.2.10 Left click the Done button.

1.2.11 SPECTRUM DETERMINATION

NOTE: The core uncovery time will be the time that a RED status occurs on the CORE COOLING critical safety function status tree until the tree conditions return to yellow status (core covered and core exit thermocouples < 700^0 F). This determination can be performed on the TV monitor or on the manual board.

a. IF the incident does not involve the reactor (i.e. spent fuel, waste gas, old spent fuel), THEN GO TO step 1.2.11.f

b. IF the incident involves the reactor AND the core has not been uncovered, THEN GO TO step 1.2.11.e.

c. Select the time that the core has been uncovered:

- < 30 minutes
- 0.5 - 1.8 hours (30 minutes - 1 hour 48 minutes)
- > 1.8 hours (1 hour 48 minutes)

d. GO TO step 1.2.12.

e. IF the incident involves mechanical damage to fuel in the reactor, THEN select '< 30 minutes' AND GO TO step 1.2.12.

f. IF the incident involves a Waste Gas Decay Tank, THEN select WASTE GAS AND GO TO step 1.2.12.

1.2.11 (Continued)

NOTE: Spent fuel that is being shipped or is in preparation for shipment should be classified as OLD SPENT FUEL. Assume that the spent fuel has been out of the reactor core for less than three years if the true time is unknown.

g. IF the incident is a fuel handling accident AND involves spent fuel that has been out of the reactor core for less than three years THEN select SPENT FUEL AND GO TO step 1.2.12.

h. IF the incident is a fuel handling accident AND involves spent fuel that has been out of the reactor core for more than three years THEN select OLD SPENT FUEL.

1.2.12 FILTRATION/CV SPRAYS/PARTITIONING

NOTE: Attachment 8.3.5.5, Accident Mitigation Systems, of this procedure describes if Filtration/CV Sprays/Partitioning are "Effective" or "Not Effective".

a. IF Filtration OR CV Sprays OR Partitioning are effective, THEN select Effective AND GO TO Step 1.2.13.

b. IF Filtration OR CV Sprays OR Partitioning are not effective, THEN select Not Effective.

1.2.13 METEOROLOGY

CAUTION

If direct access to the meteorological tower has failed, the data will appear colored red in the input fields. DO NOT USE THIS DATA.

a. IF meteorological data with a good quality code is being displayed, THEN GO TO Step 1.2.13.m.

b. IF a bad quality code OR no data is being displayed for meteorological data, THEN left click the REFRESH button to make a second attempt to acquire meteorological data from ERFIS.

c. IF the computer makes the connection to the meteorological tower AND the meteorological data is properly updated (in accordance with Caution Statement above), THEN GO TO Step 1.2.13.m.

d. IF meteorological data is not available from the control room computer, THEN manually update the meteorological data.

e. Call the CP&L offsite meteorological contact (See the ERO Phone Book for number).

f. IF meteorological data is available from the CP&L offsite meteorological contact, THEN manually update the meteorological data AND GO TO Step 1.2.13.k.

NOTE: If the Florence Airport or the National Weather Service office is called, the only information that can be obtained is the wind direction, wind speed, and ambient temperature. Stability factor must be obtained from Step 1.2.13.k of this procedure. If wind speed and direction are only supplied for one point enter these values in both the elevated and ground fields. Do not enter wind gust as the wind speed, and if no Delta T is supplied do not enter one.

g. Call the Florence Airport: (See the ERO Phone Book for numbers)

1.2.13 (Continued)

h. IF meteorological data is available from the Florence Airport, THEN manually update the meteorological data AND GO TO Step 1.2.13.

i. Call the National Weather Service office in Columbia, South Carolina: (See the ERO Phone Book for numbers)

j. IF meteorological data is available from the National Weather Service, THEN manually update the meteorological data.

k. IF there is no stability class data available, THEN make an estimate of the current Atmospheric Stability Class by visual observation, using the following table:

	Rain, Day or Night	Sunny Day	Cloudy Day	Cloudy Night	Clear Night
light wind or calm (< 11.5 mph)	D	B	C	E	F
moderately strong wind(≥ 11.5 mph)	D	C	D	D	D

l. Enter the stability class in the appropriate field.

m. Left click the Shutdown time field.

1.2.14 REACTOR SHUTDOWN TIME

a. IF the reactor is not shutdown, THEN GO TO Step 1.2.15.

b. IF the reactor is shutdown AND the shutdown time is not displayed OR is not correct, THEN manually enter the date and time of shutdown in the space provided.

1.2.15 RELEASE DURATION

NOTE: The estimated release duration should be from the start of the release until the projected time that the release should stop. This can be determined by estimating the completion of a damage control mission, performance of a repair to stop the release, or the estimated time until the RCS, CV Sump, or Steam Generator is below 200° F.

a. IF the release duration is known, THEN manually enter the release duration in the field provided AND go to Step 1.2.16.

b. IF the release duration is unknown AND an estimate is available, THEN enter the estimated time in the field provided AND go to Step 1.2.16.

c. IF the release duration is unknown AND no estimate is available, THEN enter 1 in the field provided AND go to Step 1.2.16.

1.2.16 Left click the Done button.

1.2.17 The dose projection will be given on the screen.

1.2.18 Using the information supplied notify the government officials as per the requirements of EPNOT-00.

2. USE OF THE DOSE PROJECTION PROGRAM BY THE DOSE PROJECTION TEAM

2.1 Access the software using Section 1.1 of this procedure as a guideline, and return to this section instead of the Control Room Dose Projection section.

2.2 The main menu screen will appear. The items in this menu can be accessed by clicking the left button on any of these items.

2.3 Six menu topics are available for use. They are listed here along with the section in this procedure which explains their use.

Projection	2.4
Contingency	2.5
Int Phase	2.6
Graphics	2.7
Utilities	2.8
Exit	2.9

NOTE: The Dose Projection Program should be used to calculate the "Total Dose" from the start of the release until the projected end. To do so conservatively, the Dose Projection Team may decide to use the estimated peak release rate throughout the release period. If no information is available, the current release rate should be considered constant throughout the release period.

2.4 PROJECTION

This menu item should be used to perform early phase dose projections based on plant radiation monitors, plant samples, or environmental samples.

2.4.1 Control Room

This function should be used by control room personnel. Its use is described in Step 1.2 of this procedure.

2.4.2 RMS

This function should be used by the dose projection team to perform dose projections when adequate data is available from the plant effluent monitors. The following steps are for guidance and are not required to be performed in entirety or in the order in which they are given.

2.4.2.1 The first screen that will appear when this menu option is selected is the ROBINSON EFFLUENT MONITORS screen. The following items should be considered when using this screen:

CAUTION

DO NOT perform an official dose projection using data obtained from a radiation monitor that is out-of-service. The control room may be contacted to determine any monitors that are out-of-service that may have good quality codes on ERFIS. This could occur when the RMS/ERFIS interface multiplexer fails.

When manually entering data in hbrdose do not leave blank spaces between characters, (e.g., use 3,000,000 or 3E6 NOT 3 E6).

NOTE: Attachment 8.3.5.12, RMS Monitored Systems can be used to determine the relationship between radiation monitors and effluent pathways.

- Data that is on this screen will have quality codes in Attachment 8.3.5.3, Quality Codes of this procedure.

2.4.2.1 (Continued)

- Dose projections for more than one release pathway can be performed using this program. The monitors are grouped on this screen according to the release pathway that they monitor. Therefore, only one monitor from each group can be selected each time the dose projection program is executed.

- The Containment to Environment release path is a valid release path in most situations even when no containment leakage has been identified. The 1.5 cfm flow is the design basis release rate when the CV is pressurized to design basis pressure. If containment leakage is into the Auxiliary Building and the release is monitored by a stack monitor a dose projection using the containment monitors is not necessary.

NOTE: If a projection is made using R-12 aligned to the plant vent it will be based on a ground level release pathway instead of a mixed mode release.

- R-12 is usually lined up to the containment atmosphere. If a dose projection is performed using R-12, ensure that it aligned the way that it is being used.

- R-12 can be used to perform a dose projection when it is aligned to the plant vent. In order to accomplish this the R-12 plant vent flowrate must be manually entered into the containment monitors flowrate field. If this is performed it can not be accomplished at the same time that a dose projection is being performed based on containment leakage. For this reason if a projection is needed based on both release paths they must be performed separately and manually added together.

2.4.2.1 (Continued)

- The flow rate for the R-14 monitors will be automatically updated by ERFIS to reflect the plant vent stack when ERFIS is available.

- R-21 has a default flow rate which is equivalent to the flow of HVE-15. This default value should normally be used, because this is the effluent volume that this detector is monitoring.

- R-20 and R-30 have a default flow rate which is equivalent to the flow of HVE-14.

- R-31A, 31B, and 31C should not normally be used if they are below 1 mrem/hr. However, if they are, they must be background corrected and manually entered. Obtain the latest valid normal reading from the weekly background/alarm setpoint check or other source (Attachment 8.3.5.11, Typical RMS Data, may be used) and subtract the normal reading from the control room readout and enter this value.

- If a release is due to a faulted steam line, a dose projection can be performed by selecting the number of SRV's and PORV that would approximate the release (use Attachment 8.3.5.8, Flow Rates). The UNKNOWN MIX under the CONTINGENCY menu can be used to perform a dose projection under this condition using Attachment 8.3.5.7, Source Term Determination, Part E.

2.4.2.1 (Continued)

NOTE: If a dose projection is performed using R-15 and the release is due to a break in the line between the condenser vacuum pumps and the plant vent stack, the projection will be based on a mixed mode release, instead of a ground level release which would be more accurate.

– The program will allow you to perform dose projections using the R-15 monitor and the plant vent monitors at the same time. However, this should only be done under the following circumstances:

- R-15 is above background and the line from the condenser vacuum pumps to the plant vent is allowing leakage, OR

- R-15 is above background and NEITHER R-14C, R-14D, R-14E, NOR R-12 when it is aligned to the plant vent, are being used for a dose projection.

2.4.2.2 Once selections have been made on this screen select the DONE field.

2.4.2.3 The SPECTRUM DETERMINATION screen is the next screen that will appear. Several characteristics of the incident must be entered on this screen in order to identify the source term.

NOTE: Only one of the following conditions can exist for each execution of the Dose Projection Program. If more than one of the following conditions exist, execute the projection more than once using the appropriate effluent monitors to accurately quantify the effluent.

- If the incident involves the reactor, the time that the reactor core has been uncovered must be selected using the guidelines in Attachment 8.3.5.4, Core Uncovery Time Determination of this procedure.

- If the incident involves Spent Fuel, regardless of the location, you must identify if the fuel is Spent Fuel or Old Spent Fuel. Old Spent Fuel is fuel that has <u>not</u> been in the reactor while critical for three years or more.

- If the incident involves a Waste Gas Decay Tank select the Waste Gas option.

NOTE: The estimated release duration should be from the start of the release until the projected time that the release should stop. This can be determined by estimating the completion of a damage control mission, performance of a repair to stop the release, or the estimated time until the RCS, CV Sump, or Steam Generator is below 200° F.

- The RELEASE DURATION should be determined and entered in the appropriate field. If an estimate of the time is not known one hour can be used here until better information is available.

2.4.2.3 (Continued)

NOTE: A Plant Operations Advisor, SRO on the Accident Assessment Team, or the Shift Technical Advisor should be consulted to determine whether these mitigation systems are operable.

- The effectiveness of FILTRATION/CV SPRAYS/PARTITIONING should be determined. Use the guidelines in Attachment 8.3.5.5, Accident Mitigation Systems, of this procedure to make this determination.

- If the quality codes for the meteorology data are good they may be used. If the quality codes are bad or there is other reason to question them, complete this section using Attachment 8.3.5.6, Obtaining and Updating Meteorological Data, of this procedure for guidance.

- If the plant has SHUTDOWN enter the shutdown date and time in the appropriate fields. Otherwise, these fields can be left as they appear.

- The DONE field should be selected when all of the information on this screen has been entered.

2.4.2.4 The Projection Screen is the final screen to appear. It is explained in Step 3 of this procedure.

2.4.3 PLANT SAMPLE

This function is for use by the dose projection team to perform dose projections based on plant samples of the effluent stream. It should be used as needed by the dose projection team.

2.4.3.1 The screen that will appear when this menu option is selected should be completed with the help of the following guidelines.

- Enter the activity of each nuclide that is listed on the screen that is available from the plant sample analysis.

- Identify the release height of the effluent. Select mixed if the release is through the plant vent regardless of the wind speed. Select ground if the release is by any other pathway, or if the pathway is unknown.

- The time from sample to release is provided to correct the sample activity for any radioactive decay that has occurred in the sample effluent between the time the sample was collected and the time of the release. DO NOT enter a value in this field unless you wish to decay correct the effluent stream.

- Enter the flowrate in cfm of the effluent stream. Care should be taken to understand where the sample was obtained, and ensure that the FLOW field data corresponds with the flow of the sampled air with no further dilution. A flowrate can be manually entered using the flowrates in Attachment 8.3.5.8, Flow Rates, as a reference, or a flow can be selected by selecting the FLOWS field.

2.4.3.1 (Continued)

NOTE: The estimated release duration should be from the start of the release until the projected time that the release should stop. This can be determined by estimating the completion of a damage control mission, performance of a repair to stop the release, or the estimated time until the RCS, CV Sump, or Steam Generator is below 200° F.

- The release duration should be determined and entered in the appropriate field. If an estimate of the time is not known, one hour can be used until better information is available.

- If the quality codes for the meteorology data are good they may be used. If the quality codes are bad or there is other reason to question them, complete this section using Attachment 8.3.5.6, Obtaining and Updating Meteorological Data of this procedure for guidance.

- If the plant has shutdown, enter the shutdown date and time in the appropriate fields.

- The DONE field should be selected when all of the information on this screen has been entered.

2.4.3.2 The Projection Screen is the final screen to appear. It is explained in Step 3 of this procedure.

2.4.4 ENVIRONMENTAL SAMPLE

This function is for use by the dose projection team to perform dose projections based on environmental samples. It should be used as needed by the dose projection team.

2.4.4.1 The screen that will appear when this menu option is selected is titled as the ENVIRONMENTAL MONITORING TEAM. It should be completed with the help of the following guidelines.

- Enter the closed window dose rate (in mrem/hr) that is obtained at a height of approximately one meter above the ground. The value should be obtained from the Environmental Monitoring Team Leader and should reflect the most recent data that is available from near the centerline of the plume.

- For the air sample dose rate select the CART field, and enter data in the appropriate fields using the following guidance:

  - Enter the sample volume in cubic feet.

  - Select whether count rate or dose rate will be entered.

  - Enter the count rate or dose rate on contact with the iodine cartridge. This data should be obtained from the Environmental Monitoring Team Leader and should reflect the most recent data that is available from the centerline of the plume.

  - Select the DONE field and the program will calculate the Thyroid Committed Dose Rate. (This calculation is based on Attachments in EPRAD-01, Environmental Monitoring.)

  - Select the CANCEL field to exit this window or click the mouse outside of the window.

2.4.4.1 (Continued)

- Enter the downwind distance from the plant stack to the sample collection location.
- Enter the direction from the plant that the sample was collected in degrees.
- The release duration should be determined and entered in the appropriate field. If the time is not known one hour should be used here until better information is available.
- Identify the release height of the effluent. Select mixed if the release is through the plant vent regardless of the wind speed. Select ground if the release is by any other pathway, or if the pathway is unknown.
- If the quality codes for the meteorology data are good they may be used. If the quality codes are bad or there is other reason to question them, complete this section using step Attachment 8.3.5.6, Obtaining and Updating Meteorological Data, of this procedure for guidance.
- If the plant has shutdown enter the shutdown date and time in the appropriate fields.
- The DONE field should be selected when all of the information on this screen has been entered.

2.4.4.2 The Projection Screen is the final screen to appear. It is explained in Step 3 of this procedure.

2.5 CONTINGENCY

Contingency calculations are typically "what if" types of calculations that allow the Dose Projection Team to make predictions of off-site dose based on a projected event. However, they can be used to make actual dose projections.

2.5.1 KNOWN MIX

This function allows the user to input the isotopic analysis of the release in order to perform a dose projection.

2.5.1.1 The screen that will appear when this menu option is selected should be completed with the help of the following guidelines.

- Enter the activity of each nuclide that is listed on the screen which could be in a postulated release.
- Identify the release height of the effluent. Select mixed if the release is through the plant vent regardless of the wind speed. Select ground if the release is by any other pathway, or if the pathway is unknown.
- Enter the time from when the activities were determined until the release could begin. This is not required, it should only be entered when it is expected that the activity has decayed since the sample was pulled.
- Enter the number of Curies that could be released. Attachment 8.3.5.7, Source Term Determination, of this procedure can be used to help determine this value.

2.5.1.1 (Continued)

- If the quality codes for the meteorology data are good they may be used. If the quality codes are bad or there is other reason to question them, complete this section using Attachment 8.3.5.6, Obtaining and Updating Meteorological Data, of this procedure for guidance.

- If the plant has shutdown enter the shutdown date and time in the appropriate fields.

- The DONE field should be selected when all of the information on this screen has been entered.

2.5.1.2 The Projection Screen is the final screen to appear. It is explained in Step 3 of this procedure.

2.5.2 UNKNOWN MIX

This function allows the user to project what the offsite dose to the public would be due to a release if the total activity of the release is known but the isotopic abundances are not known.

2.5.2.1 The screen that will appear when this menu option is selected should be completed with the help of the following guidelines.

NOTE: Only one of the following conditions can exist for each execution of the Dose Projection Program. If more than one of the following conditions exist, execute the projection more than once using the appropriate effluent monitors to accurately quantify the effluent.

- If the incident involves the reactor core the time that the reactor core has been uncovered or could be uncovered must be selected. Use Attachment 8.3.5.4, Core Uncovery Time Determination, to help make this determination.

2.5.2.1 (Continued)

- If the incident involves Spent Fuel, regardless of the location, you must identify if the fuel is Spent Fuel or Old Spent Fuel. Old Spent Fuel is fuel that has not been in the reactor while critical for three years or more.

- If the incident involves a Waste Gas Decay Tank select the Waste Gas option.

- Enter the number of Curies that could be released. Attachment 8.3.5.7, Source Term Determination, of this procedure can be used to help determine this value.

- Identify the release height of the effluent. Select mixed if the potential release is through the plant vent regardless of the wind speed. Select ground if the release is by any other pathway, or the pathway is unknown.

- The effectiveness of Filtration/CV Sprays/Partitioning should be determined. The guidelines in Attachment 8.3.5.5, Accident Mitigation Systems, of this procedure should be used to make this determination.

- If the quality codes for the meteorology data are good they may be used. If the quality codes are bad or there is other reason to question them, complete this section using Attachment 8.3.5.6, Obtaining and Updating Meteorological Data, of this procedure for guidance.

- If the plant has shut down enter the shutdown date and time in the appropriate fields.

- The DONE field should be selected when all of the information on this screen has been entered.

2.5.2.2 The Projection Screen is the final screen to appear. It is explained in Step 3 of this procedure.

2.5.3 DEFAULTS

CAUTION

Calculated dose using defaults are EXTREMELY conservative and may assume all of the core activity is released, depending on the spectrum determination.

This function allows the user to hypothesize what the offsite dose to the public would be due to a postulated release if plant conditions are unknown. A default should only be used when neither the total activity nor the isotopic analysis of the potential release are known.

2.5.3.1 The screen that will appear when this menu option is selected should be completed with the help of the following guidelines.

NOTE: Only one of the following conditions can exist for each execution of the Dose Projection Program. If more than one of the following conditions exist, execute the projection more than once using the appropriate effluent monitors to accurately quantify the effluent.

- If the incident involves the reactor core the time that the reactor core has been uncovered or could be uncovered must be selected. Use Attachment 8.3.5.4, Core Uncovery Time Determination, to make this determination.

- If the incident involves Spent Fuel, whether in the containment or in the Fuel Handling Building, you must identify if the fuel is Spent Fuel or Old Spent Fuel. Old Spent Fuel is fuel that has not been in the reactor while critical for three years or more.

2.5.3.1 (Continued)

- If the incident involves a Waste Gas Decay Tank select the Waste Gas option.

- Identify the release height of the effluent. Select mixed if the potential release is through the plant vent regardless of the wind speed. Select ground if the release is by any other pathway, or the pathway is unknown.

- The effectiveness of Filtration/CV Sprays/Partitioning should be determined. The guidelines Attachment 8.3.5.5, Accident Mitigation Systems, of this procedure should be used for making this determination.

- If the quality codes for the meteorology data are good they may be used. If the quality codes are bad or there is other reason to question them, complete this section using Attachment 8.3.5.6, Obtaining and Updating Meteorological Data, of this procedure for guidance.

- If the plant has shutdown enter the shutdown date and time in the appropriate fields.

- The DONE field should be selected when all of the information on this screen has been entered.

2.5.3.2 The Projection Screen is the final screen to appear. It is explained in Step 3 of this procedure.

2.6 INTERMEDIATE PHASE

Intermediate phase calculations are used during the intermediate phase of an emergency to project the one year, two year, and fifty year committed dose to the public due to exposure from contamination deposited on the ground. The calculations are based on environmental data.

2.6.1 DOSE RATE

This function is used to calculate the projected doses using dose rate data from environmental monitoring teams.

2.6.1.1 The screen that will appear when this menu option is selected should be completed with the help of the following guidelines.

- It should be determined if weathering (radioactive decay is also included in this factor) will be considered when performing this function. To do this select the UTILITIES function from the main menu, and follow the guidelines in Step 2.9.5 of this procedure.

- Enter the closed window dose rate in mrem/hr taken at approximately one meter from the ground in the 1 meter dose rate field.

- Enter the straight line distance in miles or fractions of miles from the plant vent that the sample was taken.

- Enter the bearing in degrees from the plant for the sample location.

2.6.1.1 (Continued)

NOTE: If no data has been entered under the "Sample" then the "Average Spectrum" choice will not appear, and only the Default Spectrum can be used.

- Select if the Default Spectrum or the Average Spectrum should be used to perform the projection. The Average Spectrum should be selected here when adequate data has been entered in the "Sample" screen (Step 2.6.2).

- Select the DONE field when complete and the dose will be given.

2.6.2 Sample

This function is used to calculate the projected dose using isotopic analysis of samples collected by environmental monitoring teams.

2.6.2.1 The screen that will appear when this menu option is selected should be completed with the help of the following guidelines.

- It should be determined if weathering (radioactive decay is also included in this factor) will be considered when performing this function . To do this select the UTILITIES function from the main menu, and follow the guidelines in Step 2.8.5 of this procedure.

- Enter the activity of each nuclide that is present in the sample that is listed on this screen. These activities should be entered in units of pCi/m^2. The nuclides that are listed on this screen are the only ones in RNP's anticipated source term that have a long enough half-life to contribute significant dose.

2.6.2.1 (Continued)

- Enter the sample identification number. This will normally be our radiochemistry form number.
- Determine if the sample should be added to the sample data base from which the average deposition is calculated. Choosing this option will also include the sample in the average spectrum function of the DOSE RATE option.
- Enter the straight line distance in miles or fractions of miles from the plant vent that the sample was taken.
- Enter the direction in degrees from the plant for the sample location.
- Select the DONE field when complete and the dose will be given.

2.7 GRAPHICS

This menu item provides a graphic display of the 10 mile and 50 mile Emergency Planning Zones. It should be used as an aid by the Dose Projection Team to help with Protection Action Recommendations, and determining the adequacy of the environmental monitoring efforts.

NOTE: The latest graphics of the 10 MILE ISOPHLETHS and the 10 MILE PARs are automatically saved to a disk file. They can be printed using the Microsoft Paintbrush program.

2.7.1 10 MILE ISOPLETHS

This function provides a display of the isopleths within the 10 mile Emergency Planning Zone where the TEDE and Thyroid CDE limits are exceeded. If isopleths do not appear the EPA PAGs are not exceeded by the latest dose projection.

2.7.2 10 MILE PARS

This function displays the evacuation Protective Action Recommendations for the 10 Mile Emergency Planning Zone. This display consist of a five mile radius with a two mile keyhole superimposed on the map. The two mile keyhole applies to only the two mile sector (A0). Any of the five mile sectors (A1, B1, C1, D1, and E1) that are intersected by the five mile radius keyhole should be evacuated. If the dose at the centerline of the plume exceeds the EPA PAGs at any distance five miles or beyond, then the radius of the keyhole is extended to ten miles. Any of the ten mile sectors (A2, B2, C2, D2, and E2) which are intersected by the ten mile keyhole should be evacuated.

2.7.3 10 MILE EMT POINTS

This function provides a method to enter and display Environmental Monitoring Team Data in the 10 mile EPZ.

- Click the mouse on the map location were the sample was taken.
- Enter the closed window dose rate taken at approximately one meter above the ground. Use units of mrem/hr and depress the enter key when complete.
- The computer will update the sample point with a color coded circle depending on the dose rate recorded at the location. These color codes are given in the upper right hand corner of the screen.

2.7.4 50 MILE INT PHASE

This function provides a method to enter Environmental Monitoring Team Data in the 50 mile EPZ, and calculate and display the 1, 2, and 50 year committed doses along with the skin dose.

- Click the mouse on the map location were the sample was taken.
- Enter the closed window dose rate taken at approximately one meter above the ground. Use units of mrem/hr and depress the enter key when complete.
- The computer will update the sample point with a color code that represents if the program is above the EPA limits, above normal background, at background level. It will also calculate the 1, 2, and 50 year committed doses along with the skin dose.

2.8 UTILITIES

This menu item is provided to assist the Dose Projection Team. These functions can be used at any time they are needed while using the program.

2.8.5 WEATHERING

This function is used when performing an Intermediate Phase Dose Projection to account for reductions in the source term due to weathering and radioactive decay.

2.8.6 PRINTING SETUP

This function can be used to configure printing from this application. The user can configure custom printers and enable or disable the automatic printing of dose projection screens.

2.8.7 DISTANCES

This function allows the user to adjust the distances from the plant that dose projections are calculated. This is done by identifying the maximum distance from the plant and the increment between each distance that is desired. This function is especially useful in determining distances close in to the site or beyond 10 miles.

2.8.8 NOTIFICATION

This function will automatically print out a State Notification Form in the proper format with the dose projection information completed when it is selected.

2.8.9 MANUAL SCREEN PRINT

Use this menu item to print the currently displayed dialog or screen. The printout will be directed to the default printer for the workstation unless a custom printer has been selected.

2.9 EXIT

This menu item will exit the dose projection program when it is selected.

3. INTERPRETATION OF THE DOSE PROJECTION SUMMARY TABLE

This summary table appears on the screen after the dose projection calculation has been completed.

3.1 The first column at the top of this table is the distance from the plant. These distances default to Site Boundary, 2 Miles, 5 Miles, and 10 Miles. The distance along the centerline of the plume is identified in the Max row.

3.2 The second column at the top of this table is the TEDE in mrem. This will give the value that is entered on the Notification Form in the appropriate location.

3.3 The third column at the top of this table is the Thyroid CDE in mrem. This will give the value that is entered on the Notification Form in the appropriate location.

3.4 The next three columns give the Effective Dose Equivalent due to Immersion in the plume, the Committed Effective Dose Equivalent due to inhalation, and the Effective Dose Equivalent due to ground deposition. These columns are provided for information only.

3.5 The final column at the top of the table gives the X/Q value in s/m^3. This value should be provided to the State and Federal Emergency Response Officials when requested.

3.6 The Dose Projection Summary Table also contains the Dose Projection Meteorology Data.

3.7 The reactor shutdown time is also found on this table.

3.8 The Projection Time which the Notification Form refers to is listed on the table as the Calculation Time.

NOTE: The following two steps are very important for proper correlation between the dose projections performed by HBR's Dose Projection Team and the projections performed by State personnel. These are the two numbers that they are requesting when they are determining the source term.

3.9 The Xe-133 Equivalent Release is provided on this table and it is the value that should be entered as the Nobel Gas Activity on the Notification Form.

3.10 The I-131 Equivalent Release is provided on this table and it is the value that should be entered as the Iodine Activity on the Notification Form.

3.11 The Dosimeter Correction Factor that is provided on this table should only be used when the Radiological Control Manager has directed that a Dosimeter Correction Factor is necessary, and there is not adequate data to calculate one using environmental data.

NOTE: The Emergency Action Level provided by the dose projection program is for INFORMATION ONLY. All Emergency Classifications shall be made by using the EAL procedures.

3.12 Emergency Action Levels

If an Emergency Action Level due to a dose projection is exceeded, the output screen will indicate the appropriate classification. Evaluate the EAL Flow Charts and compare the dose calculation against the EAL's to determine the Emergency Classification. Notify the RCM of all Emergency Action Levels that the program recommends.

3.13 HBRDOSE/RASCAL

Attachment 8.3.6.16, HBRDOSE/RASCAL Comparison Matrix can be used to discuss differences in plant dose projections and those performed using the NRCs RASCAL program.

8.3.4 **RECORDS**

N/A

8.3.5 **ATTACHMENTS**

8.3.5.1 Definitions and Abbreviations

8.3.5.2 General Information

8.3.5.3 Quality Codes

8.3.5.4 Core Uncovery Time Determination

8.3.5.5 Accident Mitigation Systems

8.3.5.6 Obtaining and Updating Meteorological Data

8.3.5.7 Source Term Determination

8.3.5.8 Flow Rates

8.3.5.9 Detector Sensitivities

8.3.5.10 Measuring Radiation Level on Main Steam Lines

8.3.5.11 Typical RMS Values

8.3.5.12 RMS Monitored Systems

8.3.5.13 Weather Service Data

8.3.5.14 Onsite Meteorological Data

8.3.5.15 Meteorological Forecast Form

8.3.6.16 HBRDOSE/RASCAL Comparison Matrix

DEFINITIONS/ABBREVIATIONS

Definitions:

Atmosphere Dispersion Factor (X/Q) - the fraction of activity released that will reach the point of interest (sec/m^3).

Committed Dose Equivalent- The dose equivalent to organs or tissue of reference that will be received from an intake of radioactive material by an individual during the 50 year period following the intake.

Committed Effective Dose Equivalent - The sum of the products of the weighting factors applicable to each of the body organs or tissues that are irradiated and the committed dose equivalent to these organs or tissues.

Core Uncovery Time - The time that inadequate core cooing occurs until the time that adequate core cooling is restored. (See Attachment 8.3.5.4).

Early Phase - The period at the beginning of a nuclear incident when immediate decisions for effective use of protective actions are required, and must be based primarily on predictions of radiological conditions in the environment. This phase may last from hours to days. For the purpose of dose projection, it is assumed to last for four days.

Effective Dose Equivalent - The sum of the products of the dose equivalent to each organ and a weighting factor, where the weighting factors is the ratio of the risk of mortality from delayed health effects arising from irradiation of a particular organ or tissue to the total risk of mortality from delayed health effects when the whole body is irradiated uniformly to the same dose. This unit is considered equivalent o the Deep Dose Equivalent for the purposes of dose projections because the external exposures are considered to be uniform across the whole body.

DEFINITIONS/ABBREVIATIONS

Intermediate Phase - The period beginning after the incident source and releases have been brought under control and reliable environmental measurements are available for use as a basis for decisions on additional protective actions and extending until these protective actions are terminated. This phase may overlap the early and late phases and may last from weeks to many months. For the purpose of dose projection, it is assumed to last for one year.

Late Phase - The period beginning when recovery action designed to reduce radiation levels in the environment to permanently acceptable levels are commenced, and ending when all recovery actions have been completed. This period may extend from months to years (also referred to as the recovery phase).

Release Duration - The period of time from the beginning of the release until the end of the release or the projected end of the release. This can be determined by estimating the completion of a damage control mission, performance of a repair to stop the release, or the estimated time until the RCS, CV Sump, or Steam Generator temperature is below 200° F.

Release Rate (Q) - The term in the dose projection which describes the amount of activity that is being released. This is recorded in Curies per second.

Total Effective Dose Equivalent - The sum of the deep-dose equivalent (for external exposures) and the committed effective dose equivalent(for internal exposures).

Abbreviations:

1. ALARA - As Low As is Reasonably Achievable
2. BSEP - Brunswick Steam Electric Plant
3. CDE - Committed Dose Equivalent
4. CFM - Cubic Feet per Minute
5. CPM - Counts Per Minute
6. CV - Containment Vessel
7. EAL - Emergency Action Level
8. EMT - Environmental Monitoring Team
9. EOF - Emergency Operations Facility
10. ERFIS - Emergency Response Facility Information System
11. ERO - Emergency Response Organization
12. GPM - Gallons Per Minute
13. HNP - Harris Nuclear Project
14. LAN - Local Area Network
15. LOCA - Loss Of Coolant Accident

DEFINITIONS/ABBREVIATIONS

16. PORV - Power Operated Relief Valve
17. RCS - Reactor Coolant System
18. RMS - Radiation Monitoring System
19. SDS - Satellite Display System
20. SRO - Senior Reactor Operator
21. SRV - Safety Relief Valve
22. STA - Shift Technical Advisor
23. TEDE - Total Effective Dose Equivalent

GENERAL INFORMATION

Backup Capability:

If ERFIS or a computer with the dose projection program are not available, contact computer support personnel and request that they provide a computer with the current revision of the dose projection software installed on it.

R-14 C, D, and E operate as follows:
R-14C is the Normal range Noble Gas monitor.
R-14D is the Intermediate range Noble Gas monitor.
R-14E is the High range Noble Gas monitor.
R-14D and R-14E normally read between 10 and 11 CPM.

R-14C when increasing will reach its predetermined alarm setpoint. Further increase will cause R-14C to reach its predetermined swap-over setpoint. When the swap-over setpoint is reached, R-14C will fail to 1 Meg (1M) which also will cause R-14D and R-14E to activate and start providing intermediate and high range noble gas readings. If R-14C is reading 1 Meg, this SHOULD NOT be used as a valid reading and RMS data SHOULD BE obtained from R-14D and R-14E.

Special attention should be paid to the quality code of the data on the program. Quality code color schemes are given in Attachment 8.3.5.3.

In order to select an item when performing the dose projection press the space bar. Pressing the space bar will also deselect the item if it had already been selected.

The help menu may be accessed at any time while using the dose projection program. This can be accomplished by pressing the F1function key. The function can be exited by clicking the mouse on the EXIT field or by pressing the F1 key.

Messages are displayed at the bottom of each screen to describe the function that the cursor is on.

Attachments 8.3.5.14, Onsite Meteorological Data, and 8.3.5.15, Meteorological Forecast Form, can be used to record weather conditions and forecast.

QUALITY CODES

Color of Data	Meaning	Action
Red Stars	Computer Entered Bad Data	**Do Not** Use This Data
Green	Computer Entered Good Data Normal Level	This Data May Be Used
Yellow	Computer Entered Good Data Alert Level	This Data May Be Used
Red	Computer Entered Good Data Alarm Level	This Data May Be Used
White	Manually Entered Data	This Data May Be Used

CORE UNCOVERY TIME DETERMINATION

NOTE: The time determination below is based upon the core level and temperature that the core cooling is insufficient to prevent the cladding from overheating and failing. This basis is conservative for all fuel damage scenarios which result from core uncovery. This time can be determined by consulting a SRO or RO with access to plant data.

- Core uncovery time is defined for dose projection purposes to be the point in time that inadequate core cooling occurs until the time that adequate core cooling is restored. For the purposes of dose projection core uncovery time will be the time that a RED status occurs on the CORE COOLING critical safety function status tree until the tree conditions return to YELLOW status (core covered and core exit thermocouples < 700° F).

- There are other possible accidents that may result in fuel damage. These events could be initiated by core flow blockage from debris or by localized melting from a rod ejection accident, pump failures, etc. as analyzed by the FSAR. In this case, judgment may be applied using the bases information for CORE UNCOVERY TIME DETERMINATION above to most closely describe the fuel damage situation. In general choice of "uncovery < 30 min", corresponding to a release of 100% of the gap activity will conservatively account for most mechanical and miscellaneous fuel damage situations.

ACCIDENT MITIGATION SYSTEMS

The capability to take credit for accident release mitigation systems is built into the dose projection program. Credit is given one of three ways, charcoal filtration, containment sprays, and water partitioning in the steam generator.

> **NOTE:** It is important to note that if the release is mitigated by **ANY** of the following: Charcoal Filtration, CV Sprays, or Partitioning then assume mitigating effects are **EFFECTIVE** unless information is known to be otherwise. Only if the release pathway is direct to the environment without mitigation, should **NOT EFFECTIVE** be selected.

- Filtration

  Various fans can be aligned to cleanup effluent from leaking systems. When the release is passing through any one of the following fans, filtration can be considered effective. The general area(s) where the fan draws a suction is listed in parenthesis.

  - HVE-1A or HVE-1B (Containment Purge)
  - HVE-3 or HVE-4 (Containment Air, In pre-purge mode)
  - HVE-5A or HVE-5B (Auxiliary Building Exhaust)
  - HVE-15A (Spent Fuel Pit during refueling)

- The CV Spray System

  Designed to remove radioiodine from containment in the event a radioactive release (typically a LOCA) occurs inside containment. If such a release occurs and the CV Spray System, (including NaOH), is operating, the CV Sprays are considered effective.

- Water Partitioning

  Occurs during a release through the steam generators (e.g., a tube leak or tube rupture) and level in the affected steam generator is above the top of the tubes. Partitioning is effective for removing iodines and some particulates when the steam generator level is greater than 10% on the Narrow Range Steam Generator Level Indicator.

OBTAINING AND UPDATING METEOROLOGICAL DATA

In the manual data entry mode, meteorological data may not be available from ERFIS. Determine wind direction, wind speed, and atmospheric stability class using one of six methods listed in preferred order of use.

> **NOTE:** Meteorological data will normally display a green value and an "OK" quality code. DO NOT USE THIS DATA if the values are displayed in white, or the quality code is "BAD"

1. If operable, use the data from control room readouts to obtain the atmospheric stability class, wind speed, and wind direction.

OR

2. Call the CP&L offsite meteorological contact (See ERO Phone Book for number).

> **NOTE:** If The Florence Airport or the National Weather Service office is called, the only information that can be obtained is the wind direction, wind speed, and ambient temperature. Stability factor must be obtained from Step 5 of this Attachment.
>
> If wind speed and direction are only supplied for one point enter these values in both the elevated and ground fields. Do not enter wind gust as the wind speed, and if no Delta T is supplied do not enter one.

3. Call the Florence Airport for Weather Information (See ERO Phone Book for number).

OR

4. Call the National Weather Service office in Columbia, South Carolina, for daily weather information or in Wilmington, North Carolina, for severe weather information. Use Attachment 8.3.5.13 to document this: (See ERO Phone Book for number)

OR

5. If there is no stability class data readily available, a general estimate of the current Atmospheric Stability Class can be made by visual observation, using the following table:

	Rain, Day or Night	Sunny Day	Cloudy Day	Cloudy Night	Clear Night
light wind or calm (< 11.5 mph)	D	B	C	E	F
moderately strong wind(≥ 11.5 mph)	D	C	D	D	D

OR

6. A manual method may be used to acquire data from the meteorological tower. The following method may be used to manually obtain this data:

   A. Obtain the Meteorological Tower Building key from E&RC or Plant Security.

   B. Locate the Met Tower recorder inside the building.

   C. Locate the Upper Display key on the recorder.

   D. Depress the Upper Display key one or more times until the Upper Display is placed in manual control. "MAN" will be displayed in the Lower Display of the recorder.

   E. Locate the Channel Up (CH Up) and Channel Down (CH Down) keys on the recorder.

   F. Using the Channel Up (CH Up) and Channel Down (CH Down) keys, scroll through the recorder channels to obtain the necessary information required on the "Manual Meteorological Collection Data Sheet" included in this attachment.

   G. Using the Differential Temperature values obtained from the recorder, determine the Stability Class as per the table included in this attachment.

OBTAINING AND UPDATING METEOROLOGICAL DATA

EXAMPLE OF RECORDER CHANNEL SELECTIONS

CH 01 LT1 - Lower Temperature #1 (ambient temperature)
CH 02 DT1 - Differential Temperature #1
CH 03 DT2 - Differential Temperature #2
CH 04 LWS - Lower Wind Speed
CH 05 LWD - Lower Wind Direction
CH 06 UWS - Upper Wind Speed
CH 07 UWD - Upper Wind Direction
CH 08 DPT - Dew Point

MANUAL METEOROLOGICAL COLLECTION DATA SHEET

WIND SPEED

UPPER WIND SPEED _____ MPH

LOWER WIND SPEED _____ MPH

WIND DIRECTION

UPPER WIND DIRECTION _____ DEGREES

LOWER WIND DIRECTION _____ DEGREES

AMBIENT TEMPERATURE

TEMPERATURE _____ DEGREES F

DIFFERENTIAL TEMPERATURE

DT1 = _____ C/100M

DT2 = _____ C/100M

STABILITY CLASS

$\frac{DT1 + DT2}{2}$ = _____C/100M

OBTAINING AND UPDATING METEOROLOGICAL DATA

STABILITY CLASS (circle one)	DIFFERENTIAL TEMP. C/100M
A	<-1.9
B	-1.9 TO -1.7
C	-1.7 TO -1.5
D	-1.5 TO -0.5
E	-0.5 TO +1.5
F	+1.5 TO +4.0
G	>+4.0

SOURCE TERM DETERMINATION

Part A - Determination of Curies in Containment Atmosphere

This calculation can be performed by obtaining the activity in the containment from the RCD or E&RC lead technician, or by calculating it using the radiation monitor data and their sensitivities. When calculations are performed utilizing radiation levels obtained from R-2, consideration should be given to background correcting the radiation level.

1) Containment atmospheric activity:

- As determined by sampling CV atmosphere: _____ µCi/cc
- Calculation of atmospheric activity from a CV radiation monitor:

Monitor	Reading		Sensitivity*		CV Activity
R-12	_____cpm	/	_____cpm/(µCi/cc)	=	_____µCi/cc
R-2	_____mrem/hr	/	_____(mrem/hr)/(µCi/cc)	=	_____µCi/cc
R-32A/B	_____rem/hr	/	_____(rem/hr)/(µCi/cc)	=	_____µCi/cc

2) Equation for determining curies in containment:

Curies in containment = (CV activity [µCi/cc]) (5.5 x 10^4 [Ci-cc/µCi])

= (_____[µCi/cc]) (5.5 x 10^4 [Ci-cc/µCi])

= _____ Ci

* This value can be determined by referencing the summary page of the RMS Detector Sensitivity Calculations. Volumes I and II of these calculations can be found in the EOF library. Ensure that the sensitivity that corresponds to the correct accident and shutdown time are used.

SOURCE TERM DETERMINATION

Part B - Determination of Curies in the Reactor Coolant System (RCS)

Obtain the RCS activity from the RCD or the E&RC lead technician to perform this calculation.

1) RCS activity: _____ µCi/ml

2) Equation for determining curies in the RCS:

Curies in RCS = (RCS activity [µCi/ml]) (2.65 x 10^2 Ci-ml/µCi)

= (_____[µCi/ml]) (2.65 x 10^2 Ci-ml/µCi)

= _____ Ci

Part C - Determination of Sump Source Term

Obtain the sump activity and the sump volume from the RCD or the E&RC lead technician in order to perform this calculation.

1) Quantity of liquid in sump _____ gal

2) Sump activity _____ µCi/cc

3) Equation for determining curies in sump:

Curies in the sump =

(volume of liquid in sump [gal]) (activity of sump [µCi/ml]) (3.79 x 10^{-3})

= (_____ [gal]) (_____[µCi/ml]) (3.79 x 10^{-3} Ci-ml/µCi-gal)

= _____ Ci

Part D - Determination of Primary to Secondary Leakage Source Term

Obtain the primary to secondary leak rate and RCS activity in order to perform this calculation.

1) Primary to Secondary Leakage _____ gal/min

2) Source Term (Ci) = (Leakrate gal/min)(6.3E-5)(RCS Activity µCi/cc)

= (_____ gpm)(6.3E-5)(_____ µCi/cc)

= (_____ Ci/sec)(_____ hrs)(3600 sec/hr)

= _____ Ci

SOURCE TERM DETERMINATION

Part E - Determination of Source Term Released Due To Secondary Leakage

Determine the leakrate from the PORV or SRVs using Attachment 8.3.5.8. If the leak is due to a faulted Main Steam System obtain an estimate of the leakrate can be obtained from the Accident Assessment Team.

1) Secondary Leakrate _____ cc/sec

2) Source Term (Ci) =

$$\frac{\text{\_\_\_\_\_ mrem/hr (R-31 Rad Level)} \times \text{\_\_\_\_\_ hr (Duration)} \times \text{\_\_\_\_\_ cc/sec (Leakrate)} \times 3.6E\text{-}03 \text{ Ci-sec/}\mu\text{Ci-hr}}{\text{\_\_\_\_\_ (mrem/hr)/(}\mu\text{Ci/cc)}}$$

$$= \text{\_\_\_\_\_ Ci}$$

R-31 Sensitivity*

* This value can be determined by referencing the summary page of the RMS Detector Sensitivity Calculations. Volumes I and II of these calculations can be found in the EOF library. Ensure that the sensitivity that corresponds to the correct accident and shutdown time are used.

Part F - Determination of Source Term Released Through Main Steam Using Direct Survey

Request that the RCD dispatch a member of the plant monitoring team with an extendable probe survey instrument to a location one level below the Main Steam lines as indicated by Attachment 8.3.5.10. The probe should be extended to a position adjacent to the low point of each steam line (or as directed by the Dose Projection Teamleader or RCD) to determine the contact dose rate. The status (open/closed) of the PORV and SRVs on the monitored lines should also be noted.

1) Contact radiation level on Steam Line: _____ mrem/hr

2) Flow Rate:_____ cc*/sec (Attachment 8.3.5.8 or Accident Assessment Team)

3) Detector Sensitivity from Attachment 8.3.5.9: _____ (mrem/hr)/(μCi/cc*)

4) Source Term (Ci) =

$$\frac{\text{\_\_\_\_\_ mrem/hr (Rad Level)} \times \text{\_\_\_\_\_ hr (Duration)} \times \text{\_\_\_\_\_ cc*/sec (Flow Rate)} \times 3.6E\text{-}03 \text{ Ci-sec/}\mu\text{Ci-hr}}{\text{\_\_\_\_\_ (mrem/hr)/(}\mu\text{Ci/cc*)}}$$

$$= \text{\_\_\_\_\_ Ci}$$

Detector Sensitivity

* Substitute ml for cc when calculations are performed for water filled main steam lines.

SOURCE TERM DETERMINATION

Part G - Determination of Source Term Released Plant Vent Stack

Request that the RCD dispatch a member of the plant monitoring team with an extendable probe survey instrument to obtain a contact radiation level on the side of the plant stack (an instrument with a remote probe can also be used). The measurement should be made inside the shielded orifice which is approximately 4 feet above the Auxiliary Building roof on the south side of the stack.

1) Contact radiation level on Plant Vent Stack: _____ mrem/hr

2) Release rate = (Use Attachment 8.3.5.8)

= (Stack Flow Rate [cfm]) (28320 [cc/ft^3]) (60 [min/hr])
= (_____ cfm) (28320 cc/ft^3) (60 min/hr)
= _____ cc/hr

3) Detector Sensitivity from Attachment 8.3.5.9: _____ (mrem/hr)/(μCi/cc)

4) Source Term (Ci) =

$$\frac{\text{Rad Level}}{\text{Sensitivity}} = \frac{\text{\_\_\_\_\_ mrem/hr} \times \text{\_\_\_\_\_ hr} \times \text{\_\_\_\_\_ cc/hr} \times 1E\text{-}06\ Ci/\mu Ci}{\text{Duration} \quad \text{Release Rate}}$$

_____ (mrem/hr)/(μCi/cc)

= _____ Ci

FLOW RATES

R-11, R-12, R-14

HVE-2A/B ..... 4.4×10^4 cfm

HVE-2A/B and HVE-15/15A. ..... 5.5×10^4 cfm

HVE-2A/B and HVE-1A/B ..... 6.2×10^4 cfm

HVE-2A/B and HVE-1A/B & HVE-15/15A ..... 7.2×10^4 cfm

R-15, Air Ejector - Noble Gas

Flow Rate = 3.10×10^2 cfm (for one vacuum pump running)

Flow Rate = 6.10×10^2 cfm (for two vacuum pumps running)

R-20, R-30, Fuel Building Basement Exhaust - Low and High Range Noble Gas

Flow Rate = 1.0×10^4 cfm

R-21, Fuel Building UPPER Level Exhaust

Flow Rate = 1.34×10^4 cfm

R-31A, R-31B, R-31C - Steam-Line Monitors (at 800 psi)

PORV (100% lift) ..... 1.92E06 cc/sec (4.57E05 lbm/hr)

PORV and 1 SRV ..... 4.00E06 cc/sec (9.51E05 lbm/hr)

PORV and 2 SRV ..... 6.11E06 cc/sec (1.45E06 lbm/hr)

PORV and 3 SRV ..... 9.19E06 cc/sec (2.19E06 lbm/hr)

FLOW RATES

R-31A, R-31B, R-31C - Steam-Line Monitors (Filled with Water)

PORV (100% lift) .....7.32E04 ml/sec

PORV AND 1 SRV .....1.56EO5 ml/sec

PORV AND 2 SRV .....2.42EO5 ml/sec

PORV AND 3 SRV .....3.68EO5 ml/sec

R-2, R-32A, R-32B - Containment Radiation Monitors

Containment isolated with no discharge via plant vent ..... 1.5 CFM[1]

Containment vented via plant vent . ..... 2500 CFM

[1] Design basis leakage for containment at 0.1% containment volume per day.

FLOW RATES

STEAM LINE FLOW RATE CALCULATION FOR A DRY STEAM GENERATOR

1.0

1. RCS Leak Rate (RCS_{LR}) _____ gpm
2. RCS Temperature _____ °F
3. RCS Pressure _____ psig
4. S/G Pressure _____ psig
5. S/G Temp _____ °F

2.0 1. From the Steam Tables determine the specific volume of RCS Fluid (RCS_{SV}) at conditions in 1.0 _____ ft^3/lb

2. From the Steam Tables determine the specific volume of S/G F luid (SG_{SV}) at condition in 1.0 _____ ft^3/lb

3.0 Determine the RCS Mass Release Rate (RCS_{MRR}) into S/G in using the following formula:

$$\frac{RCS_{LR}\ (gal/^{min})}{(7.48\ gal/ft^3)\ (RCS_{SV}\ ft^3/lb)} = lb/min$$

$$\frac{(\_\_\_\_RCS_{LR}\ gal/^{min})}{(7.48\ gal/ft^3)\ (\_\_\_\_\_RCS_{SV}\ ft^3/lb)} = \_\_\_\_\_\ lb/min$$

4.0 Determine the steam flow rate using the following formula:

RCS_{MRR} (lb/min) SG_{SV} (ft^3/lb) (472 cc/sec) = cc/sec
ft^3/min

(_____) (_____) (472 cc/sec) = _____
RCS_{MRR} (lb/min) SG_{SV} (ft^3/lb) ft^3/min cc/sec

5.0 Performed by: _____

Verified by: _____

FLOW RATES

CONVERSION OF STEAM MASS FLOW RATE TO VOLUMETRIC FLOW RATE [1]

1. Obtain and record the steam mass flow rate in lbs/hr from the Accident Assessment Team.

   _____ lbs/hr [1]

2. Obtain and record the main steam pressure in psig.

   _____ psig

3. Use the figure on the following page to determine the specific volume (cc/lb) for the pressure determined in step 2.

   _____ cc/lb [2]

4. Determine the volumetric flow rate using the following formula:

   (lbs/hr) (1 hr/3600 sec) (cc/lb) = cc/sec

   (_____ lb/hr) (1 hr/3600 sec) (_____ cc/lb) = _____ cc/sec
   [1] [2]

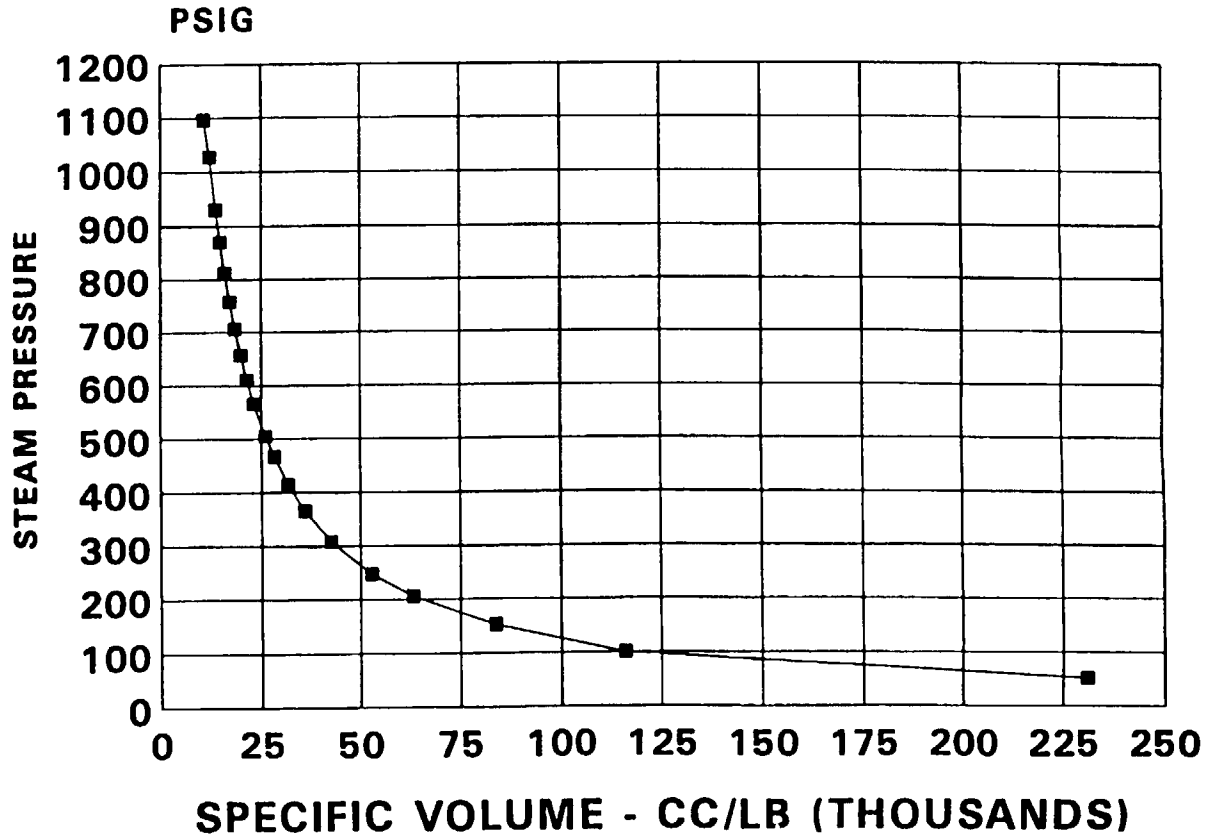
Performed by: _____ _____/_____
Date Time

Verified by: _____ _____/_____
Date Time

[1] For use with R-31 readings under any conditions.

STEAM PRESSURE VS SPECIFIC VOLUME

PSIG VS CC PER POUND



DETECTOR SENSITIVITIES

Determine the appropriate accident scenario classification (1-10) utilizing the following table.

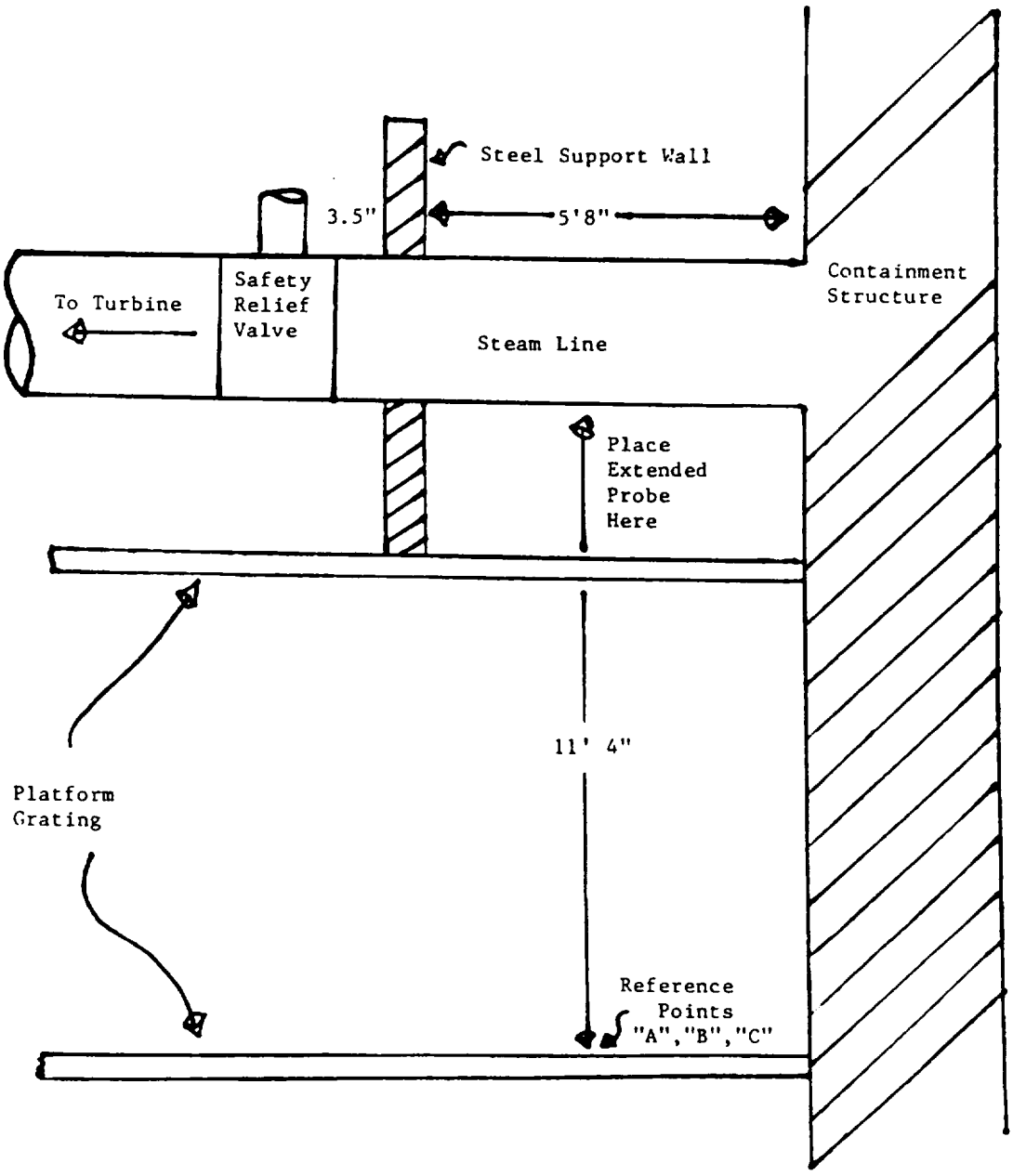
ACCIDENT SCENARIO	PLANT CONDITIONS	FILTRATION/PARTITIONING/SPRAYS
1	Core not uncovered	Effective or Not Effective
2	Core uncovered <30 minutes	Effective
3	Core uncovered <30 minutes	Not Effective
4	Core uncovered 0.5 - 1.8 hours	Effective
5	Core uncovered 0.5 - 1.8 hours	Not Effective
6	> 1.8 hours	Effective
7	> 1.8 hours	Not Effective
8	New Spent Fuel	Effective or Not Effective
9	Old Spent Fuel	Effective or Not Effective
10	Waste Gas Decay Tank	Effective or Not Effective

Determine the sensitivity of the appropriate detector using the following table and accident scenario. (These sensitivities are based on nuclide mixes at reactor shutdown)

ACCIDENT SCENARIO	PLANT VENT STACK(mrem/hr)/(μCi/cc)	STEAM FILLEDMAIN STEAM LINE(mrem/hr)/(μCi/cc)	WATER FILLED MAIN STEAM LINE(mrem/hr)/(μCi/ml)
1	3.28E+02	1.49E+01	4.51E+00
2	1.42E+03	7.11E+01	2.15E+01
3	2.63E+03	9.66E+01	2.35E+01
4	1.40E+03	7.08E+01	2.16E+01
5	1.98E+03	7.94E+01	2.09E+01
6	1.40E+03	7.08E+01	2.15E+01
7	2.20E+03	8.24E+01	2.06E+01
8	2.80E+03	N/A	N/A
9	5.44E+00	N/A	N/A
10	2.48E-01	N/A	N/A

ATTACHMENT 8.3.5.10
Page 1 of 1

MEASURING RADIATION LEVEL ON MAIN STEAM LINES



TYPICAL RMS VALUES

The background and alarm setpoint for radiation monitors should be obtained from the control room or other current sources if they are needed to perform dose projections. The following two tables provide the typical values for the background and alarm setpoints for radiation monitors, however **these values should not be used for performing dose projections unless no other data is available**. Table 1 contains all of the radiation monitors that are used for dose projections, while Table 2 contains other monitors that may be of interest to the dose projection team.

TABLE 1:

RADIATION MONITOR	CHANNEL DESCRIPTION	TYPICAL* BKG/SETPOINT	SCALE
R2	CV LOW RANGE AREA	~ 10 / 100 mR/HR	0.1 - 10,000 mR/HR
R12	CV AIR GAS	~ 1 K / 2.2 K CPM = 1.8 times BKG	10 -10,000,000 CPM
R14C	PLANT VENT GAS LOW Default 1 M in high range.	30-60/~10,000 CPM switch to high range ~ 700 k CPM	10 - 1,000,000 CPM or 10 M at monitor all R-14 channels
R14D	PLANT VENT GAS MID Default 10 in low range	10-11 / 130 CPM	10 - 1,000,000 CPM
R14E	PLANT VENT GAS HIGH Default 10 in low range	10-11 / 140 CPM	10 - 1,000,000 CPM
R15	CONDENSER AIR EJECTOR	10-15 /100+BKG CPM	10 - 1,000,000 CPM
R20	LOWER FUEL HANDLING BUILDING low range	10-40 / 9,800 CPM	10 -10,000,000 CPM
R21	UPPER FUEL HANDLING FUEL HANDLING	10-25 / 9,730 CPM	10 -10,000,000 CPM
R30	LOWER FUEL HANDLING BUILDING high range	~ 0.5 / 18+BKG mR/HR	1 - 100,000 mR/HR
R31A	MAIN STEAM LINE A	~ 0.3 / 12 mR/HR	1 - 100,000 mR/HR
R31B	MAIN STEAM LINE B	~ 0.4 / 12 mR/HR	1 - 100,000 mR/HR
R31C	MAIN STEAM LINE C	~ 0.6 / 12 mR/HR	1 - 100,000 mR/HR
R32A	CV HIGH RANGE	<1/ 10&1,000 R/HR	1-10,000,000 R/HR
R32B	CV HIGH RANGE	<1/ 10&1,000 R/HR	1-10,000,000 R/HR

* A printscreen can be performed on either the EDS terminal or ERFIS at the onset of an accident to provide more current backgrounds for monitors that are not yet being effected by the accident.

TYPICAL RMS VALUES

TABLE 2:

RADIATION MONITOR	CHANNEL DESCRIPTION	TYPICAL BKG/SETPOINT	SCALE
R1	CONTROL ROOM AREA	<1 / 2.5 mR/HR	0.1 - 10,000 mR/HR
R3	PASS PANEL AREA	0.1-0.3/ 20 mR/HR	0.1 - 10,000 mR/HR
R4	CHARGING PUMP AREA	~4 / 50 mR/HR	0.1 - 10,000 mR/HR
R5	SPENT FUEL BLDG. AREA	<1 / 50 mR/HR	0.1 - 10,000 mR/HR
R6	SAMPLING ROOM AREA	<1 / 50 mR/HR	0.1 - 10,000 mR/HR
R7	IN-CORE INSTRUMENT AREA	~4 / 200 mR/HR	0.1 - 10,000 mR/HR
R8	DRUMMING ROOM	1-2 / 50 mR/HR	0.1 - 10,000 mR/HR
R9	LETDOWN LINE AREA	10-40/ 3000 mR/HR	1 - 100,000 mR/HR
R11	CV AIR PARTICULATE	~20 K / 3.6E4 CPM = 1.8 times BKG	10 - 1,000,000 CPM
R14A	PLANT VENT PARTICULATE	~500 / 2E6 CPM	10 - 1,000,000 CPM
R14B	PLANT VENT IODINE	~10 / 90,000 CPM	10 - 1,000,000 CPM
R16	HVH COOLING WATER	~300 / 1,900 CPM	10 - 1,000,000 CPM
R17	COMPONENT COOLING WATER	~300 / 830 CPM	10 - 1,000,000 CPM
R18	LIQUID WASTE DISPOSAL	~18,500/ VARIES	10 - 1,000,000 CPM
R19A	SG "A" BLOWDOWN	<2,000/ ~10 K CPM	10 -10,000,000 CPM
R19B	SG "B" BLOWDOWN	<1,000/ ~8 K CPM	10 -10,000,000 CPM
R19C	SG "C" BLOWDOWN	<2,000/ ~10 K CPM	10 -10,000,000 CPM
R22P	E&RC BLDG. PARTICULATE	~300 / 10,000 CPM	1 - 1,000,000 CPM
R22I	E&RC BUILDING IODINE	~15 / 300 CPM	1 - 1,000,000 CPM
R22NG	E&RC BUILDING NG	~40 / 1,000 CPM	1 - 1,000,000 CPM
R23P	RADWASTE BLDG. PART.	~60 / 9,700 CPM	1 - 1,000,000 CPM
R23I	RADWASTE BLDG. IODINE	<10 / 1090 CPM	1 - 1,000,000 CPM
R23NG	RADWASTE BLDG. NG	~20 / 387 CPM	1 - 1,000,000 CPM
R33	MONITOR BLDG. AREA	<1 / 10 mR/HR	1 - 100,000 mR/HR
R37	COND. POLISHER	~100 /18,500 CPM	10 -10,000,000 CPM
R38P	EOF PARTICULATE	~900 / 32,000 CPM	10 - 1,000,000 CPM
R38I	EOF IODINE	~10 / 802 CPM	10 - 1,000,000 CPM
R38NG	EOF NOBLE GAS	~25 / 935 CPM	10 - 1,000,000 CPM

ATTACHMENT 8.3.5.12
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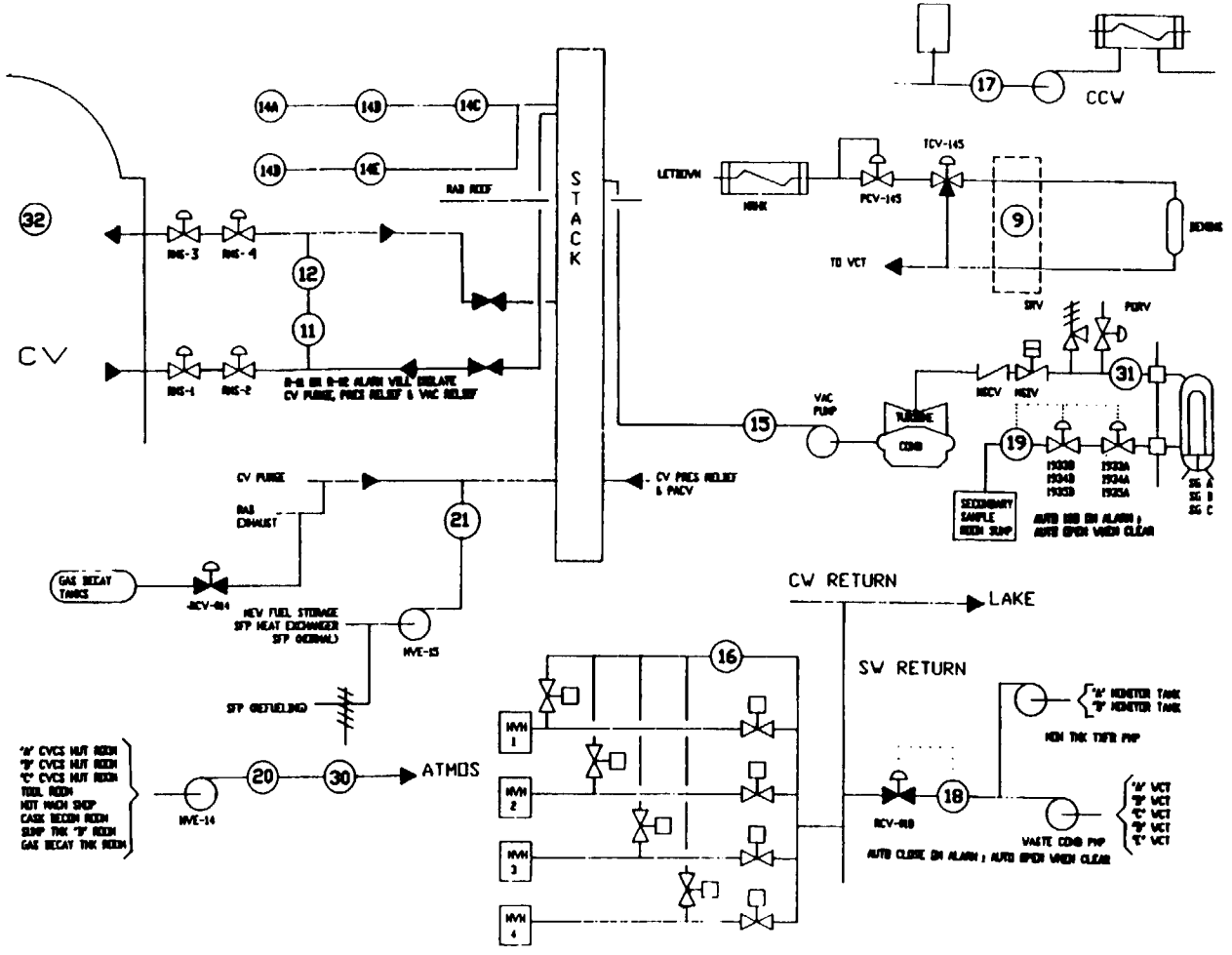
RMS MONITORED SYSTEMS



WEATHER SERVICE DATA

1. Call the Weather Service at the Florence Airport , Columbia, South Carolina or Wilmington, North Carolina. Ask for the forecaster on duty and identify yourself by saying, "This is (your name) at the Carolina Power & Light Company (CP&L) H. B. Robinson Nuclear Plant. This is an emergency (or emergency drill). May I have the last hour surface weather observation from Florence, South Carolina?" If the last hour data is not available from Florence, then request the last hour surface weather observation from Columbia. The following data should be obtained:

   1-Hour Forecast

   - Station for which data is given _____
   - Wind Speed (MPH) _____
   - Cloud Cover (in tenths of total) _____
   - Cloud Ceiling (feet above ground) _____
   - Wind Direction (from N,S,E,W,etc.) _____
   - Wind Direction Trends (steady, shifting, variable) _____
   - Precipitation Activity _____
   - Probability of Precipitation _____

2. Also, obtain a 3 hour forecast for Florence from the meteorologist on duty.

   3-Hour Forecast

   - Station for which data is given _____
   - Wind Speed (MPH) _____
   - Cloud Cover (in tenths of total) _____
   - Cloud Ceiling (feet above ground) _____
   - Wind Direction (from N,S,E,W,etc.) _____
   - Wind Direction Trends (steady, shifting, variable) _____
   - Precipitation Activity _____
   - Probability of Precipitation _____

3. Other Information: _____

_____

_____

_____

_____

Date:_____ Time:_____ Name:_____

ONSITE METEOROLOGICAL DATA

Date:_____

Time	_____	_____	_____	_____
Ground Wind Speed (mph)	_____	_____	_____	_____
Elevated Wind Speed (mph)	_____	_____	_____	_____
Ground Wind Dir. (From)	_____	_____	_____	_____
Elevated Wind Dir. (From)	_____	_____	_____	_____
AMB Temp. (°F)	_____	_____	_____	_____
ΔT (°0/100m)	_____	_____	_____	_____
Stability Class	_____	_____	_____	_____

Time	_____	_____	_____	_____
Ground Wind Speed (mph)	_____	_____	_____	_____
Elevated Wind Speed (mph)	_____	_____	_____	_____
Ground Wind Dir. (From)	_____	_____	_____	_____
Elevated Wind Dir. (From)	_____	_____	_____	_____
AMB Temp. (°F)	_____	_____	_____	_____
ΔT (°0/100m)	_____	_____	_____	_____
Stability Class	_____	_____	_____	_____

ATTACHMENT 8.3.5.15
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METEOROLOGICAL FORECAST FORM

Date:_____ Time Issued:_____

Issued By:_____ Received By:_____

Forecast
Location:_____

A) Next 1 Hour

1) Wind Direction: Sector_____ Deg._____

2) Winds Should Remain (Steady; Shifting; Variable)
2a) Variation Should Be_____ Deg.

3) Wind Velocity:_____ to _____ (MPH)

4) Stability Class_____

5) Precipitation Activity Will Be (None, Scattered, Steady)

6) Precipitation Type (Rain, Rainshowers, Thunderstorms, Ice, Snow)

7) Precipitation Intensity (Light, Moderate, Severe)

B) Next 3 Hours:

_____

_____

_____

C) Remarks: _____

_____

_____

_____

HBRDOSE/RASCAL COMPARISON MATRIX

	HBRDOSE	RASCAL	DIFFERENCES/COMMENTS	EFFECTS
EPA 400 Dosefactors	Yes	Partial	See Note 1	HBRDOSE will give higher ground exposure doses. Rascal will give higher external doses. TEDE may be affected in either direction.
Reg Guide 1.1145 X/Q's	Yes	No	RASCAL uses a single equation with non site-specific wake factors. Also, probably doesn't use plume meander default. RASCAL cap on Sig z is 500 m. R.G. 1.145 shows 3000 m.	RASCAL generally will use higher X/Q values, especially for ground level releases at closer distances. When using default cap on Sig z, Rascal will calculate higher doses during unstable met conditions.
Deposition	No	Yes	RASCAL calculations as a separate dose quantity, does not effect TEDE.	NONE
Depletion	No	No		NONE
Wet Deposition	No	Yes	RASCAL uses a mass balance for wet deposition.	RASCAL immersion and inhalation doses will be lower than HBRDOSE. RASCAL ground doses will be higher.
Finite Model	Yes	Yes	RASCAL converts to a semi-infinite model at Sigmay = 400 m. HBRDOSE uses Sigma = 500 m. RASCAL uses horizontal dispersion coefficient only in determining plume size. HBRDOSE uses average Sigma.	Conversion point of finite model, semi-infinite model will cause negligible difference. RASCAL use of Sigmay instead of an average Sigma as described in "Meteorology and Atomic Energy" may cause a big difference in the calculated gamma dose for non-isotropic plumes.
Decay for TAS	Yes	Yes		NONE
Downwind Decay	No	No		NONE

HBRDOSE/RASCAL COMPARISON MATRIX

	HBRDOSE	RASCAL	DIFFERENCES/COMMENTS	EFFECTS
Daughter Ingrowth	No	Yes	RASCAL calculates ingrowth of daughter decay products.	HBRDOSE may underestimate doses, particularly inhalation doses.
Source Term	RTM-92	NUREG-1228	Different isotopes, RASCAL can dynamically calculate spectrum based on particular accident sequence.	During LOCA sequences, Spent Fuel accidents, or Waste Gas Decay Tank rupture, there should be little difference. Other sequences may cause large differences.
Uses monitor reading for source term	Yes	No	NRC will probably be doing worst case analysis based on specific accident and PRA instead of actual release.	NRC predicted dose will be higher. CP&L should consider a method of providing gross noble gas, iodine, and particulate release rates to the NRC. DO NOT ALLOW THE NRC TO USE THE EQUIVALENT RELEASE RATES CALCULATED BY HBRDOSE.
Source term based on EMT samples	Yes	Yes	HBRDOSE uses gross (cpm or mrem/hr) inputs. RASCAL requires isotopic analysis.	NRC results will not be available for several hours, but may be more accurate.
Intermediate Phase Calculations	Yes	No		NONE

Note 1: Dose factors for thyroid are identical between the two models. For external dose, RASCAL includes the contribution of short lived daughters in the external dose factors, which EPA-400 does not do. Similarly, RASCAL includes short lived daughter products in the inhalation and ground exposure dose factors. The most obvious result of this is that some of the noble gases (i.e. Kr-88), are included in inhalation and ground exposure dose in RASCAL. Ground exposure dose factors are calculated in RASCAL assuming a 0.3 cm/s deposition rate and further correction factor of 0.5 to account for rough ground. EPA-400 dose factors assume a deposition velocity of 1 cm/s for iodines and 0.1 cm/s for particulates with no correction factor.

CP&L

R
Reference
Use

CAROLINA POWER & LIGHT COMPANY
H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2

PLANT OPERATING MANUAL

VOLUME 2
PART 5

EMERGENCY PROCEDURE

EPTSC-07

DAMAGE ASSESSMENT

REVISION 3

SUMMARY OF CHANGES

STEP #	REVISION COMMENTS
Attach 8.7.5.1d	CV corrected volume, 14.7psi and 520°R allows for P/T ratio. RNP-C/Cont-1002 CV Volume increased to 2013007 Cubic Ft.
Attach 8.7.5.5 Pgs 2&3	Adjusted dated to allow for larger volume. R/hr × MW_{th} = (R/hr) × CV volume ÷ Pwr(MW_{th} × 2E6)

TABLE OF CONTENTS

8.7 DAMAGE ASSESSMENT

8.7.1 PURPOSE

1. The purpose of this procedure is to provide guidance and direction to the Technical Analysis Director and the Accident Assessment Team in the evaluation of core damage and implementation of accident assessment actions of PLP-007, Robinson Emergency Plan.

   This procedure provides methods used to identify the four major fuel conditions; 1) no damage, 2) clad damage, 3) fuel overtemperature, and 4) fuel melt using Auxiliary indications, (e.g. core exit thermocouples, hydrogen, subcooling and R-32 A/B) for initial estimates. These results are then followed by an analysis of system radionuclide concentrations for the confirmation.

8.7.2 RESPONSIBILITIES

1. The Technical Analysis Director is responsible for ensuring appropriate Accident Assessment Team activation and utilization of this procedure.

2. The Accident Assessment Team is responsible for implementation of this procedure.

8.7.3 INSTRUCTIONS

NOTE: This procedure uses two methods of core damage assessment. The first, and best, is based on radionuclide analysis, which requires upwards of three hours. (Three hours are needed for analysis alone). The second, or "quick" method, is based on direct interpretation of plant instrumentation and is considerably simplified and less accurate.

1. This procedure is arranged into 8 Work Packages.
   Work Package 1 is applicable to all core damage assessments and should be used first.

8.7.3 (Continued)

2. Work Packages 2, 3, and 4 comprise the best assessment method. They are based on sampling and subsequent analysis, and are dependent on how long the reactor has been at a constant power level.

3. Work Packages 5, 6, and 7 are plant instrument specific. These comprise the "quick" method of core damage assessment.

4. Work Package 8 is a summary of assessment activities, incorporating the information from the other work packages.

5. Use of the work package flowchart (Attachment 8.7.5.12) will avoid the use of work packages which are not needed or for which data are not available.

6. The following Attachments are provided as informational materials or as a summary of information contained within the work packages.

   a. Attachment 8.7.5.9, Characteristics of Categories of Fuel Damage,

   b. Attachment 8.7.5.10, Core Protection,

   c. Attachment 8.7.5.11, Functional Restoration Procedures,

   d. Attachment 8.7.5.13, Definitions.

8.7.4 **RECORDS**

N/A

8.7.5 ATTACHMENTS

8.7.5.1 Work Package 1 - General Information Needed for All Assessment Methods

8.7.5.2 Work Package 2 - Assessment Using Radionuclide Analysis - Reactor Power Constant 30 Days or More

8.7.5.3 Work Package 3 - Assessment Using Radionuclide Analysis - Reactor Power Constant 4-30 Days

8.7.5.4 Work Package 4 - Assessment Using Radionuclide Analysis - Reactor Power Constant Less Than 4 Days

8.7.5.5 Work Package 5 - Assessment Based on Containment Radiation Monitors

8.7.5.6 Work Package 6 - Assessment Based on Hydrogen Concentration in Containment

8.7.5.7 Work Package 7 - Assessment Based on Core Exit Thermocouple Readings

8.7.5.8 Work Package 8 - Summary of Assessments

8.7.5.9 Characteristics of Categories of Fuel Damage

8.7.5.10 Core Protection

8.7.5.11 Function Restoration Procedures

8.7.5.12 Work Package Flowchart

8.7.5.13 Definitions

WORK PACKAGE 1-GENERAL INFORMATION NEEDED FOR ALL ASSESSMENTS

Work Package 1 - General Information Needed for all Assessment Methods.

1. Use this work package first.

> **NOTE:** If radiochemistry data is not available, complete as much of this package as possible, then go directly to Work Package 5 - Assessment Based on Containment Radiation Monitors.

2. Obtain plant data and radiochemistry sample data necessary to complete this package.

3. Use an ERFIS/EDS Terminal to obtain Plant data, as follows:

   a. Access the group library function

      – Located under turn on core "Real," for real time data display on EDS.

   b. Select "COREDAMG"

   c. A copy of the group may be printed for convenience.

4. Record sample times, dates, temperatures, pressures and corrected system volumes on the worksheet.

5. Use this package to correct reactor coolant and RHR system density where requested.

6. Use this package to convert sump level to total gallons of RHR system volume in containment.

WORK PACKAGE 1-GENERAL INFORMATION NEEDED FOR ALL ASSESSMENTS

CORE DAMAGE ASSESSMENT
SAMPLE DATA WORKSHEET

1.0 CONTAINMENT ATMOSPHERE

A. Date and time sample drawn: ___/___/___, _____ hours

B. CV temperature @ time of sample: _____ °F + 460 = _____ °R

C. CV pressure @ time of sample: _____ psig + 14.7 = _____ psia

D. CV volume (corrected): (1.612 E09) x (Step B ÷ Step C) = _____ cc @ STP

2.0 REACTOR COOLANT SYSTEM

A. Date and time sample drawn: ___/___/___, _____ hours

B. RCS temperature @ time of sample: _____ °F

C. Pressurizer level @ time of sample: _____% x .01 = _____

D. Water density ratio: _____ = ρ(t)/ρ(@STP)

E. RCS volume (corrected):

[(2.29 E08) + (Step C)(3.34 E07)] x (Step D) = _____ cc

3.0 RHR SYSTEM

A. Date and time sample drawn: ___/___/___/, _____ hours

B. CV sump level @ time of sample:

(LI-801 or LI-802)

_____ (gallons in sump) x 3785.6 cc/gal

= _____ cc

C. If the RHR System is used during a LOCA event, then the RHR volume is determined as:

Step B + 3.7856 E07 cc = _____ cc

If the RHR System is used in a cooldown mode with the RCS intact, then the RHR volume is determined as:

[(2.29 E08) + (Step C in Section 2.0) (3.34 E07)] cc +

3.7856 E07 cc = _____ cc

D. Water density ratio: _____ = ρ(t)/ρ(@STP)

E. RHR volume (corrected): (Step C) x (Step D) = _____ cc

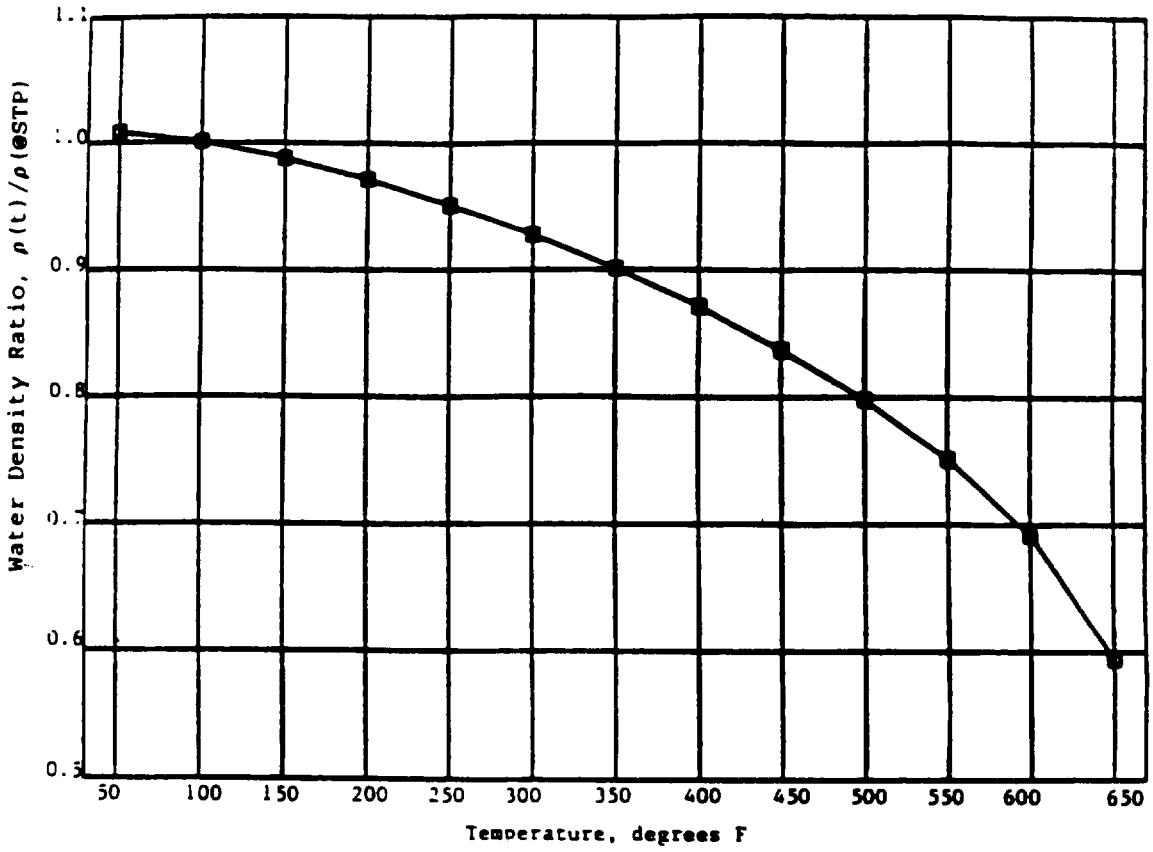
4.0 TIME OF REACTOR SHUTDOWN

A. Time _____ C. Percent power prior to shutdown _____

B. Date _____ D. Core Burnup _____EFPD

WORK PACKAGE 1-GENERAL INFORMATION NEEDED FOR ALL ASSESSMENTS

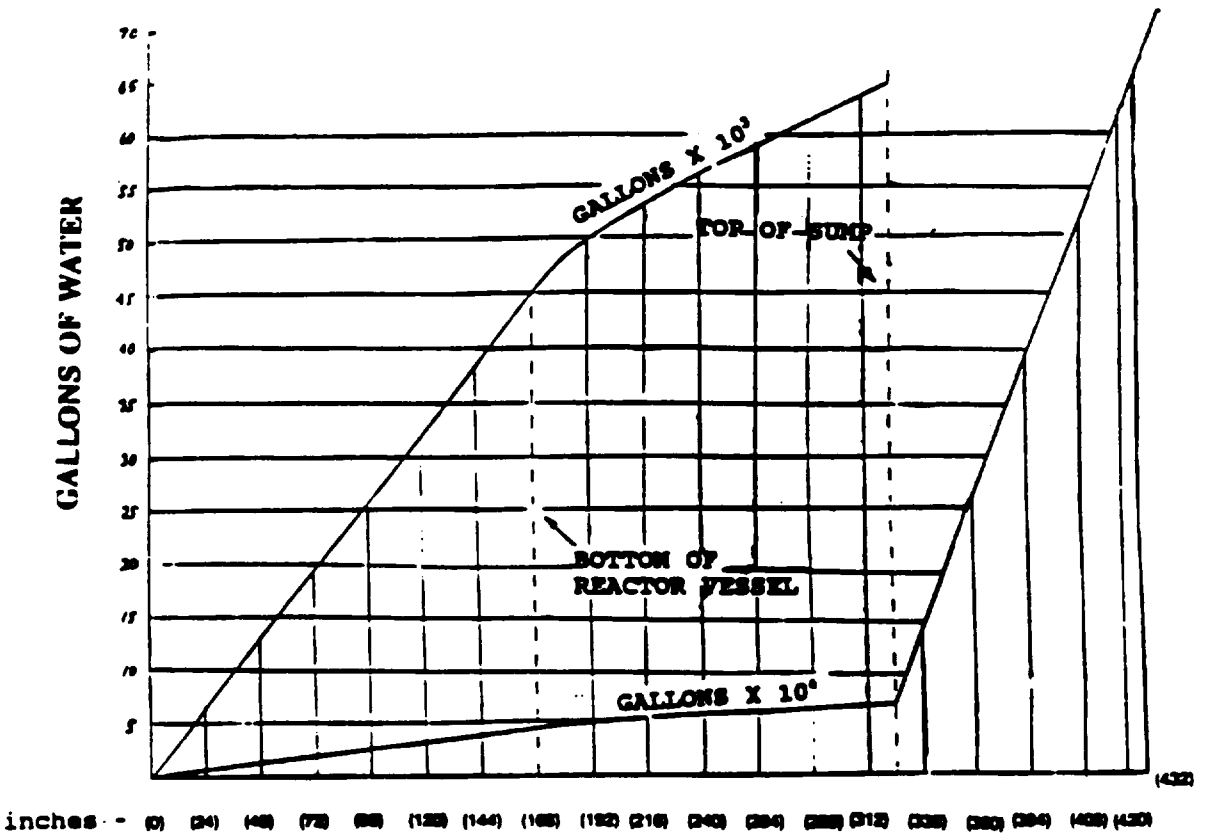
WATER DENSITY RATIO VS. TEMPERATURE



This graph assumes 2250 psia, however it can b used with lower pressures with a very small (<1%) error.

WORK PACKAGE 1-GENERAL INFORMATION NEEDED FOR ALL ASSESSMENTS

CONTAINMENT WATER VOLUME VS. SUMP LEVEL



(INCHES) ABOVE BOTTOM OF CONTAINMENT SUMP

WORK PACKAGE 2 - ASSESSMENT USING RADIONUCLIDE ANALYSIS - REACTOR POWER CONSTANT 30 DAYS OR MORE

NOTE: Constant reactor power is defined as the operating condition where there is less than 10% rated thermal power variation during the period.

1. Obtain the results of the radionuclide analysis from the Radiological Control Director and complete this package.

2. Enter the uCi/cc sample activity in the appropriate space (i.e., RCS, RHR, or CV) for each nuclide.

NOTE: Because of the long counting time associated with accurate strontium analysis, Ba-140 will serve as the initial fuel melt indicator until the strontium results are obtained and confirmed.

3. Using the decay constant provided in Column (2) for each isotope, divide the Column (1) sample activity by the Column (2) value which is the product of the decay constant and the time difference between sample time and reactor shutdown, to determine the corrected specific activity in Column (3).

NOTE: On this package, the sample activity in Column (1) is corrected during laboratory analysis back to the original activity at the time of sampling. To accurately assess core damage, this activity must be corrected to the specific activity at shutdown on Column (3) and the total activity in Column (5) which would have yielded that sample activity if the release had occurred at shutdown. This activity is compared to the adjusted power source term in Column (6) to estimate % of nuclide release. Columns (3) and (5) are representative activities if the release occurs at the instant of reactor shutdown. All total activities are corrected to time of shutdown to make calculations easier.

RCS pressure, temperature, or power transients may result in increased RCS iodine concentrations without clad damage (iodine spiking). Do not use iodine concentrations alone as evidence of fuel clad damage.

4. Record the specific system corrected volume from Work Package 1 in Column (4). Multiply the corrected specific activity from Column (3) by the volume in Column (4) to determine the corrected system total uCi content. Record the results in Column (5).

WORK PACKAGE 2 - ASSESSMENT USING RADIONUCLIDE ANALYSIS - REACTOR POWER CONSTANT 30 DAYS OR MORE

5. Obtain the percent constant reactor power prior to the incident and the Effective Full Power Days (EFPD) of fuel used in the cycle from the Plant Operations Director. Use this data where applicable to determine the correction terms identified in Column (6).

6. Divide Column (5) by Columns (6) and (7) and multiply by 100 to obtain the percent released per system in Column (8).

7. To obtain the total percent released, sum all three sample system results from Column (8) and record in Column (9).

8. Proceed to Work Package 8 - Summary of Assessments.

WORK PACKAGE 2 - ASSESSMENT USING RADIONCLIDE ANALYSIS - REACTOR POWER CONSTANT 30 DAYS OR MORE

≥30 DAY NUCLIDE RELEASE WORKSHEET

NUCLIDE	SAMPLE	SAMPLE ACTIVITY uCi/cc	+	$e^{-\lambda t}$	=	CORRECTED SPECIFIC ACTIVITY uCi/cc	x	CORRECTED VOLUME cc	=	CORRECTED SYSTEM TOTAL ACTIVITY uCi	+	CORRECTION TERM ÷ SOURCE TERM uCi		x 100 =	PERCENT RELEASE	Σ	TOTAL PERCENT RELEASED %
		(1)		(2)		(3)		(4)		(5)		(6)	(7)		(8)		(9)
	RCS		+	e-.545t	=		x		=		+	% power/100	+3.22E13	x 100 =			
Kr-87	RHR		+	e-.545t	=		x		=		+	% power/100	+3.22E13	x 100 =			
	CV		+	e-.545t	=		x		=		+	% power/100	+ 3.22E13	x 100 =			
	RCS		+	e-.244t	=		x		=		+	% power/100	+ 4.53E13	x 100 =			
Kr-88	RHR		+	e-.244t	=		x		=		+	% power/100	+ 4.53E13	x 100 =			
	CV		+	e-.244t	=		x		=		+	% power/100	+ 4.53E13	x 100 =			
	RCS		+	e-.004t	=		x		=		+	% power/100	+ 6.12E13	x 100 =			
I-131	RHR		+	e-.004t	=		x		=		+	% power/100	+ 6.12E13	x 100 =			
	CV		+	e-.004t	=		x		=		+	% power/100	+ 6.12E13	x 100 =			
	RCS		+	1	=		x		=		+	.9	+ 6.83E12	x 100 =			
Cs-134	RHR		+	1	=		x		=		+	.9	+ 6.83E12	x 100 =			
	CV		+	1	=		x		=		+	.9	+ 6.83E12	x 100 =			
	RCS		+	1	=		x		=		+	EFPD/1140	+ 5.37E12	x 100 =			
Cs-137	RHR		+	1	=		x		=		+	EFPD/1140	+ 5.37E12	x 100 =			
	CV		+	1	=		x		=		+	EFPD/1140	+ 5.37E12	x 100 =			
	RCS		+	e-.009t	=		x		=		+	% power/100	+ 8.71E13	x 100 =			
Te-132	RHR		+	e-.009t	=		x		=		+	% power/100	+ 8.71E13	x 100 =			
	CV		+	e-.009t	=		x		=		+	% power/100	+ 8.71E13	x 100 =			
	RCS		+	1	=		x		=		+	EFPD/1140	+ 6.19E13	x 100 =			
Sr-89	RHR		+	1	=		x		=		+	EFPD/1140	+ 6.19E13	x 100 =			
	CV		+	1	=		x		=		+	EFPD/1140	+ 6.19E13	x 100 =			
	RCS		+	1	=		x		=		+	EFPD/1140	+ 3.92E12	x 100 =			
Sr-90	RHR		+	1	=		x		=		+	EFPD/1140	+ 3.92E12	x 100 =			
	CV		+	1	=		x		=		+	EFPD/1140	+ 3.92E12	x 100 =			
	RCS		+	e-.002t	=		x		=		+	% power/100	+ 1.09E14	x 100 =			
Ba-140	RHR		+	e-.002t	=		x		=		+	% power/100	+ 1.09E14	x 100 =			
	CV		+	e-.002t	=		x		=		+	% power/100	+ 1.09E14	x 100 =			

REACTOR POWER LEVEL CONSTANT FOR 30 DAYS (LESS THAN 10% CHANGE)
t = (hours) time difference between sample time and reactor shutdown
EFPD = effective full power days
λ = (hours^{-1}) decay constant

NOTE: Due to the long analysis time associated with Strontium analysis these columns will not be completed initially, but can be recorded upon receiving sample results.

WORK PACKAGE 3 - ASSESSMENT USING RADIONUCLIDE ANALYSIS - REACTOR POWER CONSTANT 4 - 30 DAYS

NOTE: Constant reactor power is defined as the operating condition where there is less than 10% rated thermal power variation during the period.

1. Obtain the results of the radionuclide analyses from the Radiological Control Director (RCD) and complete this package.

2. Complete Columns (1) through (5) in accordance with the instructions of Work Package 2.

3. Obtain the reactor power history for the 30 days prior to the incident and the Effective Full Power Days (EFPD) of fuel used in the cycle from the Plant Operations Director. As applicable, use the power history data, Pages 3 through 5 or the EFPD data to determine the correction terms identified in Column (6).

NOTE: If the thermal power has not been constant over the last 30 days prior to shutdown, then some isotopes have not reached equilibrium concentrations. If the power level has not been constant, adjustments for the effects of power changes must be made. Where core power levels have changed by more than 10% of rated thermal power, a separate line must be completed for I-131, Te-132, and Ba-140 at each power level.

RCS pressure, temperature, or power transients may result in increased RCS iodine concentrations without clad damage (iodine spiking). Do not use iodine concentrations alone as evidence of fuel clad damage.

4. Complete Columns (8) and (9) of this package.

5. Proceed to Work Package 8.

WORK PACKAGE 3 - ASSESSMENT USING RADIONUCLIDE ANALYSIS - REACTOR POWER CONSTANT 4 - 30 DAYS

≥4 DAY, <30 DAY NUCLIDE RELEASE WORKSHEET

NUCLIDE	SAMPLE	SAMPLE ACTIVITY uCi/cc	+	$e^{-\lambda t}$	=	CORRECTED SPECIFIC ACTIVITY uCi/cc	x	CORRECTED VOLUME cc	=	CORRECTED SYSTEM TOTAL ACTIVITY uCi	+	CORRECTION TERM - SOURCE TERM uCi		x 100 =	PERCENT RELEASE	Σ	TOTAL PERCENT RELEASED %
		(1)		(2)		(3)		(4)		(5)		(6)	(7)		(8)		(9)
	RCS		+	e-.545t	=		x		=		÷	% power/100	÷ 3.22E13	x 100 =			
Kr-87	RHR		+	e-.545t	=		x		=		÷	% power/100	÷ 3.22E13	x 100 =			
	CV		+	e-.545t	=		x		=		÷	% power/100	÷ 3.22E13	x 100 =			
	RCS		+	e-.244t	=		x		=		÷	% power/100	÷ 4.53E13	x 100 =			
Kr-88	RHR		+	e-.244t	=		x		=		÷	% power/100	÷ 4.53E13	x 100 =			
	CV		+	e-.244t	=		x		=		÷	% power/100	÷ 4.53E13	x 100 =			
	RCS		+	e-.004t	=		x		=		÷	Complete	6.12E13	x 100 =			
I-131	RHR		+	e-.004t	=		x		=		÷	Att. 8.7.5.3	6.12E13	x 100 =			
	CV		+	e-.004t	=		x		=		÷		6.12E13	x 100 =			
	RCS		+	1	=		x		=		÷	9	÷ 6.83E12	x 100 =			
Cs-134	RHR		+	1	=		x		=		÷	9	÷ 6.83E12	x 100 =			
	CV		+	1	=		x		=		÷	9	÷ 6.83E12	x 100 =			
	RCS		+	1	=		x		=		÷	EFPD/1140	÷ 5.37E12	x 100 =			
Cs-137	RHR		+	1	=		x		=		÷	EFPD/1140	÷ 5.37E12	x 100 =			
	CV		+	1	=		x		=		÷	EFPD/1140	÷ 5.37E12	x 100 =			
	RCS		+	e-.009t	=		x		=		÷	Complete	8.71E13	x 100 =			
Te-132	RHR		+	e-.009t	=		x		=		÷	Att. 8.7.5.3	8.71E13	x 100 =			
	CV		+	e-.009t	=		x		=		÷		8.71E13	x 100 =			
	RCS		+	1	=		x		=		÷	EFPD/1140	÷ 6.19E13	x 100 =			
Sr-89	RHR		+	1	=		x		=		÷	EFPD/1140	÷ 6.19E13	x 100 =			
	CV		+	1	=		x		=		÷	EFPD/1140	÷ 6.19E13	x 100 =			
	RCS		+	1	=		x		=		÷	EFPD/1140	÷ 3.92E12	x 100 =			
Sr-90	RHR		+	1	=		x		=		÷	EFPD/1140	÷ 3.92E12	x 100 =			
	CV		+	1	=		x		=		÷	EFPD/1140	÷ 3.92E12	x 100 =			
	RCS		+	e-.002t	=		x		=		÷	Complete	1.09E14	x 100 =			
Ba-140	RHR		+	e-.002t	=		x		=		÷	Att. 8.7.5.3	1.09E14	x 100 =			
	CV		+	e-.002t	=		x		=		÷		1.09E14	x 100 =			

REACTOR POWER LEVEL CONSTANT FOR≥4 DAYS and <30 DAYS (LESS THAN 10% CHANGE)
t = (hours) time difference between sample time and reactor shutdown
EFPD = effective full power days
λ = (hours^{-1}) decay constant

NOTE: Due to the long analysis time associated with Strontium analysis these columns will not be completed initially, but can be recorded upon receiving sample results.

WORK PACKAGE 3 - ASSESSMENT USING RADIONUCLIDE ANALYSIS - REACTOR POWER CONSTANT 4 - 30 DAYS

CORRECTION TERM WORKSHEET FOR I-131

	(C1)	(C2)	(C3)	(C4)	(C5)	(C6)
	P_j	t_j	t_{ji}	1-exp ($-\lambda t_j$)	exp($-\lambda t_{ji}$)	(C1)*(C4)*(C5)
Sum						

Sum (C2) = Must be equal to 720 hours.
Correction Term = Sum (C6)/100

P_j = % Average reactor power for period j
t_j = (hours) Duration of operation at P_j
t_{ji} = (hours) Duration from end of interval t_j to reactor shutdown

I-131 λ = 0.004 $HOURS^{-1}$

WORK PACKAGE 3 - ASSESSMENT USING RADIONUCLIDE ANALYSIS - REACTOR POWER CONSTANT 4-30 DAYS

CORRECTION TERM WORKSHEET FOR Te-132

	(C1)	(C2)	(C3)	(C4)	(C5)	(C6)
	P_j	t_j	t_{ji}	1-exp ($-\lambda t_j$)	exp($-\lambda t_{ji}$)	(C1)*(C4)*(C5)
Sum						

Sum (C2) = Must be equal to 720 hours.
Correction Term = Sum (C6)/100

P_j = % Average reactor power for period j
t_j = (hours) Duration of operation at P_j
t_{ji} = (hours) Duration from end of interval t_j to reactor shutdown

Te-132 λ = 0.009 $HOURS^{-1}$

WORK PACKAGE 3 - ASSESSMENT USING RADIONUCLIDE ANALYSIS - REACTOR POWER CONSTANT 4- 30 DAYS

CORRECTION TERM WORKSHEET FOR Ba-140

	(C1)	(C2)	(C3)	(C4)	(C5)	(C6)
	P_j	t_j	t_{ji}	1-exp ($-\lambda t_j$)	exp($-\lambda t_{ji}$)	(C1)*(C4)*(C5)
Sum						

Sum (C2) = Must be equal to 720 hours.
Correction Term = Sum (C6)/100

P_j = % Average reactor power for period j
t_j = (hours) Duration of operation at P_j
t_{ji} = (hours) Duration from end of interval t_j to reactor shutdown

Ba-140 λ = 0.002 $HOURS^{-1}$

WORK PACKAGE 4 - ASSESSMENT USING RADIONUCLIDE ANALYSIS - REACTOR POWER CONSTANT LESS THAN 4 DAYS

1. Obtain the results of the radionuclide analyses from the Radiological Control Director (RCD) and complete this package.

2. Complete Columns (1) through (5) in accordance with the instructions of Work Package 2.

3. Obtain the reactor power history for the 4 days prior to the incident and the Effective Full Power Days (EFPD) of fuel used in the cycle from the Plant Operations Director. As applicable, use the power history data and the EFPD data to determine the correction terms identified in Column (6).

NOTE: If the power level has not been constant, adjustments for the effects of power changes must be made. Where core power levels have changed by more than 10% of rated thermal power, a separate line must be completed for Kr-87, Kr-88, I-131, Te-132, and Ba-140 for each power level.

RCS pressure, temperature, or power transients may result in increased RCS iodine concentrations without clad damage (Iodine spiking). Do not use iodine concentrations alone as evidence of fuel clad damage.

4. Complete Columns (8) and (9) of this package.

5. Proceed to Work Package 8.

WORK PACKAGE 4 - ASSESSMENT USING RADIONUCLIDE ANALYSIS - REACTOR POWER CONSTANT LESS THAN 4 DAYS

<4 DAY NUCLIDE RELEASE WORKSHEET

NUCLIDE	SAMPLE	SAMPLE ACTIVITY uCi/cc +	$e^{-\lambda t}$ =	CORRECTED SPECIFIC ACTIVITY uCi/cc x	CORRECTED VOLUME cc =	CORRECTED SYSTEM TOTAL ACTIVITY uCi +	CORRECTION TERM - SOURCE TERM uCi		x 100 =	PERCENT RELEASE	Σ TOTAL PERCENT RELEASED %
		(1)	(2)	(3)	(4)	(5)	(6)	(7)		(8)	(9)
	RCS	+	e-.545t =	x	=	+	Complete	+ 3.22E13	x 100 =		
Kr-87	RHR	+	e-.545t =	x	=	+	Att. 8.7.5.4	+ 3.22E13	x 100 =		
	CV	+	e-.545t =	x	=	+		+ 3.22E13	x 100 =		
	RCS	+	e-.244t =	x	=	+	Complete	+ 4.53E13	x 100 =		
Kr-88	RHR	+	e-.244t =	x	=	+	Att. 8.7.5.4	+ 4.53E13	x 100 =		
	CV	+	e-.244t =	x	=	+		+ 4.53E13	x 100 =		
	RCS	+	e-.004t =	x	=	+	Complete	6.12E13	x 100 =		
I-131	RHR	+	e-.004t =	x	=	+	Att. 8.7.5.4	6.12E13	x 100 =		
	CV	+	e-.004t =	x	=	+		6.12E13	x 100 =		
	RCS	+	1 =	x	=	+	. 9	+ 6.83E12	x 100 =		
Cs-134	RHR	+	1 =	x	=	+	. 9	+ 6.83E12	x 100 =		
	CV	+	1 =	x	=	+	. 9	+ 6.83E12	x 100 =		
	RCS	+	1 =	x	=	+	EFPD/1140	+ 5.37E12	x 100 =		
Cs-137	RHR	+	1 =	x	=	+	EFPD/1140	+ 5.37E12	x 100 =		
	CV	+	1 =	x	=	+	EFPD/1140	+ 5.37E12	x 100 =		
	RCS	+	e-.009t =	x	=	+	Complete	8.71E13	x 100 =		
Te-132	RHR	+	e-.009t =	x	=	+	Att. 8.7.5.4	8.71E13	x 100 =		
	CV	+	e-.009t =	x	=	+		8.71E13	x 100 =		
	RCS	+	1 =	x	=	+	EFPD/1140	- 6.19E13	x 100 =		
Sr-89	RHR	+	1 =	x	=	+	EFPD/1140	- 6.19E13	x 100 =		
	CV	+	1 =	x	=	+	EFPD/1140	- 6.19E13	x 100 =		
	RCS	+	1 =	x	=	+	EFPD/1140	- 3.92E12	x 100 =		
Sr-90	RHR	+	1 =	x	=	+	EFPD/1140	- 3.92E12	x 100 =		
	CV	+	1 =	x	=	+	EFPD/1140	- 3.92E12	x 100 =		
	RCS	+	e-.002t =	x	=	+	Complete	1.09E14	x 100 =		
Ba-140	RHR	+	e-.002t =	x	=	+	Att. 8.7.5.4	1.09E14	x 100 =		
	CV	+	e-.002t =	x	=	+		1.09E14	x 100 =		

REACTOR POWER LEVEL CONSTANT FOR <4 DAYS (LESS THAN 10% CHANGE)
t = (hours) time difference between sample time and reactor shutdown
EFPD = effective full power days
λ = (hours^{-1}) decay constant

NOTE: Due to the long analysis time associated with Strontium analysis these columns will not be completed initially, but can be recorded upon receiving sample results.

WORK PACKAGE 4 - ASSESSMENT USING RADIONUCLIDE ANALYSIS - REACTOR POWER CONSTANT LESS THAN 4 DAYS

CORRECTION TERM WORKSHEET FOR Kr-87

	(C1)	(C2)	(C3)	(C4)	(C5)	(C6)
	P_j	t_j	t_{ji}	$1-\exp(-\lambda t_j)$	$\exp(-\lambda t_{ji})$	(C1)*(C4)*(C5)
Sum						

Sum (C2) = Must be equal to 96 hours.
Correction Term = Sum (C6)/100

P_j = % Average reactor power for period j
t_j = (hours) Duration of operation at P_j
t_{ji} = (hours) Duration from end of interval t_j to reactor shutdown

Kr-87 $\lambda = 0.545$ hours^{-1}

WORK PACKAGE 4 - ASSESSMENT USING RADIONUCLIDE ANALYSIS - REACTOR POWER CONSTANT LESS THAN 4 DAYS

CORRECTION TERM WORKSHEET FOR Kr-88

	(C1)	(C2)	(C3)	(C4)	(C5)	(C6)
	P_j	t_j	t_{ji}	1-exp ($-\lambda t_j$)	exp($-\lambda t_{ji}$)	(C1)*(C4)*(C5)
Sum						

Sum (C2) = Must be equal to 96 hours.
Correction Term = Sum (C6)/100

P_j = % Average reactor power for period j
t_j = (hours) Duration of operation at P_j
t_{ji} = (hours) Duration from end of interval t_j to reactor shutdown

Kr-88 $\lambda = 0.244$ hours^{-1}

WORK PACKAGE 4 - ASSESSMENT USING RADIONUCLIDE ANALYSIS - REACTOR POWER CONSTANT LESS THAN 4 DAYS

CORRECTION TERM WORKSHEET FOR I-131

	(C1)	(C2)	(C3)	(C4)	(C5)	(C6)
	P_j	t_j	t_{ji}	1-exp ($-\lambda t_j$)	exp($-\lambda t_{ji}$)	(C1)*(C4)*(C5)
Sum						

Sum (C2) = Must be equal to 96 hours.
Correction Term = Sum (C6)/100

P_j = % Average reactor power for period j
t_j = (hours) Duration of operation at P_j
t_{ji} = (hours) Duration from end of interval t_j to reactor shutdown

I-131 λ = 0.004 $HOURS^{-1}$

WORK PACKAGE 4 - ASSESSMENT USING RADIONUCLIDE ANALYSIS - REACTOR POWER CONSTANT LESS THAN 4 DAYS

CORRECTION TERM WORKSHEET FOR Te-132

	(C1)	(C2)	(C3)	(C4)	(C5)	(C6)
	P_j	t_j	t_{ji}	1-exp ($-\lambda t_j$)	exp($-\lambda t_{ji}$)	(C1)*(C4)*(C5)
Sum						

Sum (C2) = Must be equal to 96 hours.
Correction Term = Sum (C6)/100

P_j = % Average reactor power for period j
t_j = (hours) Duration of operation at P_j
t_{ji} = (hours) Duration from end of interval t_j to reactor shutdown

Te-132 λ = 0.009 $HOURS^{-1}$

WORK PACKAGE 4 - ASSESSMENT USING RADIONUCLIDE ANALYSIS - REACTOR POWER CONSTANT LESS THAN 4 DAYS

CORRECTION TERM WORKSHEET FOR Ba-140

	(C1)	(C2)	(C3)	(C4)	(C5)	(C6)
	P_j	t_j	t_{ji}	1-exp ($-\lambda t_j$)	exp($-\lambda t_{ji}$)	(C1)*(C4)*(C5)
Sum						

Sum (C2) = Must be equal to 96 hours.
Correction Term = Sum (C6)/100

P_j = % Average reactor power for period j
t_j = (hours) Duration of operation at P_j
t_{ji} = (hours) Duration from end of interval t_j to reactor shutdown

Ba-140 λ = 0.002 $HOURS^{-1}$

WORK PACKAGE 5 - ASSESSMENT BASED ON CONTAINMENT RADIATION MONITORS

NOTE:	The following assumptions are made:

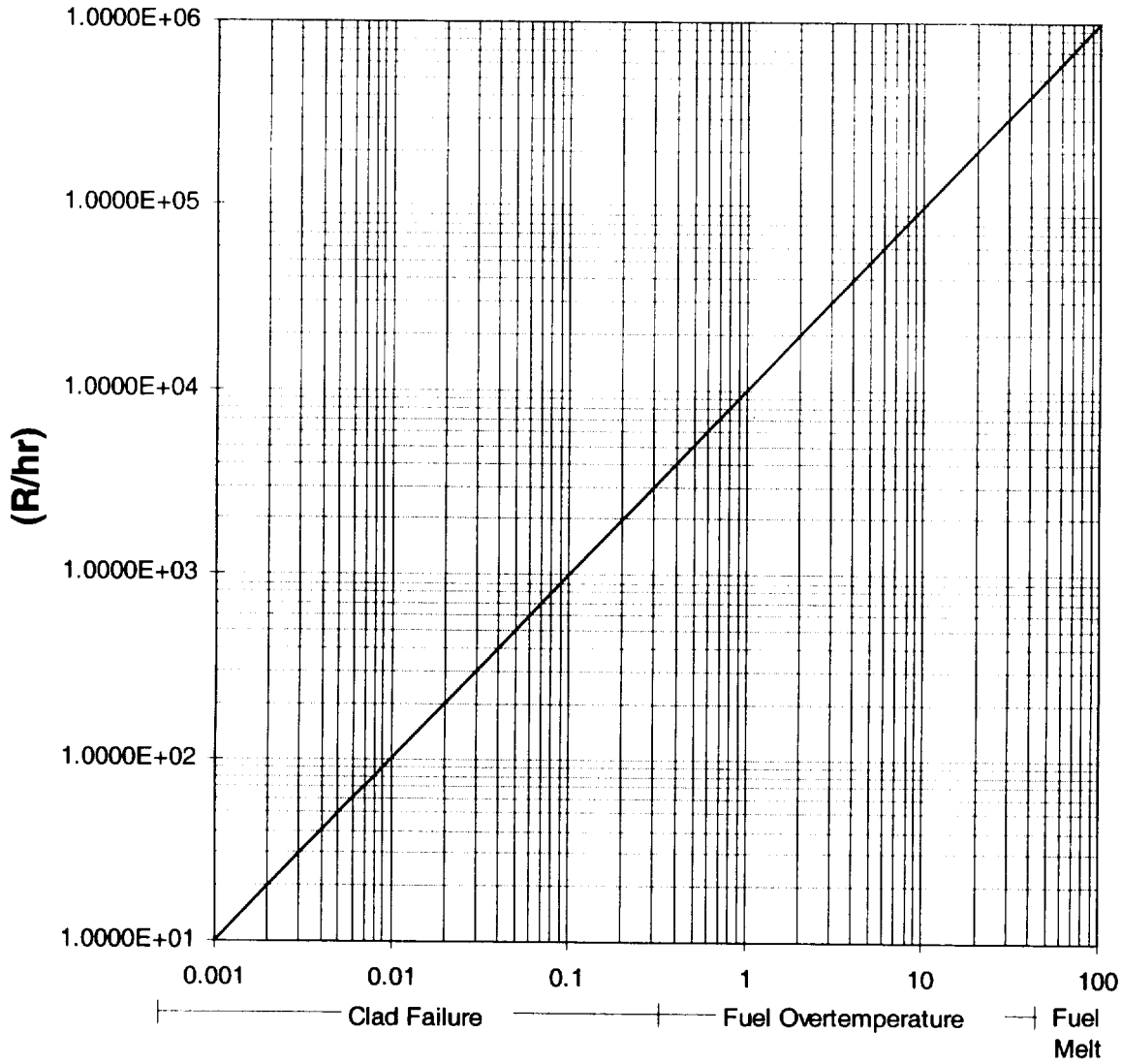
- Radiogases released from the fuel are instantaneously and uniformly distributed throughout containment.
- The source terms were developed with the Origin II fuels code using information contained in the Siemens Report, "H. B. Robinson Unit 2 Radiological Assessment of Postulated Accidents," which assumes reactor operation at 2300 MWth with peak assembly exposures up to 52,500 MWd/MTu.
- 100% of the noble gases, 25% of the halogens, and 1% of all others are released.

1. Obtain most current R-32 A/B readings from the ERFIS System or radiation reading at "x" outside CV from Radiological Control Director, then determine % noble gas released and estimate core damage.

2. Proceed to Work Package 8.

Work Package 5 - ASSESSMENT BASED UPON CONTAINMENT RADIATION MONITORS

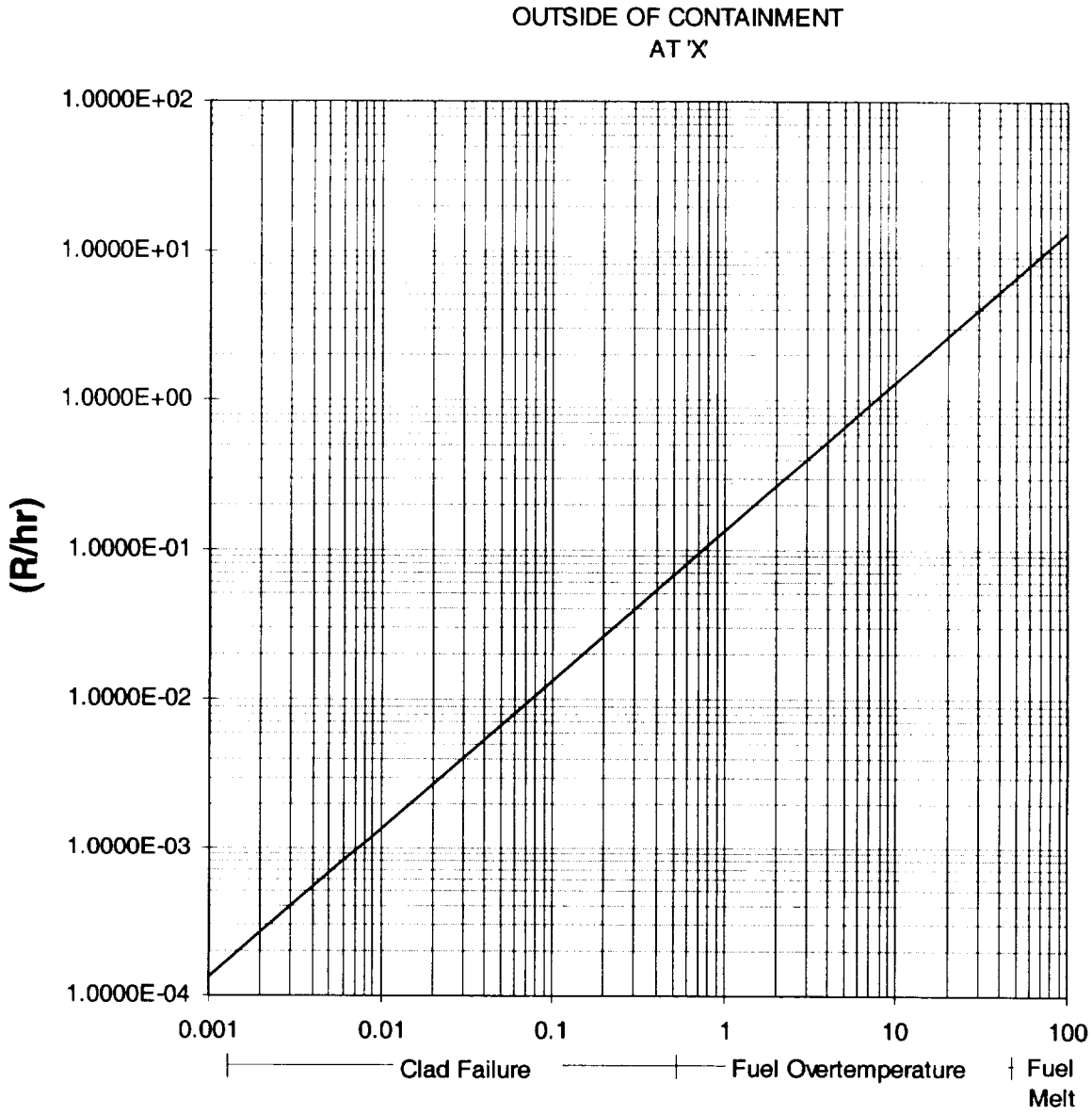
CONTAINMENT HIGH RADIATION MONITORS
R32 A/B



% Noble Gases in Containment

Note: % Noble Gases = (Rad. Level)*1.012E-4

Work Package 5 - ASSESSMENT BASED UPON CONTAINMENT RADIATION MONITORS



% Noble Gases Released

Note: % Noble Gases Released = (Rad. Level)*7.486

WORK PACKAGE 6 - ASSESSMENT BASED ON HYDROGEN CONCENTRATION IN CONTAINMENT

1. Obtain containment atmosphere H_2 monitor reading from the ERFIS/EDS System.

CAUTION

A very low oxygen concentration may indicate that there has been a hydrogen burn. If the summary report (Work Package 8) indicates that there SHOULD HAVE BEEN ELEVATED H_2 LEVELS in containment air, request an O_2 determination from the radiological controls director. Also, determine if there has been a containment pressure spike, which may also indicate a hydrogen burn.

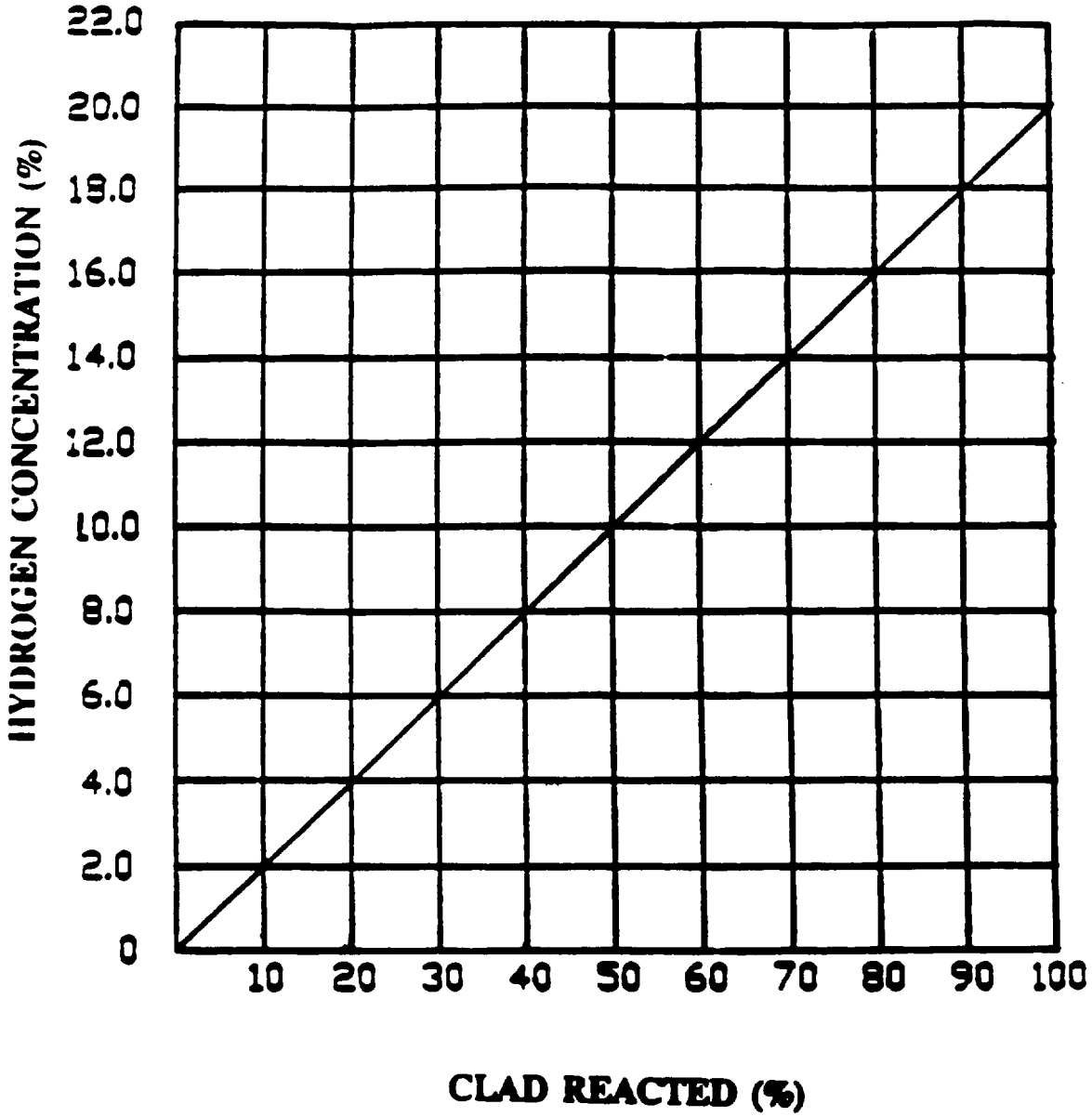
2. Use this package to estimate the percentage of fuel cladding reacted. (This applies to containment only.)

3. Use this package for a second estimate of fuel cladding reacted.

4. Proceed to Work Package 8.

WORK PACKAGE 6 - ASSESSMENT BASED ON HYDROGEN CONCENTRATION IN CONTAINMENT

CONTAINMENT
HYDROGEN CONCENTRATION VS. % CLAD REACTED



WORK PACKAGE 6 - ASSESSMENT BASED ON HYDROGEN CONCENTRATION IN CONTAINMENT

IDEAL GAS LAW FOR DETERMINING % Zr CLAD FAILURE

1. $n = \frac{PV}{RT}$ where:

R = 670.0 psia-cc/gm-mole-°R
n = number of moles of H_2 gas in CV
P = absolute pressure, psia
V = H_2 volume = fraction H_2 detected x total CV volume

A_{CV} = (_____ / 100 % H_2 in CV) x (_____ corrected CV_{vol} from Step 1.0,

Work Package 1 = _____ cc H_2 in CV

NOTE: The cc H_2/kg H_2O value used in the B_{RCS} calculation below should be the measured value minus the cc H_2/kg H_2O normally maintained dissolved in solution.

B_{RCS} = (_____ cc H_2/kg H_2O in RCS / 1000 cc/kg) x (_____corrected RCS_{vol} from Step 2, Work Package 1 x 1.057 cc H_2 @ 60°F/cc H_2 @ 32° F = _____ cc H_2 in RCS

2. (A_{CV} _____ + B_{RCS} _____) = _____ total cc H_2

_____ total cc H_2 ÷ (2.37 X 10^4 cc/gm-mole) = _____ total moles H_2

3. _____ total moles H_2 ÷ 2 = _____ total moles of Zr reacted

4. To obtain total reacted lbs_m Zr:

[_____ moles Zr from Step 3, above] x [(91.22 gm/mole) ÷ 453.59 gm/lb] = _____ total lbs Zr

5. To determine total % of clad reacted:

[___lbs_m Zr from Step 4, above] x 100 / 49279 lbs_m Zr in core = _____ % clad reacted

WORK PACKAGE 7 - ASSESSMENT BASED ON CORE EXIT THERMOCOUPLE READINGS

CAUTION

As many TC's as possible should be used for evaluation of core temperature conditions. It is recommended that a minimum of one TC near the center of the core and one in each quadrant be monitored.

Caution must be used if a TC reads offscale - low or is reading considerably different from neighboring TC's as it may have failed.

1. Use this package to select the thermocouples to be read.

2. Read TC data from the ERFIS Print-Out.

3. Analyze the readings as follows:

   a. If core exit TC's indicate less than 700°F and a subsequent RVLIS check indicates no degraded core cooling, go to Work Package B.

   b. If at least 5 or more core exit TC's are more than 700°F, and if RVLIS full range indicates less than 41% of collapsed liquid level in the core, there may be inadequate core cooling with potential cladding breach.

   c. Check R-2, R-7, R-9, and R-32 A/B to validate that fuel damage has occurred.

      – Note that R-9, Letdown Monitor, may be isolated if Phase A isolation has occurred.

WORK PACKAGE 7 - ASSESSMENT BASED ON CORE EXIT THERMOCOUPLE READINGS

NOTE: If at least 5 core exit TC's indicate more than 1200°F; this condition indicates that most of the reactor coolant has gone from the core and that decay heat is superheating the steam in the core. This means that there is a real potential for fuel overtemperature conditions.

d. Use the following table for fuel damage vs. fuel rod temperatures.

Fuel Damage	Temperature °F
No Damage	<1300
Clad Damage	1300 - 2000
Ballooning of zircaloy cladding	1300
Burst of zircaloy cladding	1300 - 2000
Oxidation of cladding and hydrogen generation	>1600
Fuel Overtemperature	
Fission product fuel lattice mobility	2000 - 2550
Grain boundary diffusion	
Release of fission products	2450 - 3450

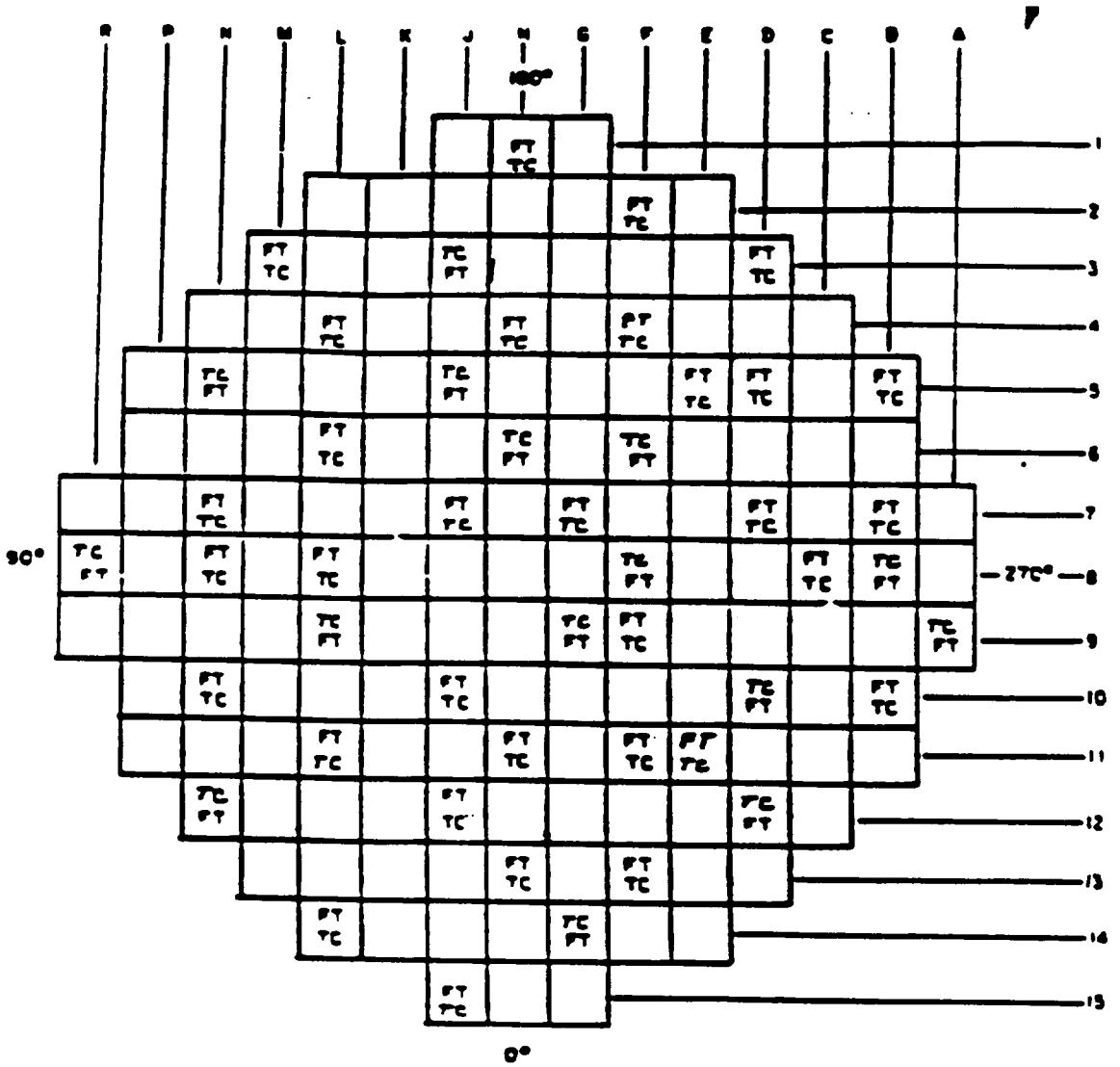
NOTE: The response of a core exit thermocouple remains valid up to 2300°F making it useful under accident conditions. However, it is to be emphasized that because the thermocouples do not directly measure fuel rod temperature, this method is qualitative only and should be used for confirming other indications only.

e. Review TC readings for indications of localized high temperatures or core damage areas.

NOTE: Excore and Incore Neutron Instrumentation may also be used to qualitatively determine very high temperatures in the core and/or the presence or absence of liquid water in the downcomer and core regions near the axial locations of the detectors. In general, high temperature water/steam formation in thedowncomer would result in increased excore detector output. High temperature water/steam formation in the core would result in local decreases in incore detector output.

4. Proceed to Work Package 8.

WORK PACKAGE 7 - ASSESSMENT BASED ON CORE EXIT THERMOCOUPLE READINGS



TC = Thermocouple
FT = Flux thimble

WORK PACKAGE 8 - SUMMARY OF ASSESSMENTS

1. Use this work package to prepare the Core Damage Assessment Summary Report (Page 2 and 3).

   a. If available, convert results from Work Packages 2, 3, or 4, using this package.

NOTE: Sections b and c of this package may be used alone as a preliminary report, pending availability of radionuclide analysis.

   b. Complete Sections 1, b, c and d of this package.

2. Complete all sections for which data is available on previous work packages.

3. Transmit full or partial report to Technical Analysis Manager and Plant Operations Director.

4. Repeat this procedure as directed.

5. Records of actions taken (work sheets and major communications) will be given to the Technical Analysis Manager.

WORK PACKAGE 8 - SUMMARY OF ASSESSMENTS

CORE DAMAGE ASSESSMENT SUMMARY REPORT

1. The implementation of EPTSC-07 has been completed. Based on an analysis of specific indicators the core damage status is as follows:

Analytical Source

		NO	CLAD	OVER TEMP	MELT
_____ A.	Reactor Coolant System				
_____ B.	RHR System				
_____ C.	Containment Atmosphere				
_____ D.	Core Thermocouple (estimated)				
_____ E.	CV CHRM R32 a or b				
_____ F.	Hydrogen Levels				

2. Core Damage Assessment Definition - complete the appropriate section based on the above source and status.

   Since it is probable that more than one type of damage may have occurred in the core, it is best to predict a range of estimated core damage. For example, the isotopic analysis may indicate major cladding failure (50-100%) with indications of some degree of fuel overheat (<10%) and the possibility of minor fuel melting (<1%).

WORK PACKAGE 8 - SUMMARY OF ASSESSMENTS

a. Percent core damage indicated by isotope release fractions. (Use Pages 2 of 11 through 10 of 11).

ISOTOPE	CLAD FAILURE %	FUEL OVERTEMP. %	FUEL MELT %
Kr-87	_____	_____	_____
Kr-88	_____	_____	_____
I-131	_____	_____	_____
Cs-134	_____	_____	_____
Cs-137	_____	_____	_____
Te-132	_____	_____	_____
Sr-89	_____	_____	_____
Ba-140	_____	_____	_____

b. Core degradation identified by core exit thermocouples/RVLIS

_____ Core Exit Therm. <700°F
_____ 700°F <Core Exit Therm. <1200°F
_____ 1200°F <Core Exit Therm. <2000°F = Clad Failure
_____ 2000°F <Core Exit Therm. <3450°F = Fuel Overtemperature

c. Percent zirconium-water reaction based on hydrogen

Total Containment H_2 _____ cc
Total RCS H_2 _____ cc

_____% clad reacted (from Item 5 of Attachment 8.7.5.6, Page 3)

WORK PACKAGE 8 - SUMMARY OF ASSESSMENTS

d. Does qualitative analysis agree with radionuclide analysis?
_____ Yes _____ No

Comments: _____

_____

_____

_____

Initiated By: _____ Date: _____

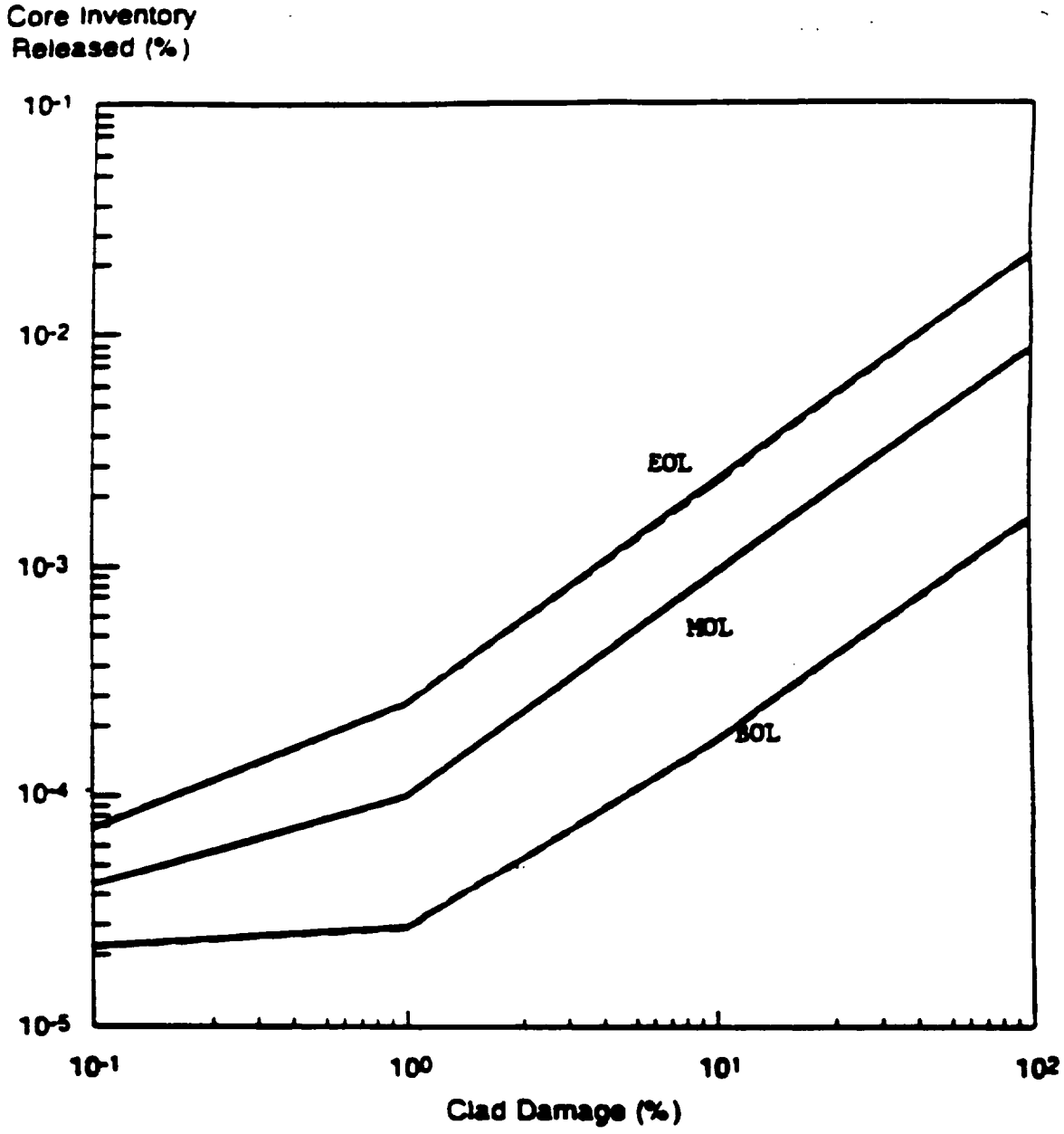
Time: _____

Reviewed By: _____ Date: _____
Technical Analysis Director

Approved By: _____ Date: _____
Plant Operations Director

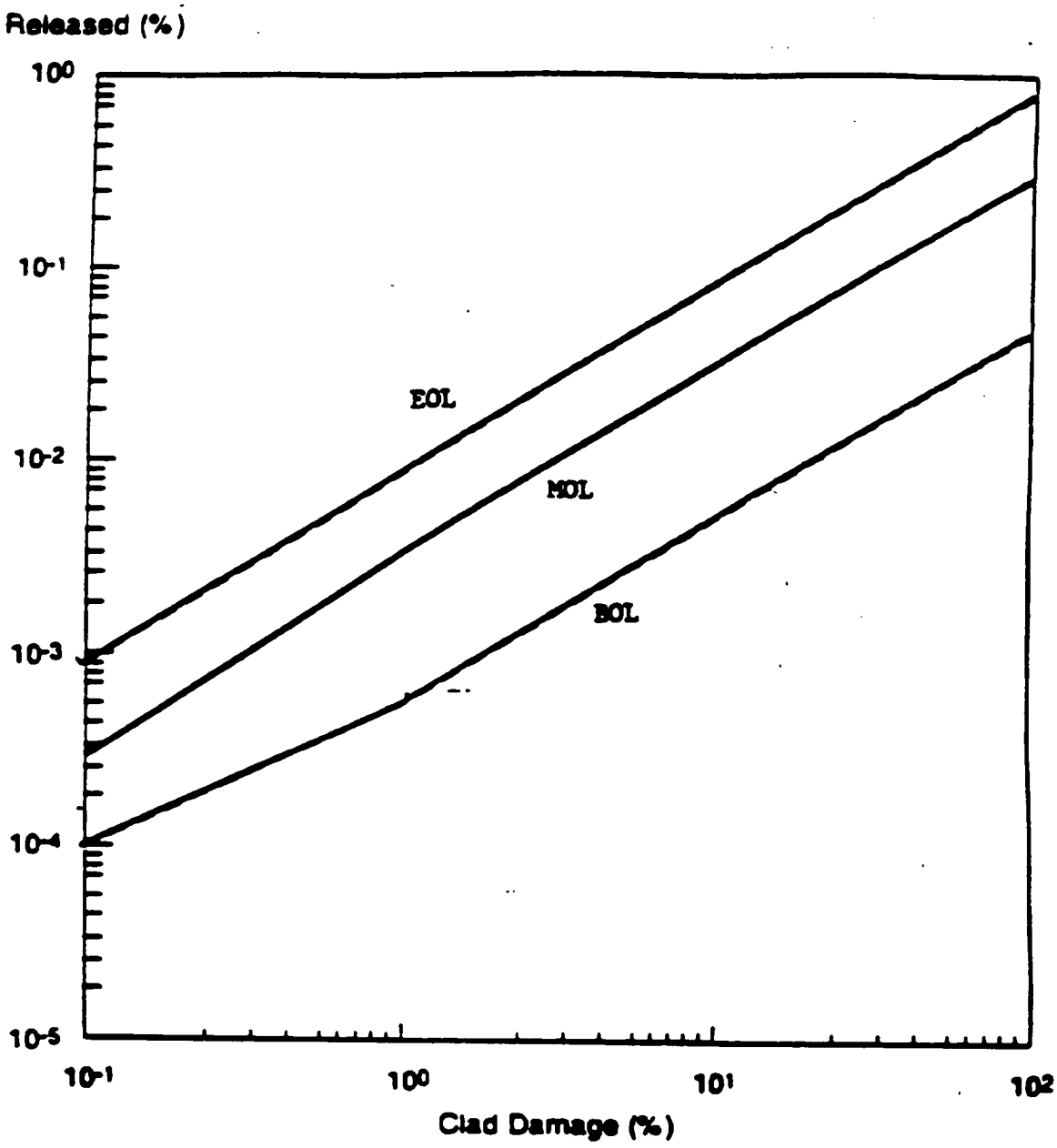
WORK PACKAGE 8 - SUMMARY OF ASSESSMENTS

RELATIONSHIP OF % CLAD DAMAGE WITH
% CORE INVENTORY RELEASED OF Kr-87, Kr-88



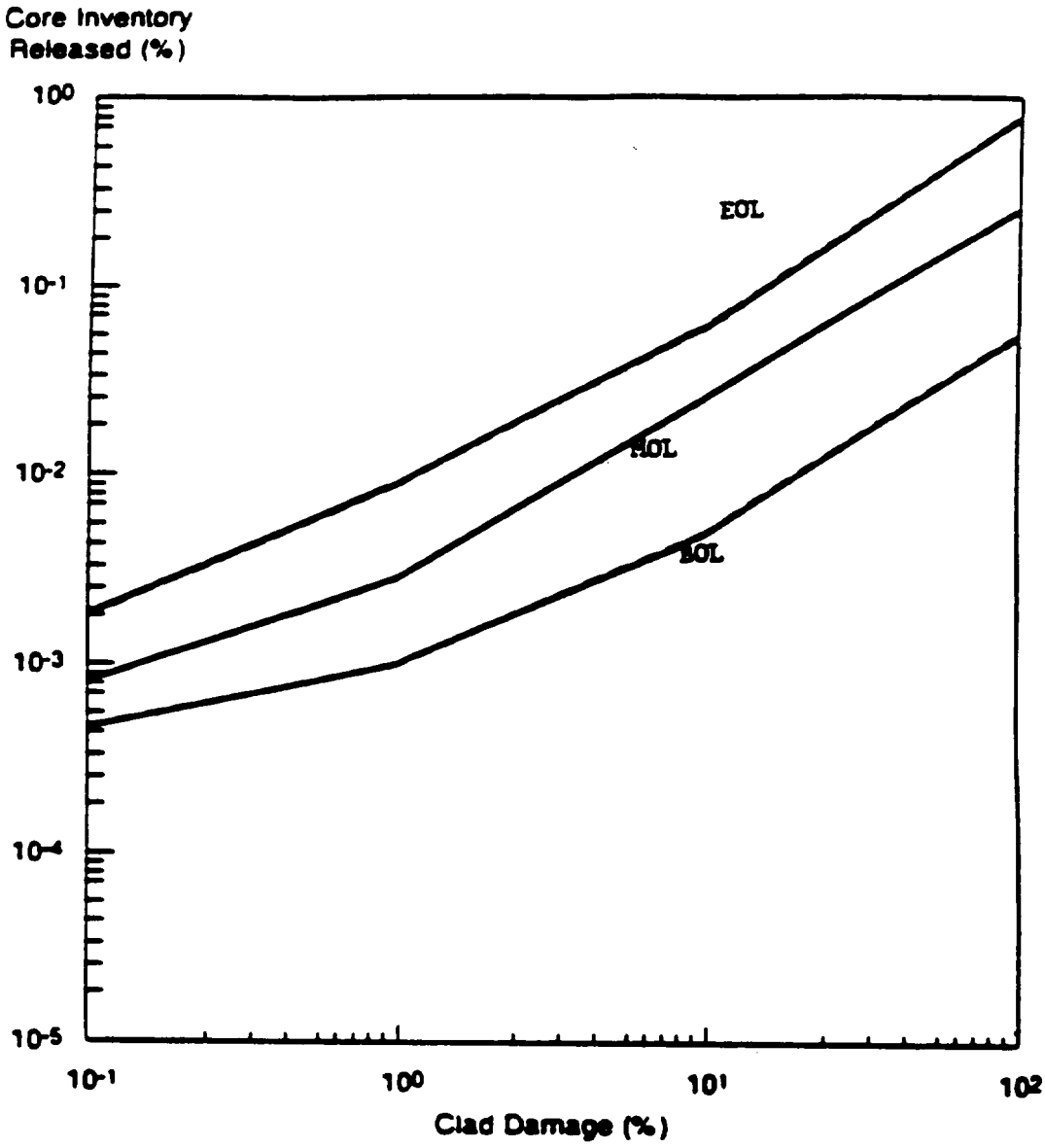
WORK PACKAGE 8 - SUMMARY OF ASSESSMENTS

RELATIONSHIP OF % CLAD DAMAGE WITH
% CORE INVENTORY RELEASE OF I-131



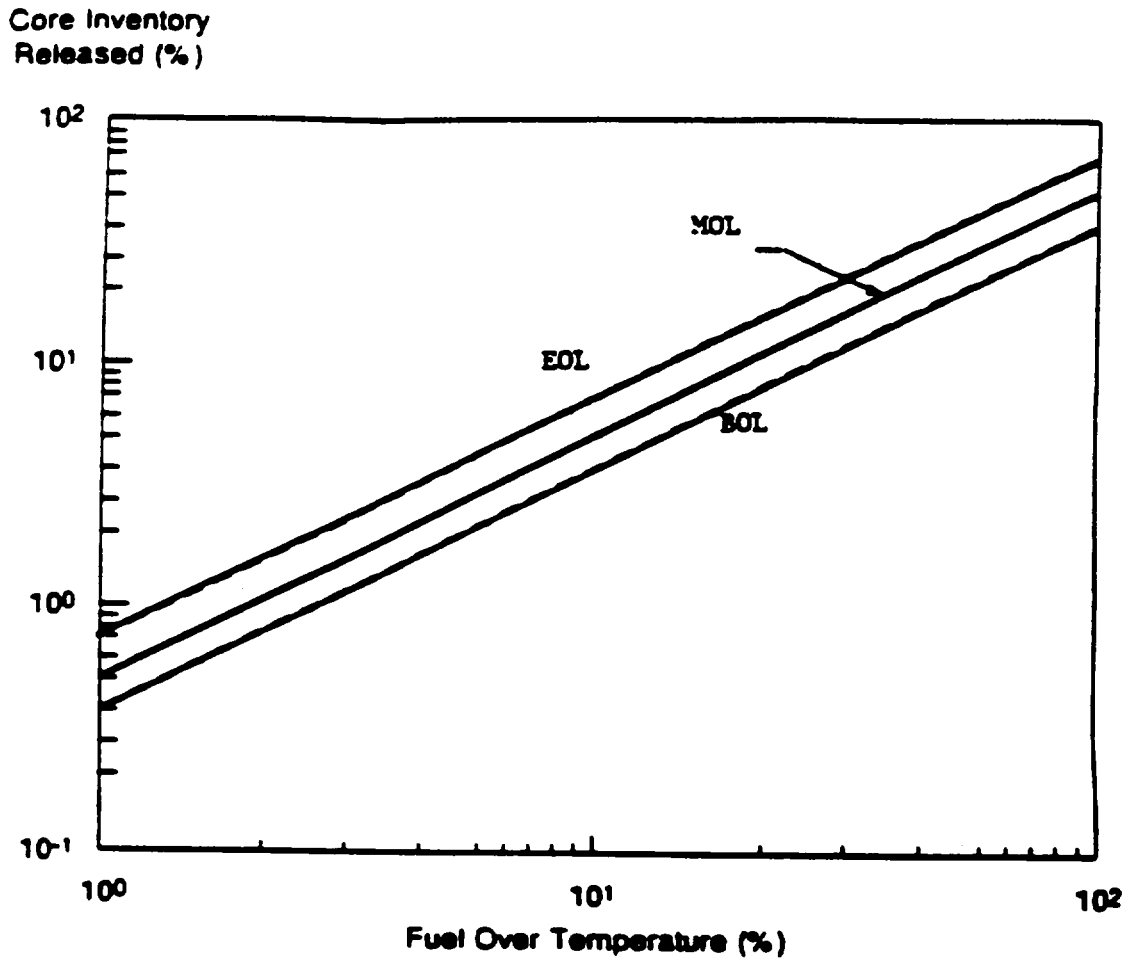
WORK PACKAGE 8 - SUMMARY OF ASSESSMENTS

RELATIONSHIP OF % CLAD DAMAGE WITH
% CORE INVENTORY RELEASE OF I-131
WITH SPIKING



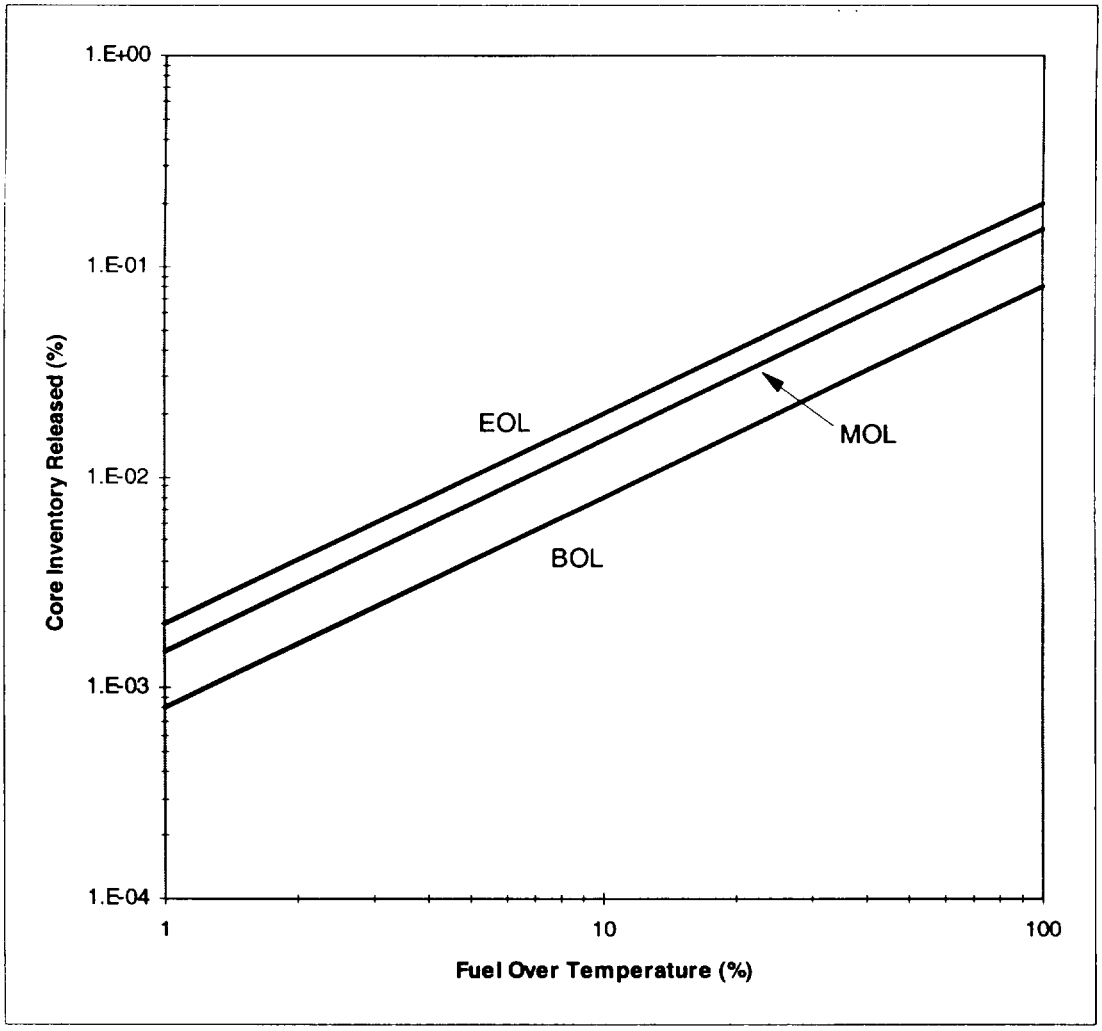
WORK PACKAGE 8 - SUMMARY OF ASSESSMENTS

RELATIONSHIP OF % FUEL OVERTEMPERATURE
WITH % CORE INVENTORY RELEASED OF
Kr, I, Cs, OR Te



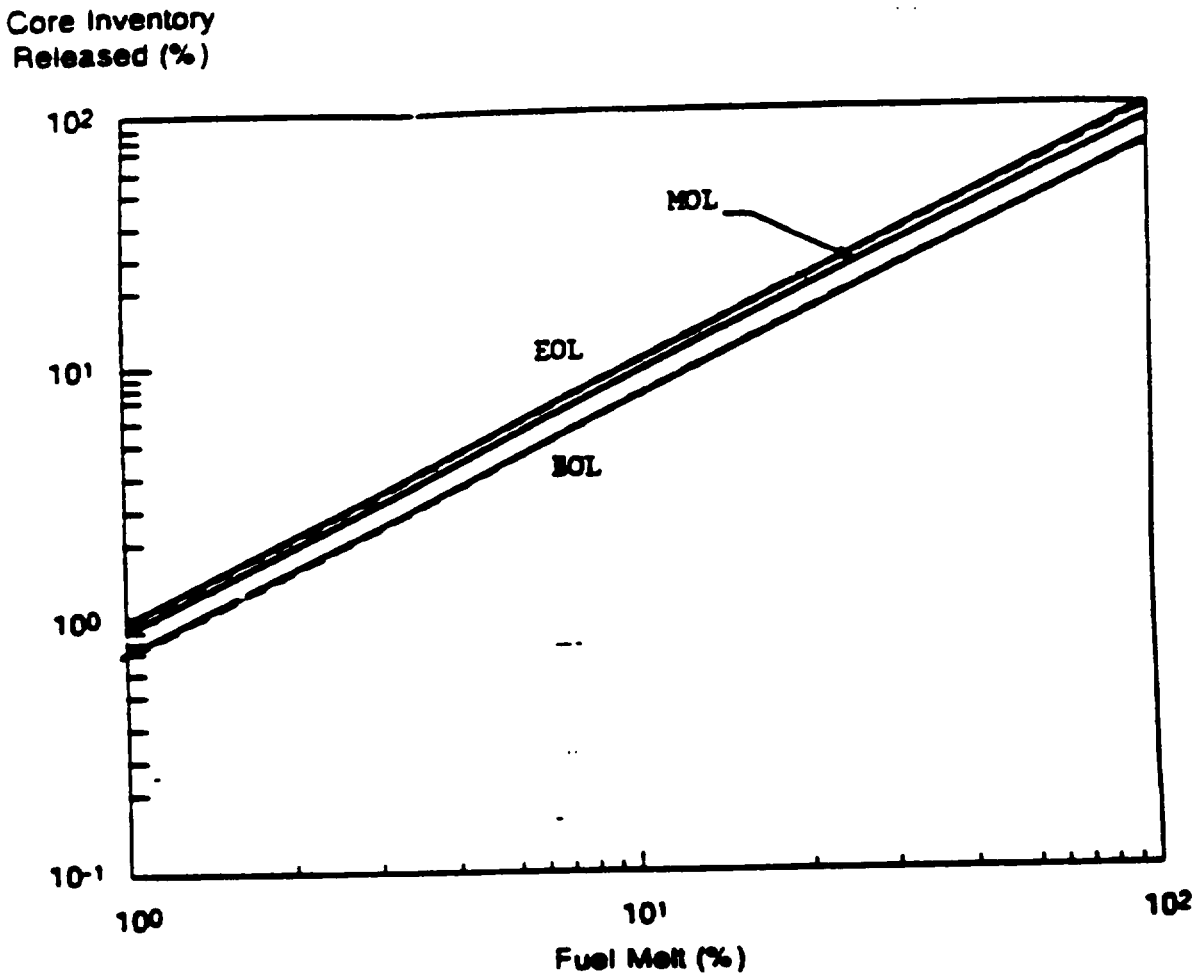
WORK PACKAGE 8 - SUMMARY OF ASSESSMENTS

RELATIONSHIP OF % FUEL OVERTEMPERATURE
WITH % CORE INVENTORY RELEASED
OF Ba OR Sr



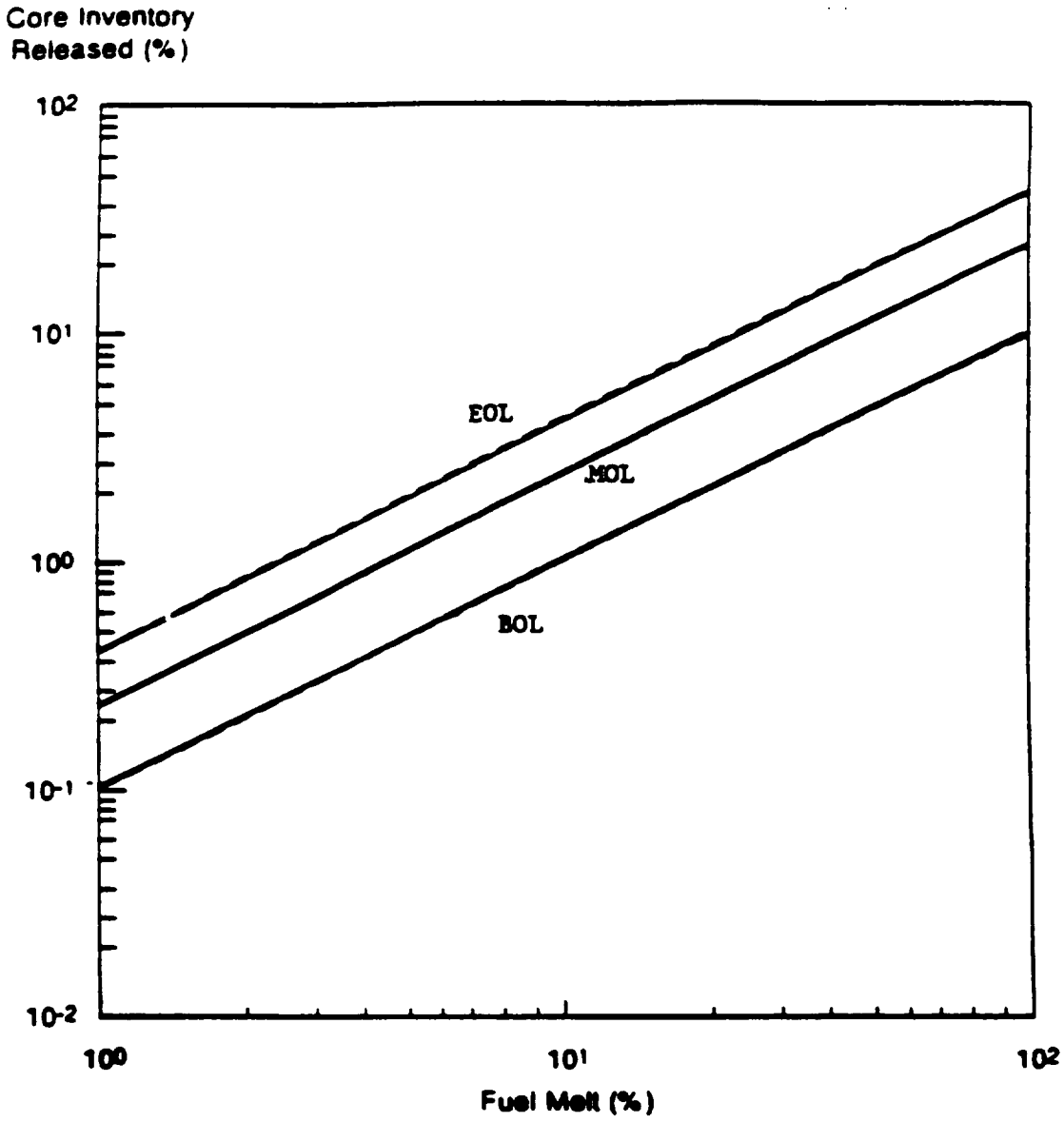
WORK PACKAGE 8 - SUMMARY OF ASSESSMENTS

RELATIONSHIP OF % FUEL MELT WITH
% CORE INVENTORY RELEASED OF
Kr, I, Cs, OR Te



WORK PACKAGE 8 - SUMMARY OF ASSESSMENTS

RELATIONSHIP OF % FUEL MELT WITH
% CORE INVENTORY RELEASED OF
Ba OR Sr



CHARACTERISTICS OF CATEGORIES OF FUEL DAMAGE

	No Fuel Damage	0-50% Cladding Failure	50-100% Cladding Failure	0-50% Fuel OverTemp	50-100% Fuel OverTemp	0-50% Core Melt	50-100% Core Melt
Fission Product Concentrations:							
Kr-87 (Kr)	<4E-5%	-0.005%	-0.01%	1-25%	-50%	-50%	>50%
Xe-131 (Xe)	<4E-3%	-0.08%	-0.1%	1-25%	-50%	-50%	>50%
Xe-133	<2E-3%	-0.05%	-0.1%				
I-131 (I)	<3E-4%	-0.01%	-0.3%	1-25%	-50%	-50%	>50%
I-132	<5E-5%	-0.02%	-0.03%				
I-133	<1E-4%	-0.05%	-0.1%				
I-135	<8E-5%	-0.03%	-0.05%				
(Cs)				1-25%	-50%	-50%	>50%
(Sr)				.001-.08%	-0.15%	-15%	>15%
(Ba)				.001-08%	-0.15%	-15%	>15%
(Te)						1-50%	>50%
(Pr)						0.1-0.8%	>0.8%
Activity Ratios:							
Kr-87/Xe-133		0.022	0.022	0.22	0.22	0.22	0.22
I-132/I-131		0.17	0.17	1.5	1.5	1.5	1.5
I-133/I-131		0.71	0.71	2.1	2.1	2.1	2.1
I-135/I-131		0.39	0.39	1.9	1.9	1.9	1.9
Core Exit Thermocouples:	<750%	1300°F	1650°F	>1650°F	>1650°F	>1650°F	>1650°F
RVLIS Indication:	>58%	<58%	<58%	<58%	<58%	<58%	<58%
Core Uncovery Begins						<41%	
Core Completely Uncovered							<25%
Containment Hydrogen Concentration:	Negligible	<10%	20%	20%	20%	20%	20%
Containment Radiation Monitors:	Background	<1500 R/hr	3000	2.7E5	5.3E5	7.8E5	>7.8E5

CORE PROTECTION

1. Critical Safety Function Status Tree (CSFST's)

   a. Subcriticality (FRP-S)

      - Verify Automatic Actions or Perform Manual Actions to Reduce Core Power
      - Emergency Borate
      - Check for Possible Sources of Positive Reactivity and Eliminate them
      - Verify Subcriticality

   b. Core Cooling (FRP-C)

      - Establish Safety Injection Flow to the RCS
      - Rapidly Depressurize SGs to Depressurize RCS
      - Start RCPs and Open All RCS Vent Paths to Containment

   c. Heat Sink (FRP-H)

      - Attempt Restoration of Feed Flow to Steam Generators
      - Initiation of RCS Bleed and Feed Heat Removal
      - Restore and Verify Secondary Heat Sink
      - Termination of RCS Bleed and Feed heat Removal

   d. Integrity (FRP-P)

      - Stop RCS Cooldown
      - Terminate SI if Criteria Satisfied
      - Depressurize RCS to Minimize Pressure Stress
      - Establish Normal Operating Conditions and Stable RCS Conditions
      - Soak if Necessary Prior to Further Restricted Cooldown

   e. Containment (FRP-J)

      - Verify Containment Isolation and Heat Removal
      - Check for and Isolate a Faulted Steam Generator
      - Check for Excessive Containment Hydrogen and Determine Appropriate Action

   f. Inventory (FRP-I)

      - Establish Charging and Letdown
      - Reduce PZR Pressure
      - Energize PZR Heaters and Control Charging and Letdown to Draw a Bubble

CORE PROTECTION

2. DBA Large Break LOCA (1 ft^2 total area up to double-ended break)
   a. Blowdown
      - Reactor Trip Signal and SI Signal in about 1 second
      - 2235 psig to atmosphere in about 24 seconds
      - Break flow 70,000 lbm/sec to zero by end of blowdown
      - SI accumulator flow initiates at 600 psig in about 16 seconds
   b. Refill
      - 2000 ppm water from RWST injected into RCS cold legs
   c. Reflood
      - Bottom of Core (BOC) recovery time about 45 seconds
      - Accumulator empties at about 58 seconds
   d. Long Term Recirculation
      - RHR pumps transferred when RWST level reach switchover setpoint
      - Cooling water backflushed from Containment Sump to the hot legs
      - Core maintained in shutdown state by borated water
3. Possible Consequences of the DBA
   a. Cladding Failure
   b. Fuel Overtemperature
   c. Core Melt
4. Instrument Errors/Malfunctions
   a. G-M tube saturation
   b. Steam voids
   c. Flooding of RTD connection blocks

FUNCTION RESTORATION PROCEDURES

1. Subcriticality (FRP-S)
   a. S.1 Response to Nuclear Power Generation/ATWS
   b. S.2 Response to Loss of Core Shutdown
2. Core Cooling (FRP-C)
   a. C.1 Response to Inadequate Core Cooling
   b. C.2 Response to Degraded Core Cooling
   c. C.3 Response to Saturated Core Cooling
3. Heat Sink (FRP-H)
   a. H.1 Response to Loss of Secondary Heat Sink
   b. H.2 Response to Steam Generator Overpressure
   c. H.3 Response to Steam Generator High Level
   d. H.4 Response to Loss of Normal Steam Release Capability
   e. H.5 Response to Steam Generator Low Level
4. Integrity (FRP-P)
   a. P.1 Response to Imminent Pressurized Thermal Shock
   b. P.2 Response to Anticipated Pressurized Thermal Shock
5. Containment (FRP-J)
   a. J.1 Response to High Containment Pressure
   b. J.2 Response to Containment Flooding
   c. J.3 Response to High Containment Radiation Level
6. Inventory (FRP-I)
   a. I.1 Response to High Pressurizer Level
   b. I.2 Response to Low Pressurizer Level
   c. I.3 Response to Voids in Reactor Vessel

FUNCTION RESTORATION PROCEDURES

ABNORMAL OPERATING PROCEDURES

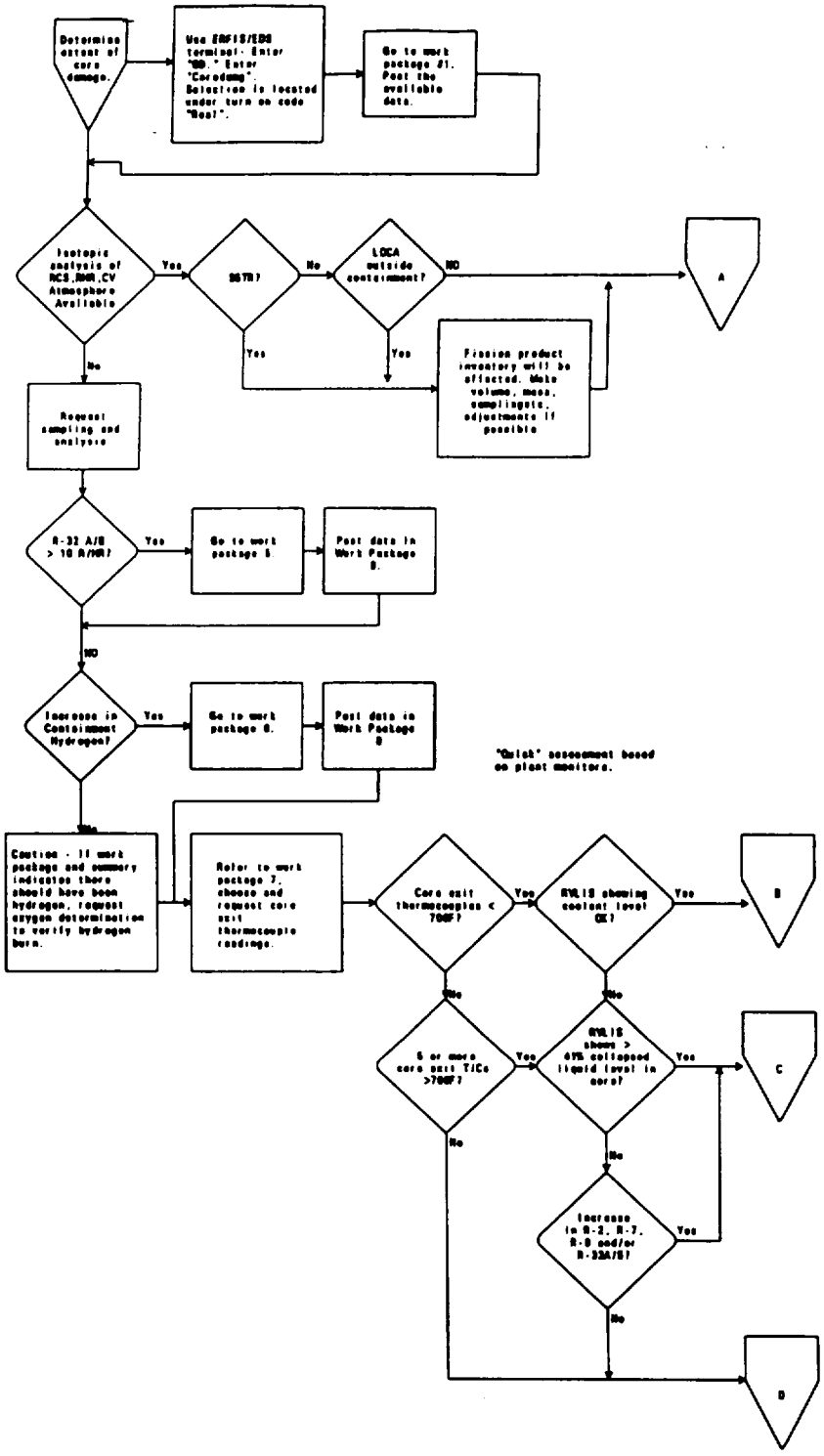
AOP-001	Malfunction of Reactor Control System
AOP-003	Malfunction of Reactor Make-up Control
AOP-004	Control Room Inaccessibility
AOP-005	Radiation Monitoring System
AOP-010	Main Feedwater/Condensate Malfunction
AOP-013	Fuel Handling Accident
AOP-018	Reactor Coolant Pump Abnormal Conditions
AOP-019	Malfunction of RCS Pressure Control
AOP-020	Loss of Residual heat Removal (Shutdown Cooling)
AOP-021	Seismic Disturbances
AOP-023	Loss of Containment Integrity
AOP-024	Loss of Instrument Bus
AOP-028	ISFSI Abnormal Events
AOP-033	Shutdown LOCA
AOP-035	S/G Tube Leak

ANNUNCIATOR PANEL PROCEDURES

APP-001	Miscellaneous NSSS
APP-002	Engineering Safeguards
APP-003	RCS & Makeup Systems
APP-004	First Out Reactor Trips
APP-005	NIS & Reactor Control

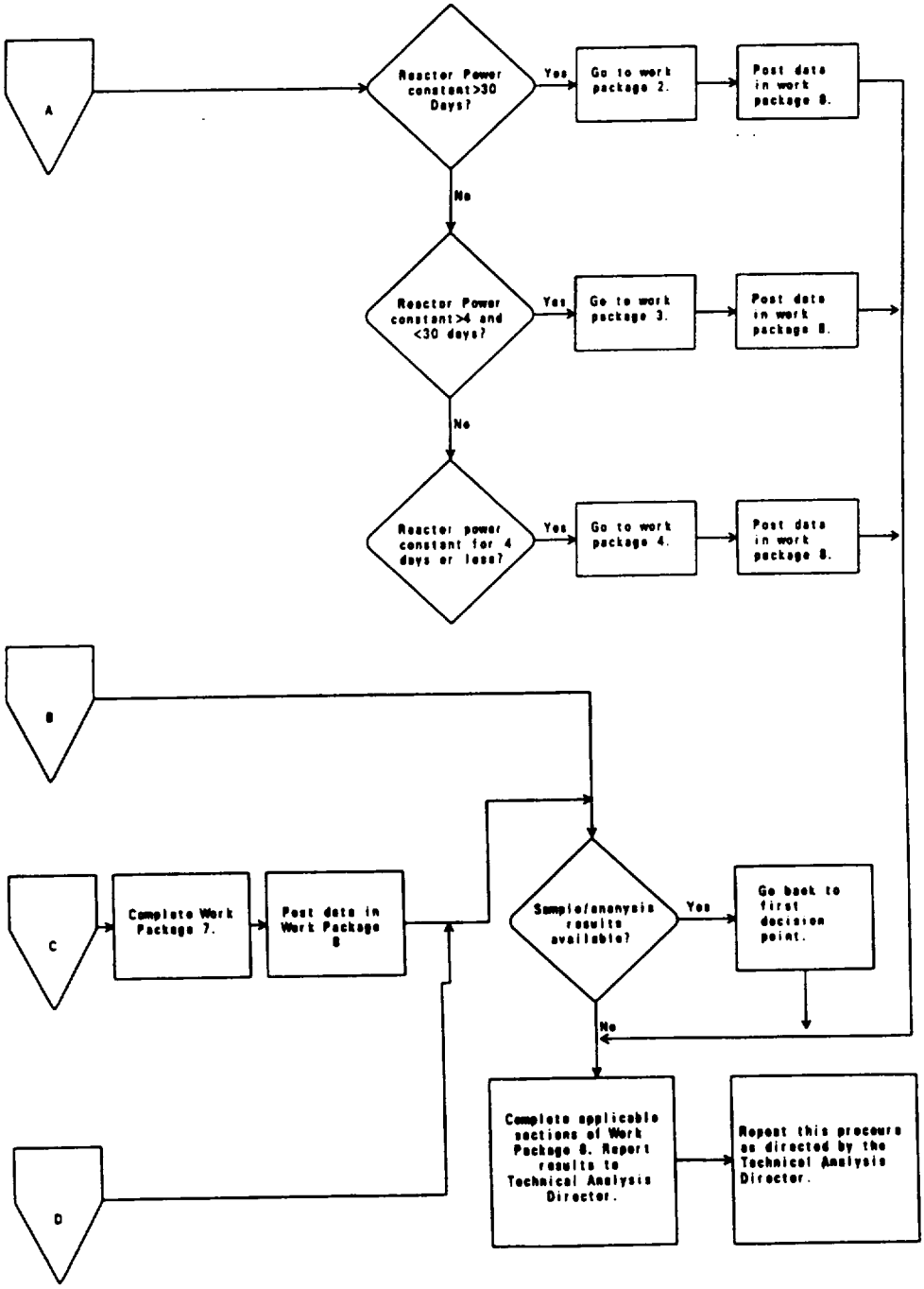
ATTACHMENT 8.7.5.12
Page 1 of 2

WORK PACKAGE FLOWCHART



ATTACHMENT 8.7.5.12
Page 2 of 2

WORK PACKAGE FLOWCHART



DEFINITIONS

1. Gap Activity- volatile fission products (nobel gases, halogens, cesiums) produced during operation which migrate into the gap region of the fuel pin.

2. Clad Damage- structural deformation of the zirconium clad housing the UO_2 fuel allowing the escape of fission products to the reactor coolant. Usually predominate with core temperatures > 1300°F - 2000°F.

3. Fuel Overtemperature- refers to the release of fission products from the grain boundary during fuel overtemperature conditions >2000°F - 3450°F.

4. Fuel Melt- refers to fission product release from the fuel associated with melting temperatures >3450°F.

5. Accuracy - This procedure has been developed to provide definition of the four categories of fuel damage. The auxiliary or "quick" methods should only be used for preliminary estimates of core damage. Confirmation of core damage shall always be accomplished through an analysis of the radionuclide inventory.

6. Spiking Phenomena Spiking is an increase in the normal primary coolant iodine activity due to Reactor Coolant System pressure, temperature or power transients, where in fact no clad damage has occurred.

7. Oxygen Concentration in the Containment A decrease in oxygen concentration may indicate a hydrogen burn has occurred. This should be considered during the evaluation of percent containment hydrogen.

8. Steam Generator Tube Rupture or Outside Containment Loss of Coolant If core activity has been released to systems not covered by the Post Accident Sampling System (e.g. secondary system, component cooling water), this procedure will not accurately reflect actual core damage. This will be identified by auxiliary methods which estimate more severe damage than the isotopic analysis. If accurate samples of these systems are available as well as reasonable estimates of the sample space volume or mass, the methods in this procedure may be applied to improve the accuracy of the nuclide release estimate of core damage.