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PSEG NUCLEAR
ONSITE IMPLEMENTING PROCEDURES
May 24, 2001

CHANGE PAGES FOR
REVISION #13

The Table of Contents forms a general guide to the current revision of each section of the Onsite EPIPs. The changes that are made in this TOC Revision #13 are shown below. Please check that your revision packet is complete and remove the outdated material listed below:

ADD			REMOVE		
Page	Description	Rev.	Page	Description	Rev.
ALL	TOC	13	ALL	TOC	12
All	NC.EP-EP.ZZ-0202	02	All	NC.EP-EP.ZZ-0202	01
All	SC.EP-EP.ZZ-0205	01	All	SC.EP-EP.ZZ-0205	00
All	HC.EP-EP.ZZ-0301	02	All	HC.EP-EP.ZZ-0301	01
All	SC.EP-EP.ZZ-0301	03	All	SC.EP-EP.ZZ-0301	02
All	NC.EP-EP.ZZ-0302	04	All	NC.EP-EP.ZZ-0302	03
All	NC.EP-EP.ZZ-0304	03	All	NC.EP-EP.ZZ-0304	02
All	NC.EP-EP.ZZ-0309	02	All	NC.EP-EP.ZZ-0309	01
All	NC.EP-EP.ZZ-0310	03	All	NC.EP-EP.ZZ-0310	02

Please note:

SC.EP-EP.ZZ-0205 goes behind the green 205 tab

HC.EP-EP.ZZ-0301 goes behind the blue 301 tab

SC.EP-EP.ZZ-0301 goes behind the green 301 tab

PSEG NUCLEAR LLC
EMERGENCY PLAN ONSITE IMPLEMENTING PROCEDURES
TABLE OF CONTENTS
May 24, 2001

STATION PROCEDURES

PSEG NUCLEAR LLC
EMERGENCY PLAN ONSITE IMPLEMENTING PROCEDURES
TABLE OF CONTENTS
May 24, 2001

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PSE&G CONTROL COPY # EPIP059

NC.EP-EP.ZZ-0202 (Q) Rev. 02

OPERATIONS SUPPORT CENTER (OSC) ACTIVATION AND OPERATIONS

USE CATEGORY: II

REVISION SUMMARY: **Biennial Review Performed Yes X No ___**

Step 5.1.1e was added. This step was originally in step 5.1.5 but was moved so the fire brigade would be notified earlier in the event.

Step 5.1.3d was added to remind Salem OSs to ensure aux building ventilation is properly aligned for post accident conditions. Refer to Safety Evaluation S01-006.

Step 1.1.7 was added to Attachment 5 to clarify team dispatch expectations during a security event.

IMPLEMENTATION REQUIREMENTS

5/24/01

APPROVED: _____ 5/14/01
Emergency Preparedness Manager Date

APPROVED: _____ 5/15/01
Vice President - Operations Date

OPERATIONS SUPPORT CENTER (OSC) ACTIVATION AND OPERATIONS

TABLE OF CONTENTS

1.0 PURPOSE

This procedure provides guidance to emergency response personnel for administration of Operations Support Center (OSC) activation and operations during an emergency at Hope Creek or Salem Nuclear Generating Stations.

2.0 PREREQUISITES

2.1 Prerequisites To Be Followed Prior To Implementing This Procedure

2.1.1 Implement this procedure:

- At the request of the Operations Superintendent (OS) or the Emergency Duty Officer (EDO).
- Upon staffing of your Emergency Response Facility.

2.1.2 Steps within a section may be completed in any order.

3.0 PRECAUTIONS AND LIMITATIONS

3.1 Precautions and Limitations To Be Followed Prior To Implementing This Procedure:

3.1.1 It is recommended that initials be used in the place keeping sign-offs, instead of checkmarks if more than one person may implement this procedure.

3.1.2 Personnel who implement this procedure shall be trained and qualified IAW the Emergency Plan.

3.1.3 Attachment 6 page 2 of 2 should only be completed if the card readers for the accountability system fail.

4.0 EQUIPMENT REQUIRED

As provided in the Emergency Response Facility.

5.0 PROCEDURE

NOTE

OSC Coordinator responsibility is filled by

Name	Date	Time

5.1 Preparation for Activation

5.1.1 NOTIFY the following OSC support personnel to report to the OSC:

a. Shift Electrician _____

b. Shift I&C Technician _____

c. Radwaste Operator _____

d. Equipment Operators _____

e. CALL the Fire Protection Supervisor (ext. 2800) or use the plant page, and direct the Fire Brigade to the OSC. _____

NOTE

The Fire Brigade normally brings equipment to the station that has declared the emergency. Advise the Fire Protection Supervisor of conditions that would not permit leaving equipment in any location

5.1.2 DESIGNATE at least two individuals to set up the OSC IAW Attachment 7, OSC SETUP _____

IF Hope Creek
THEN implement Attachment 7a, OSC Setup, Hope Creek.

IF Salem
THEN implement Attachment 7b, OSC Setup, Salem

5.1.3 REPORT to the Control Room (CR) and obtain the following information from the Operations Superintendent (OS): _____

a. Update of emergency status. _____

b. Plant conditions including any known radiological problems. _____

c. Status of personnel dispatched into the plant by the CR staff. _____

d. **(Salem Only)** Discuss Auxiliary Building Ventilation System Status and ensure that One Supply and Two Exhaust Fans are operating properly. If less than the normal compliment of fans is in service, then request the OS prioritize actions IAW Attachment 2 of the Operating Procedure. Ensure design based auxiliary building temperatures are maintained. The aux. building ventilation system needs to be restored within 2 hours following an accident initiation. _____

5.1.4 ENSURE OSC clock time is approximately the same as the CR/SPDS time. _____

5.1.5 IMPLEMENT the following steps in any order:

- IMPLEMENT Attachment 2 - Accountability Instructions, when Accountability is called. _____
- DIRECT one individual to ensure all OSC personnel sign in on the Attachment 6, OSC Sign In Roster. DO NOT have control room personnel sign in at this time on Attachment 6 _____
- ASSEMBLE available OSC personnel and brief them on the status of the emergency. _____
- DIRECT non-supervisory OSC personnel who are not assisting in set up of the OSC to assemble in the OSC Ready Room. _____
- DIRECT the Radiation Protection Supervisor-Exposure Control (RPS-EXP) or Shift Radiation Protection Technician to implement NC.EP-EP.ZZ-0304(Q), OSC – Radiation Protection Response. _____

5.1.6 ACTIVATE the OSC as follows: _____

- INFORM the OS and OSC personnel that the OSC is activated, at (time) _____ on (date) ___/___/___ _____
- MAKE the following page announcement (Announce Twice): _____

"The OSC is now activated. All Plant Activities should be coordinated thru the OSC."

NOTE

Each individual's annual limit will automatically be raised to 4500 mRem upon the declaration of an Alert or higher emergency classification provided a completed NRC FORM-4 is on record.

NOTE

The following steps should be completed simultaneously

5.2 **Post Activation of the OSC** DIRECT an OSC Supervisor or OSC staff member to periodically brief the OSC READY ROOM on plant conditions and update the EMERGENCY INFORMATION OPS READY ROOM status board in the OSC Ready Room.

5.2.1 WHEN Accountability is called, THEN:

a. IMPLEMENT Attachment 2, ACCOUNTABILITY INSTRUCTIONS. _____

b. **(SALEM ONLY)** IF requested
THEN IMPLEMENT Attachment 9, Assembly/Accountability Instructions for High Noise Areas – OSC (Salem Only). _____

5.2.2 IF directed to perform bomb search activities, THEN IMPLEMENT Attachment 1, BOMB SEARCH Operations. _____

5.2.3 IF loss of habitability occurs for: _____

- The OSC Ready Room, THEN direct personnel to the Technical Support Center (TSC) or other location as directed by the OS/EDO.
- The OSC, THEN direct OSC personnel to the TSC or other location as directed by the OS/EDO. _____

5.2.4 DIRECT Ops, Mechanical, I&C, Fire Protection, and Electrical Supervisors to implement Attachment 5, OPS/MECH/ELECT/I&C/FIRE PROTECTION DUTIES. _____

5.2.5 DIRECT the Planner and Duty Storekeeper to implement Attachment 4, PLANNER/DUTY STOREKEEPER DUTIES. _____

5.2.6 DIRECT the OSC Clerk to: _____

a. MAINTAIN the OSC Coordinator's Log. _____

b. PROVIDE the log to the OSC Coordinator for periodic review. _____

c. MAINTAIN the OSC Team Status Board and Priority Status Board. _____

5.2.7 ASSEMBLE available OSC personnel and brief on the emergency. _____

5.2.8 DIRECT the OSC Clerk report to the TSC, if conditions degrade where respirators are needed for OSC personnel.

5.2.9 ENSURE the OSC priorities and activities are periodically discussed with the OS. _____

5.2.10 BRIEF the oncoming OSC Coordinator and conduct the turnover IAW Attachment 3, OSCC TURNOVER LOG. _____

5.3 **Restoration**

ENSURE the OSC is restored to a ready status. _____

6.0 RECORDS

Return completed procedure, attachments, and or forms to the Manager – EP & IT.

7.0 REFERENCES

7.1 References

None

7.2 Cross References

PSEG Nuclear Emergency Plan

ATTACHMENT 1
Page 1 of 3
BOMB SEARCH OPERATIONS

1.0 BOMB SEARCH OPERATIONS

1.1 **Perform the following for bomb search operations, as directed by the OS/EDO:**

1.1.1 The OSC Coordinator should:

CAUTION

Portable radios and portable phones shall not be used during a bomb search. Radio transmissions may cause an explosive device to detonate.

A. MAKE the following page announcement TWICE:

"Attention all personnel, terminate use of all portable radios phones until further notice."

B. CALL the Salem OS and request they make the proceeding page announcement.

C. CALL PSEG Security Supervisor (ext. 2222) and request that a Security Team Leader or Security Technical Analyst reports to the OSC.

D. OBTAIN a briefing from the OS concerning the requested bomb search to include, as a minimum:
- Nature of the bomb threat
- Specific areas mentioned in the threat
- Current bomb search activities
- Restrictions due to radiological concerns
- Copy of a completed Bomb Threat Checklist and Report Form if available.

E. DIRECT the Security Team Leader or Security Technical Analyst, assigned to the OSC, to recommend bomb search areas priorities, in accordance with Security Contingency Procedures.

ATTACHMENT 1
Page 2 of 3

F. MODIFY bomb search priorities recommended by the Security Team Leader or Security Technical Analyst as required due to plant operational and/or radiological conditions.

G. Assemble bomb search teams that should consist of a Plant Operator as the Team Leader and a Security Force Member (SFM).
- Fire Protection Operators may be utilized if Plant Operators are not available
- Radiation Protection Technicians (RPT) should be assigned to bomb search teams in the RCA.

H. BRIEF the bomb search teams, in conjunction with the Security Team Leader or Security Technical Analyst and the SRPT/RPS – EXP.

I. OFFER the team leader a copy of Attachment 8, TEAM LEADER BRIEFING SHEET.

J. BRIEF each bomb search team to include discussion of the following:
- Information known from the bomb threat.
- Assigned search area(s) for each team.
- Operational and Radiological concerns such as exposure limits, dosimetry, protective clothing, etc.
- Abort conditions.
- OSC phone call back numbers for team communications.
- Instruct each team member to look for physical evidence of suspected sabotage in addition to the location of destructive device(s).
    1. **Mechanical** (valve alignment, piping, loose ducts, structures, normal running equipment checks).
    2. **Electrical** (checks for any breakers in an off-normal position, open cabinets, open conduit, etc.).
    3. **Physical Barriers** (blocked open doors, misplaced contamination/high radiation areas, etc.).
    4. **Suspicious looking articles** (lunch boxes, tool boxes, packing crates, etc.).
    5. **Abnormal log readings/indications for the area.**

K. Using the plant page or hard wire phone, inform the OSC Coordinator immediately upon locating a potential bomb or sabotaged area.

ATTACHMENT 1
Page 3 of 3

L. IF a bomb is discovered, THEN:

a. ENSURE that all personnel in the vicinity of the bomb are relocated to a safe area and direct the bomb search team to secure access to the area.
b. CONTACT the OS, the OSC coordinator, the OSC Security Force Supervisor and EDO to take appropriate actions.

M. RECALL, debrief and deactivate the Bomb Search Team when:

a. Completion of search with negative results is reported.
b. Termination of the bomb threat.

ATTACHMENT 2
Page 1 of 3
ACCOUNTABILITY INSTRUCTIONS - OSC

1.0 ACCOUNTABILITY INSTRUCTIONS

1.1 Upon Hearing the Page Announcement to Implement Accountability, the OSC Coordinator Shall:

Initials

1.1.1 ENSURE OSC and Control Room personnel are listed on the Attachment 6, OSC SIGN IN ROSTER (only obtain control room sign-in if back up Accountability method is being used.)

_____
OSCC

NOTE

Personnel who have carded into the Control Room Security Area are not required to pass their photobadges through the OSC accountability station cardreader. This is because Control Room personnel are accounted for automatically by the access door cardreaders into the Control Room.

1.1.2 Upon hearing the page announcement, **"All ACCOUNTABILITY STATIONS IMPLEMENT ACCOUNTABILITY":**

A. DIRECT all personnel who are not within the Control Room Security Area to pass their photobadges through the special accountability cardreader located just outside the OSC.

_____
OSCC

B. DIRECT all OSC teams in the field to verbally accounted for by using an ACCOUNTABILITY EXEMPTION FORM, page 3 of this Attachment.

_____
OSCC

1.1.3 MAINTAIN current status of all OSC personnel. This should include name, assignment, time dispatched.

_____
OSCC

ATTACHMENT-2
Page 2 of 3

1.1.4 Upon hearing the page announcement, **"All ACCOUNTABILITY STATIONS COMPLETE YOUR 3O MINUTE ACCOUNTABILITY,"**

A. ENSURE that any personnel arriving at the OSC since the initial call for accountability also have passed their photobadges through the OSC accountability cardreader.

OSCC

B. ENSURE the badge numbers of personnel listed on page 3 of this attachment (Accountability Exception Form) are called to security at extension 2222. If unable to contact security on 2222, contact the security liaison at NETS 5214 (Hope Creek) or NETS 5217 (Salem)

OSCC

1.1.5 IF personnel arrive at the OSC after 30 minutes have elapsed, THEN:

A. NOTIFY security of the badge numbers of the personnel that have reported to the OSC using ext. 2222.

OSCC

B. DIRECT those personnel to:

1. PASS their photobadge through the accountability cardreader.

OSCC

2. SIGN Attachment 6, OSC SIGN IN ROSTER if not already signed in

OSCC

1.1.6 IF directed,
THEN form search teams for unaccounted for personnel.

OSCC

1.1.7 MAINTAIN continuous accountability until the emergency is terminated.

OSCC

2.0 **AUTOMATED ACCOUNTABILITY SYSTEM MALFUNCTION:**

2.1 **Perform the Following Should the Automated Accountability System Malfunction:**

2.1.1 PROVIDE a copy of Attachment 6, OSC SIGN IN ROSTER Sheet(s), to the Security Force Member dispatched to the OSC.

OSCC

ATTACHMENT 2
Page 3 of 3

ACCOUNTABILITY EXEMPTION FORM
OSC _____ STATION

NAME (print)		BADGE NUMBER
LAST	FIRST	

NOTE

Call Security at extension 2222 and provide the badge numbers of the personnel listed above. The personnel listed above have been accounted for verbally. These personnel are involved in actions to mitigate emergency events. If unable to contact security at extension 2222, contact the TSC security liaison at NETS 5214 (Hope Creek) or NETS 5217 (Salem).

_____ _____/_____

Signature (OSC Coordinator or OS) Time Date

ATTACHMENT 3
Page 1 of 1
OSCC TURNOVER LOG

Date: ____/__

1. [UE] [A] [SAE] [GE] was declared @ _____ hrs. on __/__/__

   Due to: _____
   _____

2. The present classification, [A] [SAE] [GE] was declared @ _____ hrs. on ____/____/____

   Due to: _____
   _____

3. The Emergency Coordinator (EC) is _____ in the [EOF] [TSC] [CR] name

4. The Oncoming and Offgoing OSCC should:

	Initials On / Off
A. DISCUSS current conditions. Include any problems encountered or anticipated, and any ongoing, or expected actions.	____/____
B. REVIEW all applicable documentation including procedures, logs, etc., ensuring they are completed, correct and signed.	____/____
C. DISCUSS the OSC's priorities, personnel requirements and any equipment or material needs.	____/____
D. DISCUSS any Radiological, Safety, or Environmental concerns.	____/____
E. ENSURE that OSC teams in the field are recalled or relieved on the job as necessary.	____/____
F. NOTIFY the OS of the change in command in the OSC. Update plant status and priorities as applicable.	_____ (ONCOMING)
G. HOLD a briefing with the OSC staff to ensure a smooth transition between the oncoming and off-going OSC personnel.	_____ (ONCOMING)

ATTACHMENT 4
Page 1 of 2
PLANNER/DUTY STOREKEEPER DUTIES

NOTE:

When the OSCC is activated, the Work Control Office becomes an extension of the OSC.

1.0 Planner Duties

1.1 Perform the Following, as Appropriate:

1.1.1 LOG on to SAP in Work Control on any available computer with LAN capabilities.

1.1.2 PROVIDE current status of repairs in progress.

1.1.3 INITIATE Work Order/Notification packages as necessary for jobs originating in the OSC.

- **IF** time is not available,
  AND
  at the discretion of the OSCC,
  THEN use a paper work request and follow up with a Work Order/Notification as soon as possible.

1.1.4 PROVIDE guidance as to procedures, tools, and time that past repairs required.

1.1.5 COORDINATE with the Duty Storekeeper to obtain spare parts, materials, tools, etc.

1.1.6 ASSIST the other OSC staff members as directed by the OSCC including answering phones, page announcements and OSC ready room updates.

1.1.7 COLLECT all work orders and paper work for review and documentation after the emergency has been terminated.

2.0 STOREKEEPER DUTIES

2.1 Perform the Following, as Appropriate:

2.1.1 SELECT a Personnel Computer in Work Control to run the parts program, if necessary.

2.1.2 OBTAIN an inventory list of available parts on Nuclear Business Unit.

2.1.3 LOCATE and procure materials/spare parts.

2.1.4 TRACK any items issued and document for post-emergency review.

2.1.5 ASSIST the other OSC staff members as directed by the OSCC, including answering phones page announcements and OSC ready room updates.

ATTACHMENT 5
Page 1 of 4
OPS/MECH/ELECT/I&C/FIRE PROTECTION DUTIES

1.0 OSC DUTIES

1.1 Perform the Following Duties, as Appropriate:

1.1.1 PROVIDE corrective action recommendations based on your expertise to the OSCC for accident mitigating activities.

1.1.2 MONITOR Oxygen content in the OSC and Control Room every hour.

1.1.3 MONITOR Fire Protection System Status and ensure compensatory measures (fire watch) are maintained in accordance with plant conditions.

NOTE

1. An individual, in lieu of a team, may be dispatched by the OSCC. The individual should be in contact with the OSC or the Control Point, via some type of audio communications (page, radio, or telephone), and should check in every 15 minutes with the OSC or the Control Point.

   A. An individual shall not be used under the following circumstances:

   - An individual's exposure could be expected to exceed 1000 mRem.
   - The task would require entry into a "Harsh Environment Area" (i.e., a steam atmosphere, a heat stress area, unknown, etc.)
   - Acts of sabotage or suspected sabotage.

2. Prompt team dispatch is of the utmost importance. If necessary, a radiological briefing may be conducted on the way to the job.

1.1.4 ASSEMBLE teams and provide team briefings and debriefings in your areas of expertise.

- ENSURE that all OSC teams are made up of at least two people unless a task meets the criteria from the note above.
- ENSURE that teams dispatched from the Control Point are tracked using the OSC Team Status Board.
- ASSEMBLE the Team and designate a Team Leader.
- IF adverse radiological conditions exist, THEN a Radiation Protection Technician (RPT) should be included on the team.
- IF a Personnel Injury/Medical Response incident occurs, THEN a Fire Brigade Member should be included on the team.

- OFFER Attachment 8, Team Leader Briefing Sheet, to each team leader.
- ENSURE all Teams obtain a briefing IAW, Team Briefing Guidelines of this Attachment.

CAUTION

Portable radios are not to be keyed in the vicinity of the Control Room or Relay Room areas.

Any portable radio and cellular phone transmissions are prohibited during bomb search operations.

- IF a Team is dispatched, THEN ENSURE the OSC Team Status Board is updated.
- MONITOR and support dispatched teams (Point of Contact).
- RECALL the Team IF:

  1. The mission or objective is accomplished.
  2. Directed by OS (higher priority, etc.).
  3. Plant conditions degrade to where an individual's exposure to unanticipated changes in radiological conditions:
     - May exceed authorized exposure limit.
     - Life threatening environmental conditions are encountered.

- WHEN the team returns, CONDUCT a general debriefing.
- COLLECT all procedures, attachments, etc. and retain to forward to the Manager CA/EP/IT.
- RELEASE team to RPT/RPS – EXP for a radiological debriefing.
- COORDINATE with the RAC for the transportation of injured person or personnel receiving Emergency Exposures of $\geq$ 5 REM to the appropriate medical facilities, if necessary.
- Deactivate the team and ensure the OSC Team Status Board is updated.

1.1.5 INTERFACE with the TSC Engineers for their support when needed by:

- REQUEST the OSCC to contact the OS for technical support, as needed.
- WHEN TSC Technical support is requested, THEN OBTAIN a copy of the Technical Support Tracking Form from the OSCC for implementing mitigating actions recommended by the engineering staff, which are not addressed in a procedure.
- ENSURE the Technical Support Tracking Form is approved for implementation by the OS.

NOTE

The Work Control Office becomes an extension of the OSC when the OSC is activated

1.1.6 ASSIST the OSC Planner in Work Request/Notification generation IAW the appropriate NAPs.

- Initiate tagging requests in Work Control.
- Request the Operations Supervisor assist in tag request generation.

1.1.7 If acts of sabotage are expected, team safety must be the number one priority. Contact security in the TSC to determine what areas are safe for personnel dispatch. If any area is considered unsafe by security, discuss delaying team dispatch until the area is cleared by security.

ATTACHMENT 5
Page 4 of 4
TEAM BRIEFING GUIDELINES

A. Mission Details	1. Designate a team leader 2. Explain purpose of mission 3. Define work to be performed 4. State expected results 5. Team identifier (team #)
B. Safety	1. Ensure required safety gear is used 2. Equipment C/T for work 3. Review Environmental Concerns: ■ Heat stress ■ Oxygen deficient atmosphere ■ Toxic/caustic chemical concerns 4. Fire hazards
C. Communications	1. Establish preferred method ■ Portable radios ■ Phones (Dimension) ■ Other (sound pwrd phones, etc.) 2. Point of contact 3. Check in time cycle 4. Estimated job completion time
D. Equipment	1. Required tools 2. Test equipment 3. Procedures (current copy[s] as required) 4. Availability/location of spare parts 5. Authorization for "cannibalization" of other equipment for parts
E. Radiological	1. Discuss expected dose rates 2. Establish stay times 3. Establish abort conditions criteria 4. Identify desired routes 5. Review rwp with the team including dress out criteria 6. Review exposure limits 7. Obtain high rad. key if required 8. Ensure the control point is notified.
F. Debrief	1. Team is expected to debrief the assigning supervisor when the job is complete or the team is recalled.

OSC SIGN IN ROSTER/ACCOUNTABILITY FORM

(PRINT NAME)

POSITION	NAME	BADGE #	POSITION	NAME	BADGE #
OSC COORD			RAD PRO SUPV.		
OSC CLERK			R.P. SUPPORT		
STORE			R. P. SUPPORT		
OPS SUPV			FIRE PROT. SUPV.		
OPERATOR			FIRE BRIG. MBR.		
OPERATOR			FIRE BRIG. MBR		
OPERATOR			FIRE BRIG. MBR		
OPERATOR			FIRE BRIG. MBR		
OPERATOR			FIRE BRIG. MBR		
OPERATOR			FIRE BRIG. MBR		
OPERATOR					
OPERATOR			PLANNER		
MAINT.SUPV. ( )			**ADDITIONAL OSC SUPPORT PERSONNEL**		
MAINT.SUPV. ( )			**POSTION**	**NAME**	**BADGE #**
SHIFT ELECT.					
SHIFT I&C TECH					
MAINT.SUPPORT ( )					
MAINT.SUPPORT ( )					
MAINT.SUPPORT ( )					
MAINT.SUPPORT ( )					

( ) INDICATESJOB CLASSIFICATION (i.e. WELD, MACH, BLR, REP, ETC.)

OSC SIGN IN ROSTER/ACCOUNTABILITY FORM

(PRINT NAME)

POSITION	NAME	BADGE #	POSITION	NAME	BADGE #
OS					
CRS					
STA					
SRO 1					
SRO 2					
NCO					
NCO					
NCO					
NCO					
COMMUNICATOR 1					
COMMUNICATOR 2					
OPS ADVISOR					
			COMMENTS		
ADDITIONAL CONTROL ROOM/OSC PERSONNEL					
OSC Coordinator Signature _____					

ATTACHMENT 7a
Page 1 of 3
OSC SETUP - HOPE CREEK

1.0 HOPE CREEK OSC SETUP

1.1 Perform The Following to Setup the OSC:

1.1.1 PROCEED to the OSC storage closet located in the North West corner of the OSC.

- BREAK the glass on the key box located on the wall next to the storage closet and obtain the keys for the closet, if necessary.

1.1.2 OBTAIN equipment and supplies stored in the OSC locker:

- REMOVE cordless phones from chargers.
- DISTRIBUTE OSC cordless phones IAW OSC Setup Diagram found in this Attachment. The setup is for guidance only. Personnel may be relocated around the table as needed or at the discretion of the OSC coordinator.
- PERFORM the following in case of cordless phone failure:

  A. PLACE the phone strip under the OSC table.

  B. IMMEDIATELY SETUP NETS and DID phones IAW OSC Setup Diagram found in this Attachment.

1.1.3 PLACE the OSC base radio station in operation as follows:

- TURN the OSC radio's power on. (The **On/Off Switch** is on the front of the unit).
- VERIFY the Control Room radio **TAKEOVER** yellow indicator is illuminated. If **TAKEOVER** green indicator is illuminated depress the **TAKEOVER** push button.
- POSITION the **FREQUENCY BUTTON** to the UP position for frequency #3.
- POSITION the HEADSET TOGGLE SWITCH to the DOWN position for headset use or in the UP position for speaker use.
- POSITION **VOLUME CONTROL** to a comfortable level. **(VOLUME CONTROL SWITCH** is on the front of the radio).
- PRESS the **TRANSMIT BAR** on the microphone to transmit a message when the headset **OFF**.
- PRESS the hand held transmit button on the headset cord to transmit, if the headset is **ON.**

- ENSURE OSC hand held radios are selected to the same frequency as the base station radio.
- TEST the base station radio to a hand held radio.

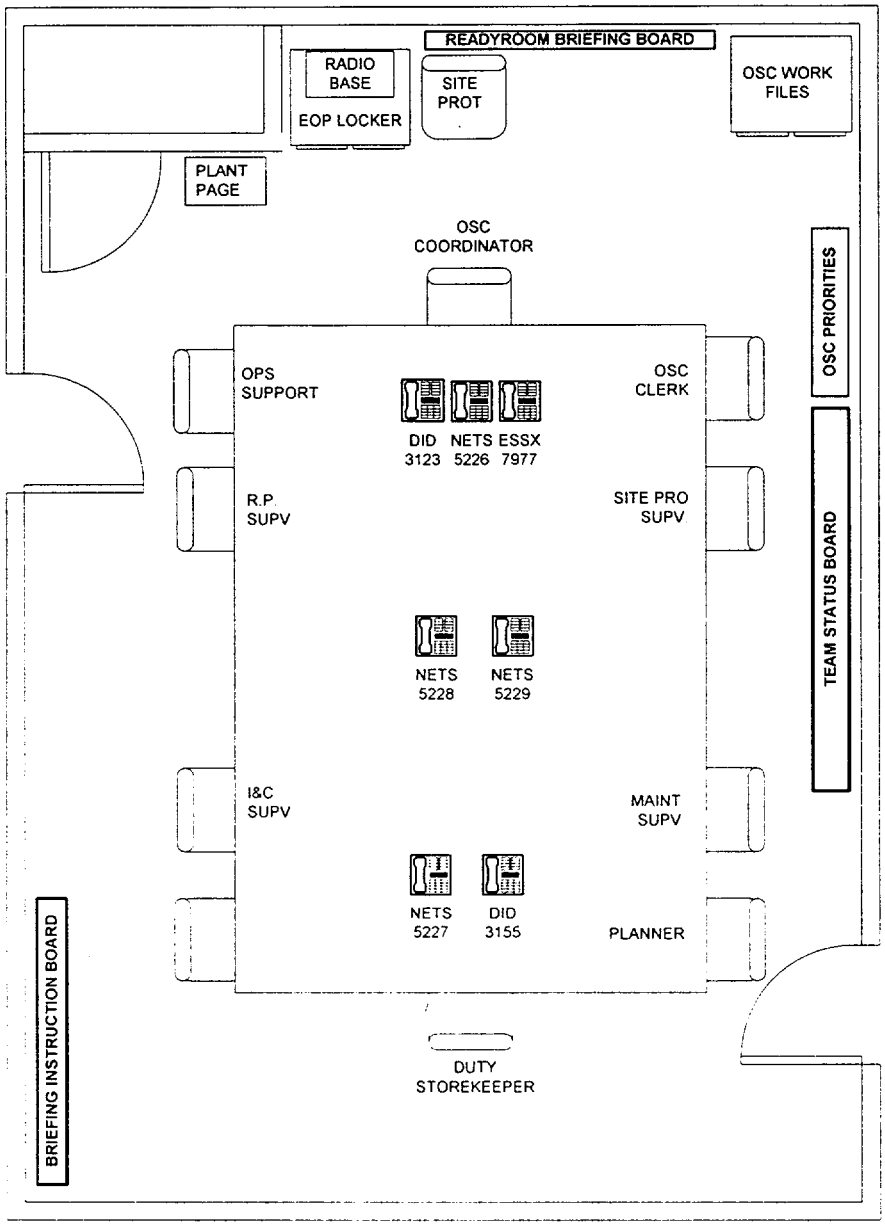
1.1.4 INCREASE or decrease the OSC page volume control to a comfortable level.

1.1.5 POST a clean copy of the OSC TEAM STATUS BOARD in the OSC.

1.1.6 SETUP the OSC Priority Status Board in the Control Room. This board is found in the storage closet in the CRS office area in the Control Room Complex.

ATTACHMENT 7a
Page 3 of 3

HOPE CREEK GENERATING STATION
OSC FLOOR PLAN



OSC

ATTACHMENT 7b
Page 1 of 3
OSC SETUP - SALEM

1.0 SALEM OSC SETUP

1.1 Perform The Following to Setup the OSC:

1.1.1 OBTAIN the keys for the OSC cabinets from the Red Key Box on the wall in Work Control. Break the glass if necessary.

1.1.2 OBTAIN equipment and supplies stored in the OSC locker and cabinets.

1.1.3 SETUP the OSC phones IAW figure found in this Attachment 7b. Phone connections are located on the underside of the table. The setup is for guidance only. Personnel may be relocated around the table as needed or determined by the OSC coordinator.

NOTE
The OSC base radio station is permanently set up in the OSC.

1.1.4 PLACE OSC base radio station in operation as follows:

A. TURN the unit power on. (The **On/Off Switch** is on the front of the unit.)

B. VERIFY the Control Room radio **TAKEOVER** yellow indicator is illuminated in the affected unit's Control Room. (IF **TAKEOVER** green indicator is illuminated, THEN depress the **TAKEOVER** push button).

C. POSITION the **FREQUENCY BUTTON** to the UP position for frequency #1 (Unit #1) or DOWN for frequency #2 (Unit #2).

D. POSITION the HEADSET TOGGLE SWITCH to the DOWN position for headset use or in the UP position for speaker use.

E. POSITION **VOLUME CONTROL** to a comfortable level. **(VOLUME CONTROL SWITCH** is on the front of the radio.)

F. DEPRESS the **TRANSMIT BAR** on the microphone to transmit a message when the headset **OFF.**

G. DEPRESS the hand held transmit button on the headset cord to transmit, if the headset is **ON.**

ATTACHMENT 7b
Page 2 of 3

H. ENSURE OSC hand held radios are selected to the same frequency as the base station radio.

I. TEST the base station radio to a hand held radio outside of the Control Room/OSC Complex.

1.1.5 DIRECT the OSC Page turned up to a comfortable level.

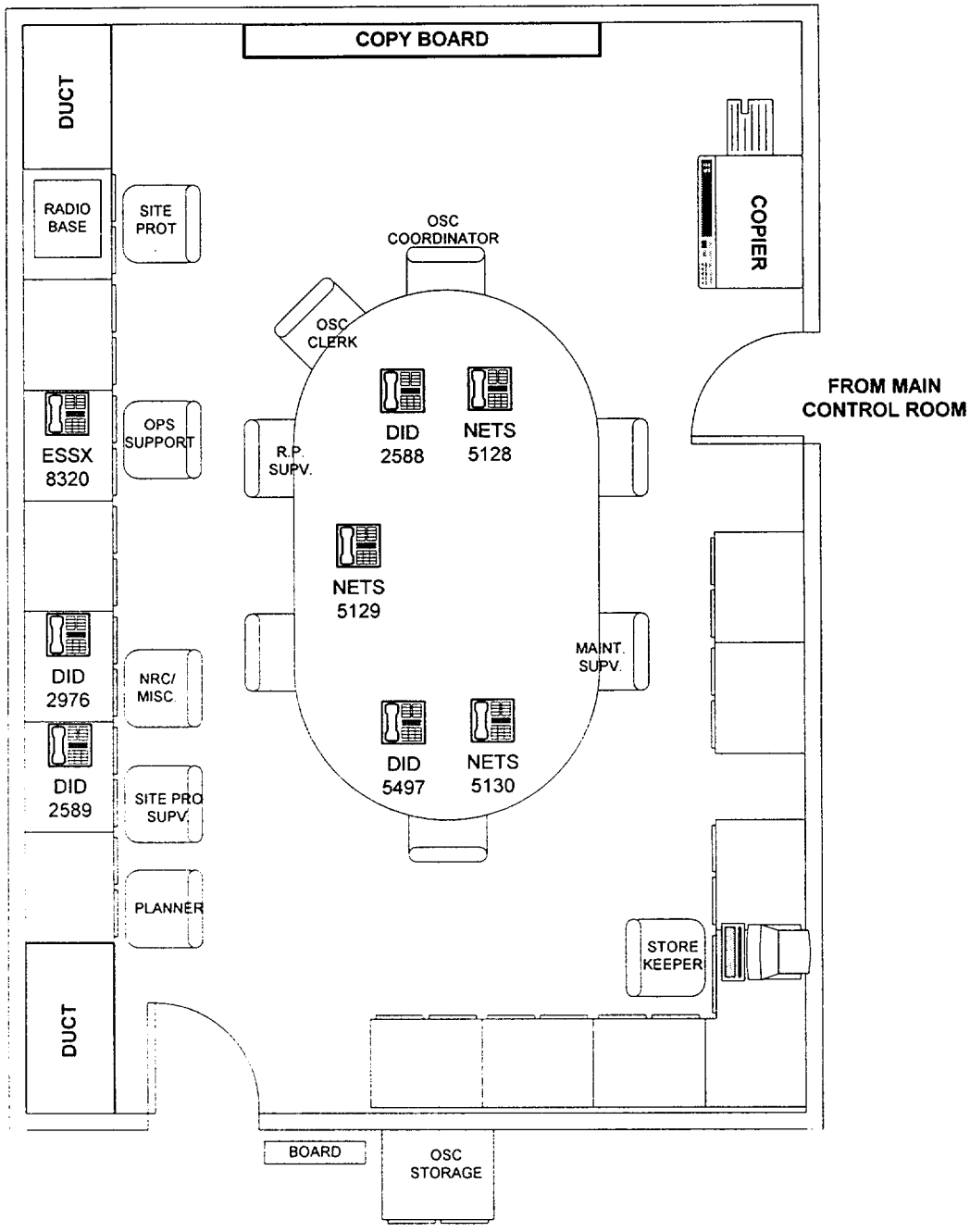
1.1.6 SETUP the OSC TEAM STATUS BOARD.

1.1.7 PROVIDE the Control Room with one of the OSC PRIORITY STATUS BOARDS.

1.1.8 SETUP the other OSC PRIORITY STATUS BOARD in the OSC near the OSCC.

ATTACHMENT 7b
Page 3 of 3

SALEM GENERATING STATION
OSC FLOOR PLAN



TEAM BRIEFING AREA

ATTACHMENT 8
Page 1 of 1
TEAM LEADER BRIEFING SHEET

TEAM NUMBER _____ TEAM LEADER _____ TIME DISPATCHED _____

TEAM MEMBERS

_____

TASK

_____

PURPOSE

_____

CONTACT _____ AT THE OSC EVERY _____ MIN. BY RADIO, PLANT PAGE OR DID PHONE

NOTE
Refer to your Team Number when communicating with the OSC.

SPECIAL INSTRUCTIONS

_____

_____

_____

BACK OUT DOSE _____ REM

EXPECTED RADIOLOGICAL CONDITIONS
INDICATE DOSE RECEIVED NEXT TO NAME ABOVE AND INFORM RP SUPERVISOR

_____

_____

DEBRIEF INFORMATION

INDICATE WHAT WAS OBSERVED IN THE FIELD/TEAM RESULTS. DEBRIEF THE OSC COORDINATOR ON FINDINGS/RESULTS

_____

_____

ATTACHMENT 9
Page 1 of 1
ASSEMBLY/ACCOUNTABILITY INSTRUCTIONS FOR HIGH NOISE AREAS - OSC
(SALEM ONLY)

NOTE

This ATTACHMENT shall be implemented upon request by Security Force Supervision to support implementation of **ASSEMBLY** or **ACCOUNTABILITY** for high noise areas.

1.0 HIGH NOISE AREA INSTRUCTIONS FOR ACCOUNTABILITY/ASSEMBLY

1.1 THE OSC COORDINATOR SHALL:

NOTE

Acceptable methods that should be used to check on high noise areas are:
- Physical Observation.
- Verification of Key Control.
- Card Reader Record of Entry (requested from Security).

1.1.1 IF requested by the Security Force Supervision, THEN form teams to check the areas listed below. **(EP97-001)**

- All Trailers within the Protected Area
- Salem Containment (priority during outages)
- Outer Penetrations (Salem U1/U2)
- Inner Penetrations (Salem U1/U2)
- Check all rooms on Aux Building 84' elevation (Salem U1/U2)
- Check all rooms on 45' elevation (Salem U1/U2).
- Salem Service Water Intake Pump Bays
- Salem Circulating Water Intake Structure
- Salem Turbine Bldg. (U1/U2)(el. 88' and 100')

1.1.2 IF any personnel are observed still onsite in any of these high noise areas, THEN INSTRUCT them to either leave site or report to their Accountability Station.

PSE&G CONTROL COPY # EPIP059

PSEG Internal Use Only

SALEM GENERATING STATION

SC.EP-EP.ZZ-0205(Q) Rev. 01

TSC – POST ACCIDENT CORE DAMAGE ASSESSMENT

USE CATEGORY: II

REVISION SUMMARY Biennial Review Performed: Yes__X__ No ____

This revision is a complete rewrite which incorporates Revision 1 of WCAP-14696-A, "Westinghouse Owners Group Core Damage Assessment Guidance." This methodology is used exclusively in Section 5.1. In addition, several enhancements were incorporated to improve clarity, satisfy reviewer's comments, and increase user-friendliness. Consequently, no changes are marked in this procedure. Significant changes are:

- Table 1 and Appendix 1 were updated to reflect the liquid volume available to the RCS by the Model F steam generators for Salem Unit 1 and by the Series 51 steam generators for Salem Unit 2.
- Revised tick-marks on figures to improve readability.
- Attachment 1 was revised by deleting 4 pages.
- Attachment 2 (Rev. 0) was deleted and replaced with a new Attachment 2.
- Attachment 3 (Rev. 0) is now part of Attachment 5, Figure 1.
- Attachment 4 (Rev. 0) is now part of Attachment 5, Figure 2.
- Attachment 5 (Rev. 0) is now part of Attachment 5, Figure 3.
- Attachment 6 (Rev. 0) was deleted and replaced with a new Attachment 6.
- Attachment 7 (Rev. 0) is now part of Attachment 5, Figure 5.
- Attachments 7 – 24 (Rev. 0) were renumbered for this revision.

IMPLEMENTATION REQUIREMENTS:

Implementation Date: 5-21-01

APPROVED: _____ Manager – EP 5/9/01 Date

APPROVED: _____ Vice President – Operations 5/10/01 Date

TSC – POST ACCIDENT CORE DAMAGE ASSESSMENT

TABLE OF CONTENTS

1.0 PURPOSE

This procedure provides information for the assessment of the degree of core damage during an accident, as required per NC.EP-EP.ZZ-0201(Q), Attachment 12. Specifically, the information contained in this procedure relates to:

- Determination of the degree of damage to the fuel rod cladding that results in the release of the fission product inventory in the fuel gap space.
- Determination of the degree of core overheating that results in the release of fission product inventory in the fuel pellets.
- **Section 5.1** of this procedure may be utilized by the Nuclear Fuels Engineer (NFE) or Core Thermal-Hydraulics Engineer (CTE) to perform a core damage assessment using current plant parameters and Dose Equivalent Iodine (DEI) readings. Section 5.1 can be utilized immediately after the identification of a plant transient condition.
- **Section 5.2** of this procedure may be utilized by the NFE to perform a core damage assessment using isotopic data obtained from a P.A.S.S. sample. Section 5.2 can be utilized after isotopic data is made available, which normally occurs several hours after the identification of a plant transient condition.

2.0 PREREQUISITES

2.1 Prerequisites To Be Followed Prior To Implementing This Procedure

2.1.1 Implement this procedure:

- At the discretion of the Nuclear Fuels Engineer (NFE) or Core Thermal-Hydraulic Engineer (CTE)
- Upon staffing of the Emergency Response Facility

3.0 PRECAUTIONS AND LIMITATIONS

3.1 Precautions

3.1.1 Personnel who implement this procedure shall be trained and qualified IAW the Emergency Plan.

3.1.2 This procedure should be used whenever the following indications are present:

- There are indicated core temperatures that trigger the use of Functional Restoration Guidelines, or
- There are indicated containment radiation levels that trigger an alarm.
- There has been an initiating event which may have resulted in fuel damage.

3.2 Limitations

3.2.1 Only the core damage assessment methodology based on Dose Equivalent Iodine (DEI) can be used at any reactor power level. All other assessment methodologies should only be used after reactor trip or shutdown.

3.2.2 Clad damage of less than 1% is not considered to be a loss of the fuel cladding boundary.

3.2.3 The core damage assessment methodology does not account for fission product spiking.

3.2.4 The methodology used in Section 5.1 defines three types of core damage: no damage, cladding failure, and fuel over-heating; while the methodology utilizing isotopic data in Section 5.2 defines fuel melting as a fourth type of core damage. Fuel melt is not considered a separate core damage category in Section 5.1 because the diagnosis of core melting is not required to evaluate and implement in-plant recovery strategies. As a result, the diagnosis of a core over-temperature condition is adequate.

4.0 EQUIPMENT REQUIRED

As provided in the Emergency Response Facility.

5.0 PROCEDURE

NOTE:

Due to the multiple and, at times, unpredictable failure mechanism associated with core damage, this procedure has been developed to provide GUIDANCE for Core Damage Assessment. The sequence and extent of procedure performance should be based on the knowledge and experience of the Nuclear Fuels Engineer and/or Core Thermal-Hydraulics Engineer.

5.1 Perform Core Damage Assessment Using Current Plant Status and Dose Equivalent Iodine (DEI) [*NFE and CTE*]

(The methodology used in this section is found in Reference 1. The Salem-specific setpoints used in this methodology are discussed in References 4 and 7.)

5.1.1 RECORD in Attachment 1, "Plant Parameter Trending," the Unit, Date, and Time of Reactor Trip or Shutdown, if trip/shutdown has occurred.

5.1.2 OBTAIN the current status of each plant parameter specified in Attachment 1 and write it in Table 1, "Plant Parameter Trend," along with the time at which the plant parameters were recorded.

Note: A core damage estimate is not used explicitly in the Salem Emergency Classification Guidelines (SECG) to determine the appropriate Emergency Action Level (EAL) in an accident. However, it is important to recognize that several plant parameters which indicate potential core damage are also used to determine EALs., most notably those found in **SECG Section 3.0 – Fission Product Barriers**. These parameters are as follows and can be used to perform a qualitative assessment of damage to the fission product barriers.

EAL #1.1.1.a	Reactor Coolant > 1 μCi/gm DEI for > 48 hours	Unusual Event
EAL #3.1.2	Reactor Coolant > 300 μCi/gm DEI	Alert or Higher
EAL #3.1.3.a	5 or More CETs > 700 °F	Alert or Higher
EAL #3.1.3.b	5 or More CETs > 1200 °F	Alert or Higher
EAL #3.1.4	RVLIS Full Range < 39% (Modes 1-4)	Alert or Higher
EAL #8.1.3.b	RVLIS Full Range < 57% (Modes 5,6)	Site Area Emerg.
EAL #3.1.5	Containment Radiation (R44A or R44B) > 300 R/hr	Alert or Higher
EAL #3.2.4	Containment Radiation (R44A or R44B) > 10 R/hr	Alert or Higher
EAL #3.3.5	Containment Radiation (R44A or R44B) > 2000 R/hr	Site Area Emerg.

* Adapted from SECG – Salem Event Classification Guidelines.

5.1.3 IDENTIFY the possible status of the reactor core by using Attachment 2, "High Level Core Damage Assessment."

Note: A clean copy of Attachment 2, "High Level Core Damage Assessment" should be used each time this step is performed.

5.1.4 ASSESS fuel rod cladding damage.

5.1.4.1 COMPLETE Attachment 3, "Clad Damage Estimate," to assess fuel rod cladding damage.

Note: A clean copy of Attachment 3, "Clad Damage Estimate," should be used each time this step is performed.

5.1.5 ASSESS fuel pellet over-temperature damage.

5.1.5.1 COMPLETE Attachment 4, "Fuel-Pellet Over-Temperature Damage Estimate," to assess fuel pellet over-temperature damage.

Note: A clean copy of Attachment 4, "Fuel-Pellet Over-Temperature Damage Estimate," should be used each time this step is performed.

RECOMMENDATION:

Because steps 5.1.3, 5.1.4, and 5.1.5 may be performed at numerous times throughout the duration of an event, it is recommended that several copies of Attachments 2, 3, and 4 be made at the time this procedure is implemented. Note that the core damage assessments performed in Attachments 3 and 4 are collected and trended in Attachment 6. Also, copies of Attachments 1 and 6 may be made as needed.

5.2 Perform Core Damage Assessment By Analyzing An Isotopic P.A.S.S. Sample

(See Reference 2 for a more detailed discussion of the methodology used in this section.)

5.2.1 PROVIDE recommendations to the Radiological Assessment Coordinator (RAC) to initiate post accident radionuclide samples according to the "Suggested Sampling Locations" in the table below.

Scenario	Principal Sampling Locations	Other Sampling Locations
Small Break LOCA Reactor Power > 1%	RCS Hot Leg, Containment Atmosphere	RCS Pressurizer
Reactor Power < 1%	RCS Hot Leg	RCS Pressurizer
Large Break LOCA Reactor Power > 1%	Containment Sump, Containment Atmosphere, RCS Hot Leg	
Reactor Power < 1%	Containment Sump, Containment Atmosphere	
Steam Line Break	RCS Hot Leg	RCS Pressurizer, Containment Atmosphere
Steam Generator Tube Rupture	RCS Hot Leg, Secondary System	Containment Atmosphere
Indication of Significant Containment Sump Inventory	Containment Sump, Containment Atmosphere	
Containment Building Radiation Monitor Alarm	Containment Atmosphere, Containment Sump	
Safety Injection Actuated	RCS Hot Leg	RCS Pressurizer
Indication of High Rad. Alarm in RCS	RCS Hot Leg	RCS Pressurizer

"**Suggested Sampling Locations**" taken from Reference 2, page 48.

* Assume operating at that level for some appreciable time.

** If a RCS hot leg sample is unavailable and a RCS cold leg sample is available, obtain a RCS cold leg sample. However, for a cold leg sample to be a good representation of the RCS, the primary water should be circulating through the system.

5.2.2 OBTAIN the P.A.S.S. sample isotopic data from the Chemistry Department.

- The majority of P.A.S.S. samples will be taken from the following media: Reactor Coolant System (RCS), containment sump, and/or containment atmosphere.

- More than one sample may be provided, each from different media.

5.2.3 If it is possible to analyze the isotopic data via the "Core Damage Assessment" Excel spreadsheet, GO TO Step 5.2.4.

If the Excel spreadsheet can NOT be utilized, GO TO Step 5.2.5 to perform a manual analysis of the data.

5.2.4 P.A.S.S. Sample – Automatic Calculation of Isotopic Data via the "Core Damage Assessment" Excel Spreadsheet

5.2.4.1 OPEN the "Core Damage Assessment" Excel Spreadsheet, located on the NFE laptop, as "Read Only."

- The spreadsheet is installed on the Nuclear Fuels Engineer (NFE) Laptop Computer, kept in Drawer C2, along the wall in the "Admin Support" area of the TSC.

- The Excel spreadsheet is found under D:\Core Damage Assessment\core_dam.xls. A shortcut to this directory exists on the desktop.

- The spreadsheet is password protected with the word "coredamage".

5.2.4.2 SAVE the "Read Only" spreadsheet by clicking **File** and then **Save As**. When prompted, rename your copy of the "Core Damage Assessment" spreadsheet with today's date in MMDDYYYY.xls format.

5.2.4.3 INPUT the following information on the spreadsheet.

Note: Only input data into the green boxes on the spreadsheet.

√	Input Parameter	Excel Spreadsheet Box
	Your Name	F10
	Plant	F11
	Date & Time of Reactor Shutdown / Trip	F4, G4
	Date & Time of RCS Sample	F5, G5
	Date & Time of Sump Sample	F6, G6
	Date & Time of Containment Atmosphere Sample	F7, G7

5.2.4.4 CHECK Box C14 if the isotopic samples taken from the RCS or sump are in units of µCi/gm.

5.2.4.5 INPUT the pressure and temperature of the containment atmosphere, sump, and RCS in Boxes D19 – D30.

5.2.4.6 INPUT the pressure, temperature, and water density ratio (ρ/ρ_{STP}), if needed, of any samples taken from the containment atmosphere, sump, and RCS in Boxes G19 – G31. See Attachment 7 to obtain the correct water density ratio.

NOTE

If isotopic data is not obtained from all three media (RCS, sump, and containment atmosphere), the pressure, temperature, and ρ/ρ_{STP} boxes for the unused media should contain dummy values. This practice will not impact the calculated results and will keep "Division By Zero" errors from appearing throughout the spreadsheet.

5.2.4.7 INPUT the isotopic data obtained from chemistry in the appropriate location of the spreadsheet.

Sample	Box Numbers
RCS	H42 – H53 B57 – B64
Sump	H74 – H85 B89 – B96
Containment Atmosphere	H104 – H115 B119 – B126

Note:
For sample media and/or specific isotopes for which data was not obtained, fill in "0.00E+00" in the appropriate box.

5.2.4.8 CHECK the appropriate box if the isotopic data has been previously decay corrected by Chemistry.

Sample	Decay Corrected Data Check Box
RCS	E44
Sump	E77
Containment Atmosphere	E107

Note:
It is standard practice that all isotopic data received from the Chemistry Department will have been decay-corrected back to the time of reactor shutdown by the Chemistry Department.

5.2.4.9 DETERMINE all liquid volumes that contribute inventory to the RCS and/or sump.

5.2.4.9.1 CHECK the appropriate boxes under the "RCS" or "Sump" headings in boxes L12 – L20 or M12 – M20, respectively.

5.2.4.9.2 INPUT the correct liquid volumes (Boxes N12 – N19) and RWST water levels (Q20 and S20) if these are different from the default values. The default values are the liquid volume at 100% capacity. **(Table 1, "Liquid Volumes Available to the RCS and Sump" of Section 5.2.5.3 contains the default values).**

5.2.4.10 INPUT the power history data in boxes M32 –M35, P32 – P35, S32 – S35.

- List power history information in chronological order from the most recent reactor start-up to shutdown.
- If isotopic data for Cs-134 exists, then use Attachment 8 to input the power correction factor in Box U56.

5.2.4.11 CHECK the applicable fuel burnup conditions.

Beginning of Cycle	Box AA3
Middle of Cycle	Box AA4
End of Cycle	Box AA5

5.2.4.12 ASSESS the amount of core damage by examining the information found in Column AH, in the Noble Gas Ratio and Iodine Ratio tables of Columns AL and AO, and the Dose Equivalent Iodine (DEI) table of Columns AL and AN.

5.2.4.13 SUMMARIZE a final core damage assessment in Attachment 23.

5.2.4.14 REPORT findings.

5.2.4.14.1 Report core damage estimate to appropriate emergency response personnel as identified in EPIP 201S/NC.EP-EP.0201(Q).

5.2.4.15 GO TO Step 5.1 to perform a core damage assessment based on current plant status, if needed.

5.2.5 **P.A.S.S. Sample – Manual Calculation of Isotopic Data**

5.2.5.1 DETERMINE if the sampling results need to be decay-corrected. **See Section 2.4.5.3 "Decay Correction" (Reference 2) for a more detailed discussion of this methodology.**

5.2.5.1.1 If the results have NOT been decay-corrected by the Chemistry Department. GO TO Attachment 9 and decay-correct the isotopic data.

5.2.5.1.2 If the results have already been decay-corrected by the Chemistry Department. GO TO Step 5.2.5.2.

Note:
It is standard practice that all isotopic data received from the Chemistry Department will have been decay-corrected back to the time of reactor shutdown by the Chemistry Department.

5.2.5.2 DETERMINE if the sampling results need to be pressure and temperature-corrected. **See Section 2.4.5.2 "Pressure and Temperature Adjustment" (Reference 2) for a more detailed discussion of this methodology.**

5.2.5.2.1 The isotopic data does NOT need to be pressure and temperature-corrected if the following is **true**. GO TO Step 5.2.5.3.

- The RCS sample or sump sample is in units of µCi/gm.
- The RCS sample or sump sample is in units of µCi/cc and the temperature of the RCS or sump is less than 200 °F.
- The pressure and temperature of the containment atmosphere sample at the time of analysis is the same as the conditions of the containment atmosphere.

5.2.5.2.2 The isotopic data DOES need to be pressure and temperature-corrected if the following is **true**. GO TO Attachment 10 and pressure/temperature-correct the isotopic data.

- The RCS sample or sump sample is in units of µCi/cc and the temperature of the RCS or sump is greater than 200 °F.
- The pressure and temperature of the containment atmosphere sample at the time of analysis is different than the conditions of the containment atmosphere.

5.2.5.3 CALCULATE the total volume of the coolant inventory available to the RCS (if RCS sample) or sump (if sump sample).

5.2.5.3.1 ADD each of the volumes in Table 1 (on the next page) that contributes to the coolant inventory in either the RCS or sump.

5.2.5.3.2 WRITE the total volume of coolant inventory of the RCS or sump in Table 2.

Table 1: *Liquid Volumes Available to the RCS and Sump

Coolant Volumes	Liquid Volume (ft^3)
Reactor Vessel (To Top of Vessel)	4945
Reactor Vessel (To Hot/Cold Leg)	3300
Reactor Vessel (To Top of Fuel)	2500
All 4 Accumulators (1 = 850 ft^3)	3400
All 4 Steam Generators **(Salem Unit 1)** (1 SG= 966.1 ft^3)	3864
All 4 Steam Generators **(Salem Unit 2)** (1 SG= 1080 ft^3)	4320
All 4 Hot Legs (1 = 108 ft^3)	432
All 4 Cold Legs (1 = 302 ft^3)	1208
Pressurizer (nominal)	1080
Pressurizer (solid)	1800
Pressurizer Surge Line	45

***The references for each value are found in Appendix 1**

Table 2: Calculated Volumes of Coolant Inventory in RCS and Sump

Volume of Coolant Inventory	**(ft^3)**
Sump	
RCS	

5.2.5.4 CALCULATE the total mass of the coolant inventory (for any RCS/sump samples) and total volume of containment (for any containment atmosphere samples).

5.2.5.4.1 USE the following equation for an RCS or sump sample.

$$M = V \times \frac{\rho}{\rho_{STP}} \times 1.0\ g/cc \times 28.3E3\ cc/ft^3$$

Where,

M = mass of coolant inventory (gm)

$\frac{\rho}{\rho_{STP}}$ = water density ratio obtained from Attachment 7

V = volume of coolant inventory (ft^3) from Table 2

5.2.5.4.2 USE the following equation for a containment atmosphere sample.

$$CV = (2.6E6\ ft^3 - SV) \times 28.3E3\ cc/ft^3 \times \frac{14.7\ psia}{P_2} \times \left(\frac{T_2 + 460}{32°F + 460}\right)$$

Where,
SV = volume of coolant inventory in sump (ft^3) in Table 2
T_2, P_2 = temperature (°F) and pressure (psia) of the containment atmosphere at time of sample
CV = corrected containment atmosphere volume (cc)

5.2.5.4.3 WRITE the calculated mass and/or volume in Table 3 below.

Table 3: Calculated RCS and Sump Masses and Containment Atmosphere Volume

RCS Mass (g)	
Sump Mass (g)	
Containment Atmosphere Volume (cc)	

5.2.5.5 CALCULATE the total activity released for each isotope from each sample medium.

5.2.5.5.1 RECORD the corrected specific activities from each sample on the appropriate page in Attachment 11. Make sure to transfer the corrected specific activities for each sample medium from the most recently used attachment (either Attachment 9 or 10). If neither Attachment 9 nor 10 was utilized, then transfer the isotopic activities from the Chemistry Data.

5.2.5.5.2 TRANSFER the coolant inventory total mass (for an RCS or sump sample) or volume (for a containment atmosphere sample) from Table 3 onto the appropriate page in Attachment 11.

5.2.5.5.3 COMPLETE the multiplication for each isotope as indicated in Attachment 11 for each sample analyzed.

5.2.5.6 CALCULATE the total amount of activity released.

- If there is only one sample, GO TO Step 5.2.5.7.
- If there are several samples from different media, PERFORM the indicated additions to calculate the total amount of activity released for each isotope from all of the media in Attachment 12.

5.2.5.7 CALCULATE the noble gas ratios for the following isotopes.

Xe-131m	Kr-85m
Xe-133m	Kr-87
Xe-135	Kr-88

5.2.5.7.1 USING the total isotopic activities found in Attachment 12 (for several samples) or in Attachment 11 (for one sample), the noble gas ratios are found by dividing the above activities by the activity for Xe-133.

$$\text{Noble Gas Ratio} = \frac{\text{Total Activity of Noble Gas Isotope}}{\text{Total Activity of Xe - 133}}$$

5.2.5.7.2 RECORD the calculated noble gas ratios in Table 4 below.

Table 4: Noble Gas Ratios

Noble Gas Isotope	Noble Gas Ratio (/Xe-133)
Xe-131m	
Xe-133m	
Xe-135	
Kr-85m	
Kr-87	
Kr-88	

5.2.5.8 CALCULATE the iodine ratios for the following isotopes.

I-132 I-133 I-135

5.2.5.8.1 USING the total isotopic activities found in Attachment 12 (for several samples) or in Attachment 11 (for one sample), the iodine ratios are found by dividing the above activities by the activity for I-131.

$$\text{Iodine Ratio} = \frac{\text{Total Activity of Iodine Isotope}}{\text{Total Activity of I-131}}$$

5.2.5.8.2 RECORD the calculated iodine ratios in Table 5.

Table 5: Iodine Ratios

Iodine Isotope	Iodine Ratio (/I-131)
I-132	
I-133	
I-135	

5.2.5.9 CALCULATE the Dose Equivalent Iodine (DEI), if not already provided by Chemistry.

5.2.5.9.1 USE the equation below to find the DEI in units of $\mu Ci/cc$ or $\mu Ci/gram$. (The constants used in the equation below are from Reference 5.)

$$DEI = (1.00 \times I\text{-}131) + (0.0361 \times I\text{-}132) + (0.270 \times I\text{-}133) + (0.0169 \times I\text{-}134) + (0.0838 \times I\text{-}135)$$

5.2.5.10 RECORD the DEI in Table 6.

Table 6: Dose Equivalent Iodine (DEI)

DEI	

5.2.5.11 OBTAIN the power history prior to shutdown.

5.2.5.12 CALCULATE the Power Correction Factor (PCF) for each isotope that is available for release utilizing the appropriate Attachment. **See Section 2.3.1, "Power Correction Factor" (Reference 2) for a discussion of this methodology.**

Attachment 13	Attachment 14	Attachment 15	Attachment 16
Kr-85m	Xe-131m	Sr-90	Sr-89
Kr-87	Xe-133	Cs-134	
Kr-88	Xe-133m	Cs-137	
Xe-135	I-131		
I-132	Te-132		
I-133	Ba-140		
I-135			
Te-129			
Pr-144			

5.2.5.13 CALCULATE the inventory available from each isotope that is available for release in Attachment 17.

5.2.5.14 CALCULATE Percent Inventory Released in Attachment 18.

5.2.5.15 EXECUTE an assessment of the core damage based on the percent inventories released in Attachment 19, using the figures found in Attachment 20.

5.2.5.16 EXECUTE an assessment of the core damage based on the Noble Gas and Iodine ratios calculated in Tables 4 and 5, using the table in Attachment 21.

5.2.6.17 EXECUTE an assessment of the core damage based on the Dose Equivalent Iodine (DEI), either provided from Chemistry or calculated in Table 6, using Attachment 22.

5.2.5.18 SUMMARIZE a final assessment of core damage based on the percent inventories released and the noble gas and iodine ratios in Attachment 23.

5.2.5.19 REPORT findings.

5.2.5.19.1 Report core damage estimate to appropriate emergency response personnel as identified in EPIP 201S/NC.EP-EP.0201(Q).

5.2.5.20 GO TO Step 5.1 to perform a core damage assessment based on current plant status, if needed.

6.0 REFERENCES

6.1 WCAP-14696-A, Westinghouse Owners Group, Core Damage Assessment Guidance, Rev. 1, November 1999.

6.2 Westinghouse Owners Group Document, Post Accident Core Damage Assessment Methodology, Rev. 2, November 1984.

6.3 NC.EP-EP.ZZ-0201(Q), TSC-Integrated Engineering Response, Rev. 2.

6.4 NFS Calc File DS1.6-0244, "Basis For Salem-Specific Values Used In SC.EP-EP.ZZ-0205(Q) – *TSC – Post Accident Core Damage Assessment*," 07/26/1999.

6.5 EPRI Document TR-108779, "Fuel Integrity Monitoring & Failure Evaluation Handbook," Appendix B, August 1998.

6.6 NFS Calc File DS1.6-0098, "Verification of Emergency Action Levels for Event Classification Guide," 02/10/1995.

6.7 NFS Calc File DS1.6-0316, "Updated Basis For Salem-Specific Values Used In SC.EP-EP.ZZ-0205(Q) – *TSC – Post Accident Core Damage Assessment*," 12/19/2000.

APPENDIX 1
Page 1 of 2

REFERENCES FOR TABLE 1
"Liquid Volumes Available to the RCS and Sump"

Coolant Volumes

1. **Reactor Vessel (To Top of Vessel) = 4945 ft^3**
   Per *Salem UFSAR, Table 5.2-3, "Reactor Vessel Design Data," Rev 16, 01/31/1998,* the total reactor vessel water volume with core and internals in place is 4945 ft^3.

2. **Reactor Vessel (To Hot/Cold Leg) = 3300 ft^3**
   Per *Salem UFSAR, Figure 5.1-1, "Reactor Vessel Schematic," Rev 6, 02/15/1987,* the nozzles are at a height roughly two-thirds above the bottom of the vessel. Thus,
   $\frac{2}{3} \times 4945\ ft^3 \approx 3300\ ft^3$.

3. **Reactor Vessel (To Top of Fuel) = 2500 ft^3**
   Per PSBP #117627, *"Reactor General Assembly Internals," Rev 4, 07/05/1989* the top of the fuel (approximately at the upper core plate) is at a height roughly one half above the bottom of the vessel. Thus, $\frac{1}{2} \times 4945\ ft^3 \approx 2500\ ft^3$.

4. **All 4 Accumulators = 3400 ft^3**
   Per *Salem UFSAR, Table 6.2-3, "Accumulator Design Parameters," Rev 6, 02/15/1987,* the minimum water volume for 1 accumulator at operating conditions is 850 ft^3. Thus, the volume of all 4 accumulators is 4 x 850 ft^3 = 3400 ft^3.

5. **All 4 Steam Generators (Salem Unit 1) = 3864 ft^3**
   All 4 Steam Generators (Salem Unit 2) = 4320 ft^3
   Per *Salem UFSAR, Table 5.2-5a, "Steam Generator Design Data (Model F)," Rev 18, 04/26/2000,* the reactor coolant water volume in one steam generator is 966.1 ft^3. Thus, the volume of all 4 steam generators for Salem Unit 1 is 4 x 966.1 ft^3 = 3864 ft^3.
   Per *Salem UFSAR, Table 5.2-5, "Steam Generator Design Data (Model 51)," Rev 18, 04/26/2000,* the reactor coolant water volume in one steam generator is 1080 ft^3. Thus, the volume of all 4 steam generators for Salem Unit 2 is 4 x 1080 ft^3 = 4320 ft^3.

6. **All 4 Hot Legs = 432 ft^3**
   Per *NFS Calc File T01.6-093, "Consolidated Documentation for the RETRAN02 Mod03 Model of Salem Units 1 and 2, 02/29/1991,* the volume of one hot leg is 109 ft^3. Thus, the volume of all 4 hot legs is 4 x 108 ft^3 = 432 ft^3.

7. **All 4 Cold Legs and RCS Pumps = 1208 ft^3**
   Per *NFS Calc File T01.6-093, "Consolidated Documentation for the RETRAN02 Mod03 Model of Salem Units 1 and 2, 02/29/1991,* the volume of one pump suction volume is 143.76 ft^3, the volume of one pump is 56.0 ft^3, and the volume of one cold leg is 102.33 ft^3. The sum of these volumes is 143.76 ft^3 + 56.0 ft^3 + 102.33 ft3 = 302 ft^3. Thus, the volume of all 4 cold legs, pumps, and pump suction volumes is 4 x 302 ft^3 = 1208 ft^3.

APPENDIX 1 (con't)
Page 2 of 2

REFERENCES FOR TABLE 1
"Liquid Volumes Available to the RCS and Sump"

Coolant Volumes

8. **Pressurizer (nominal) = 1080 ft^3**
Per *Salem UFSAR, Table 5.2-4, "Pressurizer and Pressurizer Relief Tank Design Data," Rev 16, 01/31/1998,* the water volume of the pressurizer at full power is 1080 ft^3.

9. **Pressurizer (solid) = 1800 ft^3**
Per *Salem UFSAR, Table 5.2-4, "Pressurizer and Pressurizer Relief Tank Design Data," Rev 16, 01/31/1998,* the water volume of the pressurizer at full power is 1080 ft^3 and the steam volume at full power is 720 ft^3. If the pressurizer was water solid, the amount of liquid would be 1080 ft^3 + 720 ft^3 = 1800 ft^3.

10. **Pressurizer Surge Line = 45 ft^3**
Per *NFS Calc File T01.6-093, "Consolidated Documentation for the RETRAN02 Mod03 Model of Salem Units 1 and 2, 02/29/1991,* the volume of the pressurizer surge line is 45 ft^3.

11. **Refueling Water Storage Tank (RWST) = calculated by:**
= (Initial RWST Level – Final RWST Level) x 1115 ft^2
Per *Salem UFSAR, Table 6.3-4, "Refueling Water Storage Tank Design Parameters," Rev 16, 01/31/1998,* the tank capacity is 400,000 gallons, while the minimum volume is 364,500 gallons. The straight side height is given as 48 ft.

400,000 gallons = 53,472 ft^3
364,500 gallons = 48,726 ft^3

The "100%" value is assumed to be the minimum allowable RWST volume of 48,726 ft^3. This occurs at a RWST level of $\left(\frac{48{,}726\ ft^3}{53{,}472\ ft^3}\right) \times 48\ ft = 43.7\ ft$. The total volume of water entering the Reactor Coolant System (RCS) from the RWST is found below.

Total RWST Volume
Entering RCS = (Initial RWST Level – Final RWST Level) x $\left(\frac{48{,}726\ ft^3}{43.7\ ft}\right)$

Total RWST Volume
Entering RCS = (Initial RWST Level – Final RWST Level) x 1115 ft^2

ATTACHMENT 1
Page 1 of 1

PLANT PARAMETER TRENDING

Unit:_____ Date:_____

Time of Reactor Trip or Shutdown:_____

Table 1: Plant Parameter Trend

#	Plant Parameter	Reading at Time =	Reading at Time =	Reading at Time =	Reading at Time =	Reading at Time =
1.	DEI (if known)	µCi/gr or µCu/cc	µCi/gr or µCu/cc	µCi/gr or µCu/cc	µCi/gr or µCu/cc	µCi/gr or µCu/cc
2.	Hottest CET Temperature	°F	°F	°F	°F	°F
3.	Number of CETs > 1200°F					
4.	Number of CETs > 1400°F					
5.	Number of CETs > 2000°F					
6.	Number of Operable CETs (Max. is 58)					
7.	R44 A Reading	Rad/hr	Rad/hr	Rad/hr	Rad/hr	Rad/hr
	R44 B Reading	Rad/hr	Rad/hr	Rad/hr	Rad/hr	Rad/hr
8.	RCS Pressure	psig	psig	psig	psig	psig
9.	T_{sat} at the above RCS Pressure [#8.]	°F	°F	°F	°F	°F
10.	Containment H_2 Level	volume %	volume %	volume %	volume %	volume %
11.	RVLIS Reading	%	%	%	%	%
12.	Hot Leg RTD Temperature	°F	°F	°F	°F	°F
13.	SRM Reading	cts/sec	cts/sec	cts/sec	cts/sec	cts/sec

CET	Core Exit Thermocouple
DEI	Dose Equivalent Iodine
H_2	Hydrogen
RCS	Reactor Coolant System
RTD	Resistance Temperature Detector
RVLIS	Reactor Vessel Level Indication System
SRM	Source Range Monitor
T_{sat}	Saturated Temperature

ATTACHMENT 2
Page 1 of 2

HIGH LEVEL CORE DAMAGE ASSESSMENT

High Level Core Damage Assessment

STEP 1: DETERMINE the time elapsed between Reactor Shutdown and the time at which the plant parameters in Table 1 of Attachment 1, "Plant Parameter Trending," were obtained and RECORD in Table 2.

> **Note: If a Reactor Trip or Shutdown has not occurred, WRITE "Not Applicable," and assess only the DEI, if known, in Table 3.**

STEP 2: DETERMINE the correct values of <CRM1> by using Figure 1, "Containment Radiation Level Vs. Time For RCS Release," in Attachment 5, "Figures For Section 5.1," and <CRM2> by using Figure 2, "Containment Radiation Level Vs. Time For 1% Fuel Pellet Over-Temperature Release," in Attachment 5, "Figures For Section 5.1," and RECORD in Tables 2 and 3.

Table 2: **Values of Containment Radiation Level Setpoints <CRM1> and <CRM2>**

#14. Time After Rx Shutdown (hrs)	#15. <CRM1>	#16. <CRM2>
hrs	R/hr	R/hr

NOTE:
The value of <CRM1> is the postulated containment radiation level corresponding to normal reactor coolant system activity with an iodine spike, while <CRM2> is the postulated containment radiation level corresponding to a 1% fuel pellet over-temperature fission product release at specific times after reactor shutdown. The actual containment radiation monitor (R-44) reading is compared to <CRM3> and <CRM4> for the purpose of discriminating between fuel rod gap activity from cladding damage and the onset of fission product releases from the fuel pellet due to high fuel pellet temperatures.

ATTACHMENT 2 (Con't.)
Page 2 of 2

HIGH LEVEL CORE DAMAGE ASSESSMENT

High Level Core Damage Assessment (Continued)

STEP 3: IDENTIFY the possible status of the reactor core by using Table 3, "Fuel Rod Fission Product Status."

Table 3: Fuel Rod Fission Product Status

Plant Status	Fuel Rod Fission Product Status
Core Exit Thermocouples LESS THAN 700 °F **AND** Containment Radiation LESS THAN <CRM1> #15 Rad/hr **AND** Dose Equivalent Iodine (DEI) [if known] LESS THAN 1 µCi/gm or 1 µCi/cc	No Core Damage Continue to Monitor Plant Parameters Go To Step 5.1.2
Core Exit Thermocouples LESS THAN 2000 °F **AND** Containment Radiation LESS THAN <CRM2> #16 Rad/hr **OR** Dose Equivalent Iodine (DEI) [if known] GREATER THAN 1 µCI/gm or 1 µCI/cc	Possible Fuel Rod Clad Damage Go To Step 5.1.4 and Attachment 3
Core Exit Thermocouples GREATER THAN 2000 °F **OR** Containment Radiation GREATER THAN <CRM2> #16 Rad/hr	Possible Fuel Pellet Over-temperature Damage Go To Step 5.1.5 and Attachment 4

Values for #15 <CRM1> and #16 <CRM2> are obtained from Table 2 on Page 22.

ATTACHMENT 3
Page 1 of 5

CLAD DAMAGE ESTIMATE (STEP 5.1.4)

A. Estimate Fuel Rod Clad Damage Based on Containment Radiation (CR) Levels

STEP 1: DETERMINE the correct value of <CRM3> by using Figure 3, "Containment Radiation Level Vs. Time For 100% Clad Damage Release," in Attachment 5, "Figures For Section 5.1," and RECORD in Table 4.

Table 4: Values of Containment Radiation Level Setpoint <CRM3>

#14. Time After Rx Shutdown	#17. <CRM3>
hrs	R/hr

STEP 2: ESTIMATE clad damage by using the following equation.

$$\text{Clad Damage}_{CR}\ (\%) = \frac{\text{Current Containment Radiation Level}}{\text{Predicted Containment Radiation Level at 100\% Clad Damage}} \times 100$$

$$\text{Clad Damage}_{CR}\ (\%) = \frac{\text{\_\_\_\_ (\#7)}}{\text{<CRM3> (\#17)}} \times 100 = \text{\_\_\_\_ \% (\#18)}$$

ATTACHMENT 3 (Con't)
Page 2 of 5

CLAD DAMAGE ESTIMATE (STEP 5.1.4)

B. Estimate Fuel Rod Clad Damage Based on Core Exit Thermocouple (CET) Readings

STEP 3: ESTIMATE clad damage by using one of the following two (2) equations.

➢ ***For RCS Pressure*** [#8] ***> 1600 psig,***

$$\text{Clad Damage}_{CET}\ (\%) = \frac{\text{Number of CETs} > 1400\,^{\circ}\text{F}}{\text{Total Number of Operable CETs}} \times 100$$

$$\text{Clad Damage}_{CET}\ (\%) = \frac{[\ \#4\ ]}{[\ \#6\ ]} \times 100 = [\ \%\ \#19\ ]$$

OR

➢ ***For RCS Pressure*** [#8] ***< 1600 psig,***

$$\text{Clad Damage}_{CET}\ (\%) = \frac{\text{Number of CETs} > 1200\,^{\circ}\text{F}}{\text{Total Number of Operable CETs}} \times 100$$

$$\text{Clad Damage}_{CET}\ (\%) = \frac{[\ \#3\ ]}{[\ \#6\ ]} \times 100 = [\ \%\ \#19\ ]$$

ATTACHMENT 3 (Con't)
Page 3 of 5

CLAD DAMAGE ESTIMATE (STEP 5.1.4)

C. Estimate Fuel Rod Clad Damage Based on Dose Equivalent Iodine (DEI) Readings

STEP 4: ESTIMATE clad damage by using Figure 5, "Clad Damage Vs. Dose Equivalent Iodine, " in Attachment 5, "Figures For Section 5.1."

DEI is: [#1]

Clad Damage$_{DEI}$ (%) = [% #20]

Note: Figure 5, "Clad Damage Vs. Dose Equivalent Iodine," was created from data found in Reference 6. Due to the very rough correlation between DEI and Clad Damage, the relatively small difference between the DEI in units of μCi/cc and units of μCi/gm does not substantially impact the estimated clad damage.

ATTACHMENT 3 (Con't)
Page 4 of 5

CLAD DAMAGE ESTIMATE (STEP 5.1.4)

D. Estimate Reasonableness of Clad Damage Estimates.

STEP 5: COMPARE current plant parameters to expected response by completing Table 5, "Current Vs. Expected Value Comparison Table," below.

Table 5: Current Vs. Expected Value Comparison Table

Expected Response	YES / NO ?
Containment H_2 Level Is [#10] < 0.5 volume %?	
RVLIS Reading Is 44% < [#11] < 57%	
Hot Leg RTD Temperature Is [T_{sat} #9] < [#12] < 650°F	
Source Range Monitor (SRM) Reading Is [#13] > 20,000 cps ?	
Clad Damage Estimates Is $\left\| \frac{[\ \%\ \#18\ ] - [\ \%\ \#19\ ]}{[\ \%\ \#18\ ]} \right\| \times 100 \leq 50\ \%$ *"Is the absolute value of [(% Clad Damage$_{CR}$ – % Clad Damage$_{CET}$) / % Clad Damage$_{CR}$] x 100 ≤ 50% ?"*	

ATTACHMENT 3 (Con't)
Page 5 of 5

CLAD DAMAGE ESTIMATE (STEP 5.1.4)

D. Estimate Reasonableness of Clad Damage Estimates (Continued)

STEP 6: For any "NO" responses in Table 5, DETERMINE if the deviation can be explained from the accident progression.

	✓
Injection of water to the RCS	
Bleed paths from the RCS	
Direct radiation to the containment radiation monitors	
Fuel burnup	
Fission product retention in the RCS	
Fission product removal from containment	
Conservatisms in the predictive model	
Other:	

E. Trend and Report Findings

STEP 7: RECORD estimated fuel pellet over-temperature damage in ATTACHMENT 6, "Core Damage Assessment Trending."

STEP 8: REPORT findings using guidance below.

1. If clad damage estimates have increased by more than 1% in the past 30 minutes or if estimates exceed 2% clad damage, report possible degradation of fission product barrier to appropriate emergency response personnel as identified in NC.EP-EP.ZZ-0201(Q).

2. Report core damage estimate to appropriate emergency response personnel as identified in NC.EP-EP.ZZ-0201(Q)

STEP 9: RETURN to 5.1.2 or 5.2 and PERFORM another core damage assessment, as needed.

ATTACHMENT 4
Page 1 of 6

FUEL PELLET OVER-TEMPERATURE DAMAGE ESTIMATE (STEP 5.1.5)

A. Estimate Fuel Pellet Over-Temperature Damage Based on Containment Radiation (CR) Levels

STEP 1: DETERMINE the correct value of <CRM4> by using Figure 4, "Containment Radiation Level Vs. Time For 100% Fuel Over-Temperature Release," in Attachment 5, "Figures For Section 5.1," and RECORD in Table 6 below.

Table 6: Values of Containment Radiation Level Setpoint <CRM4>

#14. Time After Rx Shutdown	#21. <CRM4>
hrs	R/hr

STEP 2: ESTIMATE fuel pellet over-temperature damage by using the following equation.

$$\text{Over - Temp. Damage}_{CR}\ (\%) = \frac{\text{Current Containment Radiation Level}}{\text{Predicted Containment Radiation Level at 100\% Over - temp Damage}} \times 100$$

Fuel Pellet Over-temperature Damage$_{CR}$ (%) = [#7] / [<CRM4> #21] = [% #22]

FUEL PELLET OVER-TEMPERATURE DAMAGE ESTIMATE (STEP 5.1.5)

B. Estimate Fuel Pellet Over-Temperature Damage Based on Core Exit Thermocouple (CET) Readings

STEP 3: ESTIMATE fuel pellet over-temperature damage by using the following equation.

$$\text{Over - Temp. Damage}_{CET}\ (\%) = \frac{\text{Number of CETs} > 2000\,^{\circ}\text{F}}{\text{Total Number of Operable CETs}} \times 100$$

$$\text{Over-Temperature Damage}_{CET}\ (\%) = \frac{\boxed{\quad}\ \#5}{\boxed{\quad}\ \#6} = \boxed{\quad\%\ \#23}$$

ATTACHMENT 4 (Con't)
Page 3 of 6

FUEL PELLET OVER-TEMPERATURE DAMAGE ESTIMATE (STEP 5.1.5)

C. Estimate Fuel Pellet Over-Temperature Damage Based on Containment Hydrogen Level

STEP: 4 DETERMINE the expected Containment H_2 Concentration at 100% Fuel Pellet Over-Temperature by using Table 7 below.

Table 7: Expected Containment Hydrogen Concentration At Various Conditions

RCS Pressure [#8] psig	Water Injection to the RCS	Predicted Containment Hydrogen Concentration For 100% Fuel Pellet OT Damage
RCS Pressure < 1050 psig	Yes	50 volume %
	No	25 volume %
RCS Pressure > 1050 psig	Yes	75 volume %
	No	25 volume %

The Expected Containment Hydrogen Concentration is [#24] %

STEP 5: ESTIMATE fuel pellet over-temperature damage by using the following equation.

$$\text{Over-Temperature Damage}_{HYDROGEN}\ (\%) = \frac{[\ \#10\ ]}{[\ \#24\ ]} \times 100 = [\ \ \%\ \#25\ ]$$

ATTACHMENT 4 (Con't)
Page 4 of 6

FUEL PELLET OVER-TEMPERATURE DAMAGE ESTIMATE (STEP 5.1.5)

D. Estimate Reasonableness of Fuel Pellet Over-Temperature Damage Estimates.

STEP 6: COMPARE current plant parameters to expected response by completing Table 8 below.

Table 8: Current Vs. Expected Value Comparison Table

Expected Response	YES / NO ?
RVLIS Reading Is [#11] < 44%	
Hot Leg RTD Temperature Is [#12] > 650°F	
Source Range Monitor (SRM) Reading Is [#13] > 20,000 cps ?	
Fuel Pellet Over-Temperature Damage Estimates Is $\left\lvert \frac{[\#22]\% - [\#23]\%}{[\#22]\%} \right\rvert$ x 100 $\leq$ 50 % *"Is the absolute value of [(% Over-Temp. Damage$_{CR}$ – % Over-Temp. Damage$_{CET}$) / % Over-Temp. Damage$_{CR}$] x 100 $\leq$ 50% ?"*	

(Table 8 is continued on the next page)

ATTACHMENT 4 (Con't)
Page 5 of 6

FUEL PELLET OVER-TEMPERATURE DAMAGE ESTIMATE (STEP 5.1.5)

D. Estimate Reasonableness of Fuel Pellet Over-Temperature Damage Estimates (Continued).

Table 8 (Con't): Current Vs. Expected Value Comparison Table

Expected Response	YES / NO ?
Fuel Pellet Over-Temperature Damage Estimates Is | [% #22] — [% #25] | ≤ 25 % *"Is the absolute value of [(% Over-Temp. Damage$_{CR}$ – % Over-Temp. Damage$_{HYDROGEN}$) ≤ 25% ?"*	
Fuel Pellet Over-Temperature Damage Estimates Is | [% #23] — [% #25] | ≤ 25 % *"Is the absolute value of [(% Over-Temp. Damage$_{CET}$ – % Over-Temp. Damage$_{HYDROGEN}$) ≤ 25% ?"*	

ATTACHMENT 4 (Con't)
Page 6 of 6

FUEL PELLET OVER-TEMPERATURE DAMAGE ESTIMATE (STEP 5.1.5)

D. Estimate Reasonableness of Clad Damage Estimates (Continued)

STEP 7: For any "NO" responses in Table 8, DETERMINE if the deviation can be explained from the accident progression.

	✓
Injection of water to the RCS	
Bleed paths from the RCS	
Direct radiation to the containment radiation monitors	
Hydrogen burn in containment or operation of hydrogen igniters	
Fuel burnup	
Fission product retention in the RCS	
Fission product removal from containment	
Conservatisms in the predictive model	
Other:	

E. Trend and Report Findings

STEP 8: RECORD estimated fuel pellet over-temperature damage in ATTACHMENT 6, "Core Damage Assessment Trending."

STEP 9: REPORT findings using guidance below.

1. If clad damage estimates have increased by more than 1% in the past 30 minutes or if estimates exceed 2% clad damage, report possible degradation of fission product barrier to appropriate emergency response personnel as identified in NC.EP-EP.ZZ-0201(Q).

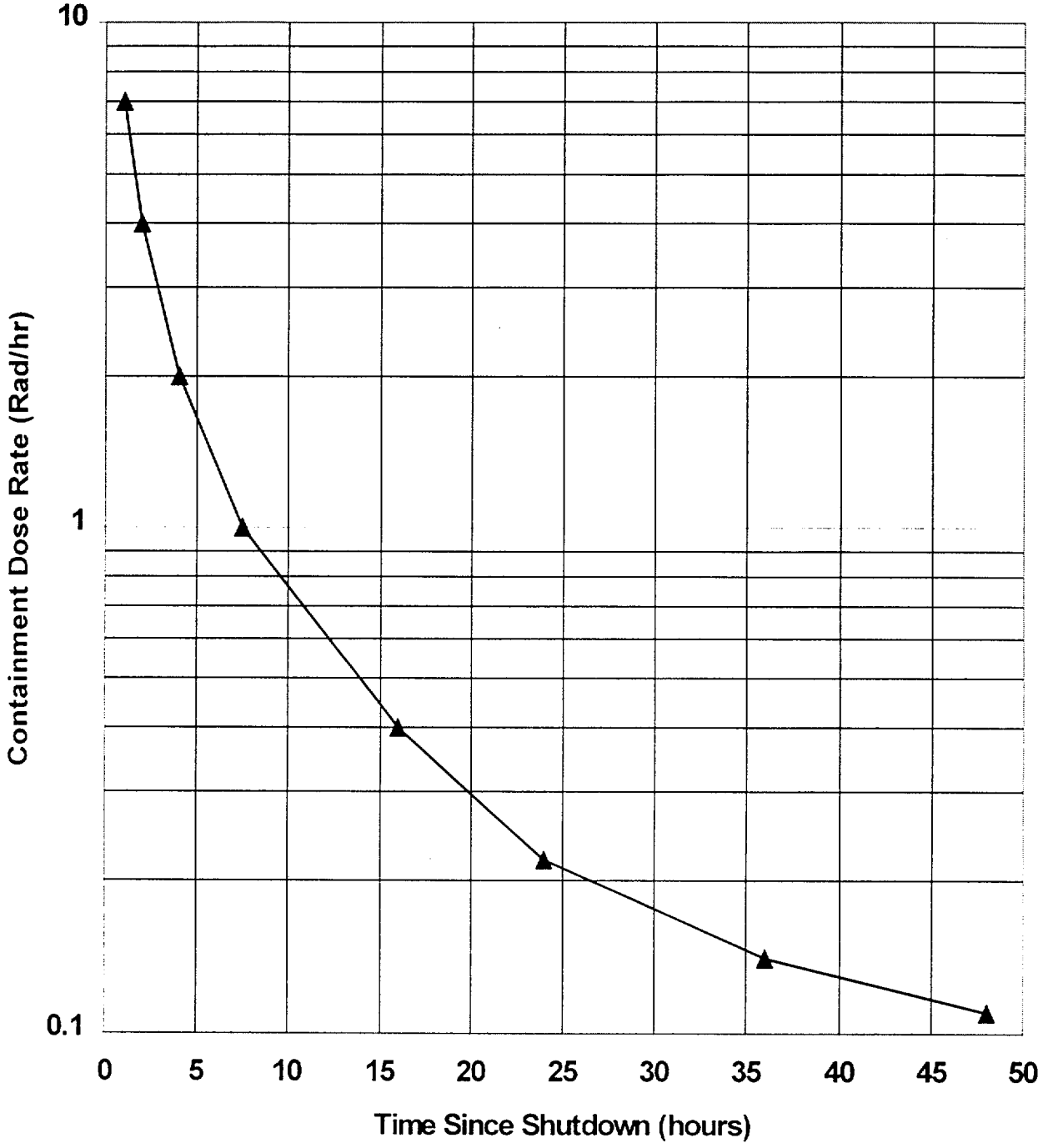
2. Report core damage estimate to appropriate emergency response personnel as identified in NC.EP-EP.ZZ-0201(Q)

STEP 10: RETURN to 5.1.2 or 5.2 and PERFORM another core damage assessment, as needed.

ATTACHMENT 5
Page 1 of 5

FIGURES FOR SECTION 5.1

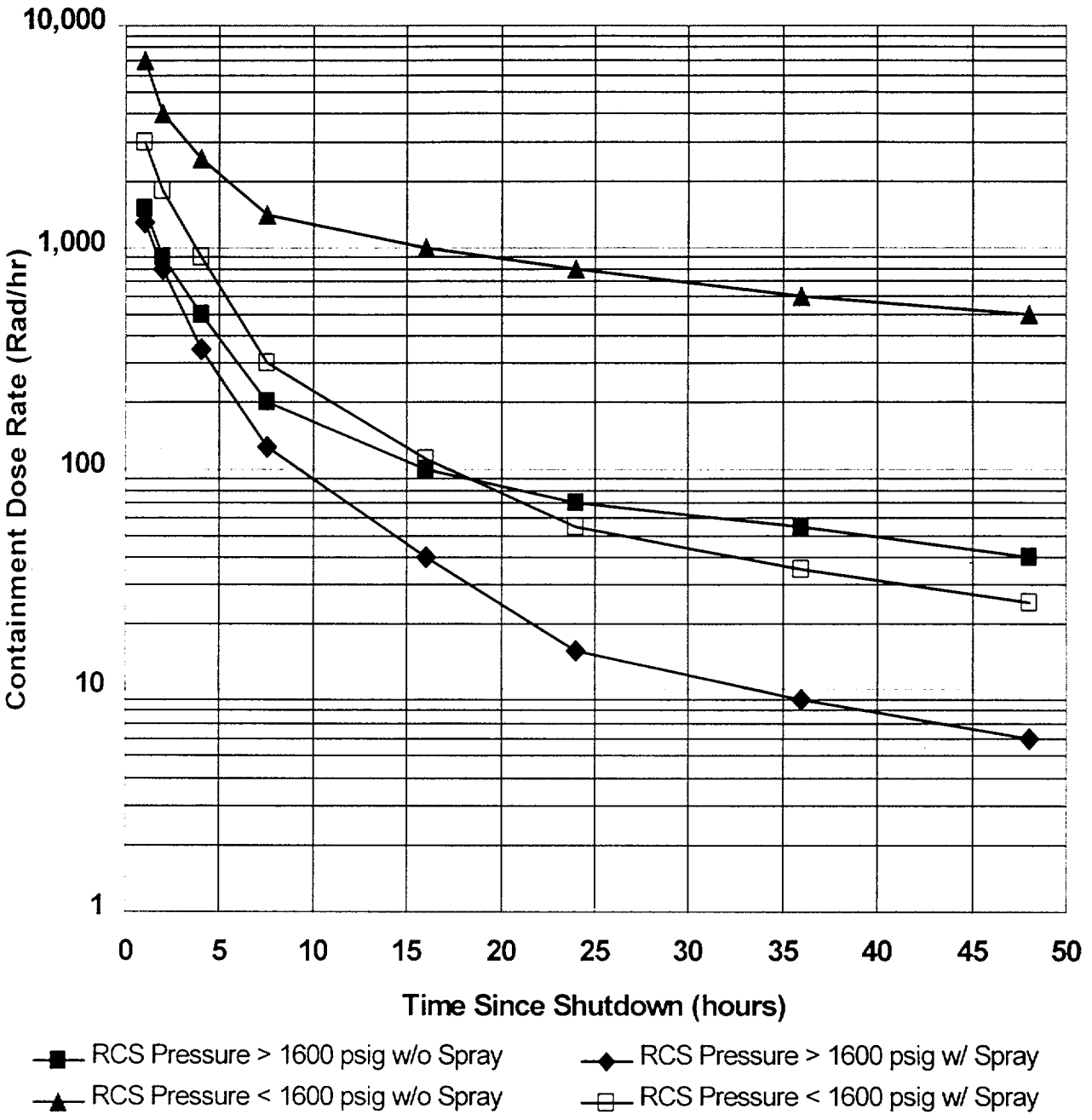
FIGURE 1: <CRM1>
"CONTAINMENT RADIATION LEVEL VS. TIME FOR RCS RELEASE"
(Adapted from Figure 1 of Reference 1)



ATTACHMENT 5 (Con't)
Page 2 of 5

FIGURES FOR SECTION 5.1

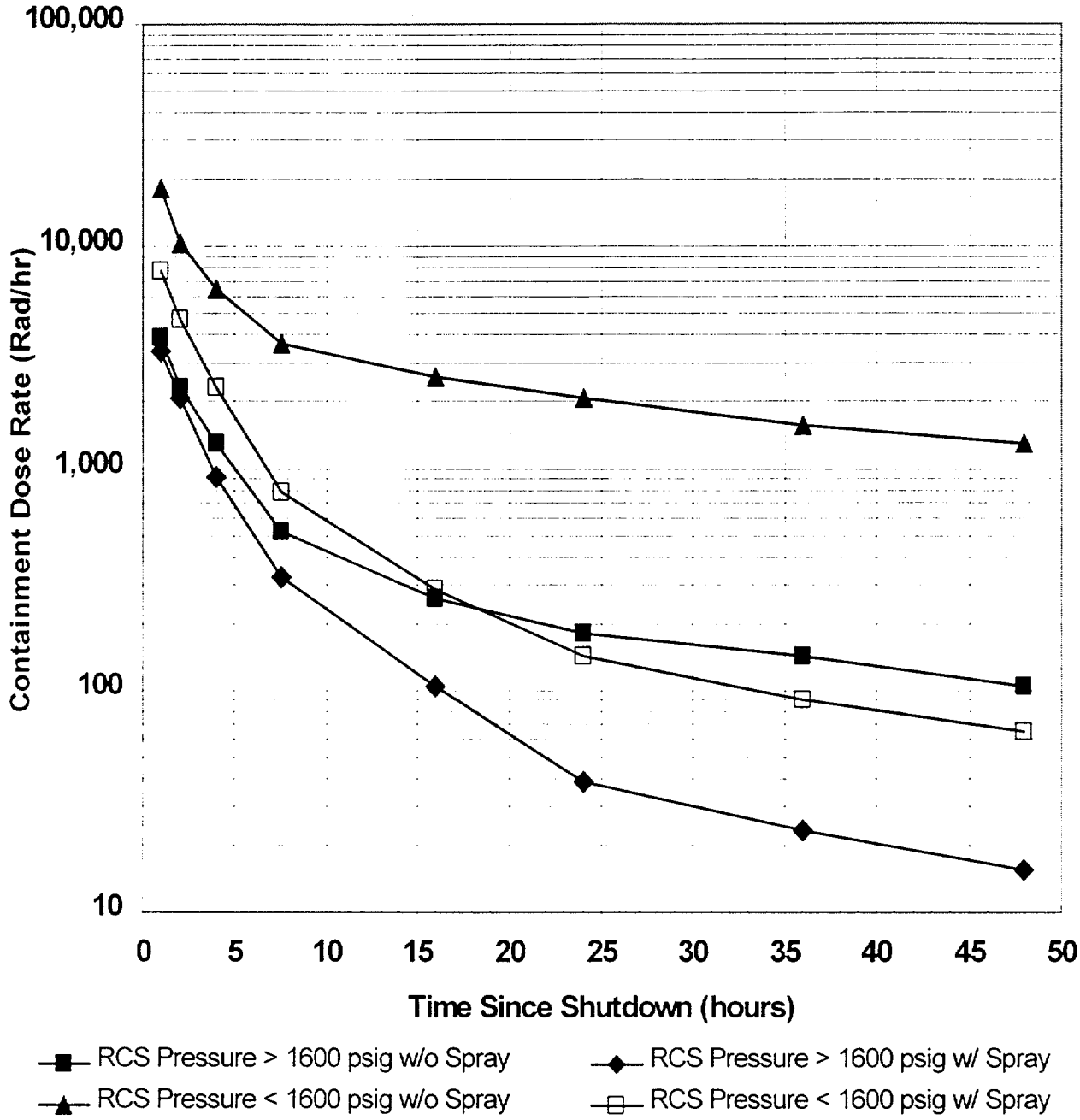
FIGURE 2: <CRM2>
"CONTAINMENT RADIATION LEVEL VS. TIME
FOR 1% FUEL PELLET OVER-TEMPERATURE RELEASE"
(Adapted from Figure 2 of Reference 1)



ATTACHMENT 5 (Con't)
Page 3 of 5

FIGURES FOR SECTION 5.1

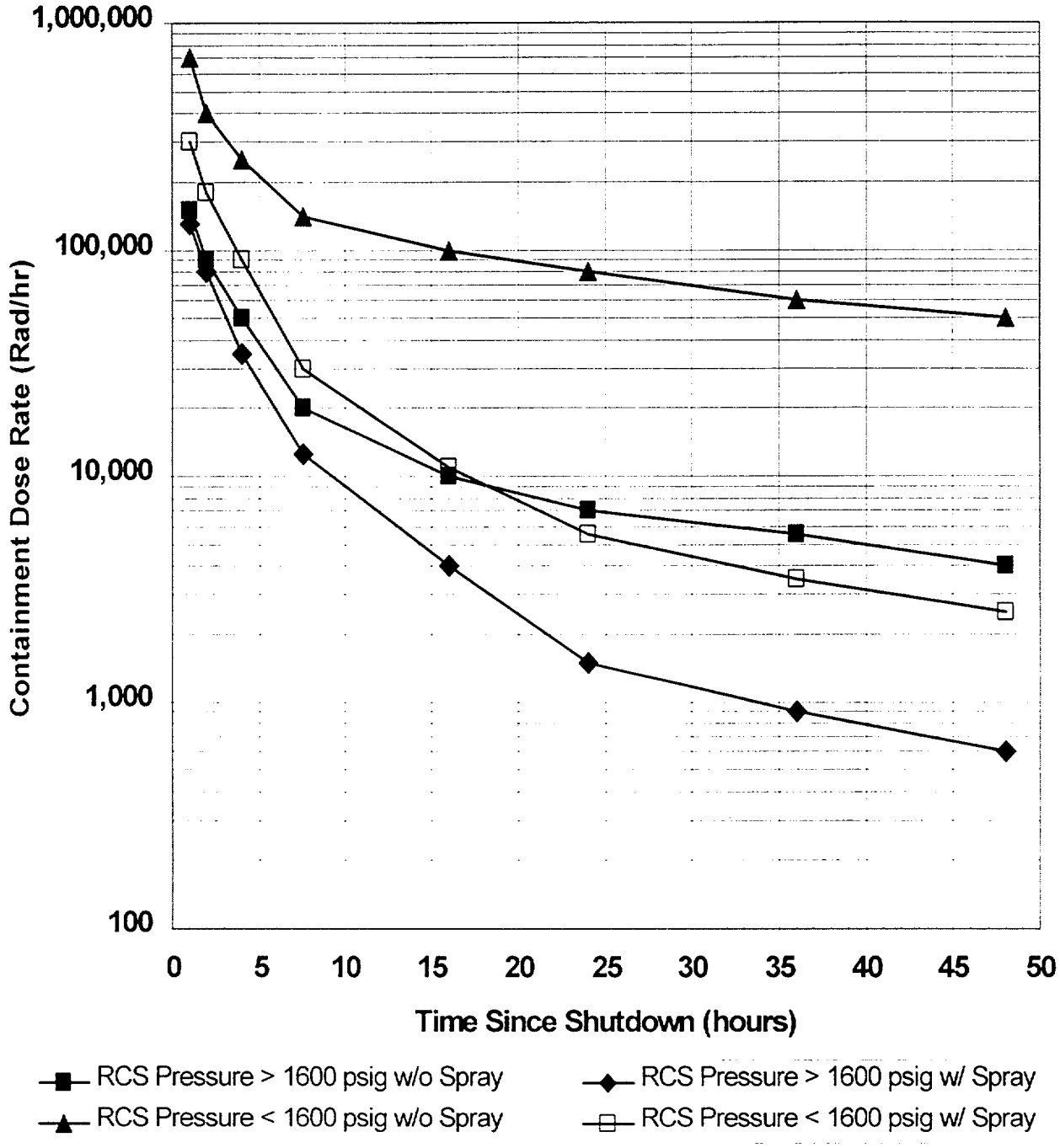
FIGURE 3: <CRM3>
"CONTAINMENT RADIATION LEVEL VS. TIME
FOR 100% CLAD DAMAGE RELEASE"
(Adapted from Figure 3 of Reference 1)



ATTACHMENT 5 (Con't)
Page 4 of 5

FIGURES FOR SECTION 5.1

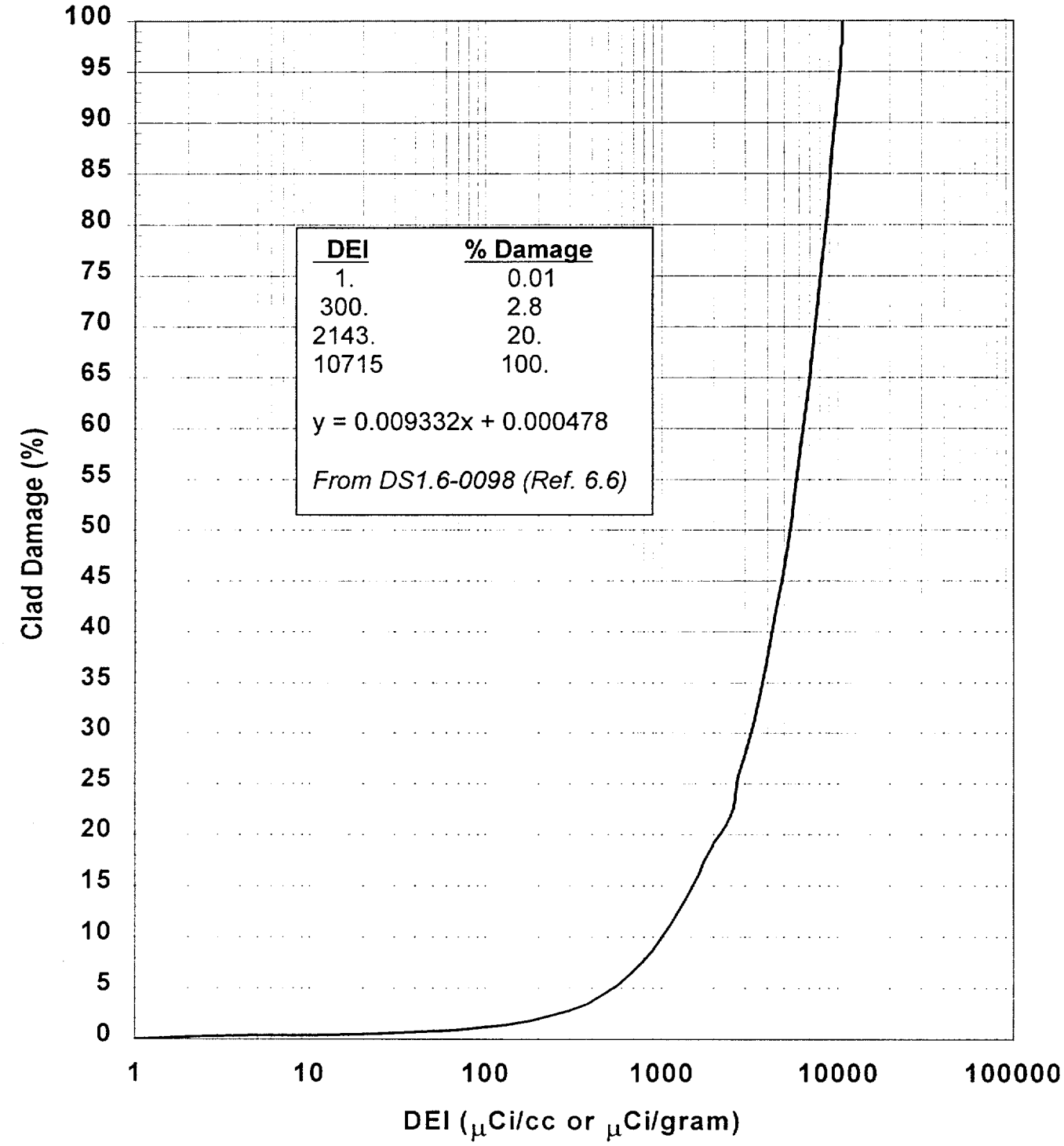
FIGURE 4: <CRM4>
"CONTAINMENT RADIATION LEVEL VS. TIME
FOR 100% FUEL OVER-TEMPERATURE RELEASE"
(Adapted from Figure 4 of Reference 1)



ATTACHMENT 5 (Con't)
Page 5 of 5

FIGURES FOR SECTION 5.1

FIGURE 5: "CLAD DAMAGE VS. DOSE EQUIVALENT IODINE (DEI)"



ATTACHMENT 6
Page 1 of 1

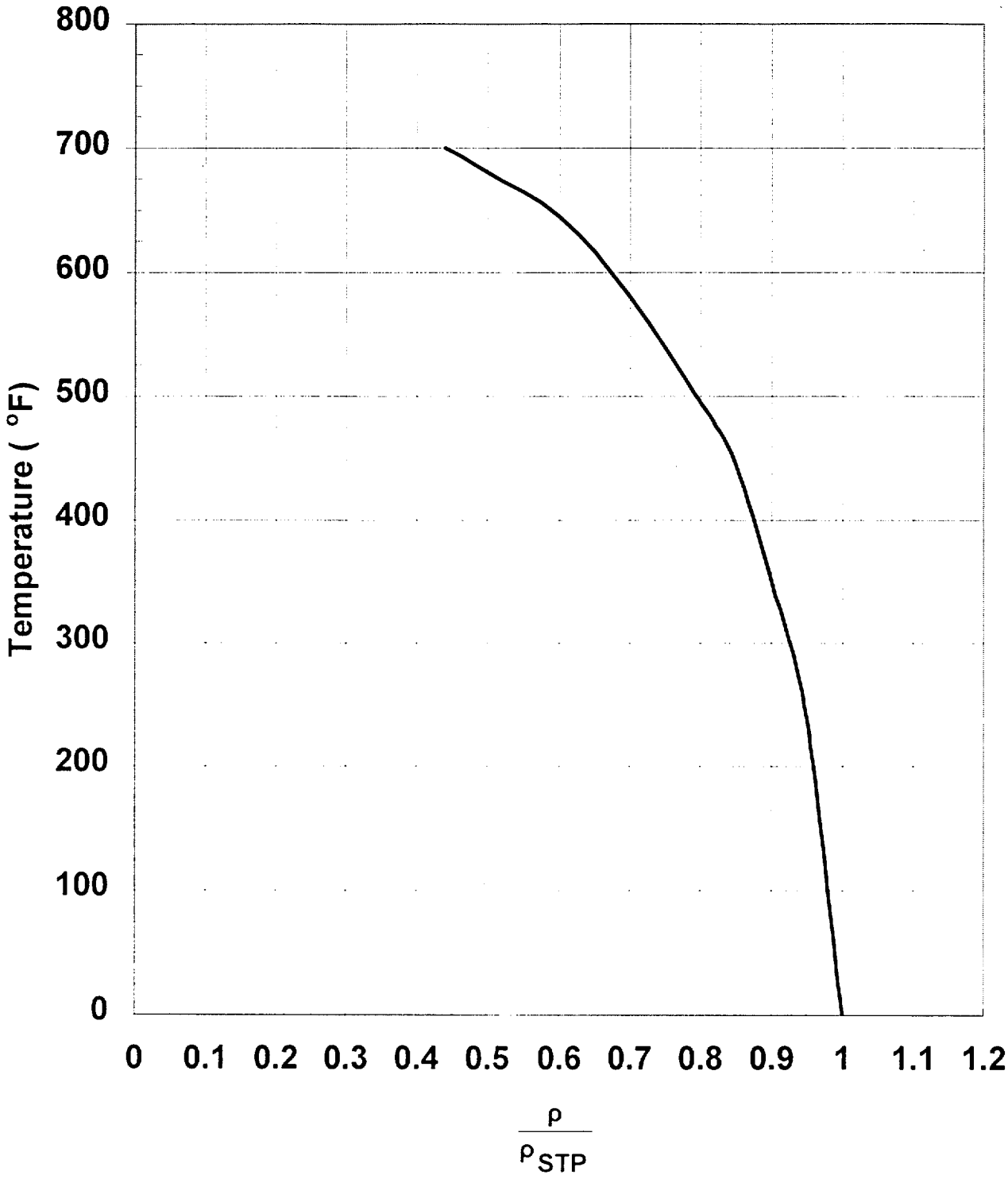
CORE DAMAGE ASSESSMENT TRENDING

Time	Estimated Clad Damage	Estimated Fuel Over-Temperature Damage

ATTACHMENT 7
Page 1 of 1

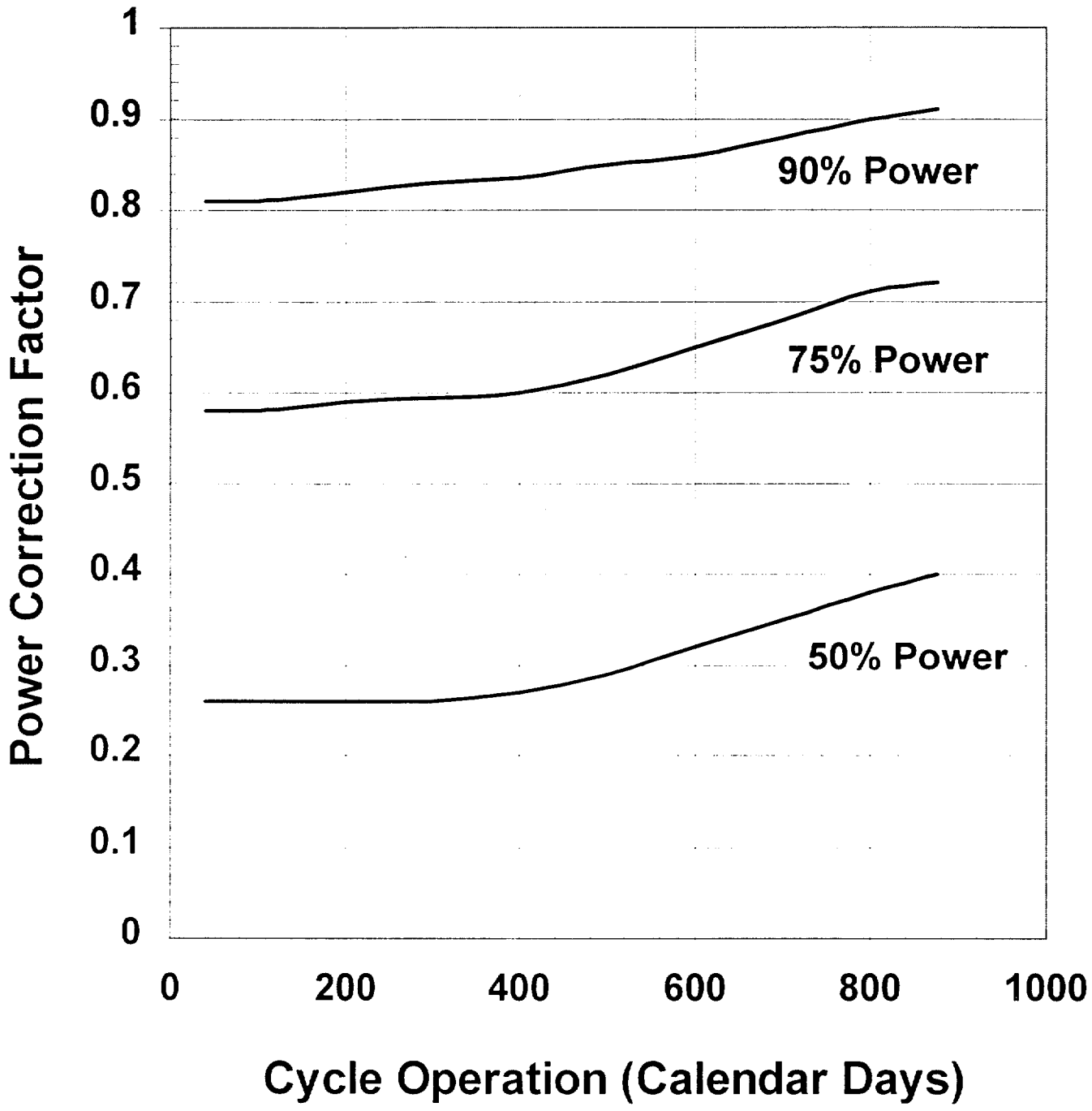
WATER DENSITY RATIO (TEMPERATURE VS. $\frac{\rho}{\rho_{STP}}$)

(Figure 2-10 of Reference 2)



ATTACHMENT 8
Page 1 of 1

POWER CORRECTION FACTOR FOR CS-134 BASED ON
AVERAGE POWER DURING OPERATION
(Figure 2-1 of Reference 2)



ATTACHMENT 9
Page 1 of 6

DECAY-CORRECTION OF ISOTOPIC DATA FOR RCS, SUMP, AND CONTAINMENT ATMOSPHERE SAMPLES

As previously stated in Step 5.2.5.1, the Chemistry Department normally delivers the isotopic data decay-corrected as standard practice. If the isotopic data is not decay-corrected, two methods are used to accomplish this. **See Section 2.4.5.3 "Decay Correction" (Reference 2) for a more detailed discussion of this methodology.**

Method 1

For the following isotopes, parent-daughter relationships need not be accounted for.

I-131	Kr-85m	Cs-134	Sr-89
I-133	Kr-87	Cs-137	Sr-90
I-135	Kr-88	Te-132	Ba-140

Use the following equation and table to calculate the decay-corrected specific activities for each sample and list them in the appropriate "Decay-Corrected Activities" page at the end of this attachment.

Note: 1 cc = 1 ml

$$A_0 = \frac{A}{e^{-\lambda_i t}}$$

where:

A = measured specific activity, (μCi/gm) or (μCi/cc)

λ_i = decay constant of isotope i, (sec^{-1})

t = time elapsed from reactor shutdown to time of sampling (sec)

A_0 = specific activity at shutdown, (μCi/gm) or (μCi/cc)

Constants Required for Method 1

ISOTOPE	$T_{1/2}$	λ (sec^{-1})
I-131	8.05 d	9.966E-7
I-133	20.3 h	9.485E-6
I-135	6.68 h	2.882E-5
Kr-85m	4.4 h	4.376E-5
Kr-87	76 m	1.520E-4
Kr-88	2.8 h	6.876E-5
Cs-134	2 y	1.098E-8
Cs-137	30 y	7.322E-10
Te-132	77.7 h	2.478E-6
Sr-89	52.7 d	1.522E-7
Sr-90	28 y	7.845E-10
Ba-140	12.8 d	6.268E-7

(Adapted from Table 2-1 of Reference 2)

ATTACHMENT 9 (Con't.)
Page 2 of 6

DECAY-CORRECTION OF ISOTOPIC DATA FOR RCS, SUMP, AND CONTAINMENT ATMOSPHERE SAMPLES

Method 2

For the following isotopes, parent-daughter relationships do need to be taken into consideration.

I-132	Xe-133	Pr-144
Xe-131m	Xe-135	
Xe-133m	Te-129	

Use the following equations and tables to calculate the decay-corrected specific activities for each sample and list them in the appropriate "Decay-Corrected Activities" page at the end of this attachment.

1. Calculate the hypothetical daughter concentration (Q_B) at the time of the sample analysis assuming 100 percent release of the parent and daughter source inventory.

$$Q_B(t) = k\frac{\lambda_B}{\lambda_B - \lambda_A} \cdot Q_A^0(e^{-\lambda_A t} - e^{-\lambda_B t}) + Q_B^0 e^{-\lambda_B t}$$

Where,
Q_A^0 = 100% source inventory (Ci) of parent (Ref. 2, Table 2-2 or 2-8)
Q_B^0 = 100% source inventory (Ci) of daughter (Ref. 2, Table 2-2 or 2-8)
$Q_B(t)$ = hypothetical daughter activity (Ci) at sample time
k = if parent has 2 daughters, k is the branching factor (Ref. 2, Table 2-7)
λ_A = parent decay constant (sec^{-1})
λ_B = daughter decay constant (sec^{-1})
t = time period from shutdown to time of sample (sec)

2. Determine the contribution of only the decay of the initial inventory of the daughter to the hypothetical daughter activity at sample time.

$$Fr = \frac{Q_B^0 \cdot e^{-\lambda_B t}}{Q_B(t)}$$

Where:
Fr = fraction of daughter activity at sample time due to the decay of only the daughter initial activity

ATTACHMENT 9 (Con't.)
Page 3 of 6

DECAY-CORRECTION OF ISOTOPIC DATA FOR RCS, SUMP, AND CONTAINMENT ATMOSPHERE SAMPLES

3. Calculate the amount of the measured sample specific activity associated with the decay of the daughter that was released.

$M_B = M \times Fr$

Where:
M = measured specific activity (μCi/gm) or (μCi/cc)
M_B = parent-daughter compensated activity (μCi/gm) or (μCi/cc)

4. Decay correct the specific activity to reactor shutdown and list it in the appropriate "Decay-Corrected Activities" page at the end of this attachment.

$$M_B^0 = \frac{M_B}{e^{-\lambda_B t}}$$

Where,
M_B^0 = decay corrected specific activity

Constants Required for Method 2:

Daughter	$T_{1/2}$	λ (sec^{-1})	Parent	$T_{1/2}$ (sec)	λ (sec^{-1})
I-132	2.26 h	8.520E-05	Te-132	77.7 h	2.478E-06
Xe-131m	11.8 d	6.799E-07	I-131	8.05 d	9.966E-07
Xe-133m	2.26 d	3.550E-06	I-133	20.3 h	9.485E-06
Xe-133	5.27 d	1.522E-06	I-133	20.3 h	9.485E-06
Xe-135	9.14 h	2.107E-05	I-135	6.68 h	2.882E-05
Te-129	68.7 m	1.682E-04	Sb-129	4.3 h	4.478E-05
Pr-144	17.27 m	6.689E-04	Ce-144	284 d	2.825E-08

(Adapted from Table 2-7 of Reference 2)

Daughter	Parent	100% Daughter Inventory Q_B^0 (Ci)	100% Parent Inventory Q_A^0 (Ci)	K
I-132	Te-132	1.4E8	1.4E8	1.0
Xe-131m	I-131	6.3E5	9.8E7	0.008
Xe-133m	I-133	2.8E7	2.0E8	0.024
Xe-133	I-133	2.0E8	2.0E8	0.976
Xe-135	I-135	3.7E7	1.8E8	0.700
Te-129	Sb-129	3.3E7	3.2E7	0.827
Pr-144	Ce-144	1.2E8	1.1E8	1.0

(Adapted from Tables 2-2 , 2-7, and 2-8 of Reference 2)

ATTACHMENT 9 (Con't.)
Page 4 of 6

DECAY-CORRECTION OF ISOTOPIC DATA FOR RCS, SUMP, AND CONTAINMENT ATMOSPHERE SAMPLES

Decay Corrected Activities – RCS Sample

I-131 = _____
I-132 = _____
I-133 = _____
I-135 = _____
Kr-85m = _____
Kr-87 = _____
Kr-88 = _____
Xe-131m = _____
Xe-133m = _____
Xe-133 = _____
Xe-135 = _____
Cs-134 = _____
Cs-137 = _____
Te-129 = _____
Te-132 = _____
Sr-89 = _____
Sr-90 = _____
Ba-140 = _____
Pr-144 = _____

Additional Isotopes For Core Damage Assessment

= _____
= _____
= _____
= _____
= _____
= _____
= _____

ATTACHMENT 9 (Con't.)
Page 5 of 6

DECAY-CORRECTION OF ISOTOPIC DATA FOR RCS, SUMP, AND CONTAINMENT ATMOSPHERE SAMPLES

Decay Corrected Activities – Sump Sample

I-131 = _____
I-132 = _____
I-133 = _____
I-135 = _____
Kr-85m = _____
Kr-87 = _____
Kr-88 = _____
Xe-131m = _____
Xe-133m = _____
Xe-133 = _____
Xe-135 = _____
Cs-134 = _____
Cs-137 = _____
Te-129 = _____
Te-132 = _____
Sr-89 = _____
Sr-90 = _____
Ba-140 = _____
Pr-144 = _____

Additional Isotopes For Core Damage Assessment

= _____
= _____
= _____
= _____
= _____
= _____
= _____

ATTACHMENT 9 (Con't.)
Page 6 of 6

DECAY-CORRECTION OF ISOTOPIC DATA
FOR RCS, SUMP, AND CONTAINMENT ATMOSPHERE SAMPLES

Decay Corrected Activities – Con't Atmosphere Sample

I-131 = _____
I-132 = _____
I-133 = _____
I-135 = _____
Kr-85m = _____
Kr-87 = _____
Kr-88 = _____
Xe-131m = _____
Xe-133m = _____
Xe-133 = _____
Xe-135 = _____
Cs-134 = _____
Cs-137 = _____
Te-129 = _____
Te-132 = _____
Sr-89 = _____
Sr-90 = _____
Ba-140 = _____
Pr-144 = _____

Additional Isotopes For Core Damage Assessment

= _____
= _____
= _____
= _____
= _____
= _____

ATTACHMENT 10
Page 1 of 4

PRESSURE AND TEMPERATURE-CORRECTION FOR RCS, SUMP, AND CONTAINMENT ATMOSPHERE SAMPLES

RCS and Sump Samples

Use the following equation to pressure- and temperature-correct the activities of the RCS or sump sample and list them in the appropriate "Pressure/Temperature/Decay-Corrected Activities" page at the end of this attachment. **See Section 2.4.5.2 "Pressure and Temperature Adjustment" (Reference 2) for a more detailed discussion of this methodology.**

$$A_{PTC} = A_0 \times \frac{\rho}{\rho_{STP}}$$

Where,
A_0 = decay-corrected specific activity
A_{PTC} = decay-pressure-temperature corrected specific activity
$\frac{\rho}{\rho_{STP}}$ = water density ratio at RCS or sump temperature taken from Attachment 6.

Containment Atmosphere Sample

Use the following equation to pressure- and temperature-correct the activities of the containment atmosphere sample and list them in the appropriate "Pressure/Temperature Decay-Corrected Activities" page at the end of this attachment.

$$A_{PTC} = A_0 \times \frac{P_2}{P_1} \times \left(\frac{T_1 + 460}{T_2 + 460} \right)$$

Where,
T_1, P_1 = measured sample temperature (°F) and pressure (psia)
T_2, P_2 = containment atmosphere temperature (°F) and pressure (psia)
A_0 = decay-corrected specific activity
A_{PTC} = decay-pressure-temperature corrected specific activity

ATTACHMENT 10
Page 2 of 4

PRESSURE AND TEMPERATURE-CORRECTION
FOR RCS, SUMP, AND CONTAINMENT ATMOSPHERE SAMPLES

Pressure/Temperature/Decay Corrected Activities (RCS Sample)

I-131 = _____
I-132 = _____
I-133 = _____
I-135 = _____
Kr-85m = _____
Kr-87 = _____
Kr-88 = _____
Xe-131m = _____
Xe-133m = _____
Xe-133 = _____
Xe-135 = _____
Cs-134 = _____
Cs-137 = _____
Te-129 = _____
Te-132 = _____
Sr-89 = _____
Sr-90 = _____
Ba-140 = _____
Pr-144 = _____

Additional Isotopes For Core Damage Assessment

= _____
= _____
= _____
= _____
= _____
= _____

ATTACHMENT 10
Page 3 of 4

PRESSURE AND TEMPERATURE-CORRECTION
FOR RCS, SUMP, AND CONTAINMENT ATMOSPHERE SAMPLES

Pressure/Temperature/Decay Corrected Activities (Sump Sample)

I-131 = _____
I-132 = _____
I-133 = _____
I-135 = _____
Kr-85m = _____
Kr-87 = _____
Kr-88 = _____
Xe-131m = _____
Xe-133m = _____
Xe-133 = _____
Xe-135 = _____
Cs-134 = _____
Cs-137 = _____
Te-129 = _____
Te-132 = _____
Sr-89 = _____
Sr-90 = _____
Ba-140 = _____
Pr-144 = _____

Additional Isotopes For Core Damage Assessment

= _____
= _____
= _____
= _____
= _____
= _____

ATTACHMENT 10
Page 4 of 4

PRESSURE AND TEMPERATURE-CORRECTION
FOR RCS, SUMP, AND CONTAINMENT ATMOSPHERE SAMPLES

Pressure/Temperature/Decay Corrected Activities
(Containment Atmosphere Sample)

I-131 = _____
I-132 = _____
I-133 = _____
I-135 = _____
Kr-85m = _____
Kr-87 = _____
Kr-88 = _____
Xe-131m = _____
Xe-133m = _____
Xe-133 = _____
Xe-135 = _____
Cs-134 = _____
Cs-137 = _____
Te-129 = _____
Te-132 = _____
Sr-89 = _____
Sr-90 = _____
Ba-140 = _____
Pr-144 = _____

Additional Isotopes For Core Damage Assessment

= _____
= _____
= _____
= _____
= _____

ATTACHMENT 11
Page 1 of 3

TOTAL ACTIVITY RELEASED FOR RCS, SUMP, AND CONTAINMENT ATMOSPHERE SAMPLES

RCS Sample

Isotope	Corrected Specific Activity (µCi/g)		RCS Mass (grams)		Total RCS Activity (µCi)
I-131		x		=	
I-132		x		=	
I-133		x		=	
I-135		x		=	
Kr-85m		x		=	
Kr-87		x		=	
Kr-88		x		=	
Xe-131m		x		=	
Xe-133m		x		=	
Xe-133		x		=	
Xe-135		x		=	
Cs-134		x		=	
Cs-137		x		=	
Te-129		x		=	
Te-132		x		=	
Sr-89		x		=	
Sr-90		x		=	
Ba-140		x		=	
Pr-144		x		=	
_____		x		=	
_____		x		=	
_____		x		=	
_____		x		=	
_____		x		=	
_____		x		=	
_____		x		=	

ATTACHMENT 11 (Con't.)
Page 2 of 3

TOTAL ACTIVITY RELEASED FOR RCS, SUMP, AND CONTAINMENT ATMOSPHERE SAMPLES

Sump Sample

Isotope	Corrected Specific Activity (µCi/g)		Sump Mass (grams)		Total Sump Activity (µCi)
I-131		x		=	
I-132		x		=	
I-133		x		=	
I-135		x		=	
Kr-85m		x		=	
Kr-87		x		=	
Kr-88		x		=	
Xe-131m		x		=	
Xe-133m		x		=	
Xe-133		x		=	
Xe-135		x		=	
Cs-134		x		=	
Cs-137		x		=	
Te-129		x		=	
Te-132		x		=	
Sr-89		x		=	
Sr-90		x		=	
Ba-140		x		=	
Pr-144		x		=	
_____		x		=	
_____		x		=	
_____		x		=	
_____		x		=	
_____		x		=	
_____		x		=	
_____		x		=	

ATTACHMENT 11 (Con't.)
Page 3 of 3

TOTAL ACTIVITY RELEASED FOR RCS, SUMP, AND CONTAINMENT ATMOSPHERE SAMPLES

Containment Atmosphere Sample

Isotope	Corrected Specific Activity (µCi/cc)		Sample Medium Mass or Volume (cc's)		Total Con't. Atmos. Activity (µCi)
I-131		x		=	
I-132		x		=	
I-133		x		=	
I-135		x		=	
Kr-85m		x		=	
Kr-87		x		=	
Kr-88		x		=	
Xe-131m		x		=	
Xe-133m		x		=	
Xe-133		x		=	
Xe-135		x		=	
Cs-134		x		=	
Cs-137		x		=	
Te-129		x		=	
Te-132		x		=	
Sr-89		x		=	
Sr-90		x		=	
Ba-140		x		=	
Pr-144		x		=	
_____		x		=	
_____		x		=	
_____		x		=	
_____		x		=	
_____		x		=	
_____		x		=	
_____		x		=	

ATTACHMENT 12
Page 1 of 1

TOTAL ACTIVITY RELEASED FOR ALL SAMPLES COMBINED

Isotope	Total RCS Activity (µCi)		Total Sump Activity (µCi)		Total Con't Atmos. (µCi)		Total Activity (µCi)
I-131		+		+		=	
I-132		+		+		=	
I-133		+		+		=	
I-135		+		+		=	
Kr-85m		+		+		=	
Kr-87		+		+		=	
Kr-88		+		+		=	
Xe-131m		+		+		=	
Xe-133m		+		+		=	
Xe-133		+		+		=	
Xe-135		+		+		=	
Cs-134		+		+		=	
Cs-137		+		+		=	
Te-129		+		+		=	
Te-132		+		+		=	
Sr-89		+		+		=	
Sr-90		+		+		=	
Ba-140		+		+		=	
Pr-144		+		+		=	
		+		+		=	
		+		+		=	
		+		+		=	
		+		+		=	
		+		+		=	
		+		+		=	
		+		+		=	

ATTACHMENT 13
Page 1 of 2

POWER CORRECTIONS FACTORS FOR: KR-85M, KR-87, KR-88, XE-135, I-132, I-133, I-135, TE-129, PR-144

A. Has prior 4 days power varied more than ± 10% Rated Thermal Power?

NO: Calculate the power correction factor using the following equation and record it in Attachment 17.

$$PCF = \frac{\text{Average Power For Prior 4 Days (\%)}}{100}$$

where,
PCF = Power Correction Factor

YES: Go to Part B.

B. Is the total operating history greater than 4 times the half life of the isotope of interest? (See table of half-lives and decay constants at end of this attachment).

NO: Calculate the power correction factor using the following equation and record it in Attachment 17.

$$PCF = \frac{\sum_{1}^{j} P_j \left(1 - e^{-\lambda t_j}\right) e^{-\lambda t_j^0}}{100\left(1 - e^{-\lambda \sum t_j}\right)}$$

where,
t_j = Operating period in days at power (P_j) where power does not vary more than ± 10% from the time averaged power (P_j)
P_j = Average power (%) during operating period (t_j)
j = The number of times that power has varied more than ± 10% in the previous 4 days
λ = Decay constant ($days^{-1}$)
t_j^0 = Time between end of period "j" and time of reactor shutdown in days
PCF = Power Correction Factor

ATTACHMENT 13(Con't.)
Page 2 of 2

POWER CORRECTIONS FACTORS FOR: KR-85M, KR-87, KR-88, XE-135, I-132, I-133, I-135, TE-129, PR-144

YES: Calculate the power correction factor using the following equation and record it in Attachment 17.

$$PCF = \frac{\sum_{1}^{j} P_j\left(1 - e^{-\lambda t_j}\right)e^{-\lambda t_j^0}}{100(1.0)}$$

where,

t_j = Operating period in days at power (P_j) where power does not vary more than ± 10% from the time averaged power (P_j)

P_j = Average power (%) during operating period (t_j)

j = The number of times that power has varied more than ± 10% in the previous 4 days

λ = Decay constant ($days^{-1}$)

t_j^0 = Time between end of period "j" and time of reactor shutdown in days

PCF = Power Correction Factor

Half-Lives and Decay Constants for Isotopes

Isotope	Half-Life (Days)	Decay Constant ($Days^{-1}$)
I-131	8.05	8.61E-2
I-132	9.42E-2	7.36
I-133	8.46E-1	8.19E-1
I-135	2.78E-1	2.49
Kr-85m	1.83E-1	3.79
Kr-87	5.28E-2	1.31E1
Kr-88	1.17E-1	5.92
Xe-131m	1.18E1	5.87E-2
Xe-133m	2.26	3.07E-1
Xe-133	5.27	1.32E-1
Xe-135	3.81E-1	1.82
Cs-134	7.30E2	9.50E-4
Cs-137	1.10E4	6.30E-5
Te-129	4.77E-2	1.45E1
Te-132	3.24	2.14E-1
Sr-89	5.27E1	1.32E-2
Sr-90	1.02E4	6.80E-5
Ba-140	1.28E1	5.42E-2
Pr-144	1.20E-2	5.78E1

ATTACHMENT 14
Page 1 of 2

POWER CORRECTIONS FACTORS FOR: XE-131M, XE-133, XE-133M, I-131, TE-132, BA-140

A. Has prior 30 days power varied more than ± 10% Rated Thermal Power?

NO: Calculate the power correction factor using the following equation and record it in Attachment 17.

$$PCF = \frac{\text{Average Power For Prior 30 Days (\%)}}{100}$$

where,
PCF = Power Correction Factor

YES: Go to Part B.

B. Is the total operating history greater than 4 times the half life of the isotope of interest? (See table of half-lives and decay constants at end of this attachment).

NO: Calculate the power correction factor using the following equation and record it in Attachment 17.

$$PCF = \frac{\sum_{1}^{j} P_j \left(1 - e^{-\lambda t_j}\right) e^{-\lambda t_j^0}}{100\left(1 - e^{-\lambda \sum t_j}\right)}$$

where,
t_j = Operating period in days at power (P_j) where power does not vary more than ± 10% from the time averaged power (P_j)
P_j = Average power (%) during operating period (t_j)
j = The number of times that power has varied more than ± 10% in the previous 30 days
λ = Decay constant ($days^{-1}$)
t_j^0 = Time between end of period "j" and time of reactor shutdown in days
PCF = Power Correction Factor

ATTACHMENT 14 (Con't.)
Page 2 of 2

POWER CORRECTIONS FACTORS FOR: XE-131M, XE-133, XE-133M, I-131, TE-132, BA-140

YES: Calculate the power correction factor using the following equation and record it in Attachment 17.

$$PCF = \frac{\sum_{1}^{j} P_j \left(1 - e^{-\lambda t_j}\right) e^{-\lambda t_j^0}}{100(1.0)}$$

where,

t_j = Operating period in days at power (P_j) where power does not vary more than ± 10% from the time averaged power (P_j)

P_j = Average power (%) during operating period (t_j)

j = The number of times that power has varied more than ± 10% in the previous 30 days

λ = Decay constant (days^{-1})

t_j^0 = Time between end of period "j" and time of reactor shutdown in days

PCF = Power Correction Factor

Half-Lives and Decay Constants for Isotopes

Isotope	Half-Life (Days)	Decay Constant (Days^{-1})
I-131	8.05	8.61E-2
I-132	9.42E-2	7.36
I-133	8.46E-1	8.19E-1
I-135	2.78E-1	2.49
Kr-85m	1.83E-1	3.79
Kr-87	5.28E-2	1.31E1
Kr-88	1.17E-1	5.92
Xe-131m	1.18E1	5.87E-2
Xe-133m	2.26	3.07E-1
Xe-133	5.27	1.32E-1
Xe-135	3.81E-1	1.82
Cs-134	7.30E2	9.50E-4
Cs-137	1.10E4	6.30E-5
Te-129	4.77E-2	1.45E1
Te-132	3.24	2.14E-1
Sr-89	5.27E1	1.32E-2
Sr-90	1.02E4	6.80E-5
Ba-140	1.28E1	5.42E-2
Pr-144	1.20E-2	5.78E1

ATTACHMENT 15
Page 1 of 1

POWER CORRECTIONS FACTORS FOR:
SR-90, CS-134, CS-137

A. Is Cs-134 the isotope of interest?

NO: Calculate the power correction factor using the following equation and record it in Attachment 17.

$$PCF = \frac{\text{Actual Number of "Effective Full Power Days" in Cycle To Date}}{\text{Expected Number of "Effective Full Power Days" in Cycle To Date}}$$

where,
PCF = Power Correction Factor

YES: Use Attachment 8 to obtain the Power Correction Factor and record it in Attachment 17.

ATTACHMENT 16
Page 1 of 2

POWER CORRECTIONS FACTORS FOR:
SR-89

A. Has prior 1 year power varied more than ± 10% Rated Thermal Power?

NO: Calculate the power correction factor using the following equation and record it in Attachment 17.

$$PCF = \frac{\text{Average Power For Prior 100 Days (\%)}}{100}$$

where,
PCF = Power Correction Factor

YES: Go to Part B.

B. Is the total operating history greater than 4 times the half life of the isotope of interest? (See table of half-lives and decay constants at end of this attachment).

NO: Calculate the power correction factor using the following equation and record it in Attachment 17.

$$PCF = \frac{\sum_{1}^{j} P_j \left(1 - e^{-\lambda t_j}\right) e^{-\lambda t_j^0}}{100\left(1 - e^{-\lambda \sum t_j}\right)}$$

where,
t_j = Operating period in days at power (P_j) where power does not vary more than ± 10% from the time averaged power (P_j)
P_j = Average power (%) during operating period (t_j)
j = The number of times that power has varied more than ± 10% in the previous 1 year
λ = Decay constant ($days^{-1}$)
t_j^0 = Time between end of period "j" and time of reactor shutdown in days
PCF = Power Correction Factor

ATTACHMENT 16
Page 2 of 2

POWER CORRECTIONS FACTORS FOR:
SR-89

YES: Calculate the power correction factor using the following equation and list it in Attachment 17.

$$PCF = \frac{\sum_{1}^{j} P_j\left(1 - e^{-\lambda t_j}\right)e^{-\lambda t_j^0}}{100(1.0)}$$

where,

t_j = Operating period in days at power (P_j) where power does not vary more than ± 10% from the time averaged power (P_j)

P_j = Average power (%) during operating period (t_j)

j = The number of times that power has varied more than ± 10% in the previous 1 year

λ = Decay constant ($days^{-1}$)

t_j^0 = Time between end of period "j" and time of reactor shutdown in days

PCF = Power Correction Factor

Half-Lives and Decay Constants for Isotopes

Isotope	Half-Life (Days)	Decay Constant ($Days^{-1}$)
I-131	8.05	8.61E-2
I-132	9.42E-2	7.36
I-133	8.46E-1	8.19E-1
I-135	2.78E-1	2.49
Kr-85m	1.83E-1	3.79
Kr-87	5.28E-2	1.31E1
Kr-88	1.17E-1	5.92
Xe-131m	1.18E1	5.87E-2
Xe-133m	2.26	3.07E-1
Xe-133	5.27	1.32E-1
Xe-135	3.81E-1	1.82
Cs-134	7.30E2	9.50E-4
Cs-137	1.10E4	6.30E-5
Te-129	4.77E-2	1.45E1
Te-132	3.24	2.14E-1
Sr-89	5.27E1	1.32E-2
Sr-90	1.02E4	6.80E-5
Ba-140	1.28E1	5.42E-2
Pr-144	1.20E-2	5.78E1

ATTACHMENT 17
Page 1 of 1

ISOTOPIC INVENTORY AVAILABLE FOR RELEASE

Isotope	Source Inventory Table 2-2, Ref. 2 (Ci)		Power Correction Factor		Inventory Available For Release (Ci)
I-131	9.8E7	x		=	
I-132	1.4E8	x		=	
I-133	2.0E8	x		=	
I-135	1.8E8	x		=	
Kr-85m	2.2E7	x		=	
Kr-87	4.0E7	x		=	
Kr-88	5.7E7	x		=	
Xe-131m	6.3E5	x		=	
Xe-133m	2.8E7	x		=	
Xe-133	2.0E8	x		=	
Xe-135	3.7E7	x		=	
Cs-134	2.3E7	x		=	
Cs-137	1.1E7	x		=	
Te-129	3.3E7	x		=	
Te-132	1.4E8	x		=	
Sr-89	7.9E7	x		=	
Sr-90	7.2E6	x		=	
Ba-140	1.7E8	x		=	
Pr-144	1.2E8	x		=	
_____		x		=	
_____		x		=	
_____		x		=	
_____		x		=	
_____		x		=	
_____		x		=	
_____		x		=	

ATTACHMENT 18
Page 1 of 1

PERCENT INVENTORY RELEASED FOR EACH ISOTOPE

A. Copy the "Total Activity" from Attachment 11 (for one sample medium) or Attachment 12 (for several sample media) and the "Inventory Available for Release" from Attachment 17 into the table below.

B. Calculate the "Percent Inventory Released" using the following equation and list it in the table below.

$$\% \text{ Inventory Released} = \frac{\text{Total Activity} \times \left({}^{1\text{Ci}}/_{1\text{E6}\,\mu\text{Ci}} \right)}{\text{Inventory Avaliable For Release}} \times 100$$

Isotope	Total Activity (µCi) (Attachment 11/12)	Inventory Available For Release (Ci) (Attachment 17)	% Inventory Released
I-131			
I-132			
I-133			
I-135			
Kr-85m			
Kr-87			
Kr-88			
Xe-131m			
Xe-133m			
Xe-133			
Xe-135			
Cs-134			
Cs-137			
Te-129			
Te-132			
Sr-89			
Sr-90			
Ba-140			
Pr-144			

ATTACHMENT 19
Page 1 of 2

CORE DAMAGE ASSESSMENT (BASED ON INVENTORY)

Take each percent inventory released from Attachment 18 and compare it to the appropriate figures in Attachment 20. Record the extent and type of damage in the following table. The figures are taken from Reference 2.

Clad Damage

Isotope	Percent Inventory Released	Estimated Clad Damage
I-131		
I-132		
I-133		
I-135		
Xe-131m		
Xe-133		
Kr-87		

Fuel Pellet Over-temperature Estimates

Isotope	Percent Inventory Released	Estimated Clad Damage
I-131		
I-132		
I-133		
I-135		
Xe-131m		
Xe-133		
Xe-133m		
Xe-135		
Kr-85m		
Kr-87		
Kr-88		
Cs-134		
Cs-137		
Te-129		
Te-132		

ATTACHMENT 19
Page 2 of 2

CORE DAMAGE ASSESSMENT (BASED ON INVENTORY)

Fuel Pellet Over-temperature Estimates

Isotope	Percent Inventory Released	Estimated Clad Damage
Ba-140		
Sr-89		
Sr-90		

Fuel Melt Estimates

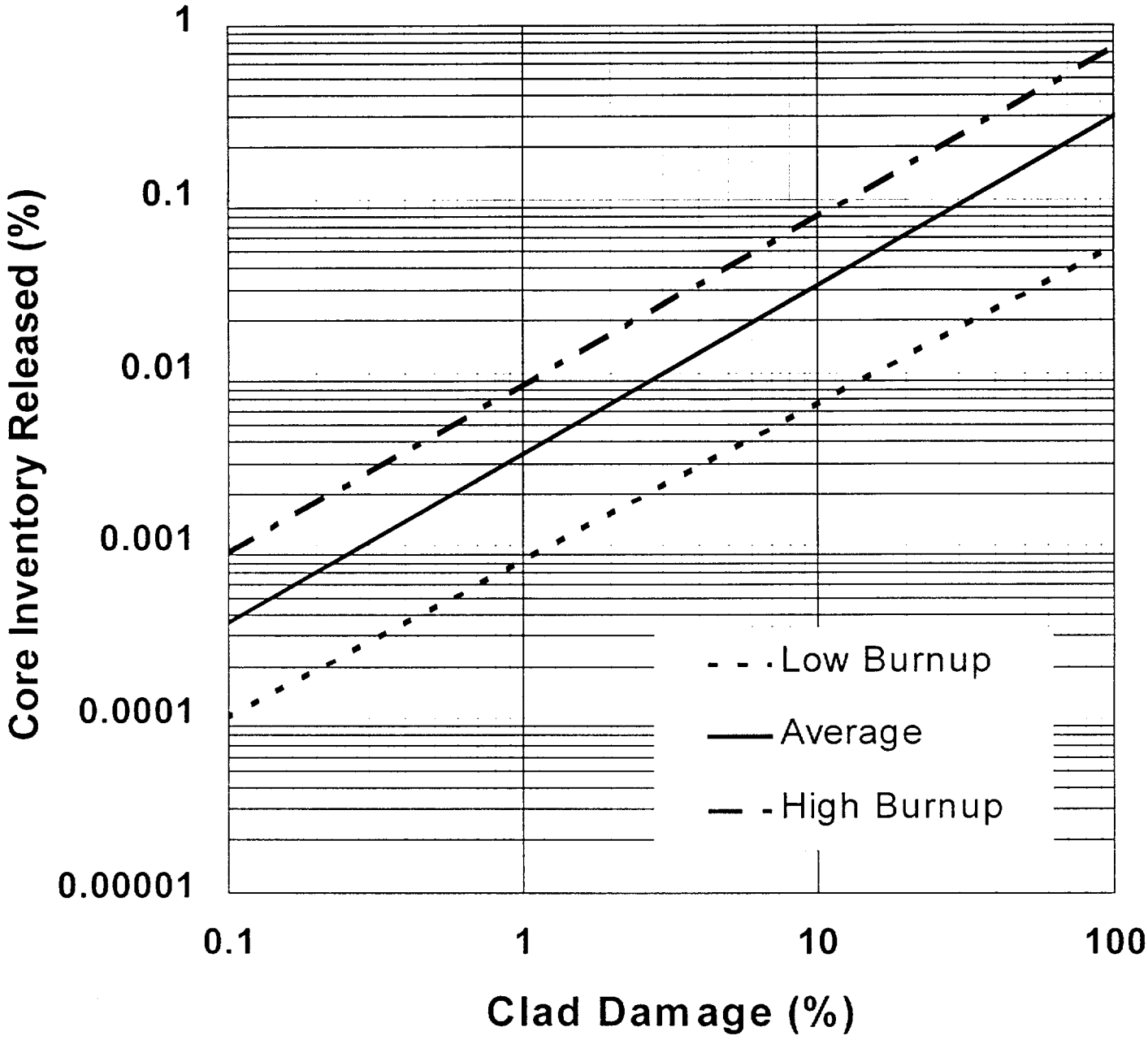
Isotope	Percent Inventory Released	Estimated Clad Damage
I-131		
I-132		
I-133		
I-135		
Xe-131m		
Xe-133		
Xe-133m		
Xe-135		
Kr-85m		
Kr-87		
Kr-88		
Cs-134		
Cs-137		
Te-129		
Te-132		
Ba-140		
Sr-89		
Sr-90		
Pr-144		

ATTACHMENT 20
Page 1 of 12

FIGURES USED IN SECTION 5.2

ISOTOPIC CONCENTRATION VS. INDICATION OF CLAD DAMAGE

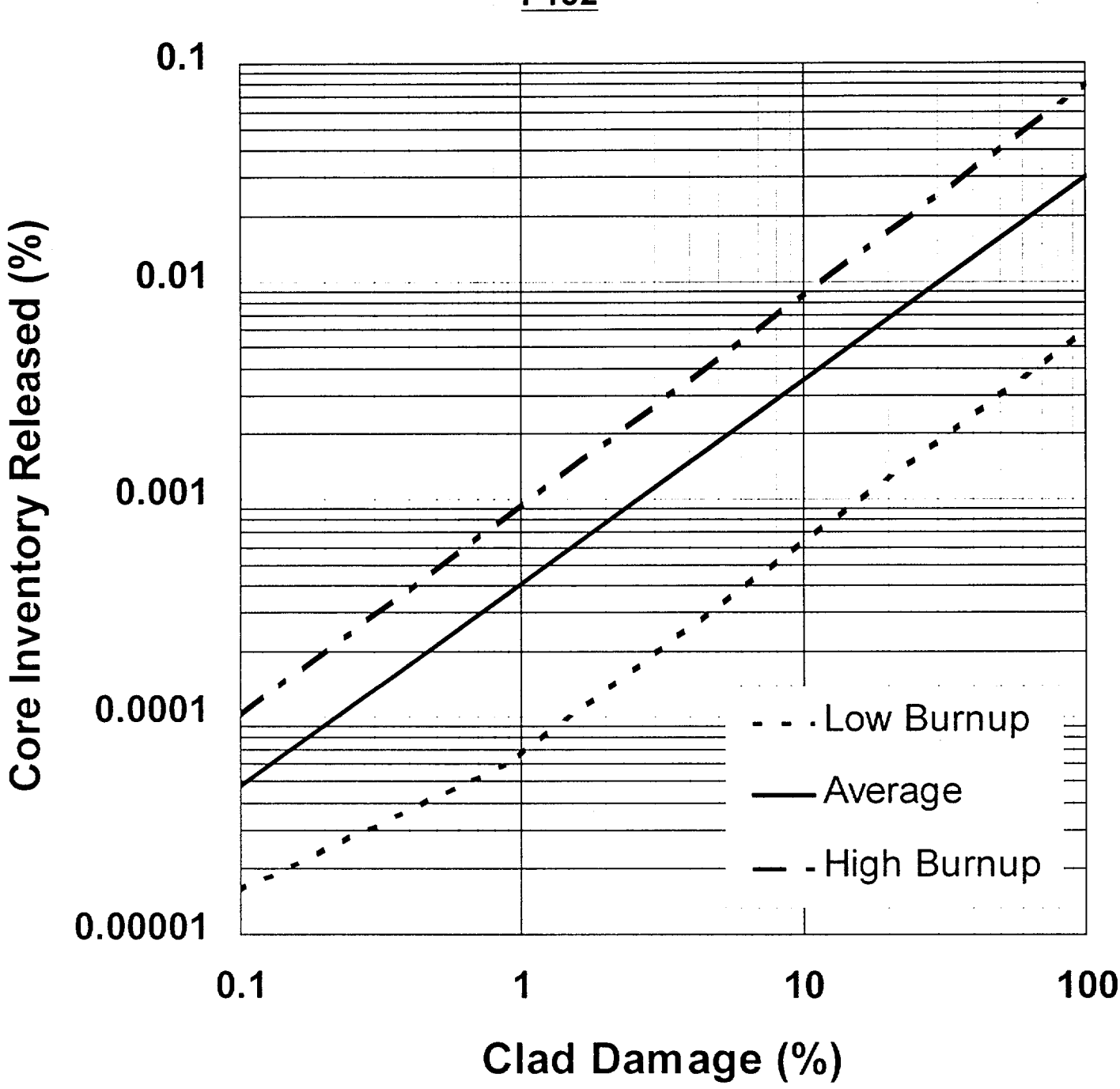
I-131



ATTACHMENT 20 (Con't)
Page 2 of 12

FIGURES USED IN SECTION 5.2

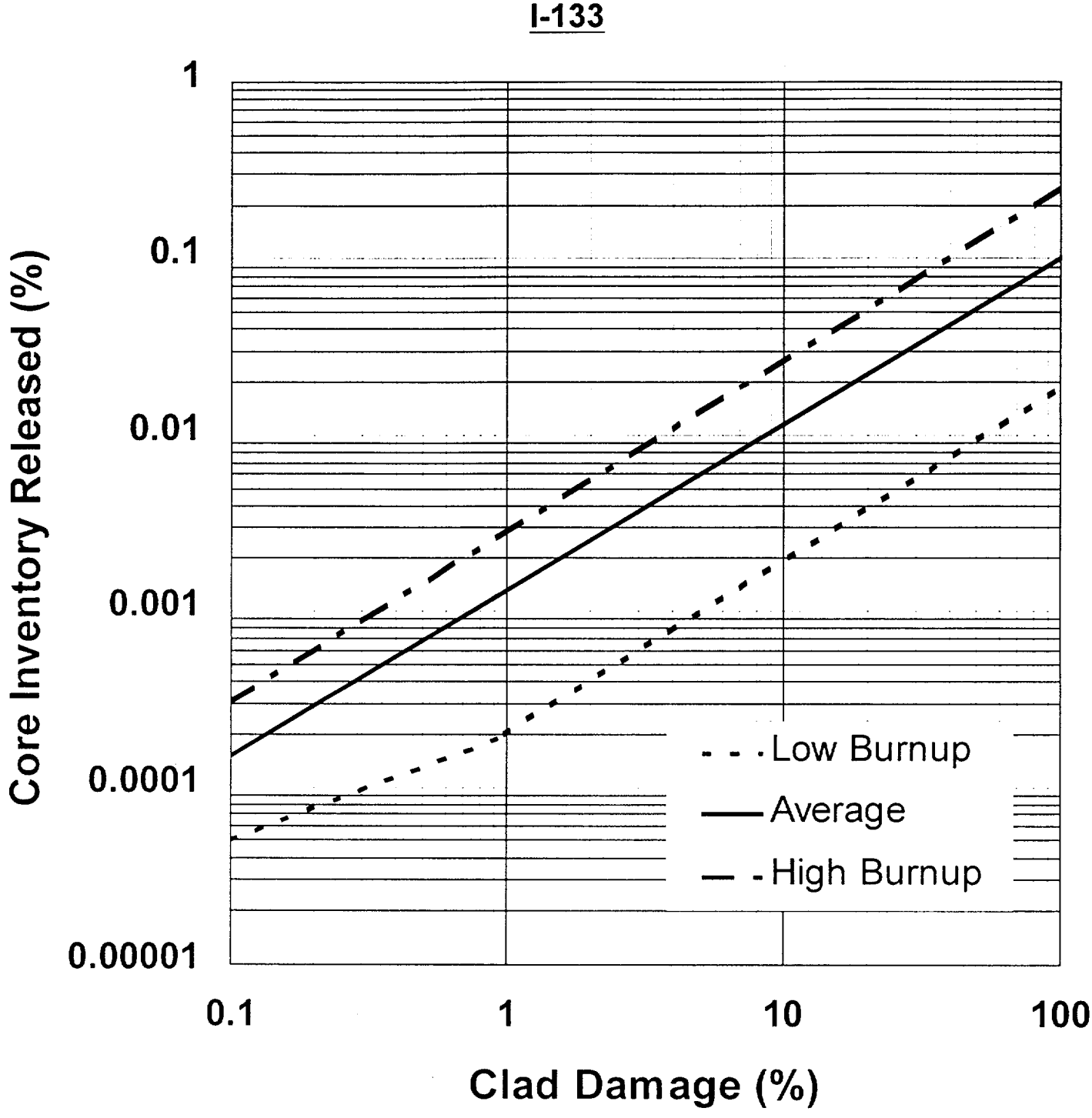
ISOTOPIC CONCENTRATION VS. INDICATION OF CLAD DAMAGE



ATTACHMENT 20 (Con't)
Page 3 of 12

FIGURES USED IN SECTION 5.2

ISOTOPIC CONCENTRATION VS. INDICATION OF CLAD DAMAGE

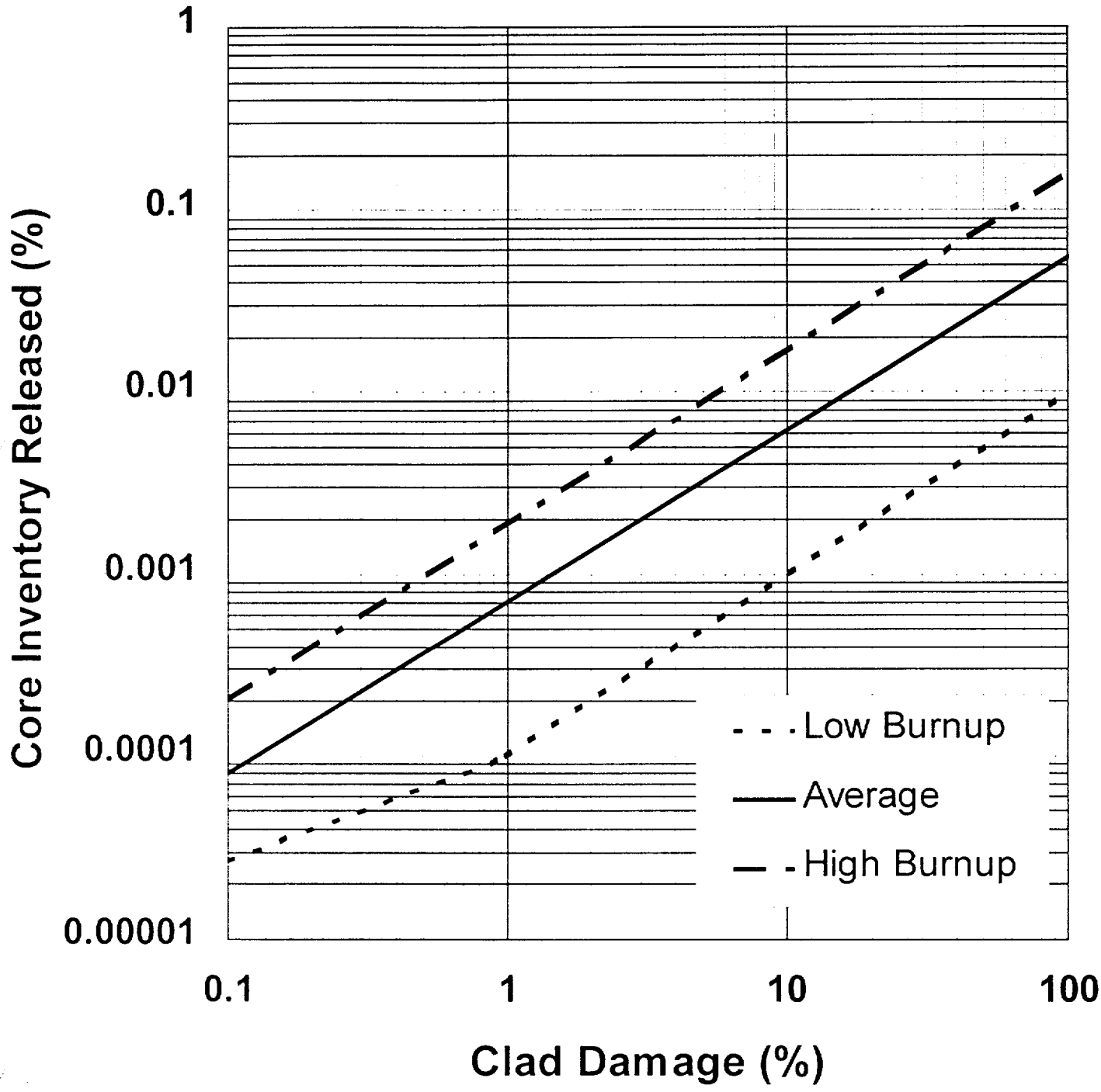


ATTACHMENT 20 (Con't)
Page 4 of 12

FIGURES USED IN SECTION 5.2

ISOTOPIC CONCENTRATION VS. INDICATION OF CLAD DAMAGE

I-135

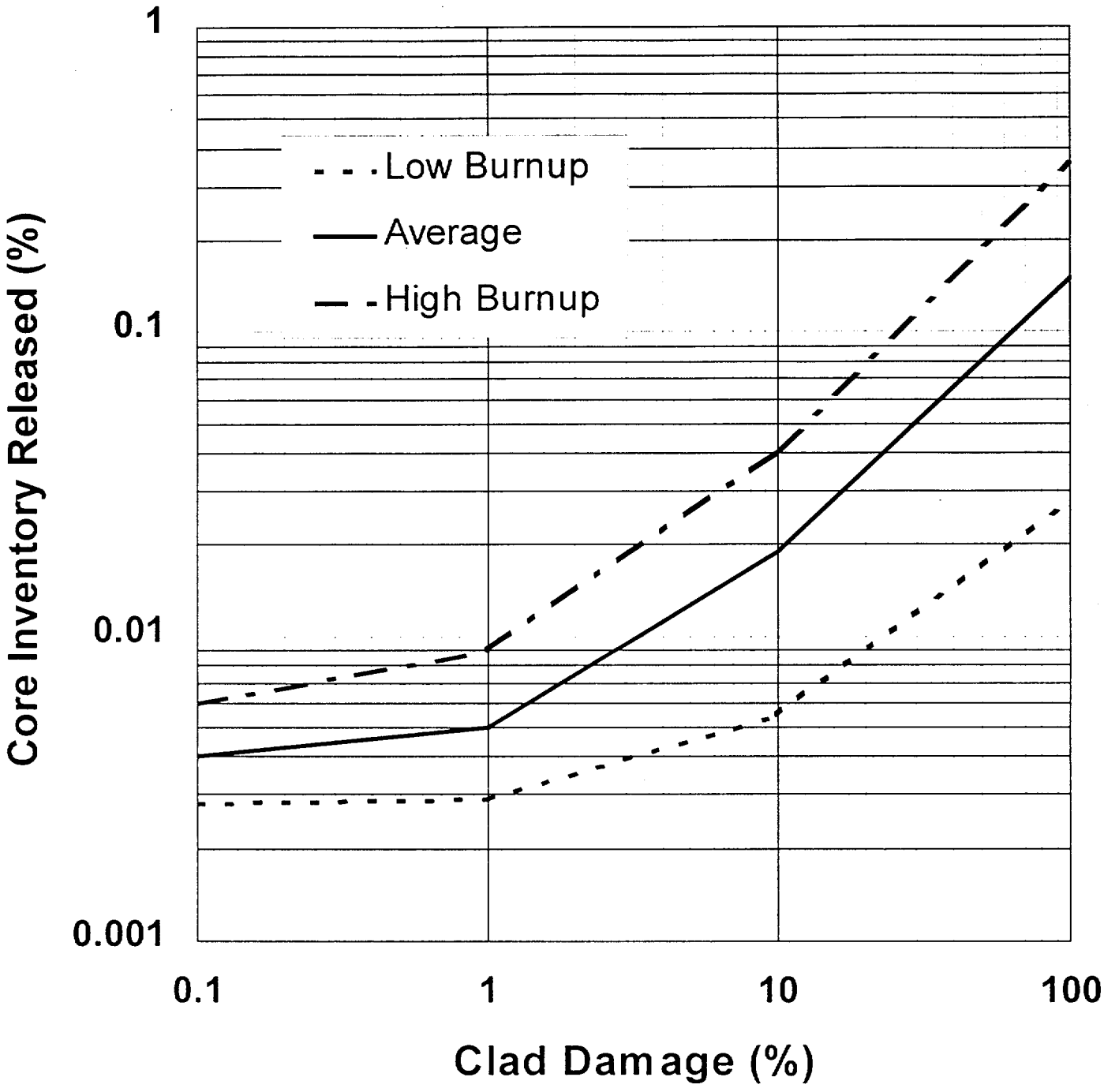


ATTACHMENT 20 (Con't)
Page 5 of 12

FIGURES USED IN SECTION 5.2

ISOTOPIC CONCENTRATION VS. INDICATION OF CLAD DAMAGE

XE-131M

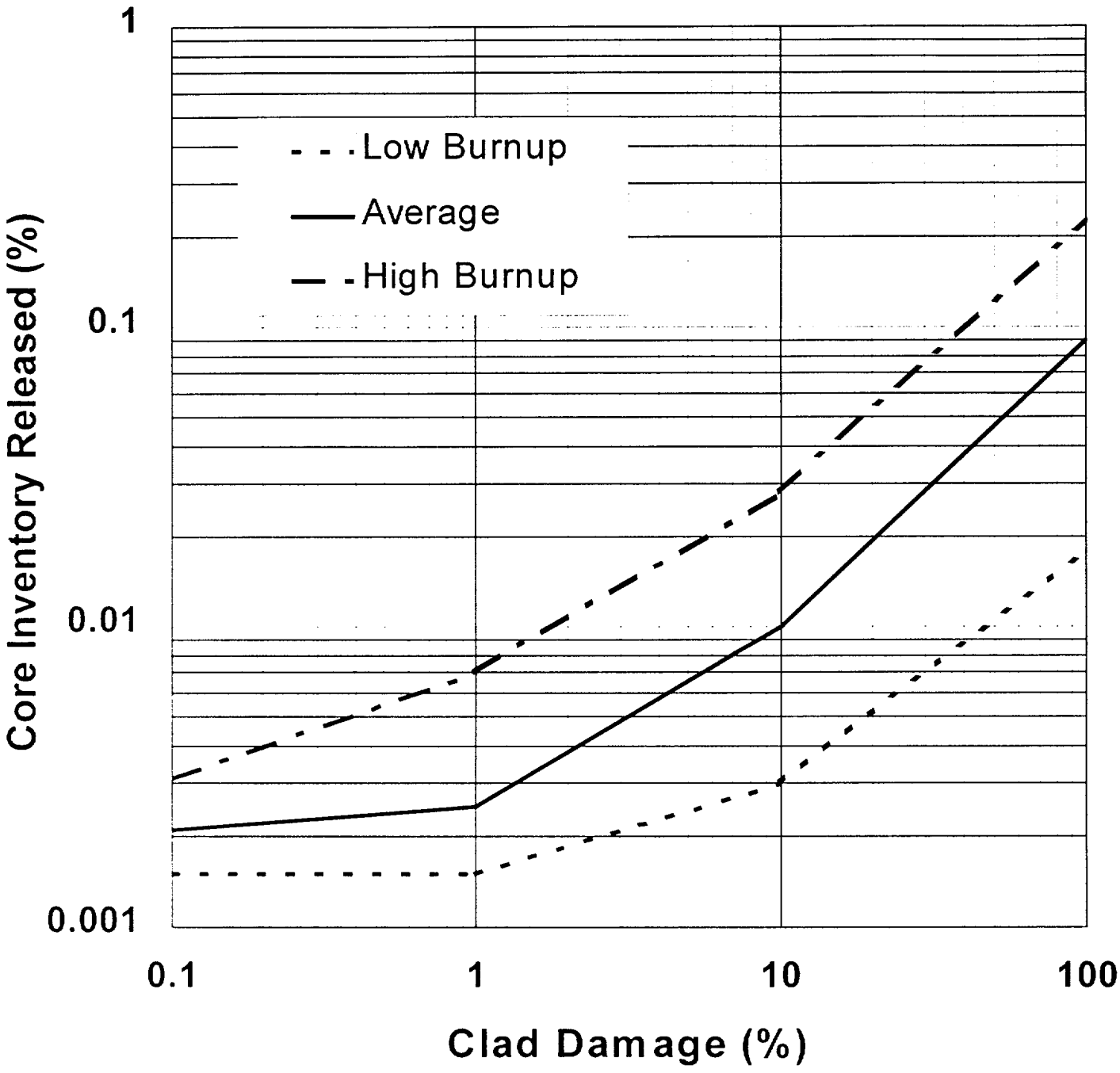


ATTACHMENT 20 (Con't)
Page 6 of 12

FIGURES USED IN SECTION 5.2

ISOTOPIC CONCENTRATION VS. INDICATION OF CLAD DAMAGE

XE-133

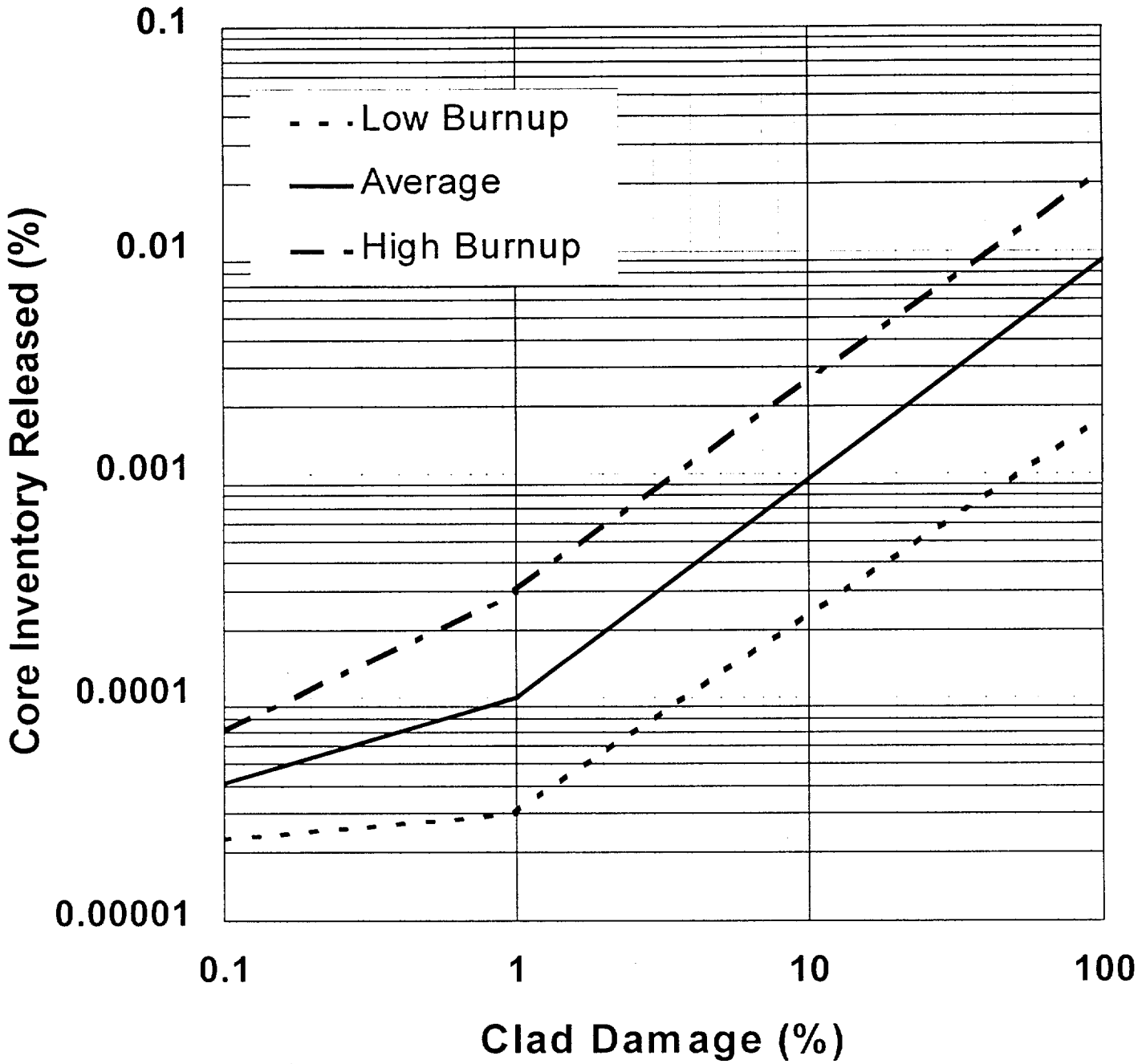


ATTACHMENT 20 (Con't)
Page 7 of 12

FIGURES USED IN SECTION 5.2

ISOTOPIC CONCENTRATION VS. INDICATION OF CLAD DAMAGE

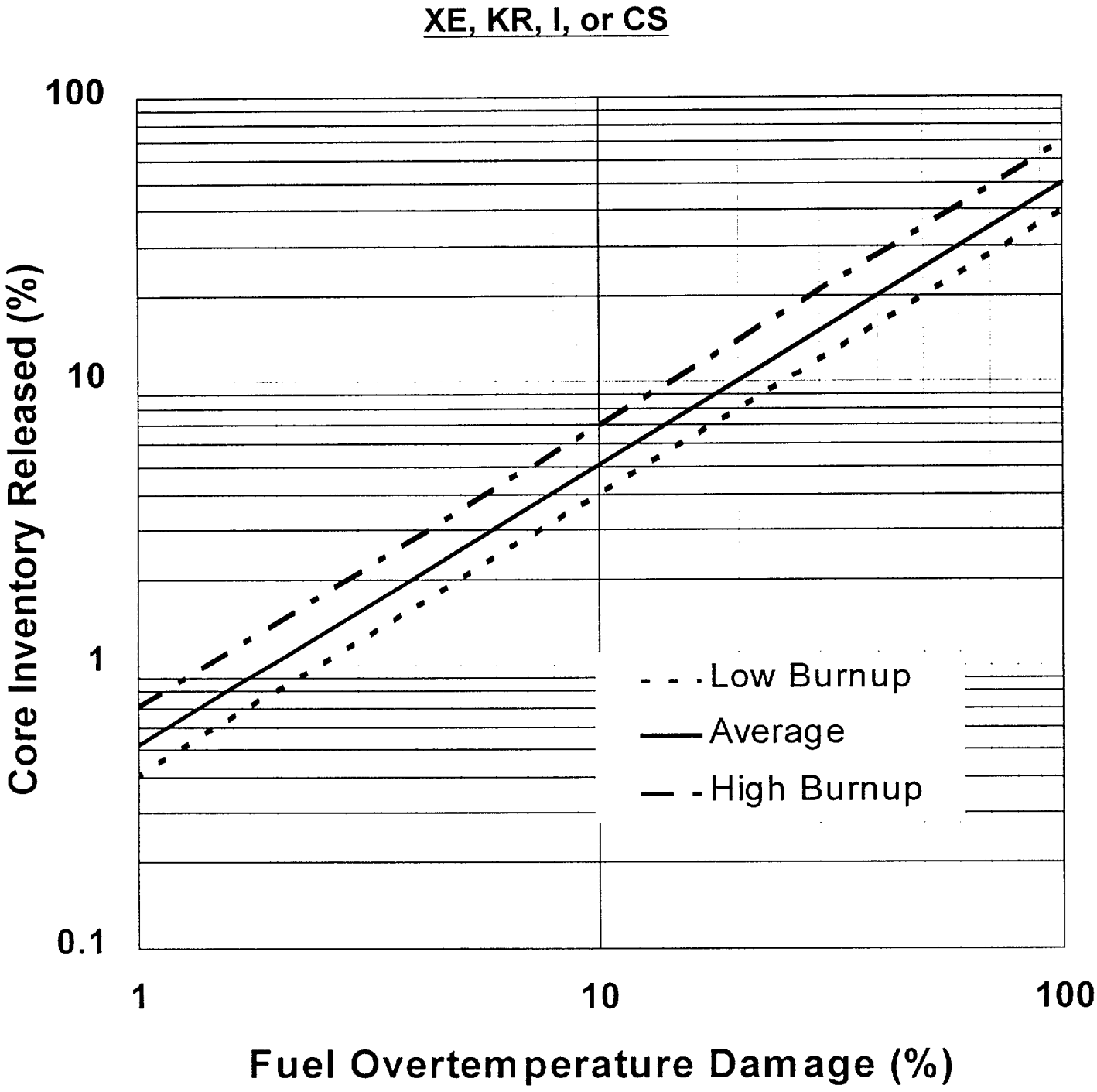
KR-87



ATTACHMENT 20 (Con't)
Page 8 of 12

FIGURES USED IN SECTION 5.2

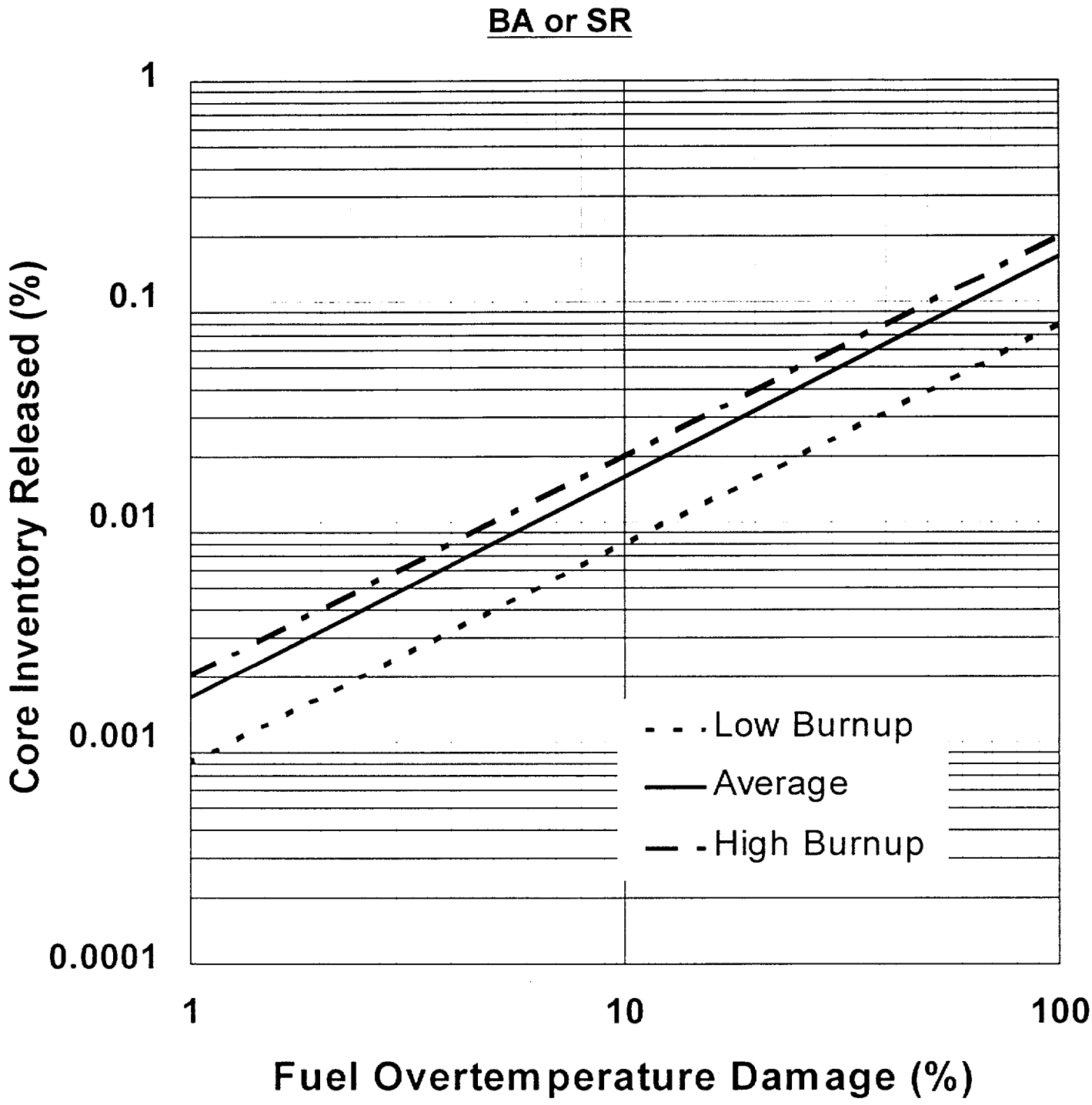
ISOTOPIC CONCENTRATION VS. INDICATION OF FUEL PELLET OVER-TEMPERATURE DAMAGE



ATTACHMENT 20 (Con't)
Page 9 of 12

FIGURES USED IN SECTION 5.2

ISOTOPIC CONCENTRATION VS. INDICATION OF FUEL PELLET OVER-TEMPERATURE DAMAGE

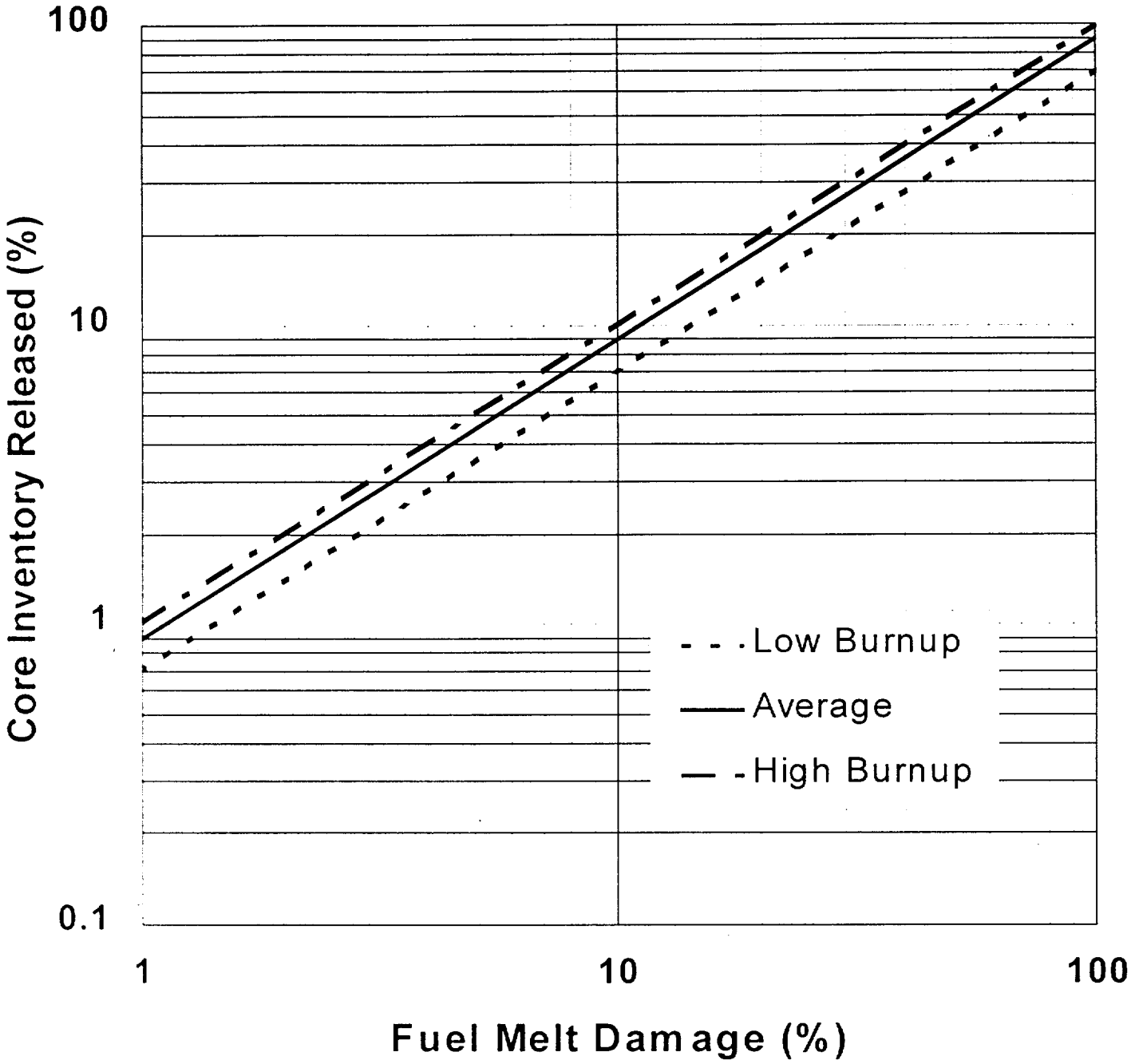


ATTACHMENT 20 (Con't)
Page 10 of 12

FIGURES USED IN SECTION 5.2

ISOTOPIC CONCENTRATION VS. INDICATION OF FUEL MELT DAMAGE

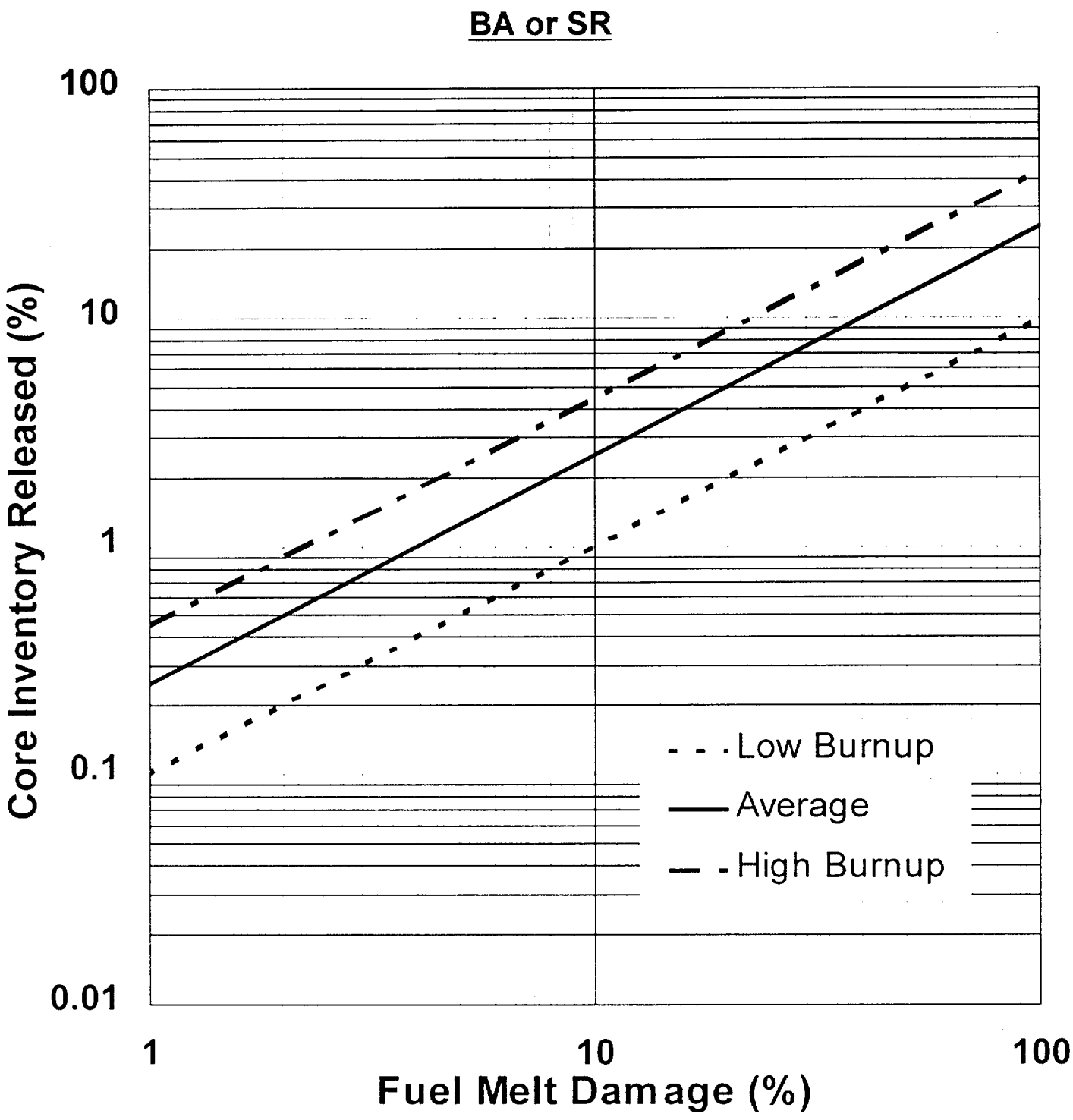
XE, KR, I, CS, or TE



ATTACHMENT 20 (Con't)
Page 11 of 12

FIGURES USED IN SECTION 5.2

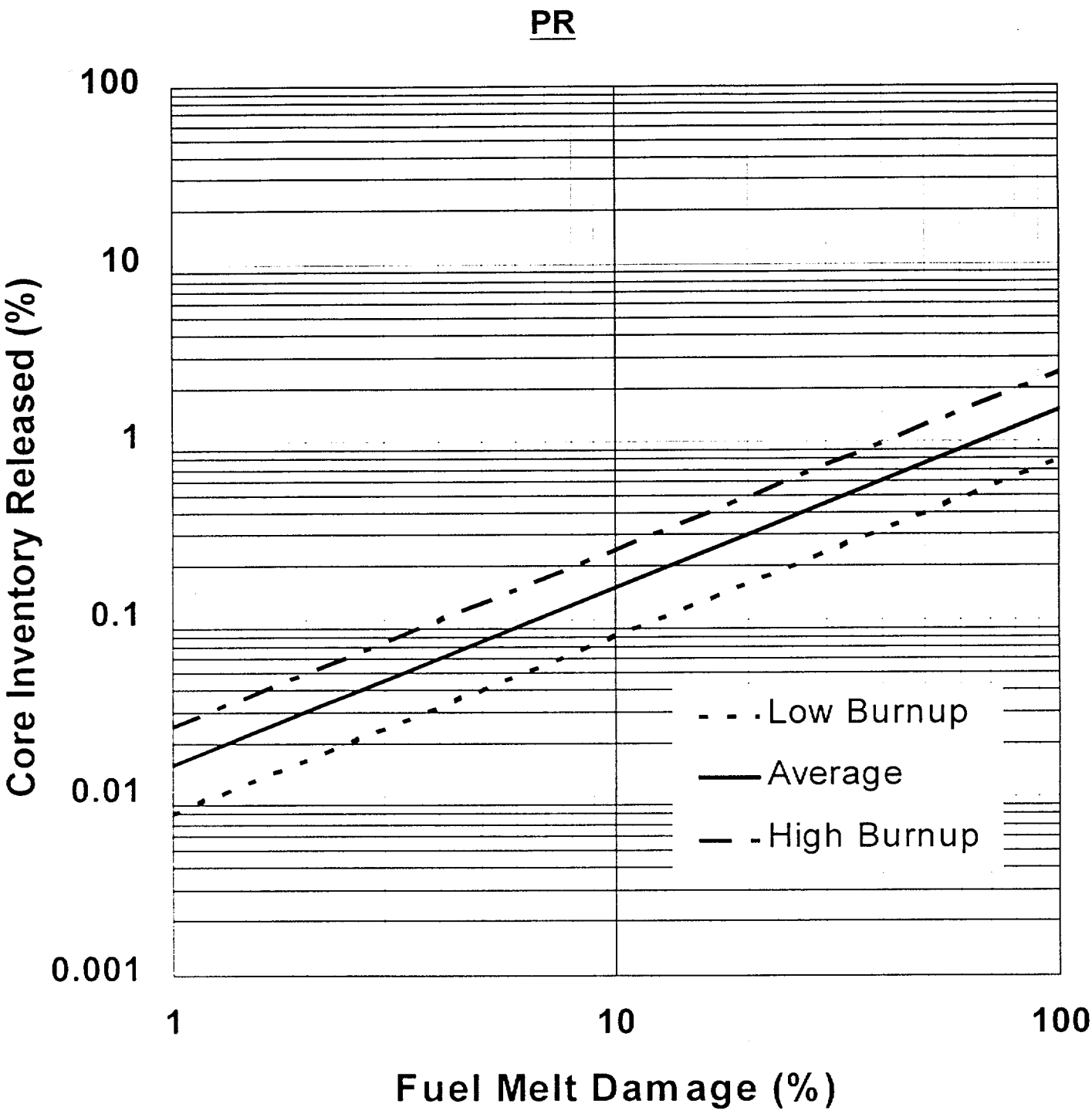
ISOTOPIC CONCENTRATION VS. INDICATION OF FUEL MELT DAMAGE



ATTACHMENT 20 (Con't)
Page 12 of 12

FIGURES USED IN SECTION 5.2

ISOTOPIC CONCENTRATION VS. INDICATION OF FUEL MELT DAMAGE



ATTACHMENT 21
Page 1 of 1

ISOTOPIC ACTIVITY RATIOS OF FUEL PELLET AND GAP

Nuclide	Fuel Pellet Activity Ratio	Gap Activity Ratio
Kr-85m	0.11	0.022
Kr-87	0.22	0.022
Kr-88	0.29	0.045
Xe-131m	0.004	0.004
Xe-133	1.0	1.0
Xe-133m	0.14	0.096
Xe-135	0.19	0.051
I-131	1.0	1.0
I-132	1.5	0.17
I-133	2.1	0.71
I-135	1.9	0.39

***Adapted from "Isotopic Activity Ratios of Fuel Pellet and Gap" Table 2-6 of Reference 2**

$$\text{Noble Gas Ratio} = \frac{\text{Noble Gas Isotope Inventory}}{\text{Xe - 133 Inventory}}$$

$$\text{Iodine Ratio} = \frac{\text{Iodine Isotope Inventory}}{\text{I - 131 Inventory}}$$

If Calculated Ratio is:	Postulated Damage
Less Than the Gap Activity Ratio	None
Greater Than the Gap Activity Ratio and **Less Than** the Fuel Pellet Activity Ratio	Clad Damage
Greater Than the Fuel Pellet Activity Ratio	Fuel Pellet Over-temperature

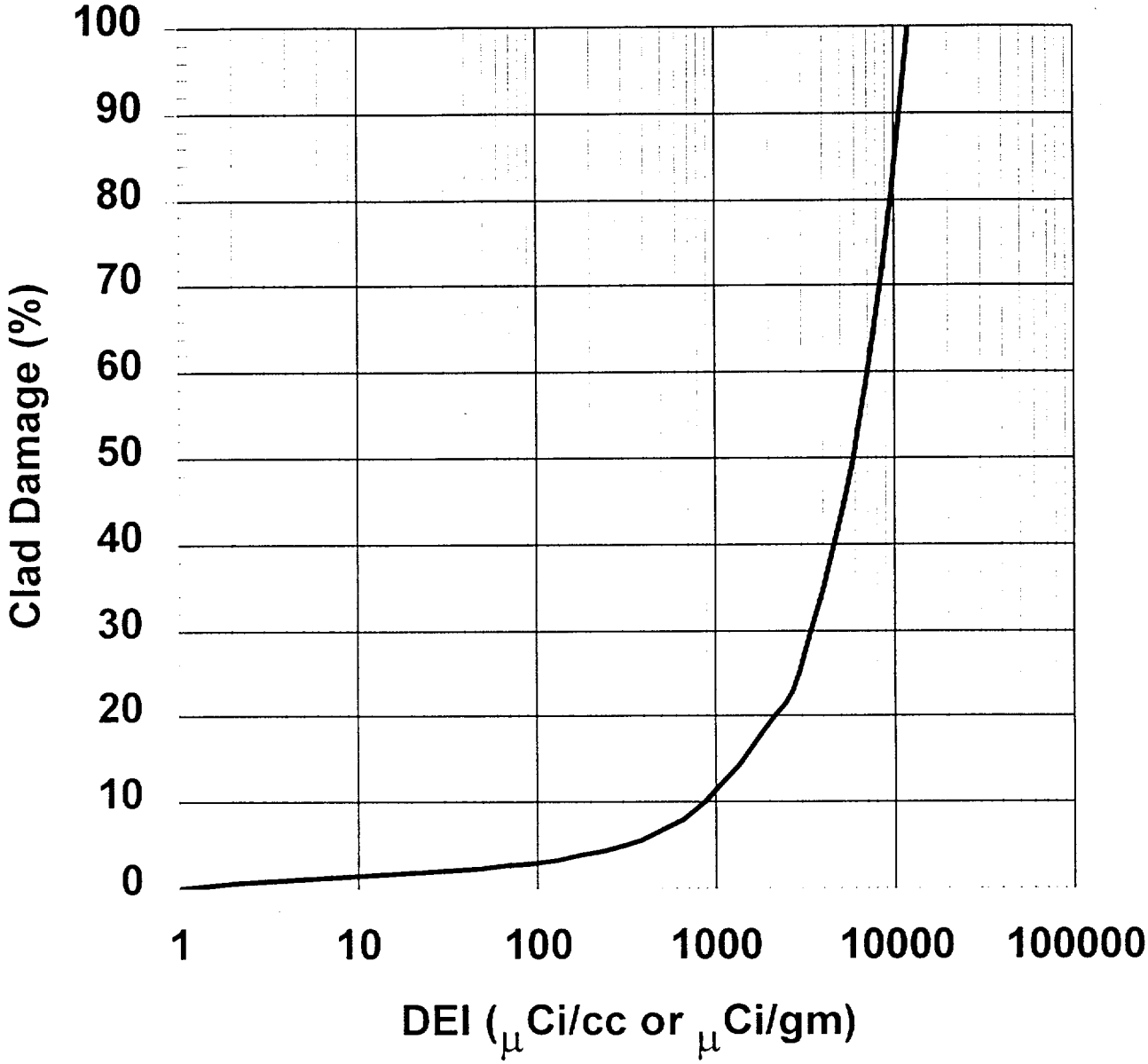
Note:

The use of these ratios for post accident damage assessment is restricted to an attempt to differentiate between fuel pellet over-temperature conditions and fuel cladding failure conditions only.

ATTACHMENT 22
Page 1 of 1

DOSE EQUIVALENT IODINE (DEI)

CLAD DAMAGE VS. DEI



Note:

This figure was created from data found in Reference 6. Due to the very rough correlation between DEI and Clad Damage, the relatively small difference between the DEI in units of μCi/cc and units of μCi/gm does not substantially impact the estimated clad damage.

ATTACHMENT 23
Page 1 of 1

FINAL CORE DAMAGE ASSESSMENT BASED ON ISOTOPIC INVENTORIES AND NOBLE GAS & IODINE RATIOS

PSE&G NUCLEAR LLC

HC.EP-EP.ZZ-0301 (Q) - REV. 02

SHIFT RADIATION PROTECTION TECHNICIAN RESPONSE

PSE&G CONTROL COPY # EPIP059

USE CATEGORY: II

REVISION SUMMARY:

1. This revision satisfies the requirement for a biennial review.
2. Changed Technical Specification to Offsite Dose Calculation Manual (ODCM)/Federal Limits wording in the note found in Attachment 1 after step 1.1.19. This use to be in Technical Specifications, but was recently moved to the ODCM.
3. Placed Figures 1-1 and 1-2 permanently into Word. The two figures resided in CAD prior to this.
4. Placed page 1 of Attachment 3 permanently into Word. No change was made to the technical information in the flow chart.

IMPLEMENTATION REQUIREMENTS:

This procedure is effective for use upon issue. 5-24-01

APPROVED: _____ EP - Manager — 5/9/01 Date

APPROVED: N/A Vice President - Operations — N/A Date

SHIFT RADIATION PROTECTION TECHNICIAN RESPONSE

TABLE OF CONTENTS

FIGURES

1.0 PURPOSE

To outline and describe the Shift Radiation Protection Technician's (SRPT) duties during a declared emergency

2.0 PREREQUISITES

2.1 Prerequisites To Be Followed Prior To Implementing This Procedure

Implement this procedure at:

- The discretion of the Operations Superintendent (OS) or Radiation Protection Supervision.
- Upon a declaration of an Unusual Event or greater emergency classification.

3.0 PRECAUTIONS AND LIMITATIONS

3.1 Precaution and Limitations To Be Followed Prior To Implementing This Procedure

3.1.1 It is recommended that initials be used in the place keeping sign-offs, instead of checkmarks, if more than one person may implement this procedure.

3.1.2 Personnel who implement this procedure shall be trained and qualified IAW the Emergency Plan.

3.1.3 Steps listed in this procedure may be performed in the order deemed appropriate for the emergency situations. Only steps applicable to the specific emergency need be performed.

4.0 EQUIPMENT REQUIRED

As provided at the Control Point and Control Room.

5.0 PROCEDURE

NOTE

The OS may change any priority for the SRPT, as deemed necessary.

5.1 The SRPT Should:

5.1.1 START completing Attachment 1, Shift Radiation Protection Technician Checklist. _____

5.2 When the TSC is Activated Perform the Following:

5.2.1 COMPLETE the turnover of Dose Assessment/Station Status Checklist duties to the Radiation Protection Supervisor – Offsite or the Radiological Assessment Coordinator (RAC). _____

5.2.2 IF RMS data is not available from the RM-11 or the VAX LA120, THEN perform the following steps every 15 minutes: _____

A. DOCUMENT radiation monitors that are in Alarm on Attachment 2, Hope Creek RMS Status Sheet, from the Control Room by referring to the 10C604 Panel. _____

B. DOCUMENT other radiation monitor values as instructed by the OS or Radiation Protection Supervision on Attachment 2. _____

C. FAX the completed Attachment 2 to the TSC and EOF using the Group "C" key _____

D. PROVIDE a completed copy of Attachment 2 to the Radiation Protection Supervisor - Exposure Control (RPS-EXP) located in the OSC, every 15 to 20 minutes, or in the opinion of the SRPT, conditions warrant it. _____

5.2.3 IMPLEMENT NC.EP-EP.ZZ-0303(Q), Control Point – Radiation Protection Response. _____

6.0 RECORDS

Return completed procedure and any information or data thought to be pertinent by the SRPT, to the Manager – EP & IT.

7.0 REFERENCES

7.1 References

Nuclear Business Unit Emergency Plan

7.2 Cross References

7.2.1 NC.EP-EP.ZZ-0302, Radiological Coordinator Response

7.2.2 NC.EP-EP.ZZ-0303(Q), Control Point Radiation Protection Response

ATTACHMENT 1
Page 1 of 5

SHIFT RADIATION PROTECTION TECHNICIAN CHECKLIST

1.0 SRPT INITIAL ACTIONS

NOTE

- Refer to NC.EP-EP.ZZ-0303(Q), for Assembly/Accountability directions at the Control Point, if implemented.
- Refer to HC.EP-EP.ZZ-0309(Q), Dose Assessment, for VAX LA120 operation instructions.
- Refer to HC.RP-TI.ZZ-0004(Q), Gaseous Effluent Surveliance, for sampling instructions, as needed.

1.1 Perform the Following:

1.1.1 REPORT to the CR when an emergency is declared to receive a briefing from the OS. _____

1.1.2 REQUEST that the SRPT, or his designee, located at the Control Point, be notified if FRVS is placed in service. _____

1.1.3 OBTAIN the identity of Communicator 2 _____. _____
(Name)

1.1.4 REQUEST the status of the MET Tower's operability. _____

- IF the MET Tower is not operational,
  THEN refer to step 1.1.8.

1.1.5 PROVIDE a briefing to the OS, which should include the following Information:

- Habitability of the Control Point and Control Room. _____
- Any unusual dose rates, Plant Conditions, or Alarms observed on the way to the CR. _____

NOTE

- On a back shift, during a non-outage situation, there should be two Rad Pro Techs and one Chemistry Tech available at all times at Salem.
- The Salem Control Point may be contacted at extension 2635, 2644, or 2608 (Radiation Protection Supervisor's phone).

- The staffing of the Salem Radiation Protection and Chemistry personnel. _____

NOTE

- The SRPT should be generating page two of the Station Status Checklist (SSCL) for Hope Creek, during Common Site Events. The Salem SRPT will be generating a SSCL for Salem Units 1 and 2 during Common Site Events.
- A blank SSCL, page 2, may be obtained from Communicator Number 2, if necessary.

1.1.6 IMPLEMENT NC.EP-EP.ZZ-0309(Q), Dose Assessment, to perform dose assessment and generate a completed SSCL pg. 2 every 30 minutes _____

1.1.7 PERFORM the following steps, if automatic data acquisition MIDAS and/or the MET Computer is not operational:

- REFER to Attachment 2, Hope Creek RMS Status Sheet. _____
- COMPLETE Vent Process Monitors and the MET Data section every 15 minutes. _____

ATTACHMENT 1
Page 3 of 5

1.1.8 OBTAIN the MET data from the following sources, if the MET Computer is not operational:

- Salem Unit One Control Room (NETS X5120, DID X5111) _____
- National Weather Service at 609-261-6604 or 609- 261- 6603. _____

1.1.9 IMPLEMENT NC.EP-EP.ZZ-0309(Q), Dose Assessment, for instructions on performing dose assessment in the manual mode. _____

1.1.10 INPUT the appropriate effluent monitor and MET values manually into MIDAS to perform dose assessment in the manual mode. _____

NOTE

Contact an Emergency Preparedness representative at x1571 or 1157, concerning any MIDAS problems.

1.1.11 IF the MIDAS computer located at the CP is not operational, THEN use one of the MIDAS computers listed below:

- Hope Creek TSC _____
- Salem Control Room _____
- Salem TSC _____

1.1.12 DETERMINE appropriate PAR, if any, utilizing the most current SSCL and Attachment 3, Radiologically Based Protective Action Recommendation Worksheet Worksheet. _____

1.1.13 REVIEW the SSCL and the Radiological Based PAR with the OS utilizing Attachment 3 to explain the PAR you are providing, if needed. _____

ATTACHMENT 1
Page 4 of 5

1.1.15 PROVIDE the signed SSCL to Communicator Number 2, or leave it with the OS, if he requests to keep it. _____

1.1.16 ASSIST the OS with completion of Page 2 of the NRC Data Sheet, if asked to. _____

1.1.17 PERFORM habitability checks at the CP, CR, and the OSC if activated, every thirty minutes and record results on Form – 1, Habitability Log, unless told otherwise by the OS, Radiation protection – Exposure Control (RPS – EXP), or the Radiological Assessment Coordinator (RAC). _____

1.1.18 MAKE appropriate Onsite PARs to the OS or RAC for Onsite locations using Attachment 4, Onsite Protective Action Guidelines. _____

1.1.19 ESTABLISH Contamination Controls (no eating, no drinking, no smoking, proper postings, setting up step off pads and friskers) IAW NC.EP-EP.ZZ-0303(Q), Figures 1-1 through 1-4 , when any of the following have occurred: _____

NOTE

Noble Gas (NG) Offsite Dose Calculation Manual (ODCM)/Federal Limits are 1.20E+04 uCi/second. for Hope Creek.

- A radiological release ≥ NG technical specification limits is in progress. _____
- The potential of a radiological release ≥ NG technical specification limits is thought to be high. _____
- Normal RCA boundaries have been breached. _____
- At the RAC's discretion. _____

ATTACHMENT 1
Page 5 of 5

1.1.20 NOTIFY the RAC and RPS-EXP of changing radiological conditions as determined from step 1.1.19 _____

NOTE

DAPA monitor readings fluctuate due to Drywell temperature. Consult Attachment 5, DAPA Correction Calculations, to perform the required calculations to obtain the correct DAPA monitor readings, if necessary.

1.1.21 TREND RMS data utilizing the RM-11 or the VAX LA120. _____

1.1.22 REFER to Attachment 7, RMS Quick Reference, for information concerning some of the RMS monitors. _____

1.1.23 REFER to HC.RP-AR.SP-0001(Q), Radiation Monitoring System Alarm Response for more complete information concerning RMS. _____

1.1.24 IMPLEMENT Section 5.2 of this procedure, and follow appropriate steps, when the TSC is activated. _____

TURNOVER
Given By: _____ Date/Time:___ - ___ - ___/_____ : _____

TURNOVER
Received By: _____ Date/Time:___ - ___ - ___/ _____ : _____

ATTACHMENT 2
Page 1 of 2
HOPE CREEK RMS STATUS SHEET

DATE: ___/___/___ TIME: ___:___

TITLE	CURRENT READING	UNITS	RANGE (LOW)	RANGE (HIGH)
FRVS		cfm	2.00E+02	9.00E+03
NPV		cfm	0.00E+00	4.19E+04
SPV		cfm	0.00E+00	4.48E+05
HTV		cfm	0.00E+00	2.50E+04

NOTE: CONTACT THE NATIONAL WEATHER SERVICE AT (609) 261-6604 OR (609) 261-6602.

METEOROLOGICAL DATA

WND SPD 33 FT.		MPH	N/A	N/A
WND SPD 150 FT.		MPH	N/A	N/A
WND SPD 300 FT.		MPH	N/A	N/A
WND DIR 33 FT		DEG FROM	N/A	N/A
WND DIR 150 FT		DEG FROM	N/A	N/A
WND DIR 300 FT		DEG FROM	N/A	N/A
DELTA T (150-33)		DEG C	N/A	N/A
DELTA T (300-33)		DEG C	N/A	N/A
STAB. CLASS		A - G	N/A	N/A

VENT PROCESS MONITORS

FRVS LOW RANGE		uCi/cc	1.00E-08	1.00E-01
FRVS MID RANGE		uCi/cc	1.00E-03	1.00E+02
FRVS HIGH RANGE		uCi/cc	1.00E-01	1.00E+05
FRVS EFFLUENT		uCI/sec	0.00E+00	1.00E+12
NPV PARTICULATE		uCi/cc	5.00E-12	1.00E-06
NPV IODINE		uCi/cc	1.10E-11	1.10E-05
NPV LOW RANGE		uCi/cc	1.00E-08	1.00E-01
NPV MID RANGE		uCi/cc	1.00E-03	1.00E+02
NPV HIGH RANGE		uCi/cc	1.00E-01	1.00E+05
NPV EFFLUENT		uCi/cc	5.00E-12	1.00E-06
SPV PARTICULATE		uCi/cc	5.00E-12	1.00E-06
SPV IODINE		uCi/cc	1.10E-11	1.10E-05
SPV LOW RANGE		uCi/cc	1.00E-08	1.00E-01
SPV MID RANGE		uCi/cc	1.00E-03	1.00E+02
SPV HIGH RANGE		uCi/cc	1.00E-01	1.00E+05
SPV EFFLUENT		uCi/cc	5.00E-12	1.00E-06
HTV LOW RANGE		uCi/cc	1.00E-04	1.00E+02
HTV MID RANGE		uCi/cc	5.00E+00	5.00E+05
HTV EFFLUENT		uCi/sec	5.00E-03	2.60E+07

DRYWELL MONITORS

DAPA A		R/hr	1.00E+00	1.00E+08
DAPA B		R/hr	1.00E+00	1.00E+08
DW LEAK DETECT		uCi/cc	1.00E-06	1.00E-01
MSL A		mR/hr	1.00E+00	1.00E+06
MSL B		mR/hr	1.00E+00	1.00E+06
MSL C		mR/hr	1.00E+00	1.00E+06
MSL D		mR/hr	1.00E+00	1.00E+06

ATTACHMENT 2
Page 2 of 2

TITLE	CURRENT READING	UNITS	RANGE (LOW)	RANGE (HIGH)
MAIN CR		mR/hr	1.00E-01	1.00E+04
TSC VESTIBULE		mR/hr	1.00E-01	1.00E+04
CHEM LAB SAM RM		mR/hr	1.00E-01	1.00E+04
RAD WASTE CR		mR/hr	1.00E-01	1.00E+04
OFFGAS TREAT CR		mR/hr	1.00E-01	1.00E+04
OFFGAS VIAL SS		mR/hr	1.00E-01	1.00E+04
RADWASTE SS		mR/hr	1.00E-01	1.00E+04
RX BLDG SS		mR/hr	1.00E-01	1.00E+04
OUTSIDE RX BLDG SS		mR/hr	1.00E-01	1.00E+04
FRVSV SKID		mR/hr	1.00E-01	1.00E+04
FRVSV LRP		mR/hr	1.00E-01	1.00E+04
PERSONNEL AIRLOCK		mR/hr	1.00E-01	1.00E+04
EQUIPMENT AIRLOCK		mR/hr	1.00E-01	1.00E+04
MOTOR EQUIP AIRLOCK		mR/hr	1.00E-01	1.00E+04
OPEN EQUIP HATCH		mR/hr	1.00E-01	1.00E+04
SPENT FP DEMIN EQUIP		mR/hr	1.00E-01	1.00E+04
AUX HATCHWAY		mR/hr	1.00E-01	1.00E+04
REST MACH SHOP A		mR/hr	1.00E-01	1.00E+04
REST MACH SHOP B		mR/hr	1.00E-01	1.00E+04
SPENT FUEL POOL		mR/hr	1.00E-01	1.00E+04
NEW FUEL A		mR/hr	1.00E-01	1.00E+04
NEW FUEL B		mR/hr	1.00E-01	1.00E+04
PROCESS MONITORS				
REFUELING FLR EXH A		uCi/cc	1.00E-06	1.00E-02
REFUELING FLR EXH B		uCi/cc	1.00E-06	1.00E-02
REFUELING FLR EXH C		uCi/cc	1.00E-06	1.00E-02
REACTOR BLDG EXH A		uCi/cc	1.00E-06	1.00E-02
REACTOR BLDG EXH B		uCi/cc	1.00E-06	1.00E-02
REACTOR BLDG EXH C		uCi/cc	1.00E-06	1.00E-02
CR VENTILATION C		uCi/cc	1.00E-06	1.00E-02
CR VENTILATION C1		uCi/cc	1.00E-06	1.00E-02
CR VENTILATION D		uCi/cc	1.00E-06	1.00E-02
CR VENTILATION D1		uCi/cc	1.00E-06	1.00E-02
COOLING TOWER BLDN		uCi/cc	1.00E-06	1.00E-02
LIQUID RAD WASTE		uCi/cc	1.00E-06	1.00E-02
OFFGAS A		mR/hr	1.00E+00	1.00E+06
OFFGAS B		mR/hr	1.00E+00	1.00E+06
OFFGAS TREAT SYS A		cpm	1.00E+01	1.00E+06
OFFGAS TREAT SYS B		cpm	1.00E+01	1.00E+06
RX BLDG VENT SYS EXH		uCi/cc	1.00E-06	1.00E-02
TB BLDG EXH		uCi/cc	1.00E-06	1.00E-02
TB BLDG COMPART EXH		uCi/cc	1.00E-06	1.00E-02
RADWASTE EXH SYS		uCi/cc	1.00E-06	1.00E-02
RADWASTE AREA EXH		uCi/cc	1.00E-06	1.00E-02
GAS R/W AREA EXH		UCi/cc	1.00E-06	1.00E-02

ATTACHMENT 3
Page 1 OF 2
RADIOLOGICAL BASED PROTECTIVE ACTION RECOMMENDATION FLOW CHART AND WORKSHEET

Initial Conditions: If Rad PAR review criteria is not exceeded, Rad PAR is not required.

Release in progress that exceeds ODCM/Federal Limits release rate
1.20E+04 uCi/sec Noble Gas
OR
Field survey dose rate at or beyond the MEA exceeds:
50 mR/hr Noble Gas
OR
250 mR/hr Thyroid Commitment

Rad PAR Review Criteria

CONTINUE IF ABOVE CRITERIA IS EXCEEDED

Does TEDE DOSE (4 day) on the SSCL exceed 1000 mRem at 5 miles?

YES

Evacuate ALL Sectors	0 –5 miles
Evacuate ± 1 Sector	5 – 10 miles
Shelter Remaining Sectors	5 – 10 miles

NO

Does THYROID CDE DOSE on the SSCL exceed 5000 mRem at 5 miles?

YES

Is THYROID CDE DOSE based on a measured value and not a default value?

YES

NO

NO

Does TEDE DOSE (4 day) on the SSCL exceed 1000 mRem at MEA or 2 miles?

YES

Evacuate All Sectors	0 – 5 miles

NO

Does THYROID CDE DOSE on the SSCL exceed 5000 mRem at the MEA or 2 miles?

YES

Is THYROID CDE DOSE based on a measured value and not a default value?

YES

NO

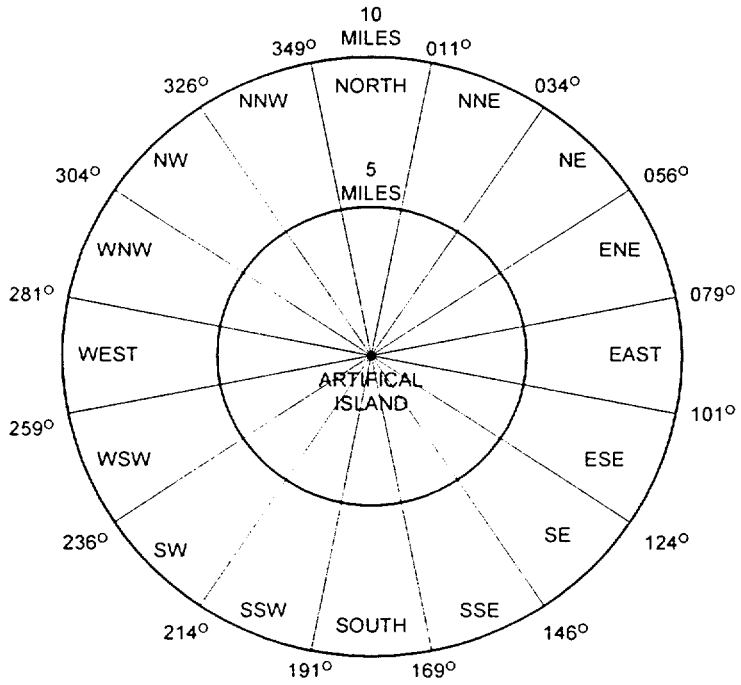
NO

NO RADIOLOGICAL PROTECTIVE ACTION RECOMMENDATION REQUIRED !!

ATTACHMENT 3
Page 2 of 2

WIND DIRECTION FROM DEGREES	COMPASS		PAR AFFECTED SECTORS DOWNWIND ±1 SECTORS
349 - 011	N	⇒	SSE - S - SSW
011 - 034	NNE	⇒	S - SSW - SW
034 - 056	NE	⇒	SSW - SW - WSW
056 - 079	ENE	⇒	SW - WSW - W
079 - 101	E	⇒	WSW - W - WNW
101 - 124	ESE	⇒	W - WNW - NW
124 - 146	SE	⇒	WNW - NW - NNW
146 - 169	SSE	⇒	NW - NNW - N
169 - 191	S	⇒	NNW - N - NNE
191 - 214	SSW	⇒	N - NNE - NE
214 - 236	SW	⇒	NNE - NE - ENE
236 - 259	WSW	⇒	NE - ENE - E
259 - 281	W	⇒	ENE - E - ESE
281 - 304	WNW	⇒	E - ESE - SE
304 - 326	NW	⇒	ESE - SE - SSE
326 - 349	NNW	⇒	SE - SSE - S

NOTE: CONSIDER ADDING A SECTOR TO THE PAR IF THE WIND DIRECTION (FROM) IS WITHIN ± 3° OF A SECTOR DIVIDING LINE.



ATTACHMENT 4
Page 1 of 1

ONSITE PROTECTIVE ACTION GUIDELINES

1.0 RADIATION LEVELS

Dose Rate (mR/hr)	Location	Action
≥ 100	Onsite	Evacuation of all nonessential personnel. Consider evacuation of other personnel.

Dose Rate (mR/hr)	Location	Action
≥ 100	Control Room OSC TSC Control Point	Consider evacuation within one hour, and/or relocation as appropriate.

Dose Rate (mR/hr)	Location	Action
≥ 1000	Onsite	Evacuation of all nonessential personnel Consider immediate evacuation of remaining personnel.

Dose Rate (mR/hr)	Location	Action
≥ 1000	Control Room OSC TSC Control Point	Consider immediate evacuation, and/or relocation upwind of the plume.

2.0 RADIOIODINE

If the Iodine-131 equivalent is calculated or measured in concentrations greater than or equal to 5.0E-7 uCi/cc, consider the use of Potassium Iodide for thyroid blocking. This section is to be applied to areas, in which personnel are working or are planning to work. Refer to Emergency Procedure NC.EP-EP.ZZ-0305(Q), Stable Iodine Thyroid Blocking, for additional information.

ATTACHMENT 5
Page 1 of 1

DAPA CORRECTION CALCULATIONS

NOTE

DAPA temperature is located on the VAX LA120, Operation Status Board (EOF Menu Selection "2").

1.0 DAPA CORRECTION CALCULATIONS

1.1 To Correct For DAPA High Temperature, Perfrom The Following

1.1.1 REFER to Figure 1-1. _____

1.1.2 IF the uncorrected DAPA reading lies below the curve, THEN the DAPA Monitor reading is unreliable and should not be used. _____

1.1.3 PROCEED to step 1.4, if the uncorrected DAPA reading lies above the curve. _____

1.1.4 REFER to Figure 1-2. _____

1.1.5 DETERMINE a BIAS value to add to the uncorrected DAPA reading by finding the value on the curve that corresponds to the associated average Drywell Air Temperature. _____

_____	+	_____	=	_____
DAPA Monitor Reading (R/hr)		Bias Value Reading (R/hr)		Corrected DAPA Reading (R/hr)

ATTACHMENT 6

Page 1 of 2

RMS QUICK REFERENCE

Hope Creek

NOTE

All ARM's in the Reactor Building have maximum ranges of 1.00E+04 mR/hr, except for the Inner Tip Room Monitor (9RX699). The Inner Tip Room Monitor's maximum range is 1.00E+07 mR/hr.

DAPA A and DAPA B (9RX635 and 9RX636) are high range ARMs in the Drywell. DAPA A is approximately twice as high as DAPA B under normal operating conditions. During a LOCA in the Drywell the two monitors should start to trend closer together due to the atmospheric conditions in the Drywell affecting both monitors equally. Increases on both of these monitors while DAPA A's reading stays about twice of what DAPA B is reading, would be an indication of fuel damage.
Ranges: 1.00E+00 to 1.00E+08 R/hr.

Tip Room Inner ARM (9RX699) is located on 102' elevation of the Reactor Building inside the Tip Room. This monitor has the highest range of any ARM in the Reactor Building and could give an idea of what the dose rates in the Reactor Building are after the other ARMs peg out high.
Ranges: 1.00E+00 to 1.00E+07 mR/hr

Main Steam Line A - D monitors (9RX509-512) are four ARMs located in the ceiling of the Main Steam Tunnel. Increases in these monitors would be an indication of fuel damage. These monitors could increase due to shine from the Reactor Building, after a radiological release.
Ranges: 1.00E+00 to 1.00E+06 mR/hr

Safeguard Instrument Room Monitor (9RX704) is an ARM located on 77' elevation of the Reactor Building. An increase on this monitor when the reactor SCRAMs with fuel damage could be due to shine from the Torus.
Ranges: 1.00E-01 to 1.00E+04 mR/hr

ATTACHMENT 6

FRVS Effluent monitor (9RX680) monitors what is going out the FRVS Plant Vent. Under normal operating conditions Reactor Building ventilation would vent through the South Plant Vent. Under accident conditions or when manually initiated, Reactor Building Ventilation isolates and the Reactor Building will vent through the FRVS. FRVS is always a ground release. Values $\geq$ 1.20E+04 uCi/Sec would be an indication that a radiological release is in progress.
Ranges: 1.00E+00 to 1.00E+12 uCi/Sec

North Plant Vent Effluent (NPV) monitor (9RX590) monitors Offgas and the chemistry lab fume hoods. NPV could be a ground or elevated release depending on the time of year and wind speed. Values $\geq$ 1.20E+04 uCi/Sec would be an indication that a radiological release is in progress.
Ranges: 1.00E+00 to 1.00E+12 uCi/Sec

South Plant Vent Effluent (SPV) monitor (9RX580) monitors Service Radwaste Building, Turbine Building and the Reactor Building (if FRVS hasn't been initiated). Values $\geq$ 1.20E+04 uCi/Sec would be an indication that a radiological release is in progress.
Ranges: 1.00E+00 to 1.00E+12 uCi/Sec

Hardened Torus Vent Effluent (HTV) monitor (9RX518) would be used to vent the Drywell to relieve pressure. The path it would take would be through the Torus and take advantage of the scrubbing properties of the Torus water. Control Room operators would have to open a valve to use this release path. Sampling from the PASS Torus Gas Space should be performed to provide information as to what is being released. Values $\geq$ 1.20E+04 uCi/Sec would be an indication that a radiological release is in progress.
Ranges: 0.00E+00 to 2.09E+12 uCi/Sec

FORM - 1
Page 1 of 1

HABITABILITY LOG
(FORM - 1)

DATE: _____

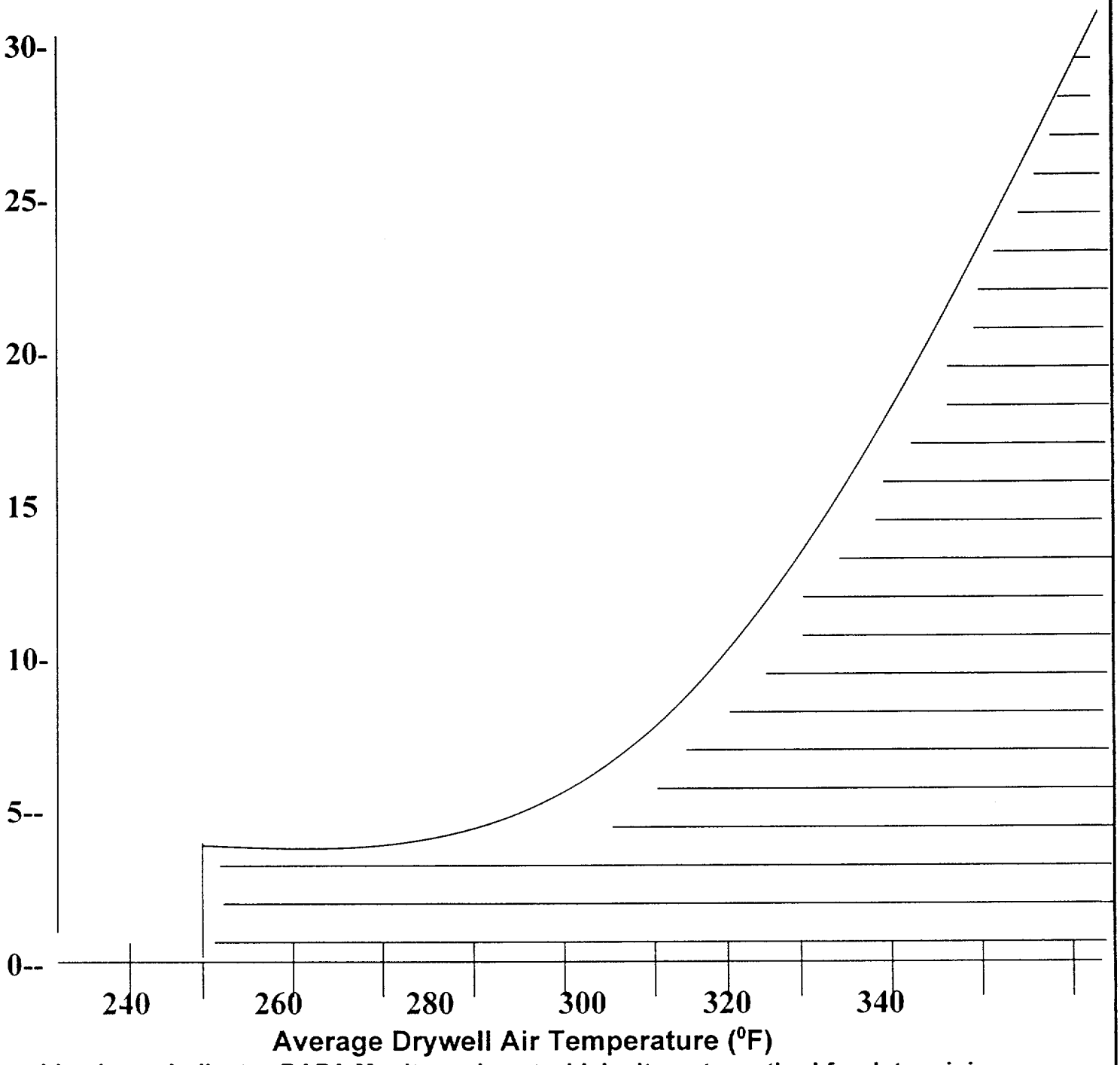
TIME PERFORMED/LOCATION	DOSE RATE (mR/hr)	CONTAMINATION (CPM)	INITIALS

IF other means are used to ensure habitability, THEN list: _____

_____

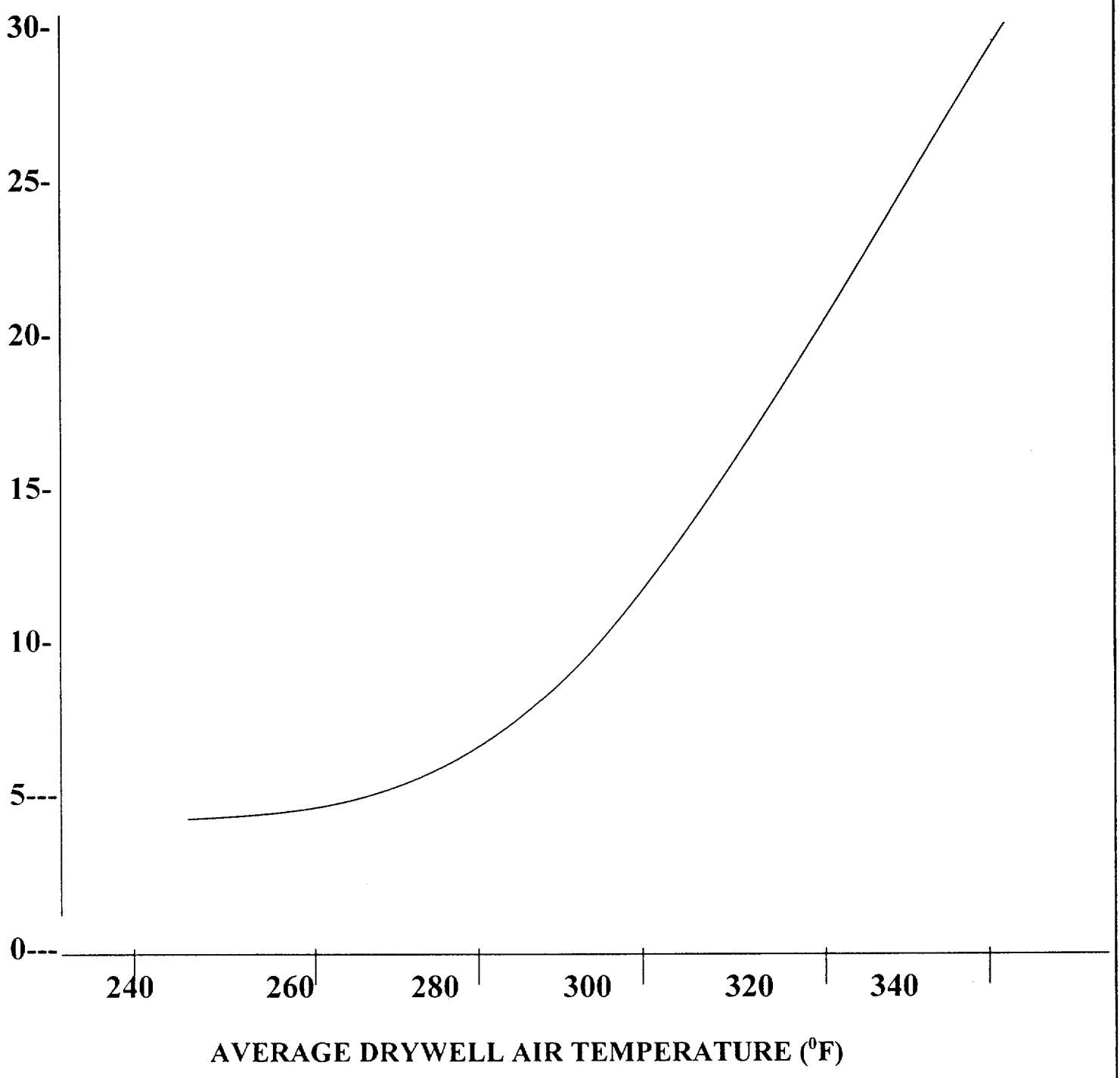
_____

FIGURE 1 - 1
Page 1 of 2
DAPA MONITOR READING vs AVERAGE DRYWELL AIR TEMPERATURE



Lined area indicates DAPA Monitor value at which alternate method for determining estimate of Drywell airborne radiation levels should be used.

FIGURE 1 - 2
Page 2 of 2
DAPA MONITOR READING BIAS vs AVERAGE DRYWELL AIR TEMPERATURE



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SC.EP-EP.ZZ-0301 (Q) - REV. 03

SHIFT RADIATION PROTECTION TECHNICIAN RESPONSE

USE CATEGORY: II

REVISION SUMMARY:

1. This revision satisfies the requirement for a biennial review.
2. Added guidance to Attachment 10 (Note prior to Step 1.1.2) to ensure personnel were aware that they could use R46 monitor data to perform dose assessment during a steam generator tube rupture and what procedure the user should refer to in order to perform dose assessment using the R 46 monitor data. This change was incorporated into NC.EP-EP.ZZ-0309(Q) (Dose Assessment), revision 02. NC.EP-EP.ZZ-0309(Q) was processed and approved as a non-editorial change, so the revision to this procedure (SC.EP-EP.ZZ-0301) is considered to be a editorial change.
3. Attachment 5, Page 9 of 9 (Drawing of R45 Terminal) was part of the procedure, but it was a CAD insert prior to this. The figure was a made Word drawing, so the figure resides in the procedure.

IMPLEMENTATION REQUIREMENTS

This procedure is effective for use upon issue. 5-24-01

APPROVED: _____ EP Manager — 5/9/01 Date

APPROVED: N/A Vice President – Operations — N/A Date

SHIFT RADIATION PROTECTION TECHNICIAN RESPONSE

TABLE OF CONTENTS

1.0 PURPOSE

To outline and describe the Shift Radiation Protection Technician's (SRPT) duties during a declared emergency

2.0 PREREQUISITES

2.1 Prerequisites To Be Followed Prior To Implementing This Procedure

Implement this procedure at:

- The discretion of the Operations Superintendent (OS) or Radiation Protection Supervision.
- Upon a declaration of an Unusual Event or greater emergency classification.

3.0 PRECAUTIONS AND LIMITATIONS

3.1 Precaution and Limitations To Be Followed Prior To Implementing This Procedure

3.1.1 It is recommended that initials be used in the place keeping sign-offs, instead of checkmarks, if more than one person may implement this procedure.

3.1.2 Personnel who implement this procedure shall be trained and qualified IAW the Emergency Plan.

3.1.3 The OS may change any priority concerning the SRPT's duties, as deemed necessary.

3.1.4 Steps listed in this procedure may be performed in the order deemed appropriate for the emergency situations. Only steps applicable to the specific emergency need be performed.

4.0 EQUIPMENT REQUIRED

As provided at the Control Point and Control Room.

5.0 PROCEDURE

5.1 The SRPT Should:

START completing Attachment 1, Shift Radiation Protection Technician(s) Checklist. _____

5.2 When the TSC is Activated Perform the Following:

5.2.1 COMPLETE the turnover of Dose Assessment/Station Status Checklist duties to the Radiation Protection Supervisor – Offsite or the Radiological Assessment Coordinator. _____

> **NOTE**
>
> A complete listing of RMS monitors can be found in the RMS Manual (Unit 1 or 2).

5.2.2 IMPLEMENT Attachment 4, RMS Quick Reference, for an abbreviated list of RMS monitors and the R44 preplanned alternative methodology. _____

5.2.3 DOCUMENT monitors in Warning "W" or Alarm "A" on Attachment 2, Radiological Assessment Data Sheet - Unit 1, or Attachment 3, Radiological Assessment Data Sheet - Unit 2. _____

5.2.4 DOCUMENT monitor values as instructed by the OS or Radiation Protection Supervision on Attachment 2, Radiological Assessment Data Sheet - Unit 1, or Attachment 3, Radiological Assessment Data Sheet - Unit 2. _____

5.2.5 TRANSMIT completed Attachment 2 or Attachment 3 via the FAX using the Group "C" key every 15 to 20 minutes or in the opinion of the SRPT, conditions warrant it. _____

5.2.6 PROVIDE a completed copy of Attachment 2 or 3 to the Radiation Protection Supervisor - Exposure Control (RPS-EXP) located in the OSC, every 15 to 20 minutes, or in the opinion of the SRPT, conditions warrant it. _____

6.0 RECORDS

Return completed procedure and any information or data thought to be pertinent by the SRPT, to the Manager – EP & IT.

7.0 REFERENCES

7.1 References

Nuclear Emergency Plan.

7.2 Cross References

7.2.1 NC.EP-EP.ZZ-0310(Q), Radiation Protection Supervisor – Offsite And Field Monitoring Team Response.

7.2.2 Salem Offsite Dose Calculation Manual (ODCM).

ATTACHMENT 1
Page 1 of 5

SHIFT RADIATION PROTECTION TECHNICIAN CHECKLIST

1.0 SRPT INITIAL ACTIONS

NOTE

The order that the steps are followed in this attachment may be performed out of sequence, if the SRPT believes the emergency warrants it.

1.1 Perform the Following:

1.1.1 REPORT to the CR when an emergency is declared to receive a briefing from the OS. _____

1.1.2 PROVIDE a briefing to the OS, which should include the following Information:

- Habitability of the Control Point and Control Room. _____
- Any unusual dose rates observed on the way to the CR. _____

NOTE

- On a back shift, during a non-outage situation, there should be 2 Rad Pro Techs and 1 Chemistry Tech available at all times at Hope Creek.
- The Hope Creek Control Point may be contacted at extension 3741.

- The staffing of the Salem Radiation Protection and Chemistry personnel. _____

1.1.3 REQUEST the status of the MET Tower's operability. _____

A. IF the MET Tower is not operational,
THEN refer to step 1.1.9.

1.1.4 OBTAIN the identity of Communicator 2 _____ _____
(Name)

ATTACHMENT 1
Page 2 of 5

1.1.5 TURN on the AMS located in the back of Unit 1 & Unit 2 CR. _____

1.1.6 REQUEST that the Emergency Vehicle from the Hope Creek Control Point (x3741) be delivered to the Unit 2 Steam Mixing Bottle Area or alternate location, depending on radiological conditions, and the keys delivered to the Salem CP when any of the following occur: _____

- Upon an Alert declaration or higher. _____
- When an Alert declaration or higher is about to be made. _____
- If on/offsite monitoring is deemed necessary by the OS or Radiation Protection Supervision. _____

NOTE

- The SRPT should be generating page two of the Station Status Checklist (SSCL) for both Salem Unit One and Unit Two, for Common Site Events. The Hope Creek SRPT will be generating a SSCL for Hope Creek under these conditions.
- A blank SSCL, page 2, may be obtained from Communicator Number 2, if thought necessary.

1.1.7 IMPLEMENT NC.EP-EP.ZZ-0309(Q)/EPIP 309S, Dose Assessment, to perform dose assessment and generate a SSCL pg. 2 every 30 minutes. _____

1.1.8 PERFORM the following steps, if automatic data acquisition MIDAS and/or the MET Computer is not operational:

- REFER to appropriate attachment, (Attachment 2, Radiological Assessment Data Sheet - Unit 1 or Attachment 3, Radiological Assessment Data Sheet - Unit 2). _____
- COMPLETE monitors with an * next to them, monitors in alarm, and the MET Data section listed on Attachments 2 and 3 every 15 minutes for the affected Unit. _____

ATTACHMENT 1
Page 3 of 5

1.1.9 OBTAIN the MET data from the following, if the MET Computer is not operational:

- Unit One Control Room _____
- Hope Creek Control Point (extension 3741) _____
- Hope Creek Control Room (extension 3059) _____
- National Weather Service at 609-261-6604 or 609- 261- 6603. _____

1.1.10 IMPLEMENT NC.EP-EP.ZZ-0309(Q)/EPIP 309S, Dose Assessment, for instructions on performing dose assessment in the manual mode. _____

1.1.11 INPUT the appropriate effluent monitor and MET values manually into MIDAS to perform dose assessment in the manual mode. _____

NOTE

Contact an Emergency Preparedness representative at x1571 or 1157 concerning any MIDAS problems.

1.1.12 IF the MIDAS computer located in the CR is not operational, THEN use one of the MIDAS computers listed below:

- Salem TSC _____
- Hope Creek Control Point _____
- Hope Creek TSC _____

1.1.13 DETERMINE appropriate PAR, if any, utilizing the most current SSCL and Attachment 7 Salem Radiological Based PARs and PAR Worksheet. _____

1.1.14 REVIEW the SSCL and the Radiological Based PAR with the OS Utilize Attachment 7 as needed to explain the PAR provided. _____

ATTACHMENT 1
Page 4 of 5

1.1.15 PROVIDE the signed SSCL to Communicator Number 2, or leave it with the OS, if he requests to keep it. _____.

1.1.16 PERFORM habitability checks in the CR, and OSC if activated, every thirty minutes and record results on Form – 1, Habitability Log, unless told otherwise by the Operations Superintendent or the Rad Pro Supervisor-Exposure Control. _____

1.1.17 MAKE appropriate Onsite PAGs to the OS or RAC for Onsite locations using Attachment 8, Onsite Protective Action Guidelines. _____

1.1.18 ESTABLISH Contamination Controls (no eating, no drinking, no smoking, proper postings, setting up step off pads and friskers) when any of the following have occurred. _____

NOTE

Noble Gas (NG) Federal Limits/Offsite Dose Calculation Manual (ODCM) Limits are 2.42E+05 uCi/second.

- A radiological release ≥ NG Federal Limits/ODCM Limits is in progress. _____
- The potential of a NG radiological release Federal Limits/ ODCM Limits is thought to be high. _____
- Normal RCA boundaries have been breached. _____
- At the RAC's discretion. _____

NOTE

A RM-14 or equivalent count rate meter should be positioned next to all newly placed contamination control step off pads.

ATTACHMENT 1
Page 5 of 5

1.1.19 IMPLEMENT Attachment 9, Contamination Control Guidance, for how to limit access to certain areas and where to position step off pads. _____

1.1.20 NOTIFY the RAC and RPS-EXP of changing radiological conditions as determined from step 1.1.18. _____

1.1.21 ASSIST the OS with completion of Page 2 of the NRC Data Sheet, if asked to . _____

1.1.22 IMPLEMENT Attachment 10, Steam Generator Tube Leak/Rupture Guidelines, when thought appropriate. _____

1.1.23 IMPLEMENT Section 5.2 of this procedure, and follow appropriate steps, when the TSC is activated. _____

TURNOVER
Given By: _____ Date/Time:___ - ___ - ___ /_____ : _____

TURNOVER
Received By: _____ Date/Time:___ - ___ - ___/ _____ : _____

ATTACHMENT 2
Page 1 of 2

RADIOLOGICAL ASSESSMENT DATA SHEET - UNIT 1

Date :_____ Time :_____

Meteorological Data

Back up MET data may be obtained by calling Hope Creek Control Point at 3741, National Weather Service at (609) 261-6604 or (609) 261-6602

Wind Speed	_____	mph	**33'**
Wind Speed	_____	mph	**300'**
Wind Direction FROM	_____	degrees	**300'**
Wind Direction FROM	_____	degrees	**33'**
Delta "T"	_____	^0C	**300-33' or**
(use 300-33 if operational)			**150-33'**
			(circleone)
Plant Vent flow rate (1.25E + 05 if unknown)	_____	cfm	

Plant Vent and Containment Monitors

Monitor Number	Name	Value	Units	Warning	Alarm	Low Range	High Range
1R11A	CTMT Particulate		CPM	W	A	1E +01	1E +06
1R12A	CTMT Noble Gas		CPM	W	A	1E +01	1E +06
1R12B	CTMT Iodine		CPM	W	A	1E +01	1E +06
***1R41A**	**Low Range PV NG**		**µCi/cc**	**N/A**	**N/A**	**1E-08**	**1E-01**
***1R41B**	**Mid Range PV NG**		**µCi/cc**	**N/A**	**N/A**	**1E-04**	**1E+02**
***1R41C**	**High Range PV NG**		**µCi/cc**	**N/A**	**N/A**	**1E-01**	**1E+05**
1R41D	NG Effluent		µCi/sec	W	A	1E+00	1E+13
*** 1R16**	**Plant Vent Gross Eff**		**CPM**	**W**	**A**	**1E+01**	**1E +06**
1R2	130 CTMT ARM		mR/hr	W	A	1E-01	1E+04
1R10A	100' CTMT Persnl Hatch		mR/hr	W	A	1E-01	1E+04
1R10B	130' CTMT Persnl Hatch		mR/hr	W	A	1E-01	1E+04
1R7	Seal Table, GA		mR/hr	W	A	1E-01	1E+04
+1R44A	CTMT High Range		R/hr	W	A	1E+00	1E+07
+1R44B	CTMT High Range		R/hr	W	A	1E+00	1E+07
*** 1R45B**	**Mid Range PV NG**		**µCi/cc**	**W**	**A**	**1E-03**	**1E+01**
*** 1R45C**	**High Range PV NG**		**µCi/cc**	**W**	**A**	**1E-01**	**1E+05**
1R45D	PV Filter Monitor		CPM	W	A	1E+00	1E+06
1R53___	MSL Process (N 16)		CPM	W	A	1E+01	1E+06

*** Complete every 15 minutes**
+ Record Value if Onscale.

ATTACHMENT 2
Page 2 of 2

Date:_____ **Time:** _____

Monitor Number	Name	Value	Units	Warning	Alarm	Low Range	High Range
1R1A	CR, General Area (GA)		mR/hr	W	A	1E-01	1E+04
1R1B	Control Room Intake Duct		CPM	W	A	1E+01	1E+06
1R3	Chem Lab, GA		mR/hr	W	A	1E-01	1E+04
1R4	Charging Pump, GA		mR/hr	W	A	1E-01	1E+04
1R5	Spent Fuel Pool		mR/hr	W	A	1E-01	1E+04
1R6A	Primary Sample Lab		mR/hr	W	A	1E-01	1E+04
1R9	New Fuel Storage, GA		mR/hr	W	A	1E-01	1E+04
1R13A	Fan Coil Cooling		CPM	W	A	1E+01	1E+06
1R13B	Fan Coil Cooling		CPM	W	A	1E+01	1E+06
1R13C	Fan Coil Cooling		CPM	W	A	1E+01	1E+06
1R13D	Fan Coil Cooling		CPM	W	A	1E+01	1E+06
1R13E	Fan Coil Cooling		CPM	W	A	1E+01	1E+06
1R15	Condenser Air Ejector		CPM	W	A	1E+01	1E+06
1R17A	Component Cooling H_2O		CPM	W	A	1E+01	1E+06
1R17B	Component Cooling H_2O		CPM	W	A	1E+01	1E+06
1R18	Liquid Waste Release		CPM	W	A	1E+01	1E+06
1R19A	#11 S/G Blowdown		CPM	W	A	1E+00	1E+06
1R19B	#12 S/G Blowdown		CPM	W	A	1E+00	1E+06
1R19C	#13 S/G Blowdown		CPM	W	A	1E+00	1E+06
1R19D	#14 S/G Blowdown		CPM	W	A	1E+00	1E+06
1R20B	Chemistry Count Room		mR/hr	W	A	1E-01	1E+04
1R26	Rx Coolant Filter		mR/hr	W	A	1E-02	1E+03
1R31A	Letdown HX Failed Fuel		CPM	W	A	1E+01	1E+06
1R32A	Fuel Handling Crane		mR/hr	W	A	1E-01	1E+06
1R34	North Pipe Pen		mR/hr	W	A	1E+01	1E+06
1R36	Evap and Feed H_2O		CPM	W	A	1E+01	1E+06
1R40	Condensate Filter		mR/hr	W	A	1E-01	1E+04
R43	Unit 1 & 2 PV, GA		mR/hr	W	A	1E-01	1E+04
1R46 ___	MSL Process		mR/hr	W	A	1E+00	1E+04
1R47	Electrical Pen High Range		mR/hr	W	A	1E-01	1E+07
2R52	PASS Room		R/hr	W	A	1E+00	1E+04

ATTACHMENT 3
Page 1 of 2

RADIOLOGICAL ASSESSMENT DATA SHEET - UNIT 2

Date :_____ Time :_____

Meteorological Data

Back up MET data may be obtained by calling Hope Creek Control Point at 3741, National Weather Service at (609) 261-6604 or (609) 261-6602

Wind Speed	_____	mph	**33'**
Wind Speed	_____	mph	**300'**
Wind Direction FROM	_____	degrees	**300'**
Wind Direction FROM	_____	degrees	**33'**
Delta "T"		^0C	**300-33' or**
(use 300-33 if operational)	_____		**150-33'**
			(circle one)

Plant Vent flow rate (1.25E + 05 if unknown) _____ cfm

Plant Vent and Containment Monitors

Monitor Number	Name	Value	Units	Warning	Alarm	Low Range	High Range
2R11A	CTMT Particulate		CPM	W	A	1E +01	1E +06
2R12A	CTMT NG		CPM	W	A	1E +01	1E +06
2R12B	CTMT Iodine		CPM	W	A	1E +01	1E +06
***2R41A**	**Low Range PV NG**		**µCi/cc**	**N/A**	**N/A**	**1E-08**	**1E-01**
***2R41B**	**Mid Range PV NG**		**µCi/cc**	**N/A**	**N/A**	**1E-04**	**1E+02**
***2R41C**	**High Range PV NG**		**µCi/cc**	**N/A**	**N/A**	**1E-01**	**1E+05**
2R41D	NG Effluent		µCi/se	W	A	1E+00	1E+13
***2R16**	**PV Gross Effluent**		**CPM**	**W**	**A**	**1E+01**	**1E +06**
2R2	130 CTMT ARM		mR/hr	W	A	1E-01	1E+04
2R10A	100' CTMT Persnl Hatch		mR/hr	W	A	1E-01	1E+04
2R10B	130' CTMT Persnl Hatch		mR/hr	W	A	1E-01	1E+04
2R7	Seal Table, GA		mR/hr	W	A	1E-01	1E+04
+2R44A	**CTMT High Range**		**R/hr**	**W**	**A**	**1E+00**	**1E+07**
+2R44B	**CTMT High Range**		**R/hr**	**W**	**A**	**1E+00**	**1E+07**
***2R45B**	**Backup Mid Range PV NG**		**µCi/cc**	**W**	**A**	**1E-03**	**1E+01**
***2R45C**	**Backup High Range PV NG**		**µCi/cc**	**W**	**A**	**1E-01**	**1E+05**
2R45D	PV Filter Monitor		CPM	W	A	1E+00	1E+06
2R53 ___	MSL Process (N 16)		CPM	W	A	1E+01	1E+06

*** Complete every 15 minutes**
+ Record Value if Onscale

ATTACHMENT 3
Page 2 of 2

Date: _____ **Time:** _____

Monitor Number	Name	Value	Units	Warning	Alarm	Low Range	High Range
2R1A	CR, General Area (GA)		mR/hr	W	A	1E-01	1E+04
2R1B	CR Intake Duct		CPM	W	A	1E+01	1E+06
2R3	Chem Lab, GA		mR/hr	W	A	1E-01	1E+04
2R4	Charging Pump, GA		mR/hr	W	A	1E-01	1E+04
2R5	Spent Fuel Pool		mR/hr	W	A	1E-01	1E+04
2R6A	Primary Sample Lab		mR/hr	W	A	1E-01	1E+04
2R9	New Fuel Storage, GA		mR/hr	W	A	1E-01	1E+04
2R13A	Fan Coil Cooling		CPM	W	A	1E+01	1E+06
2R13B	Fan Coil Cooling		CPM	W	A	1E+01	1E+06
2R13C	Fan Coil Cooling		CPM	W	A	1E+01	1E+06
2R15	Condenser Air Ejector		CPM	W	A	1E+01	1E+06
2R17A	Component Cooling H_2O		CPM	W	A	1E+01	1E+06
2R17B	Component Cooling H_2O		CPM	W	A	1E+01	1E+06
2R18	Liquid Waste Release		CPM	W	A	1E+01	1E+06
2R19A	#21 S/G Blowdown		CPM	W	A	1E+00	1E+06
2R19B	#22 S/G Blowdown		CPM	W	A	1E+00	1E+06
2R19C	#23 S/G Blowdown		CPM	W	A	1E+00	1E+06
2R19D	#24 S/G Blowdown		CPM	W	A	1E+00	1E+06
1R20B	Chem Count Room (Unit 1)		mR/hr	W	A	1E-01	1E+04
2R26	Rx Coolant Filter		mR/hr	W	A	1E-01	1E+06
2R31	Letdown HX Failed Fuel		CPM	W	A	1E+01	1E+06
2R32A	Fuel Handling Crane		mR/hr	W	A	1E-01	1E+04
2R34	South Pipe Pen		mR/hr	W	A	1E+01	1E+06
2R36	Evap and Feed H_2O		CPM	W	A	1E+00	1E+06
2R40	Condensate Filter		mR/hr	W	A	1E-01	1E+04
R43	Unit 1 & 2 PV, GA		mR/hr	W	A	1E-01	1E+04
2R46 ___	MSL Process		MR/hr	W	A	1E+00	1E+04
2R47	Electrical Pen High Range		mR/hr	W	A	1E-01	1E+07
2R52	PASS Room		R/hr	W	A	1E+00	1E+04
2R53	N16 Main Steamline Mon		CPM	W	A	1E+01	1E+06

ATTACHMENT 4
Page 1 of 2

RMS QUICK REFERENCE

Salem RMS (Unit 1 and 2)

R2 is an Area Radiation Monitor (ARM) located in Containment on the 130' elevation.
Ranges: 1E-01 to 1E+04 mR/hr.

R7 is an ARM located in Containment on the 100' elevation, adjacent to the Seal Table Room.
Ranges: 1E-01 to 1E+04 mR/hr.

R10A is an ARM located in Containment on the 100' elevation next to the personnel airlock.
Ranges: 1E-01 to 1E+04 mR/hr.

R10B is an (ARM) located in Containment on the 130' elevation next to the personnel airlock.
Ranges: 1E-01 to 1E+04 mR/hr.

R16 Plant Vent Stack is located in the Plant Vent duct at 194' elevation and monitors what is going out the Plant Vent stack.
Ranges: 1E+01 to 1E+06 CPM

R34 is an ARM located in the Mechanical Penetration across from the 100' elevation Containment personnel Airlock.
Ranges: 1E-01 to 1E+06 mR/hr.

R44A is a High Range or Accident Area Radiation Monitor (HARM) located in Containment on the 130' elevation close to the personnel airlock.
Ranges: 1E+00 to 1E+07 R/hr.

R44B is a (HARM) located in Containment on the 100' elevation between the R10A and R7 ARMs.
Ranges: 1E+00 to 1E+07 R/hr.

R47 is an ARM located in the 78' Electrical Penetration. The PASS lines are located in the overhead. The skid and PASS lines may be the source of any increase in this area. This Penetration has its own ventilation flow path and will vent directly into the atmosphere. There is a potential for an unmonitored release from this Penetration.
Ranges: 1E-01 to 1E+07 mR/hr

ATTACHMENT 4

NOTE

- All emergency Grab Samples (Noble Gas, Iodine and Particulate) should be taken from the R45 Skid located in the R45 Shed.
- Only one of the following Effluent Monitors (R41A, R41B, R41C, R45B or R45C) readings should be used in MIDAS Manual Mode. Refer below for the ranges of the monitors. Refer to NC.EP-EP.ZZ-0309(Q), Section 5.4 for more clarification concerning which plant vent effluent monitor value to use for performing dose assessment.

R41A is the Low Range Noble Gas Monitor and is located on the R41 Sample Skid on the 122' elevation of the Auxiliary Building next to the door to the stairs.
Ranges: 1E-08 to 1E-01 uCi/cc

R41B is the Mid Range Noble Gas Monitor and is located on the R41 Sample Skid on the 122' elevation of the Auxiliary Building next to the door to the stairs.
Ranges: 1E-04 to 1E-02 uCi/cc

R41C is the High Range Noble Gas Monitor and is located on the R41 Sample Skid on the 122' elevation of the Auxiliary Building next to the door to the stairs.
Ranges: 1E-01 to 1E+05 uCi/cc

R41D is the Effluent Noble Gas Monitor and is located on the R41 Sample Skid on the 122' elevation of the Auxiliary Building next to the door to the stairs.
Ranges: 0E+00 to 1E+13 uCi/Sec
(The R41D should not be used in MIDAS to perform manual dose assessment calculations)

R45B is the "Backup" Mid Range Noble Gas Monitor and is located in the R45 Shed behind the Fuel Handling Building. This monitor should not be used unless the R41 monitors are inoperable.
Ranges: 1E-03 uCi/cc to 1E+01 uCi/cc

R45C is the "Backup" High Range Noble Gas Monitors and is located in the R45 Shed behind the Fuel Handling Building. This monitor should not be used unless the R41 monitors are inoperable.
Ranges: 1E-01 uCi/cc to 1E+05 uCi/cc

ATTACHMENT 5
Page 1 of 9

OPERATING INSTRUCTIONS FOR THE R-45 CONTROL TERMINAL

1.0 INFORMATION CONCERNING THE R-45 CONTROL TERMINAL

- On the front panel of the R-45 Console (see DETAIL A of Figure 1) there are six **System Status Annunciators**. Below is a brief explanation of each.

- The **NORMAL (green)** light will be lit if any channel in the system is NORMAL or ALARM OFF.

- All lights will be off if none of the channels in the system have been initialized.

- The **MAINTENANCE (white)** light will be lit if any channel in the system is in "Calibrate", "Maintenance", or "Check Source" status; "Standby" or "Flush" mode; or if any field unit is in "Local Control" (at the shed).

- The **FAIL (yellow)** light will be lit if any channel in the system is in "Fail External", "Fail High", or "Fail Low" status. This light will be lit if any field unit is determined to have lost AC power or to have failed via the communications programs.

- The **TREND (yellow)** light will be lit if any channel in the system has determines a trend alarm rate.

- The **ALERT (yellow)** light will be lit if any channel in the system has determined an alert alarm level.

- The **HIGH ALARM (red)** light is lit when any channel in the system is in "High Alarm" or "Flow Alarm" status. On a new alarm condition, the light will be flashing until the switch (button) is depressed, which causes the light to stay on but silences the audible alarm.

- The **AUDIBLE ALARM** sounds at any change of status on any channel in the system. This annunciation is an audible beep of approximately 1 second duration. Also, it sounds when the system is first started (or restarted) and when a high alarm occurs. The alarm will sound until the HIGH ALARM light is depressed, thus acknowledging the condition.

- While entering commands onto the keyboards and after the operator finishes, information is displayed on the digital data display located above the keyboards (see Figure 1). If after approximately 15 seconds the operator does not touch the keyboards, the system returns to the ready mode (time and date are the only items displayed) and the operator may begin again.

- Information is obtained from the Control Terminal by entering commands on the keyboards. There are two keyboards: the Instruction Pad, and the Numeric Pad (see last page of this Attachment for diagram).

- The **RUB OUT** key functions like the backspace key on a computer keyboard, and if the operator makes an entry error he can correct it by pressing this key prior to pressing the enter key.

- Depress the up or down arrow key to see the information displayed on the digital readout.

- Depress the keys in the following order: **PRINT, FILE, ENTER** to printout the information.

- If the operator recalls a Historical Data File **(10 MIN, HOUR, or DAY)**, there are additional options other than just looking at and/or printing the data. The operator can depress the **DOWN ARROW KEY** and then the **ENTER KEY** after the desired function appears on the digital display. The following is a brief explanation of each.

- **INTERPRETED** -removes all abnormal data points and replaces them with points interpolated/extrapolated from the remaining "normal" data. If there is not enough data for this, then "INSUFFICIENT DATA" will appear in the display screen, meaning you cannot obtain this function.

- **INTEGRATED** - is a summation beginning with the oldest data point.

- **AVERAGED** - a single value will be displayed which is the mathematical average of the data over the time period of the file

- **RATE OF CHANGE** - the increase over the two adjacent intervals, standardized to a "per hour" rate

- **RELEASE RATE** - allows calculation of a release rate (uCi/min); the flow rate must be entered using the Numeric Pad in cc/min.

2.0 OPERATING INSTRUCTIONS

2.1 Perform the Following to Operate the R-45 Control Terminal.

NOTE

- The operator can obtain data by performing the steps listed below. If the operator has any problems or the monitor(s) are inoperable/failed, then contact the OS and/or I&C to fix or assist in fixing the problem.
- If after approximately 15 seconds the operator does not touch the keyboards, the system returns to the ready mode (time and date are the only items displayed) and the operator may begin again.

2.1.1 OBTAIN the R45 Control Key from the Control Room Operator, OS or I & C. _____

2.1.2 INSERT the key into the "Command Enable" slot and turn clockwise. _____

NOTE

The data received from the SA-16 (Particulate and Iodine Channel) includes events from fission gas in the sample collector. The SA-16 radioiodine data is valid only when the "FLUSH" has been turned on. While the system is in "FLUSH" Mode, information can be obtained on the SA-16 channel. **During this period the noble gas channels are not sampling plant vent flow and the data coming from them is NOT valid.** The "FLUSH"mode should be used only for the time period required to obtain radioiodine data from the SA-16 detector.

2.1.3 DEPRESS the following keys, to enter the Flush Mode:

A. FLUSH _____

B. ON _____

C. 1 for Unit 1 _____

D. 2 for Unit 2 _____

E. ENTER _____

2.1.4 Leave the Flush Mode by depressing the following keys:

A. FLUSH _____

B. OFF _____

C. 1 for Unit 1 _____

D. 2 for Unit 2 _____

E. ENTER _____

2.1.5 DEPRESS the **PRINT**, **ENTER** keys to obtain the current status of all monitors/channels in a hard copy printout. _____

NOTE

The following Channel Numbers represent these specific monitors.

CHANNEL NUMBER	MONITOR REPRESENTED BY THE NUMBER
1	R45D (SA-16) Particulate and Iodine
2	R45A (SA-15) Noble Gas Background Subtract
3	R45C (SA-15) High Range Noble Gas
4	R45B (SA-14) Medium Range Noble Gas

2.1.6 DEPRESS the following keys, to obtain the current reading for a specific channel on the readout digital display:

A. DATA _____

B. 1 for Unit 1 _____

C. **2 for UNIT 2** _____

D. **DOWN ARROW** _____

E. **CHANNEL NUMBER** _____

F. **ENTER** _____

G. **DOWN ARROW** _____

Example:

DATA, 1, DOWN ARROW, 3, ENTER, DOWN ARROW. This will display current data for R45C, UNIT 1

2.1.7 DEPRESS the following keys, to obtain a printout of the above data:

A. **PRINT** _____

B. **FILE** _____

C. **ENTER** _____

2.1.8 DEPRESS the following keys, to obtain **"10 MINUTE HISTORICAL DATA"** for a specific channel that is displayed on the digital readout display. Choose only one type of historical data at a time.

A. **HIST 10 MIN** _____

B. **1 for Unit 1** _____

C. **2 for Unit 2** _____

D. **DOWN ARROW** _____

E. **CHANNEL #** _____

F. **ENTER** _____

G. **UP ARROW** _____

2.1.9 DEPRESS the following keys, to obtain **"HOUR HISTORICAL DATA"** for a specific channel that is displayed on the digital readout display. Choose only one type of historical data at a time.

A. **HIST HOUR** _____

B. **1 for Unit 1** _____

C. **2 for Unit 2** _____

D. **DOWN ARROW** _____

E. CHANNEL # _____

F. ENTER _____

G. UP ARROW _____

2.1.10 DEPRESS the following keys, to obtain **"DAY HISTORICAL DATA"** for a specific channel that is displayed on the digital readout display. Choose only one type of historical data at a time.

A. HIST DAY _____

B. 1 for Unit 1 _____

C. 2 for Unit 2 _____

D. DOWN ARROW _____

E. CHANNEL # _____

F. ENTER _____

G. UP ARROW _____

Example:

HIST HOUR, 2, DOWN ARROW, 4, ENTER, UP ARROW. This will display the 24 most recent averages for channel R45B on Unit 2

2.1.11 DEPRESS the following keys, to obtain a printout of the historical file specified:

A. PRINT _____

B. FILE _____

C. ENTER _____

3.0 ADDITIONAL KEYBOARD OPERATIONS

3.1 Perform the Following Steps to Silence/Clear Alarms, Turn On/Off Pump, or Expose a Check Source

3.1.1 OBTAIN the R45 key from I & C or the OS. _____

3.1.2 INSERT the key into the"Command Enable" slot and turn the key clockwise. _____

3.1.3 DEPRESS the following, to silence an alarm on a specified channel and unit:

A. ALM ACK _____

B. 1 for Unit 1 _____

C. 2 for Unit 2 _____

D. DOWN ARROW _____

E. CHANNEL NUMBER _____

F. ENTER _____

3.1.4 DEPRESS the following keys, to clear high alarms for a specified channel and unit:

A. ALM CLR _____

B. 1 for Unit 1 _____

C. 2 for Unit 2 _____

D. DOWN ARROW _____

E. CHANNEL NUMBER _____

F. ENTER _____

3.1.5 DEPRESS the following keys, to turn the 6 lpm pump on or off:

A. PUMP _____

B. ON or OFF _____

C. 1 for Unit 1 _____

D. 2 for Unit 2 _____

E. ENTER _____

3.1.6 DEPRESS the following keys, to expose the check source to a specified detector/channel:

A. CK SRC

B. 1 for Unit 1

C. 2 for Unit 2

D. **DOWN ARROW**

E. **CHANNEL # (3 or 4)**

F. **ENTER**

3.1.7 DEPRESS the following keys, to disable/re-enable the alarm function of specified channel and Unit:

A. **ALM**

B. **OFF or ON**

C. **1 for Unit 1**

D. **2 for Unit 2**

E. **DOWN ARROW**

F. **CHANNEL #**

G. **ENTER**

3.1.8 DEPRESS the following keys, with the "Command" enable turned off and the key removed, to display the operational parameters of a specified channel and Unit:

A. **FILE**

B. **1 for Unit 1**

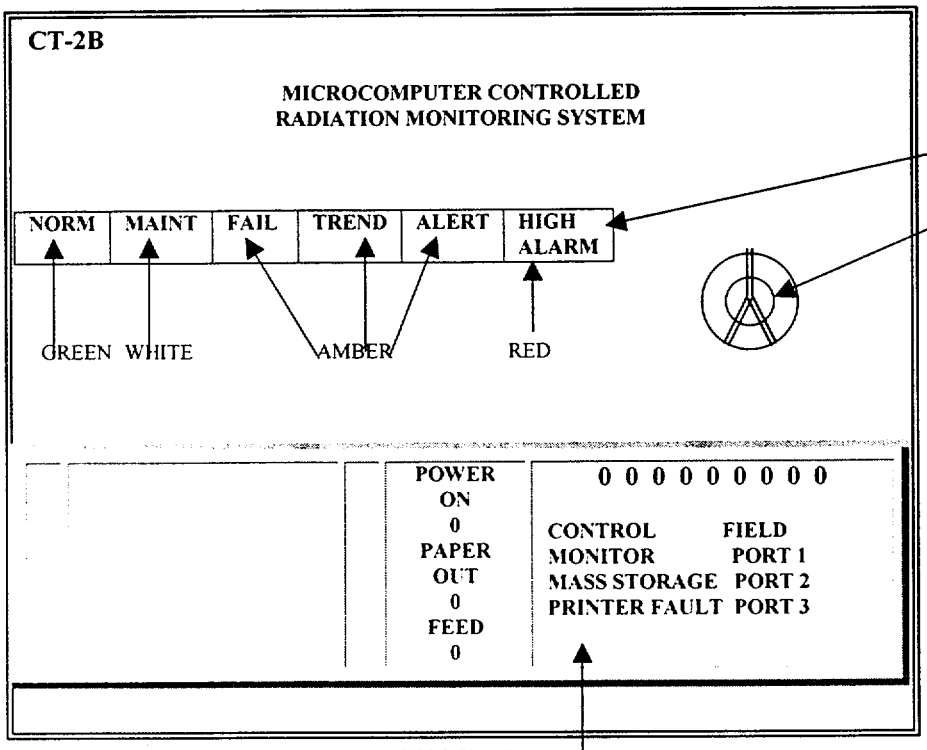
C. **2 for Unit 2**

D. **DOWN ARROW**

E. **CHANNEL #**

F. **ENTER**

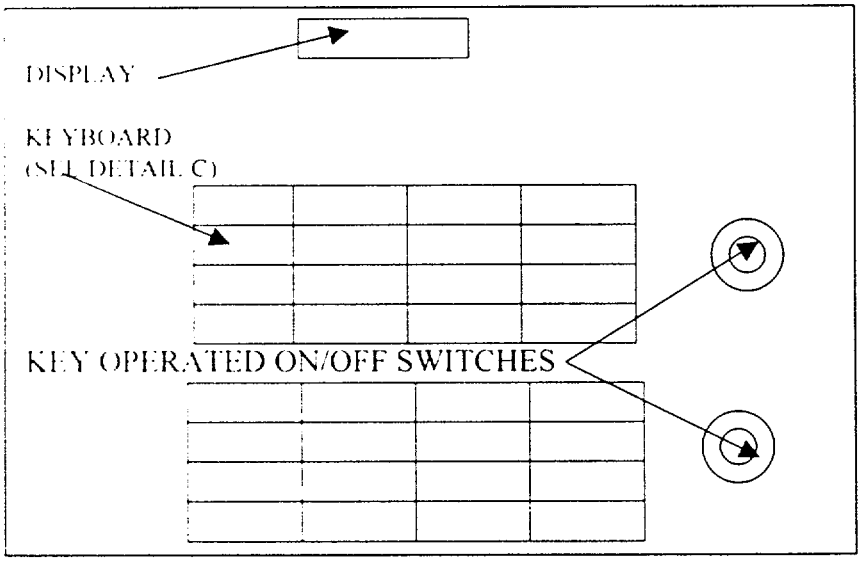
ATTACHMENT 5
Page 9 of 9



DETAIL A
(SYSTEM ANNUNCIATOR PANEL
(DRAWER PULLS OUT TO EXPOSE DETAIL B)

HIST MIN	HIST 10 MIN	HIST HOUR	HIST DAY
DATA	CK SRC	ALM ACK	ALM CLR
FILE	FILT STEP	FLUSH	ALM
PRINT	OFF ON	PUMP	STND BY

INSTRUCTION PAD



DETAIL B
(SYSTEM CONTROLLER PANEL)

ENTER	7	8	9
EDIT	4	5	6
+ ⇧	1	2	3
- ⇩	0	.	RUB OUT

NUMERIC PAD
DETAIL C
TYPICAL KEYBOARD

ATTACHMENT 6

OPERATING INSTRUCTIONS FOR THE SALEM UNIT 2 RMS COMPUTER AND THE RM 2300 (R41 MONITOR VALUES)

NOTE

- This attachment provides guidance to allow access to the RMS computer for Unit 2. The main display indicates status (alarm, warning, no scan etc).
- Check the RMS computer time in the upper right hand corner of the screen with the Control Room clock. If the time is approximately correct and the seconds are updating, the data will be current. If the time/date is "frozen", current data is not available. I&C RMS supervisor should be contacted. The time/date that appears should be the time the system malfunctioned.
- When obtaining RMS data without the computer, use RP1 panel & rack room strip charts.

1.0 OPERATING INSTRUCTIONS FOR THE SALEM UNIT 2 RMS COMPUTER

1.1 Perform the Following to Operate the Unit 2 RMS Computer

1.1.1 DEPRESS the following keys, to access all of the RMS monitor values:

A. Enable and Plant Location simultaneously _____

B. "E" for all monitors _____

C. <CR> _____

NOTE

Any monitor in warning or alarm must be rechecked by strip chart integration in the rack room, behind the Control Room. Unit 2 strip chart recorders are limited, so data history must be checked by 15 minute averages on the computer.

1.1.2 PERFORM the following, for fifteen minute average data:

A. DEPRESS the **ENABLE & BARGRAPH** keys simultaneously. The bottom line on the screen will ask hourly or 15 minute average. _____

B. DEPRESS **M** & **<CR>** keys. Computer will then tell you to enter channel. _____

C. ENTER the monitor channel you wish to see (i.e."**C2R16**"). _____

D. DEPRESS the **<CR>** key. You will be asked to enter scale. _____

NOTE

Fifteen Minute averages begin and end on the quarter hour. Data is located to the left of the appropriate entry. Do not use "latest" data line as it is a 30 second average.

E. DEPRESS the **<CR>** key and the scale will be automatically adjusted & "auto range on" will be displayed. This mode will provide the four latest 15 minute averages only. The top entry is the oldest data, the bottom entry is the current 15 minute average data. _____

F. IF other 15 minute averages are needed for other monitor channels while in bar graph mode,
THEN enter channel number (i.e. "**C2R16**"). _____

G. DEPRESS the **<CR>** key. Data/status will be provided. _____

2.0 OPERATION OF THE RM 2300 (R41 MONITORS)

Note

The RM2300 computer is the controller for obtaining historical data for the R41 channels. The RM2300 computer is in the rear rack room on U/1 on RACK 136. The computer for U/2 is in the front, on panel 2RP1. The upper left hand corner of the display has a tag that reads; "Sorrento Electronics".

CAUTION

Permission **MUST** be obtained from the Operations Superintendent or Control Room Operator prior to operating the RM 2300.

2.1 PERFORM the following to obtain 1 minute, 10 minute, hourly, or daily readings.

3.1.1 PRESS **CURRENT ACTIVITY**.

3.1.2 PRESS **SELECT**.

3.1.3 IF "MENUS" is not highlighted,
THEN RETURN to Step 2.1.1.

3.1.4 VERIFY "MENUS" is highlighted

3.1.5 PRESS **SELECT**.

3.1.6 PRESS **DOWN "▼" ARROW** until "Display/Clear History" is highlighted

3.1.7 PRESS **SELECT**. "DISPLAY HISTORY" should be highlighted.

3.1.8 PRESS **SELECT**.

3.1.9 USE **DOWN "▼" ARROW** to highlight 1 minute, 10 minute, hourly, or daily averages.

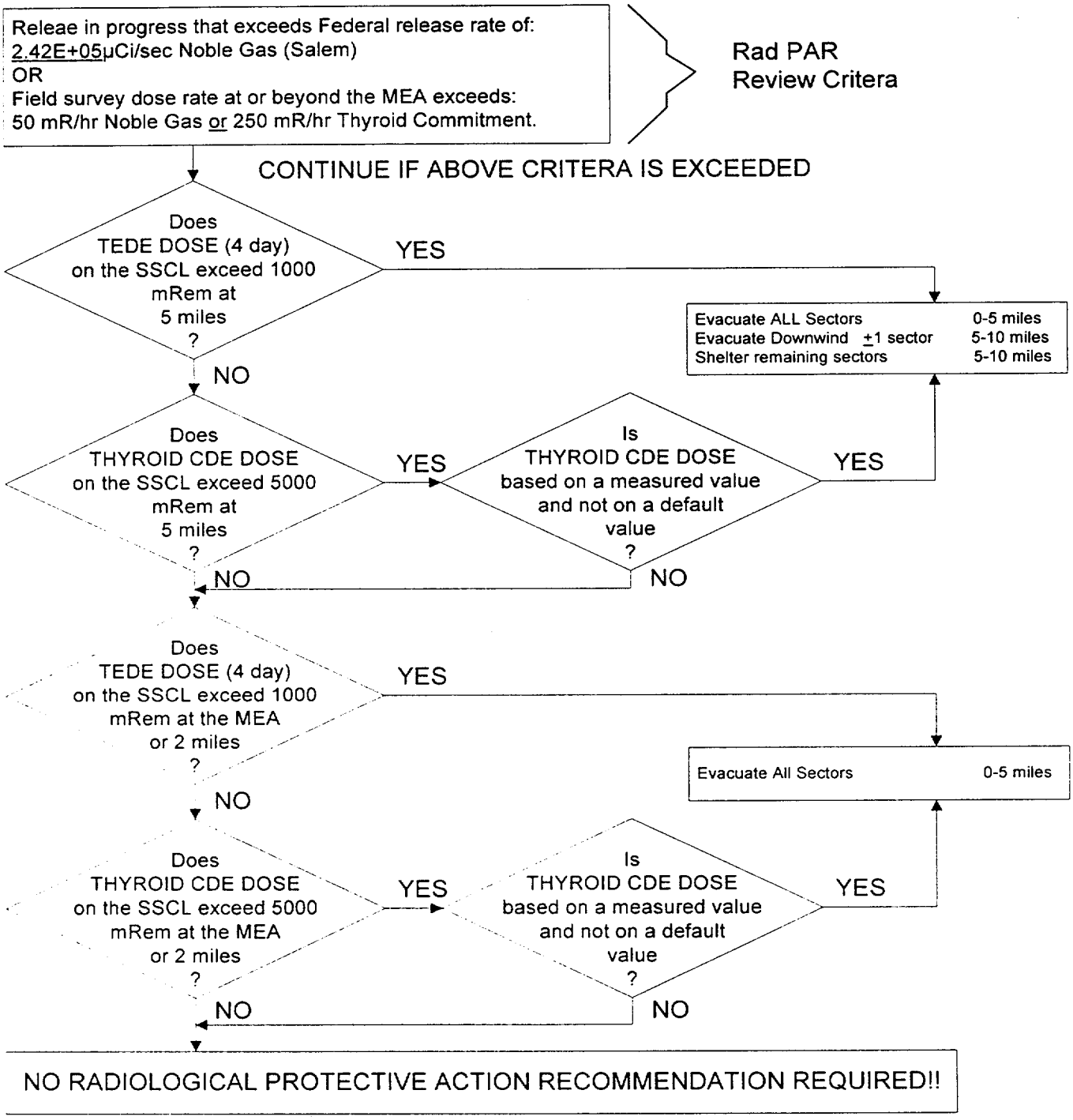
3.1.10 PRESS **SELECT**. Channel ID is located in the upper left hand corner of screen (Channel 1 = R41A, Channel 2 = R41B, Channel 3 = R41C, and Channel 4 = R41D)

3.1.11 USE **PREVIOUS** or **NEXT** push buttons to change channel to desired channel. These bottoms are located on right side of panel, under Channel Select. The most current reading is at the top of the left side column.

3.1.12 PRESS **CURRENT ACTIVITY** push button to return to the main screen.

ATTACHMENT 7
Page 1 OF 2
SALEM RADIOLOGICALLY BASED PROTECTIVE ACTION RECOMMENDATION FLOWCHART

Initial Conditions: If Rad PAR review criteria is not exceeded, Rad PAR is not required.

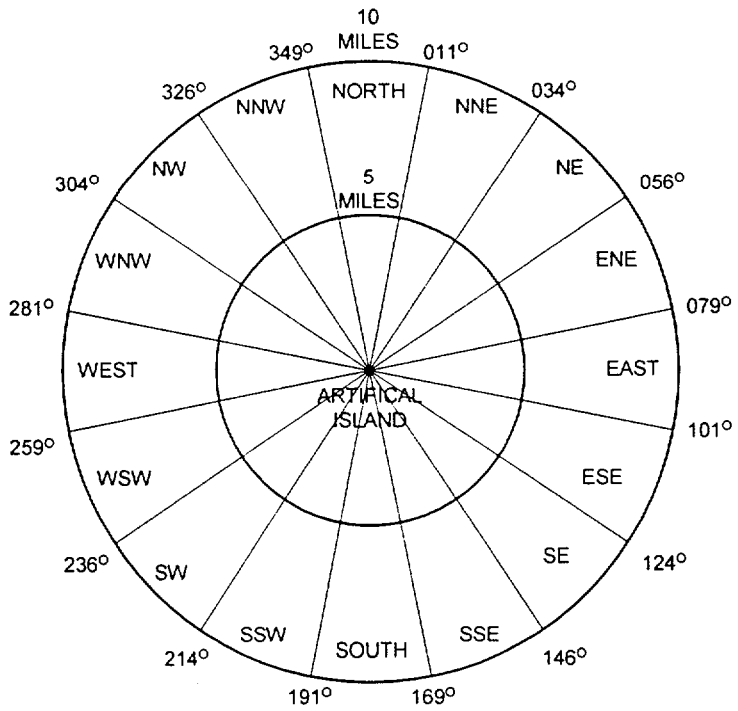


ATTACHMENT 7
Page 2 of 2

Recommended Protective Action Guidelines

WIND DIRECTION FROM DEGREES	COMPASS		PAR AFFECTED SECTORS DOWNWIND ±1 SECTORS
349 - 011	N	⇒	SSE - S - SSW
011 - 034	NNE	⇒	S - SSW - SW
034 - 056	NE	⇒	SSW - SW - WSW
056 - 079	ENE	⇒	SW - WSW - W
079 - 101	E	⇒	WSW - W - WNW
101 - 124	ESE	⇒	W - WNW - NW
124 - 146	SE	⇒	WNW - NW - NNW
146 - 169	SSE	⇒	NW - NNW - N
169 - 191	S	⇒	NNW - N - NNE
191 - 214	SSW	⇒	N - NNE - NE
214 - 236	SW	⇒	NNE - NE - ENE
236 - 259	WSW	⇒	NE - ENE - E
259 - 281	W	⇒	ENE - E - ESE
281 - 304	WNW	⇒	E - ESE - SE
304 - 326	NW	⇒	ESE - SE - SSE
326 - 349	NNW	⇒	SE - SSE - S

NOTE: CONSIDER ADDING A SECTOR TO THE PAR IF THE WIND DIRECTION (FROM) IS WITHIN ± 3° OF A SECTOR DIVIDING LINE.



ATTACHMENT 8
Page 1 of 1

ONSITE PROTECTIVE ACTION GUIDELINES

1.0 RADIATION LEVELS

Dose Rate (mR/hr)	Location	Action
≥ 100	Onsite	Evacuation of all nonessential personnel. Consider evacuation of other personnel.

Dose Rate (mR/hr)	Location	Action
≥ 100	Control Room OSC TSC Control Point	Consider evacuation within one hour, and/or relocation as appropriate.

Dose Rate (mR/hr)	Location	Action
≥ 1000	Onsite	Evacuation of all nonessential personnel Consider immediate evacuation of remaining personnel.

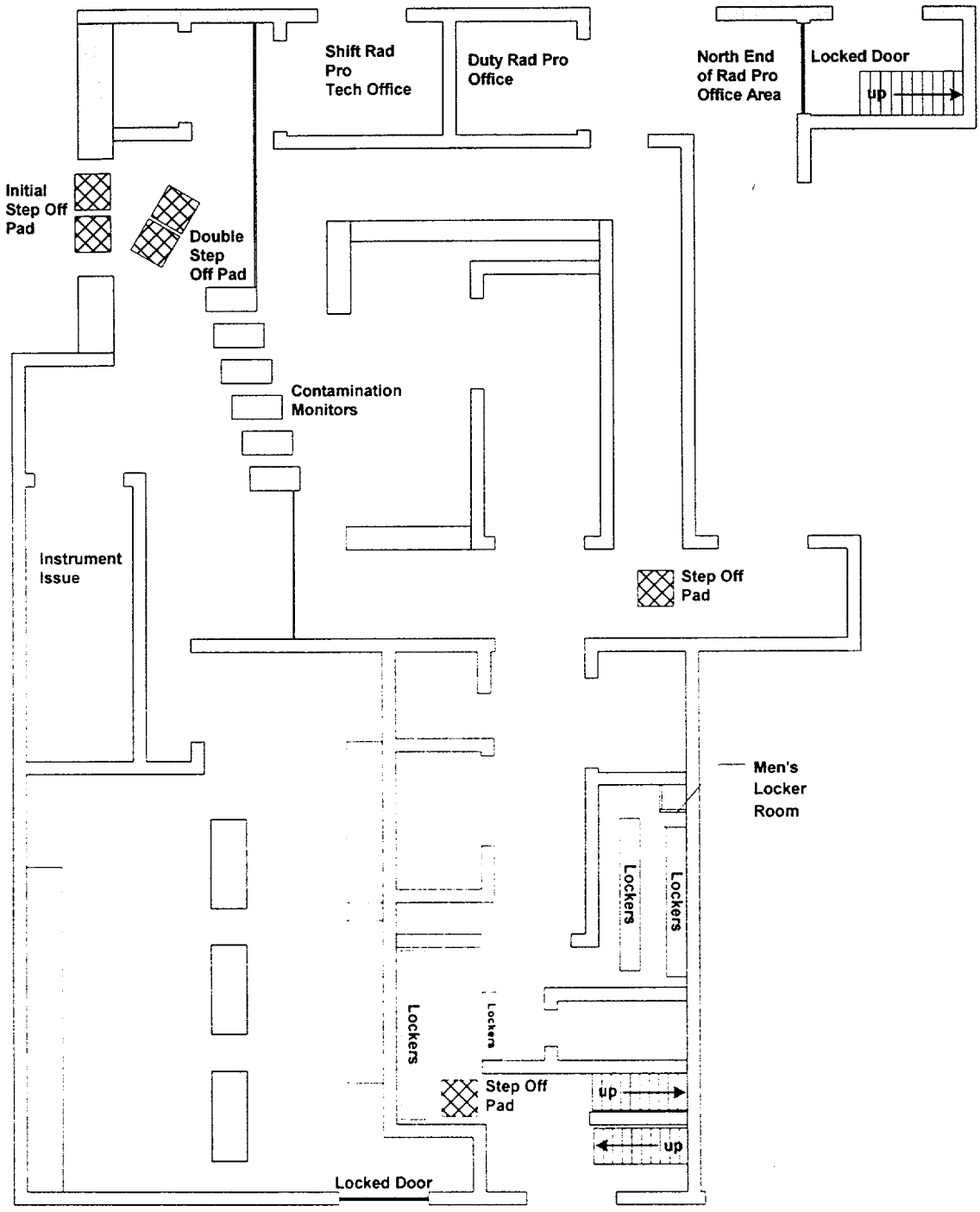
Dose Rate (mR/hr)	Location	Action
≥ 1000	Control Room OSC TSC Control Point	Consider immediate evacuation, and/or relocation upwind of the plume.

2.0 RADIOIODINE

If the Iodine-131 equivalent is calculated or measured in concentrations greater than or equal to 5.0E-7 uCi/cc, consider the use of Potassium Iodide for thyroid blocking. This section is to be applied to areas, in which personnel are working or are planning to work. Refer to Emergency Procedure NC.EP-EP.ZZ-0305(Q), Stable Iodine Thyroid Blocking, for additional information.

ATTACHMENT 9
Page 1 of 1

CONTAMINATION CONTROL GUIDANCE



ATTACHMENT 10
Page 1 of 3

STEAM GENERATOR TUBE LEAK/RUPTURE GUIDELINES

1.0 STEAM GENERATOR TUBE LEAK/RUPTURE GUIDELINES

1.1 **Refer to the Following Guidelines for Assistance During a Steam Generator Tube Leak/Rupture.**

1.1.1 REFER to SC.RP-TI.RM-0607(Q) Primary To Secondary Leak Rate Calculation Based on R15 or R19 Data, to monitor steam generator leak rate. Keep the OS informed of leak rates. _____

NOTE

- A Steam Generator Tube Rupture (SGTR) that occurs without a breach of the Main Steam Line(s) (MSL) will be a monitored, but unfiltered release. The Plant Vent Effluent Radiation Monitors (R41A – C & R45B – C) will detect this release and dose assessment may be performed using the appropriate Plant Vent Effluent Radiation Monitor in accordance with (IAW) NC.EP-EP.ZZ-0309(Q) Dose Assessment unless or until Operations isolates the pathway from the condenser air removal header to the Plant Vent.
- Dose assessment may be performed using the R46 monitor value during a primary to secondary leak or SGTR IAW NC.EP-EP.ZZ-0309(Q) Dose Assessment (Section 5.4).
- Dose assessment may be performed in the case of a breach of the MSL, or the appropriate R46 monitor being out of service, by taking a dose rate on a **PRE-EXISTING TELETECTOR RAD MONITORING LOCATION** of the affected MSL IAW NC.EP-EP.ZZ-0309(Q) Dose Assessment (Section 5.4).
- The PRE-EXISTING TELETECTOR RAD MONITORING LOCATIONS are at the bend of the MSL, prior to the Main Steam Isolation Valves. Refer to EPIP 309S, Dose Assessment (Attachment 1) for a diagram.

1.1.2 IF appropriate, THEN perform dose assessment using a dose rate taken from the MSL and inputting it into MIDAS IAW section 5.4 of NC.EP-EP.ZZ-0309(Q), Dose Assessment, using the predetermined teletector correction factor of (9.33E-05) or the R46 monitor value, as appropriate. _____

ATTACHMENT 10
Page 2 of 3

1.1.3 CONSIDER setting up contamination controls for the Turbine Building due to pre-existing leaks should be considered contaminated. (Contamination levels could increase to "Contamination Area" values due to the secondary side being contaminated from the primary side). _____

1.1.4 IF radiological conditions in the area warrant it, THEN establish the Turbine Building or portions of the Turbine as Radiation Areas or High Radiation Areas (The dose rates could increase to these levels due to the secondary side being contaminated by the primary side). _____

NOTE

- The possibility exists that the entire Protective Area for Salem and Hope Creek could become a contaminated area where only clean islands exist.
- All areas of water found on Plant surfaces/floors and in the Yard, should be considered contaminated, until proven otherwise.

1.1.5 CONSIDER setting up contamination controls promptly, to ensure that the Control Room/OSC, Control Point, TSC and Main Guard House are maintained as clean islands. _____

1.1.6 CONSIDER the following items to help maintain these areas as clean islands:

- DELIVER Shoe covers, gloves, friskers, PC and waste Containers to the Control Room/OSC. _____
- DRESS Anyone exiting the CR/OSC clean area in shoe covers and gloves. _____
- FRISK all personnel prior to entering the CR/OSC. _____

ATTACHMENT 10
Page 3 of 3

- DECONTAMINATE all contaminated persons, as time and manpower permits. _____
- PREVENT contaminated persons or items/equipment from entering into clean areas without Supervision's approval. _____
- SETUP the entrance(s) to the Main Guard House, with step off pads, friskers, PC and waste containers, as time and manpower permits. _____
- DELIVER shoe covers and gloves to the Guard House, to be worn by anyone exiting the guard house into the Protected Area, as time and manpower permits. _____
- REQUEST the OS for additional support from Hope Creek to assist with appropriate tasks, if thought necessary. _____

FORM 1

Page 1 of 1

HABITABILITY LOG

DATE: / /

TIME	LOCATION	DOSE RATE (mR/hr)	CONTAMINATION (CPM)	INITIALS

IF other means are used to ensure habitability, THEN list:_____