Southern Nuclear Operating Company, Inc.
Vogtle Electric Generating Plant
Post Office Box 1600
Waynesboro, Georgia 30830

Tel 706.826.4209
Fax 706.826.3321

May 5, 2000

SOUTHERN COMPANY
Energy to Serve Your World℠

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D. C. 20555

NOG-01157

VOGTLE ELECTRIC GENERATING PLANT
EMERGENCY PLAN IMPLEMENTING PROCEDURE REVISION

Gentlemen:

In accordance with 10 CFR 50.4, as required by 10 CFR 50, Appendix E, Part V, Southern Nuclear hereby submits the following revision(s) to the Vogtle Emergency Plan Implementing Procedure (s):

Procedure	Revision	Effective Date
91105-C	11	04/18/00
91202-C	11	04/24/00
91502-C	11	04/18/00
91504-C	09	04/18/00

By copy of this letter, the NRC Region II Administrator and the Site NRC Senior Resident Inspector will receive one copy each of the revision(s).

Please contact Angel Cardona at (706) 826-3114 if you have any questions.

Sincerely,

J.T. Gasser
General Manager

JTG/AEC/jmm

Enclosure: Emergency Plan Implementing Procedure(s)

A045

xc: Southern Nuclear
Mr. J. B. Beasley, Jr.
Mr. L. A. Ward
NORMS

Shaw, Pittman, Potts & Trowbridge
Mr. E. L. Blake, Jr., Attorney-at-Law (with attachment)

Troutman & Sanders
Mr. A. H. Domby, Attorney-at-Law (with attachment)

U. S. Nuclear Regulatory Commission
Mr. L. Reyes, Regional Administrator (with attachment - one copy)
Mr. J. Zeiler, NRC Senior Resident Inspector, Vogtle(with attachment-one copy)

Southern Nuclear Operating Company
Nuclear Operations
P.O. Box 1600
Waynesboro, Georgia 30830
Telephone 706-724-1562
706-554-9961

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RECORDS SUBMITTAL FORM

TO: **US NRC**
ATTN: DOCUMENT CONTROL DESK
SET 6 W/ ORIG LTR
WASHINGTON, D.C. 20555

Submittal No. EP-00-06

ubmitted to you for storage. Documents
indicated by a mark in the SE column.

Document Number	Rev	SE	Document Description
91105-C	11		"Duties of the EOF Manager"
			3 pages of documentation
91202-C	11		"Activation and Operation of the Operations Support Center"
			3 pages of documentation
91502-C	11		"Core Damage Assessment"
			3 pages of documentation
91504-C	09		"Core Inventory Determinations Using Reactor Power History"
			3 pages of documentation

RECEIVED
APR 27 2000

Remarks: Printed copies compared to originals in Document Control.

June J. McBride
Submitted By:

Received By: (Document Control)

Emergency Preparedness
Department

04/27/2000
Date

4/27/00
Date

Figure 2 (Example)

REFERENCE USE PROCEDURE **PRB REVIEW REQUIRED**

1.0 PURPOSE

The purpose of this procedure is to provide instructions to the Emergency Operations Facility (EOF) Manager for overall direction of the EOF.

2.0 RESPONSIBILITIES

2.1 EOF MANAGER RESPONSIBILITIES

2.1.1 Timely offsite communications when the Emergency Director (ED) is in the EOF.

2.1.2 Managing the EOF and directing EOF emergency response personnel.

2.1.3 Coordinating and directing all offsite emergency response functions.

2.1.4 Providing radiological information to the State and local emergency response agencies.

2.1.5 Ensuring that ALL Vogtle Electric Generating Plant (VEGP), Georgia Power Company (GPC), Southern Nuclear Company (SNC) employees, and vendor/contractors reporting to the EOF meet the requirements of the Fitness For Duty (FFD) policy for recall of off-duty personnel.

2.1.6 Participation in the development of protective actions recommendations.

2.1.7 Providing recommendations on protective actions to the ED.

2.1.8 Ordering evacuation of EOF (if needed).

2.1.9 Review and approve News Releases when Emergency Director is not available.

3.0 PREREQUISITES

Site Area Emergency or General Emergency has been declared or the ED has ordered activation of the EOF.

4.0 PRECAUTIONS

4.1 This procedure shall not take priority over measures required to maintain or restore the plant to a safe operating condition.

4.2 This procedure does not replace any plant operating procedure. During an emergency condition, the EOF Manager will continue to use appropriate plant procedures in parallel with this and other Emergency Plan Implementing Procedures.

5.0 PROCEDURE

5.1 EOF ACTIVATION

5.1.1 The EOF shall be brought to a standby status at the ALERT classification level. Standby status is defined as physical readiness of the facility and staffing of key positions except the ED. The EOF will be operational (capable of being activated) within about an hour after initial notification of ERO personnel following the declaration of a Site Area Emergency or higher declaration.

5.1.2 The EOF Manager shall complete the initial actions of the EOF Manager Checklist as soon as possible and complete the subsequent actions on a continuing basis.

5.2 STAFF SUPERVISION

The EOF Manager shall supervise the activities of the following EOF staff:

5.2.1 Dose Assessment Manager (dose assessment, protective action recommendations, Field Monitoring Team control).

5.2.2 Security Coordinator (site access, accountability, evacuation, liaison with local law enforcement).

5.2.3 Support Coordinator (logistics, offsite support groups, communications, staffing, log keeping, etc.)

6.0 REFERENCES

6.1 VEGP EMERGENCY PLAN

6.2 PROCEDURES

6.2.1 91002-C, "Emergency Notifications"

6.2.2 91101-C, "Emergency Response Organization"

6.2.3 91203-C, "Activation And Operation Of The EOF"

6.2.4 91204-C, "Emergency Response Communications"

6.2.5 91305-C, "Protective Action Guidelines"

6.2.6 91501-C, "Recovery"

6.3 NUREG-0654, FEMA-REP-1, Rev. 1 "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants"

END OF PROCEDURE TEXT

Sheet 1 of 3

EOF MANAGER CHECKLIST

DESIGNEES

- Manager Outage and Planning
- Manager Training and Emergency Preparedness
- Manager Health Physics/Chemistry
- Manager Plant Modification and Maintenance Support
- Maintenance Manager

RESPONSIBILITY:

Manage the EOF and direct the offsite emergency response. Communicate radiological information to state and local emergency response agencies. Provide support for initial activities associated with planning for re-entry or recovery operations.

INITIAL ACTIONS

1. Report to the EOF.

2. Sign in on Emergency Response Facility Roster.

3. Obtain work packets, appropriate dosimetry as necessary and emergency identification badge.

4. Obtain briefing if possible from the ED, TSC Manager or other knowledgeable management personnel.

5. Ensure that key EOF positions have been filled by reviewing Emergency Response Facility Roster. Refer to Procedure 91203-C, "Activation And Operation Of The Emergency Operations Facility" for minimum EOF staff requirements.

6. Review facility and equipment readiness with EOF staff.

7. When adequately staffed, declare the EOF operational, notify the ED, the TSC Manager, Emergency News Center and General Office Operations Center.

NOTE

If a recall of off-duty personnel has been initiated, perform the following:

8. FFD determinations

   a. Review the sign in roster and ensure that ALL personnel reporting to the EOF answer the fitness for duty question.

   b. If any personnel have answered 'yes' to the FFD question, a FFD evaluation is required. The Safety and Health department is available to help make this determination.

EOF MANAGER CHECKLIST

SUBSEQUENT ACTIONS

1.* Maintain log(s).

2.* Assist the ED as needed.

3.* Provide periodic briefings to EOF staff.

4.* Review and approve News Releases when Emergency Director is not available.

Notifications

1.* Assist the ED in performing notifications to the State, County, NRC and SRS EOC (Procedure 91002-C, "Emergency Notifications").

2. Complete and transmit the Emergency Notification message forms (Procedure 91002-C, "Emergency Notifications") when the EOF is responsible for offsite notifications. Provide to the ED for review and approval.

Protective Actions

1.* Coordinate with the Dose Assessment Manager in developing protective action recommendations (Procedure 91305-C, "Protective Action Guidelines").

2.* Provide protective action recommendations to the ED.

3.* Assure that the EOF remains habitable. Direct activation of the alternate EOF if necessary (Procedure 91203-C, "Activation And Operation Of The EOF").

4. If the offsite public alerting sirens are activated by the state or local authorities, then the activation should be repeated by the EOF back-up activation station. Contact Telecommunication or Emergency Preparedness to initiate this activation.

Liaison with Offsite Agencies

1.* Assure that the Dose Assessment Manager maintains liaison with the appropriate State radiological officer to transmit radiological information.

2.* Provide briefings and liaison with State, County, SRS, FEMA and NRC personnel arriving at the EOF.

* Continuing Activity

EOF MANAGER CHECKLIST

SUBSEQUENT ACTIONS (CONT'D)

Support Activities

1.* Assure that the EOF Support Coordinator is obtaining necessary offsite support when required.

2. Coordinate with EOF Support Coordinator to develop extended duty roster, if needed.

Relief

1. Perform relief and complete Relief Checklist in Procedure 91101-C, "Emergency Response Organization".

Emergency Termination

1. After the emergency condition has been declared terminated, proceed as follows:

   a. Hold a final staff meeting.

   b. Collect logs and checklist from EOF staff.

   c. Attend a staff briefing with the ED and key staff members to determine recovery actions.

Recovery

1. Coordinate with the ED to provide support for initial recovery planning activities per Procedure 91501-C, "Recovery".

Restoration of the EOF

1. Restore the EOF to a ready condition at the termination of the emergency.

* Continuing Activity

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Nuclear Operations
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Waynesboro, Georgia 30830
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706-554-9961

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Submittal No. EP-00-06

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Submitted By:

Received By: (Document Control)

Emergency Preparedness
Department

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4/27/00
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Figure 2 (Example)

REFERENCE USE PROCEDURE **PRB REVIEW REQUIRED**

1.0 PURPOSE

The purpose of this procedure is to provide instructions for the activation and operation of the Operations Support Center (OSC).

2.0 RESPONSIBILITIES

2.1 The first knowledgeable person from the Emergency Response Organization (ERO) arriving at the OSC shall be responsible for initiating preparations to physically activate the OSC.

2.2 The OSC Manager shall be responsible for declaring the OSC operational and coordinating Radiological Emergency Team (RET) formation and dispatch.

2.3 The OSC Status Loop Communicator shall be responsible for supporting the OSC Manager with communications between the OSC and other Emergency Response Facilities and RETs.

2.4 I&C Technicians, Electricians, Mechanics, Chemistry Technicians, Health Physics Technicians, oncoming shift personnel and off-shift operators shall be responsible for assisting in determining repair/damage control alternatives, corrective actions and serving as members of RETs.

2.5 The TSC Manager shall be responsible for ordering evacuation of the OSC based upon recommendations from the OSC Manager and/or the Health Physics Supervisor.

3.0 PREREQUISITES

3.1 An Alert, Site Area Emergency or General Emergency has been declared or the Emergency Director (ED) has ordered activation of the OSC.

3.2 For a Notification of Unusual Event, the ED may order partial activation of the OSC to provide manpower resources for assignment to RETs.

4.0 PRECAUTIONS

If the radiological conditions indicate that the OSC is uninhabitable, the TSC Manager should consider evacuation of the OSC and to reassemble at the TSC and/or the EOF.

5.0 PROCEDURE

5.1 ACTIVATION

5.1.1 The ED shall order activation of the OSC, which is located on the second floor of the Maintenance Building, and notifications of appropriate OSC staff will be made per Procedure 91002-C, "Emergency Notifications". The OSC will be operational (capable of being activated) within about an hour of initial notification.

5.1.1.1 To declare the facility activated the following minimum OSC staff must be present to perform the following functions:

POSITION	FUNCTION
• OSC Manager	OSC Management
• Health Physics Technicians (2) **(May be located at TSC or HPCP)**	Radiation Protection/First Aid
• Field Monitoring Personnel (2)	Offsite Surveys
• Electricians (2)	Electrical Maintenance
• Mechanics (2)	Mechanical Maintenance
• Instrument & Control Technicians (2)	Instrument & Control Maintenance

5.1.2 The following personnel who are members of the RETs, shall report to the OSC, obtain dosimetry and emergency identification badges, sign in on the "Emergency Response Facility Roster", Data Sheet 1, or similar form, set up work stations inclusive of status boards, and follow the directions of the OSC Manager:

5.1.2.1 Maintenance Team Leaders/Assistant Team Leaders not assigned to the TSC.

5.1.2.2 I&C Technicians

5.1.2.3 Mechanics

5.1.2.4 Electricians

5.1.2.5 Chemistry and Health Physics Technicians not assigned to TSC or control point.

5.1.2.6 Other Operators

5.1.2.7 OSC Support Staff Personnel

5.1.2.7.1 Nuclear Specialist

5.1.2.7.2 Work Planners

5.1.2.7.3 Quality Control Specialist

5.1.2.7.4 Performance Team Technical Staff

5.1.2.8 OSC Status Loop Communicator(s)

5.1.3 If other personnel have assumed their assigned position, stand by the OSC for second shift duty or other assignment in accordance with directions from the OSC Manager.

5.1.4 The OSC Manager shall report OSC readiness per the OSC Manager Checklist, Procedure 91104-C, "Duties Of The OSC Manager".

5.2 FUNCTIONS AND OPERATIONS

5.2.1 After activation, the following functions shall be performed at the OSC according to the organization shown in Figure 1:

5.2.1.1 Serve as the assembly and staging area for personnel pooled for emergency response.

5.2.1.2 Respond to requests from the ED and TSC concerning deployment of RETs.

5.2.1.3 Management of emergency equipment and supplies.

5.2.1.4 Coordination of movement of personnel in the plant and onsite, except for those assigned to the TSC and Control Room.

5.2.2 The OSC Manager shall coordinate the activities of the Search and Rescue, First Aid, Damage Assessment, Damage Control, and Repair and Modification Teams. This shall include ensuring that teams are properly briefed and equipped prior to dispatch and debriefed upon return to the OSC. He shall maintain a communications logbook and ensure that important information obtained by these teams is disseminated to the TSC and Control Room, as appropriate.

5.2.3 The OSC Manager shall issue vehicle and fuel pump keys to the offsite survey teams.

5.2.4 The OSC Status Loop Communicator(s) shall report directly to the OSC Manager and maintain communications logs and status boards.

5.2.5 The OSC support staff personnel shall conduct personnel accountability of OSC Staff, under the direction of the OSC Manager, per Procedure 91401-C, "Assembly and Accountability".

5.2.6 Technicians, Off-shift Operators and oncoming shift personnel shall assist the OSC Manager and serve as members of emergency teams. Team members shall be qualified as RET members. Each team shall include at least one health physics technician if radiological conditions warrant. The composition of teams, reporting requirements and appropriate procedures/checklists are as follows:

5.2.6.1 Search and Rescue Team

a. Designees and Qualifications:

At least two members that are familiar with the plant and ONE must be First Aid-trained, ONE being a Health Physics Technician if radiological conditions warrant. Team formed by OSC Manager or designee.

b. Reporting Requirements:

Team Leader (designated by OSC Manager) reports to the OSC Manager directly, or via OSC Foreman/Supervisor at least every one-half hour by hand-held radio, plant telephone, or page.

c. Procedure/Checklist:

Procedure 91306-C, "Contamination Monitoring and Decontamination".

5.2.6.2 First Aid Team

a. Designees and Qualifications:

At least two members, who are First Aid-trained, ONE being a Health Physics Technician if the injured person is potentially contaminated.

b. Reporting Requirements:

Team Leader (designated by OSC Manager) reports to the OSC Manager directly or via OSC Foreman/Supervisor at least every one-half hour by hand-held radio, plant telephone or page.

c. Procedures/Checklists:

Procedure 91306-C, "Contamination Monitoring and Decontamination".

Procedure 91307-C, "Contaminated Injury".

5.2.6.3 Damage Assessment/Control Team

a. Designees and Qualifications:

At least two appropriately qualified OSC personnel. Formed by OSC Manager or designee.

b. Reporting Requirements:

Team Leader (designated by OSC Manager) reports to OSC Manager directly or via OSC Foreman/Supervisor at least every one-half hour by hand-held radio, plant telephone or page.

c. Procedure/Checklist:

Procedure 91306-C, "Contamination Monitoring and Decontamination", if Health Physics Technician accompanies team.

5.2.6.4 Repair and Modification Team

a. Designees and Qualifications:

At least two appropriately qualified OSC personnel. Formed by OSC Manager or designee.

b. Reporting Requirements:

Team Leader (designated by OSC Manager) reports to OSC Manager directly or via OSC Foreman/Supervisor at least every one-half hour by hand-held radio, plant telephone or page.

c. Procedures/Checklists:

Procedures 91306-C, "Contamination Monitoring and Decontamination", if Health Physics Technician accompanies team.

NOTE

In-plant monitoring teams are normally formed at the Health Physics Control Point.

5.2.6.5 In-Plant Monitoring Team

a. Designees and Qualifications:

At least two members, with at least one being a Health Physics Technician. Formed by OSC Manager or designee when dispatched from the OSC.

b. Reporting Requirements:

Team Leader (designated by OSC Manager when dispatched from the OSC) reports at least every one-half hour to Health Physics Supervisor or via Survey Team Communicator in the TSC by hand-held radio, plant telephone or page.

c. Procedure/Checklist:

Procedure 91302-C, "In-Plant Sampling and Surveys".

5.2.6.6 Back-Up Fire Brigade

a. Designees and Qualifications:

Assigned Fire Brigade personnel. Formed by OSC Manager or designee.

b. Reporting Requirements:

Team Leader (designated by OSC Manager) reports to Fire Brigade Captain and OSC Manager when assigned task is completed.

c. Procedure/Checklist:

Procedure 92000-C, "Fire Protection Program".

5.2.6.7 Field Monitoring Team

a. Designees and Qualifications:

Assigned Field Monitoring Team (FMT) personnel. At least two members who are Field Monitoring Team trained.

b. Reporting Requirements:

Team Leader (designated by OSC Manager or designee) reports at least every one-half hour to the Dose Assessment Manager (or HP Supervisor if the EOF is not activated) via the Field Monitoring Team Communicator in TSC or EOF by mobile and/or hand held radio.

c. Procedures/Checklist

Procedure 91303-C, "Field Sampling and Surveys".

Procedure 91306-C, "Contamination Monitoring and Decontamination".

5.2.6.8 Site Evacuation Team

a. Designees and Qualifications:

At least two members with one being a Health Physics Tech or other qualified HP staff member and an assigned Evacuation Team Leader (Nuclear Security Officer). Team formed by the OSC Manager or his designee.

b. Reporting Requirements:

Team leader provides periodic progress report to the OSC Manager directly or via OSC Foreman/Supervisor by radio or telephone.

c. Procedures/Checklists:

Procedure 91306-C, "Contamination Monitoring and Decontamination"

Procedure 91403-C, "Site Evacuation", Evacuation Leader Checklist

5.2.7 Prior to activation of the OSC, the ED may dispatch Emergency Teams from assigned shift personnel. In this case, teams will be formed by and report to the ED, or his designee.

NOTES

a. Communications links available in the OSC are described in Procedure 91204-C, "Emergency Response Communications".

b. Emergency equipment and supplies stored at or near the OSC are detailed in Procedure 91702-C, "Emergency Equipment and Supplies" or 91705-C, "Inventory And Testing Of Emergency

Preparedness Material/Equipment Which Are Not Part Of The Emergency Kits".

5.2.8 The OSC Manager will make provisions for a shift change within 12 to 16 hours of the initiation of the current shift.

5.3 OSC EVACUATION

5.3.1 Evacuation of the OSC should be considered if the facility is not functional or its radiological conditions reach or exceed either or both of the following values:

a. Dose Rate = 100 mRem/hr

b. Iodine Activity - 2.7E-7 μCi/cc

5.3.2 The TSC Manager may order evacuation of the OSC as recommended by the OSC Manager. He shall instruct the OSC Manager to relocate staff, equipment and supplies to the TSC and/or the EOF, as appropriate.

5.3.3 The OSC Manager shall determine the reassembly points for the OSC staff and direct the evacuation. Personnel who may be called on for immediate support will be relocated to the TSC.

5.3.4 The OSC Manager shall contact all RETs performing in-plant activities and inform them of OSC evacuation, interim communications methods and reassembly locations.

5.3.5 The OSC Manager shall keep the TSC Manager apprised of all phases of the evacuation and shall report completion of relocation.

6.0 REFERENCES

6.1 VEGP EMERGENCY PLAN

6.2 PROCEDURES

6.2.1 91002-C, "Emergency Notifications"

6.2.2 91104-C, "Duties of the OSC Manager"

6.2.3 91204-C, "Emergency Response Communications"

6.2.4 91302-C "In-Plant Sampling and Surveys"

6.2.5 91303-C, "Field Sampling And Surveys"

6.2.6 91306-C, "Contamination Monitoring and Decontamination"

6.2.7 91307-C, "Contaminated Injury"

6.2.8 91401-C, "Assembly and Accountability"

6.2.9 91702-C, "Emergency Equipment And Supplies"

6.2.10 91705-C, "Inventory And Testing Of Emergency Preparedness Material/Equipment Which Are Not Part Of The Emergency Kits

6.2.11 92000-C, "Fire Protection Program"

6.3 NUREG-0654, FEMA-REP-1, Rev 1, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants"

6.4 NUREG-0696, "Functional Criteria for Emergency Response Facilities"

END OF PROCEDURE TEXT

OSC ORGANIZATION CHART

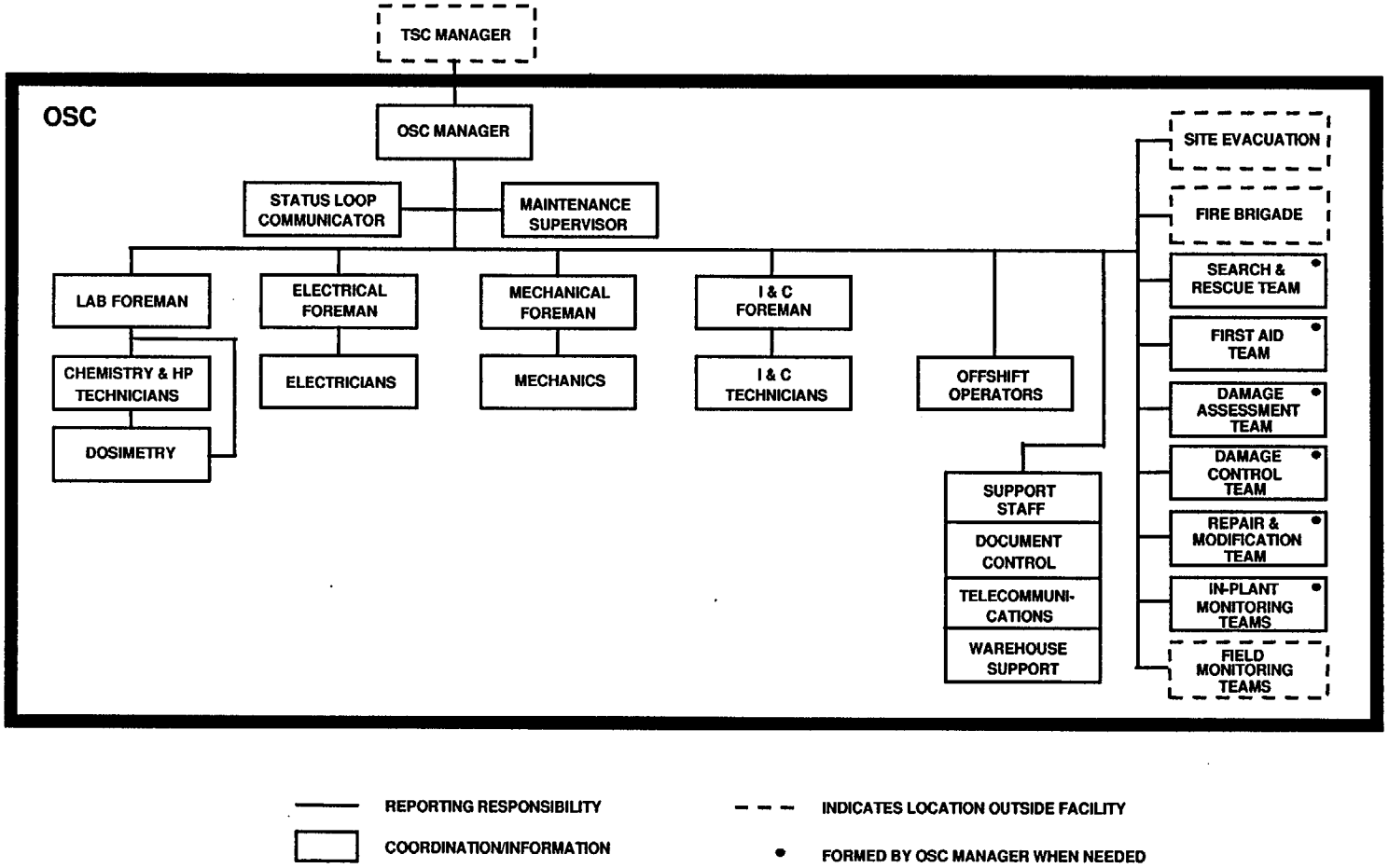

FIGURE 1

Sheet 1 of 1

DATA SHEET 1
EMERGENCY RESPONSE FACILITY ROSTER

Facility _____

Date _____

TIME		BADGE NO.	NAME	(FOR RECALLED PERSONNEL ONLY) Have you consumed any alcohol in the past 5 hours?	
IN	OUT	(NO, SG, SD)		NO	YES

PAGE ____ of ____

DATA SHEET 2

HABITABILITY SURVEY

OSC FACILITY **Date** _____

Time (once per hour minimum)							
Dose Rate (100 mRem/hr limit)							
Iodine Activity (2.7E-7 μCi/cc limit)							
Air Sample Activity							
Swipe Survey							
OSC Manager and HP Supervisor advised of the results							
Performed by initials							

OSC ACTIVATION CHECKLIST

RESPONSIBILITY:

All personnel reporting to the OSC shall prepare the OSC physically for use by the VEGP Emergency Response Organization.

INITIAL ACTIONS

1. Badge in on the OSC ACAT.

2. Review the OSC Floor Plan per layout posted in OSC.

3. Sign in on the Emergency Response Facility Roster and answer Fitness for Duty (FFD) question. (FFD question for recalled personnel only).

4. Remove emergency response materials and equipment from storage areas and arrange physical facilities per layout posted in OSC.

5. Remove telephones, emergency identification badges, status boards, copies of procedures, checklists, maps and other equipment/supplies from the OSC Emergency Kit and prepare the OSC for activation.

6. Check operability of telephones by lifting receiver and listening for a dial tone.

7. Perform radio check of hand held radios (Channels 1, 2, 3, 4 and 5).

NOTES

OSC personnel that are already in the field performing their emergency duties may be credited as minimum shift staffing for activation. (i.e. HP Technicians/FMT members/crafts).

8. Ensure that the minimum OSC staff that is needed for activation is present per section 5.1.1.1 of this procedure.

9. Report readiness to the OSC Manager.

10. If the OSC Manager has not arrived, begin completing OSC Manager Checklist in Procedure 91104-C, "Duties Of The OSC Manager".

11. Establish your workstation and await instructions from the OSC Manager or TSC Manager.

Sheet 1 of 2

LAB FOREMAN CHECKLIST

POSITION FILLED BY: HP Foreman

INITIAL ACTIONS

1. Report to the OSC.
2. Sign-in on the Emergency Response Facility Roster and badge in on OSC ACAT.
3. Obtain work packets. (Packets located in the OSC document control cabinet.)
4. Obtain briefings from OSC Manager, senior on-shift Health Physics Technician or HP Supervisor (from TSC) on status of plant and any releases.
5. Advise OSC Manager when ready for operation and begin maintaining appropriate logs and checklists.
6. Establish an unmanned personnel-monitoring station at the entrance to the OSC.
7. Periodically monitor conditions in accordance with the Habitability Checklist on the following sheet.

SUBSEQUENT ACTIONS

1. Assign Health Physics Technicians to Radiological Emergency Teams (RETs) if radiological conditions warrant or are unknown in areas where teams will be working. (i.e., Plant Entry Security Building, Secondary Alarm Station, Supervisor Nuclear Security office).

NOTE

Do not use a designated emergency response field-monitoring vehicle for transportation to the relocation center.

NOTE

Ensure that the offsite relocation team takes their procedure manual when dispatched from OSC.

2. Assign Health Physics personnel to report with the Evacuation Leader (Nuclear Security Officer) to the offsite relocation center at an ALERT to set up for decontamination, should a Site Evacuation be ordered.

LAB FOREMAN CHECKLIST

SUBSEQUENT ACTIONS CONTINUED

OFFSITE PERSONNEL MONITORING AND DECONTAMINATION (SITE EVACUATION)

1. Upon instruction from the HP Supervisor, dispatch available HP Foreman or Health Physics personnel to the Plant Entry and Security Building Exit to monitor personnel as they evacuate the protected area. Exiting personnel should be frisked for contamination if they alarm the high sensitivity portal monitors.

2. If exiting personnel are found to be contaminated, have any contaminated clothing removed and provide temporary coveralls and shoe covers. Direct individuals to the offsite relocation center or other appropriate location for decontamination.

3. When required, request permission from the TSC to dispatch additional monitoring teams to the assigned relocation center.

4. Remain in contact with the offsite relocation center (via radio channel 5 or telephone) to review the progress of offsite monitoring and decontamination activities.

OSC RADIOLOGICAL HABITABILITY CHECKLIST

1. *Periodically monitor radiological conditions in the area.

2. *Log the time, dose rate (if appropriate), air sample results, iodine concentration and swipe survey results. (Use Data Sheet 2 or similar form)

3. Report findings to the HP Supervisor and OSC Manager.

*Continuing Activity

Southern Nuclear Operating Company
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P.O. Box 1600
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Emergency Preparedness
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Figure 2 (Example)

PRB REVIEW REQUIRED

1.0 PURPOSE

This procedure provides a method to classify and estimate the extent of core damage through core fission product release measurements, reactor vessel level indications, and core exit thermocouple temperatures together with additional auxiliary indicators.

2.0 PRECAUTIONS AND LIMITATIONS

Exercise extreme caution during post-accident sampling and analysis activities. Possible high dose rates at sampling stations and in laboratories require that appropriate radiological precautions be taken to ensure personnel safety.

3.0 PREREQUISITES

An emergency condition has been declared and core damage is suspected.

4.0 RESPONSIBILITIES

4.1 CHEMISTRY DEPARTMENT

4.1.1 Chemistry personnel are responsible for post-accident sampling and analysis activities and transmitting data to the Engineering personnel coordinating core damage assessment activities.

4.2 OPERATIONS DEPARTMENT

4.2.1 Operations Department personnel are responsible for collecting, recording and transmitting to the TSC Engineering personnel coordinating damage assessment activities, data provided by Control Room instrumentation through implementation of Procedure 91503-C, "Control Room Instrumentation Output For Assessment Of Core Damage".

4.3 PLANT ENGINEERING DEPARTMENT

4.3.1 Engineering personnel are responsible for overall coordination of this procedure including the assignment of responsibilities to other groups or individuals as is required to complete the assessment.

NOTE

Coordinate with the Operations Supervisor on starting of the H_2 analyzers inside the affected containment building if core damage is suspected. Indication of hydrogen concentration is available within 30 minutes of initiating flow through the monitors when in standby.

4.3.2 Engineering personnel are responsible for implementing Procedure 91504-C, "Core Inventory Determinations Using Reactor Power History".

4.3.3 Engineering personnel, as coordinators of assessment activities, are responsible for data management.

4.3.4 Engineering personnel are responsible to review the completed core damage estimates (Data Sheets 1, 2, 3, 4, and 5 of this procedure).

4.3.5 Engineering personnel are responsible for making all damage estimates.

5.0 MAIN BODY

5.1 EVALUATION OF INITIATING EVENT AND PRELIMINARY INDICATIONS OF CORE INVENTORY

NOTES

a. No generalized core damage is likely if the fuel assemblies have not been uncovered. If the RVLIS full range instrument indicates that the collapsed liquid level has never been below the top of the core and no core exit thermocouple temperatures corresponding to superheated steam at the corresponding RCS pressure were indicated, then no generalized core damage is probable.

b. If the core was uncovered, increases in the CVCS letdown monitor, containment atmosphere process radiation monitor, and the Containment Building area radiation monitors are evidence that some degree of fuel damage occurred.

c. The automated core damage spreadsheet may be used in lieu of the manual method when performing core damage assessment.

5.1.1 The TSC Engineering group should implement Procedure 91504-C, "Core Inventory Determinations Using Reactor Power History".

5.1.2 The TSC Engineering personnel may request the Operations Department to implement Procedure 91503-C, "Control Room Instrumentation Output For Assessment Of Core Damage". The data may be available from the Integrated Plant Computer or the Status Loop and recorded on Data Sheet 1 of procedure 91503-C, "Control Room Instrumentation Output For Assessment Of Core Damage".

5.1.3 Record the length of time the core was uncovered on Data Sheet 1, Sheet 1, line A.1 (Information is obtained from Data Sheet 1 of Procedure 91503-C, "Control Room Instrumentation Output for Assessment of Core Damage").

5.1.4 When obtained, compare the thermocouple temperatures recorded on Data Sheet 1 of Procedure 91503-C, "Control Room Instrumentation Output For Assessment Of Core Damage" to those in Table 1, "Fuel Damage Versus Core Exit Thermocouple Temperatures".

5.1.5 Record the maximum thermocouple temperature observed and the corresponding damage category from Table 1, on line A.2 of Data Sheet 1, Sheet 1.

5.1.6 Obtain the containment high range area monitor reading from Data Sheet 1 of Procedure 91503-C, " Control Room Instrumentation Output For Assessment Of Core Damage" and record on the Y-axis of the graph on Data Sheet 1, Sheet 2.

5.1.7 Determine the time lapse between core shutdown and the containment area monitor reading and record on the X-axis of the graph on Data Sheet 1, Sheet 2.

5.1.8 Using the monitor reading from Step 5.1.6 and the time lapse, Step 5.1.7, estimate the core damage based on where the values intersect on the graph on Sheet 2 of Data Sheet 1. Record the damage category on line A.3 of Data Sheet 1, Sheet 1.

5.1.9 Obtain the Containment Building atmosphere hydrogen concentration from Procedure 91503-C, "Control Room Instrumentation Output For Assessment Of Core Damage".

5.1.10 Refer to percent hydrogen concentration versus percent Zirconium/Water Reaction Bar Graph on Sheet 2 of Data Sheet 1 to determine the percent of Zircaloy cladding oxidized.

CAUTION

The bar graph indicating the relationship between the containment hydrogen concentration and the percentage of the Zirconium/Water Reaction assumes that all of the hydrogen produced in the reaction is released from the reactor coolant to the containment atmosphere. It does not take into account hydrogen depletion due to the operation of the hydrogen recombiners or hydrogen ignitions. (These factors may be taken into account when attempting to determine the extent of the Zirconium/Water reaction.)

5.1.11 Record the result on line A.4 of Data Sheet 1, Sheet 1.

5.1.12 If the systems have not been isolated, obtain the CVCS letdown monitor (RE-48000) and containment process radiogas monitor (RE-2562C) data. Record on lines A.5 and A.6 on Data Sheet 1, Sheet 1.

5.1.13 Complete Preliminary Core Damage Assessment section of Data Sheet 1, Sheet 1. Immediately transmit a copy of the preliminary core damage assessment results to the Emergency Director or TSC Manager.

5.2 ESTIMATION OF FUEL DAMAGE USING GROSS ANALYSIS DATA

5.2.1 Chemistry personnel obtain post-accident samples of reactor coolant system (reactor coolant or sump) and containment atmosphere.

NOTES

a. Ensure that sample activities when analyzed are not decay corrected back to the time of sampling as is the routine method of analysis. A decay and ingrowth correction factor will be applied to sample activities later in the procedure which will correct sample activities back to time of reactor shutdown.

b. Sample volume corrections will be made before the data is entered into this procedure.

5.2.2 Chemistry personnel also perform isotopic analysis of post-accident samples. No decay correction should be applied to sample activities.

5.2.3 When the Isotopic Analysis Report is received from the Chemistry Department, compare nuclides found in the report to those nuclides representing each category of damage in Table 3, "Selected Nuclides For Core Damage Assessment".

NOTE

An upper boundary of the extent of fuel damage is made at this point. Use Table 5 if pre-accident RCS activities are not available to check for indicating nuclides. Nuclides are not considered present if specific activities are less than 100 times normal values.

5.2.4 Determine the maximum extent of fuel damage as indicated by the fission products present in samples and record on line B.1 of Data Sheet 1, Sheet 1.

5.3 RADIONUCLIDE SELECTION FOR CORE DAMAGE ASSESSMENT

5.3.1 Select at least two nuclides from each category of damage listed under Table 3, "Selected Nuclides For Core Damage Assessment", for detailed analysis and utilization in final core damage assessment.

NOTE

Not all indicating nuclides identified in both the Isotopic Analysis Report and Table 3 are required for this assessment, however, a better overall assessment is made when several nuclides are used. Ensure that nuclides representing each category of damage exhibited in Table 3 and those indicated in Sub-subsections 5.3.2 and 5.3.3 are included.

5.3.2 Include Xenon 133 and at least one other noble gas to allow a noble gas ratio to be determined. (Kr-87 or Xe-131m are the preferred additional nuclide).

5.3.3 Include Iodine 131 and at least one other radioiodine to allow a radioiodine ratio to be determined.

NOTES

a. Consider the length of time that has passed between the reactor shutdown (time of the accident) and the time of sampling and analysis, nuclides with very short half-lives are inappropriate if long periods of time have passed between the reactor shutdown and sample analysis.

b. Consider the loss of release activity due to a loss of the containment integrity or loss due to condensation prior to the collection of the post accident samples. Reactor coolant and containment atmosphere samples drawn after environmental releases occur will not accurately represent total activities released from the core.

5.3.4* Enter into Column 2, of Data Sheet 2, Sheet 2, "Reactor Coolant System Activity", Data Sheet 3, "Containment Atmosphere Activity", and Data Sheet 4, "Additional Activity Released From The Core", the concentration of the nuclides selected above. Data Sheet 4 is provided for use under conditions of loss of activity from containment building.

NOTES

a. Data Sheet 4, "Additional Activity Released From Core", is provided for use in cases where a significant portion of the core fission product activity is contained in sources other than the reactor coolant and containment atmosphere.

5.4 DETERMINATION OF RELEASE ACTIVITIES

5.4.1* Determine and record the elapsed time from reactor shutdown to the sample count (Isotopic Analysis) on Data Sheet 2, "Reactor Coolant System Activity", Data Sheet 3, "Containment Atmosphere Activity", and Data Sheet 4, "Additional Activity Released From Core".

5.4.2* For each nuclide selected, determine the ingrowth and decay correction factor using Table 4, "Ingrowth And Decay Correction Factors". Record the factor in Column 3 of Data Sheets 2, 3, and 4.

5.4.3* Multiply the measured specific activities by the ingrowth and decay correction factors and record in Column 4 of the respective Data Sheet.

5.4.4* Obtain the reactor coolant addition volume and Tavg from Data Sheet 2, "Post Accident RCS Addition Volume Determination", of Procedure 91503-C, "Control Room Instrumentation Output For Assessment Of Core Damage" and record on Data Sheet 2, Sheet 1, "Reactor Coolant System Activity".

5.4.5* Convert RCS addition volume, using Data Sheet 2, Sheet 1, from gallons to grams mass as follows:

a. Multiply the total estimated RCS additions volume in line 1 by 3,785 grams per gallon.

b. Record the grams mass in the appropriate space on line 1.

* - Denotes manual completion of the step is not required if the automated spreadsheet is used.

5.4.6 Estimate the RCS mass, using Data Sheet 2, Sheet 1 prior to safety injection as follows:

a. Use 2.45E+8 grams if the Reactor Coolant System was from no load temperature and pressure to full load temperature and pressure and proceed to Step 5.4.7 or specific gravity of 0.73 on Core Damage Assessment spreadsheet.

b. If the Reactor Coolant System temperature was below no load temperature and pressure at the start of the incident, make the following correction:

(1)* From the "Specific Gravity Of Water VS Temperature" graph, determine the specific gravity of the coolant at Tavg (at the beginning of the incident) and record in the appropriate space on line 2.

(2) Multiply the reactor coolant cool mass (3.32E+8 grams), by the specific gravity at Tavg and record on line 2.

5.4.7* Complete the post accident mass calculation, using Data Sheet 2, Sheet 1, as follows:

a. Add the added mass from line A.1, to the initial mass on line A.2.

b. Record the sum on line A.3 of Sheet 1, and in the appropriate space at the top of Data Sheet 2, Sheet 2.

5.4.8* Multiply the corrected specific activities, (Column 4) of Data Sheet 2, by the RCS mass and record in Column 5.

5.4.9* On Data Sheet 3, "Containment Atmosphere Activity", multiply the corrected specific activities (Column 4) by the containment atmosphere volume and record in Column 5.

5.4.10* On Data Sheet 4, "Additional Activity Released From Core", if used, multiply the corrected specific activity (Column 4) by the corresponding mass or volume and record in Column 5.

5.5 TOTAL RELEASED ACTIVITY OF THE SELECTED RADIONUCLIDES

5.5.1* Record the activities from Column 5 of Data Sheet 2, Sheet 2, on the appropriate line of Column 2 of Data Sheet 5, "Release Activity And Percent Activity Released".

5.5.2* Record the activities from Column 5 of Data Sheet 3 on the appropriate line of Column 3 of Data Sheet 5.

5.5.3* Record the activities from Column 5 of Data Sheet 4 if used, on the appropriate line of Column 4 of Data Sheet 5.

* - Denotes manual completion of the step is not required if the automated spreadsheet is used.

5.5.4* Add Columns 2, 3 and 4 of Data Sheet 5, Sheets 1 and 2, for each nuclide, and record in Column 5.

5.5.5* Record in Column 6 of Data Sheet 5, Sheet 1 and 2, the total corrected core inventories from the completed Procedure 91504-C, "Core Inventory Determinations Using Reactor Power History".

5.5.6* Determine the release percentage by dividing the activity of each nuclide on Data Sheet 5, Column 5, by the total corrected core inventory, Column 6 and multiply by 100.

5.5.7* Record each release percentage in Column 7.

5.6 ESTIMATION OF PERCENT FUEL DAMAGE FROM RELEASE PERCENTAGES

5.6.1 With the release percentages in Column 7, of Data Sheet 5, use Enclosure 1, "Instructions For Utilization Of Percent Clad Damage, Pellet Overtemperature And Fuel Melt".

5.6.2 Record on line B.2 of Data Sheet 1, Sheet 1, the overall core damage category based on examination of the release percentages recorded on Data Sheet 1, Sheet 3.

NOTE

Within the limitations of the accuracy associated with this method of assessment, estimates are limited to the following categories:

No Fuel Damage
Less Than 50% Cladding Failure
Greater Than 50% Cladding Damage
Less Than 50% Fuel Overtemperature
Greater Than 50% Fuel Overtemperature
Less Than 50% Fuel Melt
Greater Than 50% Fuel Melt

5.6.3 To determine whether iodine spiking has affected the analysis results use the following only if fuel overtemperature has not occurred:

a. Compare the concentrations of the nuclides from the isotopic analysis to those in Table 5, "Normal Operating Activity" or the last RCS isotopic analysis prior to the transient. An increase of 100 times or more is considered significant fuel degradation.

* - Denotes manual completion of the step is not required if the automated spreadsheet is used.

b. If the radioiodine activities are disproportionately high in comparison to other fission product activities, consider that the radioiodine activity may be due to the spiking phenomenon and not due to fuel degradation.

c. Review Table 6, "Iodine 131 Activity Available For Release Due to Spiking Phenomenon", to determine if the iodine activity is elevated due to the spiking phenomena and not fuel degradation.

5.7 FUEL DAMAGE CLASSIFICATION BY ACTIVITY RATIOS

5.7.1* Determine the noble gas ratios by dividing the total corrected release activity of the noble gas nuclides in Column 5 of Data Sheet 5, by the total corrected release activity of Xenon 133. Record the noble gas ratio(s) on Data Sheet 1, Sheet 1, line B.4.

5.7.2* Compare the noble gas ratios (from Sub-subsection 5.7.1) to those in Table 7, "Noble Gas and Radioiodine Activity Ratios Of Gap and Fuel Pellet".

5.7.3 If the actual noble gas ratio resembles the Gap Activity Ratio, record "Clad Damage" on Data Sheet 1, sheet 1, line B.4. If the actual noble gas ratio resembles the Fuel Pellet Ratio, record "Overtemperature" or "Fuel Melt" on Data Sheet 1, sheet 1, line B.4.

5.7.4* Determine the radioiodine activity ratio. Divide the total corrected release activity of the radioiodine isotopes in Column 5, of Data Sheet 5, by the total corrected release activity of Iodine 131. Record the iodine ratio(s) on Data Sheet 1, Sheet 1, line B.3.

5.7.5* Compare the radioiodine activity ratio to that in Table 7.

5.7.6 If the actual radioiodine ratio resembles the Gap Activity Ratio, record "Clad Damage" on Data Sheet 1, sheet 1, line B-3. If the actual radioiodine ratio resembles the Fuel Pellet Ratio, record "Overtemperature" or "Fuel Melt" on Data Sheet 1, sheet 1, line B.3.

5.8 FINAL ASSESSMENT

5.8.1 Perform the final core damage assessment by evaluating the data recorded on Data Sheet 1, "Core Damage Assessment Summary", Sheets 1, 2, and 3. Record the final assessment on the appropriate line on Data Sheet 1, Sheet 1.

* - Denotes manual completion of the step is not required if the automated spreadsheet is used.

NOTE

The final assessment is a broad based examination of all data collected. Because of overlapping values of release activities and potential simultaneous conditions of clad damage, overtemperature, and core melt, Considerable Judgment is required in the final assessment.

5.8.2 On completion of the final assessment, forward the completed Data Sheet 1, Sheets 1, 2 and 3 to the Emergency Director or the TSC Manager.

6.0 ACCEPTANCE CRITERIA

NONE

7.0 REFERENCE

7.1 Westinghouse Owners Group Post-Accident Core Damage Assessment Methodology, Revision 2, November, 1984.

7.2 PROCEDURES

7.2.1 91504-C, "Core Inventory Determinations Using Reactor Power History"

7.2.2 91503-C, "Control Room Instrumentation Output For Assessment Of Core Damage"

END OF PROCEDURE TEXT

TABLE 1

FUEL DAMAGE VERSUS CORE EXIT THERMOCOUPLE TEMPERATURES

Fuel Damage	Temperature °(F)
No Damage	<750
Clad Damage (0-50%)	750 - 1300
Clad Damage (50-100%)	1300 - 1650
Fuel Over temperature Or Fuel Melt	>1650

TABLE 2

SUGGESTED SAMPLING LOCATIONS

ACCIDENT CONDITION	SAMPLING LOCATIONS	COMMENTS
Small Break LOCA Rx Power > 1%	RCS Hot leg and Containment Atmosphere Alternate RCS sample points: RCS Cold Legs or RCS Pressurizer	
Rx Power < 1%	RCS Hot Leg and Containment Atmosphere Alternate RCS sample points: RCS Cold legs or RCS Pressurizer or Residual Heat Removal Pump Discharge	If RCS is pressurized and RC pumps are running If RCS on RHR
Large Break LOCA Rx Power > 1%	RCS Hot Leg and Containment Atmosphere and Containment Sump Alternate RCS sample points: RCS Cold legs or RCS Pressurizer	
Large Break LOCA Rx Power < 1%	Containment Atmosphere and Containment Sump Alternate RCS sample point: Residual Heat Removal Pump Discharge	Provided Containment Sump Supplying Core Cooling Provided that RHR taking from Containment Sump

TABLE 2 (CONT'D)

SUGGESTED SAMPLING LOCATIONS

ACCIDENT CONDITION	SAMPLING LOCATIONS	COMMENTS
Steam Line Break	RCS Hot Leg and Containment Atmosphere Alternate RCS sample points: RCS Pressurizer or RCS Cold legs	If the containment atmosphere monitor has increased or is increasing
Steam Generator Tube Rupture	RCS Hot Leg and Main Steam and Containment Atmosphere Alternate RCS sample points: RCS Pressurizer or Alternate Main Steam sample point: Main Condenser Hot Well and Main Condenser Off Gas	If the containment atmosphere monitor has increased or is increasing

TABLE 3

SELECTED NUCLIDES FOR CORE DAMAGE ASSESSMENT

Core Damage Category	Nuclide	Half-Life	Predominant Gammas, keV Yield, (%) *
Clad Failure	Kr-85m	4.4 h	150(74), 305(13)
	Kr-87	76 m	403(84), 2570(35)
	Kr-88	2.8 h	191(35), 850(23), 2400(35)
	Xe-131m	11.8 h	164(2)
	Xe-133	5.27 d	81(37)
	Xe-133m	2.26 d	233(14)
	Xe-135	9.14 h	250(91)
	I-131	8.05 d	364(82)
	I-132	2.26 h	773(89), 955(22), 1400(14)
	I-133	20.3 h	530(90)
	I-135	6.68 h	1140(37), 1280(34),1460(12), 1720(19)
	Rb-88	17.8 m	898(13), 1863(21)
Fuel Over-Temperature	Cs-134	2 y	605(98), 796(99)
	Cs-137	30 y	662(85)
	Te-129	68.7 m	455(15)
	Te-132	77.7 h	230(90)
Fuel Melt	Ba-140	12.8 d	537(34)
	La-140	40.22 h	487(40), 815(19), 1596(96)
	La-142	92.5 m	650(48), 1910(9), 2410(15), 2550(11)
	Pr-144	17.27 m	695(1.5)

* - Values obtained from Table of Isotopes, Lederer, Hollander, and Perlman, Sixth Edition.

TABLE 4
INGROWTH AND DECAY CORRECTION FACTORS (Curies)
(time* (t) in hours)

Kr-85m: $(EXP\ 0.157t)\ (1E\text{-}6)$

Kr-87: $(EXP\ 0.547t)\ (1E\text{-}6)$

Kr-88: $(EXP\ 0.247t)\ (1E\text{-}6)$

Xe-131m:
$$\frac{(1E-6)}{[-2.62\ EXP\ (-3.54E-3)t]+[3.62\ EXP\ (-2.45E-3)t]}$$

Xe-133:
$$\frac{(1E-6)}{[-0.185\ EXP-(3.41E-2)t]-[0.10\ EXP-(1.28E-2)t]+[1.285\ EXP-(5.48E-3)t]}$$

Xe-133m:
$$\frac{(1E-6)}{[-0.1\ EXP-(3.41E-2)t]+[1.1\ EXP-(1.28E-2)t]}$$

Xe-135:
$$\frac{(1E-6)}{[-9.26\ EXP-(1.04E-1)t]-[0.033\ EXP-(2.66)t]+[10.293\ EXP-(7.58E-2)t]}$$

I-131: $(EXP\ 0.00359t)\ (1E\text{-}6)$

I-132:
$$\frac{(1E-6)}{[0.103\ EXP-(8.91E-3)t]+[0.897\ EXP-(0.307)t]}$$

I-133: $(EXP\ 0.0341t)\ (1E\text{-}6)$

I-135: $(EXP\ 0.104t)\ (1E\text{-}6)$

Cs-134: $(1E\text{-}6)$

Te-129:
$$\frac{(1E-6)}{[1.09\ EXP-(0.161)t]+[0.16\ EXP-(8.47E-4)t]-[0.25\ EXP-(0.605)t]}$$

Te-132: $(EXP\ 0.00892t)\ (1E\text{-}6)$

Ba-140: $(EXP\ 0.00225t)\ (1E\text{-}6)$

La-140:
$$\frac{(1E-6)}{[1.09\ EXP-(2.25E-3)t]-[0.09\ EXP-(1.72E-2)t]}$$

La-142:
$$\frac{(1E-6)}{[-0.14\ EXP-(3.78)t]+[1.14\ EXP-(0.449)t]}$$

Pr-144:
$$\frac{(1E-6)}{[0.91\ EXP-(1.04E-4)t]+[0.09\ EXP-(2.4)t]}$$

* Time, t is the number of hours between shutdown and time of sample count.

TABLE 5

DEFAULT NORMAL OPERATING ACTIVITY *

Nuclide	Reactor Coolant Specific (μCi/gram)Activity
Kr-85m	1.1E-01
Kr-87	6.0E-02
Kr-88	2.0E-01
Xe-131m	1.1E-01
Xe-133	1.8E+01
Xe-135	3.5E-01
I-131	2.7E-01
I-132	1.0E-01
I-133	3.8E-01
I-135	1.9E-01

* Values obtained from ANS 18.1.

TABLE 6

IODINE 131 ACTIVITY AVAILABLE FOR RELEASE DUE TO SPIKING PHENOMENON

Average Reactor Coolant I-131 Specific Activity (μCi/gram)					Total I-131 Available For Release (Curies)
0.5	≤	SA	<	1.0	3400
0.1	≤	SA	<	0.5	380
0.05	≤	SA	<	0.1	200
0.01	≤	SA	<	0.05	200
0.005	≤	SA	<	0.01	100
0.001	≤	SA	<	0.005	100
		SA	<	0.001	2

Where SA = Normal operating I-131 specific activity (μCi/gram) in the reactor coolant.

TABLE 7

NOBLE GAS AND RADIOIODINE ACTIVITY RATIOS OF GAP AND FUEL PELLET

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

Where:

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

$$\text{Radioiodine Ratio} = \frac{\text{Total Activity of Radioiodine Gas Isotope Released}}{\text{Total Activity of I - 131 Released}}$$

DATA SHEET 1
CORE DAMAGE ASSESSMENT SUMMARY

A. PRELIMINARY CORE DAMAGE ASSESSMENT

1. RVLIS Indication:
   No Core Uncovery _____
   Uncovery Indicated _____ Length Of Time Uncovered _____
2. Core Exit Thermocouple Readings:
   Maximum Core Exit Thermocouple Reading: _____
   Fuel Damage Category Based
   On Thermocouple Temperatures _____
3. Fuel Damage Based On
   Containment High Range Area Monitor _____
4. Percent Zircaloy/Water Reaction _____
5. CVCS Letdown Monitor (RE-48000)* _____
6. Containment Process Radiogas Monitor (RE-2562C)* _____
7. Preliminary Core Damage Assessment Results _____

DATE:_____ TIME:_____ PERFORMED BY: _____

REVIEWED BY: _____

B. CORE DAMAGE ASSESSMENT BASED ON ISOTOPIC ANALYSIS REPORT (Post Accident Sampling)

Record Category of Fuel Damage Based on the following Radioisotopic Indications:

1. Fission Products Present In Samples _____
2. Fission Product Release Percentages _____
3. Radioiodine Ratio _____ Damage Category _____
4. Noble Gas Ratio _____ Damage Category _____

C. FINAL CORE DAMAGE ASSESSMENT

_____

_____

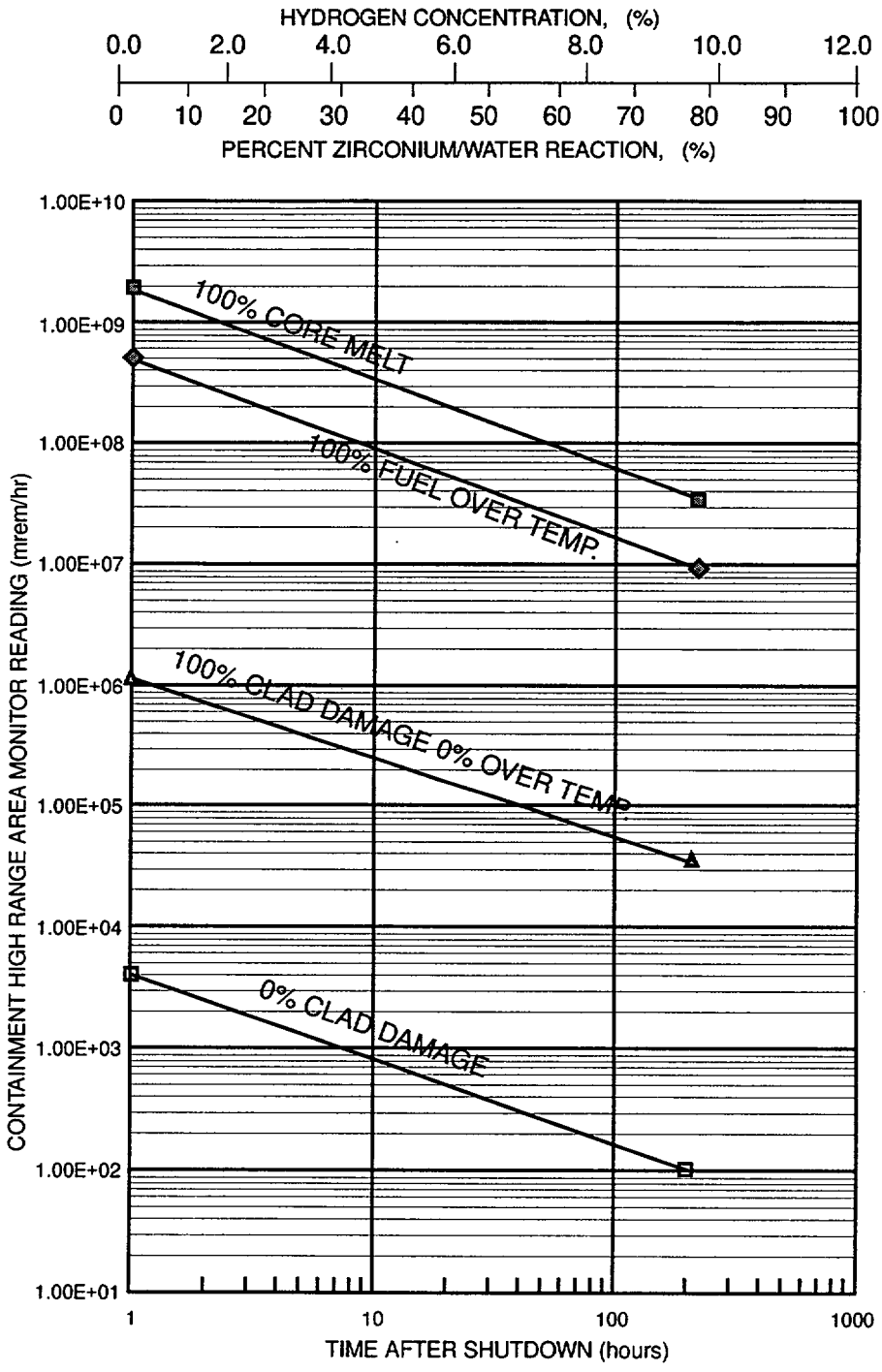
DATE:_____ TIME:_____ PERFORMED BY: _____

REVIEWED BY: _____

* - If system has not been isolated.

DATA SHEET 1

CORE DAMAGE ASSESSMENT SUMMARY



Sheet 3 of 3

DATA SHEET 1

CORE DAMAGE ASSESSMENT SUMMARY

COLUMN 1	COLUMN 2	COLUMN 3	COLUMN 4
NUCLIDE	PERCENT CLAD DAMAGE <50% ≥50%	PERCENT OVERTEMPERATURE <50% ≥50%	PERCENT FUEL MELT <50% ≥50%
Kr 85m			
Kr 87			
Kr 88			
Xe 131m			
Xe 133			
Xe 133m			
Xe 135			
I 131			
I 132			
I 133			
I 135			
Cs 134			
Te 129			
Te 132			
Ba 140			
La 140			
La 142			
Pr 144			

DATE: _____ TIME: _____ PERFORMED BY: _____

REVIEWED BY: _____

DATA SHEET 2
REACTOR COOLANT SYSTEM ACTIVITY

A. POST-ACCIDENT REACTOR MASS DETERMINATION

1. Added Mass

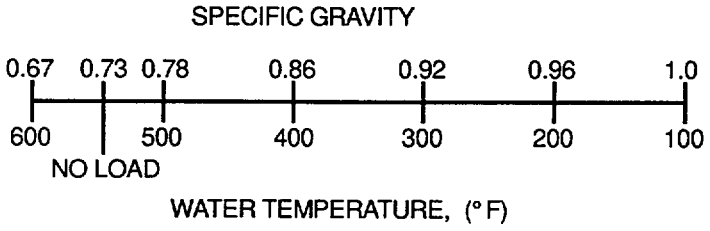
   Total _____ *Gallons X 3,785 Grams/Gallon = _____ Grams

2. Initial Mass

   Enter 2.45E8 Grams if RCS was in the range of no load temperature and pressure to full load temperature and pressure. If less than no load temperature and pressure, use the following correction:

   3.32E8 Grams X _____ (Specific Gravity of RCS At Tavg#) = + _____ Grams

3. Total Post-Accident Reactor Coolant System = _____ Grams Mass



* From 91503-C - Data Sheet 2

No load temperature and pressure are 557°F and 2235 psig respectively.

Sheet 2 of 2

DATA SHEET 2

B. RCS ACTIVITY CALCULATION

ELAPSED TIME, HOURS,
SHUTDOWN TO SAMPLE COUNT _____

RCS MASS, GM _____
(From Data Sheet 2, Sheet 1 of 2)

COL 1	COL 2	COL 3	COL 4	COL 5
NUCLIDE	MEASURED CONCENTRATION μCi/gram	INGROWTH/DECAY CORRECTION FACTOR	INGROWTH/DECAY CORRECTED CONCENTRATION Ci/gram	RCS ACTIVITY, Ci
Kr 85m				
Kr 87				
Kr 88				
Xe 131m				
Xe 133				
Xe 135				
I 131				
I 132				
I 133				
I 135				
Cs 134				
Te 129				
Te 132				
Ba 140				
La 140				
La 142				
Pr 144				

DATE: _____ TIME: _____ PERFORMED BY: _____

REVIEWED BY: _____

Sheet 1 of 1

DATA SHEET 3

CONTAINMENT ATMOSPHERE ACTIVITY

ELAPSED TIME, HOURS,
SHUTDOWN TO SAMPLE COUNT _____

CONTAINMENT VOL, (7.9 E10 CC)

COL 1	COL 2	COL 3	COL 4	COL 5
NUCLIDE	MEASURED CONCENTRATION µCi/cc	INGROWTH/DECAY CORRECTION FACTOR	INGROWTH/DECAY CORRECTED CONCENTRATION Ci/cc	CONTAINMENT ACTIVITY, Ci
Kr 85m				
Kr 87				
Kr 88				
Xe 131m				
Xe 133				
Xe 135				
I 131				
I 132				
I 133				
I 135				
Cs 134				
Te 129				
Te 132				
Ba 140				
La 140				
La 142				
Pr 144				

DATE: _____ TIME: _____ PERFORMED BY: _____

REVIEWED BY: _____

Sheet 1 of 1

DATA SHEET 4

ADDITIONAL ACTIVITY RELEASED FROM CORE CALCULATION

ELAPSED TIME, HOURS,
SHUTDOWN TO SAMPLE COUNT _____

MASS OR VOLUME,
GM/CC _____

COL 1	COL 2	COL 3	COL 4	COL 5
NUCLIDE	MEASURED CONCENTRATION μCi/g(cc)	INGROWTH/DECAY CORRECTION FACTOR	INGROWTH/DECAY CORRECTED CONCENTRATION Ci/g(cc)	ACTIVITY RELEASED, Ci
Kr 85				
Kr 85m				
Kr 87				
Kr 88				
Xe 131m				
Xe 133				
Xe 135				
I 131				
I 132				
I 133				
I 135				
Cs 134				
Te 129				
Te 132				
Ba 140				
La 140				
La 142				
Pr 144				

DATE: _____ TIME: _____ PERFORMED BY: _____

REVIEWED BY: _____

Sheet 1 of 1

DATA SHEET 5
RELEASE ACTIVITY AND PERCENT ACTIVITY RELEASED

COL 1	COL 2	COL 3	COL 4	COL 5	COL 6	COL 7
NUCLIDE	RCS, Ci	CONTAINMENT ATMOS, Ci	ADDITIONAL SOURCES, Ci	TOTAL ACTIVITY RELEASED, Ci	TOTAL CORRECTED CORE INVENTORY, Ci	RELEASE PERCENTAGE
Kr 85m		+	+	=	÷	X 100 =
Kr 87		+	+	=	÷	X 100 =
Kr-88		+	+	=	÷	X 100 =
Xe 131 m		+	+	=	÷	X 100 =
Xe 133		+	+	=	÷	X 100 =
Xe 135		+	+	=	÷	X 100 =
I 131		+	+	=	÷	X 100 =
I 132		+	+	=	÷	X 100 =
I 133		+	+	=	÷	X 100 =
I 135		+	+	=	÷	X 100 =
Cs 134		+	+	=	÷	X 100 =
Te 129		+	+	=	÷	X 100 =
Te 132		+	+	=	÷	X 100 =
Ba 140		+	+	=	÷	X 100 =
La 140		+	+	=	÷	X 100 =
La 142		+	+	=	÷	X 100 =
Pr 144		+	+	=	÷	X 100 =

DATE:_____ TIME:_____ PERFORMED BY: _____

REVIEWED BY: _____

ENCLOSURE 1

INSTRUCTIONS FOR UTILIZATION OF PERCENT CLAD DAMAGE, PELLET OVERTEMPERATURE, AND FUEL MELT

1.0 Obtain estimated core burn-up from Procedure 91504-C, "Core Inventory Determinations Using Reactor Power History" Data Sheet 12, and use correct set of burn-up graphs as follows:

1.1 If the core burn-up is less than 5,000 MWD/MTU, use bottom line of appropriate graph.

1.2 If the core burn-up is between 5,000 and 25,000 MWD/MTU, use middle line of appropriate graph.

1.3 If the core burn-up is greater than 25,000 MWD/MTU, use top line of appropriate graph.

1.4 If iodine spiking is indicated, use appropriate graph.

1.5 Obtain release percentage values from column 7 of Data Sheet 5, "Release Activity and Percentage Activity Released".

1.6 Enter each graph with the corresponding release percentage value to obtain the percent clad damage estimate. Record the percentage clad damage values on Data Sheet 1, Sheet 3, "Core Damage Assessment Summary".

2.0 To determine percent fuel overtemperature, select the correct set of bar graphs as follows:

2.1 If the core burn-up is less than 5,000 MWD/MTU, use "Low Burn-up Bar Graphs".

2.2 If the core burn-up is between 5,000 and 25,000 MWD/MTU, use "Average Burn-up Bar Graphs".

2.3 If the core burn-up is greater than 25,000 MWD/MTU use "High Burn-up Bar Graphs".

2.4 Obtain percent inventory released values from column 7 of Data Sheet 5, "Release Activity and Percentage Activity Released".

2.5 Enter each bar graph with the corresponding release percentage value to obtain the percentage of fuel overtemperature estimate. Record the percentage fuel overtemperature value on Data Sheet 1, Sheet 3, "Core Damage Assessment Summary".

ENCLOSURE 1

INSTRUCTIONS FOR UTILIZATION OF PERCENT CLAD DAMAGE, PELLET OVERTEMPERATURE, AND FUEL MELT

3.0 To determine the percent fuel melt, select correct set of bar graphs as follows:

3.1 If the core burn-up is less than 5,000 MWD/MTU, use "Low Burn-up Graphs".

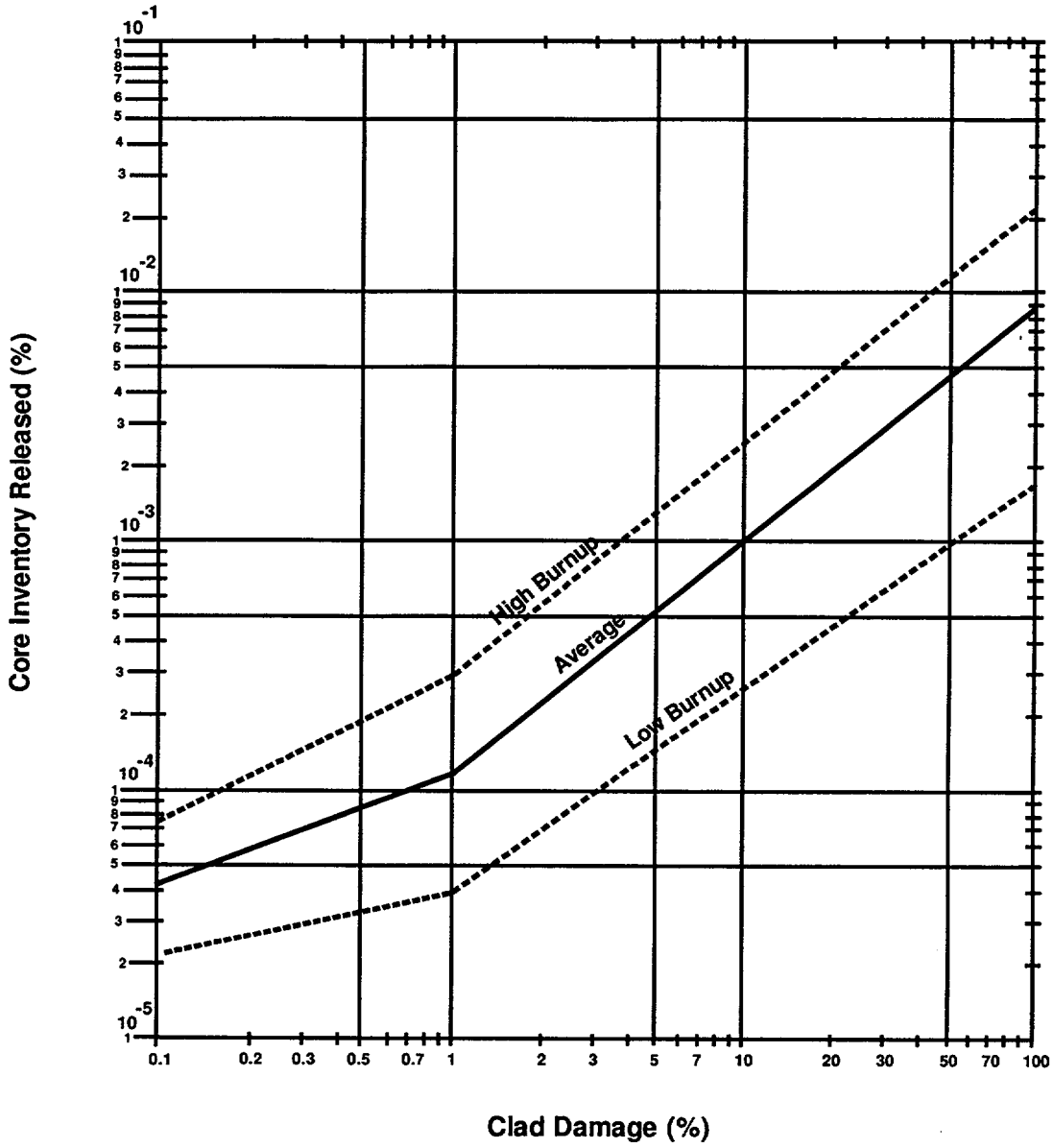
3.2 If the core burn-up is between 5,000 and 25,000 MWD/MTU, use "Average Burn-up Bar Graphs".

3.3 If greater than 25,000 MWD/MTU, use "High Burn-up Graphs".

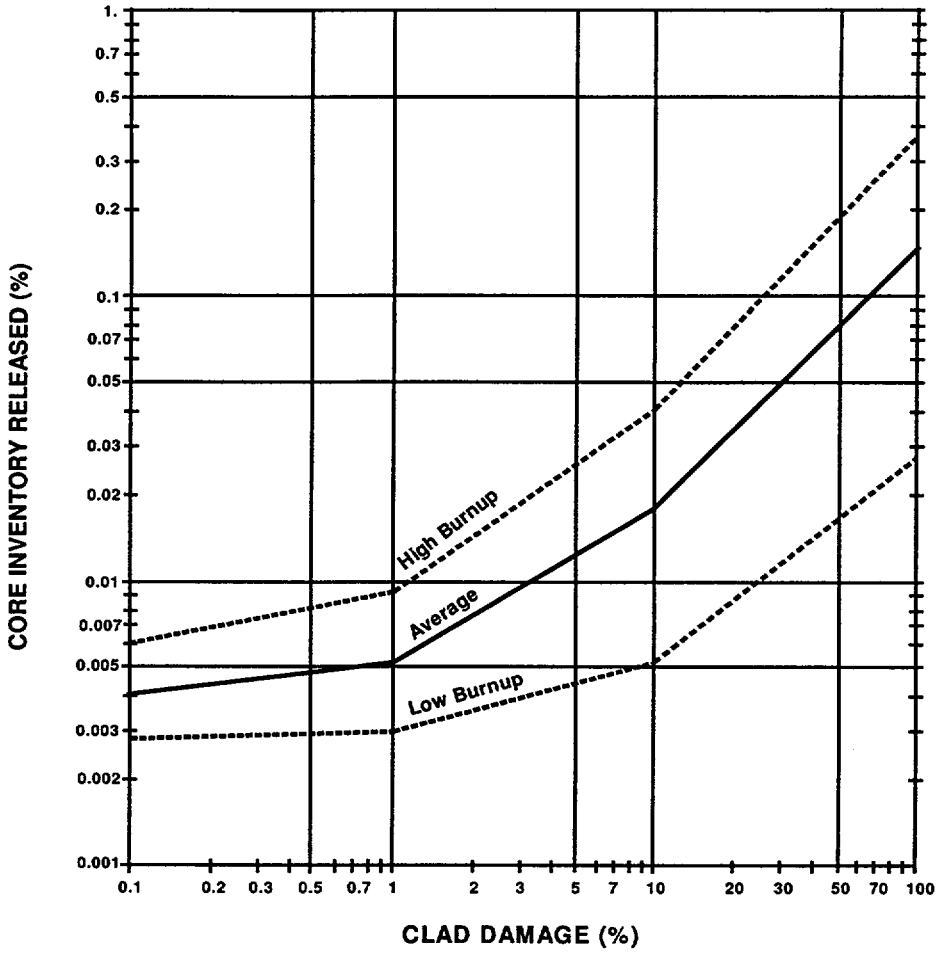
3.4 Obtain percent inventory released values from column 7 of Data Sheet 5, "Release Activity and Percentage Activity Released".

3.5 Enter each bar graph with the corresponding release percentage value to obtain the percent fuel melt estimate. Record the percentage fuel melt values on Data Sheet 1, Sheet 3, "Core Damage Assessment Summary".

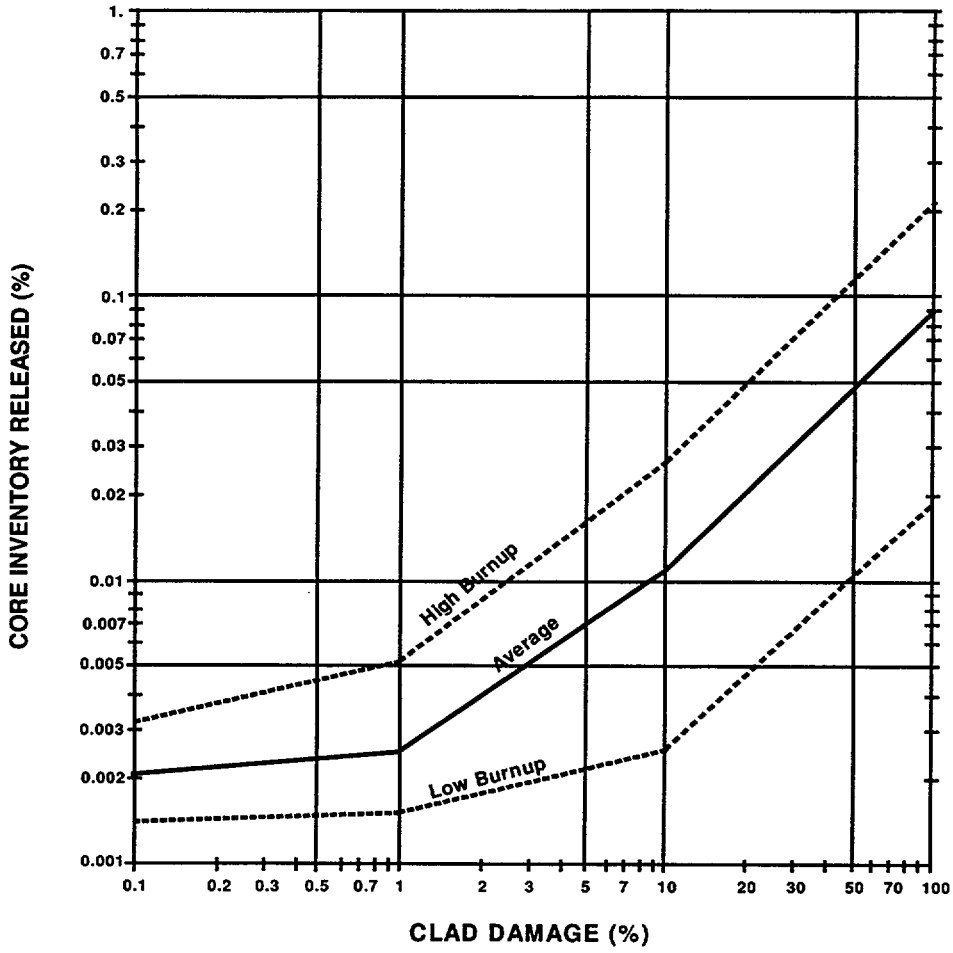
3.6 Return to Step 5.6 in Procedure.



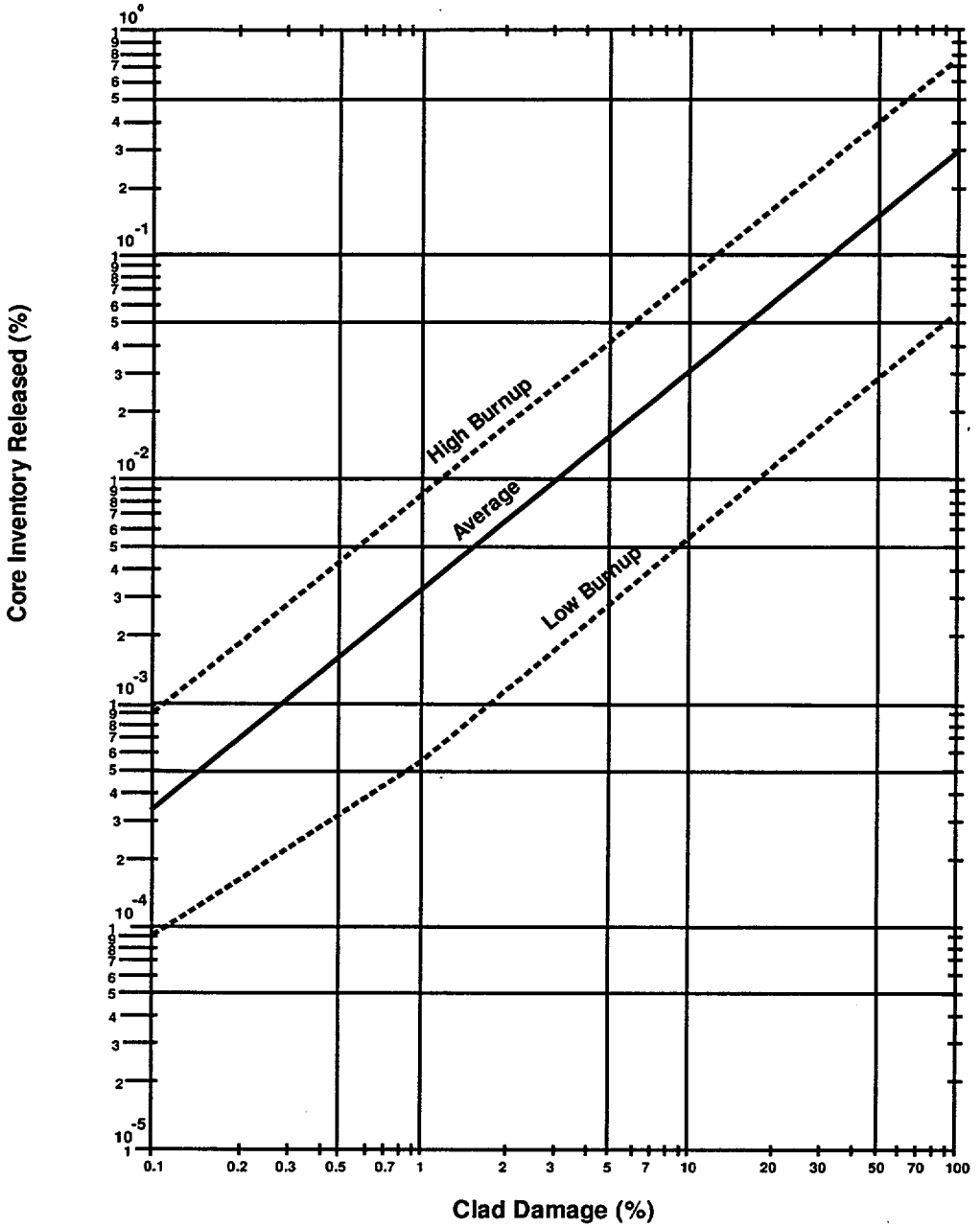
RELATIONSHIP OF % CLAD DAMAGE WITH % CORE INVENTORY RELEASED OF KR-87



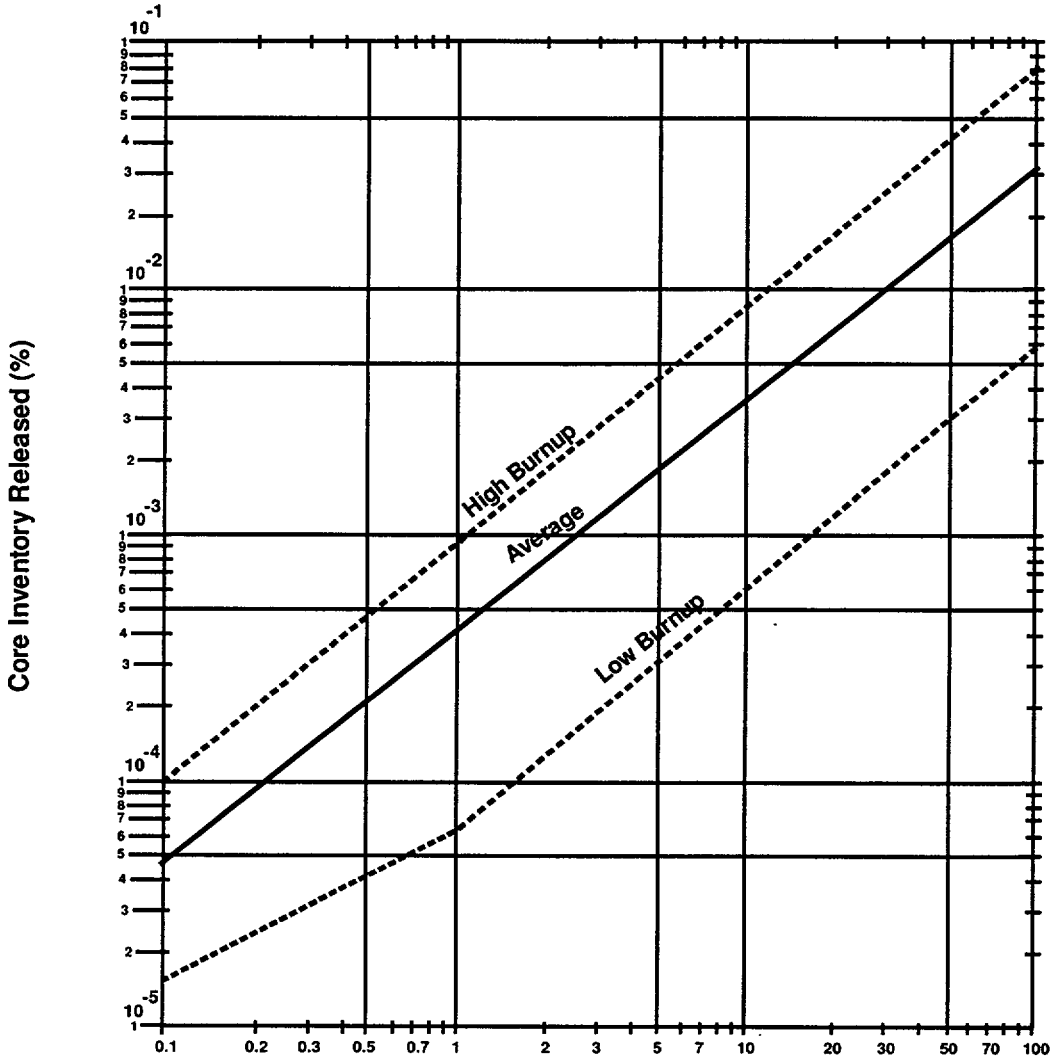
RELATION OF % CLAD DAMAGE WITH % CORE INVENTORY RELEASED OF Xe-131m



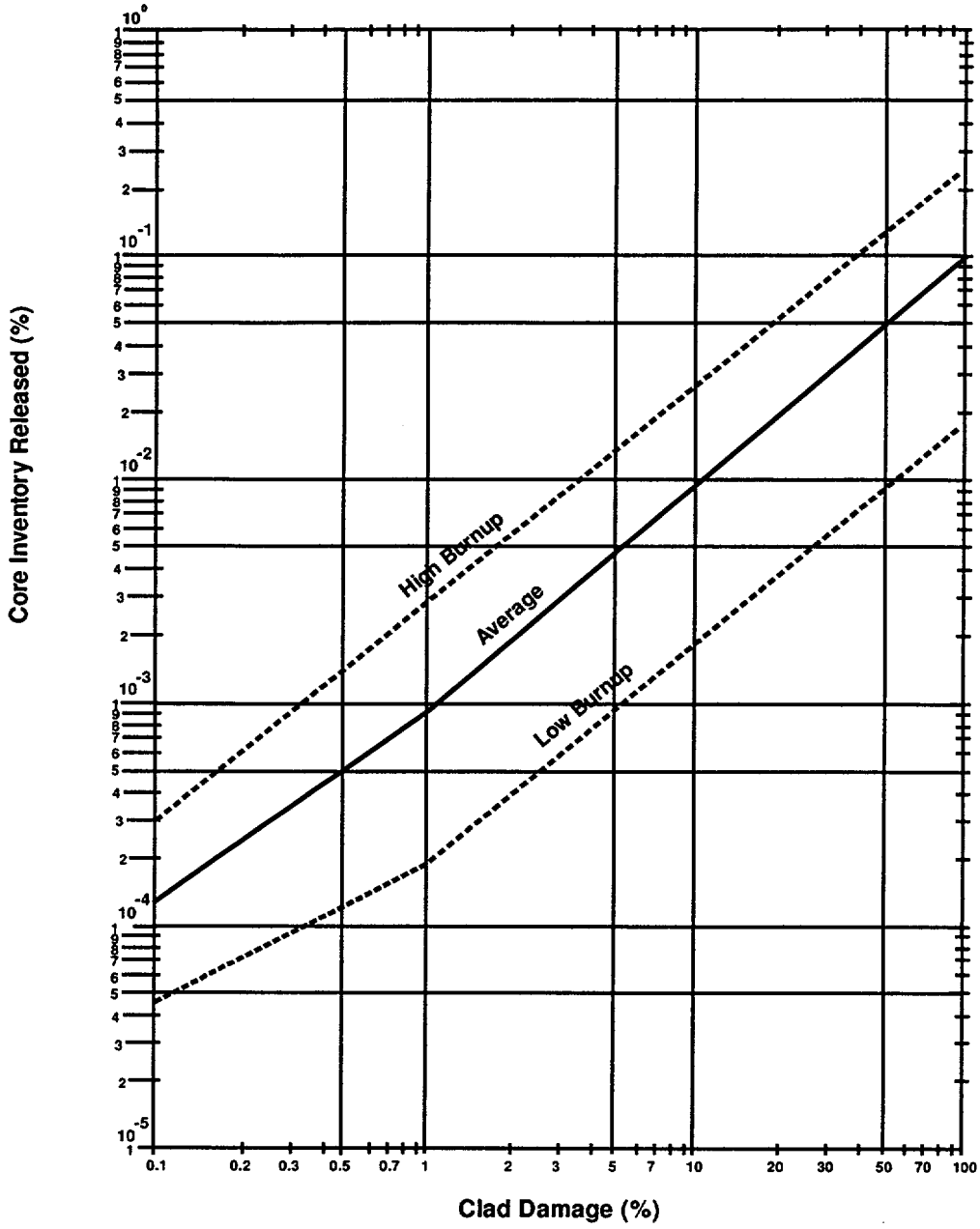
RELATION OF % CLAD DAMAGE WITH % CORE INVENTORY RELEASED OF Xe-133



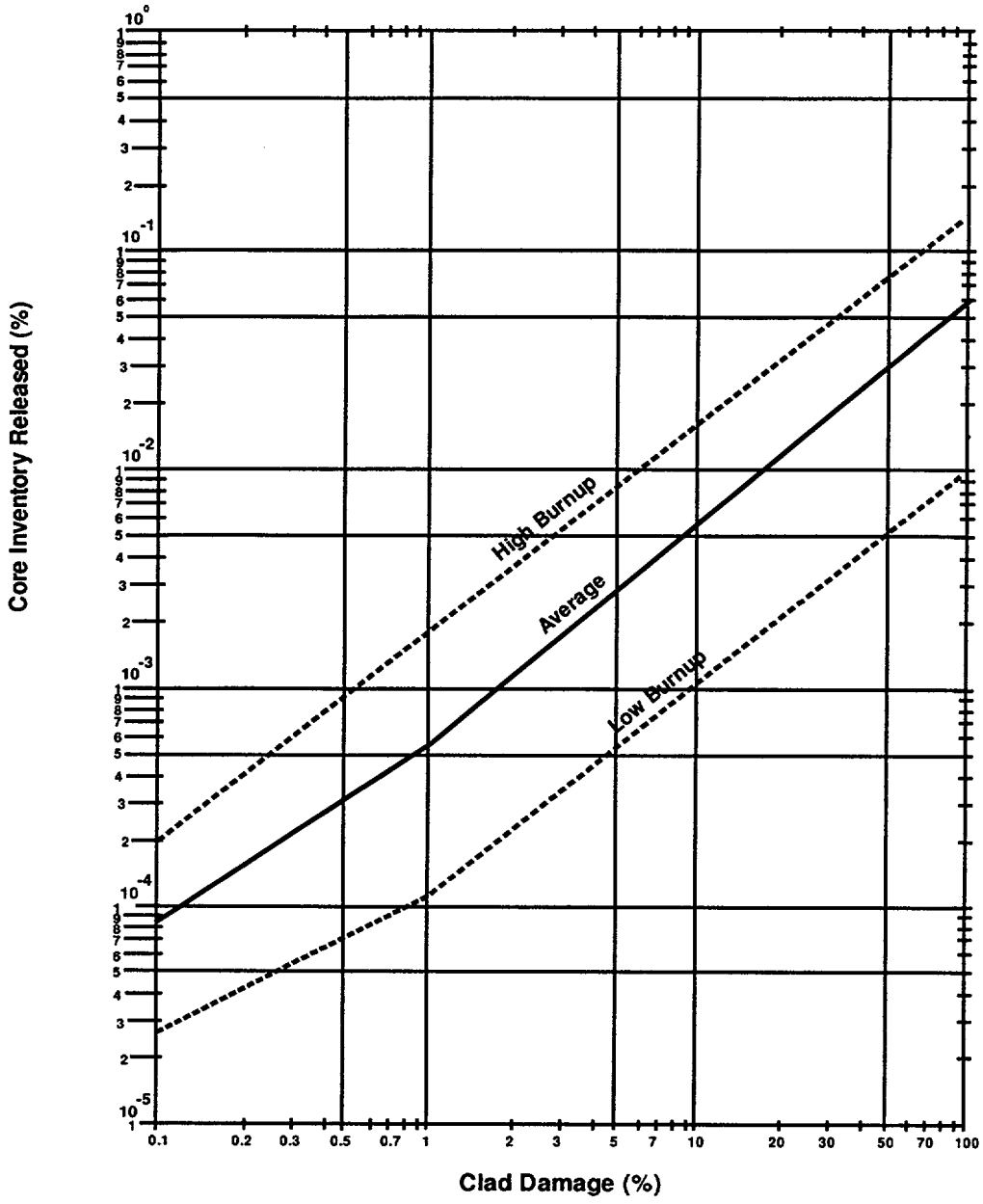
RELATIONSHIP OF % CLAD DAMAGE WITH % CORE INVENTORY RELEASED OF I-131



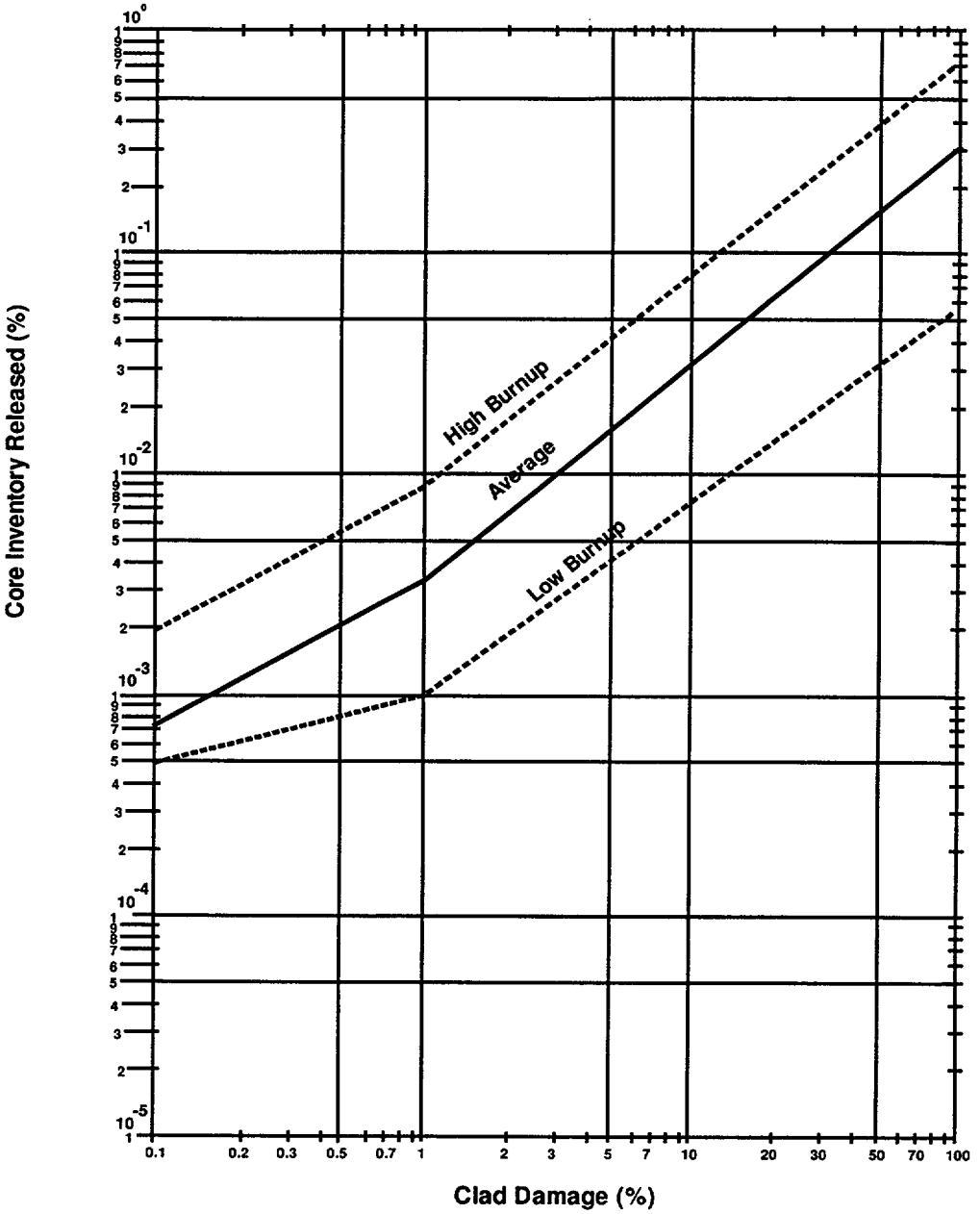
RELATIONSHIP OF % CLAD DAMAGE WITH % CORE INVENTORY RELEASED OF I-132



RELATIONSHIP OF % CLAD DAMAGE WITH % CORE INVENTORY RELEASED OF I-133



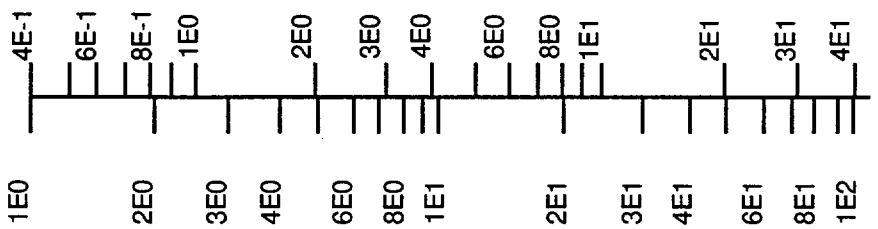
RELATIONSHIP OF % CLAD DAMAGE WITH % CORE INVENTORY RELEASED OF I-135



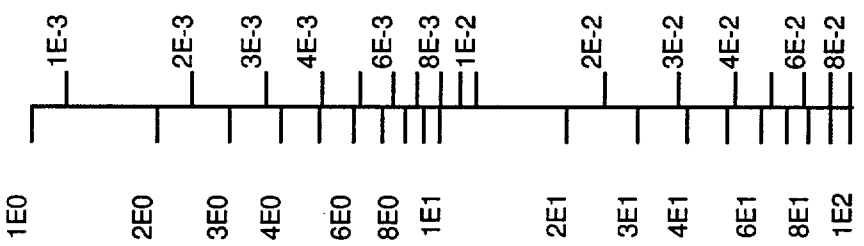
RELATIONSHIP OF % CLAD DAMAGE WITH % CORE INVENTORY RELEASED OF I-131 WITH SPIKING

PERCENT CORE INVENTORY RELEASED VERSUS PERCENT OVERTEMPERATURE FOR LOW BURN-UP CASE

Core Inventory Released, (%) For Kr, Xe, I and Cs

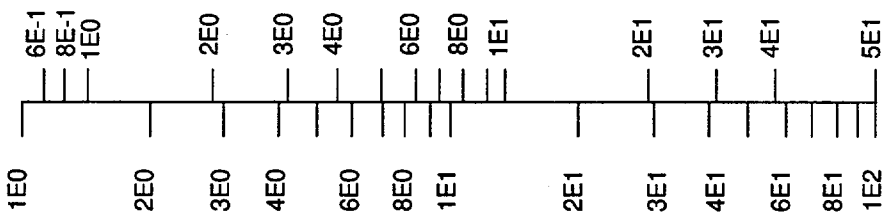


Core Inventory Released, (%) For Ba and Sr

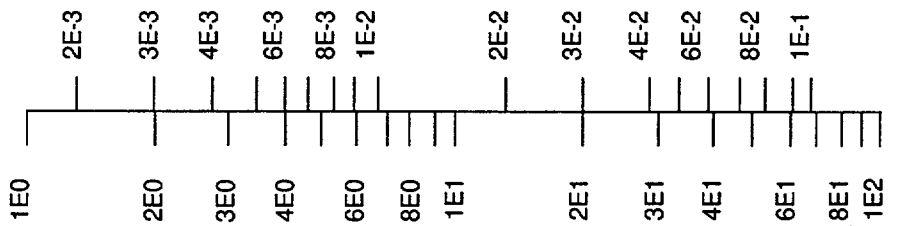


PERCENT CORE INVENTORY RELEASED VERSUS PERCENT OVERTEMPERATURE FOR AVERAGE BURN-UP CASE

Core Inventory Released, (%) For Kr, Xe, I and Cs

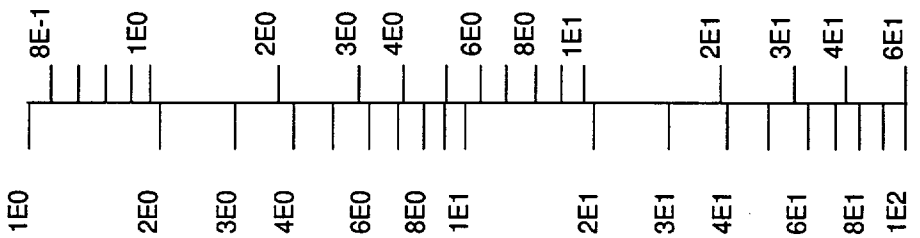


Core Inventory Released, (%) For Ba and Sr

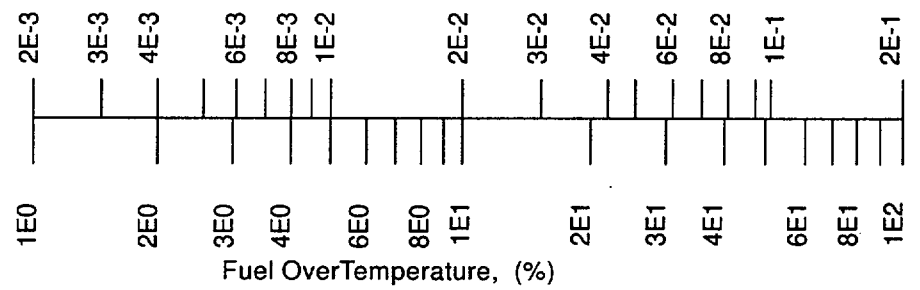


PERCENT CORE INVENTORY RELEASED VERSUS PERCENT OVERTEMPERATURE FOR HIGH BURN-UP CASE

Core Inventory Released, (%) For Kr, Xe, I and Cs

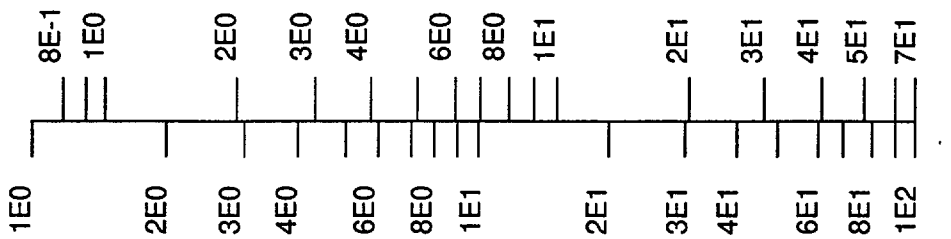


Core Inventory Released, (%) For Ba and Sr



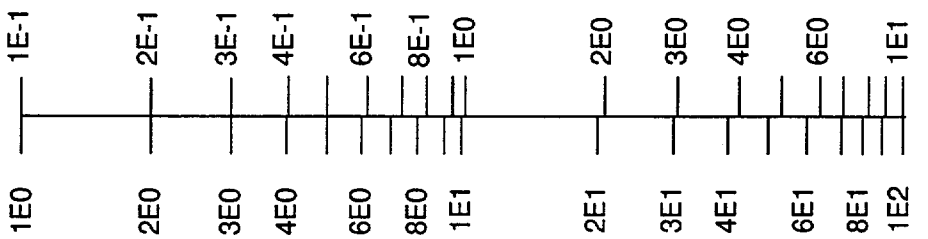
PERCENT CORE INVENTORY RELEASED VERSUS PERCENT FUEL MELT FOR LOW BURN-UP CASE

Core Inventory Released, (%) For Kr, Xe, I, Cs and Te



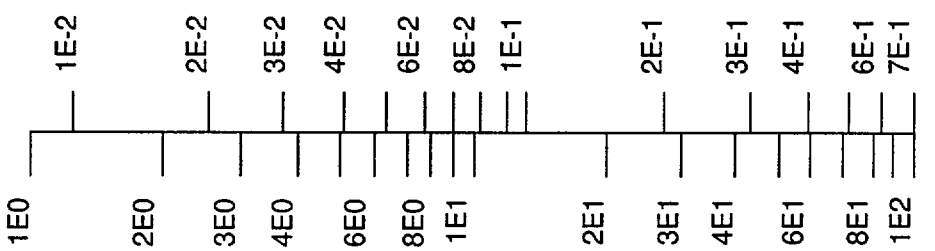
Fuel Melt, (%)

Core Inventory Released, (%) For Ba and Sr



Fuel Melt, (%)

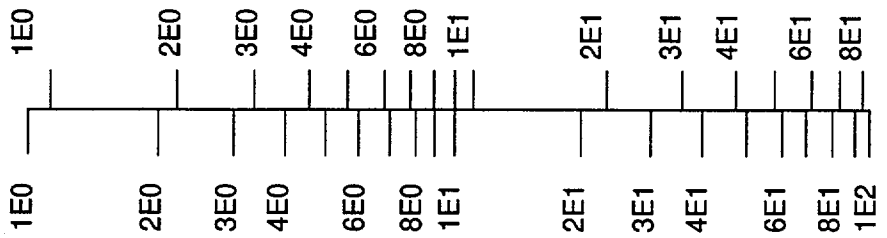
Core Inventory Released, (%) For Pr



Fuel Melt, (%)

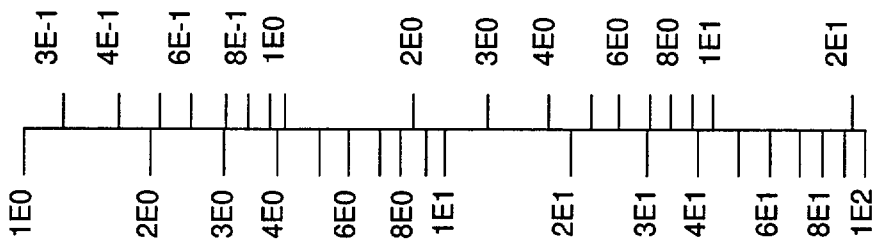
PERCENT CORE INVENTORY RELEASED VERSUS PERCENT FUEL MELT FOR AVERAGE BURN-UP CASE

Core Inventory Released, (%) For Kr, Xe, I, Cs and Te



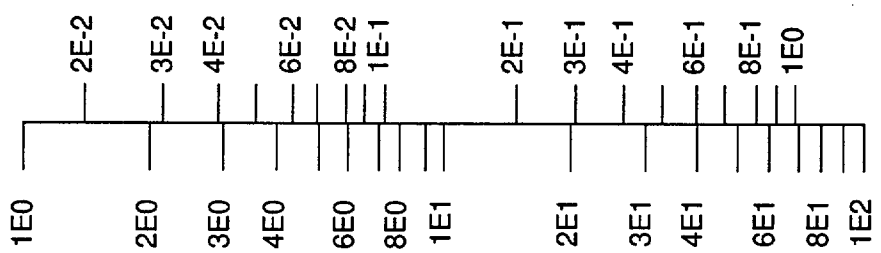
Fuel Melt, (%)

Core Inventory Released, (%) For Ba and Sr



Fuel Melt, (%)

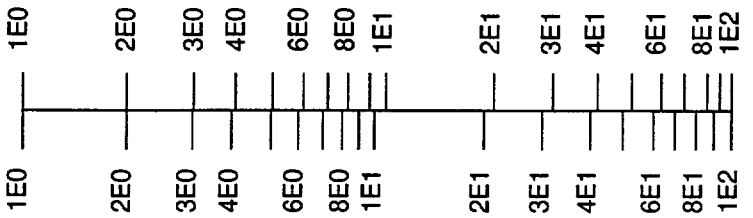
Core Inventory Released, (%) For Pr



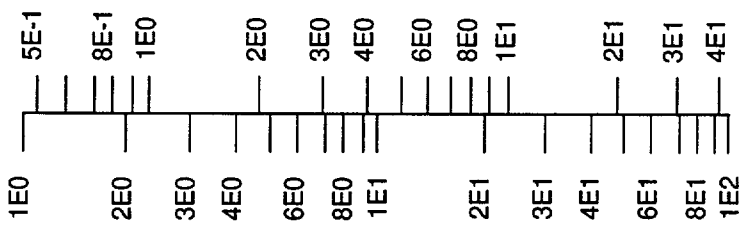
Fuel Melt, (%)

PERCENT CORE INVENTORY RELEASED VERSUS PERCENT FUEL MELT FOR HIGH BURN-UP CASE

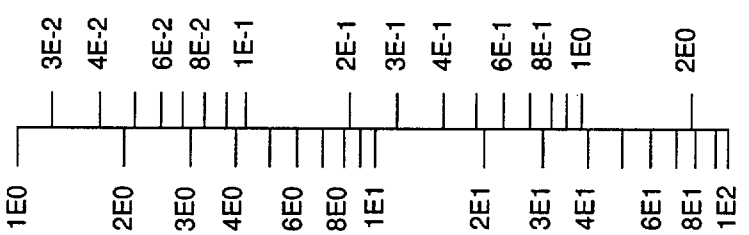
Core Inventory Released, (%) For Kr, Xe, I, Cs and Te



Core Inventory Released, (%) For Ba and Sr



Core Inventory Released, (%) For Pr



Southern Nuclear Operating Company
Nuclear Operations
P.O. Box 1600
Waynesboro, Georgia 30830
Telephone 706-724-1562
706-554-9961

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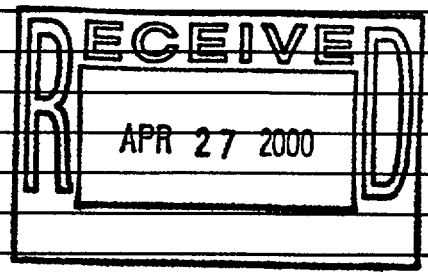
RECORDS SUBMITTAL FORM

Submittal No. EP-00-06

TO: DOCUMENT CONTROL
The documents described below are being submitted to you for storage. Documents which contain a Safety Evaluation (Part B) are indicated by a mark in the SE column.

Document Number	Rev	SE	Document Description
91105-C	11		"Duties of the EOF Manager"
			3 pages of documentation
91202-C	11		"Activation and Operation of the Operations Support Center"
			3 pages of documentation
91502-C	11		"Core Damage Assessment"
			3 pages of documentation
91504-C	09		"Core Inventory Determinations Using Reactor Power History"
			3 pages of documentation



Remarks: Printed copies compared to originals in Document Control.

June J. McBride
Submitted By:

Received By: (Document Control)

Emergency Preparedness
Department

04/27/2000
Date

4/27/00
Date

Figure 2 (Example)

PRB REVIEW REQUIRED

1.0 PURPOSE

1.1 This procedure provides instructions and Data Sheets necessary for manual determination of fission product core inventories. These estimates, based on Reactor Power History, are used in post-accident core damage assessment and represent inventories at the time of reactor shutdown prior to a core damage accident. Inventories may also be determined by computer using approved software.

2.0 PRECAUTIONS AND LIMITATIONS

2.1 The reactor power fluctuations of no more than plus or minus ten percent of the recorded power level values, are acceptable within any power level period.

2.2 The length of Reactor Power History required for determining core inventories varies with each nuclide used in the assessment. A reactor power history equal to at least four (4) times the half-life of the nuclide is required and is specified below Column 2 of each Reactor Power History Data Sheet.

3.0 PREREQUISITES

An emergency condition has been declared and core damage is suspected.

4.0 RESPONSIBILITIES

4.1 It is the responsibility of the Technical Support Center (TSC) Engineering Supervisor to execute this procedure and to coordinate the core damage assessment actions.

4.2 The TSC Engineering Supervisor is also responsible to review completed core damage assessment, Procedure 91502-C, Core Damage Assessment".

4.3 The Reactor Engineer assigned to the TSC should normally perform these duties under the direction of the TSC Engineering Supervisor.

5.0 MAIN BODY

5.1 INSTRUCTIONS

NOTE

If this procedure is being performed on a reload core with zero MWD/MTU cycle burn-up, then the power history will include operation during the previous cycle. This will require the fission product inventories to be adjusted for the fraction of fuel assemblies which were used in the previous cycle. Specifically, multiply results by (number of fuel assemblies from previous cycle) ÷ (total number of fuel assemblies).

NOTE

The automated core damage spreadsheet may be used in lieu of the manual method when performing core damage assessment.

5.1.1 Obtain Reactor Power History for at least the last 1230 hours (51 days), in units of percent rated full power from Reactor Engineering Power History and Burn up Log. Divide the Power History into a series of periods in which the reactor power varied no more than ±10% from its mean for that period.

5.1.2* Enter reactor power level as percent of rated full power in Column 1 of Data Sheets 1 through 11 and 13 through 18.

5.1.3* For each percent power level value entered in Column 1 of Data Sheets 1 through 11 and 13 through 18, enter the duration at this power, in hours, in Column 2. The power level and duration values should be for a time period equal to or slightly greater than the minimum time indicated below Column 2 to be used for calculation purposes.

5.1.4 Data Sheet 12 is used to determine the power correction factor for Cs-134. To use Data Sheet 12, the average power during the entire operating period is required. (Due to the production characteristics of Cs-134, a different method must be used in determining the power correction factor.) If using the core damage assessment spreadsheet, enter Total Corrected Core Activity for Cs-134 on spreadsheet.

* - Denotes manual completion of the step is not required if the automated spreadsheet is used.

NOTE

If using core damage assessment spreadsheet go to step 5.1.12 of this procedure.

5.1.5 Enter into Column 3, of each Data Sheet, the time between the end of each power period recorded in Column 1 and the time at which reactor shutdown occurred, in hours.

5.1.6 Using the bar graph provided for each nuclide, determine the Factor A associated with each time value in Column 3. Record each Factor A in Column 4.

5.1.7 Using the bar graph provided for each nuclide, determine the Factor B associated with each time value, recorded in Column 2. Record each Factor B in Column 5.

5.1.8 Multiply each respective power level (Column 1) with its corresponding Factor A (Column 4) and Factor B (Column 5), to obtain the product of percent power. Enter the product in Column 6.

5.1.9 Add the products in Column 6 to determine the power correction factor and enter the value below Column 6.

5.1.10 Calculate the core inventory for each nuclide by multiplying the power correction factor from Sub-subsection 5.1.8 by the respective nuclide factor given on the Data Sheet.

5.1.11 Enter the product obtained on the line labeled "Total Corrected Activity".

5.1.12 Execute Procedure 91502-C, "Core Damage Assessment".

6.0 REFERENCES

6.1 Westinghouse Owner's Group Post Accident Core Damage Assessment Methodology, Revision 2, November, 1984.

6.2 PROCEDURES

6.2.1 91502-C, "Core Damage Assessment"

6.2.2 91503-C, "Control Room Instrumentation Output For Assessment Of Core Damage"

END OF PROCEDURE TEXT

Sheet 1 of 1

DATA SHEET 1

REACTOR POWER HISTORY AND CORE INVENTORY DETERMINATION

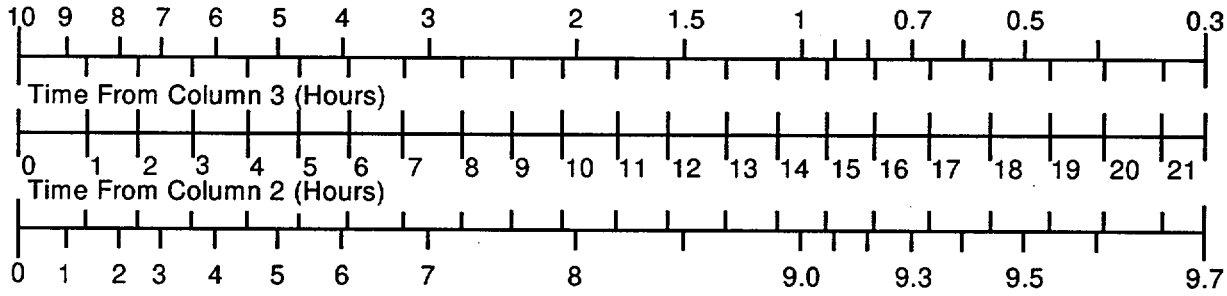
NUCLIDE: Kr 85m

Column 1 Average Power Level	Column 2 Duration At Power	Column 3 Shutdown To End Of Power	Column 4 Factor A	Column 5 Factor B	Column 6 Product %P x A x B
(% P)	(Hours)	(Hours)			

Duration = _____ * Power Correction Factor $\sum_{i} P_i x A_i x B_i$ = _____

*Must be at least 17.6 hours

Factor A



Factor B

Core Inventory = 2.10E3 X _____ = _____ Curies
PCF, col 6 sum Total Corrected Core Activity

DATE: _____ TIME: _____ PERFORMED BY: _____

Sheet 1 of 1

DATA SHEET 2

REACTOR POWER HISTORY AND CORE INVENTORY DETERMINATION

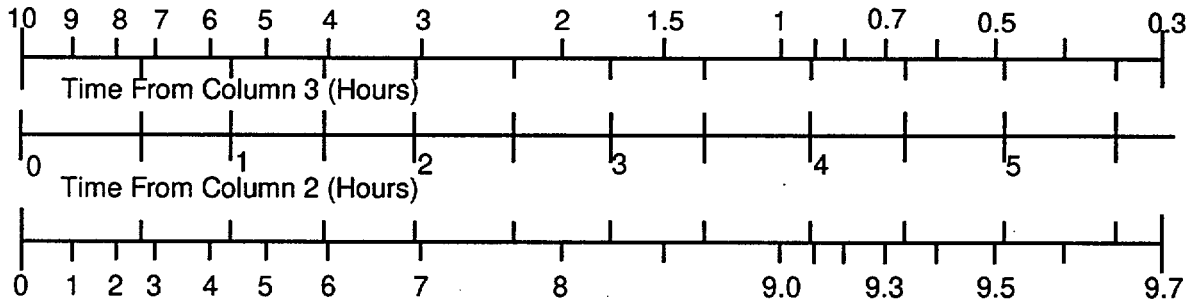
NUCLIDE: Kr 87

Column 1 Average Power Level	Column 2 Duration At Power	Column 3 Shutdown To End Of Power	Column 4 Factor A	Column 5 Factor B	Column 6 Product %P x A x B
(% P)	(Hours)	(Hours)			

Duration = _____ * Power Correction Factor $\sum_i P_i x A_i x B_i$ = _____

*Must be at least 5.0 hours

Factor A



Factor B

Core Inventory = 3.83E3 X _____ = _____ Curies
PCF, col 6 sum Total Corrected Core Activity

DATE: _____ TIME: _____ PERFORMED BY: _____

DATA SHEET 3

REACTOR POWER HISTORY AND CORE INVENTORY DETERMINATION

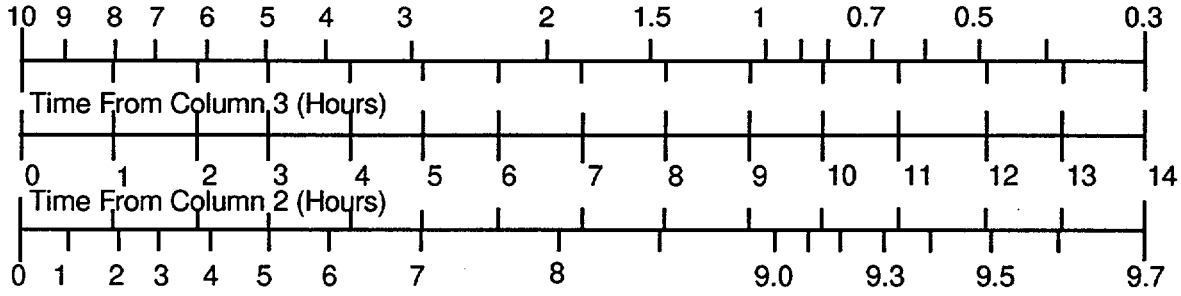
NUCLIDE: Kr 88

Column 1 Average Power Level	Column 2 Duration At Power	Column 3 Shutdown To End Of Power	Column 4 Factor A	Column 5 Factor B	Column 6 Product %P x A x B
(% P)	(Hours)	(Hours)			

Duration = _____ * Power Correction Factor $\sum_{i} P_i x A_i x B_i$ = _____

*Must be at least 11.2 hours

Factor A



Factor B

Core Inventory = 5.45E3 X _____ = _____ Curies
PCF, col 6 sum Total Corrected Core Activity

DATE: _____ TIME: _____ PERFORMED BY: _____

DATA SHEET 4

REACTOR POWER HISTORY AND CORE INVENTORY DETERMINATION

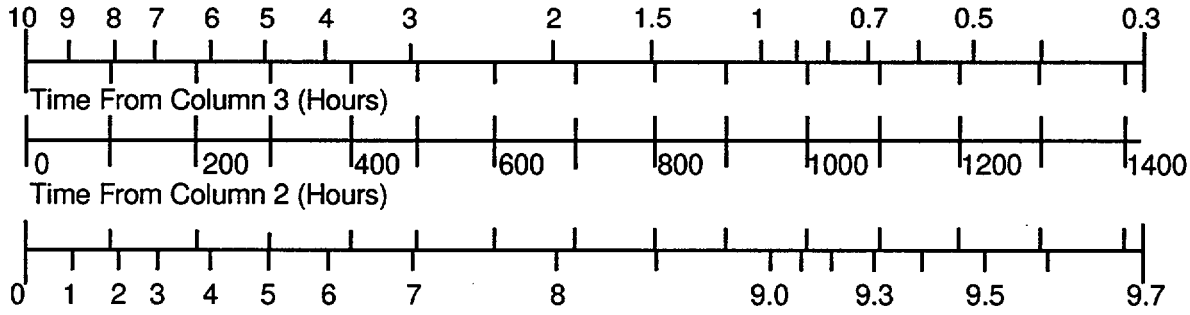
NUCLIDE: Xe 131m

Column 1 Average Power Level	Column 2 Duration At Power	Column 3 Shutdown To End Of Power	Column 4 Factor A	Column 5 Factor B	Column 6 Product %P x A x B
(% P)	(Hours)	(Hours)			

Duration = _____ * Power Correction Factor $\sum_{i} P_i x A_i x B_i$ = _____

*Must be at least 1132 hours

Factor A



Factor B

Core Inventory = 6.03E1 X _____ = _____ Curies
PCF, col 6 sum Total Corrected Core Activity

DATE: _____ TIME: _____ PERFORMED BY: _____

DATA SHEET 5

REACTOR POWER HISTORY AND CORE INVENTORY DETERMINATION

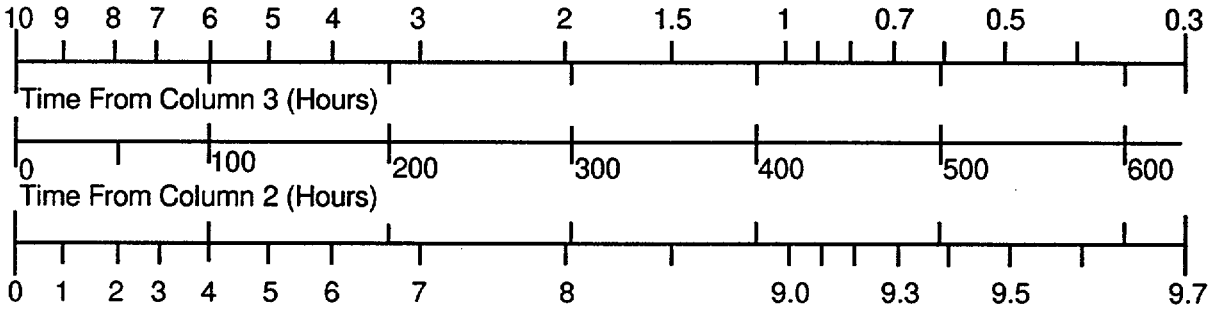
NUCLIDE: Xe 133

Column 1 Average Power Level	Column 2 Duration At Power	Column 3 Shutdown To End Of Power	Column 4 Factor A	Column 5 Factor B	Column 6 Product %P x A x B
(% P)	(Hours)	(Hours)			

Duration = _____ * Power Correction Factor $\sum_{i} P_i x A_i x B_i$ = _____

*Must be at least 506 hours

Factor A



Factor B

Core Inventory = 1.91E4 X _____ = _____ Curies
PCF, col 6 sum Total Corrected Core Activity

DATE: _____ TIME: _____ PERFORMED BY: _____

Sheet 1 of 1

DATA SHEET 6

REACTOR POWER HISTORY AND CORE INVENTORY DETERMINATION

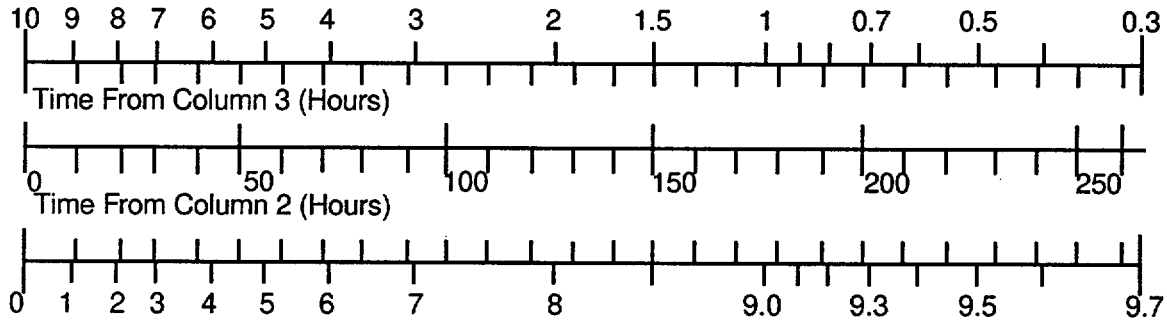
NUCLIDE: Xe 133m

Column 1 Average Power Level	Column 2 Duration At Power	Column 3 Shutdown To End Of Power	Column 4 Factor A	Column 5 Factor B	Column 6 Product %P x A x B
(% P)	(Hours)	(Hours)			

Duration = _____ * Power Correction Factor $\sum_{i} P_i x A_i x B_i$ = _____

*Must be at least 217 hours

Factor A



Factor B

Core Inventory = 2.68E3 X _____ = _____ Curies
PCF, col 6 sum Total Corrected Core Activity

DATE: _____ TIME: _____ PERFORMED BY: _____

Sheet 1 of 1

DATA SHEET 7

REACTOR POWER HISTORY AND CORE INVENTORY DETERMINATION

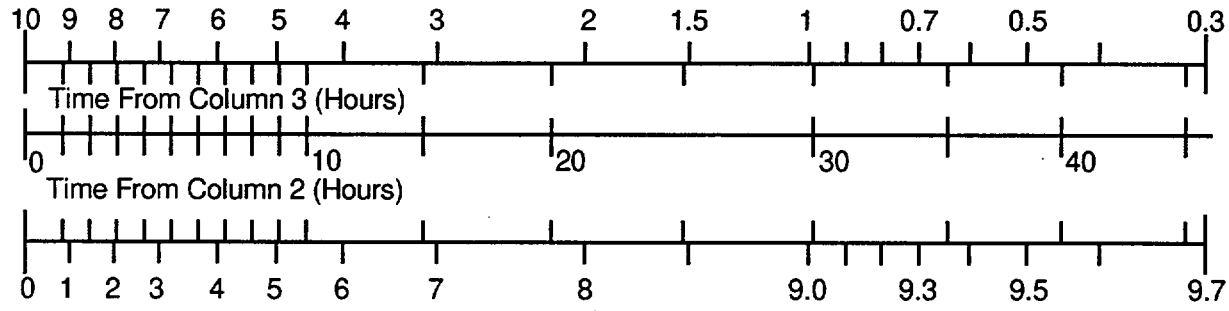
NUCLIDE: Xe 135

Column 1 Average Power Level	Column 2 Duration At Power	Column 3 Shutdown To End Of Power	Column 4 Factor A	Column 5 Factor B	Column 6 Product %P x A x B
(% P)	(Hours)	(Hours)			

Duration = _____ * Power Correction Factor $\sum_{i} P_i x A_i x B_i$ = _____

*Must be at least 36.6 hours

Factor A



Factor B

Core Inventory = 3.54E3 X _____ = _____ Curies
PCF, col 6 sum Total Corrected Core Activity

DATE: _____ TIME: _____ PERFORMED BY: _____

DATA SHEET 8

REACTOR POWER HISTORY AND CORE INVENTORY DETERMINATION

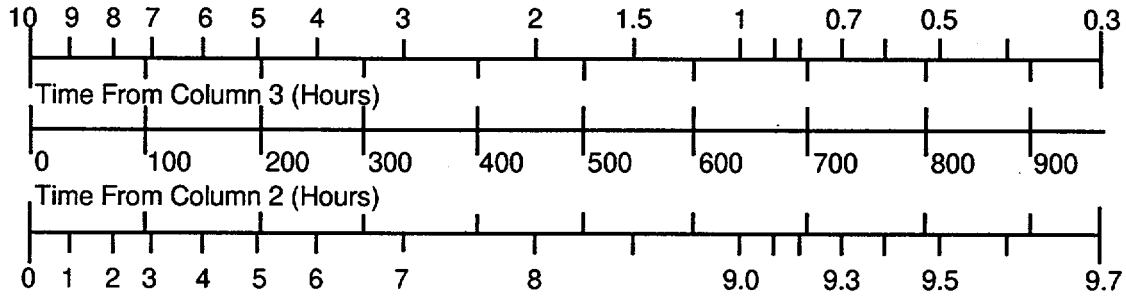
NUCLIDE: I 131

Column 1 Average Power Level	Column 2 Duration At Power	Column 3 Shutdown To End Of Power	Column 4 Factor A	Column 5 Factor B	Column 6 Product %P x A x B
(% P)	(Hours)	(Hours)			

Duration = _____ * Power Correction Factor $\sum_{i} P_i x A_i x B_i$ = _____

*Must be at least 773 hours

Factor A



Factor B

Core Inventory = 9.38E3 X _____ = _____ Curies
PCF, col 6 sum Total Corrected Core Activity

DATE: _____ TIME: _____ PERFORMED BY: _____

DATA SHEET 9

REACTOR POWER HISTORY AND CORE INVENTORY DETERMINATION

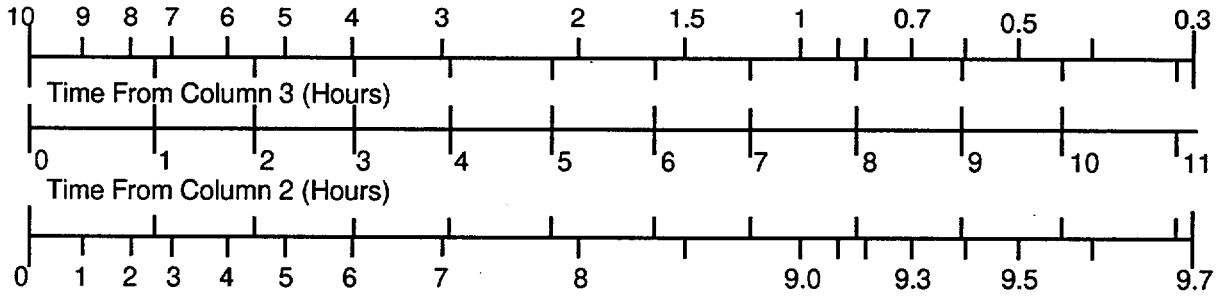
NUCLIDE: I 132

Column 1 Average Power Level	Column 2 Duration At Power	Column 3 Shutdown To End Of Power	Column 4 Factor A	Column 5 Factor B	Column 6 Product %P x A x B
(% P)	(Hours)	(Hours)			

Duration = _____ * Power Correction Factor $\sum_{i} P_i x A_i x B_i$ = _____

*Must be at least 9 hours

Factor A



Factor B

Core Inventory = 1.34E4 X _____ = _____ Curies
PCF, col 6 sum Total Corrected Core Activity

DATE: _____ TIME: _____ PERFORMED BY: _____

DATA SHEET 10

REACTOR POWER HISTORY AND CORE INVENTORY DETERMINATION

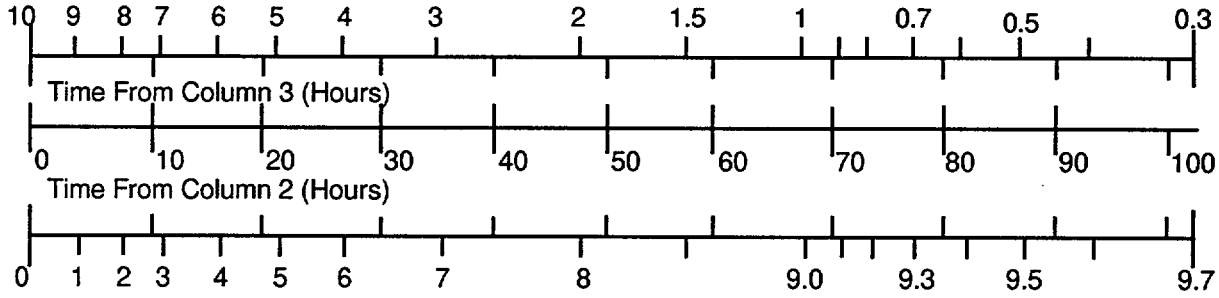
NUCLIDE: I 133

Column 1 Average Power Level	Column 2 Duration At Power	Column 3 Shutdown To End Of Power	Column 4 Factor A	Column 5 Factor B	Column 6 Product %P x A x B
(% P)	(Hours)	(Hours)			

Duration = _____ * Power Correction Factor $\sum_i P_i x A_i x B_i$ = _____

*Must be at least 81 hours

Factor A



Factor B

Core Inventory = 1.91E4 X _____ = _____ Curies
PCF, col 6 sum Total Corrected Core Activity

DATE: _____ TIME: _____ PERFORMED BY: _____

Sheet 1 of 1

DATA SHEET 11

REACTOR POWER HISTORY AND CORE INVENTORY DETERMINATION

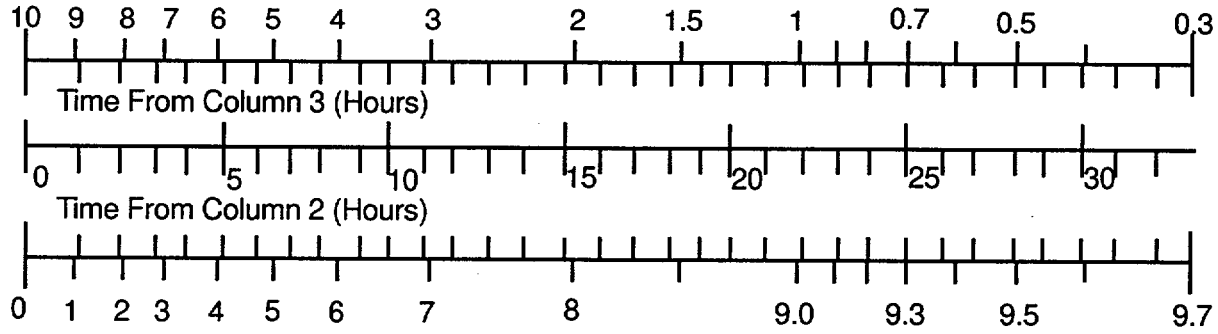
NUCLIDE: I 135

Column 1 Average Power Level	Column 2 Duration At Power	Column 3 Shutdown To End Of Power	Column 4 Factor A	Column 5 Factor B	Column 6 Product %P x A x B
(% P)	(Hours)	(Hours)			

Duration = _____ * Power Correction Factor $\sum_{i} P_i x A_i x B_i$ = _____

*Must be at least 27 hours

Factor A



Factor B

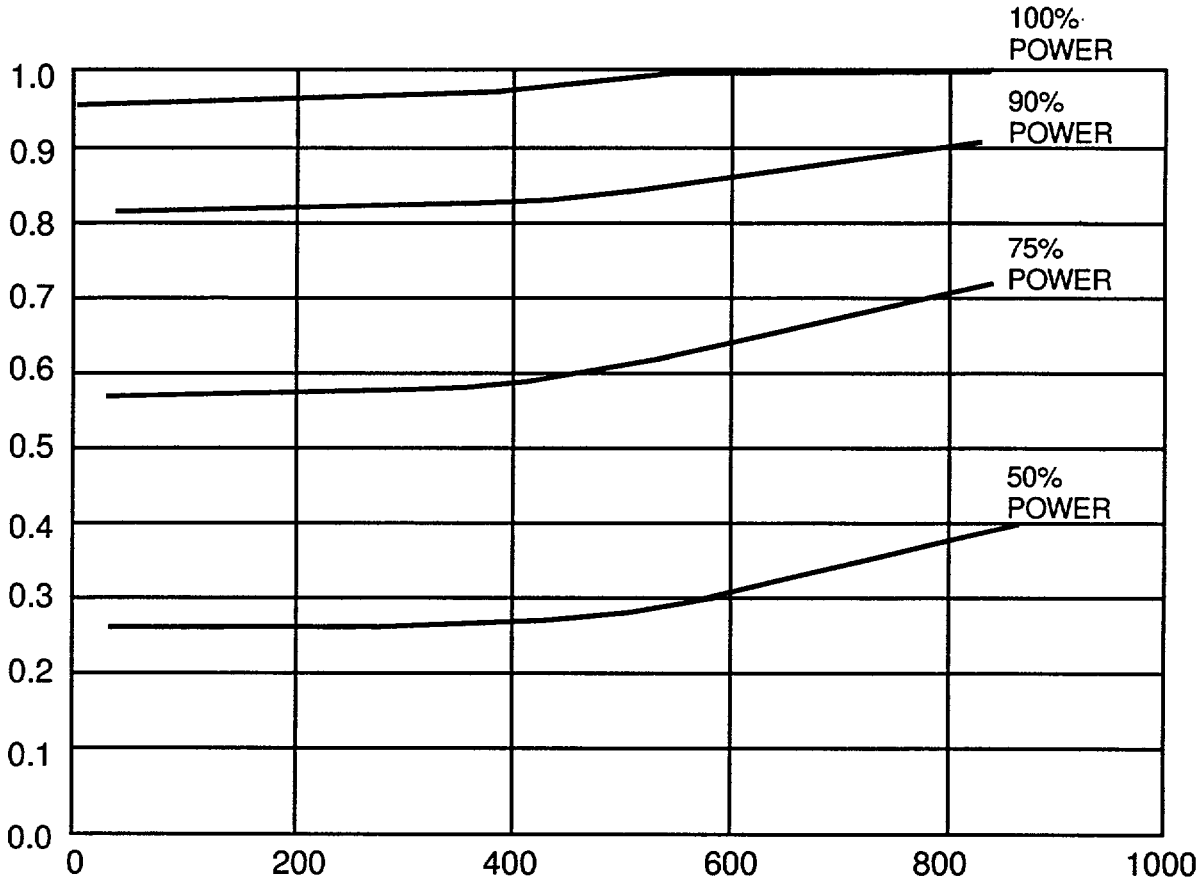
Core Inventory = 1.72E4 X _____ = _____ Curies
PCF, col 6 sum Total Corrected Core Activity

DATE: _____ TIME: _____ PERFORMED BY: _____

DATA SHEET 12

REACTOR POWER HISTORY AND CORE INVENTORY DETERMINATION

NUCLIDE: Cs 134



CYCLE OPERATION (CALENDAR DAYS)

NOTE

Must be at least 34 days of operation since the last refueling.

Core Inventory = 2.81E7 X (_____ / PCF) = _____ Curies
Total Corrected Core Activity

DATE: _____ TIME: _____ PERFORMED BY: _____

Sheet 1 of 1

DATA SHEET 13

REACTOR POWER HISTORY AND CORE INVENTORY DETERMINATION

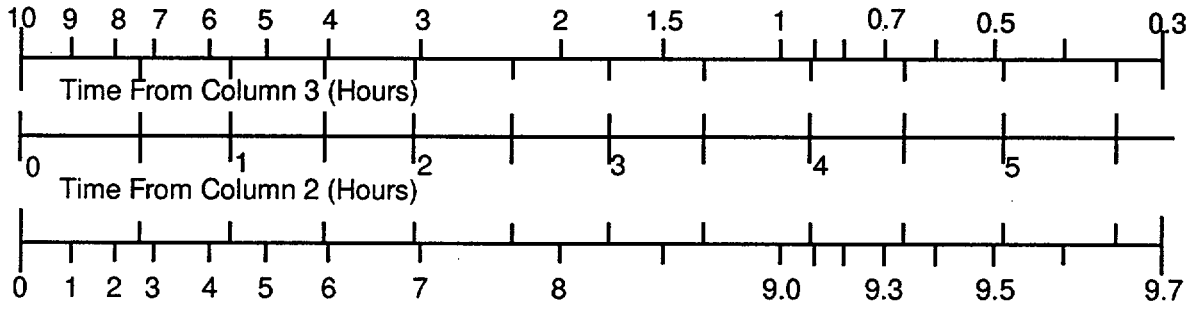
NUCLIDE: Te 129

Column 1 Average Power Level	Column 2 Duration At Power	Column 3 Shutdown To End Of Power	Column 4 Factor A	Column 5 Factor B	Column 6 Product %P x A x B
(% P)	(Hours)	(Hours)			

Duration = _____ * Power Correction Factor $\sum_{i} P_i x A_i x B_i$ = _____

*Must be at least 5 hours

Factor A



Factor B

Core Inventory = 3.16E3 X _____ = _____ Curies
PCF, col 6 sum Total Corrected Core Activity

DATE: _____ TIME: _____ PERFORMED BY: _____

DATA SHEET 14

REACTOR POWER HISTORY AND CORE INVENTORY DETERMINATION

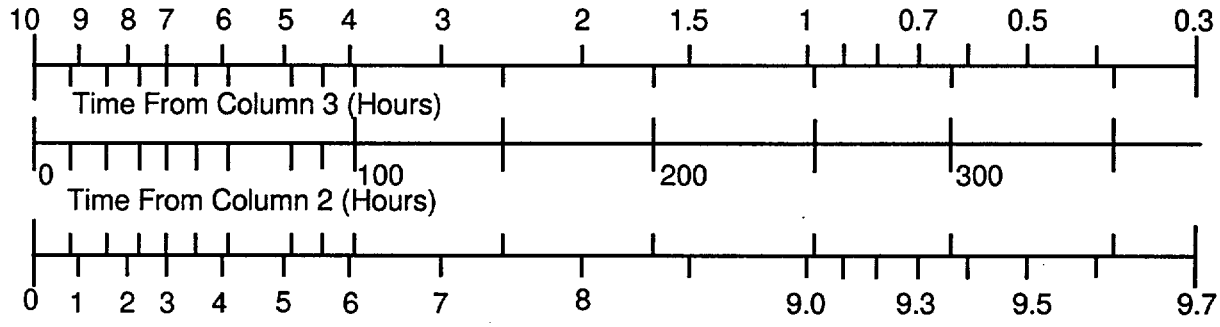
NUCLIDE: Te 132

Column 1 Average Power Level	Column 2 Duration At Power	Column 3 Shutdown To End Of Power	Column 4 Factor A	Column 5 Factor B	Column 6 Product %P x A x B
(% P)	(Hours)	(Hours)			

Duration = _____ * Power Correction Factor $\sum_{i} P_i x A_i x B_i$ = _____

*Must be at least 310 hours

Factor A



Factor B

Core Inventory = 1.34E3 X _____ = _____ Curies
PCF, col 6 sum Total Corrected Core Activity

DATE: _____ TIME: _____ PERFORMED BY: _____

Sheet 1 of 1

DATA SHEET 15

REACTOR POWER HISTORY AND CORE INVENTORY DETERMINATION

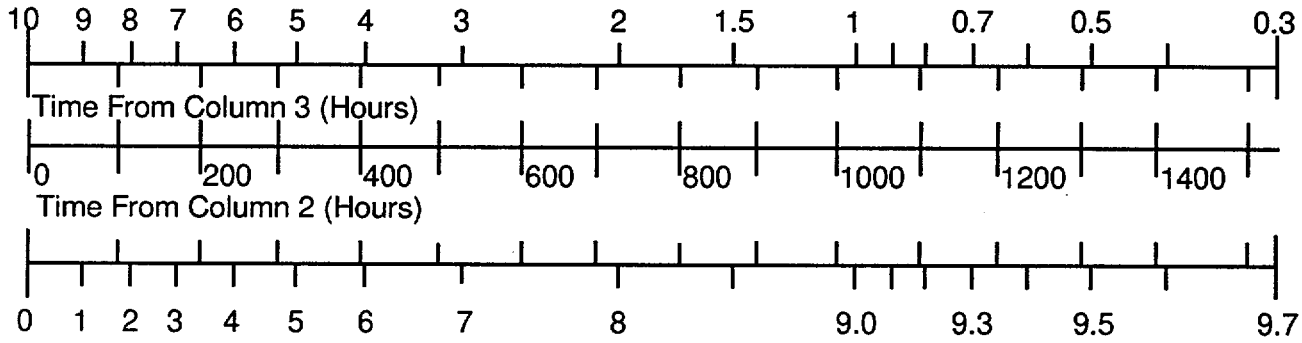
NUCLIDE: Ba 140

Column 1 Average Power Level	Column 2 Duration At Power	Column 3 Shutdown To End Of Power	Column 4 Factor A	Column 5 Factor B	Column 6 Product %P x A x B
(% P)	(Hours)	(Hours)			

Duration = _____ * Power Correction Factor $\sum_i P_i x A_i x B_i$ = _____

*Must be at least 1230 hours

Factor A



Factor B

Core Inventory = 1.63E4 X _____ = _____ Curies
PCF, col 6 sum Total Corrected Core Activity

DATE: _____ TIME: _____ PERFORMED BY: _____

DATA SHEET 16

REACTOR POWER HISTORY AND CORE INVENTORY DETERMINATION

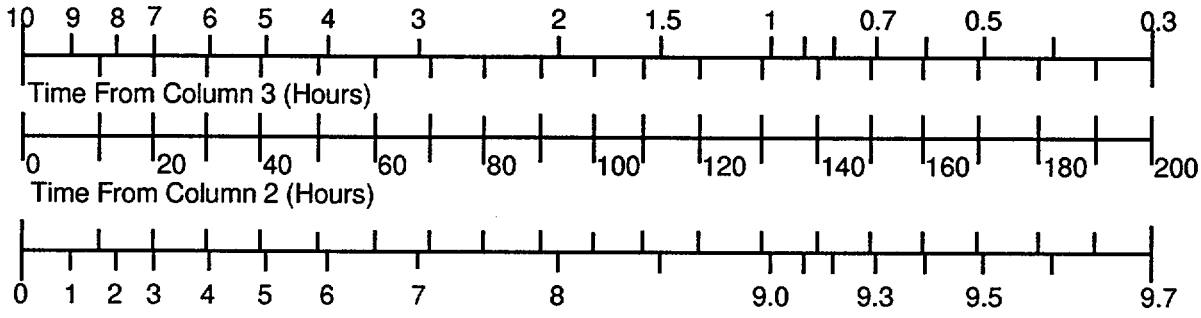
NUCLIDE: La 140

Column 1 Average Power Level	Column 2 Duration At Power	Column 3 Shutdown To End Of Power	Column 4 Factor A	Column 5 Factor B	Column 6 Product %P x A x B
(% P)	(Hours)	(Hours)			

Duration = _____ * Power Correction Factor $\sum_{i} P_i x A_i x B_i$ = _____

*Must be at least 160 hours

Factor A



Factor B

Core Inventory = 1.72E4 X _____ = _____ Curies
PCF, col 6 sum Total Corrected Core Activity

DATE: _____ TIME: _____ PERFORMED BY: _____

DATA SHEET 17

REACTOR POWER HISTORY AND CORE INVENTORY DETERMINATION

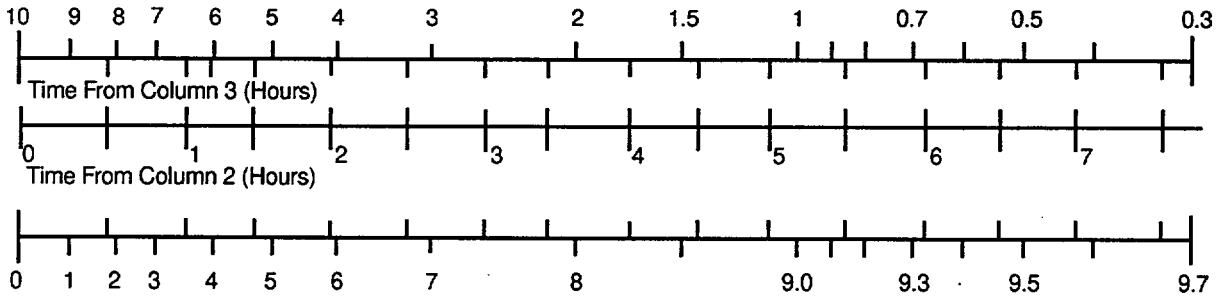
NUCLIDE: La 142

Column 1 Average Power Level	Column 2 Duration At Power	Column 3 Shutdown To End Of Power	Column 4 Factor A	Column 5 Factor B	Column 6 Product %P x A x B
(% P)	(Hours)	(Hours)			

Duration = _____ * Power Correction Factor $\sum_{i} P_i x A_i x B_i$ = _____

*Must be at least 6 hours

Factor A



Factor B

Core Inventory = 1.43E4 X _____ = _____ Curies
PCF, col 6 sum Total Corrected Core Activity

DATE: _____ TIME: _____ PERFORMED BY: _____

DATA SHEET 18

REACTOR POWER HISTORY AND CORE INVENTORY DETERMINATION

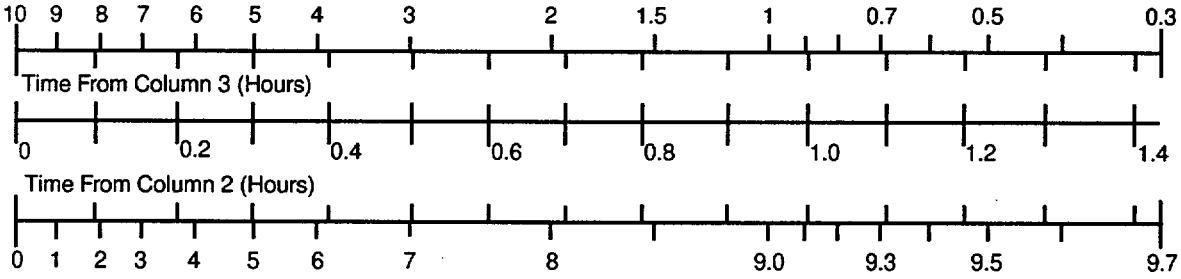
NUCLIDE: Pr 144

Column 1 Average Power Level	Column 2 Duration At Power	Column 3 Shutdown To End Of Power	Column 4 Factor A	Column 5 Factor B	Column 6 Product %P x A x B
(% P)	(Hours)	(Hours)			

Duration = _____ * Power Correction Factor $\sum_{i} P_i x A_i x B_i$ = _____

*Must be at least 1.5 hours

Factor A



Factor B

Core Inventory = 1.15E4 X _____ = _____ Curies
PCF, col 6 sum Total Corrected Core Activity

DATE: _____ TIME: _____ PERFORMED BY: _____