OMAHA PUBLIC POWER DISTRICT
CONFIRMATION OF TRANSMITTAL
EMERGENCY PLAN IMPLEMENTING PROCEDURES
(EPIP)

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NOTE: Procedure OSC-15 contains Proprietary Information.

J. J. Fisenco by BV
Manager - Radiological Health and Emergency Planning

I hereby acknowledge receipt of the above copy or numbered pages. The additional or revised pages have been included in my assigned copy of the EPIP and/or superseded pages have been removed as required.

Signed Date

(Please sign and return this form within 5 days to Rhonda Hankins, Jones Street Station, Omaha Public Power District, 1623 Harney Street, Omaha, NE 68102).

NOTE: If your copy of the Emergency Plan Implementing Procedures has been transferred to another person or address, please fill out the spaces below.

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OMAHA PUBLIC POWER DISTRICT
CONFIRMATION OF TRANSMITTAL
EMERGENCY PLAN IMPLEMENTING PROCEDURES
(EPIP)
(Continued)

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VOLUME III

OMAHA PUBLIC POWER DISTRICT - FORT CALHOUN STATION

EMERGENCY PLAN IMPLEMENTING PROCEDURES

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5. PUBLIC INFORMATION

Fort Calhoun Station Unit No. 1
EMERGENCY PLAN IMPLEMENTING PROCEDURE
EPIP-OSC-2

Emergency Plan Activation and Notifications

I. PURPOSE

This procedure provides the instruction to be followed by the Shift Supervisor or his designee when an emergency occurs that requires initiation of the emergency plan.

II. PREREQUISITE

1. The emergency has been classified in accordance with EPIP-OSC-1.
2. Initial actions to ensure the plant is in a safe condition have been taken.
3. A completed "Initial Response Organization Call List" (Attachment 3), is available in the N.O. Station's Shift Supervisors Office, Systems Operations dispatcher 43rd Street Dispatch, Fort Calhoun Station Control Room and all Emergency Team TAG No. 1 personnel.

II. PRECAUTIONS

1. All significant events and actions shall be logged in the Operations Log Book.
2. The person relieving the Shift Supervisor as Site Director shall be fully briefed prior to assuming responsibility.
3. The "Initial Response Organization Call List" is latest revision.

IV. PROCEDURE

1. Notification of Unusual Event Classification

   A. The Shift Supervisor or his designee shall perform the following:

      1. Notify plant personnel by announcing the classification condition twice over the Gaitronic system.

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IV. PROCEDURE: (Continued)

1. A. 2. Initiate emergency response by utilizing the Initial Response Organization Call List.

3. Notify State/Agencies:

a. Provide initial notification within 15 minutes to the Nebraska State Civil Defense Agency and Iowa Office of Disaster Services via the Conference Operations (COP) Network. Complete the form shown in Attachment 1 of this procedure for any and all emergency classifications. This form is titled Nuclear Power Plant Incident Initial Report to Offsite Government Agencies.

b. The telephone and NAWAS may be used as alternate metnods of notification. See Attachment 3 of EPIP-OSC-15 for additional requirements when these are used.

4. Notify the NRC Operation Center via the ENS (Red Telephone) immediately after State Notification, NOT to exceed 1 hour after classification. (Refer to OPPD Standing Order R-11). Backup telephone numbers are on the red telephones.

5. Use Gai-tronics to contact Shift HP and Chemist if they are not already in the Control Room.

6. Notify the Security Force (Ext. 6657) to confirm that the Security Emergency Procedures are in effect.

7. Consider evacuation of compartments within the containment and auxiliary buildings.

2. Alert Classification

A. The Shift Supervisor or his designee shall perform the following:

1. Notify plant personnel by sounding the Nuclear Emergency Alarm followed by an announcement on the Gaitronic system with special evacuation instructions. Repeat the instructions.

2. Perform actions listed for "Notification of Unusual Event" if not completed.

3. Complete accountability of personnel.

4. Initiate personnel search and rescue as needed.

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IV. PROCEDURE: (Continued)

2. A. 5. Direct in-plant radiological surveys and determine control room habitability.

6. Direct offsite surveys as additional emergency monitors arrive.

7. Provide update reports to the States whenever emergency classifications are changed and/or the emergency is terminated, or every 15 minutes during a radioactive release.

In the Control Room, fill out FC-195, (Attachment 2) and transmit using the COP Network, regular phone, or NAWAS. In the TSC, the terminetts will be used. If unavailable, transmit FC-195 data to the States using the COP Network or the Facisimile Network.

8. Transfer emergency responsibility with complete briefing to relieving Site Director or Recovery Manager when they are available, in accordance with either EPIP-EOF-13 or EPIP-EOF-14.

3. Site Area Emergency and General Emergency Classifications

A. The Shift Supervisor or his designee shall perform the following:

1. Perform actions listed for the "Notification of Unusual Event" and "Alert" classifications if not completed

2. Within 15 minutes of classification, contact counties and recommend Early Warning Siren Activation 1.A.W. EPIP-EOF-17.

3. Transfer emergency responsibility with complete briefing to the Site Director or Recovery Manager when those persons become available. The transfer shall be performed in accordance with either EPIP-EOF-13 or EPIP-EOF-14.

4. The Shift Supervisor should now direct all efforts to operation of the reactor and plant.

B. The Site Director or his designee shall perform the following:

1. Continue update reports to State and County Agencies until responsibility is transferred to the Recovery Manager.

2. Provide Initial notification to Counties at Site Area and General Emergencies unless EOF personnel agree to make such notifications.

ATTACHMENT 1
NUCLEAR POWER PLANT INCIDENT
INITIAL REPORT TO OFFSITE GOVERNMENT AGENCIES

1. This is _____ (Name), _____ (Title), at the Fort Calhoun plant. Telephone call-back number (USE ONLY WHEN COP NETWORK IS NOT USED) is _____. Time is _____.

2. _____ NOTIFICATION OF UNUSUAL EVENT/ _____ ALERT/ _____ SITE AREA/ _____ GENERAL EMERGENCY was declared at _____ (Time) on _____ (Date).

3. _____ Airborne/ _____ Liquid/ _____ No Release of radioactive material occurred.

(ITEMS 4 THRU 6 WILL NOT BE COMPLETED WHEN NO RELEASE HAS OCCURRED)

4. The estimated duration of the release is _____ minutes.

   The release is _____ Terminated/ _____ In Progress/ _____ Potential.

5. Wind speed is _____ MPH; wind direction is from _____°.

6. Sector(s) affected are _____ for _____ miles.
   _____ for _____ miles.

7. Recommended protective actions are: (See EPIP-EOF-7, Table EOF-7.1)

   [ ] Advisory - for information only - no public notification (Notification of Unusual Event).

   [ ] Standby - be prepared for possible public action (Alert).
   [ ] Public Reponse - notify public (Site Area and General).

   [ ] 15-minute siren notification - standby for more information (Site Area and General)

   [ ] Limit use of potentially affected water (liquid release).

   [ ] Inhouse shelter may be necessary (Site Area).

   [ ] Inhouse shelter (General Emergency - 2 mile radius/5 mile downwind).

   [ ] Evacuation may be necessary (Site Area - General Emergency).

8. Remarks: (This IS/IS NOT an exercise. Repeat. This IS/IS NOT an exercise)

   _____

   _____

9. Report was received by:

   _____, _____, _____, _____

   _____ (NAME), _____ (AGENCY), _____ (TIME), _____ (DATE)

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EPIP-OSC-2-5

ATTACHMENT 2

DOSE ASSESSMENT DATA PROCESSOR
(402)-536-4842

FORT CALHOUN STATION
UPDATE REPORT TO OFFSITE AUTHORITIES

FC-195
FORM REV 4 03-20-87

GENERAL INFORMATION

1. CLASSIFICATION:
   a. NOUE declared at _____ (TIME)
   b. ALERT declared at _____ (TIME)
   c. SITE AREA EMERGENCY declared at _____ (TIME)
   d. GENERAL EMERGENCY declared at _____ (TIME)

2. Surface contamination is ( ) Estimated/ ( ) Measured as:
   a. Inplant: _____ Onsite: _____ Offsite: _____ microcuries/100 cm^2

3. The following emergency response actions are underway:
   a. ( ) Environmental Sampling b. ( ) Radiation Monitor Surveys
   c. ( ) Other _____

4. We ( ) Have requested/ ( ) Are requesting the following offsite assistance:
   a. ( ) Fire, b. ( ) Rescue, c. ( ) Police,
   d. ( ) Other (specify) _____

5. Average River Flow rate (Seasonal) _____

RELEASE INFORMATION

6. TYPE: ☐ AIRBURNE ☐ LIQUID ☐ NONE

7. LOCATION: ☐ CONTAINMENT ☐ STACK ☐ MAIN STEAM ☐ OTHER
   a. Height of release _____ (other than stack)

8. ESTIMATED DURATION: _____ HOURS

9. QUANTITY AND RATE: ☐ ACTUAL ☐ ESTIMATED
   _____ CURIE NOBLE GAS AT _____ CURIE/SECOND
   _____ CURIE IODINE AT _____ CURIE/SECOND
   _____ CURIE PARTICULATE AT _____ CURIE/SECOND
   _____ CURIE LIQUID AT _____ CURIE/MINUTE

10. METEOROLOGICAL DATA:
    a. WIND SPEED: _____ MPH; b. WIND DIRECTION: FROM _____°;
    c. ΔT _____ °C; d. AMB. TEMP. _____ (°C)
    e. STABILITY CLASS: A B C D E F G (CIRCLE ONE)
    f. PRECIPITATION: _____

DOSE ASSESSMENT INFORMATION

11. TIME OF CALCULATION: _____

12. AFFECTED SECTOR(S) _____ (LETTERS)

13.

	a) Projected Dose Rate (Rem/Hr)		b) Total Projected Dose (Rem)	
	WHOLE BODY	THYROID	WHOLE BODY	THYROID
Site Boundary				
At 2 Miles				
At 5 Miles				
At 10 Miles				

14. Our prognosis of the emergency based on plant information is:
    ( ) Conditions are stable
    ( ) The plant status is improved.
    ( ) The emergency condition may be relaxed or terminated within _____ Hours
    ( ) Progess is NOT favorable.

15. RECOMMENDED OFFSITE PROTECTIVE ACTIONS:
    ☐ NONE
    ☐ IN HOUSE SHELTER FOR _____ MILES _____ Sectors
    ☐ EVACUATION PREGNANT WOMEN & SCHOOL CHILDREN _____ MILES _____ Sectors
    ☐ EVACUATION GENERAL PUBLIC FOR _____ MILES _____ Sectors

16. Protective Action Recommendation Approval

BY: _____
SITE DIRECTOR OR RECOVERY MANAGER

17. This is _____, _____
NAME (TITLE)
at FCS. Telephone call back number is _____. Time is _____

18. Report received by:

_____ _____ _____ _____
(NAME) (AGENCY) (TIME) (DATE)

ATTACHMENT #3
INITIAL RESPONSE ORGANIZATION CALL LIST

UPON DECLARATION OF AN EMERGENCY, THE FORT CALHOUN SHIFT SUPERVISOR OR HIS DESIGNEE WILL CALL THE PAGER NUMBERS LISTED BELOW FOR THE INITIAL RESPONSE ORGANIZATION. THEN HE WILL NOTIFY THE CALL LIST CALLER AND BOTH NEBRASKA CIVIL DEFENSE/STATE PATROL AND IOWA OFFICE OF DISASTER SERVICES.
IF THE CALL LIST CALLER IS UNABLE TO RESPOND, HE WILL CONTINUE THE CALL LIST HIMSELF.

WHEN THE PHONE IS ANSWERED AT THE NUMBER LISTED BELOW,
ENTER THE CODE LISTED BELOW

CLASSIFICATION	PAGER PHONE NUMBER	CODE
NOTIFICATION OF UNUSUAL EVENT	PHONE NUMBER IS CONFIDENTIAL AND IS MAINTAINED IN CONTROL ROOM KEY LOCKER	2*2*2##
ALERT, SITE AREA OR GENERAL EMERGENCY	PHONE NUMBER IS CONFIDENTIAL AND IS MAINTAINED IN THE CONTROL ROOM KEY LOCKER	2*2*2##

DUTY/TITLE	NAME	TELEPHONE NUMBER	TIME CONTACTED	COMMENTS
CALL LIST CALLER	NORTH OMAHA STATION SHIFT SUPERVISOR			
STATE AGENCIES	NEBRASKA CIVIL DEFENSE/ STATE PATROL			
	IOWA OFFICE OF DISASTER SERVICES			

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ATTACHMENT #3
INITIAL RESPONSE ORGANIZATION CALL LIST

UPON NOTIFICATION OF AN EMERGENCY, THE CALL LIST CALLER WILL CALL ALL THE MEMBERS OF THE INITIAL RESPONSE ORGANIZATION BASED UPON THE EMERGENCY CLASSIFICATION

EMERGENCY CLASSIFICATION:

_____ A NOTIFICATION OF UNUSUAL EVENT
_____ AN ALERT
_____ A SITE AREA EMERGENCY
_____ A GENERAL EMERGENCY

NOTE: FOR EVERY CLASSIFICATION, THE CALL LIST CALLER WILL START HIS/HER CALL PROCEDURE AT THE TOP OF THE NEXT PAGE.

THE CALL LIST CALLER WILL FOLLOW THE ORDER AND SPECIAL INSTRUCTIONS ON THIS CALL LIST.

FORT CALHOUN PERSONNEL WILL FOLLOW THIS FORMAT IF THE CALL LIST CALLER IS UNABLE TO RESPOND.

COMMENCE CALLING INDIVIDUALS LISTED IN THIS CALL LIST IN THE ORDER IN WHICH THEY ARE LISTED. IF THE MEMBER IS STILL AT THE NUMBER CONTACTED, INFORM HIM OF THE EMERGENCY CLASSIFICATION AND REQUEST THAT HE REPORT IMMEDIATELY TO HIS EMERGENCY STATION.

IF IT IS KNOWN THAT THE PAGER SYSTEM IS INOPERABLE, COMMENCE MAKING CALLS STARTING AT THE TOP OF THE NEXT PAGE AND CONTINUE, IN ORDER OF LISTING, UNTIL OTHERWISE NOTED ON THIS CALL LIST.

LOG ALL OUTGOING CALLS ON THE CALL LIST!

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ATTACHMENT #3
INITIAL RESPONSE ORGANIZATION CALL LIST

____ A NOTIFICATION OF UNUSUAL EVENT
____ AN ALERT
____ A SITE AREA EMERGENCY
____ A GENERAL EMERGENCY

HAS BEEN DECLARED AT THE FORT CALHOUN STATION.
IT IS REQUESTED THAT YOU REPORT IMMEDIATELY TO
YOUR EMERGENCY RESPONSE STATION.

DUTY/TITLE	NAME	WORK PHONE	HOME PHONE ** PAGER NUMBER	EMERGENCY STATION NUMBER	CONTACTED BY PHONE YES/NO	TIME
SITE DIRECTOR (1 REQUIRED)						
OPERATIONS SUPPORT MANAGER (1 REQUIRED)						
RECOVERY MANAGER (1 REQUIRED)						
EMERGENCY COORDINATOR (1 REQUIRED)						

** For the pager numbers, first dial the number as listed, after the phone is answered, dial the phone number you want them to call. Then press "#" and hang up.

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ATTACHMENT #3
INITIAL RESPONSE ORGANIZATION CALL LIST

____ A NOTIFICATION OF UNUSUAL EVENT
____ AN ALERT
____ A SITE AREA EMERGENCY
____ A GENERAL EMERGENCY

HAS BEEN DECLARED AT THE FORT CALHOUN STATION. IT IS REQUESTED THAT YOU REPORT IMMEDIATELY TO YOUR EMERGENCY RESPONSE STATION.

DUTY/TITLE	NAME	WORK PHONE	HOME PHONE ** PAGER NUMBER	EMERGENCY STATION NUMBER	CONTACTED BY PHONE YES/NO	TIME
CORE PHYSICS SUPERVISOR (1 REQUIRED)						
ADMINISTRATIVE LOGISTICS MANAGER (1 REQUIRED)						
TECHNICAL SUPPORT MANAGER (1 REQUIRED)						
MAINTENANCE SUPERVISOR (1 REQUIRED)						
TECHNICAL SUPPORT SUPERVISOR (1 REQUIRED)						

** For the pager numbers, first dial the number as listed, after the phone is answered, dial the phone number you want them to call. Then press "#" and hang up.

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ATTACHMENT #3
INITIAL RESPONSE ORGANIZATION CALL LIST

____ A NOTIFICATION OF UNUSUAL EVENT
____ AN ALERT
____ A SITE AREA EMERGENCY
____ A GENERAL EMERGENCY

HAS BEEN DECLARED AT THE FORT CALHOUN STATION. IT IS REQUESTED THAT YOU REPORT IMMEDIATELY TO YOUR EMERGENCY RESPONSE STATION.

DUTY/TITLE	NAME	WORK PHONE	HOME PHONE ** PAGER NUMBER	EMERGENCY STATION NUMBER	CONTACTED BY PHONE YES/NO	TIME
HEALTH PHYSICS CHEMISTRY SUPERVISOR (1 REQUIRED)						
EOF INFORMATION SPECIALIST E.T. TAG # 23 (1 REQUIRED)						
TSC RECORDER						
PHONE TALKER E.T. TAG # 1 (2 REQUIRED)						

** For the pager numbers, first dial the number as listed, after the phone is answered, dial the phone number you want them to call. Then press "#" and hang up.

NOTE: IF THE PAGER SYSTEM IS INOPERABLE:

1. THE CALL LIST CALLER WILL STOP CALL OUTS AT THIS POINT AND TURN OVER CONTACT RESPONSIBILITY TO THE 2 TAG TEAM # 1 TSC RECORDER/PHONE TALKERS TO COMPLETE.

2. IF THE CALL LIST CALLER IS UNABLE TO LOCATE 2 TAG TEAM # 1 MEMBERS, THE CALL LIST CALLER SHALL COMPLETE THE CALL LIST.

3. IN EITHER CASE, THE CALL LIST CALLER SHALL CALL THE FORT CALHOUN SITE DIRECTOR AT 6623/6632 AND REPORT STATUS OF CALL LIST.

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ATTACHMENT #3
INITIAL RESPONSE ORGANIZATION CALL LIST

____ A NOTIFICATION OF UNUSUAL EVENT
____ AN ALERT
____ A SITE AREA EMERGENCY
____ A GENERAL EMERGENCY

HAS BEEN DECLARED AT THE FORT CALHOUN STATION. IT IS REQUESTED THAT YOU REPORT IMMEDIATELY TO YOUR EMERGENCY RESPONSE STATION.

DUTY/TITLE	NAME	WORK PHONE	HOME PHONE ** PAGER NUMBER	EMERGENCY STATION NUMBER	CONTACTED BY PHONE YES/NO	TIME
MONITOR COORDINATOR E.T. TAG # 15 (1 REQUIRED)						
RADIATION PROTECTION TECHNICIAN (3 REQUIRED)						

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ATTACHMENT #3
INITIAL RESPONSE ORGANIZATION CALL LIST

____ A NOTIFICATION OF UNUSUAL EVENT
____ AN ALERT
____ A SITE AREA EMERGENCY
____ A GENERAL EMERGENCY

HAS BEEN DECLARED AT THE FORT CALHOUN STATION.
IT IS REQUESTED THAT YOU REPORT IMMEDIATELY TO
YOUR EMERGENCY RESPONSE STATION.

DUTY/TITLE	NAME	WORK PHONE	HOME PHONE ** PAGER NUMBER	EMERGENCY STATION NUMBER	CONTACTED BY PHONE YES/NO	TIME
RADIOCHEMISTRY TECHNICIAN (1 REQUIRED)						
OFFSITE MONITOR E.T. TAG # 5-8 (4 REQUIRED)						

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MAY 15 1987

ATTACHMENT #3
INITIAL RESPONSE ORGANIZATION CALL LIST

____ A NOTIFICATION OF UNUSUAL EVENT
____ AN ALERT
____ A SITE AREA EMERGENCY
____ A GENERAL EMERGENCY

HAS BEEN DECLARED AT THE FORT CALHOUN STATION. IT IS REQUESTED THAT YOU REPORT IMMEDIATELY TO YOUR EMERGENCY RESPONSE STATION.

DUTY/TITLE	NAME	WORK PHONE	HOME PHONE ** PAGER NUMBER	EMERGENCY STATION NUMBER	CONTACTED BY PHONE YES/NO	TIME
ONSITE MONITORS E.T. TAG # 11-14 (4 REQUIRED)						
GATE MONITOR E.T. TAG # 9 & 10 (1 REQUIRED)						
SAMPLE COUNTER/ DOSIMETRY ISSUE E.T. TAG # 21 (1 REQUIRED)						
RADIO OPERATOR E.T. TAG # 16 (1 REQUIRED)						

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MAY 15 1987

ATTACHMENT #3
INITIAL RESPONSE ORGANIZATION CALL LIST

____ A NOTIFICATION OF UNUSUAL EVENT
____ AN ALERT
____ A SITE AREA EMERGENCY
____ A GENERAL EMERGENCY

HAS BEEN DECLARED AT THE FORT CALHOUN STATION. IT IS REQUESTED THAT YOU REPORT IMMEDIATELY TO YOUR EMERGENCY RESPONSE STATION.

DUTY/TITLE	NAME	WORK PHONE	HOME PHONE ** PAGER NUMBER	EMERGENCY STATION NUMBER	CONTACTED BY PHONE YES/NO	TIME
ELECTRICAL TECHNICIAN (2 REQUIRED)						
INSTRUMENT AND CONTROL TECHNICIAN (1 REQUIRED)						

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MAY 15 1987

ATTACHMENT #3
INITIAL RESPONSE ORGANIZATION CALL LIST

____ A NOTIFICATION OF UNUSUAL EVENT
____ AN ALERT
____ A SITE AREA EMERGENCY
____ A GENERAL EMERGENCY

HAS BEEN DECLARED AT THE FORT CALHOUN STATION.
IT IS REQUESTED THAT YOU REPORT IMMEDIATELY TO
YOUR EMERGENCY RESPONSE STATION.

DUTY/TITLE	NAME	WORK PHONE	HOME PHONE ** PAGER NUMBER	EMERGENCY STATION NUMBER	CONTACTED BY PHONE YES/NO	TIME
MACHINIST TECHNICIAN (1 REQUIRED)						
MAINTENANCE TECHNICIAN (1 REQUIRED)						
CONTROL ROOM DATA COLLECTOR E.T. TAG # 20 (1 REQUIRED)						

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ATTACHMENT #3
INITIAL RESPONSE ORGANIZATION CALL LIST

____ A NOTIFICATION OF UNUSUAL EVENT
____ AN ALERT
____ A SITE AREA EMERGENCY
____ A GENERAL EMERGENCY

HAS BEEN DECLARED AT THE FORT CALHOUN STATION. IT IS REQUESTED THAT YOU REPORT IMMEDIATELY TO YOUR EMERGENCY RESPONSE STATION.

DUTY/TITLE	NAME	WORK PHONE	HOME PHONE ** PAGER NUMBER	EMERGENCY STATION NUMBER	CONTACTED BY PHONE YES/NO	TIME
SECURITY AND ADMINISTRATIVE SUPERVISOR (1 REQUIRED)						
SHIFT SUPERVISOR (AS REQUESTED)						
SHIFT TECHNICAL ADVISORS (AS REQUESTED)						

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MAY 15 1987

ATTACHMENT #3
INITIAL RESPONSE ORGANIZATION CALL LIST

____ A NOTIFICATION OF UNUSUAL EVENT
____ AN ALERT
____ A SITE AREA EMERGENCY
____ A GENERAL EMERGENCY

HAS BEEN DECLARED AT THE FORT CALHOUN STATION. IT IS REQUESTED THAT YOU REPORT IMMEDIATELY TO YOUR EMERGENCY RESPONSE STATION.

DUTY/TITLE	NAME	WORK PHONE	HOME PHONE ** PAGER NUMBER	EMERGENCY STATION NUMBER	CONTACTED BY PHONE YES/NO	TIME
OPERATIONS PERSONNEL (AS REQUESTED)						

NOTE IF EMERGENCY CLASSIFICATION IS:

NOTIFICATION OF UNUSUAL EVENT -- 1. STOP HERE
2. NOTE TIME
3. CALL THE FORT CALHOUN SITE DIRECTOR AT EXT. 6632/6623

ALERT, SITE AREA EMERGENCY OR GENERAL EMERGENCY -- 1. CONTINUE ON WITH CALL LIST

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MAY 15 1987

ATTACHMENT #3
INITIAL RESPONSE ORGANIZATION CALL LIST

____ A NOTIFICATION OF UNUSUAL EVENT
____ AN ALERT
____ A SITE AREA EMERGENCY
____ A GENERAL EMERGENCY

HAS BEEN DECLARED AT THE FORT CALHOUN STATION. IT IS REQUESTED THAT YOU REPORT IMMEDIATELY TO YOUR EMERGENCY RESPONSE STATION.

DUTY/TITLE	NAME	WORK PHONE	HOME PHONE ** PAGER NUMBER	EMERGENCY STATION NUMBER	CONTACTED BY PHONE YES/NO	TIME
I & C/ELECTRICAL SUPPORT COORDINATOR (1 REQUIRED)						
PROCEDURE TRAINING SUPERVISOR (1 REQUIRED)						
EMERGENCY REENTRY TEAM E.T. TAG # 2 & 3 (1 REQUIRED)						
DOSE ASSESSMENT OPERATOR E.T. TAG # 4 (1 REQUIRED)						
ENGINEERING MECHANICAL SUPPORT COORDINATOR (1 REQUIRED)						

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ATTACHMENT #3
INITIAL RESPONSE ORGANIZATION CALL LIST

____ A NOTIFICATION OF UNUSUAL EVENT
____ AN ALERT
____ A SITE AREA EMERGENCY
____ A GENERAL EMERGENCY

HAS BEEN DECLARED AT THE FORT CALHOUN STATION. IT IS REQUESTED THAT YOU REPORT IMMEDIATELY TO YOUR EMERGENCY RESPONSE STATION.

DUTY/TITLE	NAME	WORK PHONE	HOME PHONE ** PAGER NUMBER	EMERGENCY STATION NUMBER	CONTACTED BY PHONE YES/NO	TIME
THERMAL HYDRAULIC COORDINATOR (1 REQUIRED)						
MESSAGE DISTRIBUTION/ CLERICAL SUPPORT E.T. TAG # 17 (1 REQUIRED)						
RESCUE SQUAD MONITOR E.T. TAG # 18 (1 REQUIRED)						
PERSONNEL DECONTAMINATION E.T. TAG # 19 (1 REQUIRED)						
OUTSIDE COORDINATOR E.T. TAG # 22 (1 REQUIRED)						

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ATTACHMENT #3
INITIAL RESPONSE ORGANIZATION CALL LIST

____ A NOTIFICATION OF UNUSUAL EVENT ____ AN ALERT ____ A SITE AREA EMERGENCY ____ A GENERAL EMERGENCY	HAS BEEN DECLARED AT THE FORT CALHOUN STATION. IT IS REQUESTED THAT YOU REPORT IMMEDIATELY TO YOUR EMERGENCY RESPONSE STATION.

DUTY/TITLE	NAME	WORK PHONE	HOME PHONE ** PAGER NUMBER	EMERGENCY STATION NUMBER	CONTACTED BY PHONE YES/NO	TIME
EOF TECHNICAL LIAISON E.T. TAG # 24 (1 REQUIRED)						

NOTE:
1. STOP HERE
2. NOTE TIME
3. CALL THE FORT CALHOUN STATION SITE DIRECTOR AT 6632/6623 AND GIVE REPORT ON STATUS OF CALL LIST.

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MAY 15 1987

Fort Calhoun Station Unit No. 1
EMERGENCY PLAN IMPLEMENTING PROCEDURE
EPIP-OSC-15

Control Room Communicator

I. PURPOSE

To provide a procedure which delineates the duties, responsibilities and actions of the Control Room Communicator (6th Operator on duty).

II. PREREQUISITES

The Control Room Communicator has been trained.

III. PRECAUTIONS

The "Site Director" is that person directing the Emergency Response effort. For this procedure, "Site Director" indicates the Shift Supervisor or his designee.

IV. PROCEDURE

1. Report to the Control Room once an emergency has been classified or upon request of the Shift Supervisor.

2. Obtain key to Control Room Emergency Gear Locker from the Shift Supervisor or break key box on locker door. Open locker and obtain Control Room Communicator Equipment Box.

3. At work station, set up log book and log all notifications calls made by Control Room and the time these calls were made.

4. If directed by the Site Director, make notification to North Omaha Station or System Operations or 43rd St. Dispatch to start emergency call list. See Shift Supervisor Checklist (from EPIP-OSC-14, entitled "Shift Supervisor/Site Director Actions) for phone numbers. Inform contact who you are, what classification has been declared, and if event is a drill or actual emergency.

5. If directed by Site Director, make initial notification to States of Iowa and Nebraska using available communications. See Shift Supervisor Checklist for call requirements/phone numbers, etc. If the regular phone must be used, see Attachment 2 of this procedure for verification procedure. Read off information on form (Attachment 1 of EPIP-OSC-2) once contact has been made.

6. If directed by Site Director, make initial notification to Washington, Harrison, and Pottawattamie Counties using available communications. See Shift Supervisor Checklist for call requirements/phone numbers, etc. Read off information on form (Attachment 1 of EPIP-EOF-17) once contact has been made.

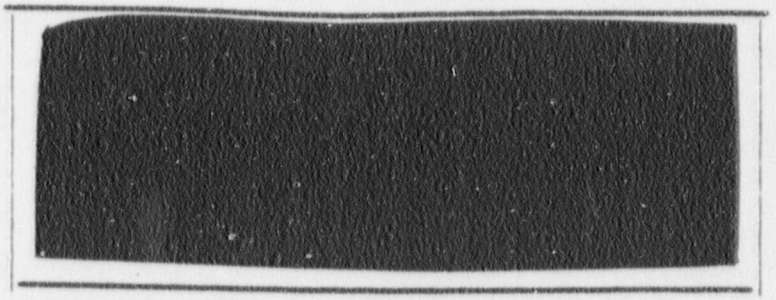
IV. PROCEDURE (Continued)

7. If directed by Site Director, make notification to KFAB using available communications. See EPIP-EOF-17 for call requirements/ phone numbers, etc. Read off information on form (from EPIP-EOF-17) once contact has been made.

8. If directed by Site Director, make notification to NRC Operations Center using available communications. See Shift Supervisor Checklist for call requirements/phone numbers, etc. Read off information on form (Appendix B and C from Standing Order R-11), if applicable, once contact has been made.

9. If directed by the Site Director, make update notifications to States of Iowa and Nebraska using available communications. See Shift Supervisor Checklist for call requirements/phone numbers, etc. Read off information on form (Attachment 2 of EPIP-OSC-2) once contact has been made.

10. Establish a conference network with the following parties as they arrive at their stations:



To accomplish this, perform the following:

a. Use the [redacted] phone in the Control Room.

b. If desired, connect headset unit (from Control Room Communicator kit) to phone for long-term use.

c. When the first position arrives and calls [redacted] you will be in conference with them, upon answering.

d. When the next position arrives and calls 6685, he will receive a busy signal, which he should hold for 10 seconds. You [redacted] will then hear a "beep". Refer to Attachment 1 for instructions on how to connect to that caller, and how to place them in conference if desired (and how to place a call while in conference).

e. Repeat part d. above for each position until all positions are on the conference line.

IV. PROCEDURE (Continued)

11. Once any part of this conference is established, pass any data requested by the parties on the line. Instruct Control Room Data Collector to obtain requested data on FC-194 and/or FC-197 forms, then read this data over conference line. Update data and repeat data transmission every 15 minutes or as directed by personnel on conference line.

12. You will be relieved of making certain notification calls as soon as required positions are manned, or facilities are activated. This is summarized as follows:

    a. State Updates: Once Dose Assessment is performed in the TSC or EOF, update will be handled via computer/phone modem system, FAX Network, or COP Network from those facilities.

    b. NRC Updates: Once TSC Communicator position is manned in the TSC, they may take over communication on the ENS (Red) phone. Until then, Control Room personnel must man that phone as requested by NRC.

Attachment 1

PROCEDURES FOR ROLM PHONE OPERATION

ESTABLISHING A CONFERENCE CALL

1. Dial first number - tell individual to wait
2. HOOK - FLASH
3. Dial next number - tell individual to wait
4. HOOK - FLASH
5. Press * 4 - now everyone is in conference
6. Repeat steps 2 thru 5 for all numbers

RECEIVING CALL WHILE IN CONFERENCE

1. Beep - (beep is heard when calling party waits on busy signal for 10 seconds)
2. HOOK - FLASH
3. Press * 1 - you are now connected to caller
4. HOOK - FLASH

5a. Press * 1 - you are now back in conference

5b. Press * 4 - caller and you are now back in conference call

PLACING CALLS WHILE IN CONFERENCE

1. HOOK - FLASH
2. Dial Number - you may call wherever you wish
3. HOOK - FLASH
4. Press * 1 - you are reconnected to conference

ATTACHMENT 2

VERIFICATION PROCEDURE

IF NOTIFICATION OF THE STATES IS PERFORMED USING THE REGULAR PHONE SYSTEM, A VERIFICATION PROCEDURE MUST BE PERFORMED AS FOLLOWS:

a. Obtain the Nebraska State Patrol letter from the Shift Supervisor's key locker.

b. Contact the Nebraska State Patrol using phone numbers from the Shift Supervisor Checklist.

c. Once dispatcher answers, identify yourself, explain purpose of call, and then ask his/her last name. Then locate name on letter, find corresponding badge number of that dispatcher, and state that badge number to him/her.

d. If dispatcher is satisfied that call is genuine, then go ahead with required message. If not, you may also provide the initials of the dispatcher, which are on the letter. If that is not sufficient, you should then ask for another dispatcher, and start over at step c.

Fort Calhoun Station Unit No. 1
EMERGENCY PLAN IMPLEMENTING PROCEDURE
EPIP-OSC-16

EMERGENCY TEAM

I. PURPOSE

The purpose of this procedure is to provide instructions for personnel assigned to Emergency Team positions.

II. PREREQUISITE

Both the primary and alternate individuals filling a particular Emergency Team position, TAG No. 1 through TAG No. 24, have been fully trained and are aware of their duties and responsibilities.

III. PRECAUTIONS

None

IV. PROCEDURE

Upon activation of the Initial Response Organization, those individuals assigned to a position on the Emergency Team will carry out their assignment as detailed in Appendix 1 of this Implementing Procedure.

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MAY 15 1987

Fort Calhoun Station Unit No. 1
EMERGENCY PLAN IMPLEMENTING PROCEDURE
EPIP-OSC-16

APPENDIX-1
EMERGENCY TEAM

A. TAG 1 -- RECORDER/PHONE TALKER

Reporting Location:

Technical Support Center

Reports To:

Site Director

Basic Responsibilities:

After receiving pager signal or a phone call to report to their emergency station, members will report to the TSC, pick up the proper tags from the TSC Tag Board and inform the Site Director of their presence.

If the pager system is inoperable, after receiving a call from the Call List Caller, the Recorder/Phone Talkers will contact each other to determine which one will immediately report to the TSC. The remaining one will continue the Call List from the location where he/she was contacted until the call outs have been completed for the Emergency Action Level, or until notified that no further calls are required. He/she will then also report to the TSC. When the Recorder/Phone Talkers report to the TSC, they will pick up the proper tag from the TSC Tag Board and inform the Site Director of their presence.

Sets up, operates and maintains the tape recorder.

Briefs the Site Director on accident status and present conditions when Site Director arrives.

Maintains emergency log book. Clerical assistance is available through the Security and Administrative Supervisor.

Performs telephone communications.

Receives Operational Data from the Control Room and posts this data on the "FCS Emergency Status Board."

Assumes responsibility for the Conference Operations (COP) Network from the Control Room when the Site Director assumes emergency response actions from the Shift Supervisor.

Mans the Conference Operations (COP) Network and provides updated information to State and County officials as directed by the Site Director until transferring COP Network responsibility to the E.O.F. Communicator.

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APPENDIX-1
(Continued)

B. TAG 2, 3 - EMERGENCY RE-ENTRY TEAM

Reporting Location:

Operation Support Center Extension in Technical Support Center Building.

Report To:

Health Physics/Chemistry Supervisor when re-entry team required.

Basic Responsibilities:

Re-entry Team personnel will report and receive instructions from the HP/Chemistry Supervisor thru the Monitor Coordinator.

Procures emergency kit, monitor kits, air samplers, and breathing equipment from storage area.

Obtains and battery checks high range survey instruments.

Obtains a set of protective clothing. Dons shoe covers and coveralls, checks out and puts on a TLD and high range dosimeter. Has other protective clothing ready to don on instruction from Monitor Coordinator.

Checks out a self-contained breathing apparatus for readiness to use. Checks the mask for proper fit.

Prepares for entry to the Auxiliary Building, verifies proper dress with the Monitor Coordinator.

Enters the Auxiliary Building as directed by the Health Physics/Chemistry Supervisor and instructed by the Monitor Coordinator.

Performs assigned tasks such as (a) search and rescue of injured person(s), (b) emergency repair to equipment and (c) assistance to Operations in performing corrective actions.

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APPENDIX-1
(Continued)

C. TAG 4 - DOSE ASSESSMENT OPERATOR

Reporting Location:

Technical Support Center Building, Room 107

Reports To:

Health Physics/Chemistry Supervisor

Coordinates With:

Site Director until the Health Physics/Chemistry Supervisor arrives at the TSC.

Basic Responsibilities:

1. Sets up and establishes maps and overlays pertinent to the emergency conditions.

2. Establishes direct-line communications with the Control Room if information is not already available in the TSC to obtain meteorological and radiological data needed to perform Dose Assessment. FC-197 "Meteorological and Radiological Data Worksheet" will be used to record this data.

3. Obtain manual Dose Assessment Data from the Control Room and enter the information into the computer prior to performing normal computer operations.

4. The Meteorological and Radiological Data Worksheet (FC-197) revision number and date will be verified by referring to EPIP-EOF-6 Section H in the official set of Operating Manuals maintained in the TSC prior to their use.

5. Calculates airborne activity, dose rate and integrated dose for locations outside the plant structures and enters this data on FC-195.

6. Ensures the Health Physics/Chemistry Supervisor is receiving calculated data.

Assists the Site Director/HP/Chemistry Supervisor on evaluation of radiological data as required.

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APPENDIX-1
(Continued)

C. TAG 4 - DOSE ASSESSMENT OPERATOR (Continued)

Maintains data in a current status.

Refers to EPIP-EOF-6 Section H "Onsite and Offsite Dose Assessment using the computerized program" when performing dose assessment duties with the computer.

Refers to EPIP-EOF-6 "Onsite and Offsite Dose Assessment", for step-by-step Procedures using plant parameters and effluent monitors to determine source term.

Contact the National Weather Service in Omaha, telephone number 9-1-402-571-8351, and request projected meteorological weather information if necessary to make long term dose exposure projections.

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APPENDIX-1
(Continued)

D. TAG 5, 6, 7 and 8 - OFFSITE MONITOR

Reporting Location:

Operation Support Center Extension in Technical Support Center Building

Reports To:

Monitor Coordinator

Basic Responsibilities:

Obtains monitoring kit, air sampler, water sampling bottles and vehicle.

NOTE: A set of keys for the vehicles are located inside each of the offsite monitor team kits. Kits are numbered to correspond with the OPPD vehicle identification number.

Informs the Monitor Coordinator/Dose Assessment Specialist prior to any departures.

As directed, proceeds to designated location and takes samples as assigned and analyzes air samples.

Labels each sample and saves separately in plastic bags in accordance with EPIP-EOF-3, "Emergency Instrumentation and Equipment". This procedure describes in detail how the samples are to be collected and analyzed.

Reports results to the Monitor Coordinator by radio thru the radio operator, Tag 16. When the Recovery Organization has been activated, the offsite monitor team will be under the control of the Dose Assessment Specialist at the EOF.

Communicates with the Emergency Response Facilities on Channel No. 1, the dedicated radio line for emergency field communication. Other channels can be used if problems develop.

Review plant conditions and projected or known release information with Monitor Coordinator or Dose Assessment Specialist periodically while in plume sectors.

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APPENDIX-1
(Continued)

E. TAG 9 and 10 - GATE MONITOR

Reporting Location:

General Services Building

Reports To:

Monitor Coordinator

Basic Responsibilities:

Notifies the Monitor Coordinator by telephone when he arrives at his work location to obtain any special instructions.

Obtains available friskers from the storage area, checks batteries and makes preparations for monitoring personnel and equipment.

Monitors all personnel exiting the plant area: Paying particular attention to hands, feet and head area.

Sends contaminated personnel to the West entrance of the General Services Building for entry to the personnel decon station.

Monitors all emergency team members returning from the plant closely for contamination; properly bags anti-contamination clothing, if contaminated.

Monitors all vehicles leaving the plant; paying particular attention to vehicle tires and top. Vehicles returning to the site will not be routinely monitored unless specified by Monitor Coordinator.

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APPENDIX-1
(Continued)

F. TAG 11, 12, 13 and 14 - ONSITE MONITOR

Reporting Location:

Operation Support Center Extension in Technical Support Center Building

Reports To:

Monitor Coordinator

Basic Responsibilities:

Obtains a full set of protective clothing including a full face respirator, TLD and high range dosimeter.

Obtains a survey instrument, clipboard, pencil and survey maps from the emergency locker.

Reports to the monitor assembly room and informs the monitor Coordinator of his arrival.

Informs the Monitor Coordinator of any departures from the TSC.

Maintains survey of on site affected areas. One monitor team will use a vehicle for survey and inspection, if required.

May perform in-plant surveys as directed by the Site Director or Monitor Coordinator.

Visually inspect the owner controlled area for personnel occupancy. Owner controlled area consists of the property within the site boundary and the strip of exclusion land directly across the Missouri River which can be viewed from the screen house.

Performs habitability check of the Guard Building, Storeroom and a survey of the General Employee Training Building.

If the early warning sirens have sounded (site area and general emergencies) instruct all non-emergency workers to vacate the owner controlled area.

If a site or public evacuation has been declared, report all refusals to vacate by non-emergency workers immediately to the Monitor Coordinator who will notify the appropriate county sheriff.

APPENDIX-1
(Continued)

F. TAG 11, 12, 13 and 14 - ONSITE MONITOR (Continued)

After initial surveys and inspection have been completed, report back to the monitor assembly area to receive more directions from the Monitor Coordinator for continuing surveys.

Return all sample and survey results to the Sample Counter/Dosimetry Issuance ET TAG 21.

Use dose rate sample log (Figure EPIP-OSC-13.1) to record all dose rate survey data which includes time of survey, location; type of survey, i.e. Beta or Gamma; dose rate in mrem per hour; and name of surveyor. Also at the top of the form, fill in the date and the instruments used and serial numbers.

APPENDIX-1
(Continued)

G. TAG 15 - MONITOR COORDINATOR

Reporting Location:

Technical Support Center Building, Room 107

Reports To:

Health Physics/Chemistry Supervisor

Directs/Coordinates:

Emergency Re-entry Team
Offsite Monitor
Gate Monitor
Onsite Monitor
Radio Operator
Rescue Squad Monitor
Personnel Decontamination
Outside Coordinator

Basic Responsibilities:

Is responsible initially to the Site Director for all monitor team activities. When the HP/Chemistry Supervisor position is manned, Tag 15 shall report directly to this individual.

Ensures that the TSC Emergency Status Board indicates current conditions and assessments.

Ensures that all surveys and data are documented in the field by the monitor teams and delivered to the TSC.

Coordinates in plant first aid assistance as needed.

Ensures that all onsite personnel have been checked for contamination.

Ensures that a radiation survey of the Control Room, OSC AND TSC has been conducted.

When the Recovery Organization has been formed and the EOF activated, the Dose Assessment Specialist will assume responsibility for the Offsite Monitor Teams.

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APPENDIX-1
(Continued)

G. TAG 15 - MONITOR COORDINATOR (Continued)

In coordination with the HP/Chemistry Supervisor, directs onsite and offsite teams when to don protective clothing.

Ensures habitability checks are performed in the Guard Building, Storeroom, General Employees Training Building and the helipad as necessary.

Ensures all radio transmissions during drills and/or exercises start and end with "THIS IS A DRILL MESSAGE" or "THIS IS AN EXERCISE MESSAGE".

Ensures off-site and on-site monitor teams are briefed on changing plant conditions and known or projected release information, periodically when teams are in plume sectors.

Maintains dosimetry log on each of the off-site monitor team members.

Records, on the monitor locations map, monitor team location, survey results and time surveys were taken for each of the field monitoring teams (OPPD teams and state teams).

APPENDIX-1
(Continued)

H. TAG-16 - RADIO OPERATOR

Reporting Location:

Operation Support Center Extension in Technical Support Center Building.

Reports To:

Monitor Coordinator

Basic Responsibilities:

Establishes and maintains radio communication with Offsite Monitor Teams, and the access road Security Guard from the TSC Building.

NOTE: The Offsite Monitor Teams will use dedicated radio Channel No. 1 for communication.

Records in writing, all messages received so that the information is distributed and/or transmitted by FAX.

Transmits radio messages as directed to field Emergency Team Members.

Authorizes onsite entry of the Recovery Organization and emergency response personnel from prepared list. Relays entry authorization of other personnel as directed by the Monitor Coordinator.

During drills and/or exercises ensures all radio transmissions start and end with "THIS IS A DRILL MESSAGE" or "THIS IS AN EXERCISE MESSAGE" as appropriate.

APPENDIX-1
(Continued)

I. TAG 17 - MESSAGE DISTRIBUTION/CLERICAL SUPPORT

Reporting Location:

Operation Support Center Extension in Technical Support Center Building.

Reports To:

Security and Administrative Supervisor

Basic Responsibilities:

Reports to the TSC and checks in with the Security and Administrative Supervisor.

Responsible for the collection and distribution of message traffic within the TSC.

Performs other administrative duties as required.

APPENDIX-1
(Continued)

J. TAG 18 - RESCUE SQUAD MONITOR

Reporting Location:

Operation Support Center Extension in Technical Support Center Building

Reports To:

Monitor Coordinator

Basic Responsibilities:

Receives instructions from the Monitor Coordinator i.e. name and location of injured personnel and if the injured person is contaminated.

Obtains a radiation survey instrument and performs operational check. Also, obtains a personnel air sampler.

Obtains four (4) high-range, zeroed pencil dosimeters.

Meets the Rescue Squad and issues a dosimeter to each member and ensures they are dressed in protective clothing if the injured person is contaminated. Briefs them on the location and probable condition of any casualties.

Briefs the Rescue Squad on radiation hazards and other precautions to be taken.

NOTE: The Rescue Squad personnel do not normally enter the auxiliary building unless personnel injuries dictate this entry is necessary. The squad will normally be met with the injured personnel at the north emergency exit.

Accompanies the Rescue Squad to pick up casualties and provide, radiological coverage during the trip to; the hospital.

Furnishes hospital personnel with the following information, if known:

(a) Types and extent of radiation exposure.

(b) Levels of external contamination.

APPENDIX-1
(Continued)

J. TAG 18 - RESCUE SQUAD MONITOR (Continued)

(c) Probability of internal contamination.

Collects, reads and records pencil dosimeters from Rescue Squad personnel.

Ensures that the Squad members, vehicle and equipment are free of contamination prior to release.

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APPENDIX-1
(Continued)

K. TAG 19 - PERSONNEL DECONTAMINATION

Reporting Location:

Operation Support Center Extension in Technical Support Center Building

Alternate Location:

General Services Building

Reports To:

Monitor Coordinator

Basic Responsibilities:

Reports to the Monitor Coordinator for a briefing.

Will aid in the decontamination of personnel using facilities specified by the Monitor Coordinator.

The following equipment will be available for use:

(a) Frisker (RM-14/15/19)

(b) Step-off pad with undress area

(c) Containers for contaminated clothing.

NOTE: Each individual who is contaminated or who has contaminated clothing must have this clothing bagged individually with the person's name and the time placed on each bag.

(d) Cleaning materials (soap, brushes, towels, etc.)

(e) Clean clothing (i.e., paper coveralls and shoe-covers).

Uses procedure EPIP-EOF-10, "Personnel Decontamination", to brief personnel on decontamination methods to use (i.e., complete shower, wash hands, etc.).

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APPENDIX-1
(Continued)

K. TAG 19 - PERSONNEL DECONTAMINATION (Continued)

NOTE: Complete showers should be avoided unless absolutely necessary to prevent spread of contamination to other parts of individual's body.

Keeps Monitor Coordinator briefed on personnel decontamination status.

Records names and survey results, initial and final, of personnel admitted to decontamination station.

APPENDIX-1
(Continued)

L. TAG 20 - CONTROL ROOM DATA COLLECTOR

Reporting Location:

FCS Control Room

Reports To:

Operations Support Manager

Basic Responsibilities:

1. Collect operational, meteorological and radiological data from instrumentation and computer equipment in the Control Room.

2. Information collected is recorded on appropriate Fort Calhoun forms.

   (a) Complete all items, as appropriate for accident, on FC-194. If a particular item does not apply enter "N/A".

   (b) Complete all items in Sections I and II, as appropriate for accident, on FC-197. For items that do not apply enter "N/A".

3. Deliver completed forms to; the Control Room communicator (phone talker) who will in-turn relay the information to phone talkers in the OSC, TSC and EOF.

4. Data must be collected and provided to the C. R. communicator every 15 minutes.

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APPENDIX-1
(Continued)

M. TAG 21 - SAMPLE COUNTER/DOSIMETRY ISSUANCE

Reporting Location:

Operation Support Center Extension in Technical Support Center Building.

Reports To:

Monitor Coordinator

Basic Responsibilities:

Ensures that all team members needing TLD"s and dosimeters have them.

NOTE: All dosimeters will be zeroed before being issued.

Maintains the TLD/dosimeter log.

Sets up a counting station and counts all samples brought into the TSC and reports results to the Monitor Coordinator. Ensures that all samples are saved and labeled for future counting if needed.

Collects radiation monitoring devices from team members as they return from assigned tasks.

Keeps the Monitor Coordinator informed on counting results/personnel exposure.

APPENDIX-1
(Continued)

N. TAG 22 - OUTSIDE COORDINATOR

Reporting Location:

General Services Building

Reports To:

Monitor Coordinator

Supervises:

All personnel that have evacuated the plant

Basic Responsibilities:

Contacts the Monitor Coordinator in the TSC by telephone for instructions.

Coordinates outside activities in the vicinity of the entrance gate and general assembly area during NOE and Alert Emergencies.

Reports to the EOF for re-assignment during "Site Area Emergency" and "General" Emergencies requiring site evacuation.

Ensures that all personnel that have evacuated the plant are in two groups:

(a) Personnel exiting from the auxiliary building area
or

(b) Personnel exiting the uncontrolled areas of the plant.

Ensures that all contaminated personnel are sent to the emergency decon station.

Ensures that all vehicles leaving the plant area are monitored (except emergency vehicles).

Reports names of any contaminated/injured personnel to; the Monitor Coordinator.

APPENDIX-1
(Continued)

O. TAG 23 - EOF INFORMATION SPECIALIST

Reporting Location:

Emergency Operations Facility

Reports To:

Site Director until the Recovery Manager takes full authority

Coordinates:

EOF Technical Liaison
Media Release Center
Site Director
Recovery Manager when Recovery Organization is activated

Responsibilities:

Monitors status of emergency and relays timely and accurate information to the Media Release Center (MRC).

Maintains information time log for post emergency reference.

Refer to M.2.6.2 for primary responsibility as related to the Recovery Organization.

Refer to EPIP-RR-40 for reporting assignment and basic duties.

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APPENDIX-1
(Continued)

P. TAG 24 - EOF TECHNICAL LIAISON

Reporting Location:

Emergency Operations Facility

Reports To:

EOF Information Specialist

Responsibilities:

Monitors status of emergency and assists EOF Information Specialist in collecting and interpreting nuclear-related data.

Serves as the EOF contact for technical liaison assigned to assist official spokesperson at the Media Release Center (MRC).

Refer to M.2.6.3 for primary responsibility as related to the secondary organization.

Refer to EPIP-RR-41 for reporting assignment and basic duties.

ISSUED

MAY 15 1987

Fort Calhoun Station Unit No. 1
EMERGENCY PLAN IMPLEMENTING PROCEDURE
EPIP-OSC-18

Initial Response Organization Notifications

I. PURPOSE

The purpose of this procedure is to detail assignment and responsibilities and provide instructions to be followed by the individuals filling the position of Call List Caller. This procedure also provides instruction to the Initial Response Organization as to their response to a notification.

II. PREREQUISITE

1. The Emergency has been classified in accordance with EPIP-OSC-1.

2. Notification has been received from the Fort Calhoun Station Shift Supervisor, or his designee, to initiate the "Initial Response Organization Call List".

3. The "Initial Response Organization Call List" is available in the North Omaha Station Shift Supervisor's office, at the Fort Calhoun Station, or with the E.T. Tag # 1 members.

4. The "Initial Response Organization Call List" utilized shall be the latest revision or issue date available at that location.

III. PRECAUTIONS

1. No member shall have more than one pager assigned to the Initial Response Organization in their possession at one time nor shall a member be simultaneously responding for more than one position.

IV. PROCEDURE

1. Upon activation of the Emergency Recovery Organization, those individuals assigned to the position of Call List Caller shall carry out their assignment as detailed in Appendix 1 of this implementing procedure.

2. Upon notification, the members of the Initial Response Organization shall respond as detailed in Appendix 2.

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MAY 15 1987

Fort Calhoun Station Unit No. 1
EMERGENCY PLAN IMPLEMENTING PROCEDURE
EPIP-OSC-18

APPENDIX 1
Call List Caller

A. Personnel Assignment (Job Title)

North Omaha Station Shift Supervisor
North Omaha Station Operators

B. Reporting Location

Normal Work Station

C. Reports To:

Site Director
(Initially the Fort Calhoun Station Shift Supervisor)

D. Primary Responsibility

Makes calls to members of the Initial Response Organization when an emergency is declared at Fort Calhoun Station.

E. Basic Duties

1. Upon notification from the Fort Calhoun Station Site Director or designee, the Call List Caller will initiate calling the Initial Response Organization.

2. The Call List Caller will follow the order and special instructions on the Call List when making outgoing calls.

3. Outgoing calls made to Initial Response Organization members will begin with the normal work phone or home phone number, depending on the time of day, then will proceed to individual's pager number, if applicable.

4. The Call List Caller will inform the Initial Response Organization member called of the Emergency Classification and request the member report immediately.

5. The Call List Caller will note the time each is contacted by telephone.

6. The Call List Caller will call the Fort Calhoun Station Site Director and report the status of completion of the Call List.

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APPENDIX 1
Call List Caller

F. Substitute Duties

1. If the Call List Caller has been previously informed that the pager system is inoperable, the Call List Caller shall continue with the remaining steps under this section.

2. Upon notification from the Fort Calhoun Station Site Director or his designee, the Call List Caller will initiate calling the Initial Response Organization.

3. The Call List Caller will follow the order and special instructions on the Call List when making outgoing calls.

4. Outgoing calls made to Initial Response Organization members will begin with the normal work phone or home phone number, depending on the time of day, and then will proceed to the individual's pager number, if applicable.

5. The Call List Caller will inform the Initial Response Organization member of the Emergency Classification and request that the member report immediately to their Emergency Response Station.

6. The Call List Caller will note the time the individual is contacted.

7. The Call List Caller will call all the individuals listed on the Call List for each position.

8. The Call List Caller shall continue the Call List until two (2) of the individuals listed for the TSC-Recorder Phone Talker (E.T. Tag No. 1) have been contacted who can respond to the emergency. Both of the TSC-Recorder Phone Talkers will be informed by the Call List Caller as to the status of the call list. The second TSC-Recorder Phone Talker shall also be informed as to the name of the other responding TSC-Recorder Phone Talker.

9. If the Call List Caller is unable to contact two (2) of the individuals listed for the TSC-Recorder Phone Talker (E.T. Tag No. 1) who can respond, then he/she shall continue the Call List until the STOP point is reached for that Emergency Classification.

10. The Call List Caller will call the Fort Calhoun Station Site Director and inform him when the calls have been completed.

Fort Calhoun Station Unit No. 1
EMERGENCY PLAN IMPLEMENTING PROCEDURE
EPIP-OSC-18

APPENDIX 2
Initial Response Organization

A. Personnel Assignment

Initial Response Organization members

B. Primary Responsibility

Respond when paged or called by the Call List Caller, TSC-Recorder Phone Talker (E.T. Tag Team No. 1), or Emergency Planning Group personnel.

C. Basic Duties

1. When contacted by pager, members of the Initial Response Organization will carry out the response as applicable for the numeric code as received on their pager.

CODE	CONDITION	REQUIRED RESPONSE
2-2-2	EMERGENCY AS CLASSIFIED PER EPIP-OSC-1	REPORT IMMEDIATELY TO ASSIGNED EMERGENCY RESPONSE STATION
8-8-8	NOTIFICATION TEST	TELEPHONE THE EOF

2. If an individual is contacted by telephone, he/she will report immediately to the designated Emergency Response Station.

3. If the page is due to a Notification Test, the member shall call the number listed. If the line is busy, the member shall continue attempting to contact the number. Once the phone is answered, the member will give the person answering the phone his name, Initial Response Organization position, and other information which may be required for completion of the test.

4. The members shall maintain the pagers in an operational condition and be familiar with their use. The members are responsible to keep the pagers on their persons or within audible range [one hundred (100) feet] of themselves.

5. Pagers are assigned based upon the number of individuals needed to fill each position of the Initial Response Organization in the event of an emergency. The actual carrying of pagers will be done on a rotating basis between all members of an assigned position. The rotation schedule is to be completed by the members themselves and should include the current month along with the two subsequent months. Vacations and any time when a member would be outside of the pager receiving area (45 mile radius of Omaha) should be taken into account when completing this schedule.

I. PURPOSE

A. This procedure contains four sections to provide independent and redundant estimates of the type and degree of core damage which may have occurred during an accident situation. Use the sections that will yield the quickest and/or most accurate assessment of damage first, as determined from the guidance below and the attached flow chart.

FAST TRANSIENT: Obtain samples using the Post Accident Sampling System (PASS) and estimate core damage by using containment hydrogen measurement (EPIP-TSC-8-C) and isotopic data analysis (EPIP-TSC-8-B) followed by containment radiation dose rate analysis (EPIP-TSC-8-A). Core damage can be estimated using Core Exit Thermocouple (CET) temperatures, but results are not expected to be very accurate for fast acting transients.

SLOW TRANSIENT: Use core exit thermocouple temperatures (EPIP-TSC-8-D) and containment radiation dose rate analysis (EPIP-TSC-8-A) for an early estimate of core damage. When conditions permit, the post Accident Sampling System (PASS) should be used to obtain samples for containment hydrogen measurement (EPIP-TSC-8-C) and isotopic data analysis (EPIP-TSC-8-B) to enhance earlier damage indications.

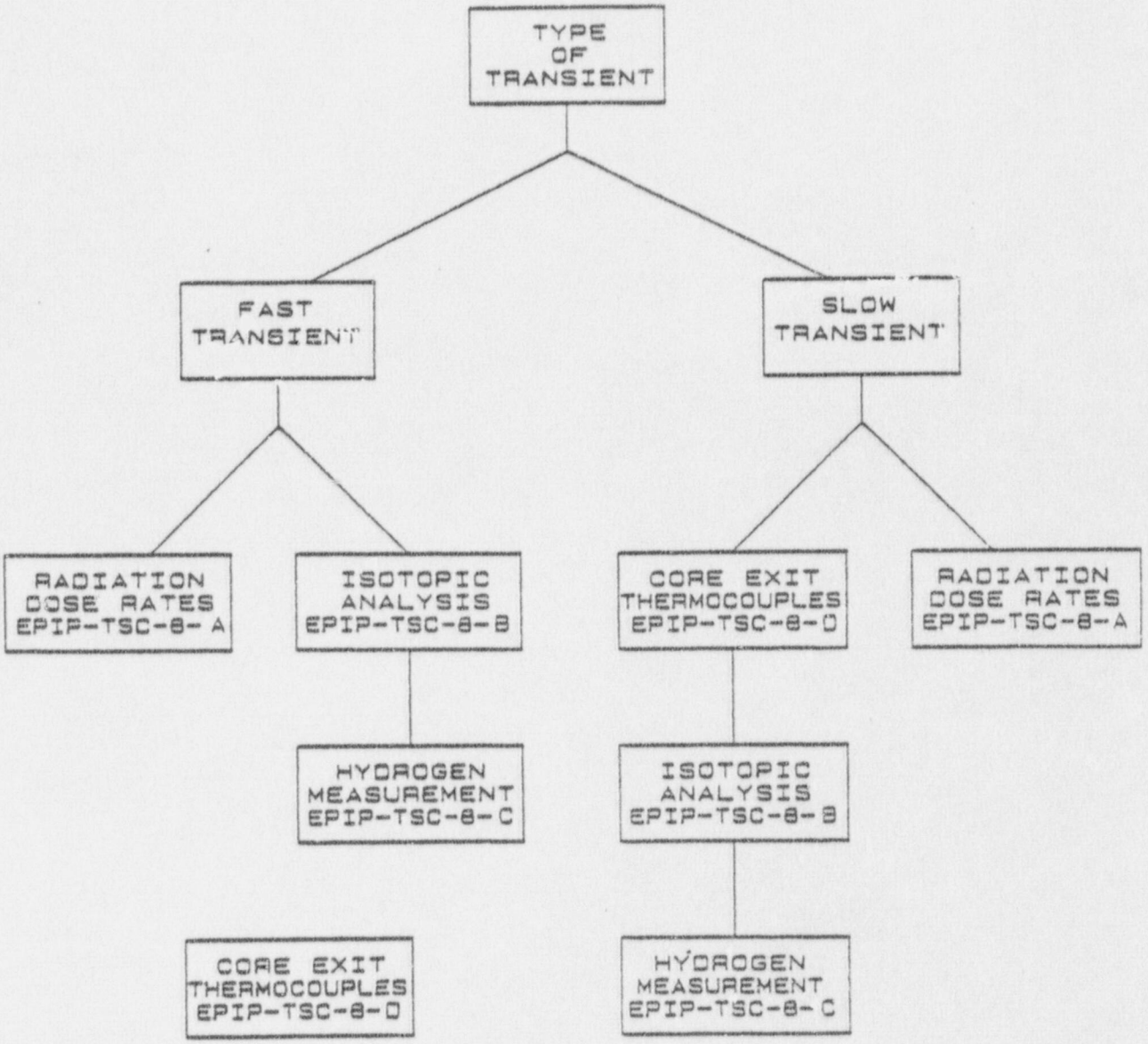
procedure is divided into the following four sections:

ction A - Containment Dose Rate Analysis uses
iation readings from RM-091A and RM-091B to estimate
type and degree of core damage.

B - Isotopic Data Analysis uses post accident
sotopic data to determine the type and degree of
ge.

Containment Hydrogen Measurement determines
f hydrogen generated in containment and relat
pe and degree of core damage.

re Exit Thermocouple (CET) Temp
temperature changes in the
core damage.



EPIP-TSC-8

CORE DAMAGE ASSESSMENT PROCEDURE FLOW CHART

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SECTION A

Estimate of Core Damage Using Containment Radiation Dose Rates

I. PREREQUISITES

A. A plant accident with the potential for core damage has occurred.

B. Wide Range Radiation Dose Monitors RM-091A and RM-091B are operable and able to measure area dose rates in containment resulting from fission products dispursed in the building atmosphere and plated out on the building surfaces.

II. PRECAUTIONS AND LIMITATIONS

A. The total quantity of fission products measured at monitor locations in containment may be changing rapidly due to transient plant conditions. Therefore, multiple measurements should be obtained within a minimum time period and under stabilized plant conditions when possible. Samples obtained during rapidly changing plant conditions should not be weighed heavily into the assessment of core damage. RM-091A and RM-091B have an upper radiation reading limit of 1E7 R/HR

B. This procedure only provides an upper limit estimate of the progressive core damage and cannot accurately distinguish between the conditions of fuel cladding failure and fuel overheat when the resulting dose rates are the same. This procedure does not attempt to identify the extent of any potential fuel melting.

C. This procedure is intended for use when the fission product inventory in the core has had sufficient time to reach equilibrium. Based upon the fission products of concern, equilibrium conditions are achieved after 30 days of operations at constant power. Reactor power is considered to be constant if it has not changed by more than ±10%. This procedure can be applied following non-constant periods of operation and when the reactor has produced power for less than 30 days. The assessment of core damage for less than 30 days of operation will underpredict the actual conditions.

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III. PROCEDURE

A. Record the following plant indications. Additional or fewer radiation dose rate measurements may be recorded as a function of data available.

CONTAINMENT BUILDING

Radiation Dose Rate _____ Rads/hr.

Time of Measurement Date _____ Time _____

Radiation Dose Rate _____ Rads/hr.

Time of Measurement Date _____ Time _____

Radiation Dose Rate _____ Rads/hr.

Time of Measurement Date _____ Time _____

Radiation Dose Rate _____ Rads/hr.

Time of Measurement Date _____ Time _____

Prior 30 days power history:

Power, Percent	Duration, Days
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

B. Time of reactor shutdown Date _____ Time _____

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III. PROCEDURE

C. Plant Power Correction

The measured radiation dose rate inside the containment building is to be corrected for the plant power history. To correct the measured dose rate to the corresponding value had the plant been operating at 100 percent power, follow the guidelines below.

For operation at constant power for more than 30 days, apply a simple ratio of power. Reactor power is considered to be constant if it has not changed by more than ±10%.

To correct the radiation dose rate for the case in which reactor power level has not remained constant during the 30 days prior to the reactor shutdown, engineering judgement is used to determine the most representative power level. The guidelines below should be used in making this determination.

The average power during the 30 day period is not necessarily the most representative value to be used for the correction to equilibrium conditions.

The power levels at which the reactor last operated should weigh more heavily in the determination than the earlier power levels.

Continued operation for an extended period should weigh more heavily than brief transient periods.

For operation less than 30 days this procedure can still be employed, however, the estimate of core damage is expected to be an under-prediction of actual conditions.

III. PROCEDURE (Continued)

D. Apply the following equation to determine the radiation dose rate corresponding to equilibrium full power source inventory conditions.

$$\text{Equilibrium Dose Rate} = \text{Measured Dose Rate} \times \frac{100}{\% \text{ Reactor Power Level}} *$$

* dose rate correction factor

E. To determine the decay correction for the radiation dose rate, record the time between measurement of the dose rate and reactor shutdown, recorded in Step B.

Time duration for this measurement = _____hours

F. Estimate the extent of core damage using the equilibrium dose rate (step III.D), the duration of reactor shutdown, and the analytically determined dose rates provided in Enclosure 2. Use engineering judgement to determine which category of core damage shown on Enclosure 2 is more representative of the plotted value. Consider the following criteria when making this determination:

Some dose rate measurements could have been recorded during periods of transient conditions within the plant. Measurements made during stable plant conditions should weigh more heavily in the assessment of core damage.

Dose rates significantly above the lower bound in the category of major fuel overheat may indicate concurrent fuel pellet melting. This procedure can not be employed to estimate the degree of fuel pellet melting.

Fuel cladding failure should be anticipated for dose rates within any category of fuel overheating. This procedure can not distinguish the relative contributions of the two categories to the total dose rate, but does give an estimate of the highest category of damage.

Dose rates corresponding to the two categories of major cladding failure and initial fuel overheat are observed to overlap on Enclosure 2. The evaluation of other plant parameters may be required to distinguish between them. However, concurrent conditions may be anticipated.

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ENCLOSURE 1

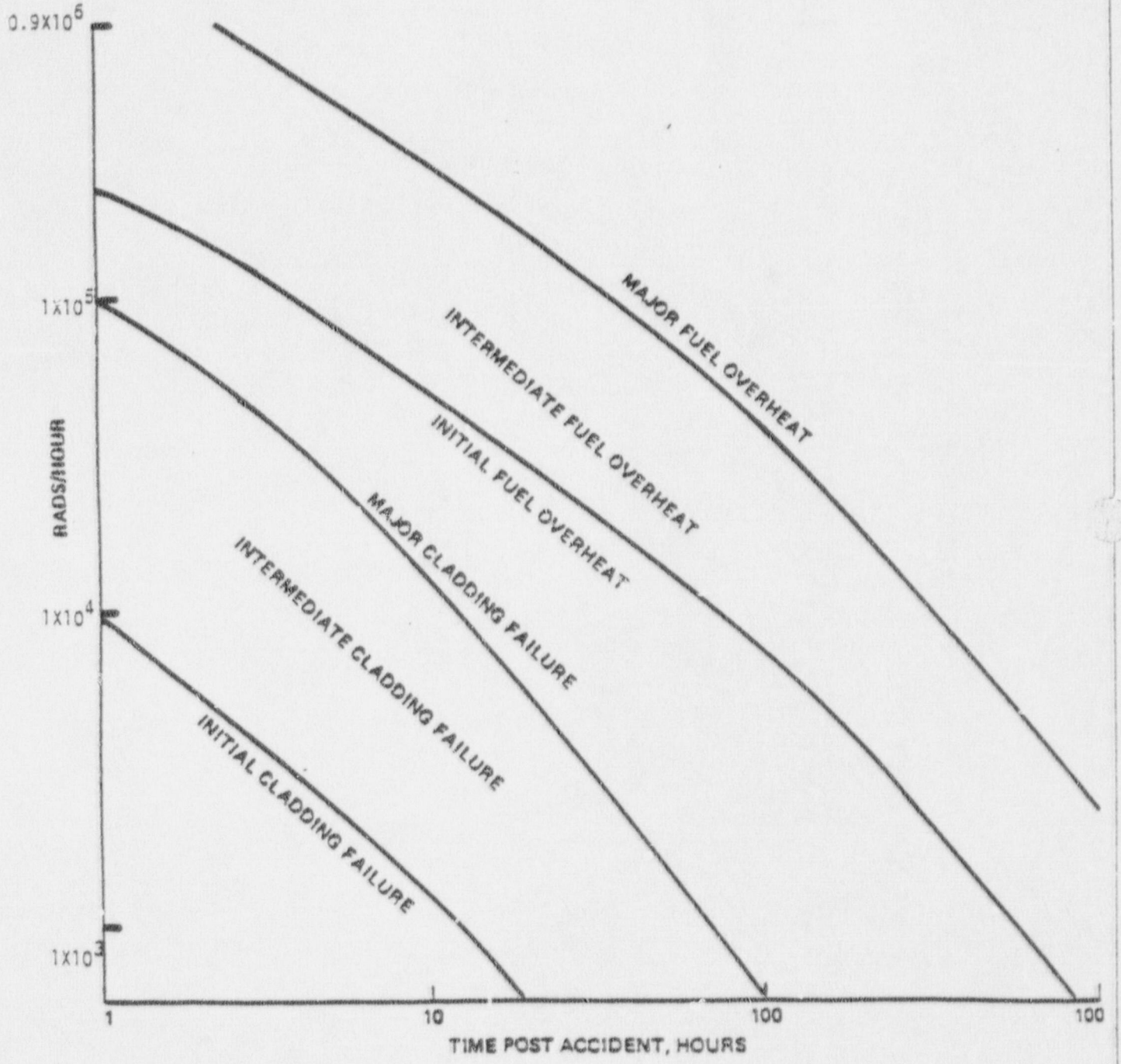
Clad Damage Characteristics of NRC Categories of Fuel Damage

	NRC Category of Fuel Damage	Temperature Range (°F)	Mechanism of Damage	Characteristic Measurement	Measurement Range	Percent of Damage Rods
1.	No Fuel Damage	~750	None	--	--	Less Than 1
2.	Initial Cladding Failure	1200-1800	Rupture Due to Gas Gap	Maximum Core Exit	<1550°F*	Less Than 10
3.	Intermediate Cladding Failure		Overpressurization	Thermocouple Temperature	<1700°F*	10 to 50
4.	Major Cladding Failure				~<2300°F ~<2% Oxidation	Greater Than 50
5.	Initial Fuel Pellet Overheating	1800-3350	Loss of Structural Integrity Due to Fuel Clad Oxidation	Amount of Hydrogen Gas Produced (Equivalent to % Oxidation of Core)	Equivalent Core Oxidation <3%	Less Than 10
6.	Intermediate Fuel Pellet Overheating				<18%	
7.	Major Fuel Pellet Overheating				~<65%	Greater Than 50

* Depends on Reactor Pressure and Fuel Burnup. Values Given for Pressure ≤1200 psia and Burnup ≥0.

ENCLOSURE 2

FORT CALHOUN IN-CONTAINMENT
POST ACCIDENT DOSE RATE



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SECTION B

Estimate of Core Damage Using Isotopic Data

I. PREREQUISITES

A. A plant accident with the potential for core damage has occurred.

B. Isotopic activities are available per OI-SL-2 or OI-PAP-2.

C. Computer program UTYPASS is available for execution.

D. The Post Accident Sampling System (PASS) is operable and has the capability to obtain and analyze the identity and concentration of fission product isotopes in fluid samples which have the potential to be highly radioactive.

II. PRECAUTIONS AND LIMITATIONS

The assessments of core damage obtained by using this procedure are only estimates and represent lower limit estimates of clad damage.

The total quantity of fission products measured at monitor locations in containment may be changing rapidly due to transient plant conditions. Therefore, multiple measurements should be obtained within a minimum time period and under stabilized plant conditions when possible. Samples obtained during rapidly changing plant conditions should not be weighed heavily into the assessment of core damage.

III. PROCEDURE

Estimation of Core Damage Using Isotopic Analysis

A. Perform an isotopic specific activity analysis by obtaining samples based on the following criteria:

	TYPE TRANSIENT	SAMPLE LOCATIONS
a)	Rapid Depressurization of Primary System	Reactor Coolant, Containment Atmosphere, Containment Sump
b)	Slow Depressurization of Primary System	
	EARLY	Reactor Coolant
	LATER	Reactor Coolant, Containment Atmosphere, Containment Sump

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III. PROCEDURE (Continued)

NOTE: If the core damage estimate is performed after purging containment, the noble gas concentrations should be adjusted to reflect the initial concentrations prior to the purge operation.

B. Using OI-SL-2 or OI-PAP-2, obtain and analyze the selected samples for fission product specific activity and record in Table 1. All of the isotopes listed in the table may not be observed in the sample.

C. Record the time of reactor trip. Date_____/ Time_____.

D. If the Safety Injection Tanks (SIT's) and/or Safety Injection Refueling Water Tank (SIRWT) have been used during the transient, complete Table 2.

E. Determine the elapsed time between reactor trip and sample measurement:

_____hours

F. Complete Table 3 on Power History.

G. This step uses the computer program UTYPASS on the IBM PC to provide an estimate of core damage using isotopic analysis. If access to the IBM PC is not available, proceed to Step I to access the program on the terminet.

1. Insert the UTYPASS floppy disk, found in the Core Physics Supervisor emergency packet, into the "A" floppy drive.

2. Enter the following statements, in order:

CD\EPIP	CR (Carriage Return)
COPY A: *.*	CR
PE	CR CR
EDIT USERI.PRG	CR

3. Input the information from Tables 1, 2 and 3 by using the arrow, PgDn and PgUp keys on the right side of the keyboard to modify the input data file as outlined in Appendix A.

4. Enter the following statements, in order:

FILE USERI.PRG NOTABS	CR
QUIT	CR
PRGPASS	CR

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III. PROCEDURE (Continued)

G. 5. When "Stop - Program Terminated." appears on the screen, enter the following statements:

PE CR

EDIT USERO.PRG CR

6. Use the arrow, PgDn and PgUp keys to view the output, or use the F7 function key on the left side of the keyboard to print the output file.

7. When finished, return the floppy disk to the Core Physics Supervisor emergency packet and type the following:

QUIT CR

QUIT CR

CD\ R

H. CORE DAMAGE ASSESSMENT

The conclusion on core damage is made using the three parameters developed above. These are:

1. Identification of the fission product isotopes which most characterize a given sample, step B, Table 1.

2. Identification of the source of the release from program output or step L, if manual calculation was used.

3. Quantity of the fission product available for release to the environment expressed as a percent of source inventory from program output or step O if manual calculation was used.

Compare the three parameters above to the definitions of the 10 NRC categories of fuel damage found in Enclosure 1. Core damage is not anticipated to take place uniformly. Therefore when evaluating the three parameters listed above, the procedure is anticipated to yield a combination of one or more of the 10 categories defined in Enclosure 1. These categories will exist simultaneously.

CONCLUSIONS:

III. PROCEDURE (Continued)

I. This step uses the computer program UTYPASS on the terminet to provide an estimate of core damage using isotopic analysis. If access to UTYPASS or the terminet is not available, continue with procedure Step J for manual calculation toward an isotopic core damage estimate.

1. To use the Combustion Engineering computer system upon which UTYPASS resides,

   SET TERMINET TO HALF DUPLEX
   Dial 1-800-243-3202
   or 1-203-683-0411
   or 1-203-683-2734

2. Once the computer has been accessed, use the following sequence to log on and access UTYPASS.

   USER NAME, PASSWORD:

   OMAHA, Ø CR

   XEDIT,UTYPASS,P CR

   Perform input changes as outlined in Appendix A

   Q,,RL CR

3. To submit the computer job, type:

   SUBMIT, UTYPASS,T CR

4. When the job is complete, use the following command to identify the job name.

   ENQUIRE,UJN CR

5. To print the results, input the following sequence:

   TRMDEF,PW=136. CR

   QGET,LfN CR

   COPY,LfN CR

6. Summarize the core damage results as directed in procedure Step H.

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III. PROCEDURE (Continued)

J. Complete the Enclosure 3 worksheet to correct the measured sample specific activity to standard temperature and pressure as follows.

NOTE: This portion of the procedure is only to be used when access to UTYPASS is not available.

1. Reactor coolant liquid samples are corrected for system temperature and pressure using the factor for water density provided in Enclosure 2. The correction factor obtained from the enclosure is divided into the measured value to obtain the density corrected value.

2. Containment building sump samples do not require correction for temperature and pressure within the accuracy of this procedure.

3. Containment building atmosphere gas samples are corrected using the following equation.

$$\text{Specific Activity(STP)} = \text{Specific Activity} \times \left(\frac{14.7}{P_1 + 14.7}\right) \times \left(\frac{T_1 + 460}{492}\right)$$

Where:

T_1, P_1 = Measured Sample temperature and pressure recorded in step B.

K. Correct the sample specific activity at STP for decay back to the time of reactor shutdown, as recorded in step C, using the following equation. Enclosure 4 is provided as a worksheet.

$$A_0 = \frac{A}{e^{-\lambda\tau}}$$

Where:

A_0 = the specific activity of the sample corrected back to the time of reactor shutdown, μci/cc.

A = the measured specific activity, μci/cc.

λ = the radioactive decay constant, 1/sec.

τ = the time period from reactor shutdown to sample analysis, sec.

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III. PROCEDURE (Continued)

L. Identification of the Fission Product Release Source.

1. Calculate the following ratios for each noble gas and iodine isotope only using the specific activities obtained in step L. Enclosure 5 is provided as a worksheet.

$$\text{Noble Gas Ratio} = \frac{\text{Noble Gas Isotope Specific Activity}}{\text{Xe133 Specific Activity}}$$

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

2. Determine the source of release by comparing the results obtained to the predicted ratios provided in Enclosure 5. An accurate comparison is not anticipated. Within the accuracy of this procedure it is appropriate to select as the source that ratio which is closest to the value obtained in step L.1.

M. Calculate the total quantity of fission products available for release to the environment. Enclosure 6 is provided as a worksheet.

1. The quantity of fission products found in the reactor coolant is calculated as follows.

a. If the water level in the reactor vessel recorded in step B indicates that the vessel is full, the quantity of fission products found in the reactor coolant is calculated by the following equation.

Total Activity(Ci) = A_0 (μci/cc) x RCS Volume

Where:

A_0 = the specific activity of the reactor coolant sample corrected to time of reactor shutdown obtained in step K, μci/cc.

RCS Volume = the full reactor coolant system water volume corrected to standard temperature and pressure using Enclosure 2.

b. If the water levels in the reactor vessel and pressurizer recorded in step B, Table 1 indicates that a steam void is present in the reactor vessel, the quantity of fission products found in the reactor coolant is calculated using the equation from step M.1.a.

c. If the water level in the reactor vessel recorded in step B is below the low end capability of the indicator, it is not possible to determine the quantity of fission products from this sample because the volume of water in the reactor coolant system is unknown. Under this condition, assessment of core damage is obtained by using the containment sump sample.

III. PROCEDURE (Continued)

M. 2. The quantity of fission products found in the containment building sump is determined as follows.

a. The water volume in the containment building sump is determined from the sump level recorded in step B, Table 1 and the curve provided in Enclosure 7.

b. The quantity of fission products in the sump is calculated by the following equation.

Total Activity, Ci = A_0 (μci/cc) x Sump Volume

Where:

A_0 = the specific activity of the containment sump sample corrected to the time of reactor shutdown obtained in step K, μci/cc.

3. The quantity of fission products found in the containment building atmosphere is determined as follows.

a. The volume of gas in the containment building at the time of the accident, is corrected to standard temperature and pressure using the following equation.

$$\text{Gas Volume(STP)} = \text{Gas Volume} \times \frac{(14.7 + P_1)}{14.7} \times \frac{492}{(T_1 + 460)}$$

Where:

T_1, P_1 = Containment Atmosphere temperature and pressure recorded in step B, Table 1.

4. The total quantity of fission products available for release to the environment is equal to the sum of the values obtained from each sample location.

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III. PROCEDURE (Continued)

N. PLANT POWER CORRECTION

The quantitative release of the fission products is expressed as the percent of the source inventory at the time of the accident. The equilibrium source inventories are to be corrected for plant power history. Use information from step F, Table 3.

1. To correct the source inventory for the case in which plant power level has remained constant for a period greater than four radioactive half lives the following procedure is employed. Enclosure 8 is provided as a worksheet.

   a. The fission products are divided into two groups based upon the radioactive half lives. Group 1 isotopes are to be employed in the case where core power had not changed greater than ± 10 percent within the last 30 days prior to the reactor shutdown. Group 2 isotopes are to be employed in the case where core power had not changed greater than ± 10 percent within the last 4 days prior to the reactor shutdown.

   b. The following equation may be applied to the fission product Group which meets the criteria stated in N.1.a only.

$$\text{Group 1 Power Correction Factor} = \frac{\text{Steady State Power Level for Prior 30 days}}{100}$$

$$\text{Group 2 Power Correction Factor} = \frac{\text{Steady State Power Level for Prior 4 Days}}{100}$$

2. To correct the source inventory for the case in which plant power level has not remained constant prior to reactor shutdown, the following equation is employed. The entire 30 days power history should be employed. Enclosure 9 is provided as a worksheet.

$$\text{Power Correction Factor} = \frac{\Sigma_j P_j \left(1-e^{-\lambda\tau_j}\right) e^{-\lambda\tau'_j}}{100}$$

Where:

P_j = steady reactor power in period j

τ_j = duration of period j

τ'_j = time from end of period j to reactor shutdown

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III. PROCEDURE (Continued)

O. Comparison of Measured Data with Source Inventory

The total quantity of fission products available for release to the environment obtained in step M.4 is compared to the source inventory corrected for plant power history obtained in step N.2. This comparison is made by dividing the two values for each isotope and calculating the percent of the corrected source inventory that is now in the sampled fluid and therefore available for release to the environment. Enclosure 10 is provided as worksheet.

P. CORE DAMAGE ASSESSMENT

Summarize the core damage results as directed in procedure step H.

TABLE 1

	Temperature °F	Pressure psia
Containment		
Gas Loop		
RCS (T_{ave})		

Reactor Vessel Level _____%

Pressurizer Level _____%

Containment Sump Level _____%

Isotope	Specific Activity (microcuries/cc) RC	CA	CS
Xe-131M			
Xe-133			
Kr-88			
Kr-85			
Kr-87			
I-132			
I-133			
I-135			
I-131			
Cs-134			
Te-132			
Ba-140			
Ru-103			

Time of Sample Measurement _____

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TABLE 2

Safety Injection Tank Level, %

	Before	After
SI-6A		
SI-6B		
SI-6C		
SI-6D		

	SIRWT Level (Inches) Before	After
SIRWT		

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TABLE 3

30 DAY POWER HISTORY

P_j	T_j	T_j^o

Up to 8 Intervals May be Revised

P_j = Steady reactor power operated in period j % full power

NOTE: In each period, the variation of steady power should be limited to ±10%.

T_j = Duration of operating period j (days)

T_j^o = Time between the end of operating period j and time of reactor shutdown (days)

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APPENDIX A

User input guide for core damage estimate computer program

PRGPASS.

CARD 1

5	10	15	20	25	30	35	40
		HOURS					
TIIMIE1=	HIOIUIRIS	1 1 1 1	1 1 1 1	1 1 1 1	1 1 1 1	1 1 1 1	1 1 1 1

Hours is in F5.1 format starting in Card Column 12

Hours is the time from reactor trip until the primary sample is read.

CARDS 2 through 5 - SI Tank Levels

5	10	15	20	25	30	35	40
SIIl-161X	1 1 1 1	101.1010	01E1+1010	101.1010	01E1+1010	1 1 1 1	1 1 1 1

Cards 2 through 5 are for SI, 6A, 6B, 6C, 6D tank levels before use and after use. The levels are in percent. Format is E9.3, 1X, E9.3 starting in Card Column 12.

CARD 6 - SIWRT Level

5	10	15	20	25	30	35	40
			INITIAL	FINAL			
SIIRIWTT							

Card 6 is for SIWRT level before and after use, if any. Level is input in inches. Format is E9.3, 1X, E9.3 starting in Card Column 12.

CARD 7 - Containment Temperature and Pressure

5	10	15	20	25	30	35	40
			TEMP.	PRESS.			
CIOINITIAIINIMIT							

Card 7 is for input of containment temperature (°F) and containment pressure (PSIA). These values should correspond to the time the containment atmospheric sample was taken. Format starting in Card Column 12 is E9.3, 1X, E9.3.

CARD 8 - Gas Sample Temperature and Pressure

5	10	15	20	25	30	35	40
			TEMP	PRESS.			
GIASI 1L	LIOIOIP1						

Card 8 is for input of the gas sample temperature (°F) and pressure (PSIA). The format starting in Card Column 12 is E9.3, 1X, E9.3.

CARD 9 - Core Average Reactor Coolant System Temperature

5	10	15	20	25	30	35	40
		TEMP.					
R C S 1 T	E M P 1						

Card 9 is for input of the core average RCS temperatures (°F) corresponding to the time when the primary sample was taken. Format starting in Card Column 12 is E9.3.

CARDS 10 through 21 - Isotopic Information

5	10	15	20	25	30	35	40
		RC		CA		CS	
I S O T 10	P E 1 . 1						

Cards 10 through 21 are for input of isotopic information.

The activities input are in microcuries/cc.

The reactor coolant values start in Card Column 12.

The containment atmospheric values start in Card Column 22.

The containment sump values start in Card Column 32.

If a sample is not read for a particular isotope or a region is not sampled, input zero's.

The format for each card is A10, 1X, E9.3, 1X, E9.3, 1X, E9.3.

The isotope cards must be in the following order.

CARD #	ISOTOPE
10	XE-133M
11	XE-133
12	KR-88
13	KR-85
14	KR-87
15	I-132
16	I-133
17	I-131
18	CS-134
19	TE-132
20	BA-140
21	RU-103

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CARD 22 - Choice to use Noble Gases or Cs-134/I-131 for Overheating Calculations.

5	10	15	20	25	30	35	40
		N1					
C|H|O|I|C|E|							

N1 = 0 Use I-131 and Cs-134,
= 1* Use Nobel Gases

*Use the data for Iodine or Cesium only when the data for noble gases is not available.

CARD 23 - Number of Values in History File (Cards 24 through 31)

5	10	15	20	25	30	35	40
		N					
P|W|R|S|							

N = Number of power changes for 30 Days prior to trip, N = 1 to 8.

Integer format in Card Column 12.

CARDS 24 through 31 - Power History

5	10	15	20	25	30	35	40
			POWER		DAYAT		DAYTIL

The power history is for the 30 days prior to shutdown. Up to 8 power changes may be modeled.

POWER = Power level in percent of full power. Note 10% levels are sufficient modeling changes.

DAYAT = Duration of operating period (Days).

DAYTIL = Time between the end of the operating period and the time of reactor shutdown (Days).

FORMAT = 15X, F5.1, 5X, F5.1, 5X, F5.1.

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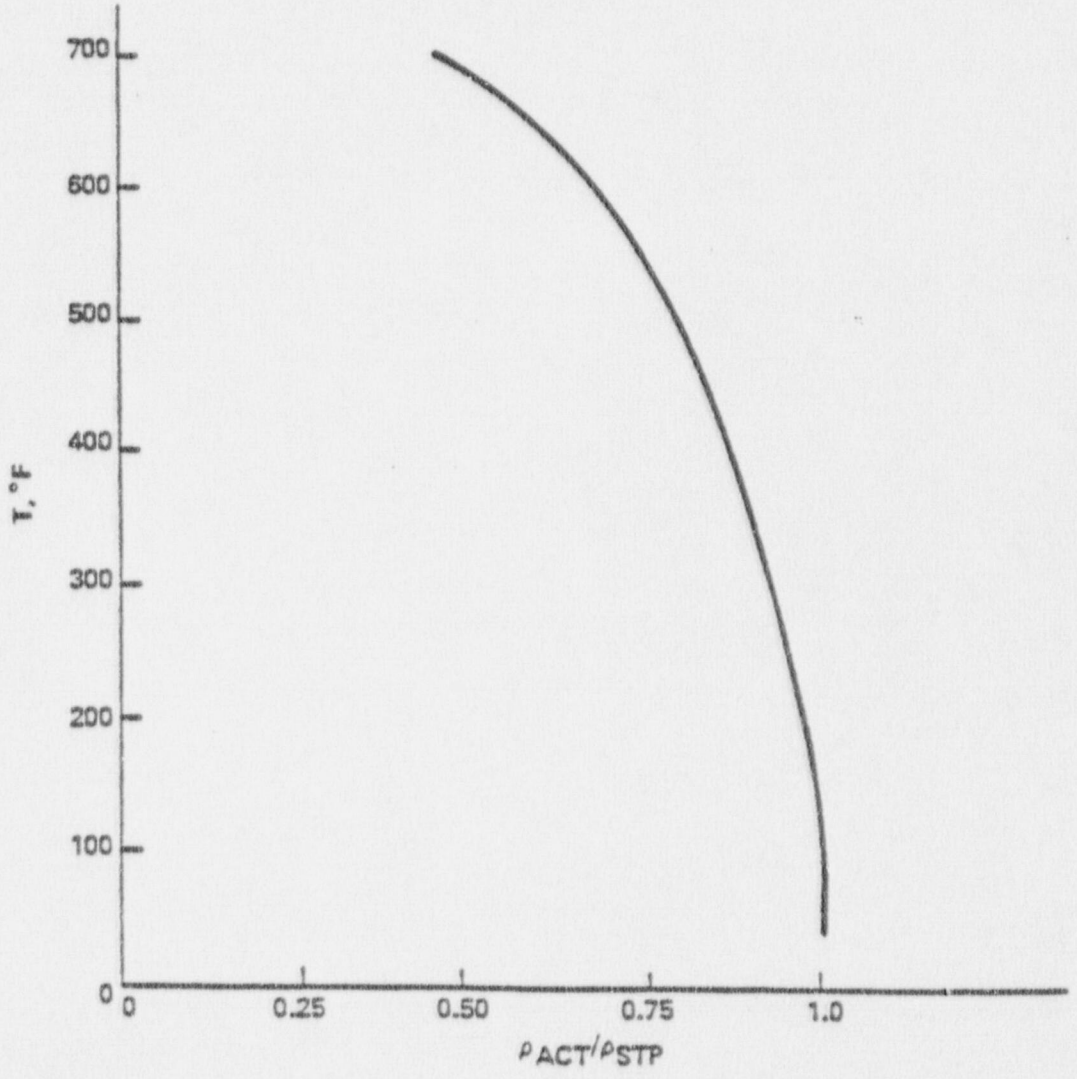
Enclosure 1

Radiological Characteristics of NRC Categories of Fuel Damage

NRC Category of Fuel Damage	Mechanism of Release	Source of Release	Characteristic Isotope	Release of Characteristic Isotope Expressed as a Percent of Source Inventory
No Fuel Damage	Halogen Spiking Tramp Uranium	Gas Gap	I 131, Cs 137 Rb 88	Less than 1
Initial Cladding Failure	Clad Burst and Gas Gap Diffusion Release	Gas Gap		Less than 10
Intermediate Cladding Failure		Gas Gap	Xe 131m, Xe 133 I 131, I 133	10 to 50
Major Cladding Failure		Gas Gap		Greater than 50
Initial Fuel Pellet Overheating	Grain Boundary Diffusion	Fuel Pellet	Cs 134, Rb 88, Te 129, Te 132	Less than 10
Intermediate Fuel Pellet Overheating		Fuel Pellet		10 to 50
Major Fuel Pellet Overheating	Diffusional Release From UO_2 Grains	Fuel Pellet		Greater than 50
Fuel Pellet Melt	Escape from Molten Fuel	Fuel Pellet		Less than 10
Intermediate Fuel Pellet Melt		Fuel Pellet	Ba 140, La 140 La 142, Pr 144	10 to 50
Major Fuel Pellet Melt		Fuel Pellet		Greater than 50

ENCLOSURE 2

RATIO OF H_2O DENSITY TO H_2O DENSITY AT STP vs TEMPERATURE



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ENCLOSURE 3

RECORD OF SAMPLE TEMPERATURE CORRECTION

Sample Number:

Location:

Time of Analysis:

Temperature, °F:

Pressure, PSIG:

Isotope	Measured Specific Activity (Table 1), $\mu ci/cc$	Correction Factor	Specific Activity @ STP, $\mu ci/cc$
Kr 87			
Xe 131m			
Xe 133			
I 131			
I 132			
I 133			
I 135			
Cs 134			
Rb 88			
Te 129			
Te 132			
Sr 89			
Ba 140			
La 140			
La 142			
Pr 144			

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ENCLOSURE 4

RECORD OF DECAY CORRECTION

Time of Reactor Shutdown, Step IV.C.

Sample Number:

Location:

Time of Analysis:

Isotope	Decay Constant, 1/sec	Specific Activity @ STP (Enclosure 3), $\mu ci/cc$	Decay Corrected Specific Activity, $\mu ci/cc$
Kr 87	1.5 (-4)		
Xe 131m	6.7 (-7)		
Xe 133	1.5 (-6)		
I 131	9.9 (-7)		
I 132	8.4 (-5)		
I 133	9.3 (-6)		
I 135	2.9 (-5)		
Cs 134	1.1 (-8)		
Rb 88	6.5 (-4)		
Te 129	1.7 (-4)		
Te 132	2.5 (-6)		
Sr 89	1.6 (-7)		
Ba 140	6.3 (-7)		
La 140	4.8 (-6)		
La 142	1.2 (-4)		
Pr 144	6.7 (-4)		

ENCLOSURE 5

RECORD OF FISSION PRODUCT RELEASE SOURCE IDENTIFICATION

Sample Number:

Location:

Isotope	Decay Corrected Specific Activity (Enclosure 4), $\mu ci/cc$	Calculated Isotope Ratio*	Fuel Pellet Inventory	Activity Ratio In Gas Gap	Identified Source
Kr 87			0.2	0.001	
Xe 131m			0.003	0.001-0.003	
Xe 133			1.0	1.0	
I 131			1.0	1.0	
I 132			1.4	0.01-0.05	
I 133			2.0	0.5-1.0	
I 135			1.8	0.1-0.5	

* Noble Gas Ratio = $\frac{\text{Decay Corrected Noble Gas Specific Activity}}{\text{Decay Corrected Xe 133 Specific Activity}}$

Iodine Ratio = $\frac{\text{Decay Corrected Iodine Isotope Specific Activity}}{\text{Decay Corrected I-131 Specific Activity}}$

ENCLOSURE 6

RECORD OF RELEASE QUANTITY

Isotope	Reactor Coolant Sample Number, Ci	Containment Sump Sample Number, Ci	Containment Atmosphere Sample Number, Ci	Total Quantity Ci
Kr 87				
Xe 131m				
Xe 133				
I 131				
I 132				
I 133				
I 135				
Cs 134				
Rb 88				
Te 129				
Te 132				
Sr 89				
Ba 140				
La 140				
La 142				
Pr 144				

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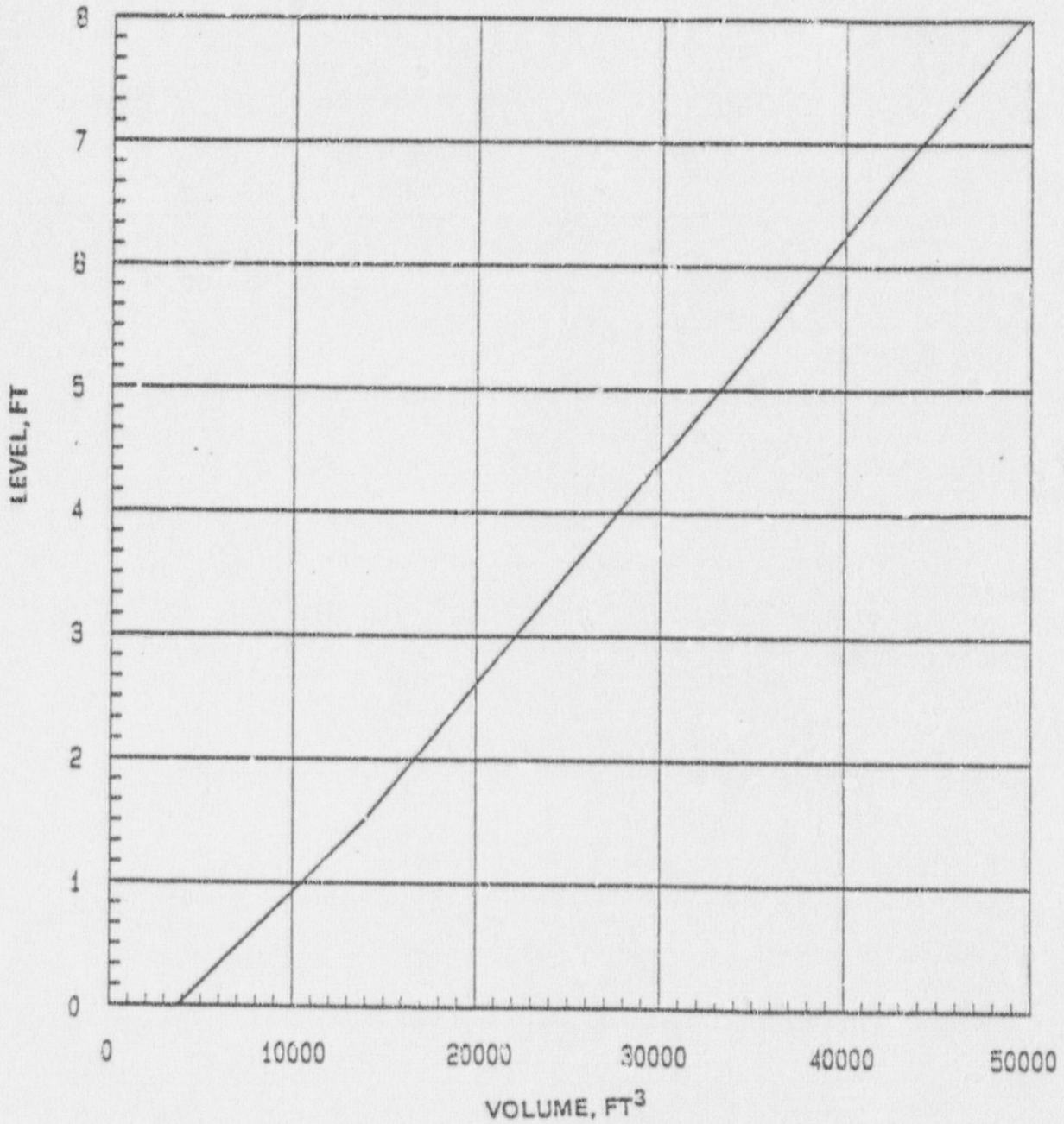
ENCLOSURE 7

CONTAINMENT BUILDING WATER
LEVEL vs VOLUME



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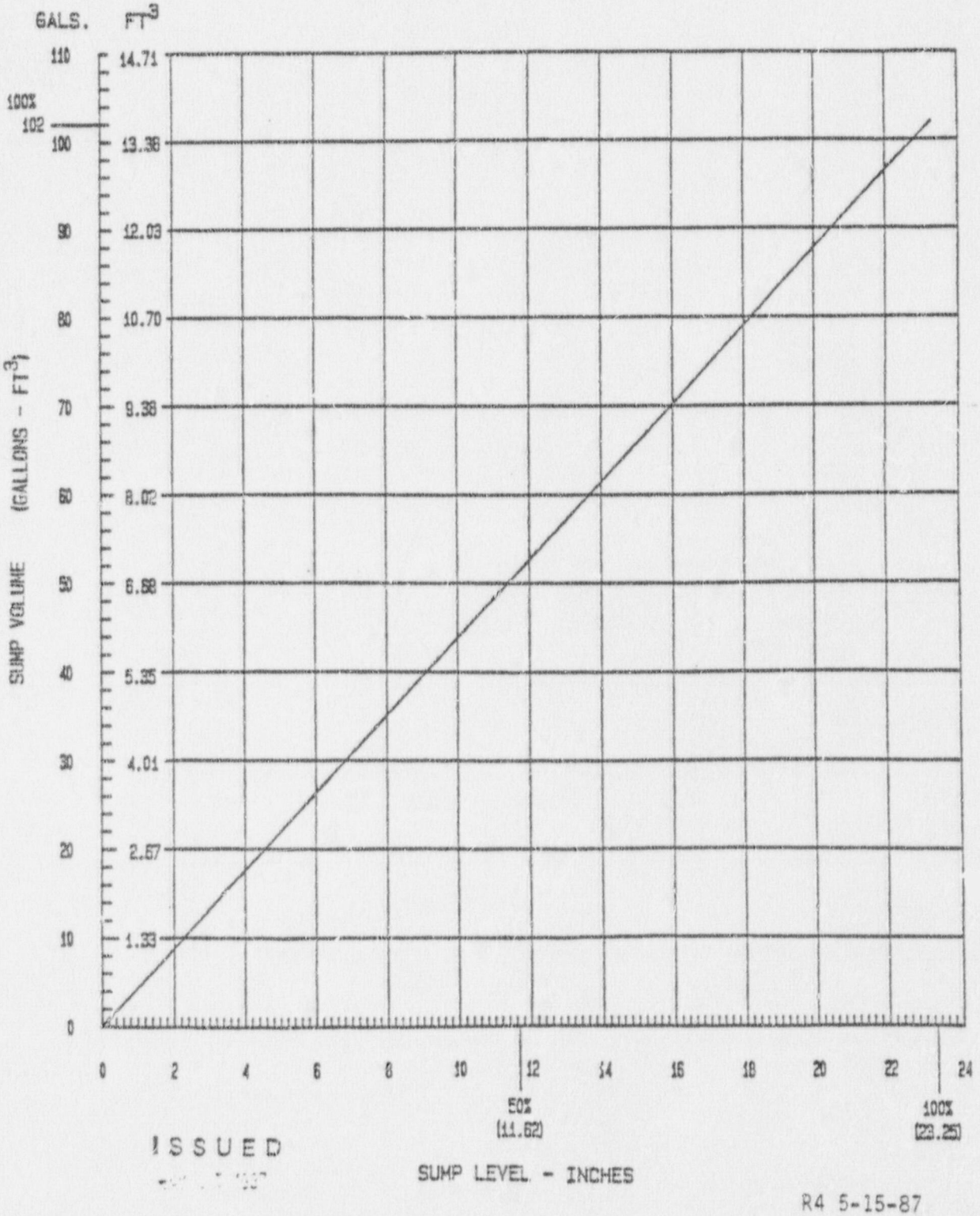
ENCLOSURE 7A

CONTAINMENT SUMP CURVE

LEVEL VS. VOLUME



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ENCLOSURE 8

RECORD OF STEADY STATE POWER CORRECTION

Sample Number:
Location:
Steady State 30 Days Power Level:
Steady State 4 Day Power Level:

Isotope	Fuel History Grouping	Power Correction Factor	x	Equilibrium Source Inventory	=	Corrected Source Inventory
Gas Gap Inventory						
Kr 87	2			3.6(0)		
Xe 131m	1			2.7(4)		
Xe 133	1			1.3(7)		
I 131	1			4.4(6)		
I 132	2			4.9(3)		
I 133	2			4.4(6)		
I 135	2			7.0(5)		
Fuel Pellet Inventory						
Kr 87	2			1.8(7)		
Xe 131m	1			2.9(5)		
Xe 133	1			1.5(8)		
I 131	1			4.8(7)		
I 132	2			7.0(7)		
I 133	2			1.5(8)		
I 135	2			8.6(7)		
Cs 134	1			6.1(6)		
Rb 88	2			2.9(7)		
Te 129	2			1.6(7)		
Te 132	1			7.0(7)		
Sr 89	1			3.9(7)		
Ba 140	1			8.0(7)		
La 140	1			8.4(7)		
La 142	2			1.0(8)		
Pr 144	2			6.5(7)		

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ENCLOSURE 9

RECORD OF TRANSIENT POWER CORRECTION

Sample Number:
Location:
Prior 30 Day Power History:

Power %	Duration, Days

Isotope	Power Correction Factor	x	Equilibrium Source Inventory	=	Corrected Source Inventory
Gas Gap Inventory					
Kr 87			3.6(0)		
Xe 131m			2.7(4)		
Xe 133			1.3(7)		
I 131			4.4(6)		
I 132			4.9(3)		
I 133			4.4(6)		
I 135			7.0(5)		
Fuel Pellet Inventory					
Kr 87			1.8(7)		
Xe 131m			2.9(5)		
Xe 133			1.5(8)		
I 131			4.8(7)		
I 132			7.0(7)		
I 133			1.5(8)		
I 135			8.6(7)		
Cs 134			6.1(6)		
Rb 88			2.9(7)		
Te 129			1.6(7)		
Te 132			7.0(7)		
Sr 89			3.9(7)		
Ba 140			8.0(7)		
La 140			8.4(7)		
La 142			1.0(8)		
Pr 144			6.5(7)		

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ENCLOSURE 10

RECORD OF PERCENT RELEASE

Isotope	Total Quantity Available For Release (Enclosure 6), Ci	÷	Power Corrected Source Inventory, x 100 = Ci (Enclosure 8 or 9)	Percent
Gas Gap Inventory				
Kr 87				
Xe 131				
Xe 133				
I 131				
I 132				
I 133				
I 135				
Fuel Pellet Inventory				
Kr 87				
Xe 131m				
Xe 133				
I 131				
I 132				
I 133				
I 135				
Cs 134				
Rb 88				
Te 129				
Te 132				
Sr 89				
Ba 140				
La 140				
La 142				
Pr 144				

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SECTION C

Estimate of Core Damage Using Hydrogen In Containment

I. PREREQUISITES

A. A plant accident with the potential for core damage has occurred.

B. The Post Accident Sampling System (PASS) is operable and has the capability to obtain and analyze the identity and concentration of fission product isotopes in fluid samples which have the potential to be highly radioactive.

II. PRECAUTIONS AND LIMITATIONS

The assessments of core damage obtained by using this procedure are only estimates and represent lower limit estimates of clad damage.

This procedure only estimates the percentage of rods which have progressed to at least clad rupture or clad embrittlement, and does not attempt to predict the physical configuration of those rods which have progressed beyond local clad fragmentation.

This procedure assumes there are no voids measurable by the Reactor Vessel Level Monitoring System. However, if the hydrogen samples are taken under conditions in which a measurable void does exist, the attached addendum contains guidelines to estimate the added contribution of hydrogen, by that source, to the total hydrogen measured.

This procedure provides an estimate of only the percentage of rods which have progressed to at least clad rupture or clad embrittlement, and does not attempt to predict the physical configuration of those rods which have progressed beyond local clad fragmentation.

III. PROCEDURE

Estimation of Core Damage Using Hydrogen Measurement

a. Record the estimates for core uncovery and recovery times using instrument records from the Reactor Vessel Level Monitoring System, Core Exit Thermocouple Temperature and Core Exit Thermocouple Saturation Margin.

Instrument	Estimated Core Uncovery Time	Estimated Core Recovery Time
Reactor Vessel Level Monitoring System	Lower Limit Elevation Uncovers. Time _____	Lower Limit Elevation Recovers. Time _____
Core Exit Thermocouple Temperature	Start of Continuous Rise or Exceed of 600F. Time _____ Temperature _____	Rapid Temperature Drop to Saturation. Time _____ Temperature _____
Core Exit Thermocouple Saturation Margin	Start of Superheat. Time _____	Return to Saturation or Subcooling. Time _____

b. Interpret the data from step a to determine the best estimate for the time period of core uncovery and obtain the range of RCS pressure (pressurizer pressure) indicated for this time period. The superheat derived from the thermocouple temperature and corresponding system pressure is considered as the best indicator for core uncovery during core boiloff and should be used but should be compared with other indicators to help identify possible anomolies. Record these values below.

	Core Uncovery	Core Recovery
Time	_____	_____
Pressure	_____	_____

c. Observe available instrument records to determine if there was some reactor vessel inlet flow during the rising temperature portion of the core uncovery period up to approximately the time of peak core exit thermocouple temperature.

Charging Flow Rate _____ GPM Letdown Flow Rate _____ GPM

HPSI Flow Rate _____ GPM LPSI Flow Rate _____ GPM

Other Flow Rate _____ GPM

NOTE: Net inlet flow indicates that this procedure may have additional bias which underpredicts clad damage.

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III. PROCEDURE (Continued)

d. Obtain a liquid sample from the RCS hot leg and a gas sample from the containment atmosphere and record the conditions in the containment at the time these samples are obtained, below. Analyze the samples for hydrogen concentration using the PASS procedure and record these results below. Estimate the total cubic feet of hydrogen at standard temperature and pressure as outlined.

Reactor Coolant System	Containment
Sampling Time _____	Atmosphere Pressure _____ psig
Pressure _____ psig	Atmosphere Temperature _____ F
Temperature _____ F	
Reactor Vessel Coolant Level _____ %	Does Pressure or Temperature History Indicate a Hydrogen Burn Yes/No
Pressurizer Level _____ %	

Cont. Sample (Vol. %/100)	X	Cont. Vol. (Ft^3)	X	(32 + 460) / Normal Temp. + 460	=	Ft^3 Hydrogen at STP
_____	X	1.05×10^6	X	492 / _____	=	_____

Hot Leg Sample (cc/kg @ STP)	X	RCS Vol. (Ft^3)	X	Density Ratio (Enclosure 2)	/	1000	=	Ft^3 Hydrogen at STP
_____	X	6395	X	_____	/	1000	=	_____

Total = _____

Record total hydrogen measured in step g, also.

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III. PROCEDURE (Continued)

e. Record the containment temperature at selected time intervals and calculate the hydrogen generated by oxidation of containment materials utilizing the typical plant hydrogen production rate from Enclosure 3.

1	2	3	4	5
Time at Start of Intervals	Interval Duration (hr)	Avg. Containment Temp. During Interval (°F)	H_2 Prod. Rate (ft^3/hr) (Enclosure 3)	H_2 Produced = 2 X 4
Accident Starts				
Sampling Time				

Long Term Hydrogen Production in Containment, Total = ________ ft^3 @STP

Typical Short term rapid hydrogen production by containment aluminum ___1000___ SCF

Total Hydrogen Production In Containment ________ SCF

Record total in step g also.

ISSUED

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III. PROCEDURE (Continued)

f. Record the data requested below and utilize the curve of Enclosure 4 to obtain the cubic feet of hydrogen at STP generated by radiolysis. Determine the approximate power to be used as follows:

For the case in which the operating power is constant or has not changed by more than ±10 percent for a period greater than 30 days, that power is used.

For the case in which the power has not remained constant during the 30 days prior to the reactor shutdown, engineering judgement is required to determine the most representative power level. The last power levels at which the reactor operated should weigh more heavily in the judgement than the earlier levels. Continued operation for an extended period should weigh more heavily in the judgement than brief transient levels.

For the case in which the reactor has produced power for less than 30 days, the procedure may still be employed. However, the estimate of hydrogen from radiolysis will be too high and therefore the calculated hydrogen by core oxidation will be too low. Hence an underprediction of core damage may result.

Prior 30 day power history	Power, percent	Duration, Days
	_____	_____
	_____	_____
	_____	_____
	_____	_____

Power to use in evaluating long term hydrogen production by radiolysis = (1500, Mwt) X _____.

Reactor Trip Time _____ hrs

Sampling Time (see step d) _____ hrs

Decay Time (Sampling Time - Trip Time) _____ hrs

Enter abscissa on Enclosure 4 with above decay time and read two values for hydrogen produced by radiolysis, one from each curve, in cubic feet of hydrogen at STP per Mwt operating power. Multiply by above power and record as follows:

Limit Curve	Hydrogen Produced (SCF/Mwt, Enclosure 4)	Operating Power	Total Hydrogen Produced (SCF)
Upper	_____	_____	_____
Lower	_____	_____	_____

Using results from Radiological Damage Assessment Procedure, estimate which results should be used; upper limit for major fuel overheat, lower limit for initial fuel overheat or appropriate estimate between the two curves for intermediate fuel overheat. Circle corresponding value of hydrogen above and also record in step g.

III. PROCEDURE (Continued)

g. Enter the amounts of hydrogen from steps d, e, and f below.

Hydrogen Measured, Step d. _____ SCF

Hydrogen Produced in Containment, Step e. _____ SCF

Hydrogen Produced by Radiolysis, Step f. _____ SCF

Subtract Step e and f from d to get Hydrogen Produced by Core Clad Oxidation _____ SCF

Divide by (2570 SCF/1% Clad Oxidized) = _____ %
= % Core Oxidated

h. Enter the abscissa of the curve on Enclosure 5 with the "% Core Oxidized" from step g. Use the curve labeled with the pressure closes to but greater than the RCS pressure during the core uncovery period as obtained and recorded in Step b. Read on the ordinate of Enclosure 5, the percent of fuel rods with ruptured clad and record below. Note that the sensitivity of measurement of hydrogen is comparable to the range of oxidation on Enclosure 5. Hence, small amounts of clad rupture are not reliably predicted by this procedure.

% of Fuel Rods with Ruptured Clad = _____ %

i. Enter the abscissa of the curve on Enclosure 6 with th "% Core Oxidized" from step g. Read on the ordinate the lower and upper values of the range indicated by the curve for the percent of fuel rods which have embrittled clad and record below.

Percent of Fuel Rods with Local Oxidation Embrittlement

Range - Upper _____ %

- Lower _____ %

j. For a given percent oxidation of the core clad, the lower limit estimate of embrittled clad in step i is, for most accident scenarios, the least amount of potential fuel structural failure. Step g may be interpreted as follows:

When the pressure during uncovery from step b is less than about 100 psia, a rapid core uncovery by blowdown is concluded. Heatup with minimum clad oxidation occurs. The extent of potential clad structural failures by melting may be greater than the upper limit of embrittlement from step i as determined by oxidation. Hence, use the upper limit from step i.

When there is inlet flow while the core is uncovering, the rate of uncovery is slower than assumed in the derivation of the curves on Enclosure 5 and 6. For a measured total amount of oxidation, the local percentage oxidation is probably greater along a shorter length of the upper portion of the fuel. Hence, favor the upper limit from step i.

III. PROCEDURE (Continued)

k. CORE DAMAGE ASSESSMENT

The conclusion on core damage is made using the two results from above. These are:

1. Percentage of fuel rods with ruptured clad, step h.

2. Percentage of fuel rods with embrittled or structurally damage clad, step i.

Knowledgeable judgement is used to compare the above two results to the definitions of the 10 NRC categories of fuel damage found in Enclosure 1. Core damage does not take place uniformly. Therefore when evaluating damage using these results, Enclosure 1 may yield a combination of categories of damage which exist simultaneously.

Enclosure 1

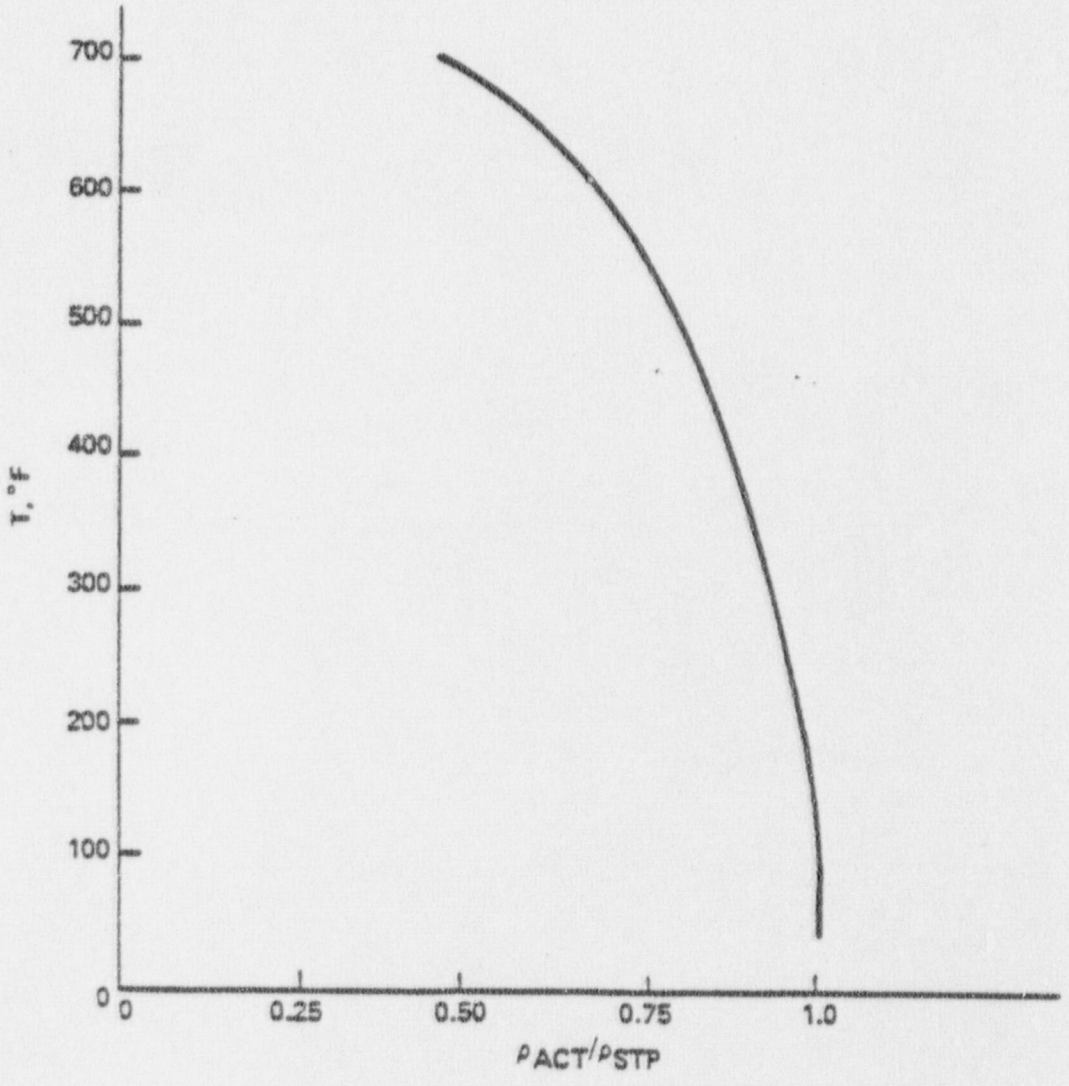
Clad Damage Characteristics of NRC Categories of Fuel Damage

NRC Category of Fuel Damage	Temperature Range (°F)	Mechanism of Damage	Characteristic Measurement	Measurement Range	Percent of Damage Rods
No Fuel Damage	~750	None	--	--	Less Than 1
Initial Cladding Failure	1200-1800	Rupture Due to Gas Gap	Maximum Core Exit	<1550°F*	Less Than 10
Intermediate Cladding Failure	1200-1800	Overpressurization	Thermocouple Temperature	<1700°F*	10 to 50
Major Cladding Failure	1200-1800	Overpressurization	Thermocouple Temperature	~<2300°F ~<2% Oxidation	Greater Than 50
Initial Fuel Pellet Overheating	1800-3350	Loss of Structural Integrity Due to Fuel Clad Oxidation	Amount of Hydrogen Gas Produced (Equivalent to % Oxidation of Core)	Equivalent Core Oxidation <3% <18%	Less Than 10
Intermediate Fuel Pellet Overheating	1800-3350	Loss of Structural Integrity Due to Fuel Clad Oxidation	Amount of Hydrogen Gas Produced (Equivalent to % Oxidation of Core)		
Major Fuel Pellet Overheating	1800-3350	Loss of Structural Integrity Due to Fuel Clad Oxidation	Amount of Hydrogen Gas Produced (Equivalent to % Oxidation of Core)	~<65%	Greater Than 50

Depends on Reactor Pressure and Fuel Burnup. Val Given for Pressure ≤1200 psia and Burnup ≥0.

ENCLOSURE 2

RATIO OF H_2O TO H_2O DENSITY AT STP vs TEMPERATURE



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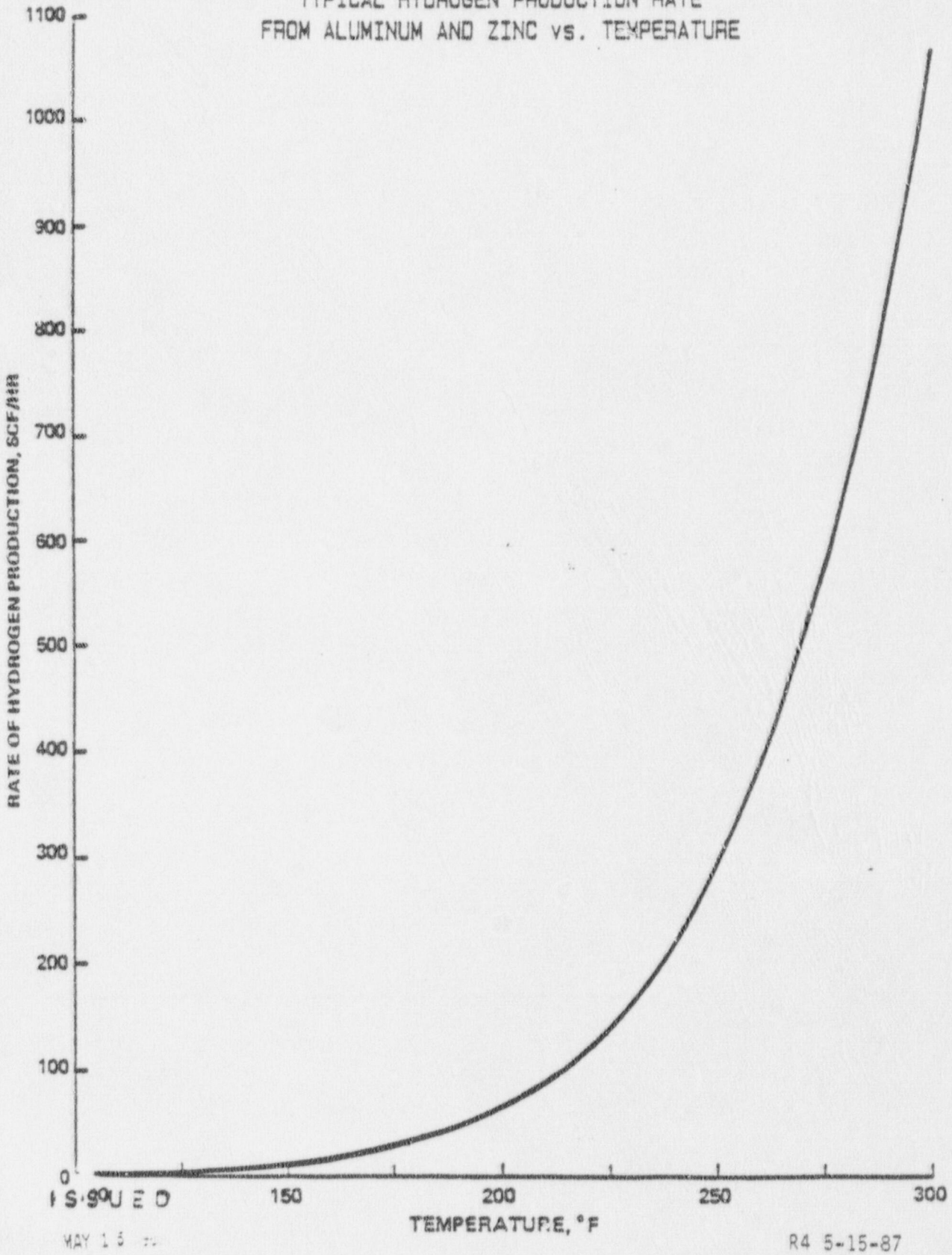
ENCLOSURE 3

TYPICAL HYDROGEN PRODUCTION RATE
FROM ALUMINUM AND ZINC vs. TEMPERATURE



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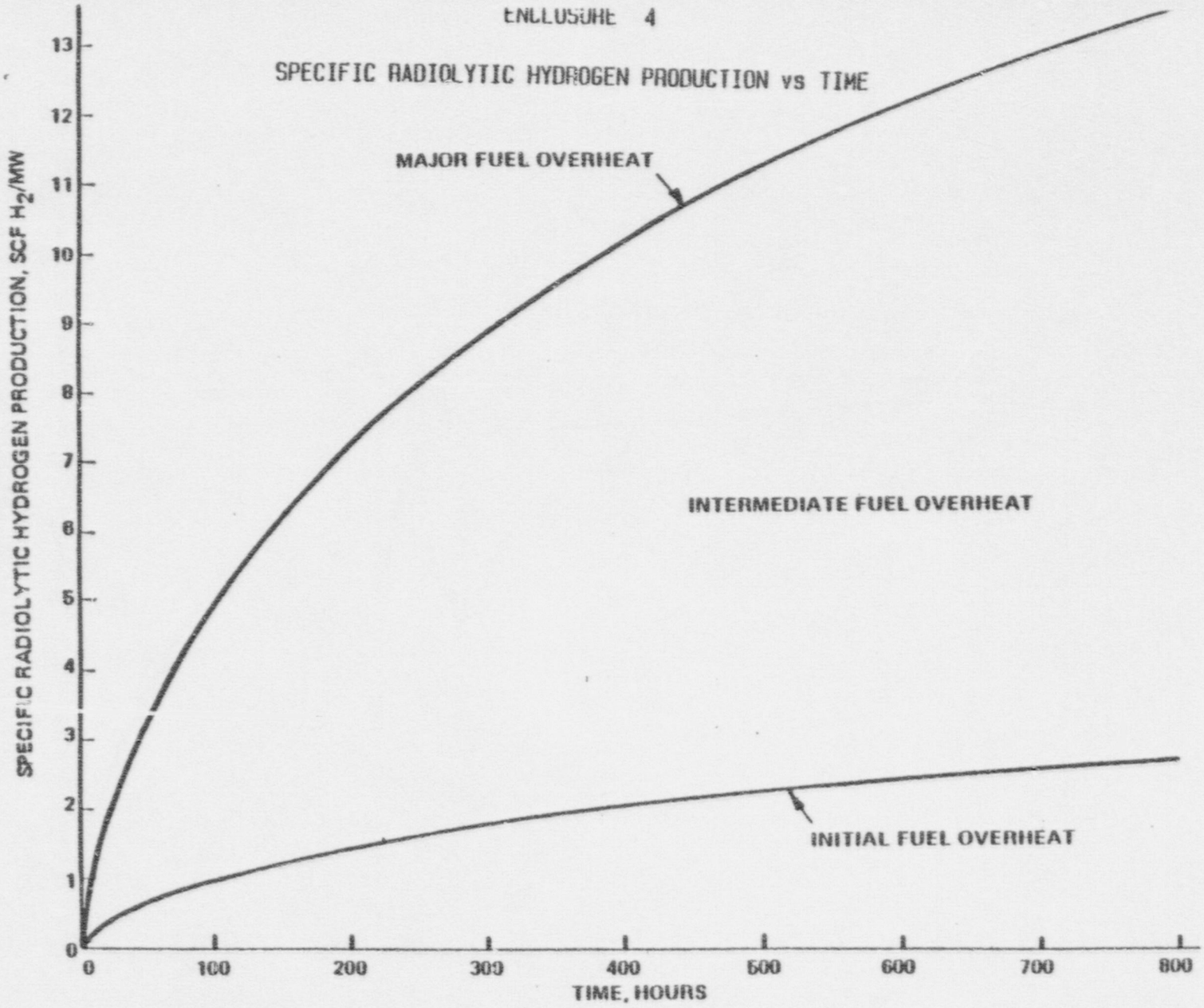
ENCLOSURE 4

EPIP-TSC-8-C-11



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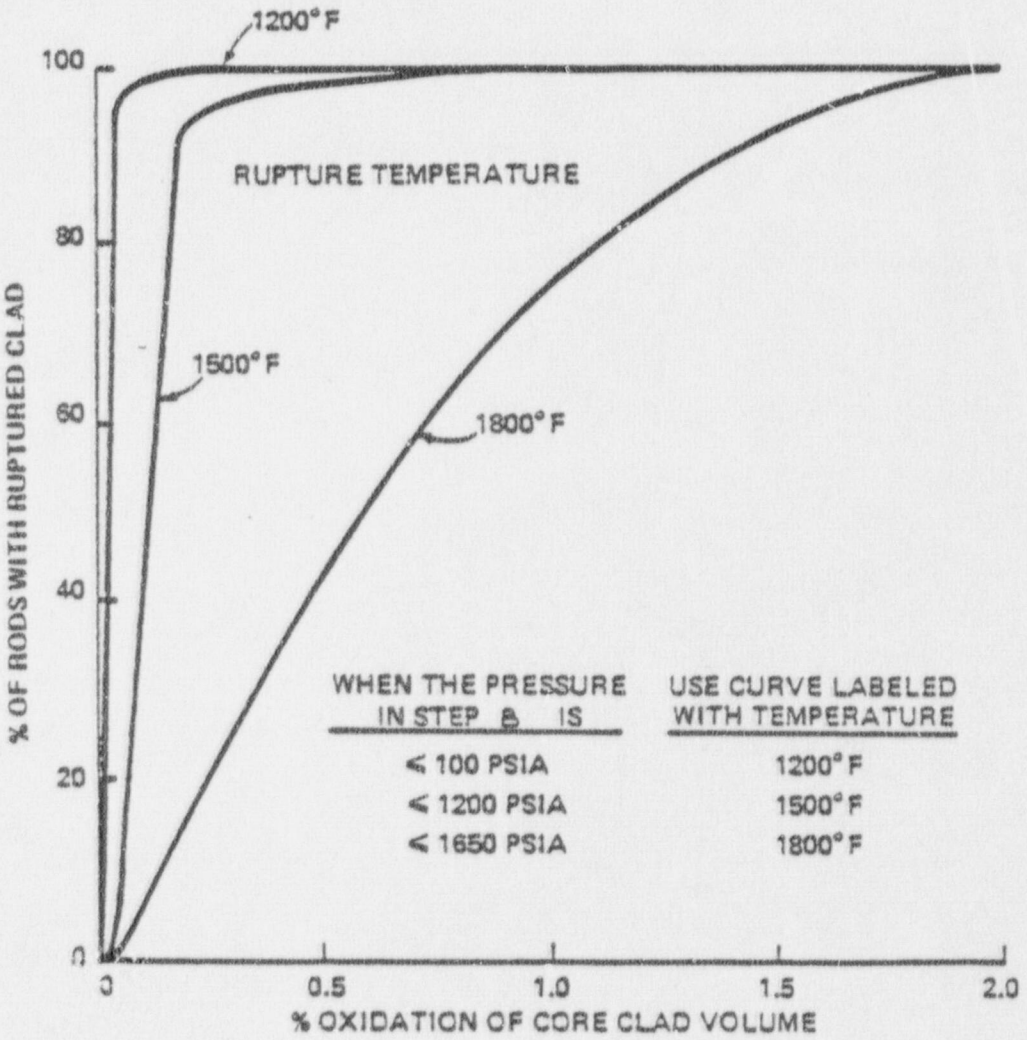
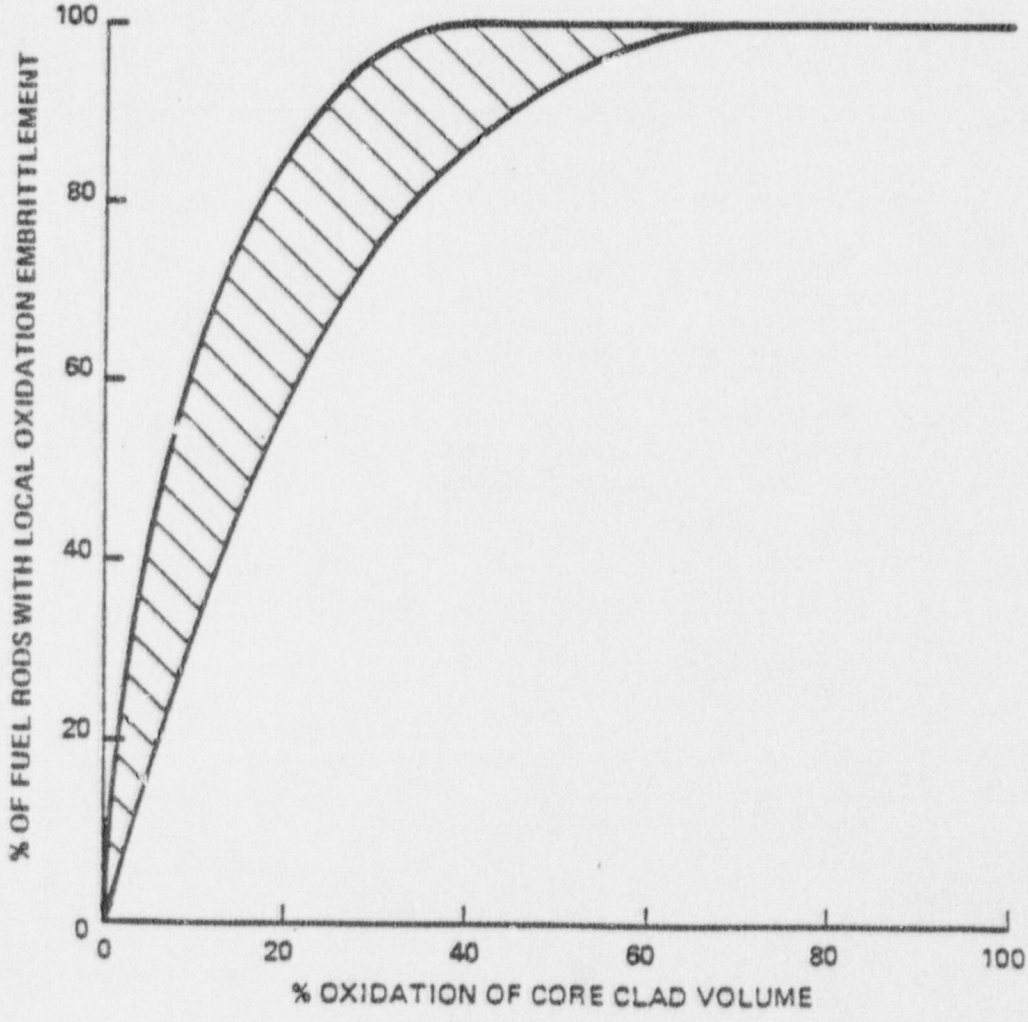
ENCLOSURE 5

PERCENT OF FUEL RODS WITH RUPTURED CLAD vs CORE CLAD OXIDATION



ENCLOSURE 6

% OF THE FUEL RODS WITH OXIDATION EMBRITTLEMENT vs
TOTAL CORE OXIDATION
FOR 1% TO 3% DECAY HEAT AND 300 PSIA TO 2500 PSIA
WHEN COOLANT LEVEL DROPS BY BOILOFF WITH
NO INLET FLOW UNTIL CORE IS RAPIDLY QUENCHED



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Fort Calhoun Station Unit No. 1
ADDENDUM TO EPIP-TSC-8-C

Estimation of hydrogen Volume in Reactor Vessel Head Void

I. PURPOSE

The purpose of this addendum is to provide a guideline for estimating the amount of hydrogen gas contained in a void at the top of the reactor vessel. This volume of hydrogen is added to the measured hydrogen in procedure Step d. of EPIP-TSC-8-C to yield the total hydrogen generated by all sources.

II. PRECAUTIONS AND LIMITATIONS

This addendum should only be used to supplement the procedure when the primary system could not be filled prior to taking the liquid sample. This addendum can then be used to estimate the hydrogen in the vessel void which is not evident from the hot leg liquid sample.

This addendum only applies when the coolant level is above the hot leg and the remainder of the primary system is filled. Verification that the steam generator tubes are filled can be provided by the existence of natural convection flow in the primary system.

The reactor vessel level monitoring system is required to provide the reactor coolant level. The volume of the void is obtained by relating the volume in the vessel above the reactor coolant level to the value of level for the Fort Calhoun reactor vessel design.

This addendum only provides the analytical means to estimate the hydrogen contained in the void. The presence of other gases including helium, nitrogen and fission product gases will add uncertainty to the result.

III. PROCEDURE

a. Determine the conditions of the void as follows:

V = Void volume (ft^3), derived from measurement of coolant level
T_L = Temperature of liquid at coolant surface (°F)
P_{SAT} = Water saturation pressure at temperature T_L
P_{TOT} = Reactor coolant system pressure (psia)

b. A first approximation is made using the following assumptions:

The partial pressure of vapor in the void is equal to the saturation pressure at the liquid temperature, T. This implies no heating of the void gas by the reactor vessel walls or head. They are normally at reactor outlet temperature and could remain above the temperature of the void causing the vapor to be superheated.

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ADDENDUM (Continued)

All the non-condensible gas in the void is assumed to be hydrogen and there is no helium or fission product gas from ruptured fuel rods and no nitrogen from the Safety Injection Tanks. A second approximation which eliminates this assumption is given in Step d.

c. Calculate the amount of hydrogen as follows:

$P_{H_2} = P_{TOT} - P_{SAT}$:

$$FT^3\ H_2\ @\ STP = (V)\left(\frac{P_{H_2}}{14.7}\right)\left(\frac{492}{T_L + 460}\right)$$

Add this amount to the total hydrogen in Step d. of EPIP-TSC-8-C.

d. A second approximation can be made using the Post Accident Sampling System and measuring the total gas and hydrogen dissolved in the hot leg liquid sample. This approximation assumes the following:

The gases have the same values of Henry's law constant which relates the partial pressure of a gas to the amount of gas dissolved in a liquid sample at equilibrium.

The dissolved gas is not in equilibrium with the gas in the void, the dissolved concentrations are still in the same relative proportion as if equilibrium did exist.

e. The partial pressure of hydrogen is calculated from:

$$P_{H_2} = (P_{TOT} - P_{SAT}) \frac{(cc/kg)_{H_2}}{(cc/kg)_{Total}}$$

Calculate the amount of hydrogen in the vessel head void by using the equation above in Step c.

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SECTION D

Estimate of Core Damage Using Core Exit Thermocouple Temperatures

I. PREREQUISITES

A. A plant accident with the potential for core damage has occurred.

B. An operational core cooling instrumentation system which includes core exit thermocouple temperatures, pressurizer pressure and core level indications. It should be able to select and permanently record the highest thermocouple temperature for convenient, later inspection.

II. PRECAUTIONS AND LIMITATIONS

The assessments of core damage obtained by using this procedure are only estimates and represent lower limit estimates of clad damage.

This procedure provides an estimate of damage up to the time the core temperature reaches about 2300°F. At that point the rods are expected to have ruptured clad but little other structural degradation. More severe core damage cannot be quantified by this procedure.

Although this procedure yields a more immediate assessment of core damage, accuracy is limited to relatively less severe accidents such as slow core uncovery by boiloff of the reactor coolant. For other more rapid uncovery scenarios this procedure could yield a very low estimate for the number of ruptured rods. In general, for core uncovery at pressures below about 1200 psia there is high confidence that at least the predicted estimate of rods are actually ruptured.

III. PROCEDURE

Estimation of Core Damage Using CET Measurements

a. From the recordings of maximum core exit thermocouple temperature and reactory coolant system pressure as a function of time, obtain and record the following data.

Maximum Core Exit Thermocouple Temperature _____ F

Time of Maximum Temperature _____

Pressurizer Pressure at Above Time _____ psia

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III. PROCEDURE (Continued)

b. Select the curve on Enclosure 2 which is labeled with a pressure approximately equal to or greater than the pressure recorded above. Enter the abscissa at the maximum temperature from above and read on the ordinate the percent of the fuel rods which have ruptured clad and record below.

Percent of ruptured rods. _____ %

c. The result in step b is probably a lower limit estimate of damage. Some judgement on the bias is available as follows.

A smooth core exit thermocouple recording and an uncovery duration of 20 minutes or longer will yield a good prediction of clad ruptures.

A large break is indicated when the pressure in step a drops below 100 psia in less than two minutes after accident initiation. This causes undetected core heatup followed by flashing during refill. Depending on the rate of refill, the thermocouple temperature may rise rapidly then quench when the core is recovered. Under these conditions, this procedure could yield a very low estimate for the percent of rods ruptured.

If the pressure in step a is above about 1650 psia, it could exceed the rod internal gas pressure, depending on rod burnup, and cause clad collapse onto the fuel pellet instead of outward clad ballooning. The clad rupture criteria are less well defined for those conditions, but at temperatures above 1800°F where the highest pressure curve applies in step b, clad failure sufficient to release fission gas is likely and this procedure may be used to obtain estimates of damage.

d. CORE DAMAGE ASSESSMENT

Use the percent of rods ruptured from step c and the clad damage characteristics of Enclosure 1 to determine the NRC category of cladding failure. This procedure yields damage estimates in categories 2, 3, or 4.

NRC category of cladding failure from Enclosure 1 _____

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Enclosure 1

Clad Damage Characteristics of NRC Categories of Fuel Damage

NRC Category of Fuel Damage	Temperature Range (°F)	Mechanism of Damage	Characteristic Measurement	Measurement Range	Percent of Damage Rods
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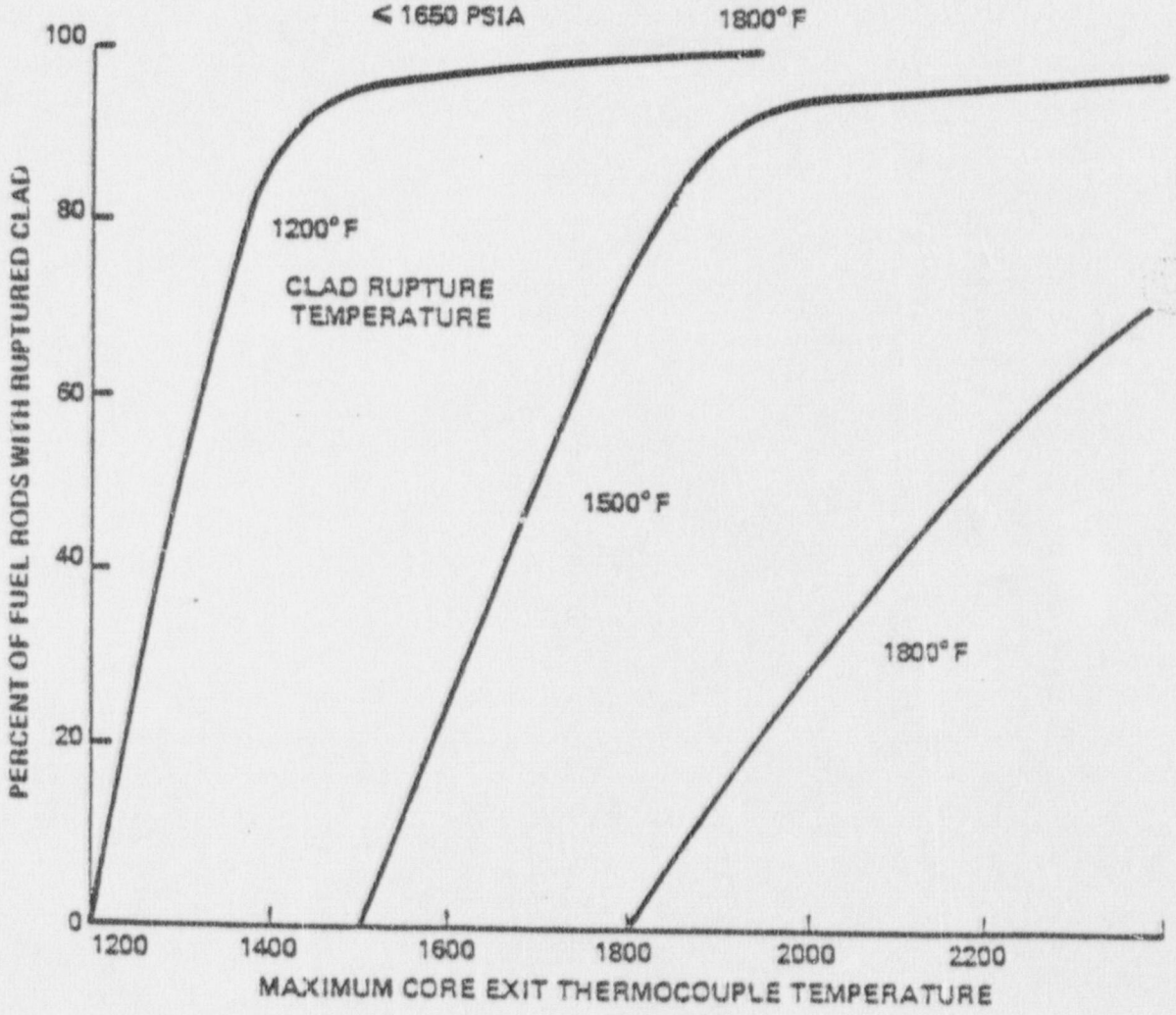
Initial Cladding Failure	1200-1800	Rupture Due to Gas Gap	Maximum Core Exit	<1550°F*	Less Than 10
Intermediate Cladding Failure	1200-1800	Overpressurization	Thermocouple Temperature	<1700°F*	10 to 50
Major Cladding Failure	1200-1800	Overpressurization	Thermocouple Temperature	~<2300°F ~<2% Oxidation	Greater Than 50
Initial Fuel Pellet Overheating	1800-3350	Loss of Structural Integrity Due to Fuel Clad Oxidation	Amount of Hydrogen Gas Produced (Equivalent to % Oxidation of Core)	Equivalent Core Oxidation <3% <18%	Less Than 10
Intermediate Fuel Pellet Overheating	1800-3350	Loss of Structural Integrity Due to Fuel Clad Oxidation	Amount of Hydrogen Gas Produced (Equivalent to % Oxidation of Core)		
Major Fuel Pellet Overheating	1800-3350	Loss of Structural Integrity Due to Fuel Clad Oxidation	Amount of Hydrogen Gas Produced (Equivalent to % Oxidation of Core)	~<65%	Greater Than 50

* Depends on Reactor Pressure and Fuel Burnup. Values Given for Pressure ≤1200 psia and Burnup ≥0.

ENCLOSURE 2

PERCENT OF FUEL RODS WITH RUPTURED CLAD vs
MAXIMUM CORE EXIT THERMOCOUPLE TEMPERATURE

WHEN THE PRESSURE IN STEP a IS	USE CURVE LABELED WITH TEMPERATURE
≤ 100 PSIA	1200° F
≤ 1200 PSIA	1500° F
≤ 1650 PSIA	1800° F



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Fort Calhoun Station Unit No. 1
EMERGENCY PLAN IMPLEMENTING PROCEDURE
EPIP-RR-79

Emergency Recovery Organization's Computer Specialist

I. PURPOSE

The purpose of this procedure is to detail the duties and responsibilities of personnel in the Emergency Recovery Organization filling the position of Computer Specialist.

II. PREREQUISITE

Both the primary and alternate individuals filling the position of Computer Specialist have been fully trained and are aware of their duties and responsibilities.

III. PRECAUTIONS

None

IV. PROCEDURE

Upon activation of the Emergency Recovery Organization, those individuals assigned to the position of Computer Specialist shall carry out the assignment detailed in Appendix 1 of this implementing procedure.

5

Fort Calhoun Station Unit No. 1
EMERGENCY PLAN IMPLEMENTING PROCEDURE
EPIP-RR-79

APPENDIX 1

COMPUTER SPECIALIST

A. Personnel filling this position

By Recovery Manager Designation

B. Reporting Location

Electric Building

C. Reports To

Administrative Logistics Manager

D. Supervises/Coordinates

Provide assistance for EAGLE VM System/Software problems.

E. Primary Responsibility

Provide Dose Assessment Team with troubleshooting and repair coordination for EAGLE VM System/Software problems.

F. Basic Duties

1. Upon notification of Emergency Recovery Organization activation, the primary and/or alternate Computer Specialist will report to their assigned location listed in Section B of this Appendix and inform the Administrative Logistics Manager of his/her presence.

2. Remains available for troubleshooting and repair of EAGLE VM System/Software problems.

3. Keeps Dose Assessment Team informed of status of repair efforts, and estimated down time.

ISSUED

MAY 20 1987