# RAPID ESTIMATE OF CORE/FUEL DAMAGE BASED ON CONTAINMENT HIGH RANGE RADIATION MONITOR

## Revision Summary

1) Human factors upgrade and reformat to conform with RAP-PR1-01.
2) Removed Figure 1.1 from Attachment 1 and made it Enclosure B.
3) Provided step-by-step procedure for completing Attachment 1.
4) Deleted normal Drywell Radiation levels from Enclosure A.
5) Deleted Enclosures 2 through 7

## Implementation Plan

[X] Revision effective immediately - ongoing work impacted

[ ] Ongoing work may proceed using previous revision

## Attachments

| | | |
|---|---|---|
| 1 | 110488 | Rapid Estimate of Core/Fuel Damage based on Actual or Estimated CHRRM Reading |

## Enclosures

| | | |
|---|---|---|
| A | 110488 | Calculated Core/Fuel Damage Based on CHRRM Reading, Rad/hr, Fermi 2 Specific Accident, 10-minute Post Shutdown |
| B | 110488 | CHRRM Reading Versus Time |

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ARMS - INFORMATION SERVICES

Date approved: 11 18 88 Release authorized by: M Roland

Change numbers incorporated: 88-3212

DSN EP-547 Rev 3 Date NOV 29 1988

DTC TPEPT File 1703.10 Recipient 935



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## 1.0 PURPOSE

To provide a rapid quantitative estimate of core/fuel damage based on the Containment High Range Radiation Monitor (CHRRM) reading prior to the availability of the drywell air Post-Accident Sampling System (PASS) sample analysis.

## 2.0 USE REFERENCES

2.1 EP-546, Calculation of Estimated Containment High Range Radiation Monitor or SGTS/AXM Monitor Readings if Instruments are Inoperable or Offscale

## 3.0 ENTRY CONDITIONS

3.1 The RERP Plan and its implementing procedures have been activated, **and**

3.2 Annunciator 3D43, DIV I/II CONTAINMENT AREA RADIATION MONITOR TROUBLE, is received in the Control Room, **and**

3.3 Drywell air PASS sample analysis is not yet available.

## 4.0 GENERAL INFORMATION

4.1 The responsibility for implementing this procedure is assigned to the Emergency Director/designee. The estimate of core/fuel damage is reported to the Emergency Director/designee for use at the discretion of the Emergency Director/designee.

4.2 This procedure provides a rapid gross method of estimating core/fuel damage based on the CHRRM reading and the quantity of radioactivity released to the containment that will become airborne during a Loss-of-Coolant Accident (LOCA).

4.3 Core/fuel damage estimates are based on calculations for three Fermi 2 specific accidents. Calculation results are shown on Enclosures A and B. The three specific accidents are:

4.3.1 100% fuel cladding gap release (10% of available noble gas, 10% of available iodine released to the containment)

4.3.2 Fermi 2 upper bound LOCA (100% noble gas, 2% iodine)

4.3.3 Regulatory Guide 1.3 LOCA (100% noble gas, 25% iodine)

## 5.0 IMMEDIATE ACTIONS

5.1 Obtain CHRRM readings from H11-P812 (H11-P602 back panel) or relay room panels H21-P914 (DIV I) and H21-P915 (DIV II).

5.2 If DIV I and DIV II CHRRM are inoperable or offscale, estimate containment radiation using EP-546.

## 6.0 PROCEDURE

6.1 Perform the following steps using Rapid Estimate of Core/Fuel Damage based on Actual or Estimated CHRRM Reading (Attachment 1)

6.1.1 Enter the date and time of reactor shutdown on Line A.

6.1.2 Enter the date and time of CHRRM Reading on Line B.

6.1.3 Calculate the number of hours after shutdown the monitor was read, and enter on Line C.

6.1.4 Enter the CHRRM Reading on Line D.

1. Select the highest actual reading from DIV I and DIV II monitors.

2. If DIV I and DIV II CHRRM are inoperable or offscale, use the estimated value from EP-546.

6.1.5 Using the time after shutdown entered on Line C and Enclosure B, enter the anticipated CHRRM Reading for the three separate analyzed accidents on Lines E, F, and G.

6.1.6 Calculate the percentage of core/fuel damage by dividing the actual (or estimated) CHRRM Reading, from Line D, by the anticipated values (Lines E, F, and G) for the three analyzed accidents.

1. Enter the values on lines H, J, and K.

6.2 Report the results to the Emergency Director.

6.2.1 Report to the % Gap Release (H), unless H > 100%.

6.2.2 If H > 100%, report % of Fermi 2 Upper Bound LOCA (J), unless J > 100%.

6.2.3 If J > 100%, report % of Regulatory Guide 1.3 LOCA (K).

6.2.4 If K is greater than 100% the results should be reported as having exceeded the Regulatory Guide 1.3 design basis for Fermi 2 by ____ % [K-100]. The additional activity is associated with release of iodines and other fission products to containment.

## 7.0 FOLLOW-UP ACTIONS

7.1 Forward completed Rapid Estimate of Core/Fuel Damage based on actual or estimated CHRRM Reading (Attachment 1) to the Supervisor, RERP, 164 NOC.

## 8.0 RECORDS

8.1 The following are required records and shall be retained or dispositioned in accordance with established procedures:

8.1.1 Rapid estimate of Core/Fuel Damage based on actual or estimated CHRRM Reading (Attachment 1).

END OF TEXT

## RAPID ESTIMATE OF CORE/FUEL DAMAGE
## BASED ON ACTUAL OR ESTIMATED CHRRM READING

1. Reactor Shutdown Date and Time _____ (A)

2. Monitor Reading Date and Time _____ (B)

3. Time After Shutdown [(B)-(A)] _____ Hours (C)

4. CHRRM Reading _____ Rad/hr (D)

   DIV I_____, DIV II_____, (Select Highest)

   Estimated_____ (From EP 546)

5. Using (C) and the CHRRM Reading Versus Time (Enclosure B)

   o Curve 1 (100% Gap Release) _____ Rad/hr (E)

   o Curve 2 (Fermi 2 Upper Bound LOCA) _____ Rad/hr (F)

   o Curve 3 (Reg Guide 1.3 LOCA) _____ Rad/hr (G)

6. (D) _____ Divided By (E)_____ x 100 = _____(H)
   % Gap Release

   (D) _____ Divided By (F)_____ x 100 = _____(J)
   % of Fermi 2
   Upper Bound LOCA

   (D) _____ Divided by (F)_____ x 100 = _____(K)
   % of Regulatory
   Guide 1.3 LOCA

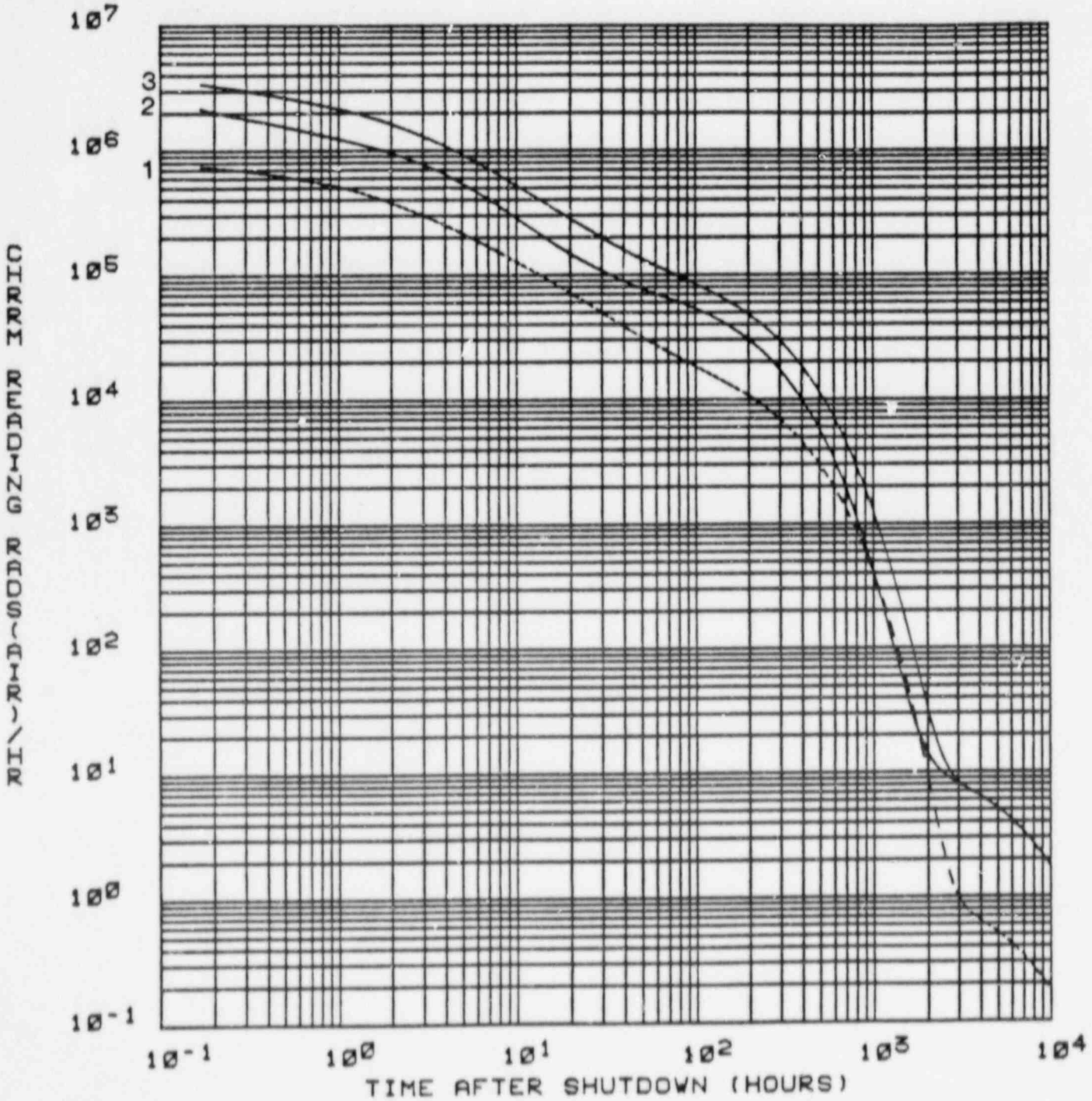
Forward original to Supervisor, RERP, 164 NOC

## CALCULATED CORE/FUEL DAMAGE BASED ON CHRRM READING, RAD/HR
## FERMI 2 SPECIFIC ACCIDENT, 10-MINUTE POST SHUTDOWN

| | Accident Description | Airborne Release, Percentage of Inventory | | 10-min Post LOCA CHRRM Reading R/hr |
|---|---|---|---|---|
| | | Nobles | Iodines | |
| 1. | Gap release, 100%* (Curve 1, Enclosure B) | 10 | 10 | $3.6 \times 10^5$ |
| 2. | Fermi 2 upper bound LOCA (Curve 2, Enclosure B) | 100 | 2 | $1.02 \times 10^6$ |
| 3. | Regulatory Guide 1.3 LOCA, sufficient core temperature to drive out all noble gases from fuel pellets (Curve 3, Enclosure B) | 100 | 25 | $1.6 \times 10^6$ |
| 4. | Release of all reactor coolant-no core damage | | | 0.01 |

*Since the curve is linear any percentage less than 100% would be a direct multiplier; e.g., 20% gap release = $7.2 \times 10^4$

## CHRRM READING VERSUS TIME




Curve 1: 100% Gap Release (10% Noble Gas/10% Iodine)
Curve 2: Fermi 2 Upper Bound LOCA (100% Noble Gas/2% Iodine)
Curve 3: Reg. Guide 1-3 LOCA (100% Noble Gas/25% Iodine)

END

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