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TITLE: OFFSITE RADIOLOGICAL MONITORING

TRANSMITTAL: LISTED BELOW ARE NEW/REVISED PROCEDURES WHICH MUST BE IMMEDIATELY INSERTED INTO OR DISCARDED FROM YOUR PROCEDURE MANUAL.

Action Required	Section or Description
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**ATTACHMENTS**

- Attachment 1, "Offsite Monitoring Team List"
- Attachment 2, "Air Sample Analysis Sheet"
- Attachment 3, "Dose Equivalent Iodine Conversion Factors"
- Attachment 4, "Dead Time Correction Curve"
- Attachment 5, "Offsite Monitoring Team Log"
- Attachment 6, "Operational Support Center/Emergency Offsite Facility Phone List"

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**USER ALERT**

**REFERENCE USE PROCEDURE**

Refer to the procedure periodically to confirm that all procedure segments of an activity will be or are being performed. Where required, sign appropriate sign-off blanks to certify that all segments are complete.

**1.0 PERSONNEL RESPONSIBILITY**

**1.1 TECHNICAL SUPPORT CENTER (TSC)/EMERGENCY OFFSITE FACILITY (EOF) HEALTH PHYSICS (HP) SUPPORT GROUP LEADER**

The TSC and/or EOF HP Support Group Leader(s), or designate(s), are responsible for ensuring that offsite radiation monitoring is performed.

**1.2 OPERATIONAL SUPPORT CENTER (OSC) HEALTH PHYSICS (HP) SUPERVISOR**

An OSC HP Supervisor(s) is responsible for tracking, organizing, briefing, and directing the Offsite Monitoring Team(s) at the request for offsite monitoring by the TSC HP Support Group.

**1.3 EMERGENCY OPERATIONS FACILITY (EOF) HEALTH PHYSICS SUPPORT TEAM**

When the EOF is activated, responsibility for tracking, and direction of the Offsite Monitoring Team(s) is transferred to the EOF HP Support Team.

**1.4 SITE EMERGENCY DIRECTOR (SED)/EOF DIRECTOR**

Based on who has command and control, either the SED or EOF Director has the responsibility to authorize the use of Potassium Iodide (KI) as a thyroid blocking agent.

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**1.5 OFFSITE MONITORING TEAM**

The Offsite Monitoring Team Technicians are responsible for performing surveys, monitoring personnel and equipment, collecting environmental samples and TLDs, analyzing air samples, and reporting results to the OSC, or the EOF when activated.

**2.0 PURPOSE**

To provide guidelines for offsite radiological monitoring during an emergency.

**3.0 REFERENCES**

**3.1 SOURCE DOCUMENTS**

- 3.1.1 Site Emergency Plan Section 7, "Emergency Facilities and Equipment"
- 3.1.2 EPA-400 Manual, "Protective Action Guidelines and Protective Actions for Nuclear Incidents 1990"
- 3.1.3 EA-JLF-93-01
- 3.1.4 EA-JLF-94-02
- 3.1.5 EA-JLF-97-004
- 3.1.6 10CFR20 Subpart C

**3.2 REFERENCE DOCUMENTS**

- 3.2.1 Health Physics Procedure HP 2.18, "Personnel Contamination"
- 3.2.2 Emergency Implementing Procedure EI-10, "Accident Environmental Assessment"
- 3.2.3 Emergency Implementing Procedure EI-13, "Evacuation/Reassembly"

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- 3.2.4 Emergency Implementing Procedure EI-16.1, "Maintenance of Emergency Equipment"
- 3.2.5 Emergency Implementing Procedure EI-2.1, "Site Emergency Director"
- 3.2.6 Palisades Administrative Procedure 10.46, "Plant Records"

**4.0 INITIAL CONDITIONS AND/OR REQUIREMENTS**

- 4.1 Offsite monitoring shall be initiated at a Site Area Emergency or above, or when the results of onsite monitoring verify that a release of radioactive material has occurred, area and/or process monitors indicate a release has occurred, conditions current and impending warrant monitoring, or upon request by the SED or TSC HP Support Group.
- 4.2 All members of the Offsite Radiation Monitoring Teams shall perform their actions in such a manner that they keep their exposure As Low As Reasonably Achievable (ALARA), and do not exceed the following yearly dose control levels (without SED approval):

<u>AREA EXPOSED</u>	<u>CONTROL LEVEL (rem)</u>
·Total Effective Dose Equivalent (TEDE)	2.0 (Consumers Dose) 4.0 (All Dose)
·Shallow Dose Equivalent (SDE) for the Whole Body and Extremities	40 (All Dose)
·Lens of eye (LDE)	12 (All Dose)

- 4.3 Emergency Implementing Procedure EI-2.1, "Site Emergency Director," gives requirements for authorizing exposure in excess of the Consumers Energy Administrative Dose Control Levels and Federal Regulatory dose limits.

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- 4.4 Turnover of the Offsite Monitoring Teams from the OSC to the EOF HP Support Group should be completed, via telephone, before EOF radio contact with the teams is established. The following information should be included in this turnover:
- a. Number of teams
  - b. Team members
  - c. Team(s) location
  - d. Surveys/Samples performed, results
  - e. Team Members Available Dose

5.0 **PROCEDURE**

**USER ALERT**  
REFERENCE USE PROCEDURE

Refer to the procedure periodically to confirm that all procedure segments of an activity will be or are being performed. Where required, sign appropriate sign-off blanks to certify that all segments are complete.

5.1 **OSC HEALTH PHYSICS SUPERVISOR**

5.1.1 **Equipment**

Ensure each Offsite Monitoring Team is equipped with instrumentation and personal protective equipment (PPE) needed for potential and actual radiological hazards encountered in the field. Guidelines for when to use PPE should be understood.

5.1.2 **Briefing**

Designate and brief the Offsite Monitoring teams prior to dispatch as outlined in Attachment 1, Section 1 of this procedure.

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**5.2 OFFSITE MONITORING TEAM**

**5.2.1 Deployment Preparation**

Refer to Attachment 1, Section 1b of this procedure to ensure all necessary equipment is available. Obtain a briefing from an OSC HP Supervisor prior to dispatch.

**5.2.2 Emergency Vehicle and Equipment**

Perform emergency vehicle and emergency equipment checks as soon as possible upon dispatch, in an area of low background, in accordance with Attachment 1, Section 2, of this procedure.

**5.2.3 Meteorological Data**

Verify given meteorological data in the field by observation of the flag, cooling tower plume, movement of trees, or other suitable means. If the observations conflict with the given data, contact the OSC to verify meteorological data and, if needed, redetermine affected areas to be monitored.

**5.2.4 Offsite Monitoring Team Log**

Each monitoring team shall keep a log of pertinent data. Record on Attachment 5 of this procedure.

- a. Significant Plant conditions, including Emergency Classification
- b. Meteorological data, observations
- c. Communications, requests
- d. Surveys performed, locations, routes
- e. Dose tracking for team members
- f. Problems, deficiencies noted
- g. Personnel monitored at Reassembly Control Point
- h. Technician initials

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**5.2.5 Evacuation Monitoring**

Refer to Attachment 1, Section 3 of this procedure for Evacuation Monitoring.

**5.2.6 Guidelines for Plume Tracking, Surveying, Sampling**

Refer to Attachment 1, Sections 4 and 5 of this procedure. Record data on Attachments 2 and 5 of this procedure.

**5.2.7 Field Collection and Determination of Airborne Concentration/Contamination Surveys**

Refer to Attachment 1, Section 5 of this procedure for Airborne sampling and Contamination Surveys.

**5.2.8 Worker Protection Against Iodine**

- e |
- a. Thyroid blocking agents shall be considered if a significant iodine release has occurred or is imminent.
  - b. Authorization to use thyroid blocking agents shall be given by the SED or EOF Director. Once authorization has been given, each worker shall personally decide whether to take the blocking agent.
  - c. The thyroid blocking agent is in the form of Potassium Iodide (KI) tablets in the amount of 130 mg per tablet. These tablets should be made available on a basis of one tablet per day per worker for a maximum of ten days. KI tablets administered three to four hours post exposure can reduce the thyroid dose by 50 percent. These tablets (KI) should be administered within four hours of exposure for maximum effectiveness.

**5.2.9 Reporting**

- a. Report results of surveys and sample analysis as soon as possible to the OSC or EOF by mobile radio. If this means of communication is not available/functional, use the nearest telephone available.

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**6.0 ATTACHMENTS AND RECORDS**

**6.1 ATTACHMENTS**

6.1.1 Attachment 1, "Offsite Monitoring Team List"

6.1.2 Attachment 2, "Air Sample Analysis Sheet"

6.1.3 Attachment 3, "Dose Equivalent Iodine Conversion Factors"

6.1.4 Attachment 4, "Dead Time Correction Curve"

6.1.5 Attachment 5, "Offsite Monitoring Team Log"

6.1.6 Attachment 6, "Operational Support Center/Emergency Offsite Facility Phone List"

**6.2 RECORDS**

Records generated by this procedure shall be filed in accordance with Palisades Administrative Procedure 10.46, "Plant Records."

**7.0 SPECIAL REVIEWS**

7.1 All applicable forms/attachment shall be completed, reported, and submitted to the OSC Health Physics Supervisor or EOF HP Group Leader.

7.2 Attachment 3, "Dose Equivalent Iodine Conversion Factors," and Attachment 4, "Dead Time Correction Curve," are intended to be used to further evaluate air sample results by TSC and/or EOF Health Physicists. See Section 3.1 references for guidance on the use of these attachments.

**OFFSITE MONITORING TEAM LIST****SECTION 1: DEPLOYMENT**

- a. Review the Offsite Monitoring Deployment Kit (3-ring binder in OSC Emergency Kit). Contents include: Emergency Implementing Procedures EI-9, "Offsite Radiological Monitoring;" EI-10, "Accident Environmental Assessment;" EI 16.1, "Maintenance of Emergency Equipment;" EI-13, "Evacuation/Reassembly;" and copies of various forms for use in the field.
- b. Determine and obtain necessary equipment in accordance with assignment and the following equipment list:
  1. Primary and Secondary dosimetry.
  2. Interim protective clothing and respiratory equipment, based on Plant conditions and job assignment in desired area(s).
  3. Writing material.
  4. Emergency vehicle keys. (Stored in HP Key Locker and OSC Emergency Kit.)
  5. Radiation Detection Instrumentation (Instrumentation for emergency vans is stored in deployment kits located in the Phone/MIS Computer Room). Perform Operational Checks of instruments prior to leaving the OSC.
- c. Obtain briefing from the OSC HP Supervisor in the following areas, if applicable:
  1. Meteorological data:
    - Wind direction
    - Wind Speed
    - Stability Class
  2. Plant conditions:
    - Affected Components/Areas
    - Release Time
    - Release Path
    - Emergency Class

**OFFSITE MONITORING TEAM LIST**

3. Projected dose rates and airborne activity.
4. Locations/routes to be surveyed.  
  
(ie, nearest population center, three downwind sectors for plume, outer boundaries, centerline, leading edge, evacuation reassembly control point/monitoring station)
5. Surveys/samples desired.  
  
(ie, dose rates three inches and three feet from ground, open/closed  $\beta$  windows; surface contamination; airborne activity)

**NOTE:** Initiate Emergency Implementing Procedure EI-10, "Accident Environmental Assessment," and obtain replacement TLDs.

6. Environmental samples and TLDs desired.
7. Optimum route to designated area, such that exposure is kept ALARA.
8. Protective action(s) guidelines/limits.
9. Communications, preferred and alternate methods, frequency, and emergency phone numbers.  
(Reference Attachment 6 of this procedure for preferred phone numbers.)

**SECTION 2: VEHICLE AND EQUIPMENT CHECKS**

- a. Start vehicle.
- b. Establish radio contact with the OSC to indicate operability.
- c. Perform vehicle checks (ie, fuel tank, lights, horn, wipers, seat belts).
- d. Emergency Implementing Procedure EI-16.1, "Maintenance of Emergency Equipment," Attachment 1, contains the inventory list for Kit 3. While a kit inventory is not necessary, this should be reviewed for knowledge of kit contents.

**OFFSITE MONITORING TEAM LIST**

- e. Perform operational check of the inverter.
- f. Verify given met data by observation.
- g. Data logged, Attachment 5.

**SECTION 3: EVACUATION MONITORING**

- a. Proceed to the assigned Reassembly Control Point/Monitoring Station (established at: Access Road; Parking Lot of Van Buren State Park; or, Parking Lot of Covert Township Park) and ascertain habitability prior to establishing the monitoring station. If personnel cannot be deconned at the selected location, they should be sent to the Allegan Service Center. Reference Emergency Implementing Procedure EI-13, "Evacuation/Reassembly," for guidance. Contact the OSC so that arrangements can be made for use of the Allegan Service Center.
- b. EI-13, "Evacuation/Reassembly," implemented: Personnel surveyed, dosimeters read, dosimetry collected, etc.
- c. Personnel decontaminated in accordance with Health Physics Procedure HP 2.18, "Personnel Contamination," (copy of HP 2.18 and forms are in decon kit).
- d. Data logged, Attachment 5.
- e. Data reported to OSC or EOF.

**OFFSITE MONITORING TEAM LIST****SECTION 4: PLUME TRACKING**

**NOTE:** The following guidance is an aid only in initially locating and following the plume.

- a. Using given meteorological data and the 10-mile Emergency Planning Zone (EPZ) map, a fair idea can be quickly obtained of the possible location of the plume. Using the wind speed and time from release data, the leading edge of the plume can be projected and followed.

**NOTE:** Plume location and dose rate information shall be reported as soon as possible. This information is vital for Members of the Public Dose Assessment and Protective Action Recommendations.

- b. Traverse the plume to determine outer boundaries, centerline, and respective dose rates.
  1. The survey instrument should be held at an open window of the vehicle, the meter monitored continuously.
  2. When an increase in dose rate is noted, record the odometer reading, relative map location, dose rate, and time. (When an air sample is taken, all data should be recorded on Attachment 2.)
  3. Continuing slowly, record dose rate increases and odometer readings to the centerline of the plume, where the dose rate will be at a maximum, periodically checking open vs closed beta window dose rates for the presence of the plume at ground level.
  4. At the centerline, unless high dose rates prohibit, obtain an air sample (iodine and particulate) and survey for dose rates at three inches and three feet from the ground. Check open and closed beta window dose rates, and take smear(s) for loose surface contamination. If centerline open/closed window readings indicate there is no ground level plume present, the air sample and surface contamination survey may be omitted. Record all data on Attachment 2.
  5. Continue to the opposite plume boundary, noting dose rates and odometer readings, and finally, the relative map location of the outer boundary.

**OFFSITE MONITORING TEAM LIST**

- c. When traversing the plume, keep vehicle windows and vents closed, except for that necessary to take dose rate readings en route. Avoid dusty, gravel, or dirt roads when traversing the plume. Periodically perform personnel and vehicle interior surveys for contamination in a low background area. If minor contamination is found, decontaminate, if possible. Record data on Attachment 5. Gross vehicle and personnel decontamination should not be attempted until the team is recalled. Report gross contamination results to the OSC or EOF for guidance and ultimate location for Vehicle and/or Personnel decontamination.
- d. When traversing or sampling in a ground level plume, evaluate necessary protective clothing.
- e. Check self-reading or electronic dosimeters frequently (ie, entry into plume, exit from plume), record times and dose received, and report to the OSC or EOF. Dose received per plume entry in addition to previous dose received in the current year should be closely tracked to ensure authorized dose control levels are not exceeded.

**SECTION 5: AIRBORNE SAMPLING AND CONTAMINATION SURVEYS**

- a. Field collection under emergency conditions should be a 5 ft<sup>3</sup> sample, normally obtained by taking a 2 cfm sample for 2.5 minutes. A shorter sample would be appropriate in the presence of high dose rates.
- b. Complete Sections 1 and 2 of Attachment 2 to document dose rates, contamination levels and air sample data to determine corrected volume. Section 1 is to be completed for every air sample taken.
- c. Carefully remove filter and cartridge. Mark the direction of air flow on the silver zeolite cartridge with an arrow. Handle filters with care to prevent cross contamination or loss of collected material, using tweezers when possible.

**NOTE:** If time constraints do not permit completion of calculations, transmit count rate data to the OSC or EOF by mobile radio.

- d. Perform initial gross analysis using a PRM-6 count rate meter with an HP-210 probe, or equivalent.

**OFFSITE MONITORING TEAM LIST**

- e. Field determination of particulate Airborne Activity:
1. Determine the background count rate with the HP-210 probe, or equivalent, in place on the sample holder.
  2. Place the particulate filter in the sample holder, upstream side up. With the HP-210 probe, or equivalent, in place on the holder, the filter should be approximately  $\frac{1}{2}$  inch from the detector.
  3. Determine the gross particulate count rate.
  4. Complete Section 3 of Attachment 2.
  5. Place the sample in a bag or envelope, label with date, time sample started and ended, average flowrate, location sample was taken, and initial.
- f. Field determination of gross Iodine Activity.
1. Determine the background count rate with the HP-210 probe, or equivalent, in the counting area.
- NOTE:** Backside readings at  $\frac{1}{2}$ " are preferred, but if count rate is negligible use the frontside at  $\frac{1}{2}$ ".
2. Determine the gross iodine count rate by placing the HP-210 probe, or equivalent,  $\frac{1}{2}$ " from the backside of cartridge.
  3. Complete Section 4 of Attachment 2.
  4. Place the cartridge in a bag, label same as for the particulate filter.
- g. Save all samples for further/future analysis, storing high level samples in a shielded area.
- h. Reevaluate protective measures necessary (protective clothing) based on determined airborne activity levels.

**AIR SAMPLE ANALYSIS SHEET**

<p><b>1. RADIOLOGICAL DATA (Taken at Each Air Sample Location)</b></p> <p>a. <u>3 foot</u>: _____ mR/hr(OW) - _____ mR/hr(CW) X _____ <sup>1</sup>BCF = _____ mrad/hr</p> <p>b. <u>3 inch</u>: _____ mR/hr(OW) - _____ mR/hr(CW) X _____ <sup>1</sup>BCF = _____ mrad/hr</p> <p>c. Ground Smear: _____ cpm/100cm<sup>2</sup>(Gross) - _____ cpm (BKG) = _____ cpm (Net)</p> <p>d. Location: _____</p> <p><sup>1</sup>BCF = Beta Correction Factor                      Date: _____ Time: _____</p>	
<p><b>2. AIR SAMPLE DATA</b></p> <p>Consumers Energy Sampler No: _____</p> <p>Date: _____ Start Time: _____ Stop Time: _____</p> <p>Sample Duration _____ (min) X Flowrate _____ (cfm) = Total Volume _____ (ft<sup>3</sup>)</p> <p>Corrected Volume (Particulate and Iodine):</p> <p>(Total Volume ft<sup>3</sup> _____ ) (0.90) (2.83E4 cc/ft<sup>3</sup>) = _____ cc</p>	
<p><b>3. PARTICULATE AIR SAMPLE ANALYSIS</b></p> <p>Instrument Model/Consumers Energy No <u>PRM-6/</u> _____ Efficiency _____</p> <p>Gross _____ cpm - Background _____ cpm = _____ ccpm</p> <p>Calculation:</p> <p><math>\mu\text{Ci/cc} = \frac{\text{ccpm}}{\text{Corrected Volume (cc) (Eff) (2.22E6 dpm/\mu\text{Ci})}} = \text{_____ } \mu\text{Ci/cc}</math></p>	
<p><b>4. IODINE SAMPLE ANALYSIS</b></p> <p>Backside (Preferred) _____ Frontside _____ (Check One)</p> <p>Instrument Model/Consumers Energy No <u>PRM-6/</u> _____</p> <p>Gross _____ cpm - Background _____ cpm = _____ ccpm</p> <p>Calculation:</p> <p><math>\mu\text{Ci/cc} = \frac{\text{ccpm}}{\text{Corrected Volume (cc) } (^2\text{CF) (ccpm}/\mu\text{Ci})} = \text{_____ } \mu\text{Ci/cc}</math></p>	
<p>Completed By: _____ Reviewed By: _____</p>	

<sup>2</sup>Conversion Factor (CF) is 1.48E5 ccpm/ $\mu\text{Ci}$  for backside count rates or 3.77E6 ccpm/ $\mu\text{Ci}$  for frontside count rates. These factors are acceptable for reactor critical and up to 8 hr post reactor shutdown. After 8 hr post reactor shutdown, use Conversion Factors in Attachment 3, Table 1 or Table 2.

**DOSE EQUIVALENT IODINE CONVERSION FACTORS**

**TABLE 1  
 BACKSIDE (PREFERRED METHOD)**

<u>TIME SINCE RX SHUTDOWN (HRS)</u>	<u>ccpm/<math>\mu</math>Ci</u>	<u>TIME SINCE RX SHUTDOWN (HRS)</u>	<u>ccpm/<math>\mu</math>Ci</u>	<u>TIME SINCE RX SHUTDOWN (HRS)</u>	<u>ccpm/<math>\mu</math>Ci</u>
0.25	2.73E+5	7.00	1.23E+5	28.00	5.98E+4
0.50	2.40E+5	8.00	1.17E+5	30.00	5.63E+4
0.75	2.23E+5	9.00	1.12E+5	32.00	5.30E+4
1.00	2.10E+5	10.00	1.07E+5	34.00	4.99E+4
1.25	2.00E+5	12.00	9.93E+4	36.00	4.65E+4
1.50	1.92E+5	14.00	9.26E+4	38.00	4.36E+4
1.75	1.85E+5	16.00	8.69E+4	40.00	4.06E+4
2.00	1.80E+5	18.00	8.11E+4	42.00	3.80E+4
3.00	1.61E+5	20.00	7.66E+4	44.00	3.52E+4
4.00	1.48E+5	22.00	7.19E+4	46.00	3.28E+4
5.00	1.38E+5	24.00	6.75E+4	48.00	3.02E+4
6.00	1.30E+5	26.00	6.35E+4	50.00	2.79E+4

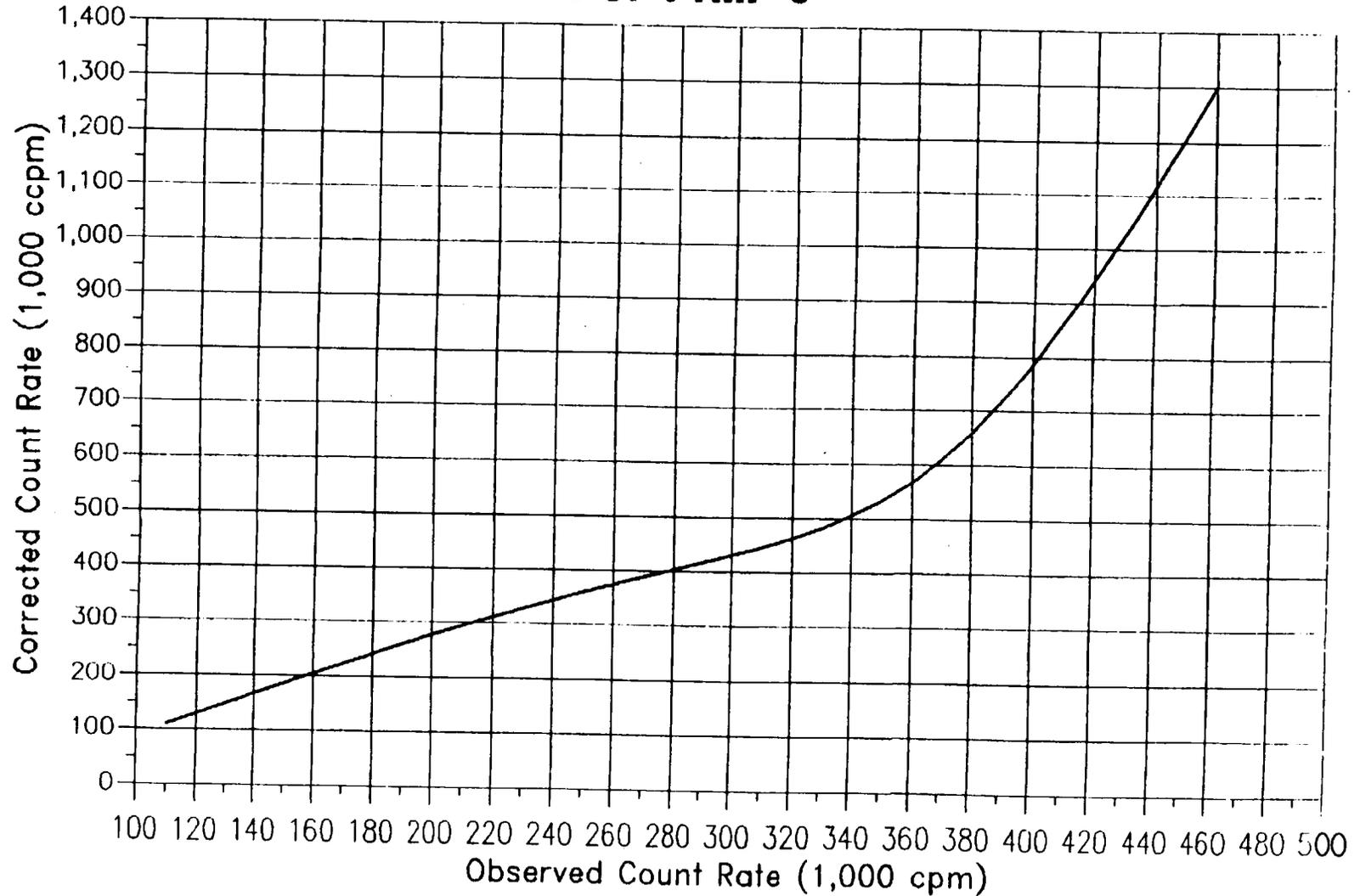
DOSE EQUIVALENT IODINE CONVERSION FACTORS

TABLE 2  
 FRONTSIDE (ALTERNATE METHOD)

TIME SINCE RX SHUTDOWN ccpm/ $\mu$ Ci (HRS)		TIME SINCE RX SHUTDOWN ccpm/ $\mu$ Ci (HRS)		TIME SINCE RX SHUTDOWN ccpm/ $\mu$ Ci (HRS)	
0.25	4.58E+6	7.00	3.18E+6	28.00	1.20E+6
0.50	4.51E+6	8.00	3.01E+6	30.00	1.16E+6
0.75	4.47E+6	9.00	2.84E+6	32.00	1.13E+6
1.00	4.43E+6	10.00	2.69E+6	34.00	1.09E+6
1.25	4.36E+6	12.00	2.40E+6	36.00	1.05E+6
1.50	4.32E+6	14.00	2.15E+6	38.00	1.01E+6
1.75	4.25E+6	16.00	1.92E+6	40.00	9.74E+5
2.00	4.22E+6	18.00	1.71E+6	42.00	9.43E+5
3.00	3.99E+6	20.00	1.53E+6	44.00	9.05E+5
4.00	3.77E+6	22.00	1.36E+6	46.00	8.76E+5
5.00	3.56E+6	24.00	1.28E+6	48.00	8.41E+5
6.00	3.37E+6	26.00	1.24E+6	50.00	8.15E+5

DEAD TIME CORRECTION CURVE

# Dead Time Correction Curve For PRM-6



OFFSITE MONITORING TEAM LOG

Date: \_\_\_\_\_ Technicians: \_\_\_\_\_

TIME	DATA

**OPERATIONAL SUPPORT CENTER /EMERGENCY OFFSITE FACILITY PHONE LIST**

OSC Director

764-2109 (OSC Director) \*  
764-2110 (TIF)  
764-2243 (OSC Communicator)

Health Physics

764-2409 (OSC) \*  
764-2410 (OSC) \*  
637-7397 (EOF) \*  
637-6695 (EOF) \*  
764-2385 (EOF, Plant Phone)  
764-2384 (EOF, Plant Phone)

Fax Line

764-2730 (OSC)  
458-7815 (EOF)  
458-8078 (EOF)

Chemistry

764-2596 (OSC)

General Use

764-2346 (OSC)

Locker Room

764-2600  
764-2606

Power Failure Only

764-8994 (OSC) \*

\*Preferred Phones for communications from Offsite Monitoring Teams