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TITLE: ONSITE RADIOLOGICAL MONITORING

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A045

PALISADES NUCLEAR PLANT
EMERGENCY IMPLEMENTING PROCEDURE

TITLE: ONSITE RADIOLOGICAL MONITORING

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Procedure Sponsor Date

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Technical Reviewer Date

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User Reviewer Date

TITLE: ONSITE RADIOLOGICAL MONITORING

Table of Contents

1.0	PERSONNEL RESPONSIBILITY	1
1.1	TECHNICAL SUPPORT CENTER (TSC) HEALTH PHYSICS (HP) GROUP LEADER	1
1.2	OPERATIONAL SUPPORT CENTER (OSC) HEALTH PHYSICS (HP) SUPERVISOR(S).....	1
1.3	SITE EMERGENCY DIRECTOR (SED)/EOF DIRECTOR.....	1
1.4	ONSITE MONITORING TEAMS	1
2.0	PURPOSE.....	1
3.0	REFERENCES.....	2
3.1	SOURCE DOCUMENTS	2
3.2	REFERENCE DOCUMENTS	2
4.0	INITIAL CONDITIONS AND/OR REQUIREMENTS	3
5.0	PROCEDURE	4
5.1	OSC HEALTH PHYSICS SUPERVISOR(S).....	4
5.1.1	Equipment	4
5.1.2	Briefing	4
5.2	ONSITE MONITORING TEAMS	4
5.2.1	Deployment Preparation	4
5.2.2	Meteorological Data.....	4
5.2.3	Onsite Monitoring Team Log	5
5.2.4	OSC Activation.....	5
5.2.5	Assembly Area Monitoring.....	5
5.2.6	Plume Tracking - Outside - Onsite	5
5.2.7	Evacuation Monitoring	6
5.2.8	Support to Other Teams.....	6
5.2.9	Field Collection and Determination of Airborne Concentration/Contamination Surveys.....	6
5.2.10	Reporting.....	6
5.3	WORKER PROTECTION AGAINST IODINE	6

TITLE: ONSITE RADIOLOGICAL MONITORING

Table of Contents

6.0 ATTACHMENTS AND RECORDS 7
6.1 ATTACHMENTS 7
6.2 RECORDS 7
7.0 SPECIAL REVIEWS 7

ATTACHMENTS

- Attachment 1, "Onsite Monitoring Team List"
- Attachment 2, "Air Sample Analysis Sheet"
- Attachment 3, "Dose Equivalent Iodine Conversion Factors"
- Attachment 4, "Dead Time Correction Curve"
- Attachment 5, "Onsite Monitoring Team Log"
- Attachment 6, "Air Sample Log"
- Attachment 7, "Operational Support Center Phone List"

TITLE: ONSITE RADIOLOGICAL MONITORING

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) HEALTH PHYSICS (HP) GROUP LEADER

The TSC HP Support Group Leader or designate is responsible for ensuring that onsite radiation monitoring is performed.

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

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

1.3 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.

1.4 ONSITE MONITORING TEAMS

The Onsite Monitoring Team technicians are responsible for performing surveys, monitoring personnel and equipment, analyzing air samples, and reporting results to the OSC.

2.0 PURPOSE

To provide guidelines for onsite radiological monitoring during an emergency.

TITLE: ONSITE RADIOLOGICAL MONITORING

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 Emergency Implementing Procedure EI-4.2, "Operational Support Center Activation"
- 3.2.2 Emergency Implementing Procedure EI-13, "Evacuation/Reassembly"
- 3.2.3 Emergency Implementing Procedure EI-16.1, "Maintenance of Emergency Equipment"
- 3.2.4 Emergency Implementing Procedure EI-9, "Offsite Radiological Monitoring"
- 3.2.5 Emergency Implementing Procedure EI-2.1, "Site Emergency Director"
- 3.2.6 Palisades Administrative Procedure 10.46, "Plant Records"
- 3.2.7 Health Physics Procedure HP 2.18, "Personnel Contamination Monitoring and Decontamination"
- 3.2.8 Health Physics Procedure HP 2.19, "Airborne Radioactivity Sampling"
- 3.2.9 Health Physics Procedure HP 2.14, "Radiological Surveys"

TITLE: ONSITE RADIOLOGICAL MONITORING

4.0 INITIAL CONDITIONS AND/OR REQUIREMENTS

- 4.1** Onsite monitoring shall be promptly initiated per SEP Section 6, "Emergency Measures," upon completion of OSC activation and accountability or upon request by the SED or TSC HP Support Group.
- 4.2** All members of the Onsite 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 the 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.

TITLE: ONSITE RADIOLOGICAL MONITORING

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(S)

5.1.1 Equipment

Ensure each Onsite 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 Onsite Monitoring Teams prior to dispatch as outlined in Attachment 1, Section 1 of this procedure.

5.2 ONSITE MONITORING TEAMS

5.2.1 Deployment Preparation

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

5.2.2 Meteorological Data

When performing surveys outside, verify given meteorological data 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.

TITLE: ONSITE RADIOLOGICAL MONITORING

5.2.3 Onsite Monitoring Team Log

Each monitoring team shall keep a log of pertinent data. This log may be kept in the field, or may be completed when the team returns to the OSC. Record log entries on Attachment 5 of this procedure.

- a. Significant changes in Plant conditions while deployed, and times.
- b. Meteorological data changes, if outside, and observations.
- c. Communications, requests from the OSC.
- d. Surveys performed, locations, routes.
- e. Specific job coverage details.
- f. Problems, deficiencies noted.
- g. Dose tracking for team members.
- h. Personnel monitored at Onsite Control Point(s).
- i. Technician initials.

5.2.4 OSC Activation

Refer to Emergency Implementing Procedure EI-4.2, "Operational Support Center Activation."

- a. Establish a Radiologically Controlled Area for sample analysis, using lead shielding, if necessary, to obtain a ≤ 300 cpm background for analysis, and for storage of "hot" samples. Maintain a log for air samples using Attachment 6 of this procedure.

5.2.5 Assembly Area Monitoring

Refer to the list on Attachment 1, Section 2, of this procedure for Assembly Area Monitoring.

5.2.6 Plume Tracking - Outside - Onsite

Refer to Attachment 1, Section 3, of this procedure. Record data on Attachments 2 and 5 of this procedure.

TITLE: ONSITE RADIOLOGICAL MONITORING

5.2.7 Evacuation Monitoring

Refer to Attachment 1, Section 4, of this procedure for Evacuation Monitoring.

5.2.8 Support to Other Teams

Refer to Attachment 1, Section 5, of this procedure. Onsite monitoring teams perform radiation monitoring, contamination control, and dose tracking in support of other teams.

5.2.9 Field Collection and Determination of Airborne Concentration/Contamination Surveys

Refer to Attachment 1, Section 6 of this procedure for Airborne Sampling and Contamination Surveys.

5.2.10 Reporting

- a. Results of surveys and sample analysis shall be reported as soon as possible to an OSC HP Supervisor. In the field, use a hand-held battery powered radio. If this means of communication is not available/functional, use the nearest telephone available.
- b. Upon the team's return to the OSC, ensure that all applicable OSC Status Boards (eg, OSC-4, "Monitoring Team Data," OSC-6, "Onsite Monitoring Board (Habitability Areas)," etc) are updated.

5.3 WORKER PROTECTION AGAINST IODINE

- a. Thyroid blocking agents shall be considered for protection of the thyroid if the worker would exceed 1000 DAC-hrs from isotopes of Iodine.
- 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.

TITLE: ONSITE RADIOLOGICAL MONITORING

6.0 ATTACHMENTS AND RECORDS

6.1 ATTACHMENTS

6.1.1 Attachment 1, "Onsite 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, "Onsite Monitoring Team Log"

6.1.6 Attachment 6, "Air Sample Log"

6.1.7 Attachment 7, "Operational Support Center 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 The scope of this procedure does not include activities that require a 50.59 review per Palisades Administrative Procedure 10.41, "Procedure Initiation and Revision." Therefore, changes to this procedure do not require a 50.59 review. | e

7.2 The scope of this procedure includes activities that require a PRC review per Palisades Administrative Procedure 10.41, "Procedure Initiation and Revision." Therefore, changes to this procedure require a PRC review. | e

ONSITE MONITORING TEAM LIST

Proc No EI-8
Attachment 1
Revision 12
Page 1 of 8

Date: _____ Technicians: _____

SECTION 1: DEPLOYMENT

- a. Review the Onsite Monitoring Deployment Kit (3-ring binder in OSC Emergency Kit). Contents include: Emergency Implementing Procedures EI-8, "Onsite Radiological Monitoring"; EI-13, "Evacuation/Reassembly"; EI-7.1, "Post Accident Sampling - PCS Liquid/Gas and Containment Air," (Section 4 and Section 5.1); EI-16.1, "Maintenance of Emergency Equipment," (Attachment 2, Kit 3 inventory); 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. Radiation Detection Instrumentation. Upon activation of the OSC, instruments will be staged and logged out of the OSC by the Dosimetry/Instrument Issue Specialist. Perform/verify Operational Checks of instruments prior to leaving the OSC.
 2. Primary and Secondary dosimetry.
 3. Applicable protective clothing and respiratory equipment. (Lapel Air Sampler for individual breathing zone samples, if determined necessary.)
 4. Radio communication equipment. Perform operability check of hand-held battery powered radio.
 5. Radeco Air Sampler for large area grab samples.
 6. Applicable survey maps, forms.
 7. Smears, smear pad.
 8. Ziploc bags for samples.
 9. Writing material.
 10. Any necessary keys (located in the HP Key Lockers or OSC Emergency Kit).
 11. Phone numbers to call in the event radio-communication becomes difficult or nonexisting. See Attachment 7 for preferred phone numbers.

ONSITE MONITORING TEAM LIST

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
3. Projected dose rates and airborne activity.
4. Locations/routes to be surveyed:

(eg, applicable Assembly Areas, stairwell from the OSC to the North Door of the TSC, Security CAS and SAS, evacuation control point/monitoring stations, work sites, affected areas, release monitoring outside-onsite, search and rescue)
5. Surveys/samples desired:

(eg, dose rates, work area, general area, contact, open/closed beta window, three inches and three feet from ground, surface contamination, airborne activity)
6. Optimum route to designated area, such that exposure is kept ALARA.
7. Protective action(s) guidelines/limits.
8. Disposition of samples:
9. Special prejob briefing for work in affected area:

(eg, special precautions, instructions, limiting circumstances, protective requirements, special dosimetry)
10. Communications, preferred and alternate methods, frequency, and emergency phone numbers. (Reference Attachment 7 of this procedure for preferred phone numbers.)

ONSITE MONITORING TEAM LIST

SECTION 2: ASSEMBLY AREA MONITORING, OSC TO TSC STAIRWELL CAS AND SAS

- a. Upon completion of OSC activation and accountability, habitability monitoring of applicable Assembly Areas should commence. Other areas such as the stairwell from the OSC to the North Door of the TSC, and Security CAS and SAS should also commence.
- b. Monitoring may include surveys for radiation dose rates, airborne activity (iodine and particulate), and loose surface contamination at the entrance(s) to the area(s). If the area air concentration is ≥ 40 DACS, or radiation levels ≥ 100 mR/hr, immediately notify the OSC Director. |e
- c. Monitoring should be at frequent, regular intervals during escalating portions of the emergency, and less frequent as stabilization is achieved, or when the emergency classification is downgraded.

d. Assembly Areas:

- 1. Assembly Area I - Control Room
- 2. Assembly Area II - TSC
- 3. Assembly Area III - Training Bldg 2nd Floor |e
- 4. Assembly Area IV - Support Bldg Reception Area
- 5. Assembly Area V - OSC - Lunchroom - Service Bldg
- 6. Assembly Area VI - Men's Locker Room across from Lunchroom - Service Bldg
- 7. Assembly Area VII - Lunchroom - Support Bldg
- 8. Assembly Area VIII - Security Bldg

ONSITE MONITORING TEAM LIST

- e. CAS (Central Alarm Station) - inside RCA.
- f. SAS (Secondary Alarm Station) - adjacent to Service Bldg elevator.
- g. Stairwell from the OSC to the North Door of the TSC.
- h. Data Logged, Attachment 5.
- i. Data reported to OSC.

SECTION 3: PLUME TRACKING - OUTSIDE - ONSITE

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

- a. Using given meteorological data and the site map, a fair idea can be obtained of the possible location of the plume.

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

- b. Traverse the suspected area to determine the existence, outer boundaries, centerline, and respective dose rates of a release.
 - 1. Using a high range ion chamber, traverse the suspected area, monitoring the meter continuously.
 - 2. When an increase in dose rate is noted, record time, dose rate, and relative site location.
 - 3. Continue monitoring dose rate increases to the centerline, where the dose rate will be at a maximum. Periodically check open vs closed beta window dose rates for the presence of the plume at ground level.

ONSITE MONITORING TEAM LIST

Proc No EI-8
Attachment 1
Revision 12
Page 5 of 8

NOTE: An Emergency Van with an Inverter, or some other power source is needed to power the Air Sampler. If power is unavailable, the Air Sample is not required.

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 indicates there is no ground level plume present, the air sample and surface contamination surveys may be omitted.
 5. Continue monitoring dose rates to the opposite plume boundary, and record the relative site location of the outer boundary.
- c. Check self-reading and electronic dosimeters frequently (ie, entry into plume, exit from plume) and record times and dose received. 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.
 - d. When traversing or sampling in a ground level plume, and/or projected or known airborne activity indicates caution, evaluate necessary protective clothing.

ONSITE MONITORING TEAM LIST

Proc No EI-8
Attachment 1
Revision 12
Page 6 of 8

SECTION 4: EVACUATION MONITORING

- a. Proceed to the assigned Control Point/Monitoring Station (established at: Security Bldg; North Beach Gate; or Inner Gate to South Radwaste) and ascertain habitability prior to establishing the monitoring station. If personnel cannot be deconned at the selected station, then bag or contain the contamination as best as possible and send them on to the designated Reassembly Area.
- 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.

SECTION 5: SUPPORT TO OTHER TEAMS

- a. Support for Chemistry, Maintenance, Operations, Fire Brigade, or Search and Rescue.
- b. Team members appropriately outfitted (ie, dosimetry, protective clothing, respiratory equipment).
- c. Performed dose rate surveys (ie, enroute, general area, work area, contact, open/closed beta window, three inches and three feet from ground).
- d. Performed airborne activity and loose contamination surveys.
- e. Dosimetry monitored, stay times calculated.
- f. Data logged, Attachment 5.
- g. Data reported to OSC.

ONSITE MONITORING TEAM LIST

Proc No EI-8
Attachment 1
Revision 12
Page 7 of 8

SECTION 6: AIRBORNE SAMPLING AND CONTAMINATION SURVEYS

NOTE: Lapel Air Samples, if taken, shall only be analyzed using HP 2.19, "Airborne Radioactivity Sampling."

- a. Field collection under emergency conditions should be a 5 ft³ 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.
- d. Perform initial gross analysis using a PRM-6 count rate meter with an HP-210 probe or equivalent.
- 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 ½ 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 flow rate, location sample was taken, and initial.

ONSITE MONITORING TEAM LIST

Proc No EI-8
Attachment 1
Revision 12
Page 8 of 8

- 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 1/2" are preferred, but if count rate is negligible use the front side at 1/2".

2. Determine the gross iodine count rate by placing the HP-210 probe or equivalent 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. If isotopic identification of air samples is desired, use the low-level counting room MCA in the Service Building, if available.
- h. Reevaluate protective measures necessary (protective clothing), based on determined airborne activity levels.

AIR SAMPLE ANALYSIS SHEET

<p>1. RADIOLOGICAL DATA (Taken at Each Air Sample Location)</p> <p>a. 3 foot: _____ mR/hr(OW) - _____ mR/hr(CW) X _____ ¹BCF = _____ mrad/hr</p> <p>b. 3 inch: _____ mR/hr(OW) - _____ mR/hr(CW) X _____ ¹BCF = _____ mrad/hr</p> <p>c. Ground Smear: _____ cpm/100cm²(Gross) - _____ cpm (BKG) = _____ cpm (Net)</p> <p>d. Location: _____</p> <p>¹BCF = Beta Correction Factor Date: _____ Time: _____</p>	
<p>2. AIR SAMPLE DATA</p> <p>Consumers Energy Sampler No: _____</p> <p>Date: _____ Start Time: _____ Stop Time: _____</p> <p>Sample Duration _____ (min) X Flowrate _____ (cfm) = Total Volume _____ (ft³)</p> <p>Corrected Volume (Particulate and Iodine):</p> <p>(Total Volume ft³ _____) (0.90) (2.83E4 cc/ft³) = _____ cc</p>	
<p>3. PARTICULATE AIR SAMPLE ANALYSIS</p> <p>Instrument Model/Consumers Energy No <u>PRM-6/</u> _____ Efficiency _____</p> <p>Gross _____ cpm - Background _____ cpm = _____ ccpm</p> <p>Calculation:</p> <p>μCi/cc = _____ ccpm _____ = _____ μCi/cc</p> <p>(Corrected Volume _____ cc) (Eff _____) (2.22E6 dpm/μCi)</p>	
<p>4. IODINE SAMPLE ANALYSIS</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>μCi/cc = _____ ccpm _____ = _____ μCi/cc</p> <p>(Corrected Volume _____ cc) (²CF _____ ccpm/μCi)</p>	
<p>Completed By: _____ Reviewed By: _____</p>	

²Conversion Factor (CF) is 1.48E5 ccpm/μCi for backside count rates or 3.77E6 ccpm/μCi 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 ccpm/μCi (HRS)</u>		<u>TIME SINCE RX SHUTDOWN ccpm/μCi (HRS)</u>		<u>TIME SINCE RX SHUTDOWN ccpm/μCi (HRS)</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

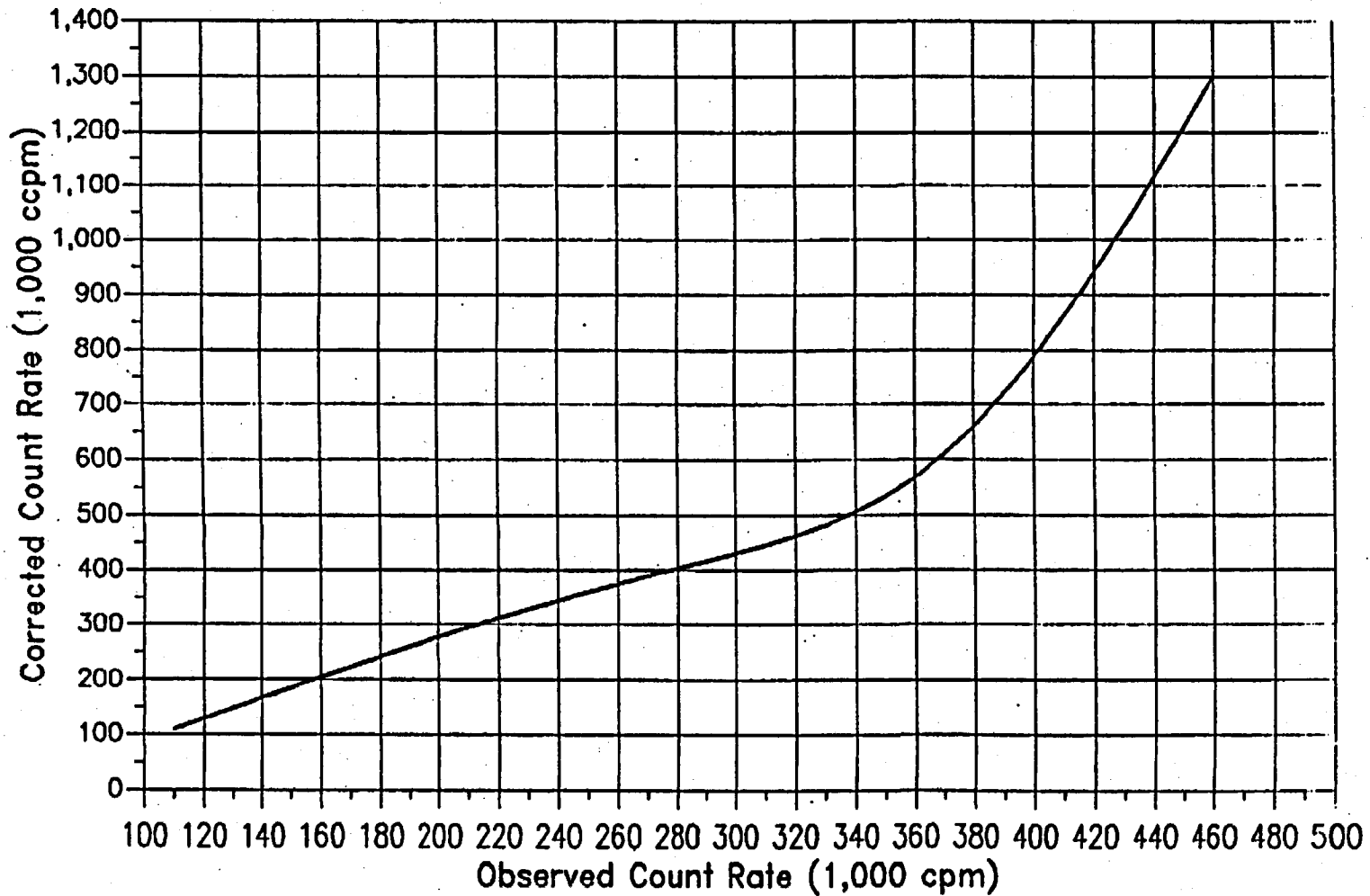
**TABLE 2
 FRONTSIDE (ALTERNATE METHOD)**

<u>TIME SINCE RX SHUTDOWN ccpm/μCi (HRS)</u>		<u>TIME SINCE RX SHUTDOWN ccpm/μCi (HRS)</u>		<u>TIME SINCE RX SHUTDOWN ccpm/μCi (HRS)</u>	
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



ONSITE MONITORING TEAM LOG

Date: _____ Technicians: _____

TIME	DATA

AIR SAMPLE LOG

Date/Time Sampled	Location	Sampled By Counted By	Unidentified Particulate Activity	Unidentified Iodine Activity	Identified Particulate Activity	Identified Iodine Activity

OPERATIONAL SUPPORT CENTER PHONE LIST

OSC Director

2109 (OSC Director)*
2110 (TIF)
2243 (OSC Communicator)*

Health Physics

2409*
2410*
Direct Line to TSC
OSC to Met Tower Line

Fax Line

764-2730

Chemistry

2596

General Use

2346

Locker Room

2600
2606

Power Failure Only

764-8994*

*Preferred phones for communications from Onsite Monitoring Teams.