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THREE MILE ISLAND NUCLEAR STATION
UNIT #2 EMERGENCY PROCEDURE 2202-1.7
EXCESSIVE RADIATION LEVELS

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Unit 1 Staff Recommends Approval

Approval NA Date —
Cognizant Dept. Head

Unit 2 Staff Recommends Approval

Approval NA Date —
Cognizant Dept. Head

Unit 1 PORC Recommends Approval

NA Date —
Chairman of PORC

Unit 2 PORC Recommends Approval

G. J. Kilbride Date 11/14/77
Chairman of PORC

Unit 1 Superintendent Approval

NA Date —

Unit 2 Superintendent Approval

J. J. Seelinger Date 11/15/77

Manager Generation Quality Assurance Approval NA Date —

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THREE MILE ISLAND NUCLEAR STATION

UNIT #2 PLANT EMERGENCY PROCEDURE

EP 2202-1.7

EXCESSIVE RADIATION LEVELS

22.1 SYMPTOMS

Symptoms of excessive or potentially excessive radiation levels are as follows: Note that these conditions may occur under both planned and unplanned radioactive releases. Planned releases as covered in HPP 1621 and HPP 1622 are exempt from this procedure.

a. Radiation Monitoring System trouble alarm on Control Room annunciator on panel 12.

b. Hi alarm (red indicator light) from any radiation monitor located on Control Room panel 12.

c. Radiation monitor ratemeter indicates in excess of Hi alarm setpoint.

d. Alert (yellow indicator light) alarm from any radiation monitor, located in Control Room panel 12.

e. Radiation Monitor ratemeter indicates radiation levels in excess of Alert Alarm Setpoint.

22.2 IMMEDIATE ACTION

22.2.1 Automatic Action

a. Receipt of an Alert Alarm

If applicable, direct personnel involved in maintenance, operation or sampling activities to immediately isolate the source of the radioactive release per the step specified in the applicable special operating procedure.

b. Receipt of a Hi Alarm:

Isolate flow paths in affected piping systems.

NOTE: Refer to Alarm Response for specific monitor alarming for details of automatic actions, general actions only are given below. Automatic interlocks associated with atmosphere and liquid high alarms are outlined in Enclosure I. A High Alarm on Gamma monitor HP-R-214 will actuate the station radiation alarm as described in the Emergency Plans and Procedures AP 1004.

22.2.2 Manual Action

a. If directed by Shift Supervisor/Shift Foreman, announce the following using the Intra Plant Communications System page channel: "Radiation Hi Alarm, (Location and alarming monitor).

b. If applicable, direct personnel involved in maintenance, operation or sampling activities to immediately isolate the source of the radioactive release per the step specified in the applicable special operating procedure.

c. Ensure that the appropriate control room charts (RMS and Meteorological) are marked with the date, time and occurrence.

22.2.3 Follow-up Action

a. Verify that automatic action (if any) as specified by Alarm Response has occurred.

b. Initiate the following action depending upon the type of monitor which is alarming and the type of alarm.

NOTE: Refer to specific Alarm Response for detailed manual action required. Below steps are generally applicable.

(1) Atmospheric Monitor:

(a) Alert Alarm:

- If applicable, take air sample in accordance with Appendix A.
- If applicable, analyze sample in accordance with Appendix B.
- Sample and analyze as specified in H.P.P. 1676.
- Evacuate affected area(s) if analyses indicate activity in excess of limits for which an RWP is required ($3x10^{-10}$ µCi/cc).
- Determine source of radiation.
- Take appropriate actions to contain radioactivity and reduce levels.

(b) Hi-Alarm:

- Clear affected area of all unnecessary personnel.
- Re-enter affected area using air breathing apparatus to obtain air samples.
- Analyze air samples in accordance with Appendix B.
- If analyses equal greater than $3x10^{-10}$ µCi/cc, re-entry to area without breathing apparatus will be permitted only under RWP.

- Determine source of radiation.
- Take appropriate action to contain radioactivity and reduce levels.
- If HP-R-219 goes into the high alarm condition, perform the following:

  1. Notify the Radiation Protection Department.
  2. Give wind direction and specify location of site Fence Survey.
  3. Insure that the Radiation Protection Department collects a gas, particulate and iodine sample and conducts a β-γ survey at the specified site fence location.
  4. Clear affected area of all non-essential personnel.
  5. Re-enter affected area using air breating apparatus to obtain air samples.
  6. Obtain and analyze air samples in accordance with HPP 1676.
  7. If the analysis indicates levels greater than 3×10^{-10} μCi/cc, re-entry to area without breathing apparatus will be permitted only under RWP.
  8. Determine source of radiation.
  9. Take appropriate action to contain radioactivity and reduce levels.

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(2) Gamma Monitor

(a) Alert Alarm

- Survey affected area(s) using Eberline Rad-Owl, portable ion chamber, or equivalent, to verify alarm.
- Locate radiation source.
- Take appropriate action to reduce radiation levels.

(b) Hi Alarm:

- Survey affected area(s) using Eberline Rad-Owl, portable ion chamber, or equivalent, to verify alarm.
- If survey indicates radiation levels greater than 100 mr/hr, permit entry to area to locate the radiation source and take action to reduce the radiation levels only under RWP.

(3) Liquid Monitor:

(a) Alert Alarm:

- Obtain sample from affected system and count sample in accordance with Appendix C.
- Take action as necessary to contain radioactive liquid.
- Take appropriate action to reduce activity level.

(b) Hi Alarm:

- Obtain sample from affected system and count sample in accordance with Appendix C. If analysis indicates activity greater than alarm setpoint (5.6×10^{-5} uCi/cc) for closed cooling water systems, isolate affected portion of system if possible.
- Take action as necessary to contain radioactive liquid.
- Take appropriate action to reduce activity level.

(c) If source of radiation is a spill, refer to Emergency Plans and Procedures, AP 1004, Local Emergency Procedure.

(4) Complete the Operations Planned/Unplanned Release Report (Enclosure II)

- Ensure that Personnel Exposures are recorded.
- Ensure that Personnel Film Badges/TLD's are processed if required.
- Ensure that the release point cubicle or room air velocity flow is taken. As soon as reasonably possible, notify Instrumentation Department to obtain these readings.
- Decontaminate as necessary.
- Ensure that the calculations for H.P.P. 1676 Attachment A are completed. These calculations include 10 CFR 20.403 evaluation and airborne

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concentrations that personnel may have been exposed to. In addition, these calculations:

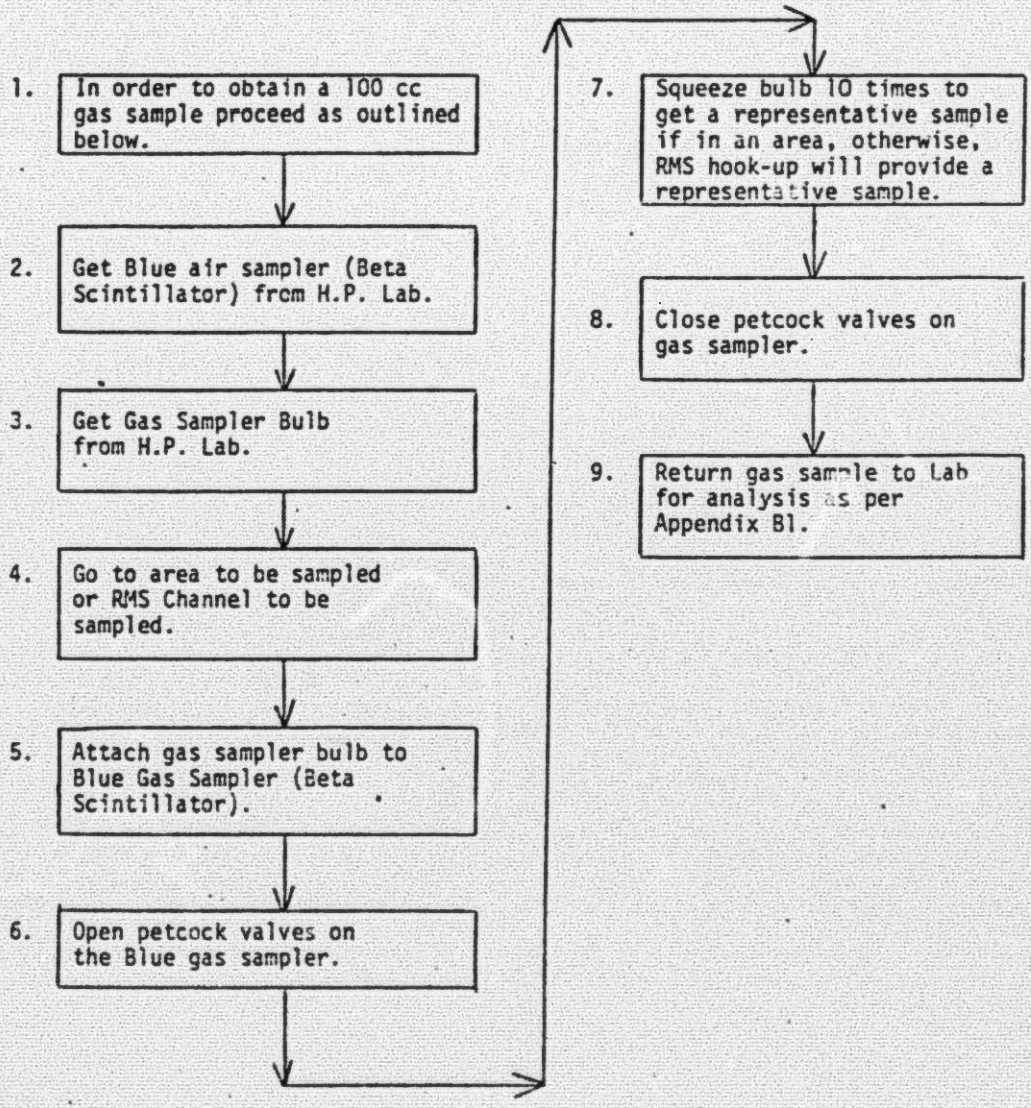
a. Compute Peak & Avg. I^{131} and Particulate release rate (if applicable).

b. Compute Peak & Avg. Noble Gas release rate.

c. Credit the release to the Semi-Annual activity inventory released to the environment.

APPENDIX A1

GASEOUS COLLECTION



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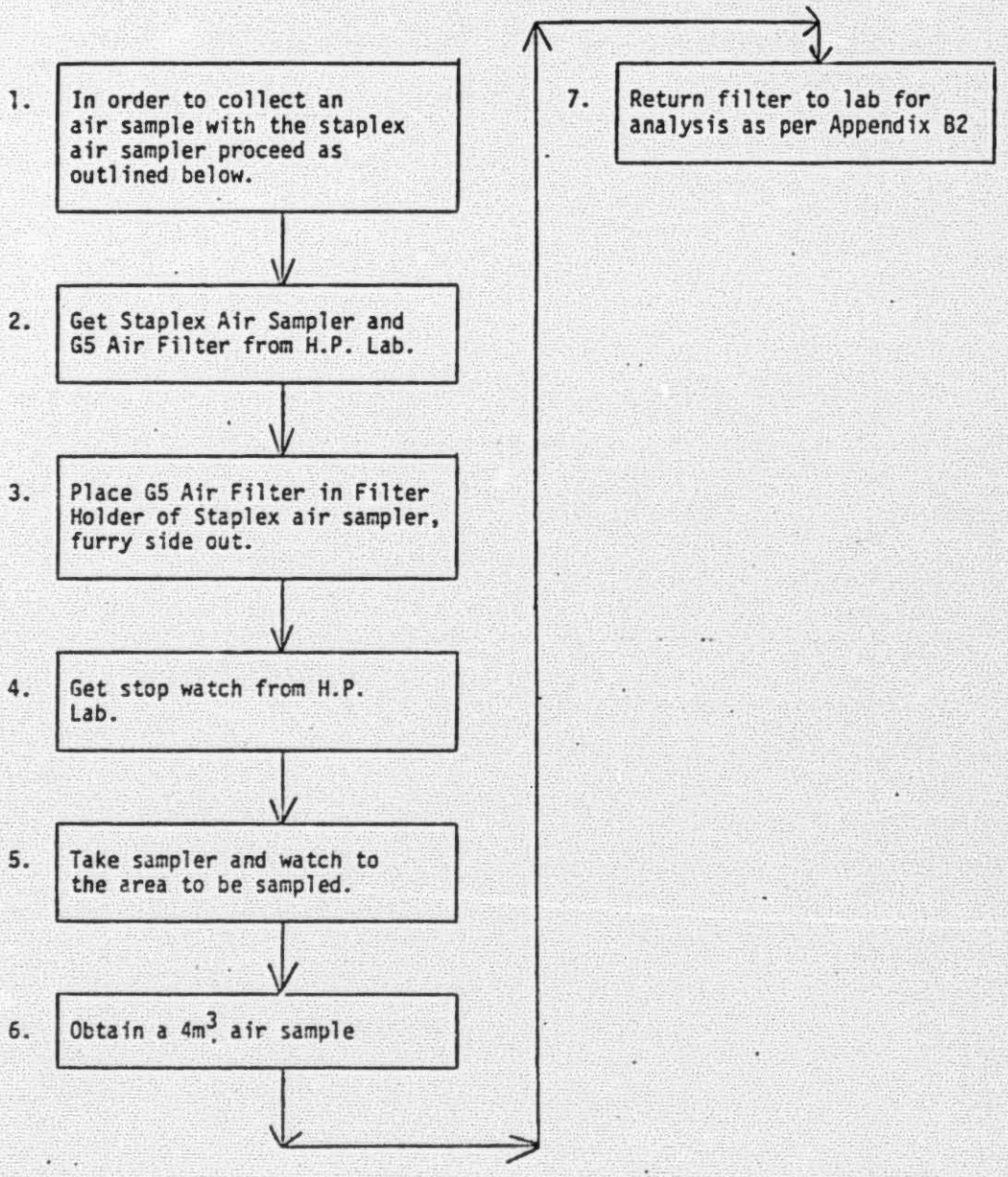
APPENDIX A2

PARTICULATE COLLECTION



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APPENDIX B1

GASEOUS COUNT & CALCULATION

1. Connect BNC connector from output of Blue gas sampler to input of Ludlum Timer Scaler as per attached sketch B-2-1.

2. Turn on Pre-Amp Switch located on the Blue Gas Sampler.

3. Turn count time switch to 5 minutes.

4. Press count button to start counting.

5. After 5 minutes, divide accumulated counts by 5 and subtract background to obtain corrected counts per min. (cc/m).
   NOTE: Background is found on the OPS Scaler Data Sheet.

6. Calculate uCi/cc by using the following formula.

$$\frac{cc/min}{(Vol)\ (EFF)\ 2.22 \times 10^6}$$

NOTE: EFF is found on the OPS Scaler Data Sheet

7. Record the results on the Count Data Sheet.

10.0

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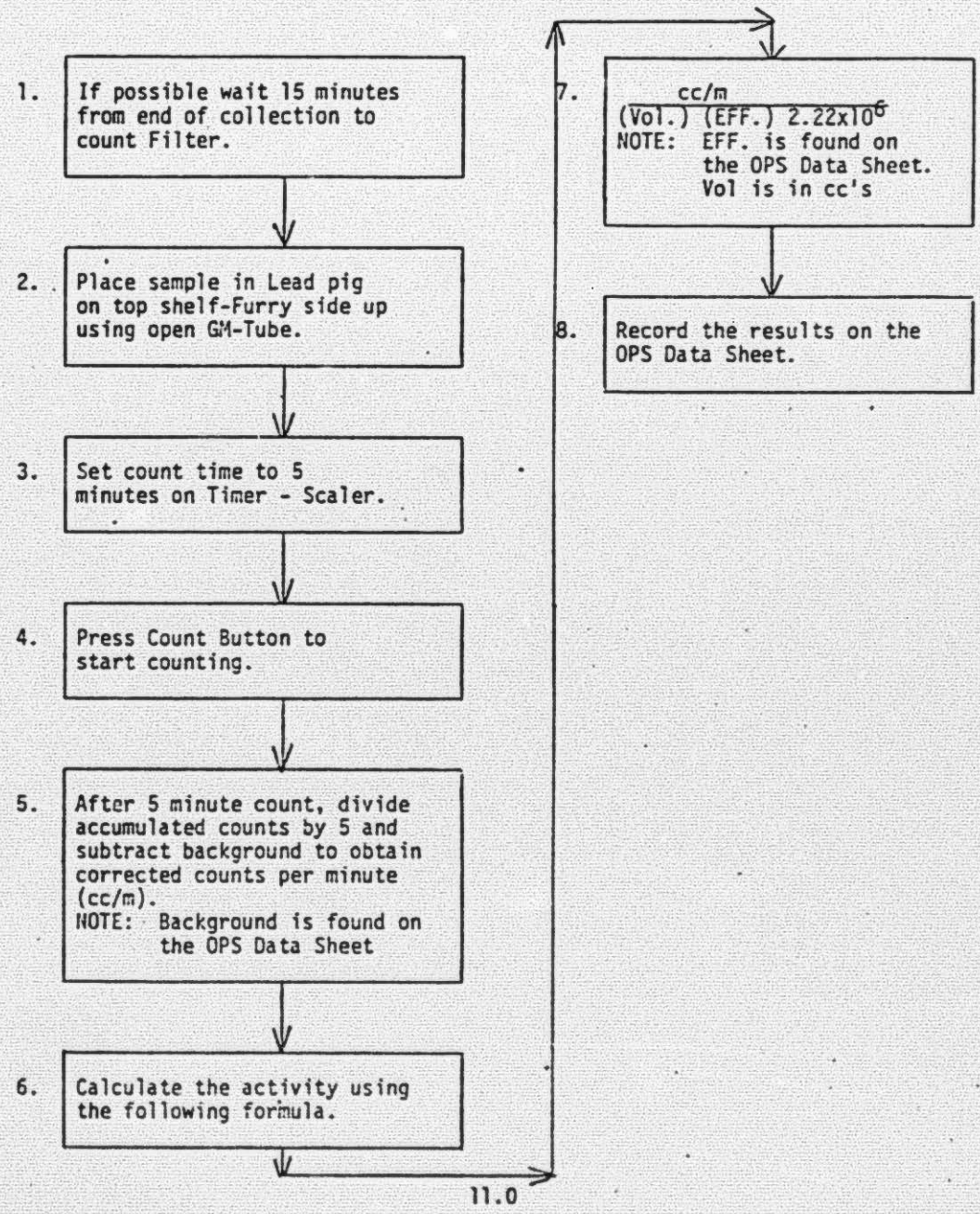
B-2-1

APPENDIX B2

PARTICULATE COUNT AND CALCULATION



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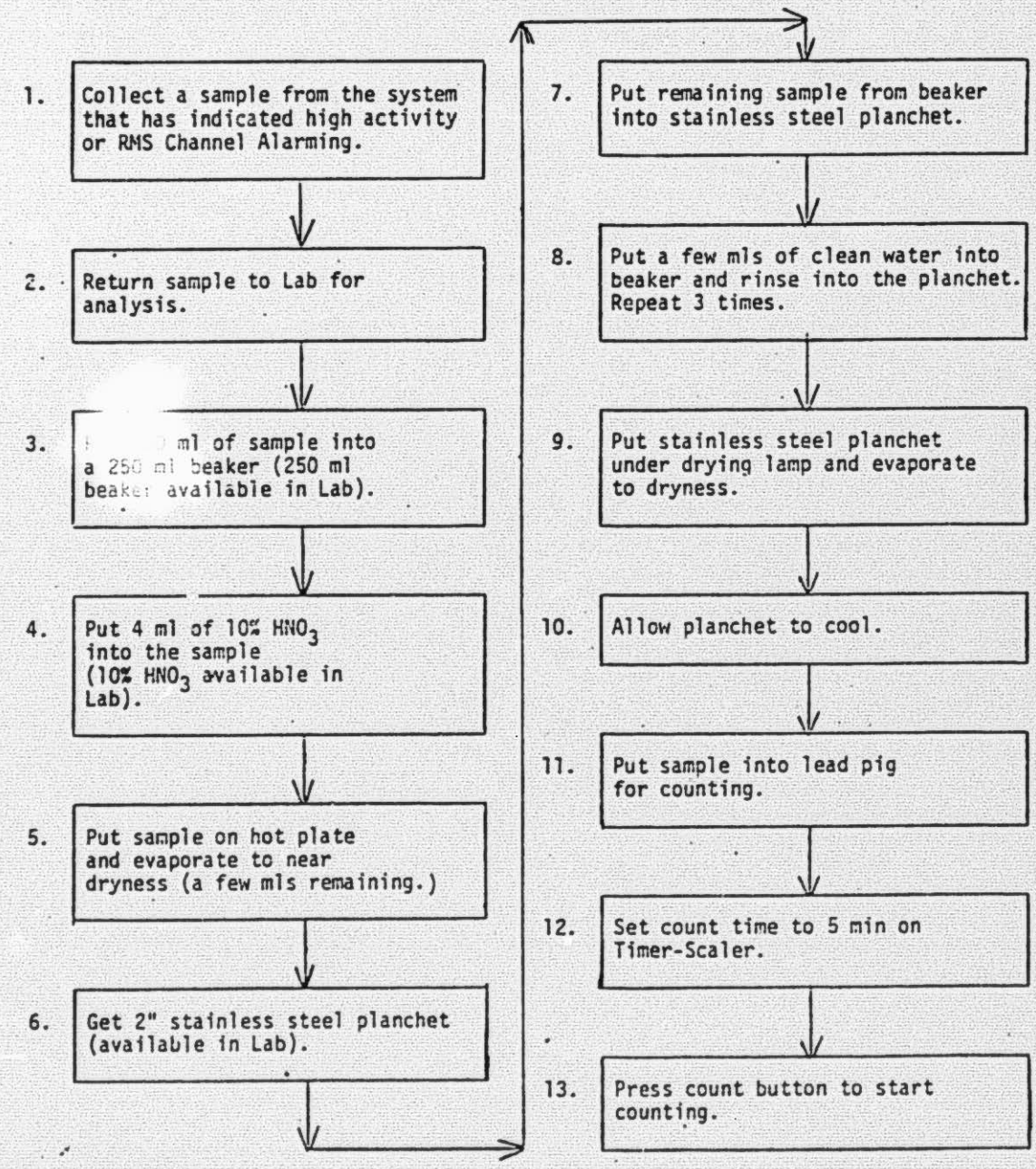
APPENDIX C

LIQUIDS



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APPENDIX C (CONT'D)

LIQUIDS

14. After 5 minutes, divide accumulated counts by 5 and subtract background to obtain corrected counts per minute (cc/m).
NOTE: Background is found on the OPS Scaler Data Sheet.

↓

15. Calculate the activity by using the following formula.

↓

16. $$\frac{cc/m}{(Vol)\ (EFF)\ (2.22 \times 10^6)}$$
NOTE: Vol is 250, EFF is found on the OPS Scaler Data Sheet.

↓

17. Record the activity on the OPS Scaler Data Sheet.

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ENCLOSURE I

INTERLOCKS ASSOCIATED WITH RADIATION MONITORING SYSTEM HI-ALARMS

1.0 Interlock functions actuated by Hi Alarms from specific atmospheric radiation monitors are as follows:

1.1 Control Room Air Monitor, HP-R-220

a. Fans AH-E-4A and/or AH-E-4B are energized
b. The following dampers assume the position indicated:

(1)	D4092A	closes	
(2)	D4092B	opens	
(3)	D4091A	opens	(with AH-E-4A only)
(4)	D4091B	opens	(with AH-E-4B only)
(5)	D4092C	closes	
(6)	D4092D	closes	
(7)	D4092E	opens	
(8)	D4098	closes	

1.2A Reactor Building Purge Exhaust Monitor, HP-R-225

a. Purge Supply Fan AH-E-12A shuts down
b. The following dampers assume the position indicated:

(1)	D5129A	closes
(2)	D5129D	opens
(3)	D5128A	closes
(4)	D5218D	closes

1.2B Reactor Building Purge Exhaust Monitor, HP-R-226

a. Purge Supply Fan AH-E-12B shuts down
b. The following dampers assume the position indicated:

(1)	D5129B	closes
(2)	D5129C	opens
(3)	D5128B	closes
(4)	D5128C	closes

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ENCLOSURE I (CONT'D)

1.3A Auxiliary Building Ventilation Exhaust Monitor (unfiltered), HP-R-222

a. The following dampers assume the position indicated:

(1)	D4020A	closes
(2)	D4020B	opens
(3)	D4020C	opens
(4)	D4020D	opens
(5)	D4020E	opens

1.3B Auxiliary Building Ventilation Exhaust Monitor (Filtered), HP-R-228

a. If operating, the following fans shut down:

(1) Aux. Bldg. Supply Fans, AH-E-7A & AH-E-7B
(2) Aux. Bldg. Exhaust Fans, AH-E-8A, AH-E-8B, AH-E-8C & AH-E-8D

b. The following dampers assume the position indicated:

(1)	D4002	closes
(2)	D4001A	closes
(3)	D4001B	closes
(4)	D4016A	closes
(5)	D4016B	closes
(6)	D4017A	closes
(7)	D4017B	closes

1.4A Fuel Handling Building Ventilation Exhaust Monitor, (unfiltered), HP-R-221A

a. The following dampers assume the position indicated:

(1)	D5683	closes
(2)	D5684A	opens
(3)	D5684B	opens
(4)	D5671A	opens
(5)	D5671B	opens

1.4B Fuel Handling Building Ventilation Exhaust Monitor (Filtered), HP-R-221B

a. If operating, the following fans shut down:

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ENCLOSURE I (CONT'D)

(1) Fuel Handling Bldg. Supply Fans AH-E-9A & AH-E-9B
(2) Fuel Handling Bldg. Exhaust Fans - AH-E-10A, AH-E-10B, AH-E-10C & AH-E-10D.

b. The following dampers assume the position indicated:

(1) D5714 closes
(2) D5710 closes
(3) D5712 closes
(4) D5680 closes
(5) D5673 closes
(6) D5670 closes
(7) D5655 closes

1.5 Rad Waste Disposal - Gas Monitors WDG-R-1480, WDG-R-1485 & WDG-R-1486

a. If open, the following valves will close:

(1) WDG-V-30A
(2) WDG-V-30B

1.6 Station Vent Monitor, HP-R-219

a. The interlocks associated with the following monitors are also interlocked to HP-R-219.

(1) HP-R-225 Reactor Bldg. Purge Exhaust Monitor
(2) HP-R-226 Reactor Bldg. Purge Exhaust Monitor
(3) HP-R-228 Aux. Bldg. Ventilation Exhaust Monitor (Filtered)
(4) HP-R-221B Fuel Handling Bldg. Ventilation Exhaust Monitor (Filtered)
(5) WDG-R-1480
(6) WDG-R-1485 Waste Disposal - Gas Monitor
(7) WDG-R-1486

b. The following fans, if operating, will shut down:

(1) AH-E-23A & AH-E-23B, Health Physics Area Ventilation Exhaust Fans.

1.7 Waste Disposal - Liquid Monitor, WDL-R-1311

a. The following valves will colse:

(1) WDL-V99
(2) WDL-V100
(3) WDL-V93A
(4) WDL-V93B

b. The following pumps will be stopped if they are running;

(1) WDL-P8A or 8B
(2) WDL-P11A or 11B

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ENCLOSURE I (CONT'D)

1.8 Station Discharge Line Monitor, RM-L7

a. The following valve will close:

(1) WDL-V99

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ENCLOSURE II

OPERATIONS PLANNED/UNPLANNED RELEASE REPORT

(SHIFT SUPERVISOR: Complete Sections #1 through #11)

1. DATE: _____ 2. TIME: _____

3. RMS AND METEROLOGICAL CHARTS MARKED: Yes _____ No _____
4. Radiation Protection Dispatched for Environmental Samples Yes _____ No _____
5. DESCRIPTION AND CAUSE: _____

_____

_____

_____

6. IMMEDIATE CORRECTIVE ACTION: _____

_____

_____

_____

7. TOTAL TIME OF RELEASE: _____
8. SAMPLE ANALYSIS:
   a. Gas Sample Yes _____ No _____ Location _____
      Results: _____
      _____
   b. Iodine Sample Yes _____ No _____ Location _____
      Results: _____
      _____
   c. Particulate Sample Yes _____ No _____ Location _____
      Results: _____
      _____
   d. Radiation Survey Yes _____ No _____ Location _____
   e. Contamination Survey Yes _____ No _____ Location _____

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9. PERSONNEL EXPOSURE: (List all personnel involved in incident)
Insure film Badges/TLD's are developed within 24 Hours

NAMES	EXPOSURE RESULTS (MREM)	TIME IN AREA OF POTENTIAL RELEASE

10. PERSONNEL CONTAMINATION: Yes ____ No ____

Names: _____

11. Air Flow-Velocity Determination initiated Yes ____ No ____

12. RECOMMENDATIONS FOR CORRECTIVE ACTION: _____

13. FORM COMPLETED BY: _____
Shift Supervisor

(Forward the original form to the Unit Superintendent and copies to the Station Superintendent and the Health Physics Supervisor)
HP to include 20.403 and personnel exposure info. below per page 4.

14. ENGINEERING EVALUATION: _____

COMPLETED BY: _____

15. REVIEWED BY: _____

(Forward the completed form to the Unit Superintendent)

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TMI DOCUMENTS

DOCUMENT NO: TM-035

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Wilda R. Mullinix, NRC