TMI DOCUMENTS

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THREE MILE ISLAND NUCLEAR STATION

STATION HEALTH PHYSICS PROCEDURE 1676

RADIATION PROTECTION RESPONSIBILITIES FOR PLANNED AND UNPLANNED RELEASES

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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

M E Potts Date 3/3/79

Chairman of PORC

Unit 2 PORC Recommends Approval

R P Warren Date 3/5/79

V- Chairman of PORC

Unit 1 Superintendent Approval

J L Seelinger Date 3/12/79

Unit 2 Superintendent Approval

J B Logan Date 3/10/79

Manager Generation Quality Assurance Approval NA Date 3/15

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THREE MILE ISLAND NUCLEAR STATION

HEALTH PHYSICS PROCEDURE 1676

Radiation Protection Responsibilities

for Planned And Unplanned Releases

1.0 PURPOSE

The purpose of this procedure is to provide a method to deal with planned/unplanned releases.

2.0 DISCUSSION

In the event that a planned or unplanned release is experienced the shift supervisor or designated alternate will be responsible to implement this procedure.

NOTE: This procedure will not be implemented during utilization of H.P.P. 1621, 1621.2, 1622 and or 1622.2

3.1 H.P.P. 1605

3.2 H.P.P. 1606

3.3 H.P.P. 1607

3.4 H.P.P. 1621

3.5 H.P.P. 1622

3.6 H.P.P. 1675

3.7 E.P. 1202-12 (Unit #1)

3.8 E.P. 2202-1.7 (Unit #2)

3.9 10 CFR-20

3.10 P.C.P. 1958

3.11 H.P.P. 1612

3.12 H.P.P 1621.2

3.13 H.P.P 1622.2

4.0 EQUIPMENT

4.1 Battery operated portable air pump.

4.2 Aluminum Marinelli Beaker or equivalent.

4.3 Radiation Emergency Kit.

4.4 Portable Beta-Gamma Radiation Detection Survey Instrument

4.5 T.L.D. Reader

4.6 Ge Li Detection System

4.7 Beta-Gamma Counter Scaler.

5.0 OPERATING INSTRUCTIONS

5.1 Collection of Air Samples Inside Buildings

5.2 Control room will notify the Radiation Protection Department of increasing counts or an alert alarm condition on an Unit #1 RMA or HPR, WDG-R, VA-R in Unit #2.

5.3 Radiation Protection initiates log entries and records conditions and times.

5.4 Radiation Protection Personnel will collect particulate and gas (Marinelli Beaker) sample(s) in the vicinity of the RMA, HPR, WDG-R or VA-R in alarm conditions and at the same time change R.M.A. samples. Take all samples per H.P.P. 1605, 1606, 1607 and clearly identify all samples.

NOTE: R.M.A. 2, 5, 7, 8, 9 samples will be collected through the sample panels in Unit #1. HP-R-222, 225, 226, 227, 228 samples, WDG-R-1480G sample and VA-R-748G sample will be collected locally through the sample panels in Unit #2.

5.5 Notify the control room of all sample changes dealing with the R.M.S.

5.6 Insure that Radiation Protection Supervision has been notified.

5.7 Analyze samples per H.P.P. 1605, 1606, 1607 and restrict entry to area(s) in question.

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NOTE: If entry is essential log the time in and the time out for all individuals going into and out of the area. All exposures should be logged. All entries will require respiratory protection.

5.8 Save all samples collected and those initially counted as further counting of samples may be required.

5.9 If samples indicate a spread of air activity further samples must be taken to determine the extent.

5.10 Continue to log all events as they happen to aid in the reconstruction of the incident after conditions return to normal. Keep all data together.

5.11 Radiation Protection Personnel will deal with contamination of all individuals involved in the incident per H.P.P. 1612 and complete a Contamination/Exposure Report.

5.12 All data is reported to the Control Room so that the Shift Supervisor may complete sections #1 through #11 of a Operations Planned/Unplanned Release Report. Ref. EP-1202-12/EP-2202-1.7.

5.13 Deleted.

6.0 COLLECTION OF AIR SAMPLES AT SITE SECURITY FENCE

6.1 Upon notification by the Shift Supervisor, or designated alternate, that a High Alarm exists on RMA-8, RMA-9, and or HP-R-219 the following steps will be followed.

6.1.1 Obtain the wind direction from the Shift Supervisor and the required sample location at the site security fence.

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6.1.2 Gas Samples

6.1.2.1 Using the portable air pump connect the aluminum marinelli beaker or equivalent to the intake of the pump.

6.1.2.2 Open both petcocks on the marinelli beaker.

6.1.2.3 Turn on the pump and check the flowrate which should be at a minimum of 4 CFM. If the flow rate is 4 CFM or greater run the collection for 5 min.

6.1.2.4 After 5 min. turn off the pump and close the petcocks.

6.1.2.5 Disconnect the marinelli beaker from the pump.

6.1.3 Particulate and Iodine Sample

6.1.3.1 Insert the particulate filter and iodine cartridge into the portable air sampler holder.

6.1.3.2 Run the sampler for the time specified on the sampler to collect a predetermined volume.

6.1.3.3 Turn the pump off and place the iodine and particulate samples into envelopes.

6.1.3.4 Mark the Date, Time, Collection Volume and the location of the samples clearly on the outside of the envelope.

6.1.4 Dose Rate Survey

6.1.4.1 Using the Beta-Gamma portable instrument, with the probe window open, perform a Beta-Gamma survey of the sample collection area.

6.1.5 Collection of T.L.D. samples

6.1.5.1 Remove the T.L.D.'s in the immediate area of the release.

6.1.5.2 Return all samples to H.P. Lab for analysis/applicable procedures.

6.2 Report completed data to the control room so that the Shift Supervisor may complete sections 1 through 11 of a Operations Planned/Unplanned Release Report as per E.P. 1202-12.

6.3 Notify Radiation Protection Foreman for completion of Appendix A and incorporation of data in semi annual report.

APPENDIX A

CALCULATIONS FOR DETERMINING CONCENTRATIONS AND RELEASE RATES DURING PLANNED/UNPLANNED RELEASES

1. During unplanned releases, the following calculations must be made to fulfill reporting requirements:

   a. Average Release Rate
   b. Maximum Release Rate
   c. Total Curies Released
   d. 24-Hour Average Concentration in the Area
   e. Maximum Concentration to Which Personnel Were Exposed (Only if personnel were in the area of the release)
   f. Maximum and Average Concentration at Nearest Downwind Unrestricted Area

2. To calculate the above values, the following information must be obtained:

   a. RM-A8 HPR-219 Strip Chart covering period of release
   b. Isotopic analysis of release (Taken as close to point of release as possible)
   c. Air flow through room (air turnover rate)
   d. Air flow out the unit vent stack (FR-123 or FR-148)
   e. Names of personnel involved and time each spent in area of release
   f. Meterological data to determine x/Q value

3. Prior to performing calculations, do the following:

   a. Determine isotopic ratio and weighted MPC_a (10 CFR 20, App. B, Table II values). Note - Releases to date have been predominately Xe-133 (>90%) with weighted MPC_a 3×10^{-7} µCi/cc.

   b. Analysis the RM-A8(G) HP-R-219(G) Strip Chart as follows:

      Make a Table:

Point	Time	CPM	Avg. CPM	Time Duration	Weighted CPM	Weighted Conc.
A	(1)	(2)	(3)	(4)	(5)	(6)
B				.		.
etc.				.		.
				µ (4) =		µ (6) =

(1) and (2) from strip charts for each point. (3) is average of 2 from working line and preceeding line. (4) is (1) in working line minus (1) in preceeding line. (3) through (6) will be blank in first line, point A.) (5) is equal to (3) x (4) . (6) is (5) ÷ sensitivity of RM-A8(G) HP-R-219(G). (If Xe-133 is dominant isotope, sensitivity is 3.7×10^7 CPM/μCi/cc.) Sum columns (4) and (6) . Points A,B,...etc. are picked on the strip charts. Points should be picked whenever a change in the slope of RM-A8(G) HP-R-219(G) response is noted. The more points chosen, the better the calculations will be.

4. Calculations:

a. Average Release Rate

$$\frac{\Sigma\ 6\ /\ \Sigma\ 4\ (\mu Ci/cc) \times \text{flow out the stack (cc/sec)} \times 10^{-6}\ m^3/cc}{\text{Weighted } MPC_a\ (\mu Ci/cc)}$$

= Avg. RR (m^3/sec)

b. Maximum Release Rate

$$\frac{\text{Max. CPM from chart (CPM)} \times \text{flow out the stack (cc/sec)} \times 10^{-6}\ (m^3/cc)}{\text{Sensitivity (CPM/}\mu Ci/cc) \times \text{Weighted } MPC_a\ (\mu Ci/cc)}$$

= Max. RR (m^3/sec)

c. Total Curies Released

Σ 6 (μCi/cc . min) x flow out the stack (cc/sec) x 60 sec/min x 10^6 Ci/μCi

= Total Release (Ci)

d. 24 Hour Average Concentration in the Area

$$\frac{\text{Total Release (Ci)} \times 10^{+6}\ \mu Ci/ci}{\text{Flow thru room (CFM)} \times 24\ \text{hours} \times 60\ \text{min/hr} \times 2{,}832 \times 10^4\ \frac{cc}{ft^3}}$$

= 24 Hour Average Concentration (μCi/cc)

e. Maximum Concentration Personnel Exposed To

$$\frac{\text{24 Hour Average Concentration (}\mu Ci/cc) \times 24\ Hr \times 60\ \text{min/Hr} \times \text{MaxRelease Rate}}{\Sigma\ 4\ (\text{min}) \times \text{Average R.R.}}$$

= Maximum Concentration in Room (μCi/cc)

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f. Average Concentration at Nearest Unrestricted Area

Σ(6)/ Σ(4)(μCi/cc) x flow out the stack (cc/sec) x X/Q (sec/m^3) x 10^{-6} (m^3/cc)

= μCi/cc (Average Concentration at nearest unrestricted area)

Maximum Concentration at Nearest Unrestricted Area

$$\frac{\text{Max. reading from chart (CPM) x flow out the stack (cc/sec) x X/Q (sec/m}^3\text{)}}{\text{Sensitivity (CPM/}\mu\text{Ci/cc) x 10}^6\text{ (cc/m}^3\text{)}}$$

= μCi/cc (Maximum Concentration at nearest unrestricted area)

5. Limits:

a. Average Release Rate

N/A

b. Maximum Release Rate

1.2 x 10^5 m^3/sec (Tech. Spec.)

c. Total Curies Released

N/A

d. 24 Hour Average Concentration

500 x MPC_a (weighted) 10 CFR 20.403 (b) (2)
5000 x MPC_a (weighted) 10 CFR 20.403 (a) (2)

e. Maximum Personnel Exposure

$$\frac{MPC_a \text{ (weighted) (10 CFR 20, Appendix B, Table I) x 40 hr x 60 min/hr}}{\text{Time individual was in area (min)}}$$

f. Concentration at Nearest Unrestricted Area

10 CFR 20, Appendix B, Table II (Weighted MPC_a)