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THREE MILE ISLAND NUCLEAR STATION CONTROLLED COPY

STATION RADIATION EMERGENCY PROCEDURE 1670.4

RADIOLOGICAL DOSE CALCULATIONS MASTER COPY

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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 G. A. Kunder Date 11/14/78 Chairman of PORC	Unit 2 PORC Recommends Approval R P Warren Date 11/20/78 V-Chairman of PORC
Unit 1 Superintendent Approval J P O Hanlon Date 11/22/78	Unit 2 Superintendent Approval J L Seelinger Date 11/20/78

Manager Generation Quality Assurance Approval NA Date —

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THREE MILE ISLAND NUCLEAR STATION

RADIATION EMERGENCY PROCEDURE 1670.4

RADIOLOGICAL DOSE CALCULATIONS

1.0 PURPOSE

The primary purpose of this procedure is to supply early information needed to decide what action must be taken to limit radiation exposure to the general public in the event of a site or general emergency.

2.0 REFERENCES

2.1 Emergency Procedure Section 1670.2 and 1670.3

2.2 10 CFR 20

2.3 Unit 1, Unit 2 FSAR

3.0 EQUIPMENT

3.1 TMI Area Map

3.2 Isopleth curves for stable, neutral, unstable conditions

3.3 Calculation Sheets and Projected Dose Curves

4.0 OPERATING INSTRUCTIONS

4.1 Confirm that either RM-A8, RM-A9, HP-R-219 or RM-L7 is alarming and that there is in fact a release in progress. (If the above monitors are not alarming, obtain the current readings.)

4.2 Obtain Meterological conditions (wind speed, direction and range) from Control Room.

4.3 Selection of Overlay (Isopleths)

4.3.1 Read the average wind speed over a ten minute period on wind speed and direction recorder chart in the control room.

4.3.2 Read the wind direction for the previous ten minute period. The average of the center of the direction trace is satisfactory for the direction from which the wind is blowing.

4.3.3 Measure the average extremes of the wind direction range for the previous 20 minute period. (NOTE: Do not consider single peaks in determing range.) Each chart line represents 10 degrees. The total of wind direction extremes over the 20 minutes period is termed wind range.

NOTE: If the direction trace occurs both at the right and left hand margins, the left average extreme in degrees to obtain the wind range.

Wind Range	Corresponding Overlay
less than 45^{o}	STABLE
between 45^{o} and 75^{o}	NEUTRAL
greater than 75^{o}	UNSTABLE

4.3.4 If the recorder in the control room becomes inoperative, the following steps will be followed for purposes of determing the proper overlay:

4.3.4.1 Determine vertical temperature difference from recorder and determine diffusion group from the following table:

Vertical Temperature Difference (as measured between 150' & 50')	Diffusion Group
Less than - 1.0^{o}F	UNSTABLE
Between - 1.0^{o} & 0.3^{o}	NEUTRAL
Greater than - 0.3^{o}	STABLE

4.4 Use of Map Overlay Selected

4.4.1 Determine downwind direction from wind direction recorder trace.

4.4.1.1 If the wind direction $\leq 180^{o}$, add 180^{o} to determine downwind direction.

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4.4.1.2 If the wind direction is $\geq 180^{o}$, subtract 180^{o} to determine downwind direction.

4.4.2 Put origin point of overlay over Reactor Building on map of TMI and surrounding area.

4.4.3 Align centerline of overlay with downwind direction to indicate plume location.

4.4.4 Read $\frac{X}{Q}$ values from overlay at points of interest (i.e., Exclusion Area, LPZ, Monitoring Points, Nearest Residents, and points recommended by the ECS.

4.5 Determination of On-Site Release Rates

4.5.1 Estimates of Release Rates are obtained by using the Source Release Term Calculation Sheet (Enclosure 1 for Unit 1, Enclosure 2 for Unit 2.) Obtain CPM or CPM/m for RM-A8, A9, and A5 for Unit 1 and HP-R-219 for Unit 2 and record on calculation sheet.

4.5.2 Obtain flow of stack monitors by using data from FR 151 or FR 148 for Unit 1 and record. For Unit 2, sum the flows of the flow recorders listed on the calculation sheet.

4.5.3 Perform calculations and obtain total source release terms for Iodine and Noble gas (Ci/sec).

4.5.4 Obtain Radiation Level Readings from RM-G8 or HP-R-214 and by using the table from Data Sheets, extrapolate the source release terms (Ci/sec).

4.5.5 Sum the source release terms and record the date and time.

4.6 Calculation of Off-site Doses

4.6.1 Transfer the source release terms sum to the dose calculation sheet (Enclosure 3).

4.6.2 Obtain the Wind Direction, Range, Speed, and record them on Enclosure 3.

4.6.3 Obtain the X/Q from the isopleth and record (sec/m^3).

4.6.4 Perform the calculations to determine the radioiodine and noble gas concentrations (µCi/cc). Plot the noble gas concentration with the projected whole body by interpolation using Figure 1 (Enclosure 6). Plot the radioiodine concentration with the projected exposure time and determine the projected thyroid dose by interpolation using Figure 2 (Enclosure 7). These projected whole body doses and thyroid doses will be used as the basis for emergency protective actions, however, as actual field measurements are made the dose assessment will be corrected to reflect measured values.

4.6.5 Report this data to the Radiation Protection Supervisor.

4.7 <u>Recalculation for True Source Term</u>

4.7.1 Transfer predicted Iodine concentration and noble gas R/hr data to Section 1 of True Source Term Calculation Sheet (Enclosure 4).

4.7.2 When information is received from off-site monitoring team for the specific location calculated, record this in Section 2.

4.7.3 Determine the Source Term Correction factor by dividing the actual data by the predicted data. This correction factor multiplied by the original source release term determines the corrected source release term for use in further calculations of estimated dose at various points of interest by use of Enclosure 3.

4.7.4 Report the corrected source term to the Supervisor of Radiation Protection and await instructions for next location.

4.8 Radioactive Liquid Release

4.8.1 Should a major accidental release of radioactive liquids to the river occur, it is essential to know the expected concentrations at various downstream points, when the radioactive flume will pass those points, and if the MPC for unrestricted areas has been exceeded.

4.8.2 Water samples will be collected at the following locations:

a. Discharge monitoring point

b. York Haven Dam

c. City of Columbia

d. Other points as designated by the Radiation Protection Supervisor.

4.8.3 Calculations to determine downstream concentrations are performed on the Liquid Release Calculations Sheet (Enclosure 5). If downstream concentrations are expected to exceed $1x10^{-6}$ μCi/cc, downstream users, (Table 2, Enclosure 9), must be notified to curtail intake. If the concentration exceeds 5000 times MPC (from 10 CFR 20, Appendix B, Table II) immediate notification of NRC is required as per 10 CFR 20.403(a). If the concentration exceeds 500 times the MPC, 24 hour notification of the NRC is required as per 10 CFR 20.403(b).

NOTE: River Flow and River Velocity are determined by using Table I (Enclosure 8). The river level (Column A) may be obtained by calling the River Forecast Center in Harrisburg:
782-3488 or 782-2256 (unlisted), or by noting the level at the River Water Intake Structure of Unit 1 (column B).

4.9 Emergency Dose Calculations - Contingency

NOTE: These procedures are to be used if the radiation monitors normally used to monitor the containment and/or plant vent are out of service or off-scale high.

4.9.1 <u>Case I LOCA</u> (Reference Unit 2 FSAR, 15.1.14.3)

A LOCA assuming severe core damage - fuel melting no core cooling (Regulatory Guide 1.4 assumptions) 100% of the noble gases and 25% of the iodines contained in the core are assumed released to the containment. The containment initially leaks at the maximum design leak rate.

4.9.2 <u>Case II LOCA</u> (reference Unit 2 FSAR, Table 15.1.14-3)

LOCA assuming fuel damage but no core melting - core cooling maintained. Primary coolant leaks at a rate fast enough to increase the temperature of the core to the point where there is damage to the fuel rods. For this case it is assumed that all the gap activity (the gases contained between the fuel and fuel rod) is released to the containment. The containment is assumed to initially leak at the maximum desing leak rate. <u>In this accident it is up to the Station Superintendent/Senior Unit Superintendent Supervisor to assure that there has been no fuel melting. If there is any question, a Case I LOCA should be assumed</u>.

4.9.3 <u>Case III Gas Decay Tank Rupture</u> (Reference Unit 2 FSAR, 15.1.17)

This procedure is used only if actual radiological monitoring equipment is unavailable for release evaluation (monitors out of service, read off scale, etc.).

4.9.4 <u>Case IV Fuel Handling Accident</u> (Reference Unit 2 FSAR, 15.1.21)

Any activity occurring as a result of a fuel handling accident is normally drawn into the Fuel Handling Building Ventilation System and vented to the Plant vent for release. Process monitors are used to monitor these releases; however, should these monitors be out of service or off scale, this technique is used to evaluate off site doses.

4.9.5 Case V Steam Generator Tube Rupture (Reference Unit 2 FSAR, 15.1.18)

Assume that all fission products leaking from reactor coolant system go directly to the secondary system. Some of the radio-noble gases and iodines would be released to the atmosphere through the condensor air removal system and the steam line safety valves.

4.10 Calculation of Whole Body and Thyroid Doses

4.10.1 Case I LOCA - Whole Body Dose

1A. Calculate the X/Q at the downwind exclusion area boundary and at the Low Population Zone boundary. (From meteorological data and isopleths)*

Downwind Exclusion Area Boundary X/Q ____________(1Aa)____________ sec/m³*

Downwind LPZ Boundary X/Q ____________(1Ab)____________ sec/m³*.

1B. To calculate the whole body dose at the exclusion area boundary, multiply the dispersion factor (1Aa) by the dose release factor to obtain a reading in mrem/hour (for first 2 hour dose only).

at exclusion area boundary

$$\underline{\qquad\qquad}_{(1Aa\ X/Q)} \times 3.6\times10^{5}\ \frac{\text{mrem}/\text{hour}}{\text{sec}/\text{m}^3} = \underline{\qquad\qquad}\ \text{mrem/hour}$$

1C. To calculate the whole body dose at the LPZ boundary, multiply the dispersion factor (1Ab) by the dose release factor to obtain a reading in mrem/hour.

at LPZ boundary

$$\underline{\qquad\qquad}_{(1Ab\ X/Q)} \times 3.6\times10^{5}\ \frac{\text{mrem}/\text{hour}}{\text{sec}/\text{m}^3} = \underline{\qquad\qquad}\ \text{mrem/hour}$$

1D. To calculate the whole body dose at any other location of interest, multiply the dispersion factor (X/Q) by the dose release factor ($3.6\times10^{5}\ \frac{\text{mrem/hr}}{\text{sec/m}^3}$) to obtain a reading in mrem/hour.

*If X/Q cannot be rapidly determined, use 6.1×10^{-4} sec/m³ for the site boundary and 9.6×10^{-5} for the LPZ (Reference Table 6.2-9 of Unit 2 FSAR)

4.10.2 Case I LOCA - Thyroid (Iodine) Dose

1A. To calculate the thyroid (Iodine) dose at the exclusion area boundary, multiply the dispersion factor (1Aa) by the dose release factor to obtain a reading in mrem/hour.

at exclusion area boundary					
______ (1Aa X/Q)*	x	9.1×10^{7}	$\frac{\frac{mrem}{hour}}{\frac{sec}{m^3}}$	=	______ mrem/hour

1B. To calculate the thyroid (Iodine) dose at the LPZ boundary, multiply the dispersion factor (1Ab) by the dose release factor to obtain a reading in mrem/hour.

at the LPZ boundary					
______ (1Ab X/Q)*	x	9.1×10^{7}	$\frac{\frac{mrem}{hour}}{\frac{sec}{m^3}}$	=	______ mrem/hour

1C. To calculate the thyroid (Iodine) dose at any other location of interest, multiply the dispersion factor (X/Q) by the dose release factor (9.1×10^{7} mrem/hr/sec/m^3) to obtain a reading in mrem/hour.

*from step 4.10.1.1A

4.10.3 Case II LOCA - Whole Body Dose

1A. To calculate the whole body dose at the exclusion area boundary, multiply the dispersion factor (1Aa) by the dose release factor to obtain a reading in mrem/hour (for the first 2 hours).

at exclusion area boundary

$$\underline{\hspace{3cm}}_{(1Aa\ x/Q)^*} \times 2.6\times10^4 \frac{\frac{mrem}{hour}}{\frac{sec}{m^3}} = \underline{\hspace{4cm}} \text{ mrem/hour}$$

1B. To calculate the whole body dose at the LPZ boundary, multiply the dispersion factor (1Ab) by the dose release factor to obtain a reading in mrem/hour.

at LPZ boundary

$$\underline{\hspace{3cm}}_{(1Ab\ x/Q)^*} \times 2.6\times10^4 \frac{\frac{mrem}{hour}}{\frac{sec}{m^3}} = \underline{\hspace{4cm}} \text{ mrem/hour}$$

1C. To calculate the whole body dose at any other location of interest, multiply the dispersion factor (x/Q) by the dose release factor ($2.6\times10^4 \frac{mrem/hour}{sec/m^3}$) to obtain a reading in mrem/hour.

*from Step 4.10.1.1A

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4.10.4 Case II LOCA - Thyroid (Iodine) Dose

1A. To calculate the thyroid (Iodine) dose at the exclusion area boundary, multiply the dispersion factor (1Aa) by the dose release factor to obtain a reading in mrem/hour.

at exclusion area boundary				
____ (1Aa X/Q)*	$\times\ 9.0\times10^{5}\ \frac{\text{mrem/hour}}{\text{sec/m}^3}$	=	________	mrem/hour

1B. To calculate the thyroid (Iodine) dose at the LPZ boundary, multiply the dispersion factor (1Ab) by the dose release factor to obtain a reading in mrem/hour.

at the LPZ boundary				
____ (1Ab X/Q)*	$\times\ 9.0\times10^{5}\ \frac{\text{mrem/hour}}{\text{sec/m}^3}$	=	________	mrem/hour

1C. To calculate the thyroid (Iodine) dose at any other location of interest, multiply the dispersion factor (X/Q) by the dose release factor $(9.0\times10^{5}\ \frac{\text{mrem/hr}}{\text{sec/m}^3})$ to obtain a reading in mrem/hour.

*from step 4.10.1.1A

4.10.5 Case III Gas Decay Tank Rupture - Whole Body Dose

1A. To calculate the whole body dose at the exclusion area boundary, multiply the dispersion factor (1Aa) by the dose release factor to obtain a reading in mrem/hour.

at exclusion area boundary

$$\underset{(1Aa\ X/Q)^*}{\underline{\qquad\qquad}} \times 3.0\times10^{6}\ \frac{\frac{mrem}{hour}}{\frac{sec}{m^3}} = \underline{\qquad\qquad\qquad} \text{ mrem/hour}$$

1B. To calculate the whole body dose at the LPZ boundary, multiply the dispersion factor (1Ab) by the dose release factor to obtain a reading in mrem/hour.

at LPZ boundary

$$\underset{(1Ab\ X/Q)^*}{\underline{\qquad\qquad}} \times 3.0\times10^{6}\ \frac{\frac{mrem}{hour}}{\frac{sec}{m^3}} = \underline{\qquad\qquad\qquad} \text{ mrem/hour}$$

1C. To calculate the whole body dose at any other location of interest, multiply the dispersion factor (X/Q) by the dose release factor ($3.0\times10^6\ \frac{mrem/hour}{sec/m^3}$) to obtain a reading in mrem/hour.

*from Step 4.10.1.1A

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4.10.6 Case IV Fuel Handling Accident - Whole Body Dose

1A. To calculate the whole body dose at the exclusion area boundary, multiply the dispersion factor (1Aa) by the dose release factor to obtain a reading in mrem/hour.

at exclusion area boundary

$$\underline{\qquad\qquad} \times 2.5\times10^{6} \frac{\frac{mrem}{hour}}{\frac{sec}{m^3}} = \underline{\qquad\qquad\qquad} \text{ mrem/hour}$$

(1Aa X/Q)*

1B. To calculate the whole body dose at the LPZ boundary, multiply the dispersion factor (1Ab) by the dose release factor to obtain a reading in mrem/hour.

at LPZ boundary

$$\underline{\qquad\qquad} \times 2.5\times10^{6} \frac{\frac{mrem}{hour}}{\frac{sec}{m^3}} = \underline{\qquad\qquad\qquad} \text{ mrem/hour}$$

(1Ab X/Q)*

1C. To calculate the whole body dose at any other location of interest, multiply the dispersion factor (X/Q) by the dose release factor $2.5 \times 10^6 \frac{mrem/hour}{sec./m^3}$ to obtain a reading in mrem/hour.

*from step 4.10.1.1A

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4.10.7 Case IV Fuel Handling Accident - Thyroid (Iodine) Dose

1A. To calculate the thyroid (Iodine) dose at the exclusion area boundary, multiply the dispersion factor (1Aa) by the dose release factor to obtain a reading in mrem/hour.

at exclusion area boundary
_______ (1Aa X/Q)* $\times 1.9\times10^7 \frac{\text{mrem/hour}}{\text{sec/m}^3}$ = _______________ mrem/hour

1B. To calculate the thyroid (Iodine) dose at the LPZ boundary, multiply the dispersion factor (1Ab) by the dose release factor to obtain a reading in mrem/hour.

at the LPZ boundary
_______ (1Ab X/Q)* $\times 1.9\times10^7 \frac{\text{mrem/hour}}{\text{sec/m}^3}$ = _______________ mrem/hour

1C. To calculate the thyroid (Iodine) dose at any other location of interest, multiply the dispersion factor (X/Q) by the dose release factor $1.9 \times 10^7 \frac{\text{mrem/hour}}{\text{sec./m}^3}$ to obtain a reading mrem/hour.

*from step 4.10.1.1A

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4.10.8 Case V Steam Generator Tube Rupture - Whole Body Dose

1A. To calculate the thyroid (Iodine) dose at the exclusion area boundary, multiply the dispersion factor (1Aa) by the dose release factor to obtain a reading in mrem/hour (for the first two hours).

at exclusion area boundary				
______ (1Aa X/Q)*	x	$4.2 \times 10^5 \frac{\text{mrem}/\text{hour}}{\text{sec}/\text{m}^3}$	= ______	mrem/hour

1B. To calculate the thyroid (Iodine) dose at the LPZ boundary, multiply the dispersion factor (1Ab) by the dose release factor to obtain a reading in mrem/hour.

at the LPZ boundary				
______ (1Ab X/Q)*	x	$4.2 \times 10^5 \frac{\text{mrem}/\text{hour}}{\text{sec}/\text{m}^3}$	= ______	mrem/hour

1C. To calculate the thyroid (Iodine) dose at any other location of interest, multiply the dispersion factor (X/Q) by the dose release factor $4.2 \times 10^5 \frac{\text{mrem/hour}}{\text{sec./m}^3}$ to obtain a reading in mrem/hour.

*from step 4.10.1.1A

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4.10.9 Case V Steam Generator Tube Rupture - Thyroid (Iodine) Dose

1A. To calculate the whole body dose at the exclusion area boundary, multiply the dispersion factor (1Aa) by the dose release factor to obtain a reading in mrem/hour.

at exclusion area boundary

_______ (1Aa X/Q)* x 5.6×10^5 $\frac{\text{mrem/hour}}{\text{sec/m3}}$ = _______________ mrem/hour

1B. To calculate the whole body dose at the LPZ boundary, multiply the dispersion factor (1Ab) by the dose release factor to obtain a reading in mrem/hour.

at LPZ boundary

_______ (1Ab X/Q)* x 5.6×10^5 $\frac{\text{mrem/hour}}{\text{sec/m3}}$ = _______________ mrem/hour

1C. To calculate the whole body dose at any other location of interest. multiply the dispersion factor (X/Q) by the dose release factor 5.6×10^5 $\frac{\text{mrem/hour}}{\text{sec./m}^3}$ to obtain a reading mrem/hour.

*from Step 1A , 4.10.1.1A

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SOURCE RELEASE TERM CALCULATIONS UNIT 1

Aux & FH	Iodine	Noble Gas	Rx Bldg.	Iodine	Noble Gas
1. RM-A8	______ c/m/m	______ c/m	1. RM-A9	______ c/m/m	______ c/m
2. FR 151	______ CFM	______	2. FR 148	______ CFM	______ CFM
3. Constant	3.62×10^{-7}		3. Constant	3.36×10^{-7}	
3. Constant		1.27×10^{-5}	3. Constant		1.21×10^{-5}
4. Mult 1x2x3=	______ $\frac{\mu Ci}{sec}$	______ $\frac{\mu Ci}{sec}$	4. Mult 1x2x3=	______ $\frac{\mu Ci}{sec}$	______ $\frac{\mu Ci}{sec}$
5. $\frac{4}{10^5}$ =	______ Ci/sec	______ Ci/sec	5. $\frac{4}{10^6}$ =	______ Ci/sec	______ Ci/sec

Secondary - Condenser Off Gas

1. RM-A5 ______ c/m
2. Constant 1.75×10^{-10} M^3/sec
3. Mult 1x2= ______ Ci/sec

Containment Leak Rate 0.2%/24 hr

RM-G8* METER READING	Iodine Ci/sec	Noble Gas Ci/sec
2R/hr	.0006	8.5
4R/hr	.0011	17.5
6R/hr	.0017	26
8R/hr	.0022	35
10R/hr	.0028	44
12R/hr	.0033	53

*RM-G8 is shielded. Reactor Building radiation level is 100 times RM-G8 meter readings. However, the numbers specified in this table are meter readings

TOTAL SOURCE TERM

	Iodine	Noble Gas
1. RM-A8 5	______	______
2. RM-A9 5	______	______
3. RM-A5 3	______	______
4. RM-G8	______	______
5. Add 1+2+3+4=	______	______ Ci/sec

Time ____________ Date ____________ Calculations by ____________________ Sheet #1

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ENCLOSURE 2

SOURCE RELEASE TERM CALCULATIONS UNIT 2

	Iodine	Noble Gas
Vent Monitor		
1. HP-R-219	______ c/m/m	______ c/m
2. Flow	______ CFM	______ CFM
3. Constant	$4.5x10^{-6}$	[X]
3. Constant	[X]	$1.35x10^{-5}$
4. Mult. 1x2x3	______ µCi/sec	______ µCi/sec
5. $4/10^{6}$	______ Ci/sec	______ Ci/sec

Flow

1. AH-FR-5720 (Service Bldg) ______ CFM
2. AH-FR-5284 (Aux. Bldg) ______ CFM
3. AH-FR-5286 (Aux. Bldg) ______ CFM
4. AH-FR-5659 (F.H. Bldg) ______ CFM
5. AH-FR-5063 (Rx. Bldg) ______ CFM
6. AH-FR-5075 (Rx. Bldg) ______ CFM
7. Total 1 thru 6 ______ CFM (Max = 275,500)

Total Source Term

	Iodine	Noble Gas
1. HP-R-219	______	______
2. HP-R-214	______	______
3. Add 1 & 2	______ Ci/sec	______ Ci/sec

HP-R-214 Containment Leak Rate

HP-R-214* Meter Reading	Iodine (Ci/sec)	Noble Gas (Ci/sec)
2 R/hr	.0006	8.5
4 R/hr	.0011	17.5
6 R/hr	.0017	26
8 R/hr	.0022	35
10 R/hr	.0028	44
12 R/hr	.0033	53

*HP-R-214 Is shielded. Rx. bldg radiation level is 100 times HP-R-214 meter reading. The numbers specified in this Table are Meter Readings

Time ______ Date ______ Calculations by ______

Data Sheet #1a

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OFF-SITE DOSE CALCULATION SHEET

Location____________________ Time__________

Wind Direction__________ ±180________

Wind Speed__________________ MPH

Wind Range______ ° Stability Class: ☐ Stable; ☐ Neutral; ☐ Unstable

		IODINE	NOBLE GAS
1.	Source Term Sheet #1	_____ Ci/sec	_____ Ci/sec
2.	X/Q	_____ Sec/M^3	_____ Sec/M^3
3.	Mult 1 x 2 =	_____ µCi/cc	_____ µCi/cc
4.	Wind Speed	_____ MPH	_____ MPH
5.	Divide 3/4	_____ µCi/cc	_____ µCi/cc
6.	Dose Rate (From Figure 1670.4-1)		_____ R/hr
7.	Expected Duration of Release	_____ Hours	_____ Hours
8.	Expected Dose to Child Thyroid (From Figure 1670.4-2)	_____ Rem	_____ Rem

Time________ Date________ Calculations by__________ Sheet #2

ENCLOSURE 4

1670.4
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1/15/78

ATION			PREDICTED 1	TIME	ACTUAL 2	CORRE[illegible] FACTOR $\frac{2}{1}$	ORIGINAL SOURCE TER[illegible] 4	TE[illegible] 4
	Iodine							
	Noble Gas							
	Iodine							
	Noble Gas							
	Iodine							
	Noble Gas							
	Iodine							
	Noble Gas							
	Iodine							
	Noble Gas							
20.0	Iodine							
	Noble Gas							
	Iodine							
	Noble Gas							
	Iodine							
	Noble Gas							
	Iodine							
	Noble Gas							
	Iodine							
	Noble Gas							

POOR ORIGINAL

Date______________ Calculation by__________ Sheet #3

7911192

ENCLOSURE 5

DATA SHEET 4 (continued)

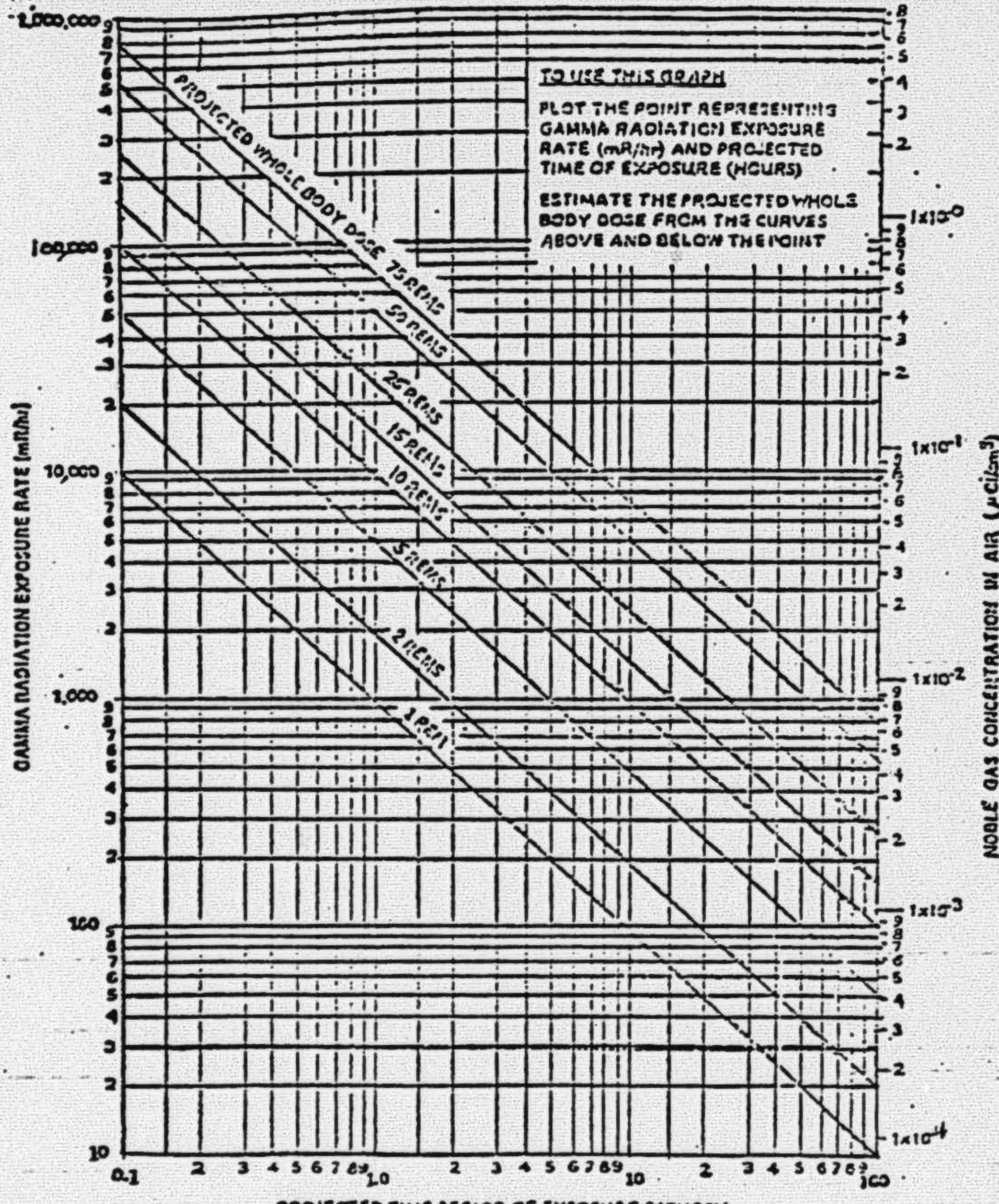
5. MPC_w** __________ $\frac{\mu Ci}{ml}$

6. Divide 4 ÷ 5 __________

**Weighted MPC_w for isotopes released. If unknown, use 3×10^{-8} $\frac{\mu Ci}{ml}$

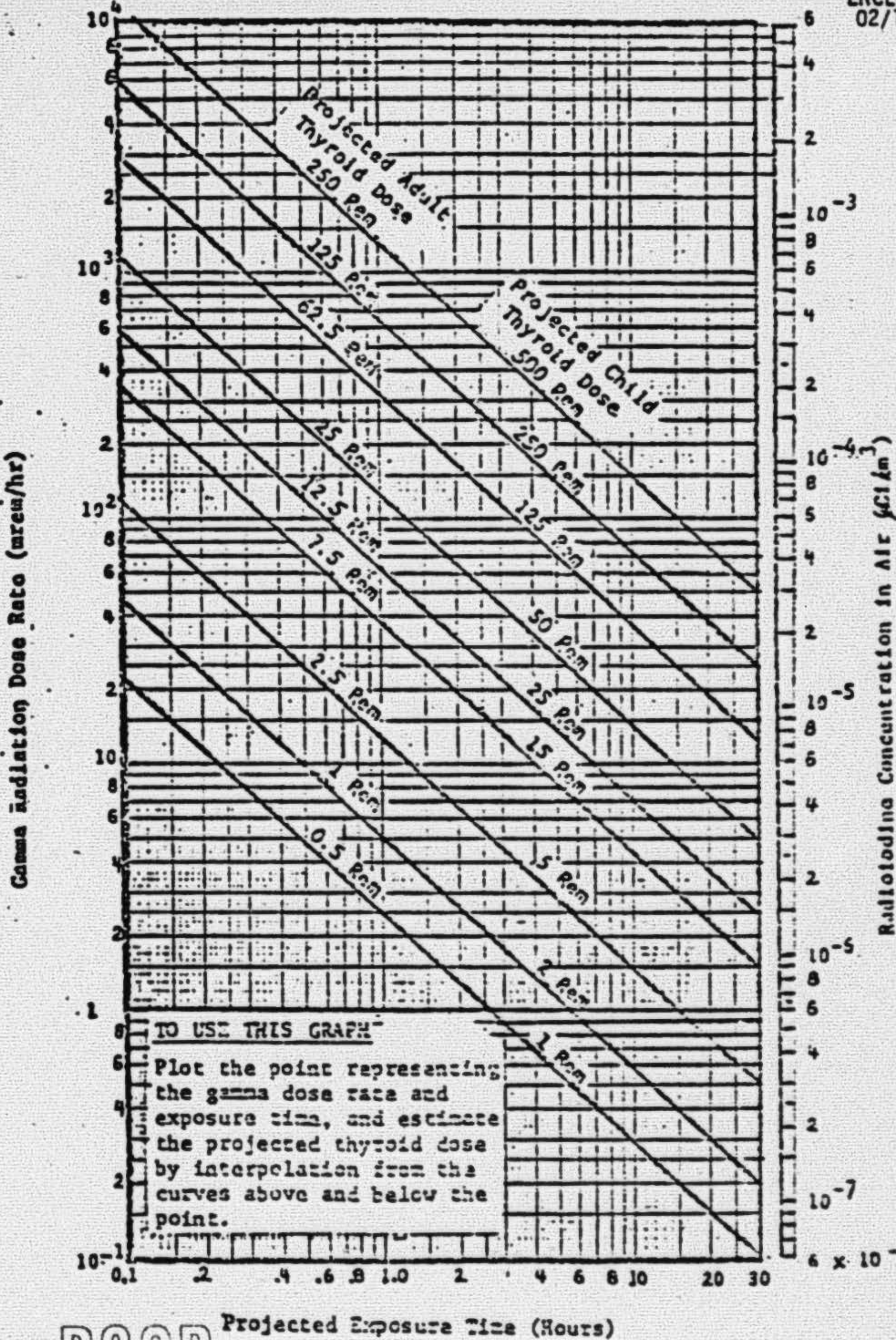
***If 6 exceeds 5000, immediate notification of NRC is required.

If 6 exceeds 500, 24-hour notification of NRC is required.



POOR ORIGINAL

7411195



POOR ORIGINAL

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ENCLOSURE 8

Table 1

A Gauge Reading Market Street Bridge, Harrisburg (Feet)	B River Elevation at TMI (Feet Above Sea Level)	C River Flow (Cubic Feet per Second)	D River Velocity (MPH)
3.0		3300	
3.5		8300	
4.0		15000	
4.3	278.7	20,000	.9
5.3	279.5	40,000	1.4
6.2	280.1	60,000	1.7
7.1	280.7	80,000	2.0
8.1	281.3	100,000	2.3
10.4	282.5	150,000	2.6
12.5	283.6	200,000	3.1
14.3	284.9	250,000	3.3
16.1	285.8	300,000	3.5
17.9	287.0	350,000	3.7
19.5	288.1	400,000	3.9
21.2	289.7	450,000	4.1
22.7	291.0	500,000	4.3
24.3	292.6	550,000	4.5
25.6	294.0	600,000	4.7
26.9	295.2	650,000	4.9
28.1	296.1	700,000	5.1
29.3	297.1	750,000	5.3
30.4	298.1	800,000	5.5
31.3	299.1	850,000	5.7
32.0	300.1	900,000	5.9
33.1	302.0	1,000,000	6.3

TABLE II

Downstream Users of the Susquehanna River

Consult 1670.14 for appropriate telephone numbers:

Potential downstream users of the Susquehanna include the following treatment facilities:

Brunner Island Steam Electric Station; west bank; 5 miles downstream.

Wrightsville Water Supply Company; west bank; 16.25 miles downstream.

Borough of Columbia; east bank; 16.75 miles downstream.

City of Lancaster; east bank; 16.75 miles downstream.

Safe Harbor Water and Power Corporation; east bank; 27.25 miles downstream.

Holtwood Reservoir; east bank; 34.75 miles downstream.

Chester Water Authority; east bank; 43 miles downstream.

City of Baltimore; west bank; 49 miles downstream.