Dept. Head ETB
PORC PL Neurons
MOO N/A

Proc. No. 2.50.4
Class. A
Rev. No. 10
Issue Date 4-25-85
Review Date 4/87

2.50.4 GENERAL EMERGENCY

DISCUSSION

A General Emergency is defined as actual or imminent substantial core degradation or melting, with a potential for loss of containment integrity. The events included in a General Emergency category represent actual or potential substantial off-site radioactivity releases requiring immediate implementation of off-site protective actions. Assessment of radiological parameters will determine the type of protective measures necessary.

The decision to make an immediate initial declaration rests with the Emergency Coordinator. Prompt notification is made to the appropriate off-site authorities to assure that sufficient emergency personnel are mobilized and respond to the event in accordance with their respective emergency plan arrangements. Public information concerning the event will be provided via appropriate mechanisms. The public will be alerted by the Public Emergency Alert System under this emergency. The State will activate this system, unless plant conditions immediately indicate a General Emergency condition. Under this circumstance the Plant Shift Superintendent will authorize activation of this system from the Control Room.

Other nuclear industry organizations will be alerted and requested to render assistance as appropriate. Federal agency response will be implemented in accordance with the Federal Master Emergency Plan.

All emergency centers are activated following the declaration of a General Emergency. All personnel without emergency assignments are evacuated from the plant Protected Area. The Emergency Operations Facility (EOF) once activated, will provide a centralized meeting location for representatives from all responding emergency organizations.

The following appendices are attached and are to be used as check-off sheets by individuals responsible for implementation of this procedure at the various identified center locations:

Dept. Head E.C.B.
PORC P.S. Newcomb

Proc. No. 2.50.10
Class. A
Rev. No. 8
Issue Date 5-28-85
Review Date 5/87

2.50.10 EVALUATION OF RADIOLOGICAL DATA

1.0 DISCUSSION

This procedure is to be used to assess the off-site radiological hazards due to an abnormal release of radioactive material by evaluating information received from within the plant, off-site monitoring teams, and environmental monitoring stations. Radiological assessment is made to the extent of projecting doses to the public from each source of data. The dose rate projections produced by this procedure represent the best estimate possible for each method. If projections from in-plant parameters are significantly different than those measured in the environment, it may be due to specific variations in the plume behavior which cannot be pre-determined. The results obtained from this procedure should be carefully analyzed since these may form the basis for protective action recommendations to the public.

There are two sources from which information will be available for the analysis of radiological hazards; in-plant (stack effluent monitor, containment hi range monitor, or other) and off-site field monitoring surveys (air samples and dose rates). From each of these sources, the projection of off-site whole body and thyroid doses are possible with the necessity of employing different techniques at each area. In order to categorize the different techniques, the procedure has been divided into several appendices.

When the High Range Stack Monitor or the High Range Containment Monitor are indicating measurable levels of radioactivity, Control Room personnel can make early initial estimates of the off-site whole body dose rates by using the computer system in the Control Room (use Appendix A) or the nomograms on the Control Room wall (use Appendix B).

APPENDIX	TITLE	PAGE
A	Computer Calculation of whole body dose/dose rate protections at 1/2 mile to 10 miles using in plant parameters.	6
	NOTE: When the computer is working use this method for calculating whole body dose/dose rates for stack and containment releases.	

These appendices should be used in the order that they appear since they are arranged in the order of priority. A description of the appendicies and the interpretation of the results are given below. Each appendix uses the existing meteorology conditions and therefore these parameters should be periodically monitored for significant changes.

Appendix A describes how to use the computer terminals, located in the Control Room and the EOF, to perform whole body dose rate calculations. The program uses the same algorithms used to develop the nomograms along with additional parameters that allow for the variation of containment leakage with containment pressure, the dose at various distances up to 10 miles and the plume arrival times. A CRT is available at the computer terminal that displays containment absolute pressure, upper wind velocity and lower wind velocity (15 min. avg.) and the 195 ft.-33 ft., temperature difference.

Appendix B may be used by Control room or Emergency Center personnel to obtain an estimate of the release rate and/or off-site whole body dose rate at 1/2 mile due to a high level stack release, a containment leakage release or a release through the main steam system during a loss of coolant accident (LOCA). This appendix uses the Emergency Off-Site Dose Nomogram which requires the following inputs: time after plant shutdown, containment hi-range monitor dose rate, wind speed, delta temperature (for atmospheric stability class), and the high range noble gas monitor response. The information obtained from the Nomograms is Total Noble Gas Release Rate and Off-Site Whole Body Dose Rate at 1/2 mile. It must be acknowledged that information obtained from the Containment Leakage Nomogram is very conservative, since it assumes a containment leakage of 0.1% per day which is the maximum allowed design basis leakage at peak containment pressure, therefore, a correction for containment pressure is available.

Appendix C should be used by the Radiological Data Evaluator to assess the potential off-site thyroid dose to the public by evaluation of the Primary Vent Stack (PVS) charcoal cartridge for halogen release. The appendix describes the method by which the charcoal cartridge at the stack should be analyzed and evaluated to obtain iodine concentations at 1/2 mile. From this result, the Field Sample Thyroid Dose Nomogram may be used to obtain Adult and Newborn thyroid dose estimates.

Appendix D describes how to calculate the airborne particulate activity from the field data. The appendix describes the methods to be used to evaluate the results reported by the off-site survey teams from the iodine cartridge field counting and to analyze the sample at the EOF for more accurate radiological estimates. These results are also used in conjunction with the Field Sample Thyroid Dose Nomogram to obtain Adult and Newborn Thyroid Doses. As data comes in from the field, it should be recorded on Data Sheet G.

Appendix E describes the method to be used to project the in-plant and field measured estimates of whole body and thyroid doses to distances greater than 1/2 mile. The results of these projections should be compared to the field sample measurement performed by the Off-Site Survey Teams. In the event that these measurements are significantly different, it may indicate one of the following:

a) Containment leakage estimates are in error, or,

b) Meteorological conditions have changed rapidly, or

c) Actual plume dispersion is extremely stochastic (variable).

Appendix F describes the manual method to use to plot the path of the airborne radioactivity (plume) as it is dispersed downwind.

Appendix G is used to estimate the accumulated dose received by the population living within the Emergency Planning Zone.

Appendix H calls attention to the use of the environmental station's samples, soil and other enviornmental sample media to be used for dose assessment to the public during the later stages of the accident. The analysis of these samples will be made when the Yankee Environmental Lab van arrives or the samples are sent out for analysis. Therefore, this section describes sample collection and labeling techniques that should be employed.

2.0 OBJECTIVE

2.1 To assess the off-site radiological hazards associated with an abnormal release of radioactive material from the plant so that appropriate protective actions to the public may be recommended.

3.0 REFERENCES

4.0 PRECAUTIONS

4.1 Meteorological conditions are subject to change and must be closely monitored and recorded during the potential radiological hazard.

4.2 Results of the different dose projection methods must be carefully compared for a complete evaluation of the radiological off-site conditions.

4.3 If the PVS High Range Noble Gas Monitor (RM 3903)is inoperable, the RM-16 monitor (RM-16) must be used for stack noble gas release calculations. The graph in Appendix B Section 5 and the nomogram located in the EOF E-Plan cabinet must be used as these parameters are NOT in the computerized dose calculation program for stack releases.

5.0 PROCEDURE

NOTE: At each stage of the procedure, pass the appropriate information to the Emergency Coordinator so that protective actions may be recommended.

5.1 Upon notification of an Emergency condition, complete the steps in Appendix A to determine the off-site whole body dose rate at 1/2 mile. Use Appendix B if the computer is inoperable.

5.2 Check with the Chemistry section to assure that they have implemented Procedure 7.1.3 "Post Accident Primary Vent Stack Sampling" if the stack radiation monitor indicates a release is occuring.

5.3 Chemistry results should be reported to the Radiological Data Evaluator.

5.4 Once the Primary Vent Stack charcoal cartridge has been analyzed or off-site iodine samples have been collected, determine the off-site projected thyroid dose as described in Appendix C. If this sample has not been taken, go to 5.3.

5.5 As offsite data are available determine offsite air activity using Appendix D.

5.6 After the 1/2 mile projected doses/dose rates have been determined, go to Appendix E and calculate projected doses at other locations of interest.

5.7 Make periodic estimates of the plume travel using Appendix F.

5.8 Make periodic estimates of the accumulated population dose using the procedure described in Appendix G.

5.9 Under the direction of the Emergency Coordinator, make provisions to collect the air samples at the environmental sample stations and other environmental samples (soil, water, vegetation, milk, etc.) as outlined in Appendix H.

5. [illegible]ccount for any steam generator blowdown that has been discharged to the [illegible]vironment during a primary to secondary tube leak incident. Have the Chemistry section evaluate the release.

5.11 As updated information becomes available, repeat the steps in each Appendix as appropriate.

6.0 FINAL CONDITIONS

6.1 The radiological hazards associated with the plume exposure pathway have been defined by the best means available.

NOTE: When reporting results to the State of Maine C.E.P. use the Data Reporting Sheets Form 3 Meteorology page 11, Form 4 Projected Doses page 9, Form Y Primary Vent Stack Iodine Analysis page 21 and Form X Off-site Survey Report page 22.

6.2 All calculated and measured parameters have been logged on the appropriate data reduction forms and recorded on the EOF status board.

6.3 All information and data forms have been given to the Emergency Coordinator.

6.4 Environmental Samples have been taken and analyzed.

APPENDIX A

Computer Whole Body Dose/Dose Rate Projections

1.0 Computer Terminal Locations

1.1 A Decwriter that will call up the off-site dose program is located in the Control Room.

1.2 A system 34 computer terminal and CRT screen and a Decwriter input terminal for the Prodcomp computer are located in the EOF.

2.0 Computer Operation - System 34

2.1 Turn the computer terminal on.

2.2 Adjust the intensity of the markers that are displayed.

NOTE: If no markers are displayed and varying the intensity knob does not bring up the markers, call the computer section for help.

2.3 To get the sign on display on screen do the following:

2.3.1 Depress and hold the up shift key (arrow pointing up).
2.3.2 Depress the Sys. Reg. key (still holding up shift).
2.3.3 Depress the Enter/Rec. Adv. key (still holding up shift).
2.3.4 Release the up shift key. The sign on display should be on screen.

NOTE: If the sign on display does not appear on the screen after several attempts call the Computer Department for help.

2.4 Type any one of the following names in the User ID field of the sign on screen:

Tom, Dick or Harry

2.5 Depress the key on the right marked Field Exit.

2.6 Type MYAT in the password field. The password will not be displayed.

2.7 Depress the Enter/Rec. Adv. key.

2.8 A Guest Menu, a display of 24 options that you can choose, will appear on screen.

2.9 Type in the number 21. Depress Enter/Rec. Adv. key. This will get the Off-Site Dose Program.

2.10 The screen will display the following:

Maine Yankee Computerized Off-Site Emergency Dose Program
--- Please note that all numeric inputs except time since shutdown require a decimal point.

Please enter the time since shutdown in hours and minutes (hours can be up to 3 digits, so zero-fill as necessary, (e.g., "013:45 for 13:45).

2.11 The instructions to put in a decimal point after each numeric entry (e.g., 12. not 12) must be followed or the computer will not accept the information and will repeat the request for the number. If a decimal point already exists in a number, you do not need to add another (1.5, not 1.5.).

2.12 The computer will continue to ask for the input parameters necessary for the calculation. Answer the request and depress the Enter/Rec. Adv. key after each entry.

2.13 After the last entry (Containment Absolute Pressure) the computer will print out a list of the inputs, followed by the instruction to "Press Enter Key to view Next Page".

2.14 After pressing the Enter Key you will get the output information. (Dose rate in mr/hr from 0.5 to 10 miles, plume arrival time at each distance, release rates from the stack and containment). Record this information.

2.15 The question Rerun Coed is asked at the end of the output table. If you answer "Y" for yes, you will be returned to the beginning of the program. Do this only if you don't want a print-out at this time.

2.16 If you answer "N" for no to the Rerun Coed question you will be returned to the Guest Menu listing. A print-out of the data input and the results will be produced. To prepare terminal for another calculation, choose option 21.

2.17 Complete Form 4 or attach a copy of the printout and route to the Rad. Evaluation Assistant.

2.18 You can sign off the computer by typing the number 24, the "Sign Off" option.

2.19 Never power off the terminal unless you sign off first.

3.0 Computer Program - Modcomp Decwriter Input

3.1 Turn the Decwriter on.

3.2 If a $ (dollar sign) is on the screen go to Step 3.8.

3.3 Press and hold the Control Key and then press the A key.

3.4 Release both keys. You then get operator control.

R 3.5 Hit /BAT001/E,, BM (slash, BAT001, slash, E, comma, comma, B,M) or at the EOF terminal, hit /BAT002/E,, BM (slash, BAT002, slash, E, comma, comma, B, M).

3.6 Hit carriage return.

3.7 You will get a $ (dollar sign) in the screen.

3.8 Type in the program name, COED.

3.9 Hit carriage return and dose program will come up.

3.10 Follow instruction on the screen.

FORM 4 - PROJECTED DOSES

Info Current at _____ Time/Date

Noble gas release rate_____

Projected Whole Body Gamma Dose Rate (Sector-Averaged)

Distance	Dose Rate	Transit Time*
1/2 Mile	_____mr/hr	_____hrs:min
1 Mile	_____mr/hr	_____hrs:min
2 Miles	_____mr/hr	_____hrs:min
3 Miles	_____mr/hr	_____hrs:min
4 Miles	_____mr/hr	_____hrs:min
5 Miles	_____mr/hr	_____hrs:min
6 Miles	_____mr/hr	_____hrs:min
7 Miles	_____mr/hr	_____hrs:min
8 Miles	_____mr/hr	_____hrs:min
9 Miles	_____mr/hr	_____hrs:min
10 Miles	_____mr/hr	_____hrs:min

* Transit time is the time it takes released material to travel from the release point to the field at the indicated distance.

---

1) Prepared by_____
Radiological Data Evaluator

2) Original to Radiological Evaluation Assistant for Approval_____

3) Copies to: Recovery Manager
NRC
Radiological Evaluation Assistant
Radiological Data Evaluator

4) Approved original to Emergency Coordinator for Approval_____

5) Emergency Coordinator's Original to Hotline Operator

6) Transmitted to State by:_____
Hotline Operator

_____
Date/Time

7) File Original

APPENDIX B

Nomogram Calculations of Whole Body Dose/Dose Rate Projections At 1/2 Mile From In-Plant Parameters

NOTE: Nomograms are wall mounted in the Control Room (behind Reactor Protection System) and in the EOF (at the dose assessor station).

1.0 Determine the value of the following parameters.

1.1 Time after Shutdown, t (HRS)
(if reactor is operating, set t = 0 HRS)

1.2 Containment Hi Range Monitor Response, Dc (R/hr)
(If applicable)

1.3 Containment Pressure, Pc (PSIG)

1.4 Range Noble Gas Stack Monitor Response, Ds (mr/hr)
(If applicable)

1.5 Steam line radiation levels (if applicable)

1.5.1 Affected steam line

1.5.2 Main steam pressure (PSIG) or Atmosphere Steam Dump.

1.5.3 Steam line radiation level, D_{SL} (mr/hr)

1.6 Wind Speed (previous 15 minute average), u (mph). Log on Form 3.

1.7 Wind Direction (previous 15 minute average). Log on Form 3.

1.8 Met Tower Delta Temperature, ΔT (°F).

1.9 Number of Primary Vent Stack (PVS) Fans Operating.

1.10 Estimated Duration of Accident
(only if accurate estimate can be established)

2.0 From the following table and the value of ΔT, determine the atmospheric Stability Class and report on Form 3.

DELTA TEMPERATURE T (°F)	PASQUILL ATMOSPHERIC STABILITY CLASS
$T \leq -1.74$	A
$-1.73 \leq T \leq -1.55$	B
$-1.54 \leq T \leq -1.37$	C
$-1.36 \leq T \leq -0.46$	D
$-0.45 \leq T \leq +1.36$	E
$+1.37 \leq T \leq +3.64$	F
$+3.65 \leq T$	G

FORM 3 - METEROLOGY

Info Current at _____ Time/Date

Delta Temperature (°F) (Upper Minus Lower)_____ °F

Stability Class - Pasquill_____

10 Meter Elevation Wind Speed_____ mph

10 Meter Elevation Wind Direction (from)_____ degrees

30 Meter Elevation Wind Speed_____ mph

30 Meter Elevation Wind Direction (from)_____ degrees

NOTE: Use with Form #2 "Release Data".

---

1) Prepared By _____
Radiclogical Data Evaluator

2) Copies To: Radiological Evaluation Assistant
NRC
Radiological Data Evaluator

3) Original to Emergency Coordinator for Approval _____

4) Approved Original to Hotline Operator

5) Transmittal to State By:_____
Hotline Operator

_____
Date/Time

6) File Original

LOCA Determination

3.0 From the In-Containment High Range Monitors (RM 6113A & RM 6113B), determine the LOCA designation from the following table.

IN-CONT. HIGH RANGE MONITOR RESPONSE	LOCA DESIGNATION	TYPE OF LOCA
2 R/hr $\leq D_C \leq$ 15 R/hr	I	Large Primary Coolant Leak
15 R/hr $\leq D_C$	III	Fuel Melt LOCA

Containment Leakage

4.0 If the In-Containment High Range Monitor response is greater than 2 R/hr, then determine the total noble gas release rate and the 1/2 mile whole body dose rate using the Containment Leakage Nomogram as described below. Log these results on Data Reduction Sheet B.1. If this monitor is less than 2 R/hr, go to step 5.0 since off-site doses will be negligible.

4.1 Locate the "Time after Shutdown" axis, at the appropriate value of t(hrs), draw a vertical line through the curves of parameters J(t) and J(t)/F(t).

4.2 At the intersections of this vertical line with the appropriate J(t) and J(t)/F(t) curves , draw a horizontal line to the right, through the appropriate diagonal lines of the In-Cont. High range Monitor readings.

4.3 From the parameter J(t) horizontal line, locate the intersection of the appropriate "In-Cont. High Range Monitor" response and proceed vertically downward until you intersect the "Noble Gas Release Rate, Q (uCi/sec) scale. Record this value on Data Reduction Sheet B.1 (page 17).

4.4 From the parameter J(t)/F(t) horizontal line, locate the intersection of the appropriate "In Containment High Range Monitor" response and proceed vertically upward. At the intersection of the appropriate "ATMOSPHERIC STABILITY CLASS", proceed horizontally to the right. At the appropriate wind speed intersection, use the ground level (10 meter) wind speed, proceed vertically upward and read the value of the "OFF-SITE DOSE RATE" @ 1/2 Mile, mr/hr and record on Sheet B.1 in uncorrected 1/2 mile Dose Rate (mr/hr) column.

4.5 Record Containment Pressure (Pc) in psig on Sheet B.1. Calculate K where K = Pc (psig)/55.

4.6 Adjust the off-site dose rate for actual containment pressure, (Pc), by multiplying by K. Record this value on Data Sheet B.1 (page 17). If release rates are to be used for any calculations, be sure to correct them for containment pressure in the same manner.

4.7 Multiply the corrected dose rate at 1/2 mile by the estimated duration of the release to obtain the projected whole body dose, if applicable. Record this value on Data Reduction Sheet A.

Primary Vent Stack Release

5.0 If the Primary Vent Stack (PVS) normal range noble gas monitor (RM 3902) response is high off-scale and the PVS high range noble gas monitor (RM 3903) reads 0.1 MR/Hr or greater, then determine the total noble gas release rate and the 1/2 mile whole body dose rate using the STACK RELEASE NOMOGRAM as described below. Log these results on Data Reduction Sheet B.1 (page 17).

NOTE: If the PVS (Victoreen) High Range Noble Gas Monitor is inoperable, go to Step 5.6.

NOTE: If neither of the above conditions exist, go to step 6.0.

5.1 Locate the "Time After Shutdown" axis on both the release rate function graph J(t) and the dose rate function graph J(t)/F(t), at the appropriate value of t(HRS), proceed vertically upward.

5.2 At the intersections of the appropriate LOCA designation curve of parameters J(t) and J(t)/F(t), draw horizontal lines to the right, through the "PVS High Range Mon." diagonal lines.

5.3 At the intersection of the horizontal line from parameter J(t) with the appropriate value of the "PVS High Range Mon." response, proceed vertically downward until you intersect the appropriate "Noble Gas Release Rate, Q(UCi/sec)" scale for 1 or 2 operating PVS fans. Record this value on Data Reduction Sheet B.1.

5.4 At the intersection of the horizontal line from parameter J(t)/F(t) with the appropriate value of the "PVS High Range Mon." response, proceed vertically upward to the appropriate "Atmospheric Stability Class" lines. At this intersection point, proceed horizontally to the right. At the intersection with the appropriate "Wind Speed" line, use the elevated level (30 meter) wind speed, proceed vertically upward until you intersect the "OFF-SITE DOSE RATE @ 1/2 Mile, mr/hr" scales for 1 or 2 operating PVS fans. Record this value on Data Reduction Sheet B.1 (page 17).

5.5 Multiply the estimate of the duration of the release by the above result to obtain the projected whole body dose. Record this value on Data Reduction Sheet B.1.

NOTE: Follow Steps 5.6 through 5.13 only if the Victoreen High Range Monitor is inoperable.

5.6 Check to see if the RM-16 is operating. The RM-16 readout is located at the bottom of the center panel of the Radiation Monitoring System Board in the Control Room.

5.7 If the RM-16 is not operating check with I & C.

5.8 If the RM-16 is working but is not reading and the low range stack monitor is off scale high have Chemistry take a stack gas sample.

5.9 Use Fig. 1 Site Boundary Dose Rate Versus PVS Gas Concentration (page 16) to estimate site boundary dose rate at the analyzed uCi/cc level.

NOTE: The graph assumes the worst meteorological conditions. Another method to use would be to calculate the release rate using the formula:

Release Rate (uci/sec)=gas activity (uci/cc) X stack flow (CFM) X 470 cc/sec/CFM

With this calculated release rate go to the nomogram (Rev-1 edition) and procede to determine the dose rate at 1/2 mile for existing conditions.

5.10 If the RM-16 is reading use the Rev. 1 edition of the Containment and PVS Nomogram. This nomogram is located in the EOF emergency storage cabinet.

5.11 Use the Rev. 1 PVS Nomogram to determine 1/2 mile offsite dose rate for the indicated RM-16 reading in the same manner as described above for the Victoreen High Range Monitor.

5.12 Data may be recorded on Data Reduction Sheet B.1 (page 17).

5.13 Multiply the estimate of the duration of the release by the above result to obtain the projected whole body dose. Data may be recorded on Data Reduction Sheet B.1.

Steam Line Releases

6.0 If the main steam safety relief valves or the atmospheric steam dumps have been operated, and radiation levels are observed on the Main Steam Line radiation monitors, then determine the noble gas release rate and off-site dose rate at 1/2 mile from the steps below. If either of the above conditions have not been met, go to Appendix C and complete those items.

NOTE: If Main Steam Line radiation monitors are not operable go to Step 7.0 (next page).

6.1 Use the Emergency Main Steam Line Release Nomogram to determine noble gas release rate and off-site dose rate.

6.2 Locate the "Time After Shutdown" axis, at the approximate value of T (hrs), draw a vertical line through the curves of parameters J(t) (the release rate function) and J(t)/F(t) (the off-site dose rate function).

6.3 At the intersections of the approximate LOCA designation curves of parameters J(t) and J(t)/F(t), draw horizontal lines to the right, through the approximate diagnal line indicating the Main Steam Monitor Response.

6.4 Draw a vertical line down from the intersection of the J(t) release rate function and the Main Steam Monitor Response through the release rate scales for the various pressure set points for the Main Steam Reliefs and the Atmospheric Steam Dump.

6.4.1 Determine if the plant is on Atmospheric Steam Dump or if the steam pressure is at or above any of the relief valve set points indicated on the scales.

6.4.2 If the steam pressure is between two safety setpoint scales, use the lower setpoint scale since the pressure is not enough to lift the higher setpoint. [For example for a steam pressure of 1015 psig use the 1005 psig scale - that scale would account for steam flow through all steam relief valves that would lift at 1015 psig].

6.4.3 If the release is via the Atmospheric Steam Dump, use the scale labeled ASD.

6.5 Read the noble gas release rate from the intersection of the vertical line drawn in Step 6.4 and the appropriate scale.

6.6 Draw a vertical line up from the intersection of the J(t)/F(t) (off-site dose rate function) and the main steam line monitor response to the appropriate "Atmospheric Stability Class" lines. At this intersection proceed horizontally to the right. Where this intersects with the appropriate "Wind Speed" line, use the ground level (10 meter) wind speed, proceed vertically upward through the "Off-Site Whole Body Dose Rate Scales".

6.7 As in Step 6.6 determine the appropriate scale and read the off-site dose rate at 1/2 mile from the intersection of the vertical line and the chosen scale.

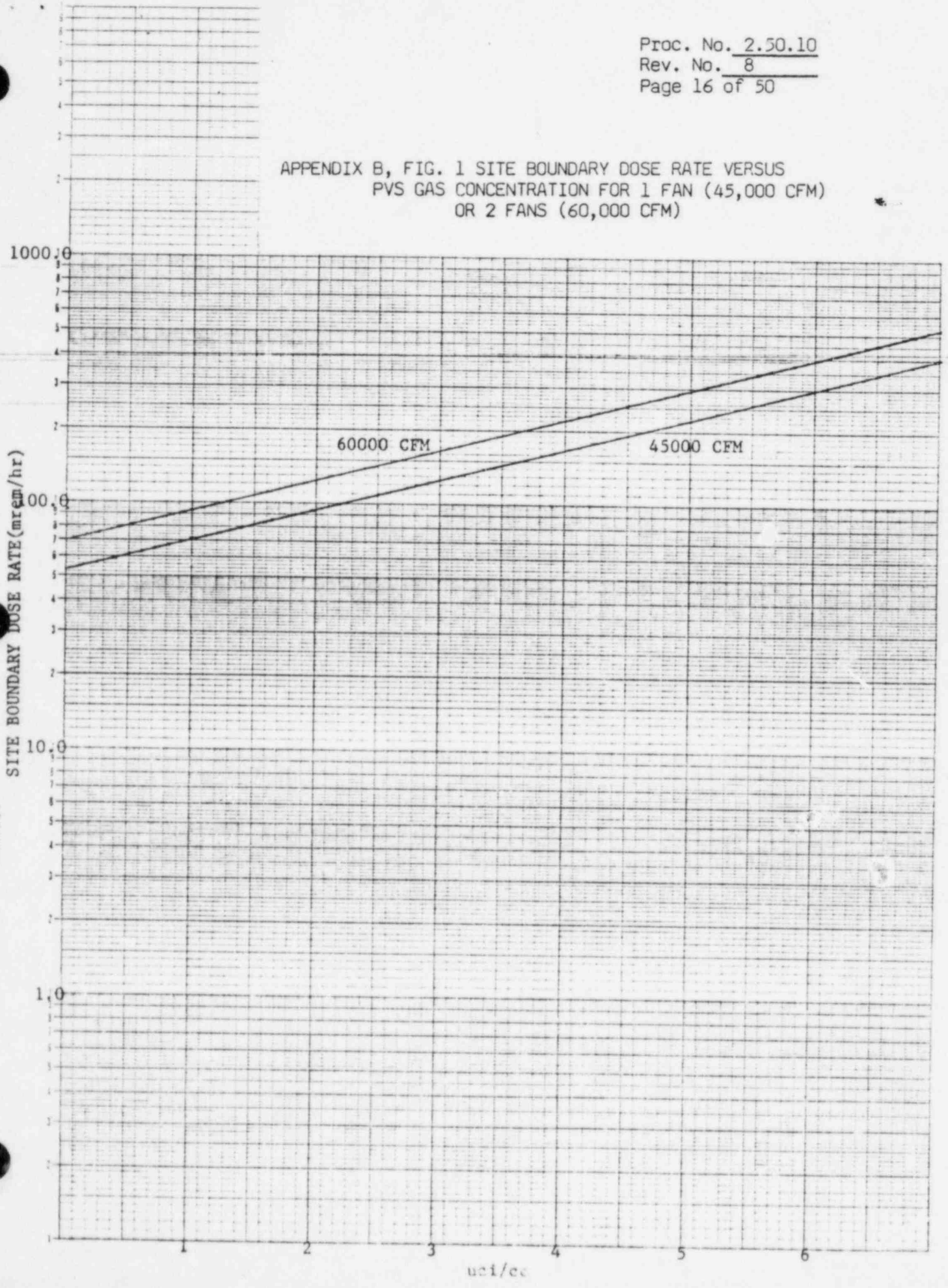
7.0 If the Maine Steam Line radiation monitors are not operable use the following steps to determine dose rates at 1/2 mile.

7.1 Send a technician to the location of the main steam radiation monitors and have him take a contact reading, using a PIC 6A, as close to the monitor as possible.

7.2 Record the reading and the Steam Line it applies to.

7.3 Use the readings obtained with the PIC 6A instead of the Main Steam Line Monitor Response for calculating the off-site dose rate from the Emergency Main Steam Line Release Nomogram.

APPENDIX B, FIG. 1 SITE BOUNDARY DOSE RATE VERSUS PVS GAS CONCENTRATION FOR 1 FAN (45,000 CFM) OR 2 FANS (60,000 CFM)



DATE

DATA REDUCTION SHEET A
PROJECTED WHOLE BODY DOSE/DOSE RATE

Calculation Results (from Nomogram)

Calculation #	Time	Q(uCi/sec)	Uncorrected 1/2 Mile Dose Rate (mr/hr)	Containment Pressure (PSIG) PC	K = Pc/55	Corrected 1/2 Mile Dose Rate (mr/hr)	Estimated Release Rate (1 hr) (Default=2hr)	1/2 Mile Dose (mr)
1								
2								
3								
4								
5								

Primary Vent Stack and Steam Line Releases

Calculation #	Time	For Stack Release Check One 1 Fan	2 Fans	For Steam Release Pressure	Q(uCi/sec)	1/2 Mile Dose Rate (mr/hr)	Estimated Release Duration (hr) (Default=2hrs)	1/2 Mile Dose (mr)
1								
2								
3								
4								
5								

APPENDIX C

Thyroid Dose Assessment From
Inplant Measurements

1.0 Inplant Analysis of PVS iodine cartridge

1.1 Obtain sample according to Chemistry Procedure 7.1.3, "Post Accident Primary Vent Stack Sampling Procedure".

1.2 Once the PVS iodine cartridge (silver zeolite) has been analyzed, on the plant GeLi (if available), or the SAM 2 (if plant GeLi is not available) proceed as follows.

1.2.1 Determine activity using the computerized analysis program.

1.2.2 If sample is counted on the plant GeLi, the output information can be either activity (uCi) or concentration (uCi/cc or uCi/ft^3) of I-131. If "Dose Equivalent Iodine-131 Activity" is provided by the computer, use that in preference to straight I-131 activity.

1.2.3 If counted on the SAM 2, calculate the activity using the following equation:

$$\text{I-131 (uCi)} = \frac{\text{SAM-2 Sample counts per minute} - \text{SAM-2 Background counts per minute}}{\text{SAM-2 Efficiency (cpm/dpm)} \times 2.22 \times 10^6 \text{ dpm/uCi}}$$

NOTE: SAM-2 efficiency is posted on the instrument.

1.3 Determine the I-131 concentration at 1/2 mile offsite as follows.

1.3.1 Calculate the release rate using the computer program if available.

1.3.2 If activity (uCi) is provided, calculate the I-131 release rate, Q_{I-131}, (in uCi/sec) as follows.

$$Q_{I-131}(\text{uCi/sec}) = \frac{(A_F)\,(F_{STACK})}{(F_F)\,(t)}$$

If sample concentration (C) is provided, calculate the release rate from:

$$Q_{I-131}\ (\text{uCi/sec}) = (C)(F_{STACK})(28317\ \text{cc/ft}^3)(1\ \text{min/60 sec.})$$

where: C= Concentration of sample, uCi/cc
A_F= Activity on charcoal cartridge, uCi
F_F= Flow rate to the charcoal cartridge, CFM
t= time since beginning of release that cartridge was in the sample stream, sec.
F_{STACK}= Flow rate out the PVS (CFM)
For 1 Fan, F_{STACK} = 45,000 CFM
2 Fans, F_{STACK}= 60,000 CFM

*If flow rate to the cartridge is given in cc/min., convert to CFM by dividing by 28, 317 cc/CF.

1.3.3 Obtain the 1/2 mile diffusion factor (uX/Q) from Table B-1 and the Stability Class.

NOTE: If stability Class E, F, or G, use value of Max. Ground Level uX/Q.

1.3.4 Observe the wind speed (u) in mph, convert this to meters/sec as follows:

u in m/sec = .447 x (mph).

1.3.5 Determine the value of X/Q (sec m^{-3}) as follows:

$$X/Q \text{ (sec } m^{-3}) = \frac{(u\ X/Q)}{u}$$

1.3.6 Calculate the 1/2 mile I-131 concentration as below.

$$C \text{ (uCi/cc)} = Q_{I-131}\text{(uCi/sec)} \times X/Q\text{(sec/m}^3\text{)} \times 10^{-6}\ m^3\text{/cc.}$$

1.4 Determine the Projected Adult and Newborn Thyroid Dose as follows.

1.4.1 Estimate the duration of the accident ("Inhalation Time").

NOTE: Use 2 hours if no other value is available.

1.4.2 Using the "Field Sample Thyroid Dose Nomogram" determine the appropriate Projected Doses as follows.

a) Locate the "I-131 air concentration, uCi/cc" axis.

b) From the appropriate concentration value, proceed vertically upward to the "Inhalation Time (Hours)" value.

c) From this intersection proceed horizontally to the right through the Adult and Newborn Thyroid Dose Scales. Log the values of the Adult and/or Newborn Thyroid Doses on Form Y.

1.5 Report Projected Dose Results to the Radiological Evaluation Assistant on Form Y and post on the Status Board.

TABLE B.1

Diffusion Factors for Elevated Releases, (uX/Q)m-2

Pasquil Stability Class	1/2 Mile Value	Distance Of Max. Ground Level Concentration, Mile	Max. Ground Level Value
A	6.3 x 10-6	0.5	--
B	2.3 x 10-5	0.5	--
C	4.0 x 10-5	0.5	--
D	2.9 x 10-5	0.5	--
E	*	1.0	3.1x10-5
F	*	2.0	2.0x10-5
G	*	5.0	9.2x10-6

*Use max. ground level value.

Info Current At _____ Time/Date

FORM Y - PRIMARY VENT STACK IODINE ANALYSIS

Time Cartridge Removed _____ AM PM

Sampling Time - Time Cartridge was in Sample Stream _____ Minutes

Sample Flow Rate _____ CFM

Number of Fans Running - 1 or 2

Results

Iodine Analysis

From Geli Analysis _____ uCi/cc
or
From Sam II Analysis _____ uCi/cc

Calculated 1/2 mile 2 hour thyroid dose _____ Adult, Child

Particulate Analysis

From Geli Analysis _____

1) Prepared by Radiological Data Evaluator _____

2) Original to Radiological Evaluation Asst. for approval _____

3) Copies to: Recovery Manager

NRC

Rad Evaluation Asst.

Rad Data Evaluator

4) Original to Emergency Coordinator for approval _____

5) Emergency Coordinator's original to Hotline Operator

6) Transmitted to State by: _____
Hotline Operator

_____
Date/Time

7) File original

FORM X - OFFSITE SURVEY REPORT

Info Current at _____ Time/Date

Survey Point #_____

Distance from Plant _____

Direction _____ Other Descriptive Information _____

Sample Time _____

I. Area gamma, beta-gamma and ground level beta-gamma survey - Dose Rates
Waist High Gamma (Beta Window Closed)_____mr/hr
Waist High Gamma (Beta Window Opened _____mr/hr
Ground Level Beta-Gamma (Beta Window Opened)_____mr/hr

II. Field Determination of Iodine Concentrations

Particulate Filter _____cpm before purge

_____cpm after purge

Iodine Cartridge _____cpm

Idoine Concentration _____uCi/cc Projected 2 hr thyroid dose _____

III. Laboratory Determination of Iodine Concentration
SAMII Counts _____
Counting Time_____
Decay Time (hours)_____(From time sample was taken)
Sample Flow Rate_____CFM

OR

Iodine Concentration_____uCi/cc

1) Prepared by _____
Radio Operator/Radiological Data Evaluator

2) Original to Radiological Evaluation Assistant for Approval._____

3) Copies to: Radiological Data Evaluator/Radio Operator
Recovery Manager
NRC
Sample Coordinator
Radiological Data Evaluator

4) Original to Emergency Coordinator for approval. _____

5) Emergency Coordinator forwards original to the Hotline Operator.

6) Transmitted to State by: _____
Hotline Operator

_____
Date/Time

7) File Original

APPENDIX D

Evaluation of Air Particulate Data

1.0 ANALYSIS OF OFFSITE AIR SAMPLE RESULTS

1.1 Obtain the following survey team sample results, sample location, sample flow rate (CFM), sample collection time and sample count results. Log them on Data Sheet G (page 27).

1.2 Determine the airborne iodine concentration using Fig. 2 and the net iodine cartridge activity from the off-site survey team. Record this value on Data Sheet G.

1.3 Obtain an estimate of the duration of the accident and log it on Data Sheet G.

NOTE: Use 2 hours if no other value is available.

1.4 Using the "Field Sample Thyroid Dose Nomogram" and the above information, determine the Adult and Newborn Thyroid Dose as follows.

1.4.1 Locate the "I-131 Concentation (uCi/cc)" axis (lower right quadrant).

1.4.2 From the appropriate I-131 concentration, proceed vertically to the estimated "Inhalation Time (hrs)" line.

1.4.3 At this intersection, proceed horizontally to the right through the Adult and Newborn Thyroid Dose Scales. Read the value of the Adult and Newborn Thyroid Dose and log the results on data Sheet G.

1.5 If the projected Newborn Thyroid Dose is greater than 10^{-1} Rem, make a recommendation to the Emergency Coordinator that these samples should be immediately returned to the EOF for further analysis.

NOTE: All field samples will be eventually returned to the EOF for further more accurate analysis.

1.6 Once samples are returned to the EOF for analysis, make provision to count samples on the SAM-2 in accordance with Procedure 9.321 "Operation and Calibration of the Eberline SAM-2/RD-22".

1.7 Analyze SAM-2 results by converting the count rate to an appropriate concentration by using the following equation.

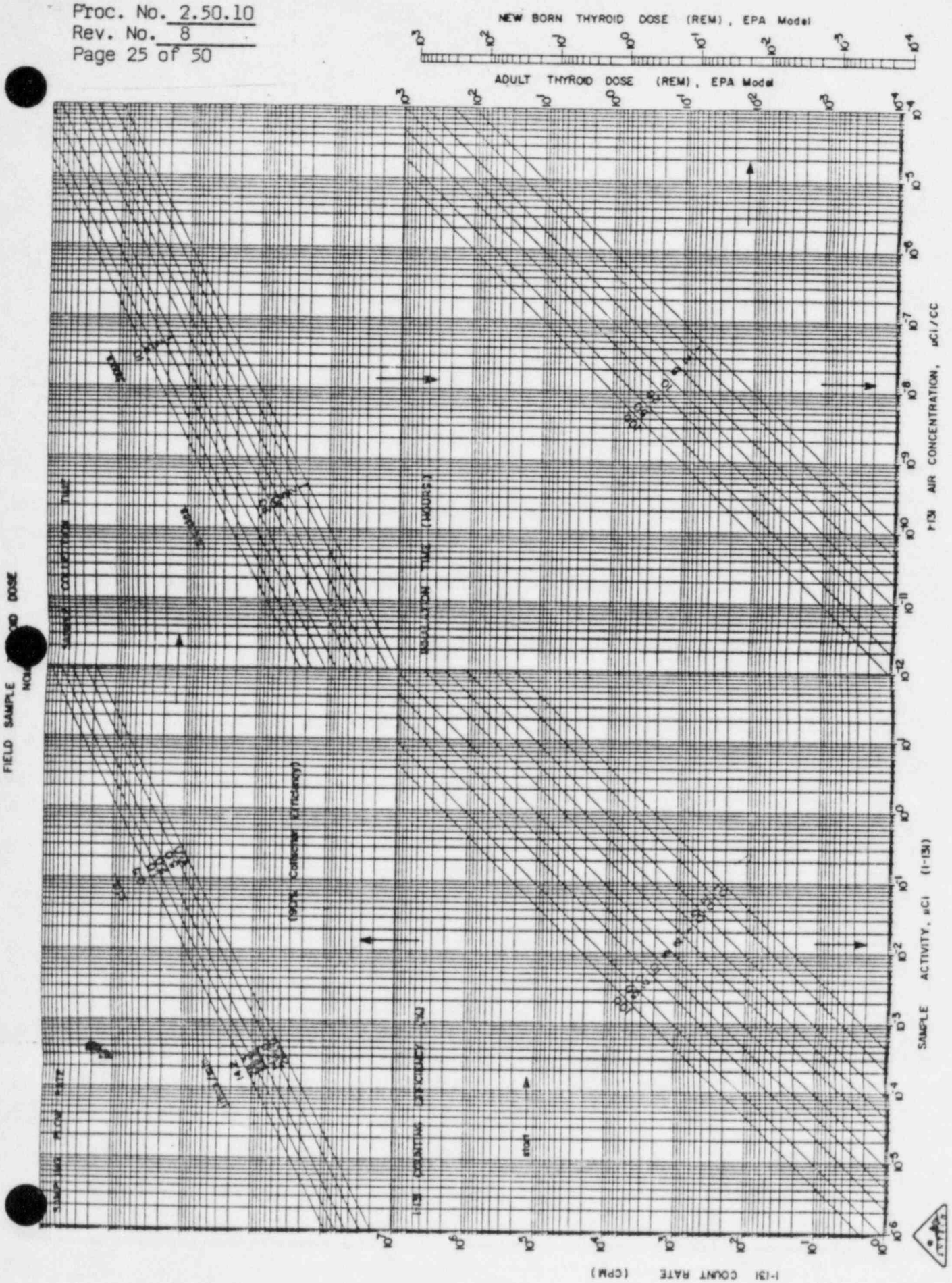
$$\text{I-131 uCi/cc} = \frac{\text{SAM-2 Counts/Minute (corrected for background)}}{(E)(2.22 \times 10^6 \text{ dpm/uCi})(F)(T)(28{,}317 \text{ cc/ft}^3)}$$

Where:

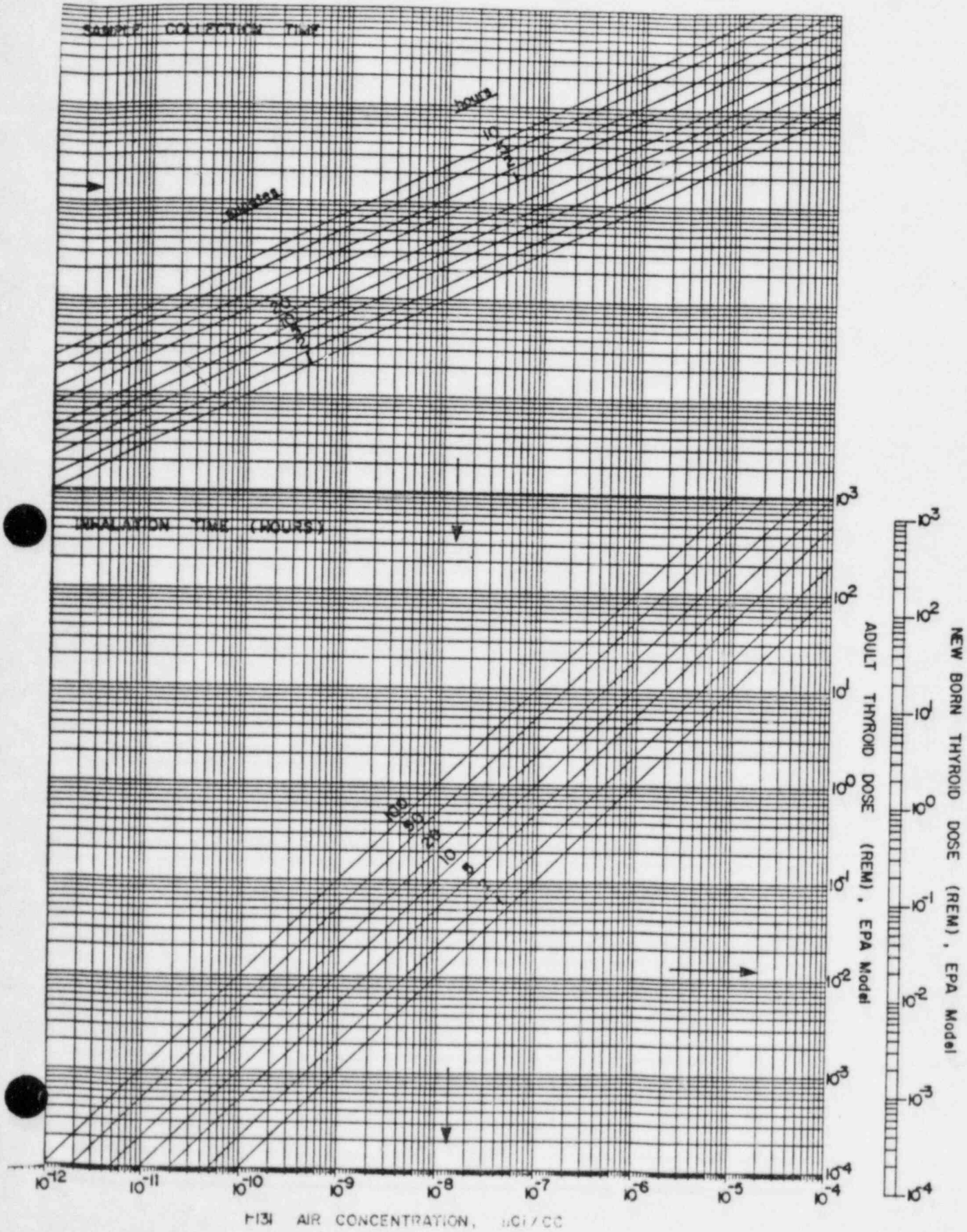
E = Sam-2 efficiency CPM/dpm
F = flow rate of sampler ft3/min
T = sampling time min

1.8 Correct the I-131 results for decay if the time between sample collection and sample count is greater than 2 hours.

1.9 Report Projected Dose results to the Radiological Evaluation Assistant on Form Y and update the Status Board.


NEW BORN THYROID DOSE (REM), EPA Model
ADULT THYROID DOSE (REM), EPA Model
I-131 AIR CONCENTRATION, μCi/CC
SAMPLE ACTIVITY, μCi (I-131)
I-131 COUNT RATE (CPM)
I-131 COUNTING EFFICIENCY (%)
SAMPLE COLLECTION TIME
INHALATION TIME (HOURS)
FIELD SAMPLE
NOBLE GAS DOSE
start

FIELD SAMPLE THYROID DOSE NOMOGRAM



DATA SHEET G

FIELD DATA

Survey Team: _____ Date _____

Sample Number	1	2	3	4	5
Time reported (24 hr. clock)					
Location					
Distance from Plant					
E-140 or PIC-6A (circle 1) — Waist level - window closed (mR/hr)					
Waist level - window open (mR/hr)					
2" above ground - window open (mR/hr)					
Air sample start time					
Air flow (cfm)					
Air sample elapsed time (min.)					
A. Background-pancake probe-in sample holder (cpm)					
B. Iodine cartridge reading (cpm)					
C Particulate filter (cpm)					
Net particulate filter activity: C-A (cpm)					
Net iodine cartridge activity: B-A (cpm)					
Airborne particulate activity from fig. 1					
I-131 Concentration from fig. 2					
Inhalation time					
Thyroid Dose Rate — Adult					
Child					

FIG. 1 GROSS AIRBORNE RADIOACTIVITY (PARTICULATE FILTER) VS. E-140 COUNT RATE W/PANCAKE DET.

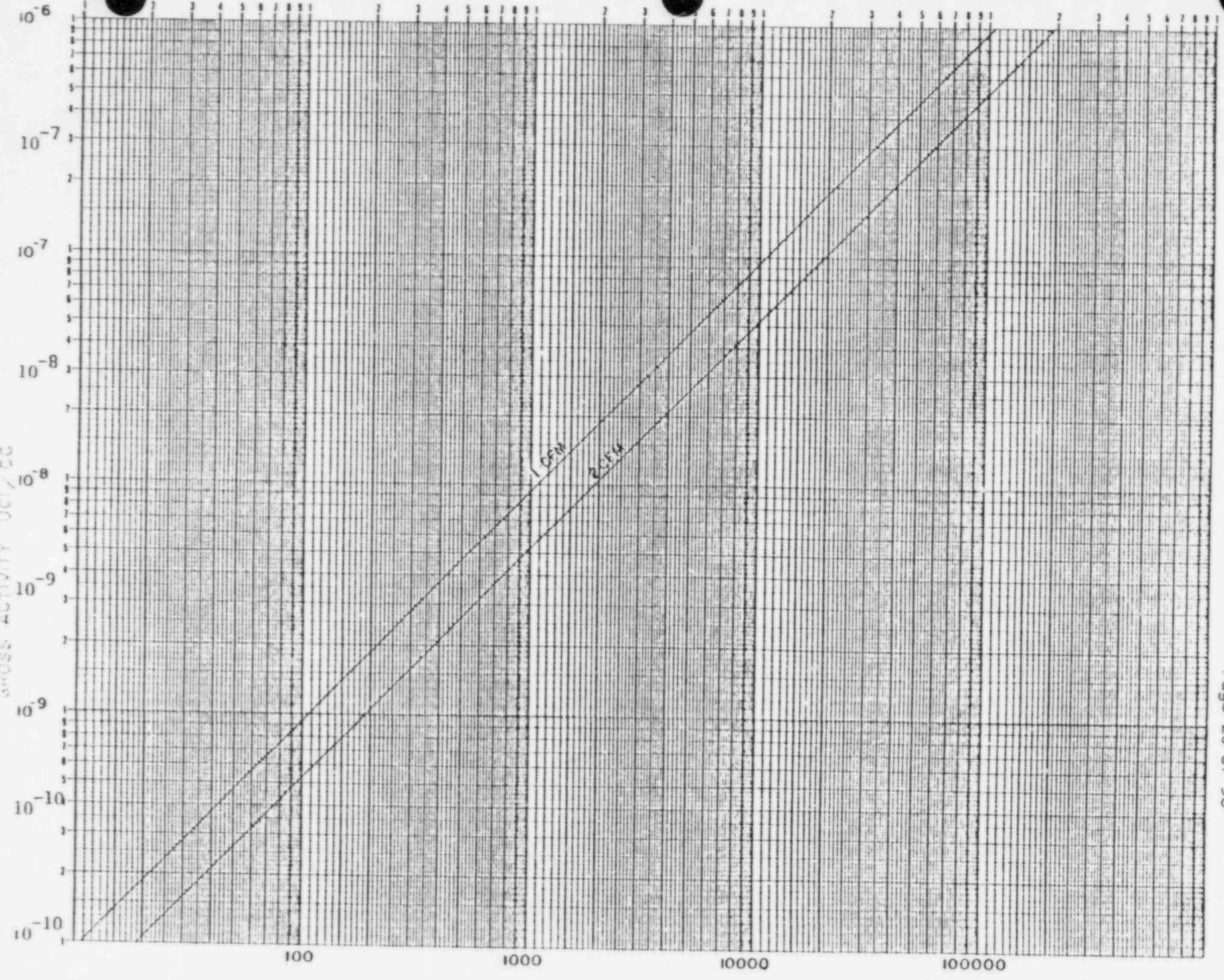
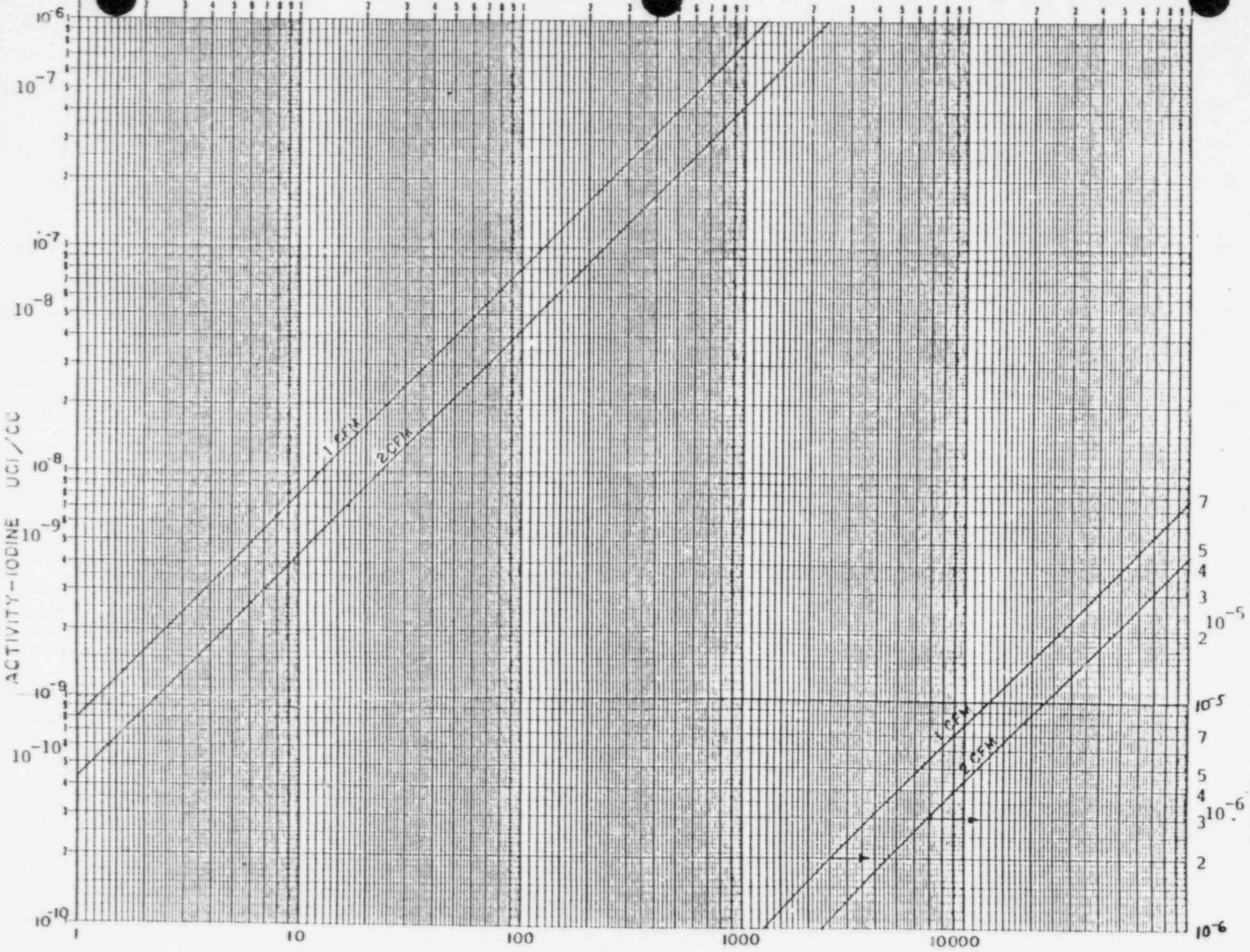


FIG. 2 AIRBORNE IODINE ACTIVITY VS. E-140 COUNT RATE WITH PANCAKE DETECTOR USING CHARCOAL OR SILICA GEL FILTER



APPENDIX E

Dose/Dose Rate Projections At Distances Greater Than 1/2 Mile

1.0 WHOLE BODY DOSE PROJECTIONS

1.1 Obtain the 1/2 mile whole body dose projections made from in-plant parameters in Appendix B.

NOTE: For distances up to about 1 mile, whole body gamma doses are practically independent of atmospheric stability.

1.2 Project these dose estimates to other distances of interest by using the Effective Gamma Dose Diffusion Factors,(uX/Q) listed in Tables C.1 and C.2 for Elevated and Ground Level releases, respectively. Log these results on Data Sheet C.

$$D_X = D_{1/2} \times \frac{[u(X/Q)]X}{[u(X/Q)]1/2}$$

1.3 Dose rates measured by the off-site teams may be projected to other distances by ratioing the UX/Q values at the desired distance to the distance of the measured value.

2.0 THYROID DOSE PROJECTIONS

2.1 Obtain the 1/2 mile thyroid dose estimate made from in-plant parameters.

2.2 Project these dose estimates to other distances of interest by using the Concentration Diffusion Factors, u X/Q, listed in Tables C.3 and C.4 for elevated and ground level releases, respectively. Log these results on Data Sheet C.

$$D_X = D_{1/2} \times \frac{[u(X/Q)]X}{[u(X/Q)]1/2}$$

2.3 Concentrations or doses measured by the off-site teams may be projected to other distances by ratioing the uX/Q value at the desired distance to the uX/Q value at the distance of the measured value.

$$D_X = D_m \frac{(uX/Q)x}{(uX/Q)m}$$

Where m = measured value.

TABLE C.1

MAINE YANKEE

EFFECTIVE GAMMA DOSE DIFFUSION FACTORS $\frac{u\,X}{Q}$, M^{-2}

ELEVATED LEVEL RELEASE

(All values should be multiplied by 10^{-6})

Downwind Distance	Stability Category						
	Pasquill A	Pasquill B	Pasquill C	Pasquill D	Pasquill E	Pasquill F	Pasquill G
0.5 miles	7.9	16.0	19.0	19.0	18.0	17.0	17.0
1.0 miles	1.2	4.1	8.0	9.9	9.7	8.9	8.6
2.0 miles	0.62	0.67	2.9	4.6	4.9	4.8	4.4
3.0 miles	0.42	0.42	1.5	2.8	3.2	3.3	3.0
4.0 miles	0.31	0.31	0.93	1.9	2.3	2.5	2.3
5.0 miles	0.25	0.25	0.64	1.4	1.8	2.0	1.9
6.0 miles	0.21	0.21	0.47	1.1	1.4	1.6	1.6
7.0 miles	0.18	0.18	0.36	0.91	1.2	1.4	1.4
8.0 miles	0.16	0.16	0.29	0.77	1.0	1.2	1.2
9.0 miles	0.14	0.14	0.24	0.66	0.89	1.1	1.1
10.0 miles	0.12	0.12	0.20	0.57	0.78	0.97	0.97

TABLE C.2

MAINE YANKEE

EFFECTIVE GAMMA DOSE DIFFUSION FACTORS $\frac{u\,X}{Q}$, M^{-2}

GROUND LEVEL RELEASE

(All values should be multiplied by 10^{-6})

Downwind Distance	Stability Category						
	Pasquill A	Pasquill B	Pasquill C	Pasquill D	Pasquill E	Pasquill F	Pasquill G
0.5 miles	8.3	19.0	26.0	34.0	37.0	41.0	47.0
1.0 miles	1.3	4.3	9.5	14.0	16.0	18.0	20.0
2.0 miles	0.63	0.68	3.1	5.7	6.9	8.3	9.4
3.0 miles	0.42	0.42	1.6	3.3	4.2	5.2	6.0
4.0 miles	0.31	0.31	0.97	2.2	2.9	3.7	4.4
5.0 miles	0.25	0.25	0.66	1.6	2.2	2.9	3.4
6.0 miles	0.21	0.21	0.49	1.3	1.7	2.3	2.8
7.0 miles	0.18	0.18	0.37	1.0	1.4	2.0	2.4
8.0 miles	0.16	0.16	0.30	0.85	1.2	1.7	2.0
9.0 miles	0.14	0.14	0.24	0.72	1.0	1.5	1.8
10.0 miles	0.13	0.13	0.20	0.62	0.92	1.3	1.6

TABLE C.3

MAINE YANKEE

PLUME CENTERLINE EFFLUENT CONCENTRATION DIFFUSION FACTORS $\frac{u\,X}{Q}$, M^{-2}

ELEVATED RELEASE

(All values should be multiplied by 10^{-6})

Downwind Distance	Stability Category						
	Pasquill A	Pasquill B	Pasquill C	Pasquill D	Pasquill E	Pasquill F	Pasquill G
0.5 miles	6.3	23.0	40.0	29.0	9.5	0.03	0.00
1.0 miles	1.4	4.9	17.0	32.0	31.0	5.8	0.04
2.0 miles	0.77	1.1	5.7	17.0	24.0	20.0	2.2
3.0 miles	0.55	0.73	2.9	10.0	17.0	20.0	5.9
4.0 miles	0.43	0.56	1.8	6.9	12.0	18.0	8.5
5.0 miles	0.36	0.46	1.2	5.1	9.8	15.0	9.2
6.0 miles	0.31	0.40	0.92	4.0	8.0	13.0	9.5
7.0 miles	0.26	0.35	0.72	3.3	6.8	12.0	9.5
8.0 miles	0.23	0.32	0.58	2.8	5.9	11.0	9.4
9.0 miles	0.21	0.29	0.49	2.4	5.1	9.6	9.1
10.0 miles	0.19	0.26	0.42	2.1	4.5	8.8	8.7

TABLE C.4

MAINE YANKEE

PLUME CENTERLINE EFFLUENT CONCENTRATION DIFFUSION FACTORS $\frac{u\,X}{Q}$, M^{-2}

GROUND LEVEL RELEASE

(All values should be multiplied by 10^{-6})

Downwind Distance	Stability Category						
	Pasquill A	Pasquill B	Pasquill C	Pasquill D	Pasquill E	Pasquill F	Pasquill G
0.5 miles	6.4	26.0	60.0	160.0	260.0	450.0	920.0
1.0 miles	1.4	4.9	19.0	60.0	110.0	210.0	350.0
2.0 miles	0.77	1.1	5.9	21.0	41.0	85.0	170.0
3.0 miles	0.55	0.73	3.0	12.0	24.0	52.0	110.0
4.0 miles	0.43	0.56	1.8	7.6	16.0	38.0	79.0
5.0 miles	0.36	0.46	1.2	5.5	12.0	29.0	61.0
6.0 miles	0.31	0.40	0.92	4.3	9.6	23.0	50.0
7.0 miles	0.26	0.35	0.72	3.5	7.9	20.0	42.0
8.0 miles	0.23	0.32	0.58	3.0	6.7	17.0	36.0
9.0 miles	0.21	0.29	0.49	2.5	5.8	15.0	32.0
10.0 miles	0.19	0.26	0.42	2.2	5.1	13.0	29.0

DATA REDUCTION SHEET C

Dose/Dose Rate Projections at Distances Greater Than 1/2 Mile

1.0 Whole Body Dose Projections

(A) Distance of Measured or Estimated Dose, Xo (mi)	(B) Value of (u X/Q) at Location (A) Table C.1 or C.2	(C) Measured or Calculated Dose at Location (A)	(D) Distance of Desired Dose Projection X(mi)	(E) Value of (u X/Q) at Location (D) (Table C.1)	(F) $\frac{(E)}{(B)}$	(G) Projected Dose at Location (D) (F) x (C)

(Sheet C Con't)

2.0 Thyroid Dose Projections

(A) Distance of Measured or Estimated Dose, Xo (mi)	(B) Value of (u X/Q) at Location (A) Table C.3 or C.4	(C) Measured or Calculated Dose at Location (A)	(D) Distance of Desired Dose Projection X(mi)	(E) Value of (u X/Q) at Location (D) (Table C.1)	(F) $\frac{(E)}{(B)}$	(G) Projected Dose at Location (D) (F) x (C)

APPENDIX F

Plume Plotting

Using the data recorded on Data Sheet E, determine the 15 minute wind vectors (direction and distance the plume segment traveled during the 15 minute period). Plot the vectors on the plastic covered map and label each 15 minute vector as Point 1 (P1), Point 2 (P2), etc. For each wind shift begin another vector plot at the proper time and label as above.

By connecting all of the points of equal time period the centerline of the actual plume travel pathway will be approximated. The width of the plume (σy) can be approximated from the width of the colored angles on the stability map for the proper distance or they can be calcuated from the formula:

$$\sigma y = 2\pi r \frac{\text{(plume angle in degrees)}}{360^\circ}$$

where r = downwind distance (units) at point of interest.
σy values can also be estimated from the graph in Fig. 1

Keep the Radiological Evaluation Assistant updated as to the progress of the plume so that he may have the most complete information available for directing the offsite teams and for making protective action recommendation.

NOTE: With several wind shifts over a period of time the actual plume path will approximate a mirror image of the wind vectors.

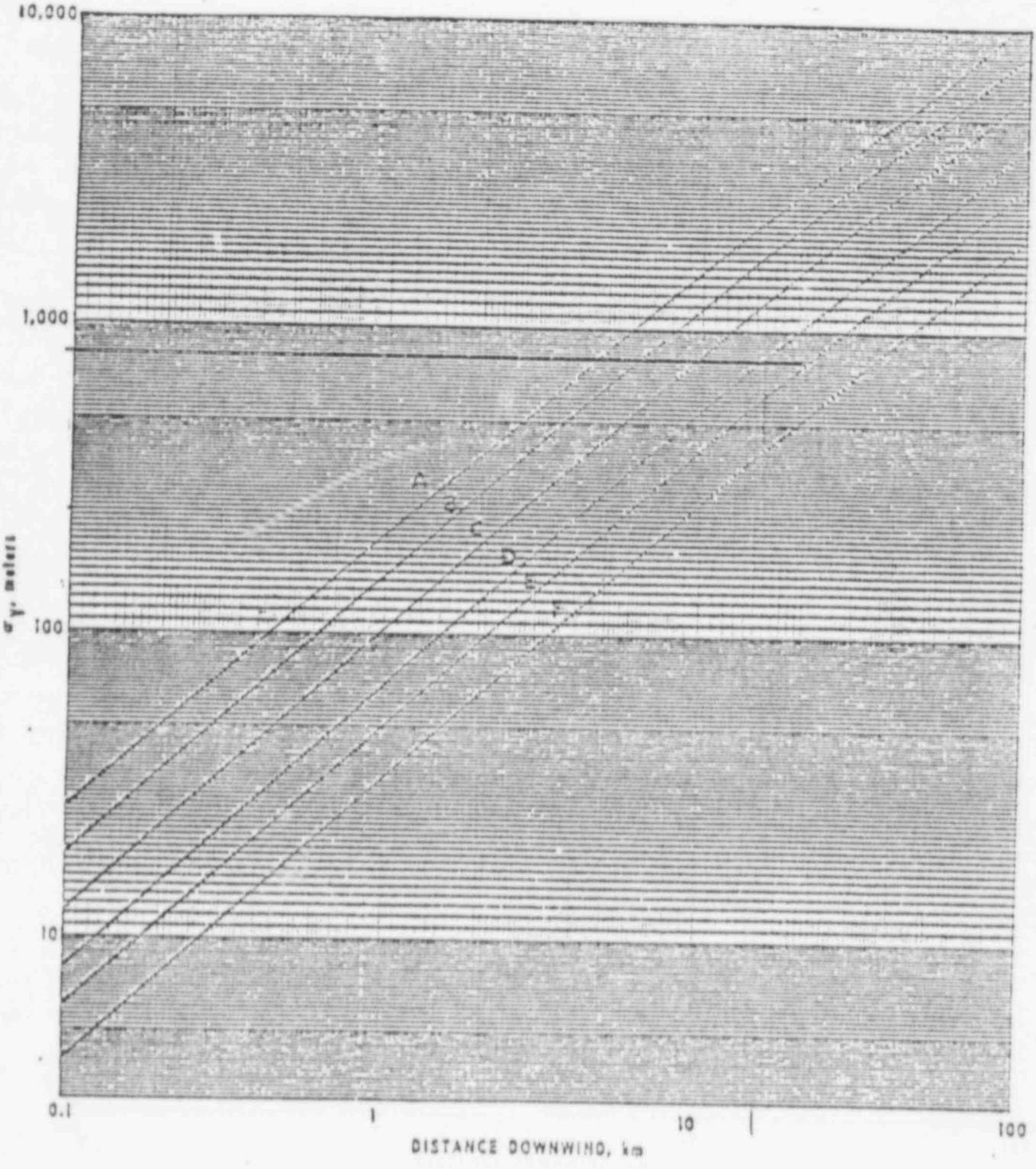


Figure 1. Horizontal dispersion coefficient as a function of downwind distance from the source.

APPENDIX G
Population Exposure Estimation

Total population exposure will be estimated as follows:

The sector segment dose rates in the EPZ will be periodically determined using the method described in procedure 2.50.10 Appendix E or by actual measurements taken by off site surey teams and the sector segment dose for the time increment of interest will be calculated. The sector segment dose will be multiplied by the sector segment population to get the segment population exposure. The segment exposure will be summed to determine the entire sector population exposure.

Population data are given by sector segments for both year round and summer seasons. The sector segments are at 1 mile radii out to 5 miles, then the segments are at 5 mile radii out to 10 miles. In the southern sector the EPZ extends beyond 10 miles and appropriate data are given for the 10-20 mile segments. A segment beyond 20 miles for sector G is also provided.

Since plume dispersion will not usually fall totally within the sector boundaries, the conservative assumption may be made that if any portion of a segment is exposed the entire population of the segment will be exposed for purposes of estimating population exposure.

The summer population data, table will be employed from Memorial Day through Labor Day. The year round population data table will be employed the remainder of the year.

Use table E-1 and Data Sheet E (page 36) to perform and record population exposure estimates.

For Xu/Q values at distances greater than 10 miles, an approximation can be made by using 1/r relationship. Hence the Xu/Q values at 20 miles should approximate 1/2 the Xu/Q value at 10 miles. This approximation is very nearly exact for A, B, D, E, F, and G stabilities and is conservative for C stability. Similarly for the segment beyond 20 miles, (20 to 30 miles) the 30 mile Xu/Q value should be 1/3 the 10 mile Xu/Q value.

SECTOR SEGMENT NOTATION

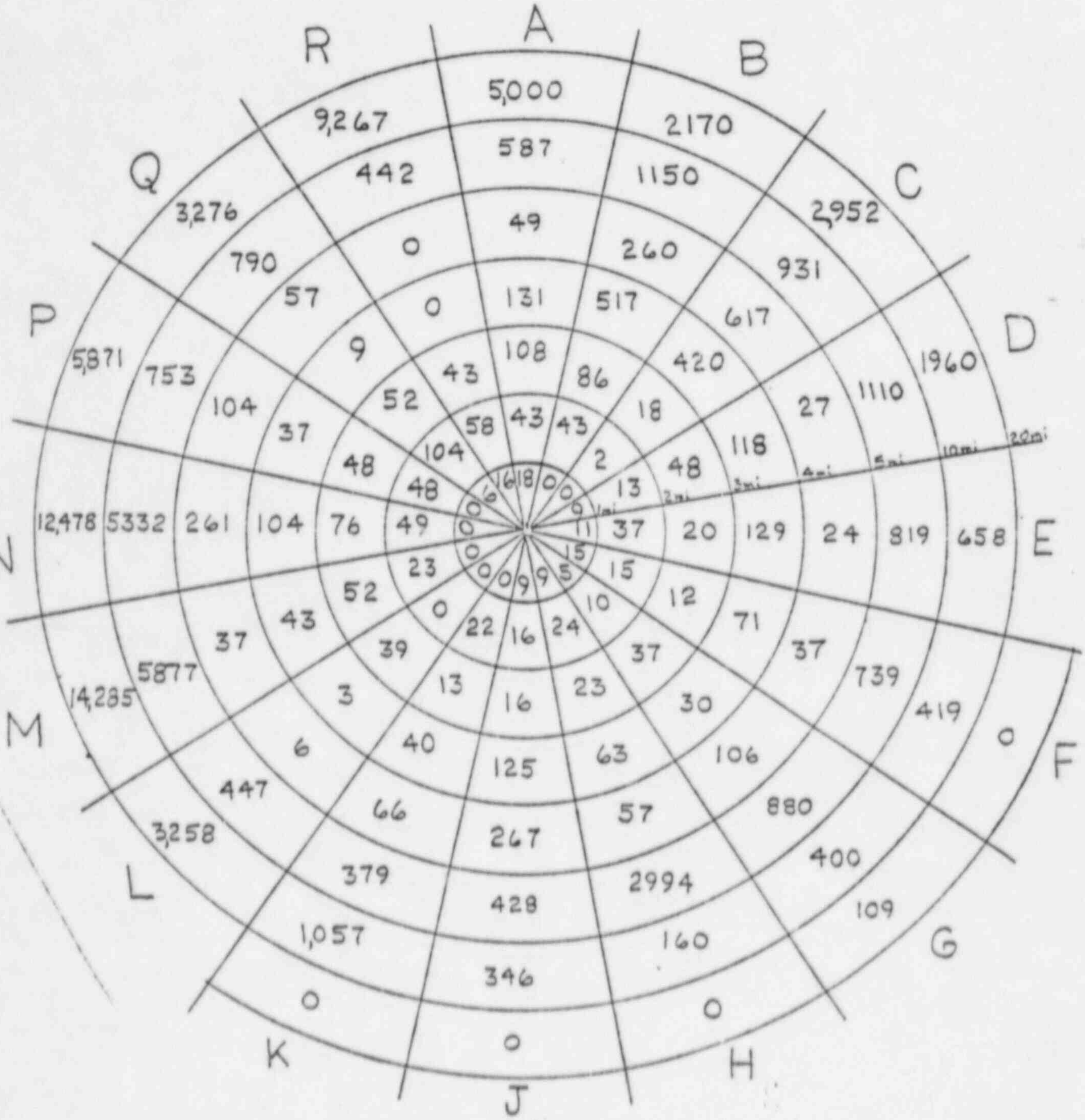
SECTOR (A-R)* SEGMENT #	DISTANCES (in miles)
1	0-1
2	1-2
3	2-3
4	3-4
5	4-5
10	5-10
20	10-20

*with letter I and O eliminated so as not to confuse them with numbers 1 and 0.

The segment # identifies the outer radius of the segment. For example, sector segment # C5 means that in sector C, our concern lies with the segment which as an inner radius of 4 miles and an outer radius of 5 miles.

TABLE G-1

YEAR ROUND POPULATION DISTRIBUTION BASED ON 1980 U.S. CENSUS



Sector	Total Population	Sector	Total Population	Sector	Total Population	Sector	Total Population
A	5936	E	R 1698	J	1207	N	R 18300
B	4226	F	1308	K	1577	P	R 6861
C	4950	G	1577	L	3753	Q	R 4294
D	3285	H	3330	M	20317	R	R 9835

DATA SHEET E

POPULATION EXPOSURE ESTIMATION DATA SHEETS

Date_____ Stability Class_____

Time_____ Wind Direction - blowing from_____

Wind Speed (upper - for stack releases)_____

Wind Speed (lower - for containment and steam line releases)_____

Directions:

1. Use the area map with the plume overlay to determine the sectors exposed to the plume.

2. Use the entire population of the segment if any portion of the segment is under the plume.

3. Use the center line dose rate for all estimates.

4. Use the plume arrival time at the inner radius (from the computer printout or from a wind speed-distance calculation) for the exposure start time.

5. Convert the time to 24 hour time for ease of manipulation.

6. Use the time of parameter change (i.e. wind direction change, dose rate change, or time of calculation if no changes have occurred) for the end time.

   NOTE: Care should be employed on those releases which have a duration in hours less than the desired time after the release has started so as not to overstate exposure time. Consideration must be given to the trailing edge of the plume after the release is stopped for exposure time.

7. For each sector segment number average dose rate by adding the inner radius dose rate to the outer radius dose rate and then dividing this sum by two. This would approximate the dose rate at the center of the sector segment.

   NOTE: For segment No. 1, which has a range of 0-1 miles, use the 1/2 mile dose rate as the inner radius dose rate when averaging with the outer radius dose rate at 1 mile.

8. Consider wind direction and dose rate remain constant during the calculation period.

9. Record the time interval as hours and fraction of an hour.

10. To calculate total time of plume exposure for column 5 of the calculation forms use the following steps:

	Segment Number	1	2	3	4	5	6	7
	Segment Range beginning of seg. - end of seg.	1/2-1	1-2	2-3	3-4	4-5	5-10	10-20
Step A	Start of release (24 hour time)							
Step B	Time to reach beginning of segment distance to beginning of seg.(miles)							
	Wind speed (miles/hour)							
Step C	Use one of the following for the stop time.							
	1. End of release use time plant release ends plus time trailing edge or plume posses beginning of segment.							
	2. Time of a dose rate change							
	3. Time of a wind direction change							
	4. Time of a desired calculation period							
Step D	Total time exposed to plume C -(A + B) = Total time							

SECTOR	SEGMENT	RANGE IN MILES	(1) DOSE RATE R/hr beginning of SEGMENT	(2) DOSE RATE R/hr end of SEGMENT	(3) SUM OF (1)+(2)	(4) AVERAGE DOSE RATE R/hr (3)/2	(5) TOTAL HOURS	(6) POPULATION	(7) MAN-REM (4)x(5)x(6)	(8) PREVIOUS MAN-REM	(9) MAN-REM TO DATE
A	1	0-1						18			
	2	1-2						43			
	3	2-3						108			
	4	3-4						131			
	5	4-5						49			
	10	5-10						587			
	20	10-20						R 5000			
B	1	0-1						0			
	2	1-2						43			
	3	2-3						86			
	4	3-4						517			
	5	4-5						260			
	10	5-10						1150			
	20	10-20						R 2170			
C	1	0-1						0			
	2	1-2						2			
	3	2-3						18			
	4	3-4						420			
	5	4-5						617			
	10	5-10						931			
	20	10-20						R 2952			
D	1	0-1						9			
	2	1-2						13			
	3	2-3						48			
	4	3-4						118			
	5	4-5						27			
	10	5-10						1110			
	20	10-20						R 1960			

SECTOR	SEGMENT	RANGE IN MILES	(1) DOSE RATE R/hr beginning of SEGMENT	(2) DOSE RATE R/hr end of SEGMENT	(3) SUM OF (1)+(2)	(4) AVERAGE DOSE RATE R/hr (3)/2	(5) TOTAL HOURS	(6) POPULATION	(7) MAN-REM (4)x(5)x(6)	(8) PREVIOUS MAN-REM	(9) MAN-REM TO DATE
E	1	0-1						11			
	2	1-2						37			
	3	2-3						20			
	4	3-4						129			
	5	4-5						24			
	10	5-10						819			
	20	10-20						R 658			
F	1	0-1						15			
	2	1-2						15			
	3	2-3						12			
	4	3-4						71			
	5	4-5						37			
	10	5-10						739			
	20	10-20						419			
G	1	0-1						5			
	2	1-2						10			
	3	2-3						37			
	4	3-4						30			
	5	4-5						106			
	10	5-10						880			
	20	10-20						400			
H	1	0-1						9			
	2	1-2						24			
	3	2-3						23			
	4	3-4						63			
	5	4-5						57			
	10	5-10						2994			
	20	10-20						160			

SECTOR	SEGMENT	RANGE IN MILES	(1) DOSE RATE R/hr beginning of SEGMENT	(2) DOSE RATE R/hr end of SEGMENT	(3) SUM OF (1)+(2)	(4) AVERAGE DOSE RATE R/hr (3)/2	(5) TOTAL HOURS	(6) POPULATION	(7) MAN-REM (4)x(5)x(6)	(8) PREVIOUS MAN-REM	(9) MAN-REM TO DATE
J	1	0-1						9			
	2	1-2						16			
	3	2-3						16			
	4	3-4						125			
	5	4-5						267			
	10	5-10						428			
	20	10-20						346			
K	1	0-1						0			
	2	1-2						22			
	3	2-3						13			
	4	3-4						40			
	5	4-5						66			
	10	5-10						379			
	20	10-20						1057			
L	1	0-1						0			
	2	1-2						0			
	3	2-3						39			
	4	3-4						3			
	5	4-5						6			
	10	5-10						447			
	20	10-20						3258			
M	1	0-1						0			
	2	1-2						23			
	3	2-3						52			
	4	3-4						43			
	5	4-5						37			
	10	5-10						5877			
	20	10-20						14285			

SECTOR	SEGMENT	RANGE IN MILES	(1) DOSE RATE R/hr beginning of SEGMENT	(2) DOSE RATE R/hr end of SEGMENT	(3) SUM OF (1)+(2)	(4) AVERAGE DOSE RATE R/hr (3)/2	(5) TOTAL HOURS	(6) POPULATION	(7) MAN-REM (4)x(5)x(6)	(8) PREVIOUS MAN-REM	(9) MAN-REM TO DATE
N	1	0-1						0			
	2	1-2						49			
	3	2-3						76			
	4	3-4						104			
	5	4-5						261			
	10	5-10						5332			
	20	10-20						R 12438			
P	1	0-1						0			
	2	1-2						48			
	3	2-3						48			
	4	3-4						37			
	5	4-5						104			
	10	5-10						753			
	20	10-20						R 5871			
Q	1	0-1						6			
	2	1-2						104			
	3	2-3						52			
	4	3-4						9			
	5	4-5						57			
	10	5-10						790			
	20	10-20						R 3276			
R	1	0-1						16			
	2	1-2						58			
	3	2-3						43			
	4	3-4						0			
	5	4-5						0			
	10	5-10						442			
	20	10-20						R 9267			

APPENDIX H

Evaluations of Environmental Station's Samples, Soil Samples, and Other Environmental Media

1.0 ENVIRONMENTAL STATION SAMPLES

1.1 Make arrangements to collect and remove the filter media and the TLD's at the environmental sample stations in the downwind direction of the plume (a 90° sector), and in one mile radius circle around the plant.

NOTE: Bailey Farm environmental personnel should be notified by Radiological Evaluation Assistant to report to the E.O.F. for instructions. Dosimetry should be issued and instructions given to environmental personnel before they go to collect samples.

1.2 At the station record the time of removal, the flow indication on the flow totalizer, the timer indication and the integrity of the system. Log this information on Data Sheet D. Label TLD's with time set out and time removed.

1.3 Place all filters and TLD's in labeled poly bags for analysis by the Yankee Mobil Van and/or other facilities.

1.4 Calculate the total flow through the filters since the beginning of the release as follows and hold this with the filter. Record this on Data Sheet D.

1.4.1 Divide the total flow indication by the timer indication to obtain the system flow rate.

1.4.2 Multiply this value by the time the system was exposed to the plume (estimate) and convert this value to cm^3.

1.5 Environmental personnel should return their samples to the Sample Coordinator at the E.O.F.

2.0 After the urgency of the accident has subsided, make provisions to collect snow, soil, vegetation, water and milk samples downwind of the plume under the direction of the Emergency Coordinator.

2.1 Solid samples should be placed in clean poly bags in a manner as to avoid cross contamination of samples.

2.2 Liquid samples should be collected in 1-5 gallon clean plastic bottles.

2.3 Snow samples should be collected as follows:

2.3.1 Select the area to be sampled from the general location requested that has not been subjected to non-meteorological disturbances (plowing, snowmobiles, pedestrians, etc.)

NOTE: Snow falling at time of interest or snow on ground at time of deposition may have drifted since the time of interest. Melting and freezing and/or rain may mean the snow deposition is fixed in an ice layer and not affected by winds. These possibilities must be considered and existing weather conditions used to determine area to be sampled.

2.3.2 Measure the selected area to be sampled in units of square feet.

2.3.3 Take up snow to depth sufficient to collect snow of interest.

NOTE: If a crust layer may have formed on an earlier snowfall, collect snow from surface to this crust. If snow of interest may be below a crust layer formed later, sweep loose snow away to this crust layer and then sample the crust layer and loose snow to next crust layer.

NOTE: Sample volume to give meaningful data should exceed 3 liters of melted snow. Loose snow volume is 4 times its liquid volume. Icy snow is approximately twice its liquid volume. The snow can be packed in the collection bag.

2.3.4 Estimate depth of snow collected.

2.3.5 Securely close sample bag. It is recommended that all samples be doubly bagged to prevent leakage as snow melts.

2.4 All samples should be labeled as follows:

time of collection,
location of sample,
name of individual.

3.0 Once analysis of samples is complete, results should be sent to the NSD Radiological Engineering Group for further analysis and dose analysis.

DATA REDUCTION SHEET D

Evaluations of Environmental Stations Samples,
Soil Samples and Other Environmental Media

1.0 Environmental Stations Samples

Location of Environmental Station	Time of Sample Removal	Flow Totalizer Reading	Timer Indication	Sample Flow Rate	Flow Through System During Plume Passage (cm^3)

(Sheet D Con't)

2.0 Other Environmental Samples

Sample Location	Type of Sample	Approximate Volume of Sample	Time Sample Taken	Initials	Destination of Sample

Guideline action levels for continuous habitability of all emergency centers is presented in Table II.

This procedure consists of four parts as follows:

5.0 Search and Rescue of Personnel
6.0 Emergency On-Site Assistance
7.0 Personnel Dosimetry Record-keeping
8.0 Decontamination of Personnel and Equipment

The following tables and forms are attached:

2.0 OBJECTIVE:

To specify emergency worker dose guidelines, including emergency center habitability, preferred routes of travel to minimize personnel exposure, the methods to perform emergency personnel dosimetry, record-keeping, and decontamination of personnel and equipment.

3.0 REFERENCES:

Emergency Procedure	2.50.20	"Prophylatic Administration of Potassium Iodide"
Emergency Procedure	2.50.8	"Medical Emergency Plan"
Emergency Procedure	2.50.7	"Emergency On-Site Radiation Monitoring Proc."
Emergency Procedure	2.50.22	"Actuation of the Alternate Emergency Operations Facility"
H.P. Procedure	9.1.6	"Establishments and Posting Controlled Areas"
H.P. Procedure	9.1.7	"Area and Equipment Decontamination"
H.P. Procedure	9.1.9	"Personnel Decontamination"
NRCP 39		

R

4.0 PRECAUTIONS:

1. During any emergency involving radiological hazards, exposure to personnel should be minimized consistent with the nature of the emergency response required.

2. Utilize radiological protective measures and equipment whenever practical.

3. Assure that the proper high range instrumentation and dosimetry is used.

   NOTE: High range dosimetry is located at the H.P. Check Point and in the Emergency Kits for the EOF, TSC, OSC. High range survey equipment is kept at the H.P. Check Point and one meter is in each of the Emergency Kits.

APPENDIX B

NUCLEAR SAFETY ENGINEER - EMERGENCY CALL LIST
Includes Nuclear Support Division

NRC

Notify NRC for All Emergency Classifications using the Red Phone in the Control Room or Technical Support Center.

Once contact is made the phone should be kept open and manned. The NSE should assign an available knowledgeable member of the plant staff to man the phone.

NOTE: If the Red Phone is inoperable, use any of the following numbers to reach the NRC Operations Center.

1. [redacted]
2.
3.
4.

Maine Yankee Nuclear Support Div.

1. Notify for All Emergency Classifications.
2. Start at the top of the list and work down until a contact is made, advise of the emergency, and if it's required, instruct him to notify the rest of the personnel on the list.
3. When a contact is made, make sure that the individual reached has a copy of the phone list so that notification can be continued if necessary.

NAME	PAGER NO.	PHONE
1. Frizzle, Charles D.	[redacted]	
2. Wood, Edwin C.		
3. Hebert, James		
4. Brinkler, James E.		
5. Lawton, Robert R.		
6. Arnold, John H.		
7. Evans, Stephen D.		

Yankee Nuclear Support Div.

1. Notify for Alert, Site Area and General Emergency ONLY.
2. Call NSD Security and report classification of emergency.

   Telephone: [redacted]

   NOTE: If you have difficulty with this number, you can reach the NSD Security with an alternate number: [redacted]
3. For backshifts and holidays call YNSD 24 hour pager answering service, ZIP-CALL, in Boston.

   Telephone: [redacted]

   An answering service operator at ZIP-CALL will answer "ZIP-CALL" and request pager number. Give the ZIP-CALL operator pager number [redacted]

   Repeat fifteen minutes later.

APPENDIX E

MISCELLANEOUS - EMERGENCY CALL LIST

1. American Nuclear Insurers [redacted]

NOTE: ANI maintains a 24-hour coverage emergency notification number. The number is [redacted] During normal office hours (8:00 a.m. - 4:00 p.m.) this number will be answered by a receptionist who will transfer an incoming emergency call to an appropriate individual in the office. Outside of normal office hours this phone line is covered by an answering service. The answering service will intercept the call and obtain the name, affiliation, and phone number of the caller. They will than notify a designated ANI staff member who will in turn call back the facility to obtain appropriate information regarding the nuclear accident.

2. INPO

Emergency Call Number [redacted] Use this number if a management decision is made to request INPO assistance.

3. Bailey House - Environmental Personnel

Regular Business Hours - Ext. [redacted]
Phone No. [redacted]

Off Duty Hours

[redacted]

William Nason	Environmental Field Supervisor
Roger O'Clair	Environmental Tech.
William Camball	Environmental Specialist
Billy Hanson	Air Quality Specialist

4. Newcastle District Office

During working hours: [redacted]

During Regular Business Hours you will get the Newcastle Office directly. Tell them who you are and where you are from and that they should prepare for the arrival of Maine Yankee Personnel and Yankee Mobile Emergency Vans.

All other times: Call the CMP Dispatcher

Read the following message: "This is _____ from the Maine Yankee Plant, please contact the Duty Supervisor for the Newcastle District Office and inform him that he should open the office and prepare for the arrival of Maine Yankee Personnel and Yankee Mobile Emergency Vans". Check to assure ?

5. Off-Site Local Assistance - When Needed

[redacted]

Dr. Anthony Keating
(Notify for all hospital cases)

Bath Hospital
Wiscassest Fire Dept.
Wiscasset Police Dept.
Wiscasset Ambulance Service

6. Emergency Plan Roster by Duties

[redacted]

Emergency Coordinator	Pager
James Brinkler	
Thomas Boulette	
Gary Cochrane	
Patrick Dostie	
Stephen Evans	
George Pillsbury	
Donald Stevenson	
Leo Croteau	
David Sturniolo	

Radiological Data Evaluators	Pager
Gary Cochrane	
James Hummer	
Michael Isham	
Gregory Kapinos	
George Pillsbury	
David Sturniolo	

First Aid	Pager
Louise Morange	
Gregory Kapinos	

Manpower Coordinators

Brenda Castonguay
Marylou Larrabee
Nancy Leavitt
Lee Ann Harpell
Patti Whitten

RELEASE DATA

INFO CURRENT AT _____ TIME/DATE

TIME SINCE SHUTDOWN _____ HRS

R CONTAINMENT HI-RANGE MONITOR (RI 6113A, B) _____ R/HR

R PRIMARY VENT STACK HIGH RANGE NOBLE GAS MONITOR (RR 3903) _____ MR/HR

MAIN STEAM LINE MONITORS SG1 _____ MR/HR

SG2 _____ MR/HR

SG3 _____ MR/HR

MAXIMUM STEAM GENERATOR PRESSURE AT TIME OF SAFETY VALVE LIFT _____ PSIG

CONTAINMENT PRESSURE _____ PSIG

NUMBER OF FANS RUNNING - 1 or 2

DURATION OF RELEASE (USE 2 HOUR DEFAULT TIME IF UNKNOWN) _____ HOURS

CHECK ONE: ESTIMATED DEFAULT

---

1) PREPARED BY _____
TSC COORDINATOR

2) COPIES TO: RADIOLOGICAL EVALUATION ASSISTANT
RECOVERY MANAGER
NRC
TSC COORDINATOR
RADIOLOGICAL DATA EVALUATOR

3) ORIGINAL TO EMERGENCY COORDINATOR FOR APPROVAL. _____

4) APPROVED ORIGINAL TO HOTLINE OPERATOR

5) TRANSMITTED TO STATE BY: _____
HOTLINE OPERATOR

_____
DATE/TIME

6) FILE ORIGINAL

[redacted]

PROC. NO. 2.50.17

TI 6/6/85
0/2

MAINE YANKEE CONTROLLED DOCUMENT REVISION TRANSMITTAL FORM

DOCUMENT: 2.50 SERIES - IMPLEMENTING PROCEDURES TO THE EMERGENCY PLAN

COPY NUMBER: Document Control Desk (2 Copies)

ISSUE DATE: May 30, 1985

1. Remove existing 2.50 series Implementing Procedures to the Emergency Plan index, and replace with attached 2.50 series index dated 5-30-85, 2 pages.

2. Remove existing page 1 of Proc. No. 2.50.4, General Emergency, Rev. No. 10, and replace with attached corrected page 1. (Typographical error)

3. Remove existing Proc. No. 2.50.10, Evaluation of Radiological Data, Rev. No. 7, and replace with attached Proc. No. 2.50.10, (Same Title), Rev. No. 8, pages 1-50.

4. Remove existing page 2 of Proc. No. 2.50.14, Emergency Radiation Exposure Control, Rev. No. 5, and replace with attached corrected page 2. (Typographical error)

5. Remove existing pages 5 and 9 of Proc. No. 2.50.17, Emergency Notification, Rev. No. 10, and replace with attached corrected pages 5 and 9. (Typographical errors)

6. Remove existing page 13 of Proc. No. 2.50.19, Technical Support Center, Rev. No. 5, and replace with attached corrected page 13. (Typographical error)

The above listed revision(s)/change(s) has/have been placed in your assigned copy.

_____ /
DATE

THE UNDERSIGNED ACKNOWLEDGES COMPLETION OF THE FOLLOWING:

R 1. The receipt, review and insertion of the revised material into the assigned manual/file.

2. Assurance that those who use the document are aware of the change.

R 3. The destruction of all superseded pages.

SIGNATURE OF HOLDER: _____ /
DATE

RETURN THIS FORM TO: Administration Office within 10 working days of issue.
Maine Yankee Atomic Power Co.
P.O. Box 408

2.50 SERIES IMPLEMENTING PROCEDURES TO THE EMERGENCY PLAN 5-30-85

NUMBER	TITLE	CURRENT REVISION							
		#	DATE	#	DATE	#	DATE	#	DATE
2.50.0	Declaration & Categorization of Emergency Condition	6	8/84						
2.50.1	Notification of Unusual Event	7	6/84	8	4/85				
2.50.2	Alert	7	7/84	8	4/85				
2.50.3	Site Area Emergency	8	7/84	9	4/85				
2.50.4	General Emergency	9	8/84	10	4/85				
2.50.5	Emergency Plan Training	3	3/85						
2.50.6	Emergency Equipment Readiness Check	21	3/85						
2.50.7	Emergency On-Site Radiation Monitoring Procedure	4	3/85						
2.50.8	Medical Emergency Plan	2	4/85						
2.50.9	Security Force Radiation Emergency Plan	5	3/85						
2.50.10	Evaluation of Radiological Data	7	4/85	8	5/85				
2.50.11	Plant Entry & Recovery Plan	6	8/84						
2.50.12	Emergency Off-Site Radiation Monitoring Procedure	6	1/85						
2.50.14	Emergency Radiation Exposure Control	5	3/85						
2.50.15	Release of Public Information During Emergencies	2	3/85	[redacted]					
2.50.16	Protective Action Recommendations	4	3/85						
2.50.17	Emergency Notification	9	5/84	10	4/85	[redacted]			

2.50 SERIES IMPLEMENTING PROCEDURES TO THE EMERGENCY PLAN 5-30-85

NUMBER	TITLE	CURRENT REVISION							
		#	DATE	#	DATE	#	DATE	#	DATE
2.50.18	Operations Support Center	4	11/84						
2.50.19	Technical Support Center	5	4/85						
2.50.20	Prophylactic Administration of Potassium Iodide for Thyroid Blocking	3	3/85						
2.50.21	Offsite Dosimetry Assistance	1	2/84						
2.50.22	Activation of the Alternate Emergency Operations Facility	0	3/85	1	4/85				
2.50.23	Emergency Preparedness Exercises & Drills	0	4/84						

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

July 9, 1985

50-309 Maine Yankee

MEMORANDUM FOR: Chief, Document Management Branch, TIDC

FROM: Director, Division of Rules and Records, ADM

SUBJECT: REVIEW OF UTILITY EMERGENCY PLAN DOCUMENTATION

The Division of Rules and Records has reviewed the attached document and has determined that it may now be made publicly available.

J. M. Felton, Director
Division of Rules and Records
Office of Administration

Attachment: As stated