WATERFORD 3 SES
PLANT OPERATING MANUAL

LOUISIANA POWER & LIGHT
MIDDLE SOUTH UTILITIES SYSTEM

POM VOLUME 18
POM SECTION 2

EP-2-060
REVISION 1 Ch. 1
APPROVAL DATE:
EFFECTIVE DATE: Fuel Load 4/18/83

EMERGENCY PLAN IMPLEMENTING PROCEDURE

RADIOLOGICAL FIELD MONITORING

LP&L W-3 RECORDS

CONTROLLED COPY

NO. 029

PORC Meeting No. 82-028

Reviewed: _____
PORC Chairman

Approved: _____
Plant Manager-
Nuclear

WATERFORD 3 SES

PLANT OPERATING MANUAL

CHANGE/REVISION/DELETION REQUEST

Procedure No. EP-2-060 Title Radiological Field Monitoring

Effective Date Fuel Load (if different from approval date)

Complete A, B, or C

A. Change No. 12 approved 7/8/83

B. Revision No. 1

C. Deletion N/A

REASON FOR CHANGE, REVISION, OR DELETION

Procedure compliance with Health Physics request

REQUIRED SIGNATURES

Originator George Wehmann Date 4/22/83

Technical Review G P Bailey Date 4-22-83

SAFETY EVALUATION

Does this change, revision, or deletion:	YES	NO
1. Change the facility as described in the FSAR?	___	✓
2. Change the procedures as described in the FSAR?	___	✓
3. Conduct tests/experiments not described in the FSAR?	___	✓
4. Create a condition or conduct an operation which exceeds, or could result in exceeding, the limits in Technical Specifications?	___	✓

If the answer to any of the above is yes, complete and attach a 10 CFR 50.59 Safety Evaluation checklist.

Safety Evaluation G P Bailey Date 4-22-83

Group/Dep't. Head Review G P Bailey Date 4-22-83

Temporary Approval* _____ Date _____ (NOS)

Temporary Approval* _____ Date _____

QC Review NA Gilliard Date 4-28-83

PORC Review [illegible] Date 4/29/83 Meeting No. 83-17A

Plant Manager-Nuclear Approval [illegible] Date 5/1/83

*Temporary approval must be followed by Plant Manager-Nuclear approval within 14 days.

WATERFORD 3 SES

PLANT OPERATING MANUAL

CHANGE/REVISION/DELETION REQUEST

Procedure No. EP-2-060 Title RADIOLOGICAL FIELD MONITORING

Effective Date FUEL LOAD (if different from approval date)

Complete A, B, or C

A. Change No. 1

B. Revision No. 1

C. Deletion N/A

REASON FOR CHANGE, REVISION, OR DELETION

To correct deficiency noted during NRC E.P. appraisal visit
Add Effective Date

REQUIRED SIGNATURES

Originator Robert D. Caywell Date 4/12/83

Technical Review N/A Date N/A

SAFETY EVALUATION

Does this change, revision, or deletion:	YES	NO
1. Change the facility as described in the FSAR?	___	✓
2. Change the procedures as described in the FSAR?	___	✓
3. Conduct tests/experiments not described in the FSAR?	___	✓
4. Create a condition or conduct an operation which exceeds, or could result in exceeding, the limits in Technical Specifications?	___	✓

If the answer to any of the above is yes, complete and attach a 10 CFR 50.59 Safety Evaluation checklist.

Safety Evaluation G P Bailey Date 4-11-83

Group/Dep't. Head Review G P Bailey Date 4-11-83

Temporary Approval* _____ Date _____ (NOS)

Temporary Approval* _____ Date _____

QC Review N/A [illegible] Date 4-15-83

PORC Review [illegible] Date 4-18-83 Meeting No. 83-15A

Plant Manager-Nuclear Approval R B Bellmard Date 5/17/83

*Temporary approval must be followed by Plant Manager-Nuclear approval within 14 days.

WATERFORD 3 SES

PLANT OPERATING MANUAL

CHANGE/REVISION/DELETION REQUEST

Procedure No. EP-2-060 Title Radiological Field Monitoring

Effective Date _____ (if different from PM-N approval date)

Complete A, B, or C

A. Change No. N/A

B. Revision No. 1

C. Deletion N/A

REASON FOR CHANGE, REVISION, OR DELETION

EP-2-060 used during drills found to be lacking sufficient directions during Emergency Planning Exercises

REQUIRED SIGNATURES

Originator [signature] Date 11-19-82

Technical Review G P Bailey Date 11-19-82

SAFETY EVALUATION

Does this change, revision, or deletion:	YES	NO
1. Change the facility as described in the FSAR?	___	X
2. Change the procedures as described in the FSAR?	___	X
3. Conduct tests/experiments not described in the FSAR?	___	X
4. Create a condition or conduct an operation which exceeds, or could result in exceeding, the limits in Technical Specifications?	___	X

If the answer to any of the above is yes, complete and attach a 10 CFR 50.59 Safety Evaluation checklist.

Safety Evaluation G P Bailey Date 11-19-82

Group/Dep't. Head Review G P Bailey Date 11-19-82

Temporary Approval* _____ Date _____ (NOS)

Temporary Approval* _____ Date _____

QC Review [signature] Date 1-13-83

PORC Review [signature] Date 1-19-83 Meeting No. 83-028 WPR

Plant Manager-Nuclear Approval [signature] Date 1/26/83

*Temporary approval must be followed by Plant Manager-Nuclear approval within 14 days.

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LIST OF EFFECTIVE PAGES

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1-~~14~~ 4, 6-14	Revision 1
5	CHANGE 1

1.0 PURPOSE

To define the methods and techniques to be utilized in performing field monitoring following a suspected release of radioactive material.

2.0 REFERENCES

2.1 EP-2-050, Offsite Dose Assessment (Manual)

2.2 EP-2-051, Offsite Dose Assessment (Computerized)

3.0 RESPONSIBILITIES

The Radiological Field Monitoring Teams are responsible for implementing this procedure.

4.0 INITIATING CONDITIONS

4.1 This procedure is to be initiated upon any of the following conditions:

4.1.1 Declaration of any of the following emergency classifications in which the event includes an actual or potential release of radioactive material to the atmosphere.

4.1.1.1 Alert

4.1.1.2 Site Emergency

4.1.1.3 General Emergency

4.1.2 At the discretion of the Health Physics Coordinator (HPC) or the Radiological Assessment Coordinator (RAC).

5.0 PROCEDURE

5.1 Assignment of Radiological Field Monitoring Teams

5.1.1 The assignment of personnel to Radiological Field Monitoring Teams will be made by the Radiological Controls Coordinator at the direction of the Health Physics Coordinator.

5.1.2 Each Radiological Field Monitoring Team should comprise two individuals, at least one qualified in the operation of the field monitoring equipment.

5.2 Radiological Field Monitoring Teams will normally be dispatched from the Operational Support Center (OSC); however, the HPC may prescribe monitoring assignments upon initial notification of certain team members. The Radiological Field Monitoring Teams, as assigned, will proceed to the nearest storage location for field monitoring kits as identified in Attachment 7.2.

5.3 The team shall obtain kit. Kits with broken seals should be avoided unless necessary.

5.4 Each kit will be opened and quickly inventoried. Inventory lists are posted inside the individual kits.

5.5 In addition to the inventory, the following equipment checks shall be performed:

5.5.1 RO-2 - Visual Check and Battery Check

5.5.2 Ludlum 2218 and Detector - Visual Check and Source Check with Barium-133 Source

NOTE

1. This check is <u>not</u> to determine instrument efficiency. Once a response is noted (counts being accumulated), the instrument can be considered operational.
2. The Radiological Field Monitoring Teams will be directed by the Health Physics Coordinator (HPC) or, if activated by the HPC, the Dose Assessment Coordinator (DAC). Once the EOF has been activated, the teams will be directed by the Radiological Assessment Coordinator. The onsite field monitoring teams will remain under the direction of the HPC.

5.5.3 Radio Communications Check - Communications must be established prior to leaving the OSC.

5.5.3.1 For Alert emergencies (Technical Support Center activation), establish communications with the Dose Assessment Coordinator.

5.5.3.2 For Site and General emergencies (EOF activation) establish communications with the Field Monitoring Communicator at such time that responsibility for dose assessment has been transferred to the EOF.

5.6 During initial communications check, each team will receive a team designation (Alpha, Bravo, etc.) from the HPC/DAC and initial instructions.

5.7 Each team shall leave the OSC and obtain their designated vehicle.

> NOTE
>
> As soon as they leave the OSC, the dose rate instrument should be turned on and monitored continuously. The HPC/DAC or RAC should be updated on dose rates and location frequently, about every 2-3 minutes.

5.8 Proceed to the location as identified by the HPC/DAC or RAC. At that location, perform the following:

5.8.1 Gamma survey with RO-2

5.8.2 Beta survey (open-window) with RO-2

> NOTE
>
> Surveys should be performed with RO-2 held vertically at one (1) meter above ground level. The monitor should slowly rotate 360 degrees and determine the maximum dose rate.

5.9 Notify the HPC/DAC or RAC of the levels monitored.

5.9.1 If levels are below the minimum sensitivity of the instrument, report results as "less than" the minimum scale deflection.

5.9.2 Report gamma ~~and beta~~ levels ~~as "closed window" for gamma and "open window" for beta.~~ ONLY TO HPC/DAC UNLESS OTHERWISE REQUESTED. BETA READINGS (OPEN WINDOW) SHOULD BE RECORDED BUT NOT REPORTED. (CHANGE)

5.10 Record all data on Attachment 7.1.

5.11 Unless otherwise directed by the HPC/DAC or RAC, obtain an air sample at this location as follows:

5.11.1 Install particulate filter and silver zeolite cartridge in the air sampler cartridge holder. Air drawn into sampler must pass through particulate filter first, then through the silver zeolite cartridge. Silver zeolite filter must be inserted so that air passes through in the direction of the arrow on the side of the filter.

5.11.2 Turn on sampler and stopwatch. Note flow rate.

> CAUTION
> Monitor flow rate frequently. If air sampler is powered by car battery with the car running and the engine is then stopped, the flow rate will decrease.

5.11.3 Run air sampler to obtain an air sample volume of at least 10 cubic feet.

> CAUTION
> Air sampler should not be placed with the nozzle near any surface which is potentially contaminated.

5.11.4 While air sample is running, prepare two envelopes, labeling each with the following information:

5.11.4.1 Date and Time

5.11.4.2 Sample Number

5.11.4.3 Location

5.11.4.4 Flow Rate (CFM)

5.11.4.5 Sampling Duration (minutes)

> NOTE
> Samples will be given a sequential number preceded by the team designation, i.e., A1, A2, A3, or B1, B2, and so on.

5.11.5 After appropriate volume is collected, stop air sampler, remove particulate filter and silver zeolite cartridge and place into envelopes.

5.11.6 Record all sample data on Attachment 7.1.

5.12 Unless otherwise directed by the HPC/DAC or RAC, analyze the air sample for iodine activity using the Ludlum 2218 as indicated below. Samples obtained on site will normally be returned to the Health Physics Lab for analysis.

> NOTE
> Background radiation levels may interfere with counting equipment. If dose rates exceed 5 mR/hr, do not attempt to count filters; proceed to low background area.

5.12.1 Verify (or set) the following settings on the Ludlum 2218 (see Attachment 7.3 for location of switches):

	Switch	Position
A.	Stabilizer Toggle Switch	On
B.	Channel 1 Toggle Switch	In
C.	Channel 2 Toggle Switch	Out
D.	Channel 1 Window	40

	Switch	Position
E.	Channel 1 Threshold	344
F.	Channel 1 Multiplier	Bypass
G.	Channel 2 Multiplier	Bypass
H.	Add-Off-Subtract Switch Channel 1	Add
I.	Add-Off-Subtract Switch Channel 2	Off
J.	Live-Clock Toggle Switch	Live
K.	Time-Multiplier Switch	X1
L.	F-S Toggle Switch	S
M.	CH1-CH2-Sealer Switch	CH1
N.	Range	X1K (Initially)
O.	Recycle Toggle Switch (on back)	Off

> NOTE
> Range setting should be reduced during counting to give on-scale reading.

5.12.2 Detector Operation and Setup

5.12.2.1 Verify that the NaI detector is connected to the Ludlum 2218.

5.12.2.2 Insert detector into shielded sample holder.

5.12.2.3 Place power selector switch to "BATT." Allow approximately 5 minutes for equipment to stabilize.

5.12.2.4 Set count timer to 2 minutes. Start the background count by pushing the COUNT RESET button. Run background count for 2 minutes. Use Attachment 7.1 for recording analysis data.

5.12.2.5 Place silver zeolite cartridge in shielded sample holder with the inlet side of the cartridge facing the detector.

5.12.2.6 Reset count timer to 5 minutes and push the COUNT RESET button. Count sample for 5 minutes. Record on Attachment 7.1.

5.13 Notify the HPC/DAC or RAC of the results of sampling and analysis for I-131 including:

5.13.1 Team Designation

5.13.2 Sample Number

5.13.3 Sample Location

5.13.4 Sample Duration

5.13.5 Sample Flow Rate

5.13.6 Total Sample Counts (5-min. count)

5.13.7 Total Background Counts (2-min. count)

5.14 Proceed as directed by the HPC/DAC or RAC to additional monitoring points. Continue performing surveys and air sampling/analysis as directed.

5.15 While in transit to monitoring points, maintain continuous dose rate monitoring and notify the HPC/DAC or RAC of any significant findings, paying particular attention to the location of the highest measured dose rates.

5.16 Retain all air samples in plastic bags.

NOTE

The HPC/DAC or RAC will designate a specified location where all samples and data sheets will be returned.

6.0 FINAL CONDITIONS

6.1 Releases have terminated or reduced to levels below the EAL's for an Alert emergency classification.

6.2 All surveys and air samples requested have been completed.

6.3 All data sheets, particulate filters and silver zeolite cartridges have been returned to the location defined by the HPC/DAC or RAC.

7.0 ATTACHMENTS

7.1 Dose Rate & Air Sample Data Log

7.2 Radiological Field Monitoring Kit Location and Contents

7.3 Ludlum 2218 Switch/Meter Locations

DOSE RATE & AIR SAMPLE DATA LOG

TEAM _____

DATE _____

SAMPLE			DOSE RATE (mR / hr)		AIR SAMPLE				AIR SAMPLE COUNT	
NUMBER	TIME (24 hr)	LOCATION	CLOSED WINDOW	OPEN WINDOW	SAMPLE START	SAMPLE STOP	SAMPLE DURATION (MIN)	FLOW RATE (CFM)	TOTAL SAMPLE COUNTS (5 MIN)	TOTAL BKGRND COUNTS (2 MIN)

INSTRUMENT DATA

DOSE RATE INSTRUMENT _____
MODEL SN

AIR SAMPLER _____
MODEL SN

GAMMA ANALYZER LUD 2218
MODEL SN

D/C FOR 364 KEV _____

TECHNICIAN SIGNATURE _____ REVIEWED BY _____

RADIOLOGICAL FIELD MONITORING KIT
LOCATION AND CONTENTS

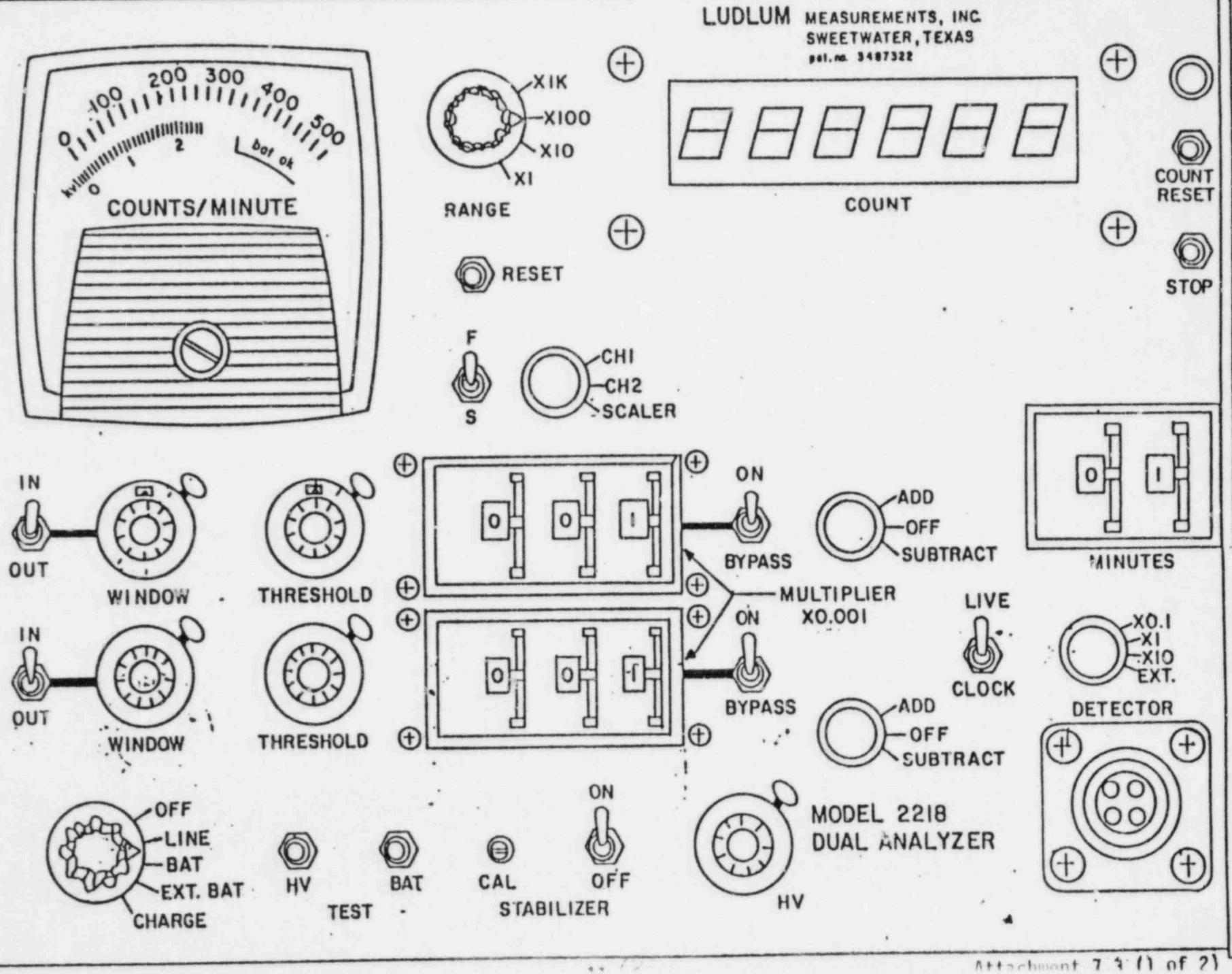
Kit Locations

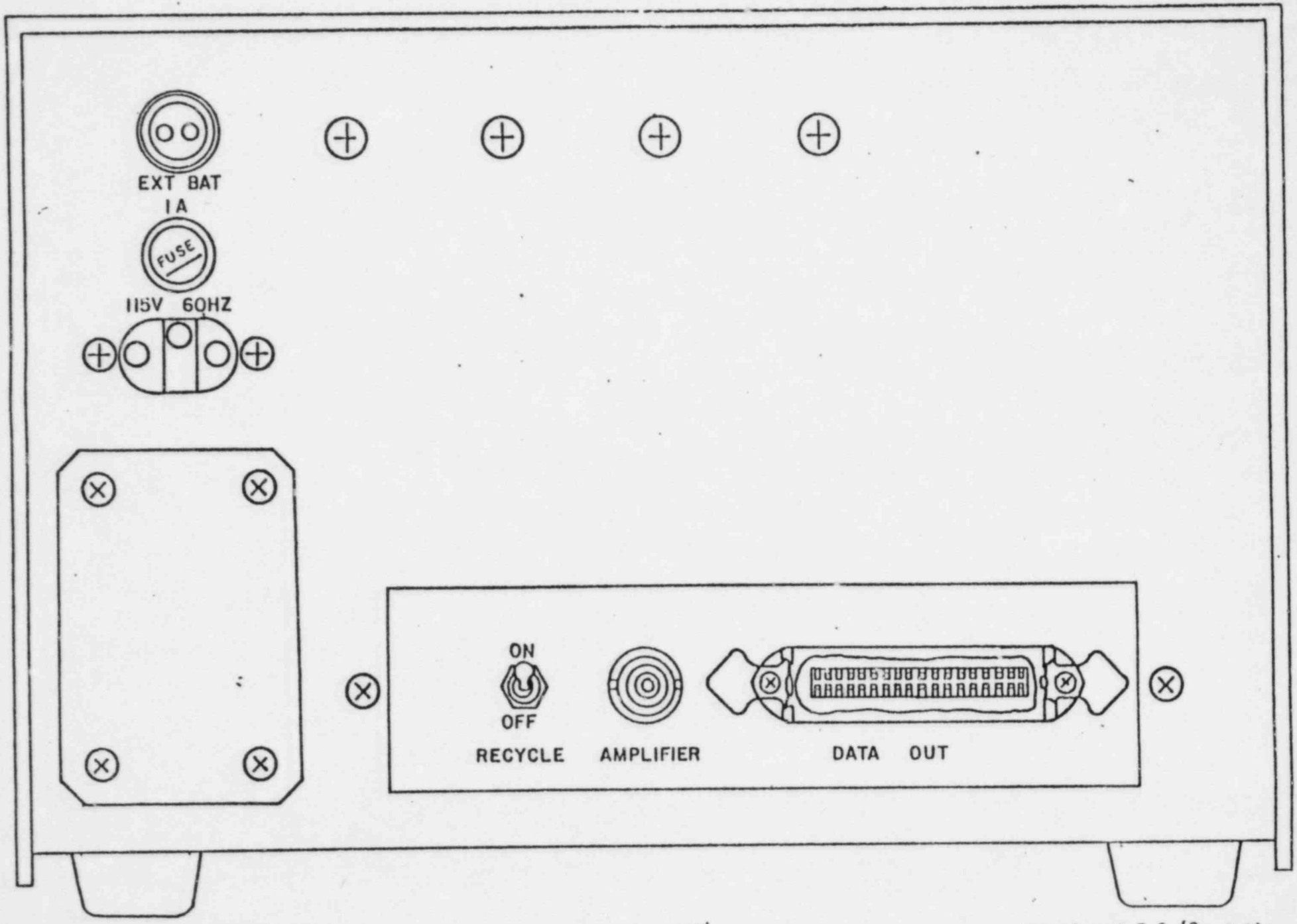
Operational Support Center	3 Kits

Kit Contents

Item	Number
Particulate air sample filter	1 bx
Silver zeolite sample cartridge	10 ea
Portable radio	1 ea
Stopwatch	1 ea
Clipboard	1 ea
Writing pen	1 ea
Flashlight	1 ea
Battery, D-cell	2 ea
Writing pad	1 ea
Sample bag	12 ea
Survey maps	
Dose rate meter (RO-2 or RO-2A)	1 ea
Air sampler, battery-powered	1 ea
Gamma analyzer, Ludlum 2218 and NaI Detector w/cable	1 ea
Shielded sample holder	1 ea

LUDLUM 2218 SWITCH METER LOCATIONS




EXT BAT
1A
FUSE
115V 60HZ
ON
OFF
RECYCLE
AMPLIFIER
DATA OUT

WATERFORD 3 SES
PLANT OPERATING MANUAL

LOUISIANA POWER & LIGHT
MIDDLE SOUTH UTILITIES SYSTEM

POM VOLUME 18
POM SECTION 2

EP-2-050
REVISION 1
APPROVAL DATE: May 2, 1983
EFFECTIVE DATE: Fuel Load

EMERGENCY PLAN IMPLEMENTING PROCEDURE

OFF-SITE DOSE ASSESSMENT (MANUAL)

PORC Meeting No. 83-174

Reviewed: _____
PORC Chairman

Approved: _____
Plant Manager-Nuclear

WATERFORD 3 SES

PLANT OPERATING MANUAL

CHANGE/REVISION/DELETION REQUEST

Procedure No. EP-2-050 Title OFF-SITE DOSE ASSESSMENT (MANUAL)

Effective Date _____ (if different from approval date)

Complete A, B, or C

A. Change No. 1

B. Revision No. 1

C. Deletion N/A

REASON FOR CHANGE, REVISION, OR DELETION

ERROR IN ~~Page Numbers~~ GW 5/10/83 Attachment Numbering System

REQUIRED SIGNATURES

Originator George Wehrmann Date 5/10/83

Technical Review N/A PH Date N/A PH

SAFETY EVALUATION

Does this change, revision, or deletion:	YES	NO
1. Change the facility as described in the FSAR?	___	X
2. Change the procedures as described in the FSAR?	___	X
3. Conduct tests/experiments not described in the FSAR?	___	X
4. Create a condition or conduct an operation which exceeds, or could result in exceeding, the limits in Technical Specifications?	___	X

If the answer to any of the above is yes, complete and attach a 10 CFR 50.59 Safety Evaluation checklist.

Safety Evaluation Robert D. Cygnarowicz Date 5/11/83

Group/Dep't. Head Review Robert D. Cygnarowicz Date 5/11/83

Temporary Approval* _____ Date _____ (NOS)

Temporary Approval* _____ Date _____

QC Review N/A E. L. Skinner Date 6-3-83

PORC Review [illegible] Date 6-13-83 Meeting No. 83-21

Plant Manager-Nuclear Approval R. F. Burkhart Date 7/10/83

*Temporary approval must be followed by Plant Manager-Nuclear approval within 14 days.

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WATERFORD 3 SES

PLANT OPERATING MANUAL

CHANGE/REVISION/DELETION REQUEST

Procedure No. EP-2-050 Title Off-Site Dose Assessment (Manual)

Effective Date ~~Fuel Load~~ (if different from approval date)

Complete A, B, or C

A. Change No. N/A

B. Revision No. 1

C. Deletion N/A

REASON FOR CHANGE, REVISION, OR DELETION

Complete Revision of data and format

REQUIRED SIGNATURES

Originator [signature] Date 4/14/83

Technical Review [signature] Date 4-14-83

SAFETY EVALUATION

Does this change, revision, or deletion:	YES	NO
1. Change the facility as described in the FSAR?	___	X
2. Change the procedures as described in the FSAR?	___	X
3. Conduct tests/experiments not described in the FSAR?	___	X
4. Create a condition or conduct an operation which exceeds, or could result in exceeding, the limits in Technical Specifications?	___	X

If the answer to any of the above is yes, complete and attach a 10 CFR 50.59 Safety Evaluation checklist.

Safety Evaluation [signature] Date 4-14-83

Group/Dep't. Head Review [signature] Date 4-14-83

Temporary Approval* _____ Date _____ (NOS)

Temporary Approval* _____ Date _____

QC Review [signature] Date 4-28-83

PORC Review [signature] Date 4/27/83 Meeting No. 83-17

Plant Manager-Nuclear Approval N/A WPR Date N/A WPR

*Temporary approval must be followed by Plant Manager-Nuclear approval within 14 days.

TABLE OF CONTENTS

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Title	Revision 1
1-62	Revision 1

1.0 PURPOSE

Provide methods for determining projected off-site doses following a major accidental release of radioactive material; for purposes of recommending off-site protective actions; and for long-term continuous updating of the off-site doses in the event the computer-based system (CEPADAS) is not available.

2.0 REFERENCES

2.1 EP-2-051, Offsite Dose Assessment (Computerized)

2.2 Meteorology and Atomic Energy - 1968, D.H. Slade USAEC Report TID 241090

2.3 U.S. NRC Regulatory Guide 1.23, Revision 1 - Meterological Programs in Support of Nuclear Power Plants

2.4 U.S. NRC Regulatory Guide 1.109 - Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purposes of Evaluating Compliance with 10CFR50, Appendix I, Rev. 1, October 1977

2.5 U.S. NRC Regulatory Guide 1.145, Revision 1, Atmospheric Dispersion Models for Potential Accident Consequent Assessments at Nuclear Power Plants

3.0 RESPONSIBILITIES

The Radiological Assessment Coordinator/Dose Assessment Coordinator is responsible for ensuring this procedure and all calculations are performed in accordance with this procedure.

4.0 INITIATING CONDITIONS

4.1 Any of the following emergencies has been declared:

Alert

Site Area Emergency

General Emergency

and a release of radioactive material to the atmosphere has occurred or has the potential to occur.

4.2 As determined by the Radiological Assessment Coordinator/Dose Assessment Coordinator or the Emergency Coordinator.

5.0 PROCEDURE

> NOTE
>
> This procedure is arranged in attachments, each describing a specific method of assessing off-site dose. The specific attachment(s) which is (are) to be utilized in performing dose assessment shall be based upon availability of plant operating data and radiological field data. Only if no plant or field data is available, should Attachment 7.4, Dose Projections Based on FSAR Accident Data, be used. Each attachment is described below.

5.1 Attachment 7.1 - Dose Projections Based on Plant Monitoring Data. This attachment is used to rapidly assess the maximum off-site doses to determine if off-site Protective Action Guides will be exceeded and if recommendations for protective actions should be made. It is the fastest means of manually calculating projections and should be followed up by further detailed calculations, especially those that may be based on actual field data.

5.2 Attachment 7.2 - Dose Projections Based on Field Monitoring Data. This attachment provides methods of performing dose projections based on actual measurements by off-site monitoring teams.

5.3 Attachment 7.3 - Dose Projections Based on Known Isotopic Release Rate. This attachment provides methods of calculating off-site doses when isotopic analysis of the release path exists.

5.4 Attachment 7.4 - Dose Projections Based on FSAR Accident Data. This attachment provides methods of calculating off-site doses based on nine types of accidents analyzed in the FSAR. Dose projections utilizing this technique should be used only if there is insufficient information to utilize the procedures identified in Attachment 7.1, 7.2 or 7.3.

5.5 Attachment 7.5 - Meteorological Data. This attachment provides the method for obtaining meteorological data needed to perform dose projections. The attachment provides the method for using overlays to determine dispersion factors.

> NOTE
> An adequate supply of all forms for each attachment is maintained in the TSC and EOF (primary and backup) for the Radiological Assessment Coordinator/Dose Assessment Coordinator's use.

6.0 FINAL CONDITIONS

6.1 Releases of radioactive material to the atmosphere have been terminated or decreased below the EAL for an alert category or:

6.2 Releases are controlled and a long term monitoring program has been established.

7.0 ATTACHMENTS

7.1 Dose Projections Based on Plant Monitoring Data

7.2 Dose Projections Based on Field Monitoring Data

7.3 Dose Projections Based on Known Isotopic Release Data

7.4 Dose Projections Based on FSAR Accident Data

7.5 Meteorological Data

DOSE PROJECTIONS BASED ON PLANT MONITORING DATA

1.0 PURPOSE

This attachment provides the methods for quickly calculating projected off-site doses in order to determine the need for protective actions.

2.0 PROCEDURE

2.1 Determination of whole body and child thyroid doses at specific off-site locations is performed using the attached work sheets.

2.2 Determination of accident type.

2.2.1 Based on information communicated by the emergency coordinator, select the form for the most appropriate accident type and log the exposure duration in Column 5.

> NOTE
>
> The exposure duration (for all except main steam line break) should be assumed as two hours unless plant information provides an accurate, dependable prediction of release duration.

Attachment 7.1, Page 5 - Fuel Handling Accident
Attachment 7.1, Page 6 - Waste Gas System Failure
Attachment 7.1, Page 7 - Liquid Waste System Failure
Attachment 7.1, Page 8 - LOCA, Major Fuel Failure
Attachment 7.1, Page 9 - LOCA, <1% Failed Fuel
Attachment 7.1, Page 10 - S.G. Tube Rupture, Major Fuel Failure
Attachment 7.1, Page 11 - S.G. Tube Rupture, <1% Failed Fuel

MAIN STEAM RELEASE = MSR

Attachment 7.1, Page 12 - MSR, Major Fuel Failure, Steam Line Break
Attachment 7.1, Page 13 - MSR, Major Fuel Failure, Relief Valve
Attachment 7.1, Page 14 - MSR, Major Fuel Failure, Atmos. Dump
Attachment 7.1, Page 15 - MSR, Major Fuel Failure, Emer. Feed Pump Turbine
Attachment 7.1, Page 16 - MSR, <1% Failed Fuel, Steam Line Break
Attachment 7.1, Page 17 - MSR, <1% Failed Fuel, Relief Valve
Attachment 7.1, Page 18 - MSR, <1% Failed Fuel, Atmos. Dump
Attachment 7.1, Page 19 - MSR, <1% Failed Fuel, Emergency Feed Pump Turbine

> NOTE
> It is possible that two release paths and two forms are applicable. If this occurs, the projected doses and release rates from each form should be added together.

2.3 Record the date and time on the selected forms.

2.4 Record the following meteorological data:

> NOTE
> Data from both the primary and backup meteorological towers is available on the CRT in the Control Room. Data from the backup tower should be used only if the required information is not available from the primary tower. Figure 1 of Attachment 7.1 provides a description of the meteorological data to be available in the Control Room. If data from neither tower is available, follow the procedure outlined in Attachment 7.5.

2.4.1 Record the 10 meter wind speed in mph in Column 3 of the selected form. Multiply meters/sec times 2.24 to obtain miles/hour.

2.4.2 Record the wind direction in whole degrees <u>from</u> which the wind is blowing in section 7 of the selected form.

2.4.3 Record the delta T (60 m - 10 m) in degrees centigrade (C) in section 8 of the selected form.

2.4.4 Based on the delta T, select the proper Xu/Q values from the Xu/Q table and record them in Column 2.

2.5 Record the proper radiation monitor reading in Column A.

NOTE

The gas channel should be used for the lowest range monitor that is on scale. The Main Condenser Evacuation System (MCES) Monitor is not normally used since any significant radioactivity will divert the MCES to the plant stack; use the plant stack monitor.

2.6 Record the flow rate in cfm in Column C. See Attachment 7.1, Table 1, page 20, to determine cfm to use in Column C.

2.7 Multiply A x B x C and record the product in Column D as noble gas release rate.

2.8 Multiply D x E and record the product in Column F. If more than one release path exists, sum Column F to use for dose calculations.

2.9 Multiply D x G and record the product in Column H, as iodine release rate.

2.10 Multiply H x I and record the product in Column J. If more than one release path exists, sum Column H to use for dose calculations.

2.11 Enter the value from Column F in Column 1 in each row designated for noble gas (NG).

2.12 Enter the value from Column J in Column 1 in each row designated for Iodine (I).

2.13 Complete the calculations below for each row.

2.13.1 Multiply 1 x 2 and divide by 3. Record the result in Column 4 as the dose rate (mrem/hr) for whole body and for a child's thyroid.

2.13.2 Multiply 4 x 5 and record the product in column 6 as projected dose in mrem.

2.14 When there is a significant change in the monitor reading (± 20%); wind speed (± 50%); wind direction (different sector) or factor of

five (5) in dispersion factor, the dose projections should be revised on another sheet.

2.15 The data recorded on each sheet should be appropriately entered on the Dose Assessment Status Boards located in the TSC and EOF.

2.16 It should also be entered at the appropriate locations on the 10 mile Emergency Planning area maps located in the TSC and EOF.

3.0 ATTACHMENTS

3.1 Worksheets - Dose Projections Based on Plant Data (15 pages)

3.2 Table 1 - System Flow Rates (2 pages)

3.3 Figure 1, Example of Meteorological Data Available in the Control Room (1 page)

Print last name / Signature _____ Date/Time _____

MONITOR	Ⓐ MONITOR READING uCi/cc	Ⓑ CONVERSION FACTOR	Ⓒ FLOW RATE (CFM)	Ⓓ Release Rate (AxBxC) Ci/sec	Ⓔ DOSE FACTOR	Ⓕ Dose Rate Factor (DxE)	Ⓖ Iodine/ Noble Gas Ratio	Ⓗ Release Rate (DxG) Ci/sec	Ⓘ DOSE FACTOR	Ⓙ Dose Rate Factor (Hx I)
PRM-IRE-5032(LO)		4.72E-04								
PRM-IRE-5032(MID)		6.70E-04			3.02 E4		6.45 E-6		1.55 E9	
PRM-IRE-5032(HI)		1.00E-03								
PRM-IRE-5107A or B		4.72E-04			3.02 E4		6.45 E-5		1.55 E9	
PRM-IRE-0100.1S		4.72E-04								
PRM-IRE-0100.2S		4.72E-04			3.02 E4		6.45 E-6		1.55 E9	
PRM-IRE-0110(MID)		6.70E-04								
PRM-IRE-0110(HI)		1.00E-03								

LOCATION	① Dose Rate Factor NG from Column F Iod from Column J	② Xu/Q	③ Wind Speed mph	④ Dose Rate mR/hr ①×②÷③	⑤ Exposure Duration (Hours)	⑥ Projected Dose = ④×⑤ (mRem)
EAB - Noble Gas						mRem Whole Body (EAB)
EAB - Iodine						mRem Child Thyroid (EAB)
2 mile - Noble Gas						mRem Whole Body (2 mi)
2 mile - Iodine						mRem Child Thyroid (2 mi)
5 mile - Noble Gas						mRem Whole Body (5 mi)
5 mile - Iodine						mRem Child Thyroid (5 mi)
10 mile - Noble Gas						mRem Whole Body (10 mi)
10 mile - Iodine						mRem Child Thyroid (10 mi)

⑦ Wind Direction From _____°

FUEL HANDLING ACCIDENT

⑧ Xu/Q Table

Delta T °C 60m-10m	S.I.	EAB	2 miles	5 miles	10 miles
<-1.0	A	1.1 (-5)	1.3 (-6)	7.1 (-7)	7.1 (-7)
-1.0 to -0.9	B	5.4 (-5)	4.5 (-6)	7.7 (-7)	7.1 (-7)
-0.9 to -0.8	C	1.2 (-4)	1.3 (-5)	2.5 (-6)	9.3 (-7)
-0.8 to -0.3	D	1.8 (-4)	3.7 (-5)	1.1 (-5)	4.2 (-6)
-0.3 to +0.8	E	2.6 (-4)	6.5 (-5)	2.3 (-5)	1.0 (-5)
+0.8 to +2.2	F	4.4 (-4)	1.3 (-4)	5.0 (-5)	2.4 (-5)
> +2.2	G	7.3 (-4)	2.4 (-4)	1.1 (-4)	5.4 (-5)

Print last name _____ Signature _____ Date/Time _____

MONITOR	Ⓐ MONITOR READING uCi/cc	Ⓑ CONVERSION FACTOR	Ⓒ FLOW RATE (CFM)	Ⓓ Release Rate (A×B×C) Ci/sec	Ⓔ DOSE FACTOR	Ⓕ Dose Rate Factor (D×E)	Ⓖ Iodine/ Noble Gas Ratio	Ⓗ Release Rate (D×G) Ci/sec	Ⓘ DOSE FACTOR	Ⓙ Dose Rate Factor (H×I)
PRM-IRE-0110(LO)		4.72 E-04								
PRM-IRE-0110(MID)		5.85 E-04								
PRM-IRE-0110(HI)		5.81 E-04								
PRM-IRE-0100.1S		4.72 E-04			4.86 E+04		4.08 E-07		9.67 E+08	
PRM-IRE-0100.2S		4.72 E-04								

LOCATION	① Dose Rate Factor N.G. from Column F Iod. from Column J	② Xu/Q	③ Wind Speed mph	④ Dose Rate mR/hr ①×②÷③	⑤ Exposure Duration (Hours)	⑥ Projected Dose = ④×⑤ (mRem)
EAB - Noble Gas						mRem Whole Body (EAB)
EAB - Iodine						mRem Child Thyroid (EAB)
2 mile - Noble Gas						mRem Whole Body (2 mi)
2 mile - Iodine						mRem Child Thyroid (2 mi)
5 mile - Noble Gas						mRem Whole Body (5 mi)
5 mile - Iodine						mRem Child Thyroid (5 mi)
10 mile - Noble Gas						mRem Whole Body (10 mi)
10 mile - Iodine						mRem Child Thyroid (10 mi)

⑦ Wind Direction From _____°

WASTE GAS SYSTEM FAILURE

⑧ Xu/Q Table

Delta T °C 60m-10m	S.I	EAB	2 miles	5 miles	10 miles
<-1.0	A	1.1 (-5)	1.3 (-6)	7.1 (-7)	7.1 (-7)
-1.0 to -0.9	B	5.4 (-5)	4.5 (-6)	7.7 (-7)	7.1 (-7)
-0.9 to -0.8	C	1.2 (-4)	1.3 (-5)	2.5 (-6)	9.3 (-7)
-0.8 to -0.3	D	1.8 (-4)	3.7 (-5)	1.1 (-5)	4.2 (-6)
-0.3 to +0.8	E	2.6 (-4)	6.5 (-5)	2.3 (-5)	1.0 (-5)
+0.8 to +2.2	F	4.4 (-4)	1.3 (-4)	5.0 (-5)	2.4 (-5)
>+2.2	G	7.3 (-4)	2.4 (-4)	1.1 (-4)	5.4 (-5)

Print last name / Signature _____ Date/Time _____

MONITOR	(A) MONITOR READING uCi/cc	(B) CONVERSION FACTOR	(C) FLOW RATE (CFM)	(D) Release Rate (AxBxC) Ci/sec	(E) DOSE FACTOR	(F) Dose Rate Factor (DxE)	(G) Iodine/ Noble Gas Ratio	(H) Release Rate (DxG) Ci/sec	(I) DOSE FACTOR	(J) Dose Rate Factor (HxI)
PRM-IRE-0110 (LO)		4.72E-04								
PRM-IRE-0110(MID)		6.37E-04								
PRM-IRE-0110 (HI)		6.42E-04			3.33E+04		1.99E-04		1.78E+09	
PRM-IRE-0100.1S		4.78E-04								
PRM-IRE-0100.2S		4.78E-04								

LOCATION	(1) Dose Rate Factor N.G. from Column F Iod. from Column J	(2) Xu/Q	(3) Wind Speed mph	(4) Dose Rate mR/hr (1)x(2)÷(3)	(5) Exposure Duration (Hours)	(6) Projected Dose = (4)x(5) (mRem)
EAB - Noble Gas						mRem Whole Body (EAB)
EAB - Iodine						mRem Child Thyroid (EAB)
2 mile - Noble Gas						mRem Whole Body (2 mi)
2 mile - Iodine						mRem Child Thyroid (2 mi)
5 mile - Noble Gas						mRem Whole Body (5 mi)
5 mile - Iodine						mRem Child Thyroid (5 mi)
10 mile - Noble Gas						mRem Whole Body (10 mi)
10 mile - Iodine						mRem Child Thyroid (10 mi)

(7) Wind Direction From _____°

LIQUID WASTE SYSTEM FAILURE

(8) Xu/Q Table

Delta T °C 60m-10m	S.I.	EAB	2 miles	5 miles	10 miles
<-1.0	A	1.1(-5)	1.3(-6)	7.1(-7)	7.1(-7)
-1.0 to -0.9	B	5.4(-5)	4.5(-6)	7.7(-7)	7.1(-7)
-0.9 to -0.8	C	1.2(-4)	1.3(-5)	2.5(-6)	9.3(-7)
-0.8 to -0.3	D	1.6(-4)	3.7(-5)	1.1(-5)	4.2(-6)
-0.3 to +0.8	E	2.6(-4)	6.5(-5)	2.3(-5)	1.0(-5)
+0.8 to +2.2	F	4.4(-4)	1.3(-4)	5.0(-5)	2.4(-5)
>+2.2	G	7.3(-4)	2.4(-4)	1.1(-4)	5.4(-5)

Print last name / Signature _____ Date/Time _____

MONITOR	(A) MONITOR READING uCi/cc	(B) CONVERSION FACTOR	(C) FLOW RATE (CFM)	(D) Release Rate (AxBxC) Ci/sec	(E) DOSE FACTOR	(F) Dose Rate Factor (DxE)	(G) Iodine/ Noble Gas Ratio	(H) Release Rate (DxG) Ci/sec	(I) DOSE FACTOR	(J) Dose Rate Factor (HxI)
PRM-IRE-0110(LO)		3.92 E-04								
PRM-IRE-0110(MID)		4.27 E-04								
PRM-IRE-0110(HI)		3.65 E-04								
PRM-IRE-0100.1S		4.02 E-04			3.42 E+05		4.28 E-03		5.09 E+08	
PRM-IRE-0100.2S		4.02 E-04								

LOCATION	(1) Dose Rate Factor N.G. from Column F Iod. from Column J	(2) Xu/Q	(3) Wind Speed mph	(4) Dose Rate mR/hr (1)x(2)÷(3)	(5) Exposure Duration (Hours)	(6) Projected Dose = (4)x(5) (mRem)
EAB - Noble Gas						mRem Whole Body (EAB)
EAB - Iodine						mRem Child Thyroid (EAB)
2 mile - Noble Gas						mRem Whole Body (2 mi)
2 mile - Iodine						mRem Child Thyroid (2 mi)
5 mile - Noble Gas						mRem Whole Body (5 mi)
5 mile - Iodine						mRem Child Thyroid (5 mi)
10 mile - Noble Gas						mRem Whole Body (10 mi)
10 mile - Iodine						mRem Child Thyroid (10 mi)

(7) Wind Direction From _____°

LOCA, MAJOR FUEL FAILURE

(8) Xu/Q Table

Delta T °C 60m-10m	S.I.	EAB	2 miles	5 miles	10 miles
<-1.0	A	1.1 (-5)	1.3 (-6)	7.1 (-7)	7.1 (-7)
-1.0 to -0.8	B	5.4 (-5)	4.5 (-6)	7.7 (-7)	7.1 (-7)
-0.8 to -0.8	C	1.2 (-4)	1.3 (-5)	2.5 (-6)	9.3 (-7)
-0.8 to -0.3	D	1.8 (-4)	3.7 (-5)	1.1 (-5)	4.2 (-6)
-0.3 to +0.8	E	2.6 (-4)	6.5 (-5)	2.3 (-5)	1.6 (-5)
+0.8 to +2.2	F	4.4 (-4)	1.3 (-4)	5.0 (-5)	2.4 (-5)
>+2.2	G	7.3 (-4)	2.4 (-4)	1.1 (-4)	5.4 (-5)

Print last name / Signature _____ Date/Time _____

MONITOR	(A) MONITOR READING uCi/cc	(B) CONVERSION FACTOR	(C) FLOW RATE (CFM)	(D) Release Rate (AxBxC) Ci/sec	(E) DOSE FACTOR	(F) Dose Rate Factor (DxE)	(G) Iodine/ Noble Gas Ratio	(H) Release Rate (DxG) Ci/sec	(I) DOSE FACTOR	(J) Dose Rate Factor (HxI)
PRM-IRE-0110(LO)		4.72 E-04								
PRM-IRE-0110(MID)		4.72 E-04								
PRM-IRE-0110(HI)		4.72 E-04								
PRM-IRE-0100.1S		4.72 E-04			6.17 E+04		1.04 E-04		7.65 E+08	
PRM-IRE-0100.2S		4.72 E-04								

LOCATION	① Dose Rate Factor NG. from Column F Iod. from Column J	② Xu/Q	③ Wind Speed mph	④ Dose Rate mR/hr ①×②÷③	⑤ Exposure Duration (Hours)	⑥ Projected Dose = ④×⑤ (mRem)
EAB - Noble Gas						mRem Whole Body (EAB)
EAB - Iodine						mRem Child Thyroid (EAB)
2 mile - Noble Gas						mRem Whole Body (2 mi)
2 mile - Iodine						mRem Child Thyroid (2 mi)
5 mile - Noble Gas						mRem Whole Body (5 mi)
5 mile - Iodine						mRem Child Thyroid (5 mi)
10 mile - Noble Gas						mRem Whole Body (10 mi)
10 mile - Iodine						mRem Child Thyroid (10 mi)

⑦ Wind Direction From _____°

LOCA, <1% FAILED FUEL

⑧ Xu/Q Table

Delta T °C 60m-10m	S.I.	EAB	2 miles	5 miles	10 miles
<-1.0	A	1.1 (-5)	1.3 (-6)	7.1 (-7)	7.1 (-7)
-1.0 to -0.9	B	5.4 (-5)	4.5 (-6)	7.7 (-7)	7.1 (-7)
-0.9 to -0.8	C	1.2 (-4)	1.3 (-5)	2.5 (-6)	9.3 (-7)
-0.8 to -0.3	D	1.8 (-4)	3.7 (-5)	1.1 (-5)	4.2 (-6)
-0.3 to +0.8	E	2.6 (-4)	6.5 (-5)	2.3 (-5)	1.0 (-5)
+0.8 to +2.2	F	4.4 (-4)	1.3 (-4)	5.0 (-5)	2.4 (-5)
>+2.2	G	7.3 (-4)	2.4 (-4)	1.1 (-4)	5.4 (-5)

Print last name _____ Signature _____ Date/Time _____

MONITOR	(A) MONITOR READING uCi/cc	(B) CONVERSION FACTOR	(C) FLOW RATE (CFM)	(D) Release Rate (AxBxC) Ci/sec	(E) DOSE FACTOR	(F) Dose Rate Factor (DxE)	(G) Iodine/ Noble Gas Ratio	(H) Release Rate (DxG) Ci/sec	(I) DOSE FACTOR	(J) Dose Rate Factor (HxI)
PRM-IRE-0110(LO)		3.92 E-04			3.42 E+05		8.56 E-06		5.09 E+08	
PRM-IRE-0110(MID)		4.27 E-04								
PRM-IRE-0110(HI)		3.65 E-04								
PRM-IRE-0100.1S		4.02 E-04								
PRM-IRE-0100.2S		4.02 E-04								
PRM-IRE-0001		3.92 E-04			3.42 E+05		8.56 E-05		5.09 E+08	
PRM-IRE-0002(MID)		4.27 E-04								
PRM-IRE-0002(HI)		3.65 E-04								

LOCATION	(1) Dose Rate Factor NG from Column F Iod from Column J	(2) Xu/Q	(3) Wind Speed mph	(4) Dose Rate mR/hr (1)x(2)+(3)	(5) Exposure Duration (Hours)	(6) Projected Dose = (4)x(5) (mRem)
EAB - Noble Gas						mRem Whole Body (EAB)
EAB - Iodine						mRem Child Thyroid (EAB)
2 mile - Noble Gas						mRem Whole Body (2 mi)
2 mile - Iodine						mRem Child Thyroid (2 mi)
5 mile - Noble Gas						mRem Whole Body (5 mi)
5 mile - Iodine						mRem Child Thyroid (5 mi)
10 mile - Noble Gas						mRem Whole Body (10 mi)
10 mile - Iodine						mRem Child Thyroid (10 mi)

(7) Wind Direction From _____°

(8) Xu/Q Table

Delta T °C 60m-10m	S.I.	EAB	2 miles	5 miles	10 miles
<-1.0	A	1.1 (-5)	1.3 (-6)	7.1 (-7)	7.1 (-7)
-1.0 to -0.9	B	5.4 (-5)	4.5 (-6)	7.7 (-7)	7.1 (-7)
-0.9 to -0.8	C	1.2 (-4)	1.3 (-5)	2.5 (-6)	9.3 (-7)
-0.8 to -0.3	D	1.8 (-4)	3.7 (-5)	1.1 (-5)	4.2 (-6)
-0.3 to +0.8	E	2.8 (-4)	6.5 (-5)	2.3 (-5)	1.0 (-5)
+0.8 to +2.2	F	4.4 (-4)	1.3 (-4)	5.0 (-5)	2.4 (-5)
>+2.2	G	7.3 (-4)	2.4 (-4)	1.1 (-4)	5.4 (-5)

S.G. TUBE RUPTURE
MAJOR FUEL FAILURE

5/10/83

Print last name / Signature _____ Date/Time _____

MONITOR	(A) MONITOR READING uCi/cc	(B) CONVERSION FACTOR	(C) FLOW RATE (CFM)	(D) Release Rate (AxBxC) Ci/sec	(E) DOSE FACTOR	(F) Dose Rate Factor (DxE)	(G) Iodine/ Noble Gas Ratio	(H) Release Rate (DxG) Ci/sec	(I) DOSE FACTOR	(J) Dose Rate Factor (IxH)
PRM-IRE-0110 (LO)		4.72E-04			6.17E+04		4.17E-07		7.65E+08	
PRM-IRE-0110 (MID)		4.72E-04								
PRM-IRE-0110 (HI)		4.72E-04								
PRM-IRE-0100.1B		4.72E-04								
PRM-IRE-0100.2B		4.72E-04								
PRM-IRE-0001		4.72E-04			6.17E+04		4.17E-06		7.65E+08	
PRM-IRE-0002 (MID)		4.72E-04								
PRM-IRE-0002 (HI)		4.72E-04								

LOCATION	(1) Dose Rate Factor NG from Column F Iod from Column J	(2) Xu/Q	(3) Wind Speed mph	(4) Dose Rate mR/hr (1)x(2)÷(3)	(5) Exposure Duration (Hours)	(6) Projected Dose = (4)x(5) (mRem)
EAB - Noble Gas						mRem Whole Body (EAB)
EAB - Iodine						mRem Child Thyroid (EAB)
2 mile - Noble Gas						mRem Whole Body (2 mi)
2 mile - Iodine						mRem Child Thyroid (2 mi)
5 mile - Noble Gas						mRem Whole Body (5 mi)
5 mile - Iodine						mRem Child Thyroid (5 mi)
10 mile - Noble Gas						mRem Whole Body (10 mi)
10 mile - Iodine						mRem Child Thyroid (10 mi)

(7) Wind Direction From _____°

S.G. TUBE RUPTURE
<1% Failed Fuel

(8) Xu/Q Table

Delta T °C 60m-10m	S.I.	EAB	2 miles	5 miles	10 miles
<-1.0	A	1.1(-5)	1.3(-6)	7.1(-7)	7.1(-7)
-1.0 to -0.9	B	5.4(-5)	4.5(-6)	7.7(-7)	7.1(-7)
-0.9 to -0.8	C	1.2(-4)	1.3(-5)	2.5(-6)	8.3(-7)
-0.8 to -0.3	D	1.8(-4)	3.7(-5)	1.1(-5)	4.2(-6)
-0.3 to +0.8	E	2.8(-4)	8.5(-5)	2.3(-5)	1.0(-5)
+0.8 to +2.2	F	4.4(-4)	1.3(-4)	5.0(-5)	2.4(-5)
>+2.2	G	7.3(-4)	2.4(-4)	1.1(-4)	6.4(-5)

1 Change 1 5/10/93

Print last name _____ Signature _____ Date/Time _____

MONITOR	(A) MONITOR READING mr/hr	(B) CONVERSION FACTOR	(C) FLOW RATE (CFM)	(D) Release Rate (AxBxC) Ci/sec	(E) DOSE FACTOR	(F) Dose Rate Factor (DxE)	(G) Iodine/ Noble Gas Ratio	(H) Release Rate (DxG) Ci/sec	(I) DOSE FACTOR	(J) Dose Rate Factor (HxI)
PRM-IRE-5500A		5.55 E-06	5.1 E03							
PRM-IRE-5500B		5.55 E-06	5.1 E03		3.42 E+05		8.56 E-03		5.09 E+08	

LOCATION	(1) Dose Rate Factor NG from Column F Iod from Column J	(2) Xu/Q	(3) Wind Speed mph	(4) Dose Rate mR/hr (1)x(2)÷(3)	(5) Exposure Duration (Hours)	(6) Projected Dose = (4)x(5) (mRem)
EAB - Noble Gas					1/30 Hour	mRem Whole Body (EAB)
EAB - Iodine						mRem Child Thyroid (EAB)
2 mile - Noble Gas						mRem Whole Body (2 mi)
2 mile - Iodine						mRem Child Thyroid (2 mi)
5 mile - Noble Gas						mRem Whole Body (5 mi)
5 mile - Iodine						mRem Child Thyroid (5 mi)
10 mile - Noble Gas						mRem Whole Body (10 mi)
10 mile - Iodine						mRem Child Thyroid (10 mi)

(7) Wind Direction From _____°

(8) Xu/Q Table

Delta T °C 60m-10m	S.I.	EAB	2 miles	5 miles	10 miles
<-1.0	A	1.1 (-5)	1.3 (-6)	7.1 (-7)	7.1 (-7)
-1.0 to -0.9	B	5.4 (-5)	4.5 (-6)	7.7 (-7)	7.1 (-7)
-0.9 to -0.8	C	1.2 (-4)	1.3 (-5)	2.5 (-6)	9.3 (-7)
-0.8 to -0.3	D	1.8 (-4)	3.7 (-5)	1.1 (-5)	4.2 (-6)
-0.3 to +0.8	E	2.8 (-4)	8.5 (-5)	2.3 (-5)	1.0 (-5)
+0.8 to +2.2	F	4.4 (-4)	1.3 (-4)	5.0 (-5)	2.4 (-5)
>+2.2	G	7.3 (-4)	2.4 (-4)	1.1 (-4)	5.4 (-5)

MAIN STEAM STEAM LINE BREAK Major Fuel Failure

Print last name / Signature _____ Date/Time _____

MONITOR	(A) MONITOR READING mr/hr	(B) CONVERSION FACTOR	(C) FLOW RATE (CFM)	(D) Release Rate (AxBxC) Ci/sec	(E) DOSE FACTOR	(F) Dose Rate Factor (DxE)	(G) Iodine/ Noble Gas Ratio	(H) Release Rate (DxG) Ci/sec	(I) DOSE FACTOR	(J) Dose Rate Factor (IxH)
PRM-IRE-5500A		5.55E-06			3.42E+05		8.56E-03		5.09E+08	
PRM-IRE-5500B		5.55E-06								

NOTE: For steam released through MCES or stack, use S.G. Tube Rupture Form.

LOCATION	(1) Dose Rate Factor NG from Column F Iod. from Column J	(2) Xu/Q	(3) Wind Speed mph	(4) Dose Rate mR/hr (1)x(2)÷(3)	(5) Exposure Duration (Hours)	(6) Projected Dose = (4)x(5) (mRem)
EAB - Noble Gas						mRem Whole Body (EAB)
EAB - Iodine						mRem Child Thyroid (EAB)
2 mile - Noble Gas						mRem Whole Body (2 mi)
2 mile - Iodine						mRem Child Thyroid (2 mi)
5 mile - Noble Gas						mRem Whole Body (5 mi)
5 mile - Iodine						mRem Child Thyroid (5 mi)
10 mile - Noble Gas						mRem Whole Body (10 mi)
10 mile - Iodine						mRem Child Thyroid (10 mi)

(7) Wind Direction From _____°

MAIN STEAM RELIEF VALVE

Major Fuel Failure

(8) Xu/Q Table

Delta T °C 60m-10m	S.I.	EAB	2 miles	5 miles	10 miles
<-1.0	A	1.1(-5)	1.3(-6)	7.1(-7)	7.1(-7)
-1.0 to -0.9	B	5.4(-5)	4.5(-6)	7.7(-7)	7.1(-7)
-0.9 to -0.8	C	1.2(-4)	1.3(-5)	2.5(-6)	9.3(-7)
-0.8 to -0.3	D	1.8(-4)	3.7(-5)	1.1(-5)	4.2(-6)
-0.3 to +0.8	E	2.6(-4)	6.5(-5)	2.3(-5)	1.0(-5)
+0.8 to +2.2	F	4.4(-4)	1.3(-4)	5.0(-5)	2.4(-5)
>+2.2	G	7.3(-4)	2.4(-4)	1.1(-4)	5.4(-5)

Print last name / Signature _____ Date/Time _____

MONITOR	Ⓐ MONITOR READING mr/hr	Ⓑ CONVERSION FACTOR	Ⓒ FLOW RATE (CFM)	Ⓓ Release Rate (AxBxC) Ci/sec	Ⓔ DOSE FACTOR	Ⓕ Dose Rate Factor (DxE)	Ⓖ Iodine/ Noble Gas Ratio	Ⓗ Release Rate (DxG) Ci/sec	Ⓘ DOSE FACTOR	Ⓙ Dose Rate Factor (HxI)
PRM-IRE-5500A		5.55E-06			3.42E05		8.56E-03		5.09E08	
PRM-IRE-5500B		5.55E-06								

NOTE: For steam released through MCES or Stack, use S.G. Tube Rupture Form.

LOCATION	① Dose Rate Factor NG from Column F Iod. from Column J	② Xu / Q	③ Wind Speed mph	④ Dose Rate mR/hr ①×②÷③	⑤ Exposure Duration (Hours)	⑥ Projected Dose = ④×⑤ (mRem)
EAB - Noble Gas						mRem Whole Body (EAB)
EAB - Iodine						mRem Child Thyroid (EAB)
2 mile - Noble Gas						mRem Whole Body (2 mi)
2 mile - Iodine						mRem Child Thyroid (2 mi)
5 mile - Noble Gas						mRem Whole Body (5 mi)
5 mile - Iodine						mRem Child Thyroid (5 mi)
10 mile - Noble Gas						mRem Whole Body (10 mi)
10 mile - Iodine						mRem Child Thyroid (10 mi)

⑦ Wind Direction From _____°

MAIN STEAM ATMOS. DUMP VALVE

Major Fuel Failure

⑧ Xu/Q Table

Delta T °C 60m-10m	S.I.	EAB	2 miles	5 miles	10 miles
<-1.0	A	1.1 (-5)	1.3 (-6)	7.1 (-7)	7.1 (-7)
-1.0 to -0.9	B	5.4 (-5)	4.5 (-6)	7.7 (-7)	7.1 (-7)
-0.9 to -0.8	C	1.2 (-4)	1.3 (-5)	2.5 (-6)	9.3 (-7)
-0.8 to -0.3	D	1.8 (-4)	3.7 (-5)	1.1 (-5)	4.2 (-6)
-0.3 to +0.8	E	2.6 (-4)	6.5 (-5)	2.3 (-5)	1.0 (-5)
+0.8 to +2.2	F	4.4 (-4)	1.3 (-4)	5.0 (-5)	2.4 (-5)
>+2.2	G	7.3 (-4)	2.4 (-4)	1.1 (-4)	5.4 (-5)

Print last name / Signature _____ Date/Time _____

MONITOR	Ⓐ MONITOR READING mr/hr.	Ⓑ CONVERSION FACTOR	Ⓒ FLOW RATE (CFM)	Ⓓ Release Rate (AxBxC) Ci/sec	Ⓔ DOSE FACTOR	Ⓕ Dose Rate Factor (DxE)	Ⓖ Iodine/ Noble Gas Ratio	Ⓗ Release Rate (DxG) Ci/sec	Ⓘ DOSE FACTOR	Ⓙ Dose Rate Factor (HxI)
PRM-IRE-5500A		5.55E-06			3.42E05		8.56E-03		5.09E08	
PRM-IRE-5500B		5.55E-06								

LOCATION	① Dose Rate Factor NG from Column F Iod. from Column J	② Xu/Q	③ Wind Speed mph	④ Dose Rate mR/hr ①x②÷③	⑤ Exposure Duration (Hours)	⑥ Projected Dose = ④x⑤ (mRem)
EAB - Noble Gas						mRem Whole Body (EAB)
EAB - Iodine						mRem Child Thyroid (EAB)
2 mile - Noble Gas						mRem Whole Body (2 mi)
2 mile - Iodine						mRem Child Thyroid (2 mi)
5 mile - Noble Gas						mRem Whole Body (5 mi)
5 mile - Iodine						mRem Child Thyroid (5 mi)
10 mile - Noble Gas						mRem Whole Body (10 mi)
10 mile - Iodine						mRem Child Thyroid (10 mi)

⑦ Wind Direction From _____°

MAIN STEAM EFWP TURBINE

Major Fuel Failure

⑧ Xu/Q Table

Delta T °C 60m-10m	S.I.	EAB	2 miles	5 miles	10 miles
<-1.0	A	1.1 (-5)	1.3 (-6)	7.1 (-7)	7.1 (-7)
-1.0 to -0.9	B	5.4 (-5)	4.5 (-6)	7.7 (-7)	7.1 (-7)
-0.9 to -0.8	C	1.2 (-4)	1.3 (-5)	2.5 (-6)	9.3 (-7)
-0.8 to -0.3	D	1.8 (-4)	3.7 (-5)	1.1 (-5)	4.2 (-6)
-0.3 to +0.8	E	2.6 (-4)	6.5 (-5)	2.3 (-5)	1.0 (-5)
+0.8 to +2.2	F	4.4 (-4)	1.3 (-4)	5.0 (-5)	2.4 (-5)
>+2.2	G	7.3 (-4)	2.4 (-4)	1.1 (-4)	5.4 (-5)

Print last name / Signature _____ Date/Time _____

MONITOR	Ⓐ MONITOR READING mr/hr	Ⓑ CONVERSION FACTOR	Ⓒ FLOW RATE (CFM)	Ⓓ Release Rate (AxBxC) Ci/sec	Ⓔ DOSE FACTOR	Ⓕ Dose Rate Factor (DxE)	Ⓖ Iodine/ Noble Gas Ratio	Ⓗ Release Rate (DxG) Ci/sec	Ⓘ DOSE FACTOR	Ⓙ Dose Rate Factor (Hx I)
PRM-IRE-5500A		9.44E-05			6.17E+04		4.17E-04		7.65E+08	
PRM-IRE-5500B		9.44E-05								

LOCATION	① Dose Rate Factor NG from Column F Iod. from Column J	② Xu/Q	③ Wind Speed mph	④ Dose Rate mR/hr ①×②÷③	⑤ Exposure Duration (Hours)	⑥ Projected Dose = ④×⑤ (mRem)
EAB - Noble Gas					1/10 Hour	mRem Whole Body (EAB)
EAB - Iodine						mRem Child Thyroid (EAB)
2 mile - Noble Gas						mRem Whole Body (2 mi)
2 mile - Iodine						mRem Child Thyroid (2 mi)
5 mile - Noble Gas						mRem Whole Body (5 mi)
5 mile - Iodine						mRem Child Thyroid (5 mi)
10 mile - Noble Gas						mRem Whole Body (10 mi)
10 mile - Iodine						mRem Child Thyroid (10 mi)

⑦ Wind Direction From _____°

Main Steam
Steam Line Break
<1% Failed Fuel

⑧ Xu/Q Table

Delta T °C 60m-10m	S.I.	EAB	2 miles	5 miles	10 miles
<-1.0	A	1.1 (-5)	1.3 (-6)	7.1 (-7)	7.1 (-7)
-1.0 to -0.9	B	5.4 (-5)	4.5 (-6)	7.7 (-7)	7.1 (-7)
-0.9 to -0.8	C	1.2 (-4)	1.3 (-5)	2.5 (-6)	9.3 (-7)
-0.8 to -0.3	D	1.8 (-4)	3.7 (-5)	1.1 (-5)	4.2 (-6)
-0.3 to +0.8	E	2.6 (-4)	6.5 (-5)	2.3 (-5)	1.0 (-5)
+0.8 to +2.2	F	4.4 (-4)	1.3 (-4)	5.0 (-5)	2.4 (-5)
>+2.2	G	7.3 (-4)	2.4 (-4)	1.1 (-4)	5.4 (-5)

Print last name / Signature _____ Date/Time _____

MONITOR	Ⓐ MONITOR READING mr/hr	Ⓑ CONVERSION FACTOR	Ⓒ FLOW RATE (CFM)	Ⓓ Release Rate (AxBxC) Ci/sec	Ⓔ DOSE FACTOR	Ⓕ Dose Rate Factor (DxE)	Ⓖ Iodine/ Noble Gas Ratio	Ⓗ Release Rate (DxG) Ci/sec	Ⓘ DOSE FACTOR	Ⓙ Dose Rate Factor (HxI)
PRM-IRE-5500A		9.44E-05			6.17E+04		4.17E-04		7.65E08	
PRM-IRE-5500B		9.44E-05								
NOTE: For steam released through MOES or stack, use S.G. Tube Rupture form.										

LOCATION	① Dose Rate Factor NG from Column F Iod. from Column J	② Xu/Q	③ Wind Speed mph	④ Dose Rate mR/hr ①×②÷③	⑤ Exposure Duration (Hours)	⑥ Projected Dose = ④×⑤ (mRem)
EAB - Noble Gas						mRem Whole Body (EAB)
EAB - Iodine						mRem Child Thyroid (EAB)
2 mile - Noble Gas						mRem Whole Body (2 mi)
2 mile - Iodine						mRem Child Thyroid (2 mi)
5 mile - Noble Gas						mRem Whole Body (5 mi)
5 mile - Iodine						mRem Child Thyroid (5 mi)
10 mile - Noble Gas						mRem Whole Body (10 mi)
10 mile - Iodine						mRem Child Thyroid (10 mi)

⑦ Wind Direction From _____°

Main Steam Relief Valve

<1% Failed Fuel

⑧ Xu/Q Table

Delta T °C 60m-10m	S.I.	EAB	2 miles	5 miles	10 miles
<-1.0	A	1.1(-5)	1.3(-6)	7.1(-7)	7.1(-7)
-1.0 to -0.9	B	5.4(-5)	4.5(-6)	7.7(-7)	7.1(-7)
-0.9 to -0.8	C	1.2(-4)	1.3(-5)	2.5(-6)	9.3(-7)
-0.8 to -0.3	D	1.8(-4)	3.7(-5)	1.1(-5)	4.2(-6)
-0.3 to +0.8	E	2.6(-4)	3.5(-5)	2.3(-5)	1.0(-5)
+0.8 to +2.2	F	4.4(-4)	1.3(-4)	5.0(-5)	2.4(-5)
>+2.2	G	7.3(-4)	2.4(-4)	1.1(-4)	5.4(-5)

_____ / _____ Date/Time _____

Print last name Signature

MONITOR	(A) MONITOR READING mr/hr	(B) CONVERSION FACTOR	(C) FLOW RATE (CFM)	(D) Release Rate (AxBxC) Ci/sec	(E) DOSE FACTOR	(F) Dose Rate Factor (DxE)	(G) Iodine/ Noble Gas Ratio	(H) Release Rate (DxG) Ci/sec	(I) DOSE FACTOR	(J) Dose Rate Factor (Hx)]
PRM-IRE-5500A		9.44E-05			6.17E+04		4.17E-04		7.65E+08	
PRM-IRE-5500B		9.44E-05								
NOTE: For steam released through MCES or stack, use S.G. Tube Rupture Form										

LOCATION	(1) Dose Rate Factor N.G. from Column F Iod. from Column J	(2) Xu / Q	(3) Wind Speed mph	(4) Dose Rate mR/hr (1)x(2)÷(3)	(5) Exposure Duration (Hours)	(6) Projected Dose = (4)x(5) (mRem)
EAB - Noble Gas						mRem Whole Body (EAB)
EAB - Iodine						mRem Child Thyroid (EAB)
2 mile - Noble Gas						mRem Whole Body (2 mi)
2 mile - Iodine						mRem Child Thyroid (2 mi)
5 mile - Noble Gas						mRem Whole Body (5 mi)
5 mile - Iodine						mRem Child Thyroid (5 mi)
10 mile - Noble Gas						mRem Whole Body (10 mi)
10 mile - Iodine						mRem Child Thyroid (10 mi)

(7) Wind Direction From _____ °

Main Steam Atmos. Dump Valve

<1% Failed Fuel

(8) Xu/Q Table

Delta T °C 60m-10m	S.I.	EAB	2 miles	5 miles	10 miles
<-1.0	A	1.1(-5)	1.3(-6)	7.1(-7)	7.1(-7)
-1.0 to -0.9	B	5.4(-5)	4.5(-6)	7.7(-7)	7.1(-7)
-0.9 to -0.8	C	1.2(-4)	1.3(-5)	2.5(-6)	9.3(-7)
-0.8 to -0.3	D	1.8(-4)	3.7(-5)	1.1(-5)	4.2(-6)
-0.3 to +0.8	E	2.6(-4)	6.5(-5)	2.3(-5)	1.0(-5)
+0.8 to +2.2	F	4.4(-4)	1.3(-4)	5.0(-5)	2.4(-5)
>+2.2	G	7.3(-4)	2.4(-4)	1.1(-4)	5.4(-5)

_____ / _____ Date/Time _____

Print last name Signature

MONITOR	(A) MONITOR READING mr/hr	(B) CONVERSION FACTOR	(C) FLOW RATE (CFM)	(D) Release Rate (AxBxC) Ci/sec	(E) DOSE FACTOR	(F) Dose Rate Factor (DxE)	(G) Iodine/ Noble Gas Ratio	(H) Release Rate (DxG) Ci/sec	(I) DOSE FACTOR	(J) Dose Rate Factor (HxI)
PRM-IRE-5500A		9.44E-05			6.17E+04		1.04E-04		7.65E08	
PRM-IRE-5500B		9.44E-05								

LOCATION	(1) Dose Rate Factor N.G. from Column F Iod. from Column J	(2) Xu/Q	(3) Wind Speed mph	(4) Dose Rate mR/hr (1)x(2)÷(3)	(5) Exposure Duration (Hours)	(6) Projected Dose = (4)x(5) (mRem)
EAB - Noble Gas						mRem Whole Body (EAB)
EAB - Iodine						mRem Child Thyroid (EAB)
2 mile - Noble Gas						mRem Whole Body (2 mi)
2 mile - Iodine						mRem Child Thyroid (2 mi)
5 mile - Noble Gas						mRem Whole Body (5 mi)
5 mile - Iodine						mRem Child Thyroid (5 mi)
10 mile - Noble Gas						mRem Whole Body (10 mi)
10 mile - Iodine						mRem Child Thyroid (10 mi)

(7) Wind Direction From _____°

Main Steam
EFWP Turbine
<1% Failed Fuel

(8) Xu/Q Table

Delta T °C 60m-10m	S.I.	EAB	2 miles	5 miles	10 miles
<-1.0	A	1.1(-5)	1.3(-6)	7.1(-7)	7.1(-7)
-1.0 to -0.9	B	5.4(-5)	4.5(-6)	7.7(-7)	7.1(-7)
-0.9 to -0.9	C	1.2(-4)	1.3(-5)	2.5(-6)	9.3(-7)
-0.8 to -0.3	D	1.8(-4)	3.7(-5)	1.1(-5)	4.2(-6)
-0.3 to +0.8	E	2.6(-4)	6.5(-5)	2.3(-5)	1.0(-5)
+0.8 to +2.2	F	4.4(-4)	1.3(-4)	5.0(-5)	2.4(-5)
>+2.2	G	7.3(-4)	2.4(-4)	1.1(-4)	5.4(-5)

SYSTEM FLOW RATES

TABLE 1

1. The stack flow rate will vary as follows:

   Normal RAB - 91,400 cfm
   Normal RAB + Containment Purge - 106,400 cfm

   SIAS - RAB and Shield Building ventilation may vary from 3,500 to 26,000 cfm

2. The FHB ventilation varies from 28,260 to 8,000 cfm Emergency Flow rate.

   Actual flow rates should be obtained from Control Room data.

3. Main Steam Releases

   a. Atmospheric Dump Valves (ADV's)

      A flow rate of 7.87 E3 cfm (two valves) or 3.99 E3 cfm (one valve) should be used in Column C. If an ADV is partially open, the flow is determined by

      $$\frac{\text{lbm flow rate}}{1\text{ E6 lbm/hr}} \times (3.99\text{ E3 cfm}) = \quad \text{cfm}$$

   b. Stuck-open S.G. Safety (Relief) Valve

      A flow rate of 9.08 E3 cfm per safety valve should be used for Column C. It is unlikely that more than one valve will be stuck.

      1 valve = 9.08 E3 cfm
      2 valves = 2(9.08 E3) cfm
      and so on

      If the value is stuck partially open, use the flow rate from Control Room and ratio the cfm as follows:

      $$\frac{\text{lbm flow rate}}{1.36\text{ E6 lbm/hr}} (9.08\text{ E3 cfm}) = \quad \text{cfm}$$

   c. Emergency FW Pump Turbine Release

      The Emerg. FW Pump releases 188.8 cfm; use this number in Column C.

d. Main Steam Line Break

The Main Steam Line Break will not give a continuing release rate but will empty the S.G. in less than two minutes (assuming feedwater is stopped). Subsequently the only releases will be the amount of primary to secondary leakage. The Engineering Technical Assessment Group must be consulted for a flow rate for the primary to secondary leakage rate.

For Main Steam Line Break:

1) Record the Main Steam Line Monitor reading prior to the break (conversion factor will not be valid after break).

2) Use 5.1 E3 cfm for flow rate.

3) Use 2 min (1/30 hour) for release duration.

4) After initial release (2 min), request Engineering Technical Assessment Group to provide flow rate of release due to primary-to-secondary release and calculate release based on Reactor Coolant Concentration (let-down monitor, grab-samples, etc.).

DOSE PROJECTIONS BASED ON PLANT MONITORING DATA

FIGURE 1

WATERFORD 3 POINT GROUP SGENVIRO 03/16/83 12:00:00 NO. OF POINTS: 14

12:00:00	A48500	PRI METR TWR 33 FT WIND SPEED	3.58	M/S
12:00:00	A48510	PRI METR TWR 33 FT WIND DIR	240.0	DEG
12:00:00	A48504	PRI METR TWR DIF TEMP PRI	-0.95	DEG C
12:00:00	A48502	PRI METR TWR 199 FT WIND SPEED	4.08	M/S
12:00:00	A48512	PRI METR TWR 199 FT WIND DIR	230.0	DEG
12:00:00	A48507	PRI METR TWR 33 FT AIR TEMP	20.60	DEG C
12:00:00	A48505	PRI METR TWR DIF TEMP SEC	-0.95	DEG C
12:00:00	A48513	PRIMARY METR TWR PRECIPITATION S	0.000	IN/HR
12:00:00	A48501	BKUP METR TWR 33 FT WIND SPEED	2.12	M/S
12:00:00	A48511	BKUP METR TWR 33 FT WIND DIR	240.0	DEG
12:00:00	A48506	BACKUP METR TWR DIF TEMP	-0.55	DEG C
12:00:00	A48503	PRI METR TWR 199 FT SIGMA THETA	19.5	DEG
12:00:00	A48508	PRI METR TWR 33 FT SIGMA THETA	21.0	DEG
12:00:00	A48509	BKUP METR 33 FT SIGMA THETA	20.8	DEG

DOSE PROJECTIONS BASED ON FIELD MONITORING DATA

1.0 PURPOSE

This attachment provides the methods for obtaining field monitoring team data, recording that data and utilizing field monitoring data for projecting doses at other off-site locations.

2.0 REFERENCES

2.1 Field monitoring will be performed in accordance with EP-2-060. Data will be radioed by the monitoring team to the Health Physics Coordinator at the TSC or the Radiological Assessment Coordinator at the EOF when activated.

2.1.1 Record field monitoring data on the data sheet.

2.1.2 Calculate the Net Count Rate at each location by:

Total Sample Counts/5 - Total Background Counts/2 = Net Count Rate (cpm)

Record on the data sheet.

2.1.3 Record the D/C factor for the instrument used, on the data sheet.

2.1.4 Determine the child thyroid dose by using the Child Thyroid Dose Rate Worksheet. Record the dose rate on the Calculation Worksheet, Block B.

NOTE

The factor 1.85 E9 includes the child thyroid inhalation dose factor from Reg. Guide 1.109, Rev. 1, dated October 1977, Table E-9, and a child breathing rate of 7.04 liters per minute and appropriate unit conversions. The Dose Equivalent Iodine (D.E.I.) Factor incorporates the dose from other iodine isotopes not accounted for in the field measurement of air samples.

NOTE

The D.E.I. should be based on a conservative assumption of two hours.

2.2 Determination of whole body or child thyroid dose at other locations is performed using the Dose Projection Worksheet.

2.2.1 Complete the information at the top of the worksheet, including wind speed, wind direction, date and time.

2.2.2 Record the location for which monitoring data is available.

2.2.3 Record the whole body dose rate (closed window reading from the data sheet) and/or child thyroid dose rate at that location in Blocks A and B.

2.2.4 Record the X/Q for that location in Block C. The X/Q can be determined from Attachment 7.5.

NOTE

For projections to be valid, the meteorological conditions must be nearly constant during the transit time from release point to monitoring point.

2.2.5 To determine the projected whole body dose at any other location:

2.2.5.1 Record the location.

2.2.5.2 Record the X/Q for that location in Block D.

2.2.5.3 Determine the dose rate by multiplying the known dose rate by the X/Q at the location of interest or concern and dividing the X/Q for the location of the known dose rate (Block A x D ÷ C). Record in Block E.

2.2.5.4 Record the anticipated or projected exposure in hours in Block F. (Use two hours unless specific data is available.)

2.2.5.5 Determine the projected whole body dose by multiplying the whole body dose rate by the release duration (Block E x F).

2.2.6 To determine the projected child thyroid dose at any other location:

2.2.6.1 Record the location.

2.2.6.2 Record the X/Q for that location in Block H.

2.2.6.3 Determine the dose rate by multiplying the known dose rate by the X/Q at the location of interest and dividing by the X/Q for the location of the known dose rate (Block B x H ÷ C). Record in block I.

2.2.6.4 Record the anticipated or projected exposure in hours in Block J. (Use two hours unless specific data is available.)

2.2.6.5 Determine the projected child thyroid dose by multiplying the projected child thyroid dose rate by the release duration (Block I x J). Record in Block K.

2.2.7 Each worksheet can be utilized to project doses at more than one location based on field monitoring data at only one location. If projections are to be based on field monitoring at other locations, separate worksheets should be used.

3.0 ATTACHMENTS

3.1 Data Sheet - Dose Rate and Air Sample Data Log

3.2 Child Thyroid Dose Rate Worksheet

3.3 Calculation Worksheet

3.4 Figure 1 - Dose Equivalent Iodine Correction Factor

DOSE RATE AND AIR SAMPLE DATA LOG

DATA SHEET

SAMPLE			DOSE RATE(mR/hr)		AIR SAMPLE DATA						
NUMBER	TIME (24 hr)	LOCATION	CLOSED WINDOW	OPEN WINDOW	SAMPLE DURATION	FLOW RATE	SAMPLE VOLUME	TOTAL SAMPLE COUNTS (5 min.)	TOTAL BKGD COUNTS (2 min.)	NET COUNT RATE	INSTRUMENT D/C

Attachment 7.2

CHILD THYROID DOSE RATE WORKSHEET

SAMPLE			A	B	C	D	E	F
Number	Time	Location	net CPM (from data)	D/C (from data)	Vol. of sample cu. ft. (from data)	D.E.I. Factor (Fig. 2)	Conversion Factor	Child Thyroid Dose-Rate (mrem/hr)
							2.97E-02	

Multiply A x B, divide by C & multiply by D x E to get F:
(A x B/C) x D x E = mrem/hr.
The conversion factor converts DPM to uCi, cu. ft. to cc, and uCi/cc to mrem/hr.:
(4.55E-07 uCi/DPM)(3.53E-05 cu. ft./cc)(1.85E+09 mrem/hr-cc/uCi)
= 2.97E-02 mrem/hr/DPM.

DOSE PROJECTIONS BASED ON FIELD MONITORING DATA

CALCULATION WORKSHEET

Data Location: _____ Date: _____ Time: _____

1. Field Monitoring and Meteorological Data

(A) Whole Body Dose Rate: _____ mR/hr

(B) Child Thyroid Dose Rate: _____ mR/hr

(C) X/Q: _____ sec/m^3 (for Field Monitoring Data Location)

Wind Speed: _____ mph

Wind Direction _____

2. Projected Whole Body Dose

Location of Interest	D* X/Q (sec/m^3) for Location of Interest	E Dose Rate A x (D ÷ C)	F Exposure Duration Hours	G Dose mrem E x F
EAB				
2 MILES				
5 MILES				
10 MILES				

3. Projected Child Thyroid Dose

Location of Interest	H* X/Q (sec/m^3) for Location of Interest	I Dose Rate B x (H ÷ C)	J Exposure Duration Hours	K Child Thyroid Dose I x J mrem
EAB				
2 MILES				
5 MILES				
10 MILES				

* D and H are X/Qs for the location of interest or concern and can be determined from Attachment 7.1 Dose Projections Based on Plant Monitoring Data, and 7.5, Meteorological Data.

Calculated by: _____

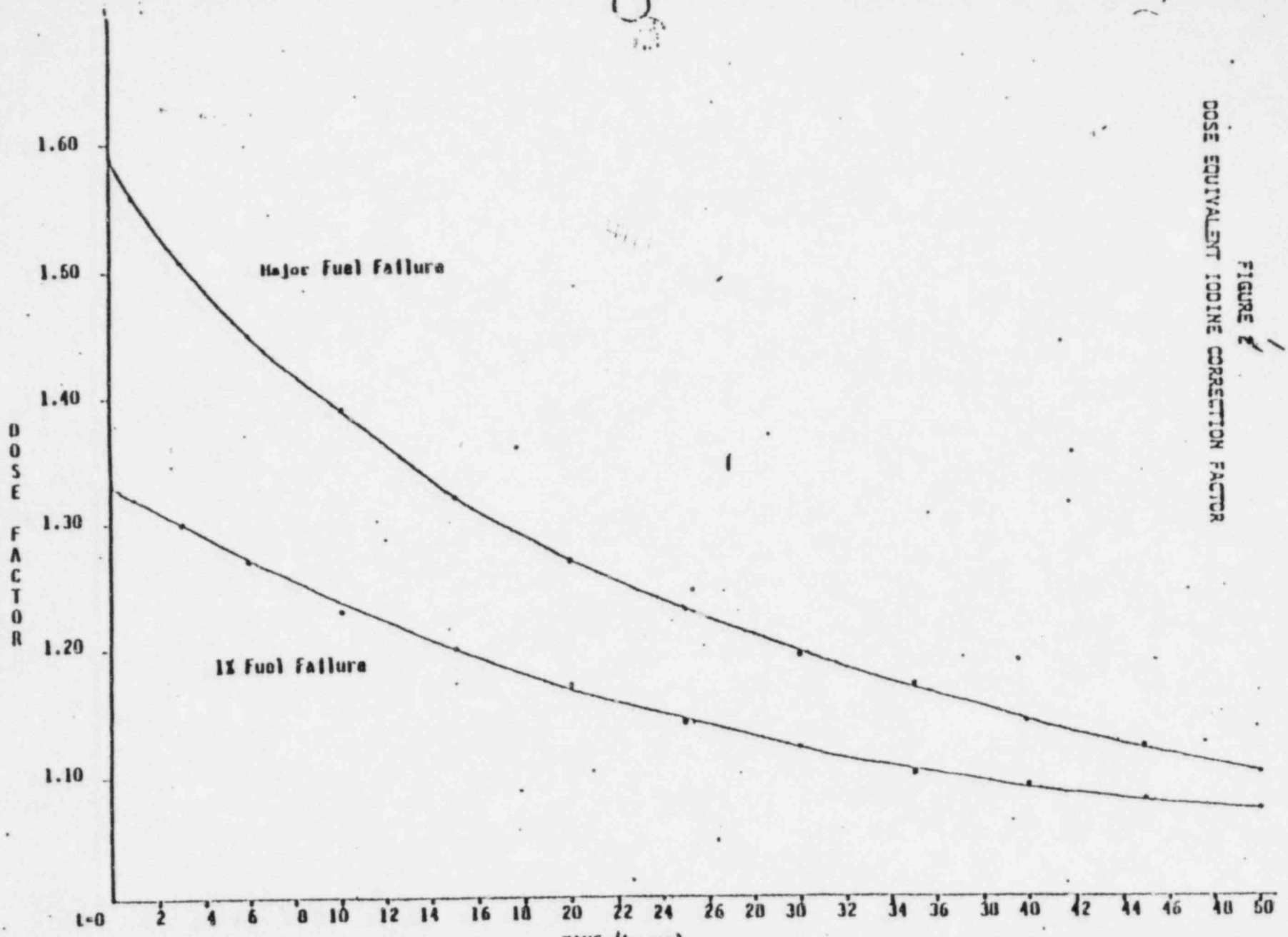

FIGURE 2
DOSE EQUIVALENT IODINE CORRECTION FACTOR

DOSE PROJECTIONS BASED ON KNOWN ISOTOPIC RELEASE RATE

1.0 PURPOSE

This attachment provides the methods for calculating projected off-site doses when the concentration of the isotopes released is known and the flow rate is determined.

2.0 PROCEDURE

2.1 Determination of the whole body dose at any specific off-site location is performed using Worksheet 1.

2.1.1 Complete the information at the top of Worksheet 1, including the date, time, wind speed, and direction for the projection being calculated.

2.1.2 Record in Column B the concentration of each isotope being released based on sample analysis or other means of identifying the radionuclide composition of the release. Ensure that the concentrations are expressed in terms of uCi/cc.

2.1.3 Multiply the concentrations recorded in Column B by the dose factor for that isotope (Column C) and record in Column D.

> NOTE
>
> The dose factors are determined from Reg. Guide 1.109, Rev. 1, dated October 1977, Table B-1. Conversion factors of 1.14×10^8 to convert mrem-m^3/μCi-yr to mrem-cc/μCi-hr; 472 to convert cfm to cc/sec; and 1×10^6 to convert cc to m^3 are included in the dose factor.

2.1.4 Sum the results of Column D.

2.1.5 Record the specific location for which the projection is being made in Column E. Several locations may be used for the specific radionuclide mix as measured. Calculations will be accurate as long as the radionuclide concentrations remain constant.

2.1.6 Record the sum of Block D in Column F.

2.1.7 Record the flow rate for the release path in Column G. Ensure that flow is recorded in cubic feet per minute (cfm).

2.1.8 Record the X/Q for the specific location in Column H. X/Q is determined in Attachment 7.5.

2.1.9 Multiply the sum of Block D, the flow rate and the X/Q (Column F x G x H) to determine the whole body dose rate at that location in terms of mrem/hr. Record the result in Column J. This result is the projected dose rate at the specific location identified and should be used to evaluate the need for protective action(s) and to compare with field measurements.

2.1.10 If the release duration is known or can be projected, enter the duration in <u>hours</u> in Column K.

2.1.11 Determine the projected dose by multiplying the dose rate at the specific location by the release duration (Column J x K).

2.2 Determination of the limiting thyroid dose at any specific off-site location is performed using Worksheet 2.

> NOTE
> The limiting dose is to the child (5-10 yrs) thyroid and should be calculated first.

2.2.1 Complete the information at the top of Worksheet 2, including date, time, wind speed and direction for the projection being calculated.

2.2.2 Record in Column B the concentration of each iodine isotope being released, based on sample analysis or other means of identifying the radionuclide composition of the release. Ensure that the concentrations are expressed in terms of μCi/cc.

2.2.3 Multiply the concentrations recorded in Column B by the dose factor for that isotope (Column C) and record in Column D.

> NOTE
>
> The dose factors are determined from Reg. Guide 1.109, Rev. 1, dated October 1977, Table E-9, and a child breathing rate of 7.04 liters per minute. Conversion factors of 472 to convert cfm to cc/sec and 6 x 10 to convert liters/per minute to cc/hr are included in the dose factor.

2.2.4 Sum the results of Column D.

2.2.5 Record the specific location for which the projection is being made in Column E. Several locations may be used for the specific radionuclide mix as measured. Calculations will be accurate as long as the radionuclide concentrations remain constant.

2.2.6 Record the sum of Block D in Column F.

2.2.7 Record the flow rate for the release path in Column F. Ensure that the flow rate is recorded in cubic feet per minute.

2.2.8 Record the X/Q for the specific location in Column H. X/Q is determined in Attachment 7.3 or 7.4.

2.2.9 Record the fraction of radioiodines being released through the charcoal filters. If the filter efficiency is unknown, use 0.05 as the release fraction.

> NOTE
>
> If the flow path does not include a filter system or the sample was obtained downstream of the filters, the release fraction is 1.

2.2.10 Multiply the sum of Block D, the flow rate, the X/Q and the release fraction (Column F x G x H x J) to determine the

projected thyroid dose per hour exposed in terms of mrem/hr exposed. Record the result in Column K.

2.2.11 If the release duration is known or can be projected, enter the duration in <u>hours</u> in Column L.

2.2.12 Determine the projected dose by multiplying the dose per hour exposed by the release duration (Column K x L). Record the projected child thyroid dose in Column M.

3.0 <u>ATTACHMENTS</u>

3.1 Projected Whole Body Dose Worksheet 1

3.2 Projected Thyroid Dose (Child Thyroid) Worksheet 2

PROJECTED WHOLE BODY DOSE

WORKSHEET 1

Wind Speed: _____ mph
Wind Direction: From: _____ Date: _____ Time: _____ a.m./p.m.

A	B	C	D
Isotope	Concentration (uCi/cc)	Dose Factor	B x C
Kr-85m		63.	
Kr-85		.624	
Kr-87		319.	
Kr-88		791.	
Kr-89		893.	
Xe-131m		4.92	
Xe-133m		13.5	
Xe-133		15.8	
Xe-135m		168.	
Xe-135		97.4	
Xe-137		76.4	
Xe-138		475.	
		Block D =	

E	F	G	H	J	K	L
Location	Block D	Flow Rate (CFM)	X/Q (sec/m^3)	Dose Rate (mrem/hr) F x G x H	Exposure Duration (hr)	Dose (mrem) J x K
EAB						
2 Miles						
5 Miles						
10 Miles						

Calculated by: _____

PROJECTED THYROID DOSE (CHILD THYROID)

WORKSHEET 2

Wind Speed: _____ mph
Wind Direction: From: _____ Date: _____ Time: _____ a.m./p.m.

CHILD THYROID

A	B	C	D
Isotope	Concentration uCi/cc	Dose Factor	B x C
I-131		8.75E5	
I-132		1.04E4	
I-133		2.08E5	
I-134		2.74E3	
I-135		4.27E4	
		Block D =	

E	F	G	H	J	K	L	M
Location	Block D	Flow Rate (CFM)	X/Q (sec/m^3)	Release Fraction	Dose Rate (mrem/hr exposed) FxGxHxJ	Exposure Duration (hr)	Dose (mrem) KxL
EAB							
2 Miles							
5 Miles							
10 Miles							

Calculated by: _____

DOSE PROJECTIONS BASED ON FSAR ACCIDENT DATA

1.0 PURPOSE

This attachment provides a method for calculating the projected dose rate at the EAB. It is based upon nine accidents that were analyzed in the FSAR.

> NOTE
>
> This technique should be used only when there is no plant or field monitoring data available. It should be used only as a first approximation and quickly replaced as plant and/or field data becomes available.

2.0 PROCEDURE

2.1 From the nine accidents identified on the worksheet, select the type of accident based on the actual occurrence (Attachment 7.4, page 3, FSAR Accident Assumptions, provides background information for this selection and is used for additional data). If no selection is possible, choose the worst case accident.

2.2 Using the Short Form worksheet, develop the X/Q at the Exclusion Area Boundary (EAB) and record in the appropriate location on the FSAR Accidents worksheet. X/Q = Xu/Q from Column 2 divided by wind speed from Column 3 on worksheet.

2.3 Multiply the X/Q by the appropriate dose factor (includes correction factor) for that accident (whole body and/or child thyroid) to obtain the projected dose at the EAB and record.

2.4 Additional worksheets are to be used to calculate doses at other distances using the appropriate dispersion (X/Q) factors.

3.0 ATTACHMENT

3.1 FSAR Accident Assumptions

FSAR ACCIDENTS - DOSE PROJECTIONS

WORKSHEET

Wind Direction: _____ Date: _____ Time: _____

ACCIDENT*	X/Q*	Dose Factor Whole Body / Child Thyroid	Dose Rem Whole Body / Child Thyroid
Main Steam Line Break	x	2.55 E-2 / 2.18 E1	
Inadvertent Steam Dump		1.02 E1 / 8.73 E3	
CEA Ejection Accident	x	8.71 E3 / 2.47 E5	
Letdown Line Break	x	2.73 E1 / 8.36 E3	
S/G Tube Rupture	x	4.91 / 4.55 E1	
Waste Gas System Leak	x	8.36 / 5.09	
Loss of Coolant Accident	x	6.91 E2 / 2.73 E3	
Liquid Waste Release	x	1.91 / 2.54 E2	
Fuel Handling Accident	x	8.55 / 3.64 E1	

*For Exclusion Area Boundary, 914 m. Calculated by: _____

FSAR ACCIDENT ASSUMPTIONS

This attachment provides the basic assumptions and radiological consequences (Design Basis) for the incidents that are not expected to occur but are postulated because their consequences would include the potential for the release of significant amounts of radioactive material. This attachment is to be used when instrumentation used for assessment is off-scale or inoperable.

Identify the type of incident which has occurred from the nine incidents defined in this attachment. If no identification is possible, use the most restrictive accident which cannot be reasonably excluded.

The information given below should be used in ratioing and adjusting assumed FSAR values with any known actual values in the event of an incident at Waterford 3 Steam Electric Station.

IDENTIFICATION AND RADIOLOGICAL CONSEQUENCE ASSUMPTIONS

1. Main Steam Line Break

   This incident is defined with a simultaneous loss of off-site power. Steam is vented directly to the atmosphere.

2. Inadvertent Steam Dump

   For an inadvertent opening of a steam generator atmospheric dump valve with a concurrent single failure of an active component and loss of off-site power, the activity released from the Steam Generators is immediately vented to the atmosphere.

3. Control Element Assembly (CEA) Ejection Accident

   This accident assumes a loss of off-site power at the time of turbine trip and a 6.5 μCi/g I-131 dose equivalent for the primary system (activity in the coolant systems prior to the accident).

4. Primary Sample or Letdown Line Break

   For primary sample or letdown line break incidents, a two-inch schedule 160 pipe is analyzed. A rupture outside the containment causes a release to the Reactor Auxiliary Building (RAB).

5. Steam Generator Tube Rupture (SGTR)

   This accident assumes a loss of off-site power and allows transport of reactor coolant into the main steam system. Release is via the Steam Generator safety valves and atmospheric dumps.

6. Loss of Coolant Accident (LOCA)

   An LOCA provides a release path to the environment via containment leakage pathways.

7. Radioactive Waste Gas System Leak or Failure

   This incident assumes an unexpected and uncontrolled release to the atmosphere of radioactive xenon and krypton fission gases.

8. Liquid Waste System Leak

   A Liquid Waste System leak or failure results in a release to the atmosphere and a release of all liquids in the Boron Management System (BMS) and Waste Management System (WMS) to the Reactor Auxiliary Building (RAB). Off-site doses will occur as a consequence of released noble gases and iodines assumed to volatilize from the spilled liquids.

9. Fuel Handling Accident

   A fuel handling accident is the most restrictive accident defined in the FSAR.

METEOROLOGICAL DATA

1.0 PURPOSE

This attachment provides two alternative methods of obtaining meteorological data required to perform dose projection calculations. It should be used when data from either the primary or backup meteorological tower is not available on the CRT in the Control Room or in the Computer Room.

2.0 PROCEDURE

2.1 The alternative methods for obtaining meteorological data are:

2.1.1 Dispatch an individual to the primary meteorological tower to record the following data from the analog recorders at the tower location:

Instruct the individual at the tower to turn the digital selector switch to the desired parameter, record the digital readout and report the value.

Delta T (60 m - 10 m) _____ x (2.78 °C) = _____ °C

Wind Speed (10 m) _____ x (2.24 mph/mps) = _____ mph
(mps is meters per seconds; mph is miles per hour)

Wind Direction (10 m) _____

> NOTE
> If primary tower data is not available, instruct individual to go to backup tower.

2.1.2 Contact the National Weather Service (NWS) by commercial telephone at (504) 522-7330.

Obtain the following information from the NWS:

Weather forecast for next 12 hours

Temperature lapse rate = _____

Wind Speed = _____

Wind Direction = _____

2.1.3 Determine the appropriate Pasquill stability class from the following table based on data obtained in section 2.1 above.

Class	Delta T (60 m - 10 m) °C
A - Very Unstable	<-1.0
B - Moderately Unstable	-1.0 to -0.9
C - Slightly Unstable	-0.9 to -0.8
D - Neutral	-0.8 to -0.3
E - Slightly Stable	-0.3 to 0.8
F - Moderately Stable	0.8 to 2.2
G - Very Stable	>2.2

Stability Index _____.

2.2 The two alternative methods for determining the dispersion factor (X/Q) are:

2.2.1 Meteorological dispersion tables based on Pasquill stability class, wind speed and downwind distance. These tables are used as follows:

Select the desired downwind distance in miles for which the X/Q value is to be calculated:

Downwind distance = _____ miles

Select the appropriate X/Q from the tables given on pages 5-18 based on wind speed, desired downwind distance and stability class (from Attachment 7.1, section 2.4). If the wind speed and/or distance falls between two values on the tables, use the distance with the higher X/Q value. Record below.

Time	Downwind Distance	Stability Class	Wind Speed (mph)	X/Q	(sec/m)

To determine X/Q at locations away from the center line of the plume, use the Emergency Planning Zone (EPZ) Isopleth Overlays described in step 2.2.2 below.

2.2.2 Estimates of atmospheric dispersion values can be obtained using isopleth overlays based on the atmospheric stability class and wind speed.

> NOTE
>
> Isopleth overlays have been developed for stability Class B (unstable), D (neutral), and F (stable) only. Isopleth overlays are located with other emergency response-dose assessment equipment.

Using the stability index from section 2.2 above, select:

Isopleth for class B for Stability Class A, B or C
Isopleth for class D for Stability Class D
Isopleth for class F for Stability Class E, F or G

Select the appropriate overlay based on the atmospheric stability class (B, D, F).

Align the center axis of the isopleth plot with the centerpoint (plant) of the Emergency Planning map.

Orient the overlay such that the projection occurs in the downwind direction. (Wind direction recorded as from 270 West should orient the overlay in a 90 East direction.)

Once aligned, locate all critical locations. Choose the nearest X/Q line toward the centerline from each critical location.

From the table on the overlay, use the appropriate wind speed (from section 2.1) and Xu/Q line number to obtain X/Q and record below. Repeat for all critical locations.

Location	Wind Speed	X/Q

The above X/Q values can be used for calculating dose projections in procedure Attachments 7.2 (Dose Projections Based on Field Monitoring Data), 7.3 (Dose Projections Based on Known Isotopic Release Data) and 7.4, (Dose Projections Based on FSAR Accident Data).

GROUND LEVEL RELEASE

PASQUILL STABILITY CLASS: A

TO BE USED WITH
30 FT. LEVEL WINDS
130FT-30FT DELTA T
WINDS FROM ALL DIRECTIONS

CENTERLINE RELATIVE CONCENTRATION (X/Q) IN SECONDS PER METER CUBED

WIND SPEED (MPH)	EXCLUSION BOUNDARY 913 METERS	1 MILE	2 MILE	5 MILE	7.5 MILE	10 MILE
0.5	2.2E-05	4.9E-06	2.6E-06	1.4E-06	1.4E-06	1.4E-06
1.0	1.1E-05	2.5E-06	1.3E-06	7.1E-07	7.1E-07	7.1E-07
2.0	5.4E-06	1.2E-06	6.6E-07	3.6E-07	3.6E-07	3.6E-07
4.0	2.7E-06	6.2E-07	3.3E-07	1.8E-07	1.8E-07	1.8E-07
6.0	1.8E-06	4.1E-07	2.2E-07	1.2E-07	1.2E-07	1.2E-07
8.0	1.4E-06	3.1E-07	1.7E-07	8.9E-08	8.9E-08	8.9E-08
10.0	1.1E-06	2.5E-07	1.3E-07	7.1E-08	7.1E-08	7.1E-08
12.0	9.1E-07	2.1E-07	1.1E-07	5.9E-08	5.9E-08	5.9E-08
14.0	7.8E-07	1.8E-07	9.4E-08	5.1E-08	5.1E-08	5.1E-08
16.0	6.8E-07	1.5E-07	8.3E-08	4.4E-08	4.4E-08	4.4E-08
18.0	6.0E-07	1.4E-07	7.3E-08	4.0E-08	4.0E-08	4.0E-08
20.0	5.4E-07	1.2E-07	6.6E-08	3.6E-08	3.6E-08	3.6E-08
30.0	3.6E-07	8.2E-08	4.4E-08	2.4E-08	2.4E-08	2.4E-08
50.0	2.2E-07	4.9E-08	2.6E-08	1.4E-08	1.4E-08	1.4E-08

PLUME TRAVEL TIME (MINUTES)

913 METERS	1 MILE	2 MILE	5 MILE	7.5 MILE	10 MILE
68.1	120.0	240.0	600.0	900.0	1200.0
34.1	60.0	120.0	300.0	450.0	600.0
17.1	30.0	60.0	150.0	225.0	300.0
8.6	15.0	30.0	75.0	112.5	150.0
5.7	10.0	20.0	50.0	75.0	100.0
4.3	7.5	15.0	37.5	56.3	75.0
3.5	6.0	12.0	30.0	45.0	60.0
2.9	5.0	10.0	25.0	37.5	50.0
2.5	4.3	8.6	21.5	32.2	42.9
2.2	3.8	7.5	18.8	28.2	37.5
1.9	3.4	6.7	16.7	25.0	33.4
1.8	3.0	6.0	15.0	22.5	30.0
1.2	2.0	4.0	10.0	15.0	20.0
0.7	1.2	2.4	6.0	9.0	12.0

IF THE WIND SPEED AND/OR DISTANCE FALLS BETWEEN TWO VALUES, USE THE HIGHER X/Q VALUE

GROUND LEVEL RELEASE

PASQUILL STABILITY CLASS: A

TO BE USED WITH
30 FT. LEVEL WINDS
130FT-30FT DELTA T
WINDS FROM ALL DIRECTIONS

PLUME WIDTH (METERS)

WIND SPEED (MPH)	EXCLUSION BOUNDARY 913 METERS	1 MILE	2 MILE	5 MILE	7.5 MILE	10 MILE
0.5	741.8	1237.5	2314.3	5294.1	7635.5	9900.4
1.0	741.8	1237.5	2314.3	5294.1	7635.5	9900.4
2.0	741.8	1237.5	2314.3	5294.1	7635.5	9900.4
4.0	741.8	1237.5	2314.3	5294.1	7635.5	9900.4
6.0	741.8	1237.5	2314.3	5294.1	7635.5	9900.4
8.0	741.8	1237.5	2314.3	5294.1	7635.5	9900.4
10.0	741.8	1237.5	2314.3	5294.1	7635.5	9900.4
12.0	741.8	1237.5	2314.3	5294.1	7635.5	9900.4
14.0	741.8	1237.5	2314.3	5294.1	7635.5	9900.4
16.0	741.8	1237.5	2314.3	5294.1	7635.5	9900.4
18.0	741.8	1237.5	2314.3	5294.1	7635.5	9900.4
20.0	741.8	1237.5	2314.3	5294.1	7635.5	9900.4
30.0	741.8	1237.5	2314.3	5294.1	7635.5	9900.4
50.0	741.8	1237.5	2314.3	5294.1	7635.5	9900.4

PLUME WIDTH IS CENTERED ON THE AFFECTED SECTOR DIRECTION

GROUND LEVEL RELEASE

PASQUILL STABILITY CLASS: B

TO BE USED WITH
30 FT. LEVEL WINDS
130FT-30FT DELTA T
WINDS FROM ALL DIRECTIONS

CENTERLINE RELATIVE CONCENTRATION (X/Q) IN SECONDS PER METER CUBED

WIND SPEED (MPH)	EXCLUSION BOUNDARY 913 METERS	1 MILE	2 MILE	5 MILE	7.5 MILE	10 MILE
0.5	1.1E-04	3.5E-05	8.9E-06	1.5E-06	1.4E-06	1.4E-06
1.0	5.4E-05	1.8E-05	4.5E-06	7.7E-07	7.1E-07	7.1E-07
2.0	2.7E-05	8.8E-06	2.2E-06	3.8E-07	3.6E-07	3.6E-07
4.0	1.3E-05	4.4E-06	1.1E-06	1.9E-07	1.8E-07	1.8E-07
6.0	9.0E-06	2.9E-06	7.5E-07	1.3E-07	1.2E-07	1.2E-07
8.0	6.7E-06	2.2E-06	5.6E-07	9.6E-08	8.9E-08	8.9E-08
10.0	5.4E-06	1.8E-06	4.5E-07	7.7E-08	7.1E-08	7.1E-08
12.0	4.5E-06	1.5E-06	3.7E-07	6.4E-08	5.9E-08	5.9E-08
14.0	3.8E-06	1.3E-06	3.2E-07	5.5E-08	5.1E-08	5.1E-08
16.0	3.4E-06	1.1E-06	2.8E-07	4.8E-08	4.4E-08	4.4E-08
18.0	3.0E-06	9.8E-07	2.5E-07	4.3E-08	4.0E-08	4.0E-08
20.0	2.7E-06	8.8E-07	2.2E-07	3.8E-08	3.6E-08	3.6E-08
30.0	1.8E-06	5.9E-07	1.5E-07	2.6E-08	2.4E-08	2.4E-08
50.0	1.1E-06	3.5E-07	8.9E-08	1.5E-08	1.4E-08	1.4E-08

PLUME TRAVEL TIME (MINUTES)

913 METERS	1 MILE	2 MILE	5 MILE	7.5 MILE	10 MILE
68.1	120.0	240.0	600.0	900.0	1200.0
34.1	60.0	120.0	300.0	450.0	600.0
17.1	30.0	60.0	150.0	225.0	300.0
8.6	15.0	30.0	75.0	112.5	150.0
5.7	10.0	20.0	50.0	75.0	100.0
4.3	7.5	15.0	37.5	56.3	75.0
3.5	6.0	12.0	30.0	45.0	60.0
2.9	5.0	10.0	25.0	37.5	50.0
2.5	4.3	8.6	21.5	32.2	42.9
2.2	3.8	7.5	18.8	28.2	37.5
1.9	3.4	6.7	16.7	25.0	33.4
1.8	3.0	6.0	15.0	22.5	30.0
1.2	2.0	4.0	10.0	15.0	20.0
0.7	1.2	2.4	6.0	9.0	12.0

IF THE WIND SPEED AND/OR DISTANCE FALLS BETWEEN TWO VALUES, USE THE HIGHER X/Q VALUE

GROUND LEVEL RELEASE

PASQUILL STABILITY CLASS: B

TO BE USED WITH
30 FT. LEVEL WINDS
130FT-30FT DELTA T
WINDS FROM ALL DIRECTIONS

PLUME WIDTH (METERS)

WIND SPEED (MPH)	EXCLUSION BOUNDARY 913 METERS	1 MILE	2 MILE	5 MILE	7.5 MILE	10 MILE
0.5	557.9	930.7	1740.4	3981.4	5742.2	7445.6
1.0	557.9	930.7	1740.4	3981.4	5742.2	7445.6
2.0	557.9	930.7	1740.4	3981.4	5742.2	7445.6
4.0	557.9	930.7	1740.4	3981.4	5742.2	7445.6
6.0	557.9	930.7	1740.4	3981.4	5742.2	7445.6
8.0	557.9	930.7	1740.4	3981.4	5742.2	7445.6
10.0	557.9	930.7	1740.4	3981.4	5742.2	7445.6
12.0	557.9	930.7	1740.4	3981.4	5742.2	7445.6
14.0	557.9	930.7	1740.4	3981.4	5742.2	7445.6
16.0	557.9	930.7	1740.4	3981.4	5742.2	7445.6
18.0	557.9	930.7	1740.4	3981.4	5742.2	7445.6
20.0	557.9	930.7	1740.4	3981.4	5742.2	7445.6
30.0	557.9	930.7	1740.4	3981.4	5742.2	7445.6
50.0	557.9	930.7	1740.4	3981.4	5742.2	7445.6

PLUME WIDTH IS CENTERED ON THE AFFECTED SECTOR DIRECTION

GROUND LEVEL RELEASE

PASQUILL STABILITY CLASS: C

TO BE USED WITH
30 FT. LEVEL WINDS
130FT-30FT DELTA T
WINDS FROM ALL DIRECTIONS

CENTERLINE RELATIVE CONCENTRATION (X/Q) IN SECONDS PER METER CUBED

WIND SPEED (MPH)	EXCLUSION BOUNDARY 913 METERS	1 MILE	2 MILE	5 MILE	7.5 MILE	10 MILE
0.5	2.4E-04	9.0E-05	2.6E-05	5.0E-06	2.4E-06	1.9E-06
1.0	1.2E-04	4.5E-05	1.3E-05	2.5E-06	1.2E-06	9.3E-07
2.0	6.0E-05	2.2E-05	6.5E-06	1.2E-06	6.0E-07	4.6E-07
4.0	3.0E-05	1.1E-05	3.2E-06	6.2E-07	3.0E-07	2.3E-07
6.0	2.0E-05	7.5E-06	2.2E-06	4.1E-07	2.0E-07	1.5E-07
8.0	1.5E-05	5.6E-06	1.6E-06	3.1E-07	1.5E-07	1.2E-07
10.0	1.2E-05	4.5E-06	1.3E-06	2.5E-07	1.2E-07	9.3E-08
12.0	1.0E-05	3.7E-06	1.1E-06	2.1E-07	1.0E-07	7.7E-08
14.0	8.6E-06	3.2E-06	9.3E-07	1.8E-07	8.6E-08	6.6E-08
16.0	7.5E-06	2.8E-06	8.1E-07	1.5E-07	7.5E-08	5.8E-08
18.0	6.7E-06	2.5E-06	7.2E-07	1.4E-07	6.7E-08	5.1E-08
20.0	6.0E-06	2.2E-06	6.5E-07	1.2E-07	6.0E-08	4.6E-08
30.0	4.0E-06	1.5E-06	4.3E-07	8.3E-08	4.0E-08	3.1E-08
50.0	2.4E-06	9.0E-07	2.6E-07	5.0E-08	2.4E-08	1.9E-08

PLUME TRAVEL TIME (MINUTES)

913 METERS	1 MILE	2 MILE	5 MILE	7.5 MILE	10 MILE
68.1	120.0	240.0	600.0	900.0	1200.0
34.1	60.0	120.0	300.0	450.0	600.0
17.1	30.0	60.0	150.0	225.0	300.0
8.6	15.0	30.0	75.0	112.5	150.0
5.7	10.0	20.0	50.0	75.0	100.0
4.3	7.5	15.0	37.5	56.3	75.0
3.5	6.0	12.0	30.0	45.0	60.0
2.9	5.0	10.0	25.0	37.5	50.0
2.5	4.3	8.6	21.5	32.2	42.9
2.2	3.8	7.5	18.8	28.2	37.5
1.9	3.4	6.7	16.7	25.0	33.4
1.8	3.0	6.0	15.0	22.5	30.0
1.2	2.0	4.0	10.0	15.0	20.0
0.7	1.2	2.4	6.0	9.0	12.0

IF THE WIND SPEED AND/OR DISTANCE FALLS BETWEEN TWO VALUES, USE THE HIGHER X/Q VALUE

GROUND LEVEL RELEASE

PASQUILL STABILITY CLASS: C

TO BE USED WITH
30 FT. LEVEL WINDS
130FT-30FT DELTA T
WINDS FROM ALL DIRECTIONS

PLUME WIDTH (METERS)

WIND SPEED (MPH)	EXCLUSION BOUNDARY 913 METERS	1 MILE	2 MILE	5 MILE	7.5 MILE	10 MILE
0.5	423.6	706.7	1321.6	3023.3	4360.4	5653.9
1.0	423.6	706.7	1321.6	3023.3	4360.4	5653.9
2.0	423.6	706.7	1321.6	3023.3	4360.4	5653.9
4.0	423.6	706.7	1321.6	3023.3	4360.4	5653.9
6.0	423.6	706.7	1321.6	3023.3	4360.4	5653.9
8.0	423.6	706.7	1321.6	3023.3	4360.4	5653.9
10.0	423.6	706.7	1321.6	3023.3	4360.4	5653.9
12.0	423.6	706.7	1321.6	3023.3	4360.4	5653.9
14.0	423.6	706.7	1321.6	3023.3	4360.4	5653.9
16.0	423.6	706.7	1321.6	3023.3	4360.4	5653.9
18.0	423.6	706.7	1321.6	3023.3	4360.4	5653.9
20.0	423.6	706.7	1321.6	3023.3	4360.4	5653.9
30.0	423.6	706.7	1321.6	3023.3	4360.4	5653.9
50.0	423.6	706.7	1321.6	3023.3	4360.4	5653.9

PLUME WIDTH IS CENTERED ON THE AFFECTED SECTOR DIRECTION

GROUND LEVEL RELEASE

PASQUILL STABILITY CLASS: D

TO BE USED WITH
30 FT. LEVEL WINDS
130FT-30FT DELTA T
WINDS FROM ALL DIRECTIONS

CENTERLINE RELATIVE CONCENTRATION (X/Q) IN SECONDS PER METER CUBED

WIND SPEED (MPH)	EXCLUSION BOUNDARY 913 METERS	1 MILE	2 MILE	5 MILE	7.5 MILE	10 MILE
0.5	3.7E-04	1.8E-04	7.5E-05	2.2E-05	1.2E-05	8.3E-06
1.0	1.8E-04	9.2E-05	3.7E-05	1.1E-05	6.2E-06	4.2E-06
2.0	9.2E-05	4.6E-05	1.9E-05	5.4E-06	3.1E-06	2.1E-06
4.0	4.6E-05	2.3E-05	9.4E-06	2.7E-06	1.6E-06	1.0E-06
6.0	3.6E-05	1.7E-05	6.7E-06	1.9E-06	1.1E-06	7.1E-07
8.0	3.2E-05	1.4E-05	5.4E-06	1.5E-06	8.1E-07	5.4E-07
10.0	2.9E-05	1.3E-05	4.6E-06	1.2E-06	6.6E-07	4.4E-07
12.0	2.4E-05	1.1E-05	3.9E-06	1.0E-06	5.6E-07	3.7E-07
14.0	2.1E-05	9.3E-06	3.4E-06	8.7E-07	4.8E-07	3.2E-07
16.0	1.8E-05	8.1E-06	2.9E-06	7.6E-07	4.2E-07	2.8E-07
18.0	1.6E-05	7.2E-06	2.6E-06	6.8E-07	3.7E-07	2.5E-07
20.0	1.5E-05	6.5E-06	2.3E-06	6.1E-07	3.4E-07	2.2E-07
30.0	9.8E-06	4.3E-06	1.6E-06	4.1E-07	2.2E-07	1.5E-07
50.0	5.9E-06	2.6E-06	9.4E-07	2.4E-07	1.3E-07	8.8E-08

PLUME TRAVEL TIME (MINUTES)

913 METERS	1 MILE	2 MILE	5 MILE	7.5 MILE	10 MILE
68.1	120.0	240.0	600.0	900.0	1200.0
34.1	60.0	120.0	300.0	450.0	600.0
17.1	30.0	60.0	150.0	225.0	300.0
8.6	15.0	30.0	75.0	112.5	150.0
5.7	10.0	20.0	50.0	75.0	100.0
4.3	7.5	15.0	37.5	56.3	75.0
3.5	6.0	12.0	30.0	45.0	60.0
2.9	5.0	10.0	25.0	37.5	50.0
2.5	4.3	8.6	21.5	32.2	42.9
2.2	3.8	7.5	18.8	28.2	37.5
1.9	3.4	6.7	16.7	25.0	33.4
1.8	3.0	6.0	15.0	22.5	30.0
1.2	2.0	4.0	10.0	15.0	20.0
0.7	1.2	2.4	6.0	9.0	12.0

IF THE WIND SPEED AND/OR DISTANCE FALLS BETWEEN TWO VALUES, USE THE HIGHER X/Q VALUE

GROUND LEVEL RELEASE

PASQUILL STABILITY CLASS: D

TO BE USED WITH
33 FT. LEVEL WINDS
130FT-33FT DELTA T
WINDS FROM ALL DIRECTIONS

PLUME WIDTH (METERS)

WIND SPEED (MPH)	EXCLUSION BOUNDARY 913 METERS	1 MILE	2 MILE	5 MILE	7.5 MILE	10 MILE
0.5	563.1	762.4	1195.4	2393.7	3335.2	4246.8
1.8	563.1	762.4	1195.4	2393.7	3335.2	4246.8
2.0	563.1	762.4	1195.4	2393.7	3335.2	4246.8
4.0	563.1	762.4	1195.4	2393.7	3335.2	4246.8
6.0	483.7	683.0	1116.0	2314.3	3255.8	4166.6
8.0	404.2	603.6	1036.5	2234.8	3176.4	4087.2
10.0	351.3	550.6	983.6	2181.9	3123.4	4034.2
12.0	324.8	524.1	957.1	2155.4	3096.9	4007.7
14.0	298.3	497.6	930.6	2128.9	3070.5	3981.3
16.0	298.3	497.6	930.6	2128.9	3070.5	3981.3
18.0	298.3	497.6	930.6	2128.9	3070.5	3981.3
20.0	298.3	497.6	930.6	2128.9	3070.5	3981.3
30.0	298.3	497.6	930.6	2128.9	3070.5	3981.3
50.0	298.3	497.6	930.6	2128.9	3070.5	3981.3

PLUME WIDTH IS CENTERED ON THE AFFECTED SECTOR DIRECTION

GROUND LEVEL RELEASE

PASQUILL STABILITY CLASS: E

TO BE USED WITH
30 FT. LEVEL WINDS
150FT-30FT DELTA T
WINDS FROM ALL DIRECTIONS

CENTERLINE RELATIVE CONCENTRATION (X/Q) IN SECONDS PER METER CUBED

WIND SPEED (MPH)	EXCLUSION BOUNDARY 913 METERS	1 MILE	2 MILE	5 MILE	7.5 MILE	10 MILE
0.5	5.2E-04	2.8E-04	1.3E-04	4.6E-05	2.8E-05	2.0E-05
1.0	2.6E-04	1.4E-04	6.5E-05	2.3E-05	1.4E-05	1.0E-05
2.0	1.3E-04	7.0E-05	3.3E-05	1.1E-05	7.1E-06	5.0E-06
4.0	6.5E-05	3.5E-05	1.6E-05	5.7E-06	3.5E-06	2.5E-06
6.0	5.8E-05	2.9E-05	1.3E-05	4.2E-06	2.5E-06	1.8E-06
8.0	5.5E-05	2.6E-05	1.1E-05	3.3E-06	2.0E-06	1.4E-06
10.0	5.2E-05	2.5E-05	9.5E-06	2.8E-06	1.6E-06	1.1E-06
12.0	4.3E-05	2.1E-05	8.1E-06	2.4E-06	1.4E-06	9.4E-07
14.0	3.7E-05	1.8E-05	6.9E-06	2.0E-06	1.2E-06	8.1E-07
16.0	3.2E-05	1.6E-05	6.1E-06	1.8E-06	1.0E-06	7.1E-07
18.0	2.9E-05	1.4E-05	5.4E-06	1.6E-06	9.2E-07	6.3E-07
20.0	2.6E-05	1.2E-05	4.9E-06	1.4E-06	8.2E-07	5.7E-07
30.0	1.7E-05	8.3E-06	3.2E-06	9.4E-07	5.5E-07	3.8E-07
50.0	1.0E-05	5.0E-06	1.9E-06	5.6E-07	3.3E-07	2.3E-07

PLUME TRAVEL TIME (MINUTES)

913 METERS	1 MILE	2 MILE	5 MILE	7.5 MILE	10 MILE
68.1	120.0	240.0	600.0	900.0	1200.0
34.1	60.0	120.0	300.0	450.0	600.0
17.1	30.0	60.0	150.0	225.0	300.0
8.6	15.0	30.0	75.0	112.5	150.0
5.7	10.0	20.0	50.0	75.0	100.0
4.3	7.5	15.0	37.5	56.3	75.0
3.5	6.0	12.0	30.0	45.0	60.0
2.9	5.0	10.0	25.0	37.5	50.0
2.5	4.3	8.6	21.5	32.2	42.9
2.2	3.8	7.5	18.8	28.2	37.5
1.9	3.4	6.7	16.7	25.0	33.4
1.8	3.0	6.0	15.0	22.5	30.0
1.2	2.0	4.0	10.0	15.0	20.0
0.7	1.2	2.4	6.0	9.0	12.0

IF THE WIND SPEED AND/OR DISTANCE FALLS BETWEEN TWO VALUES, USE THE HIGHER X/Q VALUE

GROUND LEVEL RELEASE

PASQUILL STABILITY CLASS: E

TO BE USED WITH
30 FT. LEVEL WINDS
130FT-30FT DELTA T
WINDS FROM ALL DIRECTIONS

PLUME WIDTH (METERS)

WIND SPEED (MPH)	EXCLUSION BOUNDARY 913 METERS	1 MILE	2 MILE	5 MILE	7.5 MILE	10 MILE
0.5	588.7	730.4	1038.3	1890.4	2559.9	3207.5
1.0	588.7	730.4	1038.3	1890.4	2559.9	3207.5
2.0	588.7	730.4	1038.3	1890.4	2559.9	3207.5
4.0	588.7	730.4	1038.3	1890.4	2559.9	3207.5
6.0	438.1	579.8	887.7	1739.8	2409.3	3056.9
8.0	343.9	485.7	793.5	1645.6	2315.1	2962.8
10.0	268.6	410.3	718.2	1570.3	2239.8	2887.5
12.0	231.0	372.7	680.6	1532.7	2202.2	2849.8
14.0	212.1	353.9	661.8	1513.8	2183.3	2831.0
16.0	212.1	353.9	661.8	1513.8	2183.3	2831.0
18.0	212.1	353.9	661.8	1513.8	2183.3	2831.0
20.0	212.1	353.9	661.8	1513.8	2183.3	2831.0
30.0	212.1	353.9	661.8	1513.8	2183.3	2831.0
50.0	212.1	353.9	661.8	1513.8	2183.3	2831.0

PLUME WIDTH IS CENTERED ON THE AFFECTED SECTOR DIRECTION

GROUND LEVEL RELEASE

PASQUILL STABILITY CLASS: F

TO BE USED WITH
39 FT. LEVEL WINDS
130FT-30FT DELTA T
WINDS FROM ALL DIRECTIONS

CENTERLINE RELATIVE CONCENTRATION (X/Q) IN SECONDS PER METER CUBED

PLUME TRAVEL TIME (MINUTES)

WIND SPEED (MPH)	EXCLUSION BOUNDARY 913 METERS	1 MILE	2 MILE	5 MILE	7.5 MILE	10 MILE	913 METERS	1 MILE	2 MILE	5 MILE	7.5 MILE	10 MILE
0.5	6.8E-04	4.9E-04	2.5E-04	1.0E-04	6.5E-05	4.8E-05	68.1	120.0	240.0	600.0	900.0	1200.0
1.0	4.4E-04	2.5E-04	1.3E-04	5.0E-05	3.3E-05	2.4E-05	34.1	60.0	120.0	300.0	450.0	600.0
2.0	2.2E-04	1.2E-04	6.3E-05	2.5E-05	1.6E-05	1.2E-05	17.1	30.0	60.0	150.0	225.0	300.0
4.0	1.1E-04	6.2E-05	3.2E-05	1.3E-05	8.2E-06	6.0E-06	8.6	15.0	30.0	75.0	112.5	150.0
6.0	1.0E-04	5.5E-05	2.6E-05	9.4E-06	5.9E-06	4.3E-06	5.7	10.0	20.0	50.0	75.0	100.0
8.0	1.1E-04	5.4E-05	2.3E-05	7.8E-06	4.8E-06	3.4E-06	4.3	7.5	15.0	37.5	56.3	75.0
10.0	8.6E-05	4.3E-05	2.1E-05	6.6E-06	4.0E-06	2.8E-06	3.5	6.0	12.0	30.0	45.0	60.0
12.0	7.1E-05	4.0E-05	1.7E-05	5.5E-06	3.4E-06	2.4E-06	2.9	5.0	10.0	25.0	37.5	50.0
14.0	6.1E-05	3.4E-05	1.5E-05	4.7E-06	2.9E-06	2.0E-06	2.5	4.3	8.6	21.5	32.2	42.9
16.0	5.4E-05	3.0E-05	1.3E-05	4.2E-06	2.5E-06	1.8E-06	2.2	3.8	7.5	18.8	28.2	37.5
18.0	4.8E-05	2.6E-05	1.2E-05	3.7E-06	2.2E-06	1.6E-06	1.9	3.3	6.7	16.7	25.0	33.3
20.0	4.3E-05	2.4E-05	1.0E-05	3.3E-06	2.0E-06	1.4E-06	1.8	3.0	6.0	15.0	22.5	30.0
30.0	2.9E-05	1.6E-05	6.9E-06	2.2E-06	1.3E-06	9.4E-07	1.2	2.0	4.0	10.0	15.0	20.0
50.0	1.7E-05	9.6E-06	4.2E-06	1.3E-06	8.0E-07	5.7E-07	0.7	1.2	2.4	6.0	9.0	12.0

IF THE WIND SPEED AND/OR DISTANCE FALLS BETWEEN TWO VALUES, USE THE HIGHER X/Q VALUE

GROUND LEVEL RELEASE

PASQUILL STABILITY CLASS: F

TO BE USED WITH
30 FT. LEVEL WINDS
150FT-30FT DELTA T
WINDS FROM ALL DIRECTIONS

PLUME WIDTH (METERS)

WIND SPEED (MPH)	EXCLUSION BOUNDARY 913 METERS	1 MILE	2 MILE	5 MILE	7.5 MILE	10 MILE
0.5	536.3	634.1	846.6	1434.8	1896.9	2343.9
1.0	536.3	634.1	846.6	1434.8	1896.9	2343.9
2.0	536.3	634.1	846.6	1434.8	1896.9	2343.9
4.0	536.3	634.1	846.6	1434.8	1896.9	2343.9
6.0	388.3	478.2	690.7	1278.8	1741.8	2188.8
8.0	263.4	361.2	573.7	1161.9	1624.8	2071.8
10.0	198.4	296.2	508.8	1096.9	1559.8	2006.1
12.0	172.4	270.2	482.8	1070.9	1533.8	1980.1
14.0	146.4	244.3	456.8	1044.9	1507.1	1954.1
16.0	146.4	244.3	456.8	1044.9	1507.1	1954.1
18.0	146.4	244.3	456.8	1044.9	1507.1	1954.1
20.0	146.4	244.3	456.8	1044.9	1507.1	1954.1
30.0	146.4	244.3	456.8	1044.9	1507.1	1954.1
50.0	146.4	244.3	456.8	1044.9	1507.1	1954.1

PLUME WIDTH IS CENTERED ON THE AFFECTED SECTOR DIRECTION

GROUND LEVEL RELEASE

PASQUILL STABILITY CLASS: G

TO BE USED WITH
30 FT. LEVEL WINDS
130FT-30FT DELTA T
WINDS FROM ALL DIRECTIONS

CENTERLINE RELATIVE CONCENTRATION (X/Q) IN SECONDS PER METER CUBED

WIND SPEED (MPH)	EXCLUSION BOUNDARY 913 METERS	1 MILE	2 MILE	5 MILE	7.5 MILE	10 MILE
0.5	1.5E-03	8.8E-04	4.8E-04	2.1E-04	1.4E-04	1.1E-04
1.0	7.3E-04	4.4E-04	2.4E-04	1.1E-04	7.2E-05	5.4E-05
2.0	3.7E-04	2.2E-04	1.2E-04	5.3E-05	3.6E-05	2.7E-05
4.0	1.8E-04	1.1E-04	6.1E-05	2.7E-05	1.8E-05	1.3E-05
6.0	2.0E-04	1.1E-04	5.5E-05	2.2E-05	1.4E-05	1.0E-05
8.0	1.7E-04	1.1E-04	5.4E-05	1.9E-05	1.2E-05	8.3E-06
10.0	1.3E-04	8.6E-05	4.4E-05	1.6E-05	9.8E-06	6.9E-06
12.0	1.1E-04	7.1E-05	3.7E-05	1.3E-05	8.1E-06	5.8E-06
14.0	9.5E-05	6.1E-05	3.2E-05	1.1E-05	7.0E-06	4.9E-06
16.0	8.3E-05	5.4E-05	2.8E-05	9.9E-06	6.1E-06	4.3E-06
18.0	7.4E-05	4.8E-05	2.5E-05	8.8E-06	5.4E-06	3.8E-06
20.0	6.7E-05	4.3E-05	2.2E-05	7.9E-06	4.9E-06	3.5E-06
30.0	4.4E-05	2.9E-05	1.5E-05	5.3E-06	3.3E-06	2.3E-06
50.0	2.7E-05	1.7E-05	8.9E-06	3.2E-06	2.0E-06	1.4E-06

PLUME TRAVEL TIME (MINUTES)

913 METERS	1 MILE	2 MILE	5 MILE	7.5 MILE	10 MILE
68.1	120.0	240.0	600.0	900.0	1200.0
34.1	60.0	120.0	300.0	450.0	600.0
17.1	30.0	60.0	150.0	225.0	300.0
8.6	15.0	30.0	75.0	112.5	150.0
5.7	10.0	20.0	50.0	75.0	100.0
4.3	7.5	15.0	37.5	56.3	75.0
3.5	6.0	12.0	30.0	45.0	60.0
2.9	5.0	10.0	25.0	37.5	50.0
2.5	4.3	8.6	21.5	32.2	42.9
2.2	3.8	7.5	18.8	28.2	37.5
1.9	3.4	6.7	16.7	25.0	33.4
1.8	3.0	6.0	15.0	22.5	30.0
1.2	2.0	4.0	10.0	15.0	20.0
0.7	1.2	2.4	6.0	9.0	12.0

IF THE WIND SPEED AND/OR DISTANCE FALLS BETWEEN TWO VALUES, USE THE HIGHER X/Q VALUE

GROUND LEVEL RELEASE

PASQUILL STABILITY CLASS: G

TO BE USED WITH
30 FT. LEVEL WINDS
150FT-30FT DELTA T
WINDS FROM ALL DIRECTIONS

PLUME WIDTH (METERS)

WIND SPEED (MPH)	EXCLUSION BOUNDARY 913 METERS	1 MILE	2 MILE	5 MILE	7.5 MILE	10 MILE
0.5	530.4	595.6	737.2	1129.0	1436.9	1734.7
1.0	530.4	595.6	737.2	1129.0	1436.9	1734.7
2.0	530.4	595.6	737.2	1129.0	1436.9	1734.7
4.0	530.4	595.6	737.2	1129.0	1436.9	1734.7
6.0	331.3	396.5	538.1	929.9	1237.8	1535.6
8.0	210.1	275.3	416.9	808.7	1116.6	1414.4
10.0	149.5	214.7	356.3	748.1	1056.0	1353.8
12.0	114.9	180.0	321.6	713.4	1021.3	1319.1
14.0	97.5	162.7	304.3	696.1	1004.0	1301.8
16.0	97.5	162.7	304.3	696.1	1004.0	1301.8
18.0	97.5	162.7	304.3	696.1	1004.0	1301.8
20.0	97.5	162.7	304.3	696.1	1004.0	1301.8
30.0	97.5	162.7	304.3	696.1	1004.0	1301.8
50.0	97.5	162.7	304.3	696.1	1004.0	1301.8

PLUME WIDTH IS CENTERED ON THE AFFECTED SECTOR DIRECTION