Tennessee Valley Authority, Post Office Box 2000, Spring City, Tennessee 37381-2000

MAR 23 2001

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555

10 CFR 50, App E.

Gentlemen:

In the Matter of) Docket No. 50-390
Tennessee Valley Authority)

WATTS BAR NUCLEAR PLANT (WBN) - EMERGENCY PLAN IMPLEMENTING PROCEDURE (EPIP) REVISION

In accordance with the requirements of 10 CFR Part 50, Appendix E, Section V, the enclosure provides the following EPIP:

EPIP	Rev	Title	Effective Date
EPIP-16	11	Initial Dose Assessment For Radiological Emergencies	3-2-2001

Filing instructions are included with this document.

There are no regulatory commitments in this letter. If you should have any questions, please contact me at (423) 365-1824.

Sincerely,

P. L. Pace
Manager, Licensing and Industry Affairs

Enclosure
cc: See Page 2

A045

MAR 2 3 2001

PLP:JES
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FILING INSTRUCTIONS

DOCUMENT NUMBER EPIP-16

REMOVE REVISION 10 **INSERT REVISION** 11

Comments

TENNESSEE VALLEY AUTHORITY

WATTS BAR NUCLEAR PLANT

EMERGENCY PLAN IMPLEMENTING PROCEDURES

EPIP-16

INITIAL DOSE ASSESSMENT FOR RADIOLOGICAL EMERGENCIES

Revision 11

Unit 0

QUALITY RELATED

PREPARED BY: F. L. Pavlechko
(Type Name)

SPONSORING ORGANIZATION: Emergency Planning

APPROVED BY: F. L. Pavlechko

EFFECTIVE DATE: 3/02/01

LEVEL OF USE: REFERENCE

REVISION LOG

Revision Number	Implementation Date	Pages Affected	Description of Revision
0	8/1/94		New WBN-EPIP.
1	2/23/95		Source Notes added to the procedure. Two additional steps added to Appendix B (FRED) for user clarification. New map developed to enhance site perimeter monitor locations. Intermediate (MET Tower instrument) added to wind speed determination in Appendix A for user assistance.
2	4/21/95		Stability class work sheet added to the procedure. Editorial (non-intent) changes made. Enhanced FRED users directions, to improve clarity of instructions.
3	6/17/96	3,4,5,6,7,8,9,10 ,11, 12,13,14, 15,18, 22-29	Unmonitored Release Nomogram added to the procedure. References associated with new nomogram added to the procedure. Stability class work sheet included in both nomograms. Page renumbering initiated due to changes. TI-30 incorporated into the procedure as Appendix E. Two and five mile conversion tables added to the nomograms as backup methods to FRED.
4	2/15/97	6,7,8,9	New dose assessment computer (ERFDS) added to the procedure to take the place of FRED. Appendixes realigned to support ERFDS model. Appendix D, Site Perimeter Map, incorporated into Appendix A. All changes considered non-intent. Pages realigned to support the enhancements. Incorporated CNs 1,2 and 3.
5	09/12/97	2-4,7,9,10-12,14-16, 18,21,22,29.	Incorporate CN-1. Add Appendix A and B Note 2, Human factoring changes and definitions for clarification. Added DCN W-39536-A changes.
CN-1	02/10/98	2,5	Include SPP-2.6 as a reference and other editorial changes.
6	6/30/98	All	Non-Intent Change. Incorporated Change Notice 1. Corrected typographical errors. Eliminated non-utilized definitions (Plume EDD). Added reference to SM/SED to responsibility. Changed total to site boundary on page 1 of Appendix B. Other enhancements. Removed unnecessary RAD monitor reference to Appendix D and removed reference to Unit 2 condenser vacuum exhaust. Added notes to data sheet E-6 to transmit data to CECC.
7	10/9/98	2,21,25	Non-intent Change. Added minimum flow rates (used in ERFDS release rate calculations) to manual calculations for release rates.
8	02/25/99	All	Non-intent change. Changed Aux Bldg flow rate on 0-RM-90-101B.
9	2/28/99	All	Non-intent change. Revised EFRDS/P2500 to ICS.
10	6/14/00	All	Non-intent change. Revised RE/RM definitions to include ICS.
11	03/02/01	2, 7, 10, 21, 25 & 27	Intent change. Interim corrective action for PER 01-002916

1.0 PURPOSE[1,2,3]

This Procedure provides initial guidance to support site activities concerning dose assessment for airborne release situation(s).

2.0 RESPONSIBILITY

The onshift Radiological Control Group (RADCON) is responsible for completing this procedure should the CECC/TSC not be activated. This procedure will be performed as directed by the SED/SM when a dose assessment is necessary.

3.0 DEFINITIONS/ACRONYMS

3.1 AIRBORNE RELEASE: Release of airborne radioactive material from the site into the environment.

3.2 CECC: Central Emergency Control Center.

3.3 Exclusion Area Boundary: The demarcation of the area surrounding the WBN units in which postulated FSAR accidents will not result in population doses exceeding the criteria of 10CFR Part 100. (See Appendix A of this procedure).

3.4 ICS: Integrated Computer System.

3.5 NOMOGRAM: A chart which utilizes wind speed, stability class, and airborne release rates to determine TEDE exposure rates at the WBN Exclusion Area Boundary (EAB).

3.6 PAG: Protective Action Guide. Specific levels of radiation dose control established by the Environment Protection Agency, (i.e., 1 REM TEDE, 5 REM Thyroid CDE).

3.7 RE/RM ICS references radiological elements (RE). The control room also has radiological monitors (RM) connected to these elements. For the purposes of this procedure these acronyms can be used interchangeably.

3.0 DEFINITIONS/ACRONYMS (continued)

3.8 SITE BOUNDARY: The Site Boundary used here is consistent with the definition in the Offsite Dose Calculation Manual. (See Appendix A of this procedure). The appropriate boundary between "onsite" and "offsite".

3.9 SITE PERIMETER (SP): An area encompassing owner controlled areas in the immediate site environment. Measurements are taken at the 16 identified radiological monitoring points along the Site Perimeter.
(See Appendix A of this procedure).

3.10 STABILITY CLASS: An index (A-G) to represent the degree of mixing in the atmosphere.

3.11 TEDE: Total Effective Dose Equivalent. The TEDE dose is equivalent to the sum of the plume EDE, the inhalation EDE, and the ground EDE.

3.12 THYROID CDE: Thyroid Committed Dose Equivalent.

3.13 X/Q: The release dilution ratio between concentrations (X) at reception point (e.g., SP) to the source strength (Q) at a given release point.

4.0 GENERAL INSTRUCTIONS

4.1 For initial dose assessment activities, COMPLETE the instructions found in Appendix A, "ICS, Dose Assessment."

4.2 Should ICS be unavailable use the backup calculation method(s) in Appendix B or C for the Site Boundary, two and five mile zones.

5.0 REFERENCES

5.1 Interfacing Documents

- CECC EPIP-8, "Dose Assessment Staff Activities During Nuclear Plant Radiological Emergencies"
- WBN FSAR
- ICS User's Manual
- WBN EPIP-1, "Emergency Plan Classification Flowchart"

5.0 REFERENCES (continued)

5.2 Other Documents

- TVA NP Radiological Emergency Plan
- NUREG-0654/FEMA REP-1, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants"
- NUREG 1465, Accident Source Terms for Light-Water Nuclear Power Plants
- NUREG 1228, Source Terms Estimated During Incident Response to Severe Nuclear Power Plant Accidents
- Title 10, Code of Federal Regulations, Part 50, Appendix E
- DCN 37910-A
- EPA-400
- Title 10, Code of Federal Regulations, Part 20
- Letter, Eberline Instrument Co., to TVA (EEB820919007), 9/19/83 on (High Range Monitor Efficiencies)
- WBN EPIP-6, Activation and Operation of the Technical Support Center (TSC)
- WBN EPIP-9, Loss of Meteorological Data
- NE Calculation Package, WBN, TSR-008, TSR-009, TSR-080, TSR107, NEA 3012, WBN, APS3-077, APS3-047, TI-RPS-119, TI-RPS-162, TI-RPS-197
- SPP-2.6, Computer Software Control

6.0 APPENDIXES

Appendix A, "ICS Dose Assessment"

Appendix B, "NOMOGRAM" (Monitored Release)

Appendix C, "NOMOGRAM" (Unmonitored Release)

Appendix D, "Radiological Gaseous Effluent Evaluation (Manual Calculation)"

7.0 RECORDS

7.1 QA RECORDS

None.

7.2 NON-QA RECORDS

Output generated through use of all appendices will be retained for real emergencies and the NRC Graded Exercises by the WBN EP Manager.

APPENDIX A
(Page 1 of 3)

"ICS" DOSE ASSESSMENT

NOTE : Touch screen or key board can be utilized to obtain ICS information.

1. **ACCESS** the TVA screen, (TVA) from an ICS terminal.

2. **ACCESS** the TSC Mimics (TSC) from the TVA screen.

3. **ACCESS** the Dose Assessment screen (DOSE)From TSC Mimics.

4. **RECALCULATE** the Dose Assessment and print the worksheet.

5. As an interim corrective action to PER 01-002916, **MULTIPLY** the doses by 1.34 and **RECORD** on the worksheet.

6. **PROVIDE** Dose Assessment information to the SM.

NOTE 1: METDATA and EFF1 information are also available from the Dose Assessment screen.

NOTE 2 Verify the operability of applicable Radiation and Flow Monitors used for dose assessment (Ex: "EFF1" or "DOSE" ICS Screens, etc.) by contacting the Main Control Room.

NOTE 3: If ICS Dose Assessment is unavailable, refer to the monitored and unmonitored nomograms found in Appendixes B and C of this procedure.

APPENDIX A
(Page 2 of 3)
ICS Dose Assessment Example

SELECT FUNC. KEY OR TURN-ON CODE DOSE >

C H P Z I

WBN - DOSE ASSESSMENT

DATE: 0 / 0 / 0
TIME: 0 : 0 : 0

RECALCULATE

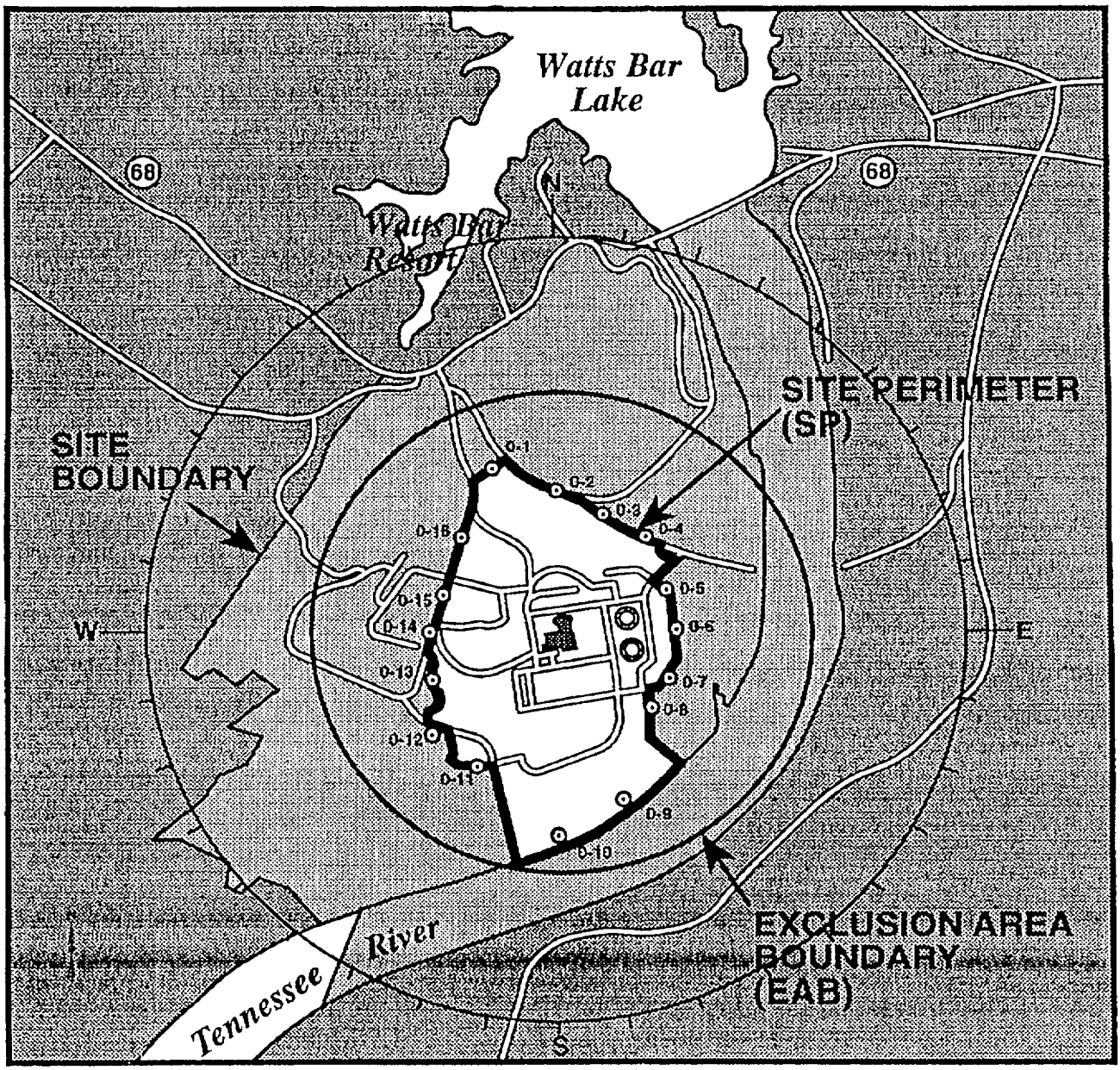
INPUTS:		VALUE	UNITS	QUALITY
MET46A15	- EDS METDATA 46M 15MIN AVG WIND SPEED		MI/HR	
MET46D15	- EDS METDATA 46M 15MIN AVG WIND DIRECTION (FROM)		DEG	
METSTCS2	- EDS 15MIN STABILITY CLASS			
RAD025	- ICS CALCULATED TOTAL NOBLE GAS RELEASE RATE	0.00e+00	uCi/s	GOOD
IODINE	- .001 * TOTAL NOBLE GAS RELEASE RATE	0.00e+00	uCi/s	GOOD

OUTPUT: HOURLY DOSE	TEDE (Rem)	THYROID CDE (Rem)
SITE BOUNDARY	0.0e+00	0.0e+00
2 MILE:	0.0e+00	0.0e+00
5 MILE:	0.0e+00	0.0e+00

MET DATA EFF1

PREVIOUS (F7) CANCEL (ESC) F1=CLEAR F2= F3= F4= F5= F6=

APPENDIX A
SITE MAP
(Page 3 of 3)



APPENDIX B
(Page 1 of 4)

"NOMOGRAM"
WORK SHEET FOR MANUAL METHODOLOGY FOR THE ASSESSMENT OF MONITORED AIRBORNE RADIOACTIVITY RELEASES

1. Remove this work sheet from this appendix.

2. Obtain appropriate meteorological data from ICS and enter below.
   a) Stability Class _____: from ICS on (METDATA) display.
      Use the Stability Class Work Sheet on page 4 of 4 (if ICS not available).
   b) Wind Speed in miles per hour is from the 46 meter (I - Intermediate, Average) measurement level _____.

NOTE: If ICS is unavailable, notify the (SM) SHIFT MANAGER and gain the information by use of WBN EPIP-9, "Loss of Meteorological Information."

3. Using the nomogram, place pencil on stability class (Parameter 1) + mark and move ruler to intersect the appropriate wind speed (Parameter 2) value. Draw a line and note that the intersection point on (Parameter 3) represents the X/Q value.

4. Obtain the noble gas release rate (Parameter 4) in μCi/second from ICS on (EFF1) display. As a corrective action to PER 01-002916, **MULTIPY** by 1.34 and **RECORD** _____μCi/second.

NOTE 1: If ICS is unavailable, notify the SM that Appendix D (backup method, time available) must be performed by RADCON/Chemistry personnel. Noble gas release rates are also used for event classification in WBN EPIP-1.

NOTE 2 Verify the operability of applicable Radiation and Flow Monitors used for dose assessment (Ex: "EFF1" or "DOSE" ICS Screens, etc.) by contacting the Main Control Room.

5. Place the ruler edge on X/Q (Parameter 3) value and rotate right side of ruler to intersect the appropriate value of (Parameter 4) noble gas release rate. Draw line through points on Parameters 3 and 4 until the line intersects (Parameter 5) (TEDE).

6. List TEDE rate value at the point of intersection of (Parameter 5) here, _____ REM/hour

7. Obtain an estimate of the release duration time (t) from the SM _____ hour(s).

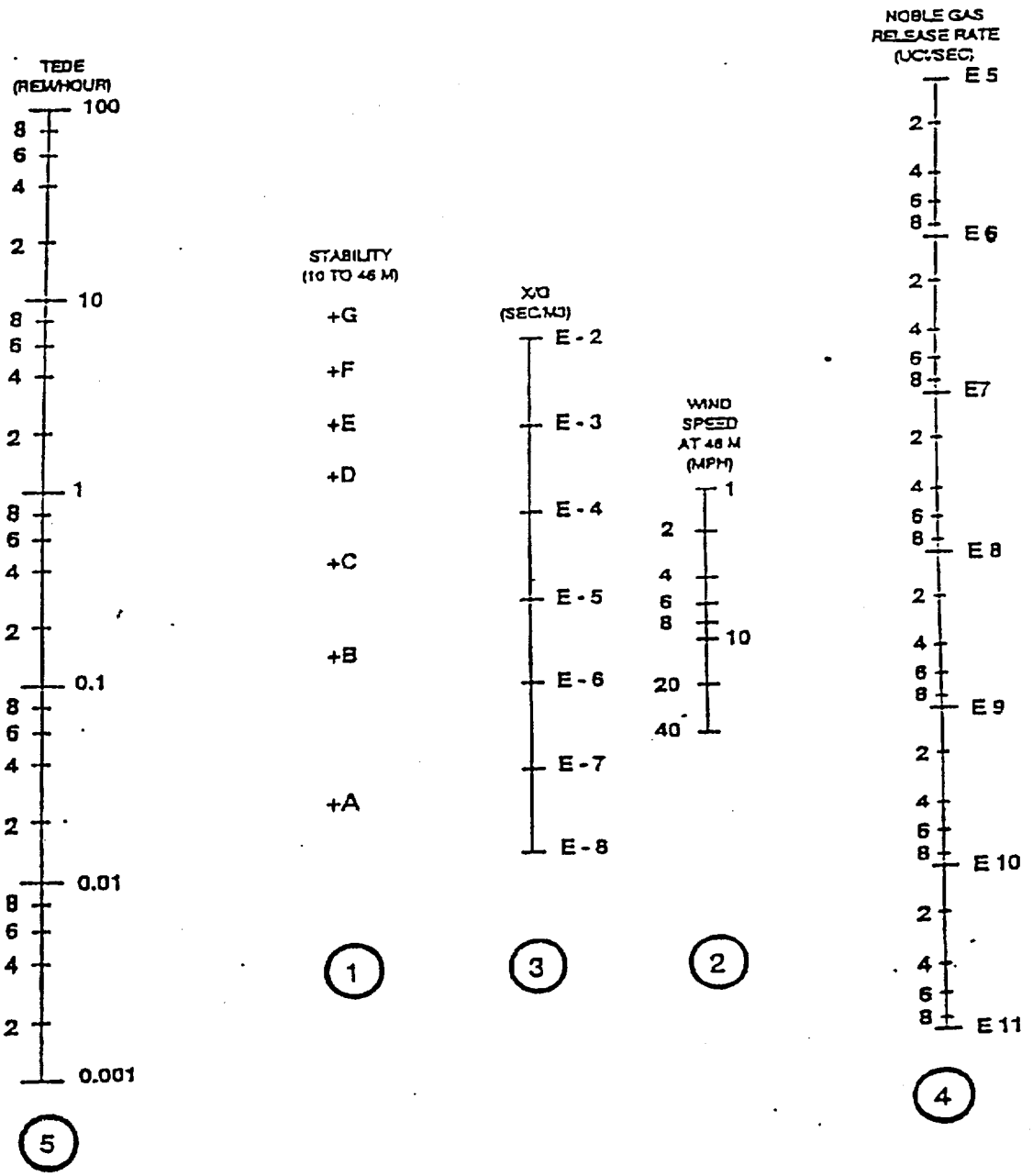
8. Now calculate the total Site Boundary dose (D):
   D= (TEDE Rate) x (t) = (_____REM/hour) x (_____hour[s]) = _____ REM.

9. Provide this dose assessment to the SM as soon as possible.

10. Calculate TEDE Doses for Two Mile_____REM and Five Mile_____ REM (page 3 of 4) and report to SM as soon as possible.

Prepared by:_____ Date:_____ Time:_____

APPENDIX B
(Page 2 of 4)
"NOMOGRAM"
MONITORED AIRBORNE RELEASES
PROJECTED TOTAL EFFECTIVE DOSE EQUIVALENT (TEDE)
TYPE I MIX
AT THE SITE BOUNDARY
WATTS BAR NUCLEAR PLANT



APPENDIX B
(Page 3 of 4)
"MONITORED NOMOGRAM"
CONVERSION TABLE

Conversion Table for estimating TEDE Doses at 2 and 5 miles.

For ground level releases, the following conversion table can be used to estimate the TEDE at 2 and 5 miles based on the Site Boundary distance TEDE, (if ICS is unavailable).

- Divide the Site Boundary (SB) distance TEDE by the conversion factor corresponding to the appropriate stability class in this table.

	STABILITY CLASS		TWO MILES
	A:6.7		
	B:15.0		
	C:7.7		
REM SB TEDE (Results from Step 8, App.B). ÷	D:6.1	= REM Two Mile TEDE	**NOTE:** Record results on Step 10 of Appendix B.
	E:5.3		
	F:5.5		
	G:5.5		

	STABILITY CLASS		FIVE MILES
	A:15.0		
	B:60.0		
	C:30.0		
REM SB TEDE (Results from Step 8, App. B). ÷	D:21.0	= REM Five Mile TEDE	**NOTE:** Record results on Step 10 of Appendix B.
	E:24.0		
	F:20.0		
	G:20.0		

APPENDIX B
(Page 4 of 4)

STABILITY CLASS WORKSHEET

If the stability class cannot be obtained from the MET DATA screen on ICS, utilize this worksheet. The stability class is based on the 46 meter minus 10 meter temperature difference.

Temperature Differences (F) I-L=difference in temperature	Stability Class
≤- 1.24	A
-1.11 to -1.23	B
-.98 to -1.10	C
-.33 to -.97	D
.97 to -.32	E
2.59 to .98	F
≥2.6	G

IF there is a loss of Meteorological data, refer to WBN EPIP-9 for additional help.

APPENDIX C
(Page 1 of 5)

"NOMOGRAM"
WORK SHEET FOR MANUAL METHODOLOGY FOR THE ASSESSMENT OF UNMONITORED AIRBORNE RADIOACTIVITY RELEASES

1. Remove this work sheet from this appendix.

2. Obtain appropriate meteorological data from ICS and enter below.
   a) Stability Class is _____: from ICS (METDATA) display. Use the Stability Class Work Sheet on page 4 of 5 (if ICS not available).
   b) Wind Speed in miles per hour is from the 46 meter (I - Intermediate) measurement level _____.

NOTE: If ICS is unavailable, notify the SM and gain the information by use of WBN EPIP-9, "Loss of Meteorological Information."

3. Using the nomograms for TEDE and Thyroid CDE, place pencil on stability class (Parameter 1) + mark and move ruler to intersect the appropriate wind speed (Parameter 2) value. Draw a line and note that the intersection point on (Parameter 3) represents the X/Q value.

4. Obtain the accident type (Parameter 4) from MCR: _____

5. Place the ruler edge on X/Q (Parameter 3) value and rotate right side of ruler to intersect the appropriate accident (Parameter 4). Draw line through points on Parameters 3 and 4 until the line intersects (Parameter 5) (TEDE and CDE).

6. List TEDE and CDE value at the point of intersection of (Parameter 5) here:
   TEDE: _____REM Thyroid CDE:_____REM

7. Provide these dose assessments to the SM as soon as possible.

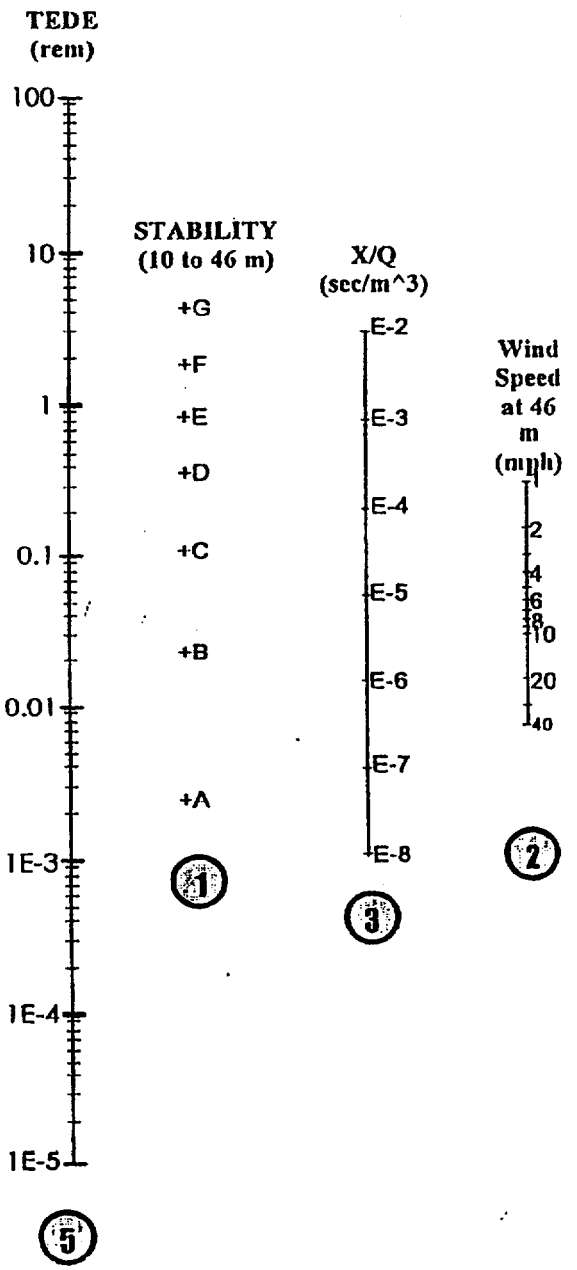
8. Calculate Doses for Two Mile: _____ REM TEDE, _____ REM CDE,

   and Five Mile: _____ REM TEDE, _____ REM CDE, (page 5 of 5)

   and report to the SM as soon as possible.

Prepared by:_____ Date:_____ Time:_____

APPENDIX C
(Page 2 of 5)
"NOMOGRAM"
UNMONITORED AIRBORNE RELEASES
PROJECTED TOTAL EFFECTIVE DOSE EQUIVALENT (TEDE) DOSE
AT THE SITE BOUNDARY
WATTS BAR NUCLEAR PLANT



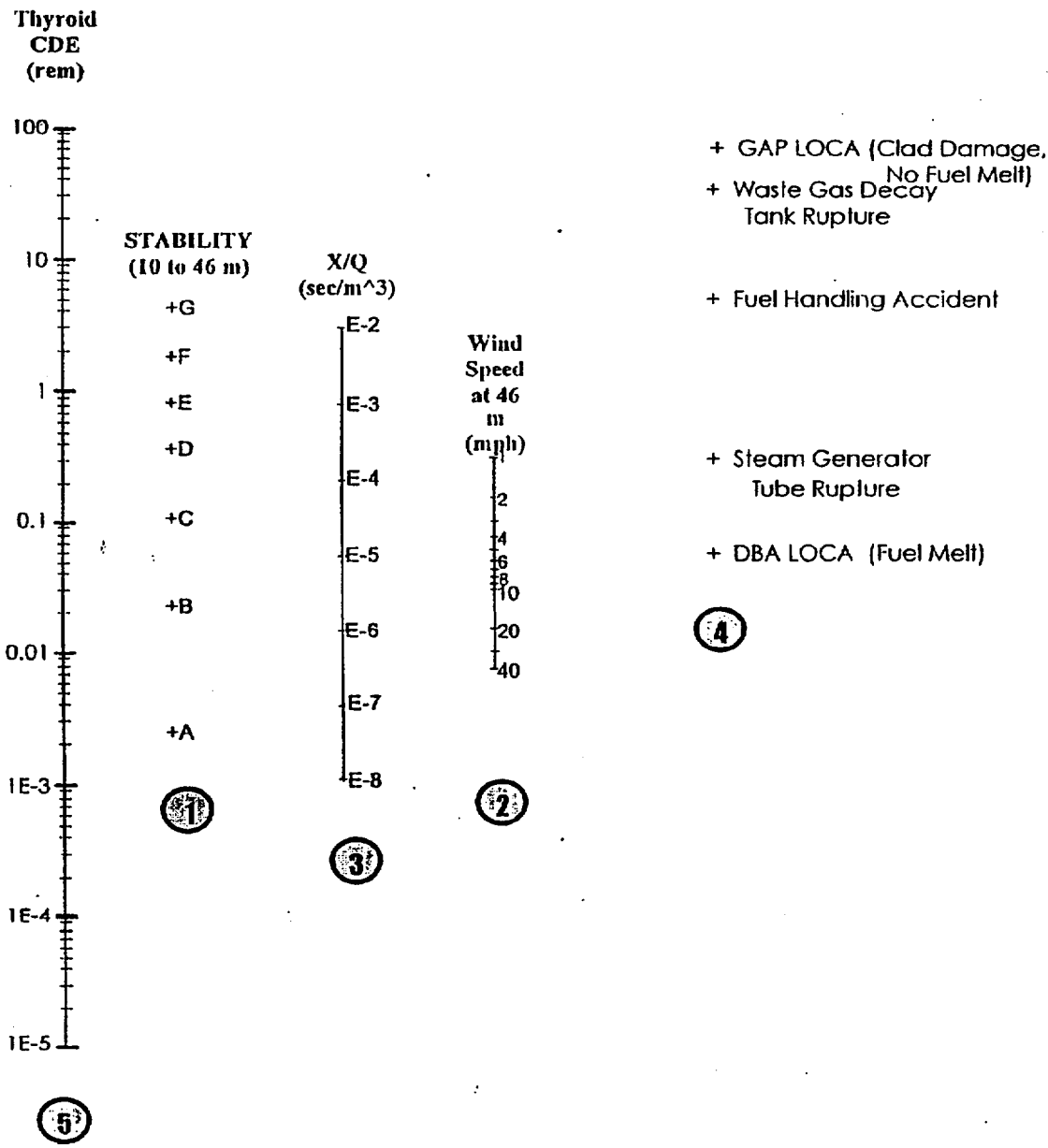
+ RCS LOCA
(Small Break LOCA,
No Clad Damage)

+ GAP LOCA
(Clad Damage, No Fuel Melt)
+ Fuel Handling Accident
+ Steam Generator
Tube Rupture
+ Waste Gas Decay
Tank Rupture

+ DBA LOCA (Fuel Melt)

4

APPENDIX C
(Page 3 of 5)
"NOMOGRAM"
UNMONITORED AIRBORNE RELEASES
PROJECTED THYROID COMMITTED DOSE EQUIVALENT (CDE) DOSE
AT THE SITE BOUNDARY
WATTS BAR NUCLEAR PLANT



APPENDIX C
(Page 4 of 5)

STABILITY CLASS WORKSHEET

If the stability class cannot be obtained from the MET DATA screen on ICS, utilize this worksheet. The stability class is based on the 46 meter minus 10 meter temperature difference.

Temperature Differences (F) I-L=difference in temperature	Stability Class
≤ - 1.24	A
-1.11 to -1.23	B
-.98 to -1.10	C
-.33 to -.97	D
.97 to -.32	E
2.59 to .98	F
≥2.6	G

IF there is a loss of Meteorological data, refer to WBN EPIP-9 for additional help.

APPENDIX C
(Page 5 of 5)

"UNMONITORED NOMOGRAM"
CONVERSION TABLE

Conversion Table for estimating TEDE Doses at 2 and 5 miles.
For ground level releases, the following conversion table can be used to estimate the TEDE at 2 and 5 miles based on the Site Boundary distance TEDE, (if ICS is unavailable).

- Divide the Site Boundary (SB) distance TEDE by the conversion factor corresponding to the appropriate stability class in this table.

		STABILITY CLASS		TWO MILES
		A:6.7		
		B:15.0		
REM SB TEDE (Results of Step 6, App. C)		C:7.7	REM Two Mile TEDE	**NOTE:** Record results on Step 8 of Appendix C.
		D:6.1		
	÷	E:5.3	=	
REM SB CDE (Results of Step 6, App. C)		F:5.5	REM Two Mile CDE	**NOTE:** Record results on Step 8 of Appendix C.
		G:5.5		

		STABILITY CLASS		FIVE MILES
		A:15.0		
REM SB TEDE		B:60.0	REM Five Mile TEDE	**NOTE:** Record results on Step 8 of Appendix C.
(Results of Step 6, App. C)	÷	C:30.0	=	
REM SB CDE		D:21.0	REM Five Mile CDE	**NOTE:** Record results on Step 8 of Appendix C.
(Results of Step 6, App. C)		E:24.0		
		F:20.0		
		G:20.0		

Appendix D (Page 1 of 10)
Radiological Gaseous Effluent Evaluation (Manual Calculation)

1 **Check** the **ICS (BOP RRR)** screen prior to initiating the manual method for determination of gaseous effluent release rates.

2 IF the ICS total noble gas release rate is displayed and is valid, THEN

RECORD the data on the nomogram and perform the dose assessment.

NOTE: If ICS is not functional and time is **not** available due to the ongoing emergency event, wait for the TSC to activate prior to proceeding in this appendix.

3 IF the ICS total noble gas release rate is not available OR is invalid, and

IF time allows, **THEN**

a) **OBTAIN** and **RECORD** the noble gas monitor readings on Data Sheet E1.

b) **OBTAIN** and **RECORD** the flow rates on Data Sheet E1.

c) **CALCULATE** the noble gas release rates on Data Sheet E1.

d) **SUM** the noble gas release rates, and

RECORD on Data Sheets E1 and E4.

e) **OBTAIN** and **RECORD the** steam line radiation monitor readings on Data Sheet E2.

f) **DETERMINE** the calibration factor from the table on Data Sheet E2, and

RECORD the value on Data Sheet E2.

g) **OBTAIN** and **RECORD** the steam mass flow rates on Data Sheet E2.

h) **CALCULATE** the steam line release rates on Data Sheet E2.

i) **SUM** the release rates for the steam lines, and

RECORD the total on Data Sheets E2 and E4.

j) **SUM** the values on Data Sheet E4 to obtain the total site noble gas release rate

k) **RECORD** the Total Noble Gas Release Rate on Data Sheet E4.

Appendix D (Page 2 of 10)
Radiological Gaseous Effluent Evaluation (Manual Calculation)
(continued)

l) **RECORD** the data on the nomogram and COMPLETE the dose projection.

4. IF manual sampling analysis is required to determine the site release rates, THEN

a) **RECORD** sample date(s) and time(s) for applicable release point(s) on Data Sheet E3.

b) **RECORD** the effluent flow rate(s) on Data Sheet E3.

c) **RECORD** the total noble gas concentration for applicable release point(s) on Data Sheet E3.

d) **CALCULATE** the total noble gas release rate as indicated on Data Sheet E3.

e) **SUM** the noble gas release rates, and

RECORD the total on Data Sheets E3 and E4.

f) **OBTAIN** and **RECORD** the steam line radiation monitor readings on Data Sheet E2.

g) **DETERMINE** the calibration factor from the table on Data Sheet E2, and

RECORD the value on Data Sheet E2.

h) **OBTAIN** and **RECORD** the steam mass flow rates on Data Sheet E2.

i) **CALCULATE** the steam line noble gas release rates on Data Sheet E2.

j) **SUM** the noble gas release rates for the steam lines, and

RECORD the total on Data Sheets E2 and E4.

k) **SUM** the values listed on Data Sheet E4 to obtain the total site noble gas release rate, and

RECORD this on Data Sheet E4.

l) **RECORD** the data on the nomogram and **COMPLETE** the dose projection.

j) **DETERMINE** CECC need for data sheet E-6. Transmit data as needed.

Appendix D (Page 3 of 10)
Radiological Gaseous Effluent Evaluation (Manual Calculation)
DATA SHEET E1

NOTE: In columns A and B of this data sheet, the radiation monitor and panel number, along with the ICS or Eberline computer points necessary to obtain the data, are listed. Monitors indicating "offscale" (>10^6 cpm is offscale for monitors reading out on panels 1 or 2-M-30) should be indicated as such. Flow rates that are less than the minimum value indicated should be reported as the minimum value.

Release Point	Effluent Noble Gas Monitor Reading	Effluent Flow Rate [1] (cfm)	Monitor Conversion Factor	Noble Gas Release Rate (µCi/s)	Monitor Read Date/Time
	A	B	C	D = AxBxC	
Aux. Bldg. Vent (0-M-12)	_____ cpm 0-RM-90-101B R0020A	_____ 0-PNL-90-L397[4] F2704A (Min.141,000 cfm)	1.82E-05[2]		____/____
Service Building Vent (0-M-12)	_____ cpm 0-RM-90-132B R0011A	_____ 0-PNL-90-L399[4] F2702A (Min.3,000 cfm)	1.82E-05[2]		____/____
U1 Shield Building Vent (1-M-30)	_____µCi/cc 1-RI-90-400 (EFF)	_____ 1-FI-90-400 (1-M-9) 1-PNL-90-L398 F2203A (Min.3300 cfm)	633[3]	_____µCi/s 1-RI-90-400 (Low, Mid, High)	____/____
U2 Shield Building Vent (2-M-30)	_____µCi/cc 2-RI-90-400 (EFF)	_____ 2-FI-90-400 (2-M-9) 2-PNL-90-L398 F2203A (Min.3300 cfm)	524[3]	_____µCi/s 2-RI-90-400 (Low, Mid, High)	____/____
U1 Condenser Vacuum Exhaust (CVE) (0-M-12)	_____ cpm 1-RM-90-119 R0001A (low rng)	_____ 1-FE-2-256[4] F2260A (Min.21 cfm)	1.82E-05[2]		____/____
NOTE: If 1-RM-90-119 is onscale, stop here. If monitor is offscale, proceed to next row.					
U1 Condenser Vacuum Exhaust (CVE) (1-M-31)	_____ cpm 1-RM-90-450 (Data) Channel 13-01	_____ 1-FE-2-256[4] F2260A (Min.21 cfm)	From table on next page		____/____
NOTE: If Channel 13-01is onscale, stop here. If channel is offscale, proceed to next row.					
U1 Condenser Vacuum Exhaust (CVE) (1-M-31)	_____ cpm 1-RM-90-450 (Data) Channel 13-03	_____ 1-FE-2-256[4] F2260A (Min.21 cfm)	From table on next page		____/____
			Total		

[1] If the effluent flow instrumentation is inoperable, use Data Sheet E5 to estimate the flow.
[2] The monitor Xe-133 efficiency multiplied by a conversion factor (472 cc/sec/scfm).
[3] Conversion factor of 472 cc/sec/scfm. (As interim corrective action to PER 01-002916, additional correction factors are included).
[4] No MCR indication (local indication only).

Appendix D (Page 4 of 10)
Radiological Gaseous Effluent Evaluation (Manual Calculation)
DATA SHEET E1[4]

CVE Accident Monitor Calibration Factors x 472 cc/s/cfm for Various Times (T) Post-Accident.

T = Hours	T=0	T=1	T=8	T=16	T=24	T=48	T=168
1-RM-90-450 (Channel 13-01)	5.48E-04	1.04E-03	2.75E-03	4.77E-03	1.60E-02	1.23E-02	1.81E-02
1-RM-90-450 (Channel 13-03)	9.44E-01	2.02	5.33	9.16	1.23E+01	2.23E+01	3.14E+01

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Radiological Gaseous Effluent Evaluation (Manual Calculation)
DATA SHEET E2

	Steam Line Radiation Monitor Reading	Calibration Factor (from table on next page)	Steam Mass Flow Rate[1]	Conversion Factor[2]	Release Rate
	(mR/hr)	(μCi/cc per mR/hr)	(lbm/hr)		(μCi/s)
	A	**B**	**C**	**D**	**AxBxCxD**
Steam Generator 1	RM-90-421A (1-M-30) Recorder RR-90-268 Pt.01 (1-M-31)			4.45	
Steam Generator 2	RM-90-422A (1-M-30) Recorder RR-90-268 Pt.02 (1-M-31)			4.45	
Steam Generator 3	RM-90-423A (1-M-30) Recorder RR-90-268 Pt.03 (1-M-31)			4.45	
Steam Generator 4	RM-90-424A (1-M-30) Recorder RR-90-268 Pt.04 (1-M-31)			4.45	
Auxiliary Feedwater Pump Turbine	RM-90-421A (1-M-30) or RM-90-424A (1-M-30)			4.45	
				Total	

[1] This data is found on the data logger 1-XR1-5, located in the auxiliary instrument room.
[2] 4.45 = [cc(steam)/0.0283 g] x g/2.205E-3 lbm x hr/3600 sec

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Radiological Gaseous Effluent Evaluation (Manual Calculation)
DATA SHEET E2
(continued)

Main Steam Line Radiation Monitor Calibration Factors (CF)

Time After Shutdown (hrs)	Normal Spectrum Monitor Reading < 1000 mR/hr (μCi/cc per mR/hr)	DBA Spectrum Monitor Reading > 1000 mR/hr or Suspected Fuel Damage (μCi/cc per mR/hr)
0	3.00E-3	9.88E-5
1	5.13E-3	7.79E-4
2	6.11E-3	5.41E-3
4	7.76E-3	6.86E-3
8	1.09E-2	9.63E-3

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Radiological Gaseous Effluent Evaluation (Manual Calculation)
DATA SHEET E3

Release Point	Noble Gas Sample Date/Time	Flow Rates[6], cfm[1,2]	Total Noble Gas Concentration (μCi/cc)		Total Noble Gas Release Rate (μCi/s)
		A	B	C[5]	D = A x B x C
Auxiliary Building	_____/____	_____ 0-PNL-90-L397 EL 786, A8-V (Min.141,000 cfm)		472	
Service Building	_____/____	_____ 0-PNL-90-L399 SN EL 751, S-5 (Min. 3000 cfm)		472	
U1 Shield Building[3,5]	_____/____	_____ 1-FI-90-400 1-PNL-90-L398 EL 729, AE-5 (Min. 3,300 cfm)		633	
U2 Shield Building[3,5]	_____/____	_____ 2-FI-90-400 2-PNL-90-L398 EL 727, AE-11 (Min. 3,300 cfm)		524	
U1 Condenser Vacuum Exhaust	_____/____	_____ [4] (Min.21 cfm)		472	

[1] If an effluent vent has no flow, it is not necessary to sample the vent.
[2] If flow instrumentation is inoperable, obtain flow estimates using Data Sheet E5.
[3] RE-90-402 is used for high radiation sampling.
[4] Request flowrate from Operations for 1-FE-2-256, U1 Condenser Vacuum Exhaust.
[5] Conversion factor: 472 cc/sec/SCFM. (As interim corrective action to PER 01-002916, additional correction factors are included).

[6] Flow rates that are less than the minimum value indicated should be reported as the minimum value.

Performed by: _____ Date: _____

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Radiological Gaseous Effluent Evaluation (Manual Calculation)
DATA SHEET E4

1. Total Release Rate from Plant Building Vents (Total from E1 or E3).	_____ µCi/s
2. Steam Generator Relief Valve and Auxiliary Feedwater Pump Turbine Noble Gas Release Rate (Total from E2)	_____ µCi/s
3. Total Noble Gas Release Rate (Sum of 1. and 2. Above)	_____ µCi/s

Performed by _____ Date _____

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Radiological Gaseous Effluent Evaluation (Manual Calculation)
DATA SHEET E5

NOTE If ventilation flow data is not readily obtainable, the maximum values in cfm from Appendix C of the REP or from DBA analysis (shown in parentheses below) may be used in the Total Flow Rate Column below. These values will be conservative.

Shield Building - Unit 1 (If 1-FI-90-400 [1-M-9] and 1-PNL-90-L398 are inoperable)			
Containment Purge air flow	(Record 14,000 per operating fan)	cfm	
EGTS air flow	(Record 8,000 if operating)	cfm	
ABGTS Fan A-A in operation.	(Record 9,900 if operating)	cfm	
PASF Ventilation	(Record 2200 if operating)		
	Total	cfm	(Maximum 44,100)

Shield Building - Unit 2 (If 2-FI-90-400 [2-M-9] and 2-PNL-90-L398 are inoperable)			
ABGTS Fan B-B in operation	(Record 9,900 if operating)	cfm	
	Total	cfm	(Maximum 9,900)

Auxiliary Building (If 0-PNL-90-L397 [no MCR indication] is inoperable)		
No. of Auxiliary Building Exhaust Fans Operating x 84,000 [1-M-9]	cfm	
No. of Fuel Handling Area Exhaust Fans Operating x 60,000 [1-M-9]	cfm	
Total	cfm	(Maximum 228,000)

Condenser Vacuum Exhaust - Unit 1 (If 1-FE-2-256 [no MCR indication] is inoperable)		
Obtain an estimate from Operations personnel (rotometer on pump)	cfm	(Maximum 100)

Service Building Exhaust (If 0-PNL-L399 [no MCR indication] is inoperable)		
Enter 10,500 SCFM for Service Building Exhaust	cfm	(Maximum 10,500)

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Radiological Gaseous Effluent Evaluation (Manual Calculation)
DATA SHEET E6

NOTE: This data to be transmitted to the CECC for long term dose assessment.

Iodine and Particulate Release Fractions

	Auxiliary Building	Service Building	U1 Shield Building	U2 Shield Building	U1 Condenser Vacuum Exhaust	Total
I-131 Concentration (µCi/cc) **A**						
Particulate Concentration (µCi/cc) **B**						
Flow Rate (cfm) **C**						
				I-131 Release Rate (µCi/s) **D = A * C * 472**		
				Particulate Release Rate (µCi/s) **E = B * C *472**		
				Noble Gas Release Rate (from Data Sheet E5) (µCi/s) **F**		
				I-131 Fraction **D / F**		
				Particulate Fraction **E / F**		

Performed by: _____ Date: _____

SOURCE NOTES
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1.	NRC Inspection Item 390/84-22-16	Provide the primary methodology for classification of an accident based on radiological effluents.
2.	NCO 920054476 SER-0474	Provide a description of procedures or calculational methods used for converting instrument readings to release rates per unit time based on exhaust air flow and considering radionuclide spectrum as a function of time after shutdown.
3.	MSC-02411 Item 390/84-22-16	Calculating release rates for assistance in determining classification of a REP accident.
4.	DCN W-39536-A	Revised CVE Accident Monitor due to 18 month fuel cycle.
5.	DCN D-50122	Adjust flow rate for Aux. Bldg Radiation Monitor, 0-RM-90-101B.