Florida Power & Light Company, 6501 South Ocean Drive, Jensen Beach, FL 34957

March 13, 2002

L-2002-047
10 CFR 50 Appendix E

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

Re: St. Lucie Units 1 and 2
Docket Nos. 50-335 and 50-389
Emergency Plan Implementing Procedure

In accordance with 10 CFR 50 Appendix E, enclosed is a copy of the revised procedure that implements the Emergency Plan as listed below.

Number	Title	Revision	Implementation Date
EPIP-09	Off-Site Dose Calculations	6A	February 21, 2002

EPIP-09 Revision 6A was revised to change a typographical error of the height of the upper level site meteorological instrumentation from 59.7 to 57.9 meters.

Please contact us if there are any questions regarding this procedure.

Very truly yours,

Donald E. Jernigan
Vice President
St. Lucie Plant

DEJ/tlt

Enclosure

A045

FPL

ST. LUCIE PLANT

EMERGENCY PLAN IMPLEMENTING PROCEDURE

SAFETY RELATED

Procedure No.
EPIP-09
Current Revision No.
6A
Effective Date
02/21/02

Title:

OFF-SITE DOSE CALCULATIONS

Responsible Department: **EMERGENCY PREPAREDNESS**

REVISION SUMMARY:

Revision 6A – Upper level met instrumentation @ 57.9 not 59.7 meter. Revision not typed as submitted/approved. (J.R. Walker, 02/13/02)

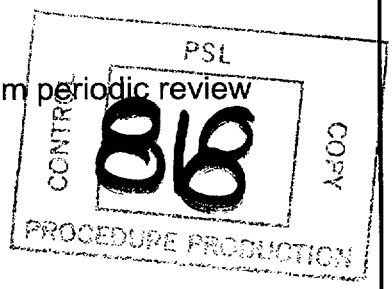
Revision 6 - **THIS PROCEDURE HAS BEEN COMPLETELY REWRITTEN**. Reformatted instructions / procedure layout to better accommodate user's with different backgrounds, added data interpretation information for both units to assist persons with less background in release pathways and effluent monitors, made human factors improvements, and made editorial / administrative changes. (M. Cooper, 11/15/01)

Revision 5 – Clarified Delta T determination. (J. R. Walker, 06/18/01)

Revision 4 – Revised fan flow rates to accommodate for maintenance acceptance criteria and included minor correction to a number used in an example. (Steve Knapp, 02/02/01)

Revision 3 - Made human factors improvements; identified applicable unit, relocated note and caution messages, changed table, revised instructions for changing date and time on Class A computer, and changed responsible department from Training to Emergency Preparedness. (Steve Knapp, 09/11/00)

Revision 2 - Revised procedure number to address QA comment from periodic review (Appendix J). (J. R. Walker, 03/18/99)



Revision	FRG Review Date	Approved By	Approval Date
0	12/15/97	J. Scarola Plant General Manager	12/15/97
6A	11/15/01	R. G. West Plant General Manager	11/15/01
		N/A Designated Approver	
		G.A. Bird Designated Approver (Minor Correction)	02/13/02

S___OPS	
DATE	
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DOCN	EPIP-09
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COM	COMPLETED
ITM	6A

TABLE OF CONTENTS

SECTION PAGE

1.0 PURPOSE 3

2.0 REFERENCES / RECORDS REQUIRED / COMMITMENT DOCUMENTS 4

3.0 RESPONSIBILITIES 6

4.0 DEFINITIONS 6

5.0 INSTRUCTIONS 9

ATTACHMENTS

ATTACHMENT 1 DATA ACQUISITION VIA ERDADS 12

ATTACHMENT 2 GROSS NOBLE GAS CONCENTRATIONS VIA EBERLINE CONTROL TERMINAL A OR B 14

ATTACHMENT 3 GROSS NOBLE GAS CONCENTRATION VIA THE PC-11, RADIATION MONITORING CONSOLE 15

ATTACHMENT 4 UNIT 1 - DATA INTERPRETATION 16

ATTACHMENT 5 UNIT 2 - DATA INTERPRETATION 18

ATTACHMENT 6 CLASS A MODEL DOSE CALCULATION 21

ATTACHMENT 7 METEOROLOGICAL DATA 28

ATTACHMENT 8 RELEASE RATE DATA 38

ATTACHMENT 9 MANUAL DOSE CALCULATION 61

ATTACHMENT 10 RESPONDING TO AN UNMONITORED CONTAINMENT BURP 71

ATTACHMENT 11 ESTIMATE OF CONTAINMENT "% MASS LOSS" 77

ATTACHMENT 12 FIELD TEAM MEASUREMENTS ASSESSMENT 79

1.0 PURPOSE

1.1 Discussion

1. This procedure is applicable to both Unit 1 and Unit 2. Should both units be affected, provisions have been made on the worksheets to sum the release rates.

2. Off-site dose estimates, release rates and containment radiation levels will be used by the EC for classifying emergencies and making Protective Action Recommendations (PARs).

3. Attachment 6, CLASS A MODEL DOSE CALCULATIONS, provides instructions for performing dose calculations using the computer model. This model estimates off-site dose rates and cumulative doses and parallels this procedure. More detailed information on the Class A Model is available in the "FPL - Class A Emergency Offsite Dose Calc Program User Guide;" a controlled copy of which is available in the TSC and EOF.

4. Attachment 10, RESPONDING TO AN UNMONITORED CONTAINMENT BURP, is to be used to assess unmonitored releases resulting from rapid containment depressurization events.

5. Attachment 11, ESTIMATE OF CONTAINMENT "% MASS LOSS", is to be used to assess a rapid depressurization (i.e., greater than design basis) of containment through an estimate of containment volume loss.

6. Attachment 12, FIELD TEAM MEASUREMENTS ASSESSMENT, provides a method to back calculate a release rate from Field Monitoring Team survey results.

2.0 REFERENCES / RECORDS REQUIRED / COMMITMENT DOCUMENTS

NOTE

One or more of the following symbols may be used in this procedure:

§ Indicates a Regulatory commitment made by Technical Specifications, Condition of License, Audit, LER, Bulletin, Operating Experience, etc. and shall NOT be revised without Facility Review Group review and Plant General Manager approval.

¶ Indicates a management directive, vendor recommendation, plant practice or other non-regulatory commitment that should NOT be revised without consultation with the plant staff.

Ψ Indicates a step that requires a sign off on an attachment.

2.1 References

1. St. Lucie Plant Updated Final Safety Analysis Report (UFSAR), Unit 1 and Unit 2
2. St. Lucie Plant Radiological Emergency Plan (E-Plan)
3. E-Plan Implementing Procedures (EPIP-00 - 13)
4. HP-2, FP&L Health Physics Manual
5. QI-17-PSL-1, Quality Assurance Records
6. Bases for Accident Dose Calculations for St. Lucie Nuclear Power Plant (Bases prepared by HMM Associates of Waltham, Massachusetts)
7. NUREG-0654, Rev. 1, FEMA Rep-1, Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants, November, 1980
8. NUREG/BR-150, Vol. 1, Response Technical Manual
9. EPA-400-R-92-001, EPA Manual of Protection Action Guides and Protective Actions for Nuclear Incidents, October, 1991.
10. ¶2 FPL Engineering Calculation PSL-BFJM-93-032, March, 1994.

2.2 Records Required

1. All completed data/worksheets or computer generated forms providing similar information, shall be maintained in the plant files in accordance with QI-17-PSL-1.

2.3 Commitment Documents

1. ¶1 Condition Report 96-2609 (ERDADS Data/Fan Status)
2. ¶3 PMAI PM99-09-016 (PARs Based on FMT Data)
3. ¶4 Condition Report 00-1426 Supplement 1 (Fan Flowrates)
4. ¶5 PMAI PM01-05-073, Condition Report CR 01-0351 (Determination of Delta T)

3.0 RESPONSIBILITIES

3.1 The Chemistry Department shall be responsible for performing off-site dose calculations, when directed by the Emergency Coordinator.

3.2 The EOF Dose Assessor shall take primary responsibility for dose assessment when the EOF is operational.

4.0 DEFINITIONS

4.1 Abbreviations/Acronyms

1. **PAR** - Protective Action Recommendation - designation used on a Dose Calculation Worksheet that refers to data that should be used when determining Protective Action Recommendations.

2. **SNF** - State Notification Form - designation used on the Dose Calculation Worksheet that refers to data that should be transferred to the Florida Nuclear Plant Emergency Notification Form.

3. **Class A Model** - Commonly used to refer to the "FPL - Class A Emergency Offsite Dose Calc Program".

4.2 **Affected Unit** - (for purposes of this procedure) - a reactor unit that has activated the Emergency Plan and has a **release**.

4.3 **Iodine Removal System** - is defined as any one Containment Spray pump running with its chemical addition system injecting the chemicals.

1. This system is considered in service if any one Containment Spray Pump is running AND for:

   A. **Unit 1**, if its Sodium Hydroxide (NaOH) tank level is decreasing.

   B. **Unit 2**, if its Hydrazine (N_2H_4) pump is "ON".

4.4 **Core Overheating / Melting** - Severe core damage, beyond gap failure, typically indicated by:

1. The core being uncovered, by coolant, for 30 minutes or more.

2. CHRRM reading greater than 4.2 E+4 R/hr.

> **NOTE**
> The 700°F Core Exit Thermocouple value used in other procedures signifies the starting point for potential core melting. The value used in this procedure signifies that the core is in an overheat condition, melting is imminent and the release may include particulates, (e.g., Bariums, Cesiums, Strontiums, etc.).

3. Valid Core Exit Thermocouple reading(s) in excess of 1700°F.

4.5 **Particulate Factor (PF)** - a factor used when core melt or overheat is under way to account for the particulate in the release pathway.

> **NOTE**
> Prior to the declaration of a release, all viable channels for the effluent pathway should be evaluated to confirm increase of the applicable monitor reading(s).

4.6 **Release** - during any declared emergency, one of the following is true:

1. Any effluent monitor increase of (approximately) 10 times or one decade above pre-transient values

OR

2. Health Physics detecting airborne radioactivity levels in excess of 25 percent Derived Air Concentration (DAC) outside of plant buildings due to failure of equipment associated with the declared emergency.

4.7 **Sea-breeze** - is a coastal phenomena where an artificial ceiling may exist.

1. Our meteorological data processing methods assume that this ceiling acts as a limit to vertical mixing; that is, the plume is below the ceiling. This leads to a slightly higher concentration for a given stability class.

2. The Class A Model will, in some cases, state "Sea-breeze: Yes", when manual calculations would indicate No Impact. The Class A Model is stating that sea-breeze may exist, although there is no impact because the ceiling is too high to affect the vertical mixing within 10 miles of the plant. This will not cause significant deviations in calculations performed using the two methods.

4.8 Symbols - the following symbols are used in this procedure:

1. < = less than
2. ≤ = less than or equal to
3. > = greater than
4. ≥ = greater than or equal to
5. E =stands for exponent and indicates the power to which 10 is raised, "or times 10 to the power of", e.g.:
   - **A.** E + 04 = 10^4 = 10,000
   - **B.** E - 04 = 10^{-4} = 0.0001

5.0 INSTRUCTIONS

5.1 Data Acquisition

NOTE
Be aware of the possibility of a release from an unmonitored point. Evaluating data on system / component pressures, operating characteristics and local area radiation monitors will help identify such releases.

1. Evaluate available plant data to determine if a release has occurred or is imminent.

2. When a release is confirmed, acquire meteorological and source term data;

NOTE
Information on Data Interpretation, Plant Parameters, Release Pathways and Effluent Monitors for Unit 1 and Unit 2 is available in Attachments 4 and 5, respectively.

A. If ERDADS - Emergency Data Acquisition and Display System, is available, Then:

1. Obtain SMD and / or RG (1 or 2) as provided in Attachment 1.

B. If ERDADS is unavailable, or some of its data is unusable, Then:

1. Obtain meteorological data as provided in Attachment 7.

2. Obtain Unit 1 Gross Noble Gas concentrations via Eberline Control Terminal A or B as provided in Attachment 2.

3. Obtain Unit 2 Gross Noble Gas concentrations via the PC-11, Radiation Monitoring Console as provided in Attachment 3.

5.1 Data Acquisition (continued)

2. (continued)

C. Obtain plant ventilation exhaust fan status

NOTE
When obtaining plant ventilation exhaust fan status from the Control Room, specify fan numbers.

1. Prior to a fully-staffed TSC, obtain exhaust fan status from the affected Control Room.

NOTE
TSC Sound-powered Phone Talker can be utilized as a source for plant ventilation exhaust fan status not available from TSC status boards.

2. When the TSC is fully staffed, obtain exhaust fan status from the Safety Functions and Equipment Status board in the TSC.

3. When the EOF is operational, obtain exhaust fan status from TSC Dose Assessor or TSC Chemistry Supervisor.

5.2 Off-Site Dose Calculations Methodologies

1. The Class A Model should be used if it is available.

A. Perform system start-up and pre-use verification QC Check in accordance with Attachment 6.

B. If system start-up and QC check are acceptable, perform dose calculations using the Class A Model.

2. If Class A Model is NOT available, Then perform manual dose calculations using Attachments 7 through 12.

5.3 Provide the Emergency Coordinator with dose calculation results prepared in the Control Room or TSC.

1. Provide TSC Administrative Staff with dose calculation results prepared in the Control Room or TSC and request results are faxed to EOF.

5.4 Provide the Recovery Manager and EOF HP Manager with dose calculation results prepared in the EOF.

5.5 The TSC Chemistry Supervisor or EOF HP Manager, once the EOF is operational, should monitor release rates and meteorological conditions to determine how frequently to update the dose rate estimates.

1. Release and dose estimates shall be revised at least hourly for the first 8 hours after the accident unless it is determined that releases of radioactivity have been terminated.

2. When performing manual dose calculations, If any of the following averages change by the amounts indicated below, over a period of 30 minutes or less, Then dose estimates shall be updated.

A. Release rates increase by more than 25 percent.

OR

B. Wind speed decreases to less than one half of previous value.

OR

C. Atmospheric stability becomes more stable by more than one class (e.g., change from stability D to F).

OR

D. Wind direction changes by more than 22.5 degrees (i.e., plume centerline is more than one sector away from prior location).

END OF SECTION 5.0

ATTACHMENT 1
DATA ACQUISITION VIA ERDADS
(Page 1 of 2)

CAUTION

1. Large errors may result if the ERDADS computer is NOT addressing the affected unit's database.
2. ¶1 "No data" after a parameter name means that this input is NOT available from ERDADS for this unit.

1. System Set-up

A. Check for a small square cursor at the top left corner; if it is present, the unit is ready.

1. If it is not present, be sure the <DIM/NON-DIM> select (on keypad) is on <NON/DIM> and then increase the contract and brightness (knobs at the bottom left of screen).

B. Press <CLEAR>.

C. Type "Pup Unit 1" to access Unit 1 data, type "Pup Unit 2" to access Unit 2 data, then press <EXEC>.

D. Top of screen will read "Unit change is complete" or "Current Unit is same as entered Unit".

2. To access data using Primary Group Key

A. Press <CLEAR>.

B. Press the yellow <EPIP> key.

1. **SMD**, titled "Site Meteorological Data", showing 15 minute average 10 and 57.9 meter wind speed, wind direction, temperature and differential temperature will display.

/R6A

ATTACHMENT 1
DATA ACQUISITION VIA ERDADS
(Page 2 of 2)

2. (continued)

   C. Press <PG-DN> to scroll through, in order:

      1. **RG (1 or 2)**, titled "Radiation Gaseous Source Term", showing plant effluent monitor, Main Steam Line monitor, CHRRM and containment pressure and same site meteorological data in SMD.

CAUTION

¶1 Certain parameters (e.g., fan status) available on Unit 2 (SF2) are NOT available on Unit 1 (SF1).

      2. **SF (1 or 2)**, titled "Safety Functions and Equipment Status", showing TSC Status Board data.

      3. **RBS**, titled "Health Physics Evaluation Screen" showing containment radiation levels and trends (not required for dose assessment).

      4. **EF (1 or 2)**, titled "EOF Data Sheet" showing EOF Status Board data.

      5. Return to **SMD**.

3. To access Chemistry Data and Radiation Monitors:

   A. Press <CLEAR>.

   B. Type R (Unit 1) and press <DSPLY>.

      1. **R (Unit 1)**, page 1 of Radiation Monitors showing area radiation monitor data will display. Press <PG-DN> to display following pages of radiation monitor data.

4. To access other data using Display Name Code:

   A. Press <CLEAR>.

   B. Type the 3 character alpha-numeric display name code and press <DSPLY>.

END OF ATTACHMENT 1

ATTACHMENT 2
GROSS NOBLE GAS CONCENTRATIONS VIA EBERLINE CONTROL TERMINAL A OR B

(Page 1 of 1)

CAUTION
Eberline Control Terminal A or B supplies data for Unit 1 only.

1. Enter the following sequence on the keypad for each applicable channel number:

   A. Press 10 MIN HIST.

   B. Determine the applicable pathway channel number from the table below.

   C. Enter the applicable pathway channel number (leading zeros not required).

   D. Press ENTER (value appears in window).

   E. Press PRINT.

   F. Press FILE.

   G. Press ENTER.

   H. Enter effluent monitor data into the applicable Release Rate Data Sheet.

NOTE
Use a steamline channel ONLY if the Safeties and / or Atmospheric Steam Dumps are releasing steam. Monitors have one range.

Path	Range		
	Low	Mid	Hi
Plant Vent	1-5	1-7	1-9
ECCS - A	2-5	2-7	2-9
ECCS - B	3-5	3-7	3-9
Fuel Bldg.	4-5	4-7	4-9
Steamline A	N/A	5-1	N/A
Steamline B	N/A	5-2	N/A

2. The Eberline Terminal provides a ribbon paper print out of several rows of ten (10) minute averages of the concentration for the selected pathway channel.

   The last row is the current value for the selected pathway channel. The row above the last row is the most recent full ten (10) minute average and should be used as the source data for dose calculations.

END OF ATTACHMENT 2

ATTACHMENT 3
GROSS NOBLE GAS CONCENTRATION VIA THE PC-11, RADIATION MONITORING CONSOLE
(Page 1 of 1)

CAUTION
The PC-11 Radiation Monitoring Console supplies data for Unit 2 only.

1. Use the following keystroke sequence for each applicable channel number:

   A. Press Key F8 to display Control Menu.

   B. Use the ARROW Key to highlight the RM-80 Utility Task under the status display.

   C. Press ENTER key.

   D. Press Key F1 to select Historical Display.

   E. Press Key F4 to select Graph 10 Minute.

   F. Determine the applicable pathway Channel Number, from the table below.

   G. At prompt, type **M** and the Channel Number.

   H. Press ENTER.

   I. Record Top #1 reading in applicable DATA column.

   J. Press Key F10.

   K. Press Key F10.

   L. Press Key F1 to display All Monitor Schematic.

Applicable Pathway Channel Number			
	Range		
Path	Low	Mid	Hi
Plant Vent	621	622	623
ECCS - A	601	602	603
ECCS - B	611	612	613
Fuel Bldg. (If NOT diverted)	413	N/A	N/A
Steamline A	N/A	631	N/A
Steamline B	N/A	632	N/A
Background (Steamline)	N/A	633	N/A

END OF ATTACHMENT 3

ATTACHMENT 4
UNIT 1 - DATA INTERPRETATION
Parameters, Pathways and Effluent Monitors
(Page 1 of 2)

1. If a single effluent monitor channel is operable and on scale, Then use the value for that channel. If the channel is not on-scale, do NOT use the channel.

2. If two effluent monitor channels for the same pathway are operable, on-scale, and display concentration values in the overlapping range, Then use the highest (most conservative) value.

3. **Eberline SPING Effluent Montiors**

   - Used on Unit 1 Plant Vent, ECCS A & B and FHB
   - All have 3 gas channels; low, mid and high range
   - Indicate "BAD" if out of instrument range, high or low

4. **Steam Generator Tube Rupture (SGTR)**

   - Use a steamline channel only if the Safeties and / or Atmospheric Dumps are releasing steam. Otherwise, verify alignment of Steam Jet Air Ejector exhaust to the Plant Vent (PV) and utilize PV effluent monitor.

5. **Containment Isolation Signal (CIS)**

   - Initiates:
     - Prior to Containment Pressure reaching 5 psig
     - When Containment Radiation is equal to or greater than 10 r/hr
     - At a Safety Injection Actuation Signal
   - Isolates HVE 10A & B
   - Auto starts HVE 6A & B and HVE 9A & B

ATTACHMENT 4
UNIT 1 - DATA INTERPRETATION
Parameters, Pathways and Effluent Monitors
(Page 2 of 2)

6. Safety Injection Actuation Signal (SIAS)

- Initiates:
  - Prior to Containment Pressure reaching 5 psig
  - When Pressurizer Pressure is equal to or greater than 1600 psia
- Isolates HVE 10A & B
- Auto starts HVE 6A & B and HVE 9A & B

Accident Type	Release Pathway	Fans	Comments
LOCA	Plant Vent ECCS	6 & 10 9	10 Fans secure on SIAS / CIS 6 & 9 fans auto start on SIAS / CIS
SGTR	Plant Vent Atmosphere	6 & 10 N/A	Air Ejector aligned to PV Atm. Dumps and Safeties Open
FUEL HANDLING	FHB Stack	15, 16 & 17	
CASK DROP	FHB Stack	15, 16 & 17	
WGDTR	Plant Vent	6 & 10	

Effluent Monitor	Channel #	Units	Scale (min - max)	Normal (non-emergency) Reading
Plant Vent - LR	01-05	µCi/cc	1.0E-07 - 6.0E-02	E-07
- MR	01-07	µCi/cc	2.5E-02 - 4.0E+02	E-04
- HR	01-09	µCi/cc	1.0E+00 - 1.0E+05	E-01
CHRRM - A	58	r/hr	1.0E+00 - 1.0E+07	E-01
CHRRM - B	59	r/hr	1.0E+00 - 1.0E+07	E-01
Post LOCA - A	52	mr/hr	1.0E+00 - 1.0E+05	E+00
Post LOCA - B	53	mr/hr	1.0E+00 - 1.0E+05	E+00
ECCS - A - LR	02-05	µCi/cc	1.0E-07 - 6.0E+02	E-07
- MR	02-07	µCi/cc	2.5E-02 - 4.0E+02	E-04
- HR	02-09	µCi/cc	1.0E+00 - 1.0E+05	E-01
ECCS - B - LR	03-05	µCi/cc	1.0E-07 - 6.0E+02	E-07
- MR	03-07	µCi/cc	2.5E-02 - 4.0E+02	E-04
- HR	03-09	µCi/cc	1.0E+00 - 1.0E+05	E-01
Steamline - A	05-01	mr/hr	1.0E-01 - 1.0E+04	E-02
Steamline - B	05-02	mr/hr	1.0E-01 - 1.0E+04	E-02
Fuel Bldg. - LR	04-05	µCi/cc	1.0E-07 - 6.0E+02	E-07
- MR	04-07	µCi/cc	2.5E-02 - 4.0E+02	E-04
- HR	04-09	µCi/cc	1.0E+00 - 1.0E+05	E-01
CIS Monitor	N/A	mr/hr	1.0E+00 - 1.0E+05	E+01

END OF ATTACHMENT 4

ATTACHMENT 5
UNIT 2 - DATA INTERPRETATION
Parameters, Pathways and Effluent Monitors
(Page 1 of 3)

1. If a single effluent monitor channel is operable and on scale, Then use the value for that channel. If the channel is not on-scale, do not use the channel.

2. If two effluent monitor channels for the same pathway are operable, on-scale, and display concentration values in the overlapping range, Then use the highest (most conservative) value.

3. **Unit 2 Effluent Monitor channels 604, 614 and 624**

   - All provide values in μCi/sec that should not be used for dose calculations
   - These channels should not be used to identify or validate a release

4. **Wide Range Gas Monitor (WRGM) Effluent Monitors**

   - Used on Unit 2 PV and ECCS A & B
   - Each monitor has three (3) gas channels; low, mid and high range
   - Each monitor uses a 2 sample pump system; the LOW range gas channel utilizes a pump system which is independent of the MID and HIGH range gas channels pump system
   - All three gas channels share a common alert and high alarm channel; once the alert or high alarm occurs, it will not occur again, regardless of the channel in operation.

ATTACHMENT 5
UNIT 2 - DATA INTERPRETATION
Parameters, Pathways and Effluent Monitors
(Page 2 of 3)

5. SGTR

- Use a steamline channel only if the Safeties and / or Atmospheric Dumps are releasing steam. Otherwise, verify alignment of Steam Jet Air Ejector exhaust to the PV and utilize PV effluent monitor.
- Steamline monitors on Unit 2 must be background corrected prior to use in the Release Rate calculation table. Use NET value (i.e., Channel - Background).

EXAMPLE
Channel 631 (S/G "A") = 12 mr/hr
Channel 632 (S/G "B") = 2.2 mr/hr
Channel 633 (Bkgd) = 2.0 mr/hr
NET Value for S/G "A" = 10 mr/hr
NET Value for S/G "B" = 0.2 mr/hr

6. Fuel Handling Building (FHB) Pathway

- Verify alignment of the FHB exhaust system. During a high radiation condition in the Unit 2 FHB, exhaust may be diverted to the Shield Building and thus routed to the PV for discharge.

7. CIS

- Initiates:
  - Prior to Containment Pressure reaching 3.5 psig
  - When Containment Radiation is equal to or greater than 10 r/hr
  - At a SIAS
- Isolates HVE 10A & B
- Auto starts HVE 6A & B and HVE 9A & B

ATTACHMENT 5
UNIT 2 - DATA INTERPRETATION
Parameters, Pathways and Effluent Monitors
(Page 3 of 3)

8. SIAS

- Initiates:
  - Prior to Containment Pressure reaching 3.5 psig
  - When Pressurizer Pressure is equal to or greater than 1736 psia
- Isolates HVE 10A & B
- Auto starts HVE 6A & B and HVE 9A & B

Accident Type	Release Pathway	Fans	Comments
LOCA	Plant Vent ECCS	6 & 10 9	10 Fans secure on SIAS / CIS 6 & 9 fans auto start on SIAS / CIS
SGTR	Plant Vent Atmosphere	6 & 10 N/A	Air Ejector aligned to PV Atm. Dumps and Safeties Open
FUEL HANDLING	FHB Stack Plant Vent	15, 16 & 17 6 & 10	Divert to Shield Bldg. (PV) on Hi Rad
CASK DROP	FHB Stack Plant Vent	15, 16 & 17 6 & 10	Divert to Shield Bldg. (PV) on Hi Rad
WGDTR	Plant Vent	6 & 10	

Effluent Monitor	Channel #	Units	Scale (min - max)	Normal (non-emergency) Reading
Plant Vent - LR	621	µCi/cc	1.0E-07 - 1.0E-01	E-07
- MR	622	µCi/cc	1.2E-03 - 1.2E+03	N/A
- HR	623	µCi/cc	1.0E-01 - 1.0E+05	N/A
CHRRM - A	40	r/hr	1.0E+00 - 1.0E+08	E+00
CHRRM - B	41	r/hr	1.0E+00 - 1.0E+08	E+00
Post LOCA - A	38	mr/hr	1.0E+01 - 1.0E+07	E+01
Post LOCA - B	39	mr/hr	1.0E+01 - 1.0E+07	E+01
ECCS - A - LR	601	µCi/cc	1.0E-07 - 1.0E-01	E-07
- MR	602	µCi/cc	1.2E-03 - 1.2E+03	N/A
- HR	603	µCi/cc	1.0E-01 - 1.0E+05	N/A
ECCS - B - LR	611	µCi/cc	1.0E-07 - 1.0E-01	E-07
- MR	612	µCi/cc	1.2E-03 - 1.2E+03	N/A
- HR	613	µCi/cc	1.0E-01 - 1.0E+05	N/A
Steamline - A	631	mr/hr	1.0E+00 - 1.0E+05	E-01
Steamline - B	632	mr/hr	1.0E+00 - 1.0E+05	E-01
Steamline Bkg.	633	mr/hr	1.0E+00 - 1.0E+05	E-01
Fuel Bldg. - LR	413	µCi/cc	1.0E-07 - 1.0E-01	E-07
CIS Monitor	N/A	mr/hr	1.0E+00 - 1.0E+07	E+01

END OF ATTACHMENT 5

ATTACHMENT 6
CLASS A MODEL DOSE CALCULATION
(Page 1 of 7)

Discussion

The computer-based Class A Model dose calculation program utilizes inputs and processes similar to the manual procedure. However, refinements in the Class A Model allow for a wider range of input information and mathematical complexity. These instructions provide the guidance for using the Class A Model to derive calculated off-site doses in a manner similar to that discussed for the manual calculation. Not all input screens available in the computer program are needed by the general user and are, therefore not discussed in these instructions.

The Class A Model provides two (2) types of dose calculations. The "Actual Dose Calculation" is accomplished in advection steps of fifteen (15) or thirty (30) minutes and is a cumulative dose determination. The "Forecast Dose Calculation" is a projected dose determination based on a given time period such as two (2) hours. Personnel having expertise in dose calculation methodology may utilize the advanced methods available through the screen driven menus to modify and refine these basic calculations.

NOTE
If both the Technical Support Center (TSC) and Emergency Operations Facility (EOF) are operational, dose assessment personnel at both locations should coordinate their efforts as a self-check to assure accuracy.

Computer Startup

1. Ensure the uninterruptible power supply to the computer is energized to prevent data loss if a power interruption occurs.

2. Ensure that the floppy disk drive is empty.

3. Turn on the display monitor, the printer and the computer.

ATTACHMENT 6
CLASS A MODEL DOSE CALCULATION
(Page 2 of 7)

4. Following system startup, check the date and time on the computer.

> **NOTE**
> Correcting the date and time should be done prior to using a stand-alone computer. When using a computer on the LAN, contact a LAN administrator if the date and/or time need to be changed.

A. If the dose calculation program starts, Then the date and time is shown in the upper left of the monitor.

B. Correct the date and time as necessary (time should match ERDADS).

Changing the date/time.

1. Depress Function Key F5 (to quit the Class A software).

2. Type "Y".

3. Depress the "ENTER" key.

4. At the system prompt, type "TIME" (or "DATE" as required).

5. Depress the "ENTER" key.

6. Type correct data and depress "ENTER" key.

C. If the dose calculation program does not start, Then the date and time is checked at the system prompt using Steps 4-6 above.

5. When the computer displays the system prompt, and has correct date/time, type "FPL" and depress "ENTER" key to return to Class A software.

Pre-use QC Check

1. If time and manpower permits, Then perform a pre-use verification QC check following the instructions in the FPL Class A Emergency Offsite Dose Calc Program User Guide.

2. At the completion of the pre-use QC check, exit to the Main Menu, and proceed to step 3 of Performing Calculations, below.

ATTACHMENT 6
CLASS A MODEL DOSE CALCULATION
(Page 3 of 7)

NOTE
If editing is required, edit the information in accordance with the displayed instructions.

Performing Calculations

CAUTION
Changing "Advection time step" after a calculation step can cause the Class A model to generate errors.

1. When the plant site menu is displayed, Then depress the Function Key (i.e., F1-Unit 1 or F2-Unit 2) to select the affected St. Lucie Plant Unit.

2. When the program asks, "Is this an exercise [Y/N]?", Then answer appropriately and depress the "ENTER" key.

3. When the Main Menu is displayed, Then select the F1 Function Key to start calculations.

4. When prompted by the program, "Warning - Start calculations will destroy previous dose values. OK [Y/N]?", Then depress "Y" and the "ENTER" key to reinitialize the data files.

NOTE
1. Thirty minute advection steps are normally used except for fuel handling accidents, for which fifteen minutes advection time steps should be used.

2. Once advection time is selected it should not be changed while running the program to prevent generating errors.

5. Select, from the General Accident Information Worksheet, the appropriate screen functions to edit the type of accident, reactor trip time, release start time, and advection step. Use the format shown on the screen by depressing the corresponding Function Keys, F1, F2, F3 or F4 respectively, Then depress "ENTER" after each new entry.

ATTACHMENT 6
CLASS A MODEL DOSE CALCULATION
(Page 4 of 7)

6. When the correct type of accident, reactor trip time, release start time, and the advection time step have been entered, Then depress the F5 Function Key to accept the inputs.

7. When the Input Menu is displayed, Then depress the F1 Function Key to bring up the Meteorological Data menu.

8. When the Meteorological Data Summary Menu is displayed, Select the data sheet corresponding to the source of the data (i.e., Site Tower (ERDADS, chart recorder), Airport (NOAA, NWS), Default).

9. Enter the meteorological data gathered in the format shown using the displayed Function Keys, Then depress the "ENTER" key after each new entry.

10. When all necessary meteorological data has been entered, Then depress the F5 Function Key to accept the data and go to the Meteorological data Summary Menu.

11. Review the entered meteorological data, Depress the F5 Function Key to accept the data and Then return to the Input Menu.

12. When the Input Menu is displayed, Then depress the F2 Function Key to bring up the Source Term Data menu.

13. If the accident type is a LOCA or SGTR, Respond appropriately to the question about the Core Damage Situation.

14. If the accident type is a LOCA, Respond appropriately to the question about the Iodine Removal System Status.

15. When the Source Term Summary Menu is displayed, Select the data sheet corresponding to the source of the data (i.e., Grab Sampling, Effluent Monitors, CHRRM, Post LOCA Monitors, Default).

16. Enter the source term data gathered in the format shown using the displayed Function Keys, Then depress the "ENTER" key after each new entry.

ATTACHMENT 6
CLASS A MODEL DOSE CALCULATION
(Page 5 of 7)

17. When the input of source term information has been completed, Then depress the appropriate Function Key to accept the data and return to the Input Menu.

18. If a final check of data accuracy is needed, Then depress the F3 Function Key to review a summary of the meteorological and source term data, Depress the F1 Function Key to print or the F2 Function Key to exit.

19. If the meteorological or source term data need to be revised, Go to step 7 or step 12 above, respectively.

20. Depress the F4 Function Key at the screen prompt, "Proceed with calculations [Y/N]?", and answer "Y", Depress the "ENTER" key to begin calculations.

NOTE
"CRT Displays" may be used instead of "Print Reports".

21. When the Output Menu is displayed, Then depress the F3 Function Key to select "Print Reports".

22. When the Printed Report Menu is displayed, Then depress the displayed Function Keys to select the desired reports.

CAUTION
Ensure that the printer and print buffer are on line and ready for use prior to proceeding with the printing task. If either device is not ready for use, the computer will exit the dose calculation program.

23. Depress any key to begin printing.

24. When the Output Menu is displayed, Then depress the F6 Function Key to select the Run Mode Menu.

25. When the Run Mode Menu is displayed, Then depress the F1 Function Key to select the Actual Calculation Mode and perform the next advection step (cumulative dose calculation) or depress the F2 Function Key to select the Forecast Calculation Mode.

ATTACHMENT 6
CLASS A MODEL DOSE CALCULATION
(Page 6 of 7)

NOTE

1. Forecast periods are typically two (2) hours.
2. Forecast doses assume release rates and meteorological conditions remain constant during the forecasting period chosen.
3. Consider the reasonableness of assuming constant meteorological conditions and release rates for forecasting periods exceeding two (2) hours.

26. Edit the forecast period as desired using the displayed instructions.

27. When the forecast period has been accepted, the Input Menu: Forecast Calculation Mode will be displayed, Then depress the displayed Function Keys to review and/or edit the inputs as necessary.

28. When all inputs are acceptable, Then depress the F4 Function Key to perform calculations, at the screen prompt, "Proceed with calculations [Y/N]?", and answer "Y", and Depress the "ENTER" key to begin calculations.

NOTE
"CRT Displays may be used instead of "Print Reports".

29. When the Output Menu - Forecast Calculations mode is displayed, Then depress the F3 Function Key to select "Print Reports".

30. When the Printed Report Menu is displayed, Then depress the displayed Function Keys to select the desired reports.

ATTACHMENT 6
CLASS A MODEL DOSE CALCULATION
(Page 7 of 7)

CAUTION
The printer and print buffer must be on line and ready!

NOTE
1. The Emergency Coordinator should be provided with a printout of actual calculated doses, Protective Action Recommendations (PARs), and as requested, forecasted doses.

2. The Emergency Coordinator should be updated every thirty minutes during periods of actual or potential off-site release.

31. When the reports have been printed, Then return to the Run Mode Menu to update information and repeat the dose calculation process as needed due to release rate or meteorological changes.

32. Depress the F1 Function Key for the Actual Calculation Mode or the F2 Function Key for the Forecast Calculation Mode or the F3 Function Key to return to the Main Menu and quit.

33. Review the Summary of Met and Source Data displays for all subsequent calculations even if the inputs do not change so that they can be reviewed and accepted. Also ensure that the Noble Gas Reduction Factor is reset to its proper value.

END OF ATTACHMENT 6

ATTACHMENT 7
METEOROLOGICAL DATA
(Page 1 of 10)

1. Obtain Meteorological Data

   A. Complete applicable pages from this attachment. Three methods are presented in preferential order. To supplement / complete any missing data in the chosen method, use one or both of the other methods. The methods are to be used in the order presented.

> **NOTE**
> ERDADS and the Unit 1 Control Room and Site Met. Tower chart recorders provide 15 minute average data.

   1. Method 1 - Site Met Tower

   Provides data from the primary and alternate locations on the Site Meteorological Tower. Use Method 1.

   2. Method 2 - NOAA / NWS

   Provides meteorological observations taken at the National Oceanic Atmospheric Administration / National Weather Service in Melbourne, Fl. Use Method 2.

   3. Method 3 - Default Values

   Daytime and nighttime default values are listed in Method 3.

   B. Select Dose Calculation Worksheet

   1. The Worksheet to be used for Dose Calculations is determined as part of completing one of the Meteorological Data Methods.

   2. The Worksheet will be used to determine doses after a Release Rate Data Sheet is completed.

ATTACHMENT 7
METEOROLOGICAL DATA METHOD 1 - SITE TOWER
(Page 2 of 10) (Page 1 of 3)

1. Gather Meteorological Data:

   A. Date & Time of meteorological observations _____/_____

> **CAUTION**
> Wind speed, wind direction and Delta temperature values should vary with time, i.e., chart recorders in the Unit 1 Control Room and A1A Site Tower Shack should NOT be straight-lining. Unchanging data should be investigated. If initial efforts to correct straight-lining fail, alternate sources of data may be used.

   B. Enter 10 Meter (alternate 57.9 Meter) **WIND SPEED**: _____**mph**

   C. Enter 10 Meter (alternate 57.9 Meter) **WIND DIRECTION (from)** ____**deg.**

   D. Enter Delta-T (displayed by ERDADS)_____deg. F

   E. ¶5 If Delta T is not available from ERDADS, Then:

      1. Enter the difference: 57.9 meter temperature minus 10 meter temperature: _____

      2. Multiply that difference by 1.044: _____

   F. If performing Class A Model dose calculation, Then use the above noted information during meteorological data entry.

   G. If performing manual dose calculations, Then proceed to Step 2 of this attachment.

ATTACHMENT 7
METEOROLOGICAL DATA METHOD 1 - SITE TOWER
(Page 3 of 10) (Page 2 of 3)

2. Determine **STABILITY CLASS**

A. Using Delta-T (ΔT) and the guide below, determine and enter the Stability Class _____.

If DELTA-T is	Then Stability Class is
less than or equal to -1.7	A
-1.6 to -1.5	B
-1.4	C
-1.3 to -0.5	D
-0.4 to +1.4	E
+1.5 to +3.6	F
greater than +3.6	G

3. Determine **AFFECTED SECTORS**

A. Using the guide below, select and circle the **AFFECTED SECTORS.**

CAUTION
Wind direction indicated as greater than 359° should be corrected by subtracting 360° from the indicated direction.

NOTE
- If the wind direction is directly on the edge of two sectors (e.g., 11°, 33°, 56°, etc.), an additional sector should be added to the Affected Sectors. For example, if the wind direction is from 78°, then the affected sectors should be L, M, N and P.
- To avoid confusion, there is no sector "O" or "I".

Wind From	Affected Sectors	Wind From	Affected Sectors	Wind From	Affected Sectors
348 - 11	HJK	123 - 146	PQR	236 - 258	CDE
11 - 33	JKL	146 - 168	QRA	258 - 281	DEF
33 - 56	KLM	168 - 191	RAB	281 - 303	EFG
56 - 78	LMN	191 - 213	ABC	303 - 326	FGH
78 - 101	MNP	213 - 236	BCD	326 - 348	GHJ
101 - 123	NPQ				

ATTACHMENT 7
METEOROLOGICAL DATA METHOD 1 - SITE TOWER
(Page 4 of 10) (Page 3 of 3)

4. Check for **SEA BREEZE EFFECT**:

Only if All of the following conditions are met, then the Sea Breeze effect is YES

If one or more conditions are NOT met, then the Sea Breeze effect is NO

- Stability Class A, B or C
- Time of day 6 AM to 7PM
- Wind Direction (from) is between 0 through EAST to 180 degrees
- 10 meter air temperature greater than HISTORICAL AVERAGE SURFACE WATER, listed below:

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
69	65	69	73	76	79	80	81	81	79	74	71

Sea Breeze Impact (Yes or No) _____

5. Select a **DOSE CALCULATION WORKSHEET**

A. Using the guide below, select a worksheet from Attachment 9.

Stab. Class	Seabreeze Impact	Dose Calc Worksheet	Stab. Class	Seabreeze Impact	Dose Calc Worksheet	Stab. Class	Dose Calc Worksheet
A	YES	1				D	7
A	NO	2	C	YES	5	E	8
B	YES	3	C	NO	6	F	9
B	NO	4				G	10

6. Copy information to the selected DOSE CALCULATION WORKSHEET:

A. **WIND DIRECTION** and the **AFFECTED SECTORS** to line A

B. **WIND SPEED** to line 2

7. This data sheet is completed, proceed to release rate determination.

END OF METHOD 1

ATTACHMENT 7
METEOROLOGICAL DATA (Page 5 of 10) **METHOD 2 - NOAA / NWS** (Page 1 of 5)

1. Gather **METEOROLOGICAL DATA**:

   A. Call NOAA / National Weather Service (NWS) Melbourne Office. The phone number is located in the St. Lucie Plant Emergency Response Directory, Section 4.0, Off-site Support. When the NOAA / NWS person answers, identify yourself as a FPL - St. Lucie Plant and obtain the following information:

   1. Date / Time of observation: _____/_____

   Eastern Standard Time

   (circle one)

   Daylight Savings Time

   2. **WIND DIRECTION** (From): _____**Degrees**

> **NOTE**
> Request NOAA / NWS to provide wind speed in miles/hour.

   3. **WIND SPEED**: _____**mph**

   4. Sunrise: _____ **am** Sunset:_____ **pm**

   5. Sky Condition (circle one): Clear Scattered Overcast Broken

   a. If sky condition is overcast or broken, Then enter Ceiling Height _____ **ft.**

   6. Estimated air temperature for Ft. Pierce area _____**°F**

   7. If time permits, ask for a weather forecast for the area:

   _____

   _____

   _____

ATTACHMENT 7
METEOROLOGICAL DATA **METHOD 2 - NOAA / NWS**
(Page 6 of 10) (Page 2 of 5)

2. Determine **STABILITY CLASS**

A. Determine the Solar Radiation Characteristic

1. If Daytime (1 hour after sunrise to 1 hour before sunset), Then:

a. Determine Solar Altitude from Figure 1 (at the end of this method sheet), using time and date.

b. Circle the Solar Radiation Characteristic on the table below, using Sky Condition, Ceiling Height and Solar Altitude.

Day Sky Condition	Ceiling, Feet	Solar Altitude			
		< 15 deg	15 to < 35 deg	35 to 60 deg	> 60 deg
Overcast	< 7000	Nil	Nil	Nil	Nil
	7K to 16K	Weak	Weak	Weak	Slight
	> 16000	Weak	Weak	Slight	Moderate
Broken	< 7000	Weak	Weak	Weak	Slight
	7K to 16K	Weak	Weak	Slight	Moderate
	> 16000	Weak	Slight	Moderate	Strong
Clear Scattered	not applicable	Weak	Slight	Moderate	Strong

2. If NOT Daytime, Then:

a. Circle the Solar Radiation Characteristic on the table below, using Night Sky Condition and Ceiling Height.

Night Sky Condition	Ceiling, Ft.	Solar Radiation Characteristic
Overcast	less than 7000	Nil
	7000 or higher	Weak Loss
Broken	not applicable	Weak Loss
Clear or scattered	not applicable	Strong Loss

ATTACHMENT 7
METEOROLOGICAL DATA **METHOD 2 - NOAA / NWS**
(Page 7 of 10) (Page 3 of 5)

2. (continued)

B. Select Stability Class

1. Using the Wind Speed in MPH and the Solar Radiation Characteristic, find in the table below and circle the Stability Class.

Solar Radiation	Wind Speed in MPH								
	0 to 1.2	>1.2 to 3.5	>3.5 - 5.8	>5.8 - 6.9	>6.9 - 8	>8 - 10.4	>10.4 - 11.5	>11.5 - 12.7	>12.7
Strong	A	A	A	B	B	B	C	C	C
Moderate	A	B	B	B	B	C	C	C	D
Slight	B	B	C	C	C	C	C	D	D
Weak	C	C	C	D	D	D	D	D	D
Nil	D	D	D	D	D	D	D	D	D
Weak Loss	F	F	E	E	D	D	D	D	D
Strong Loss	G	G	F	F	E	E	E	D	D

3. Determine **AFFECTED SECTORS**

A. Using the guide below, select and circle the Affected Sectors.

NOTE

- If the wind direction is directly on the edge of two sectors (e.g. 11°, 33°, 56°, etc.), an additional sector should be added to the Affected Sectors. For example, if the wind direction is from 78°, then the affected sectors should be L, M, N and P.
- To avoid confusion, there is no sector "O" or "I".

Wind From	Affected Sectors	Wind From	Affected Sectors	Wind From	Affected Sectors
348 - 11	HJK	123 - 146	PQR	236 - 258	CDE
11 - 33	JKL	146 - 168	QRA	258 - 281	DEF
33 - 56	KLM	168 - 191	RAB	281 - 303	EFG
56 - 78	LMN	191 - 213	ABC	303 - 326	FGH
78 - 101	MNP	213 - 236	BCD	326 - 348	GHJ
101 - 123	NPQ				

ATTACHMENT 7
METEOROLOGICAL DATA (Page 8 of 10) **METHOD 2 - NOAA / NWS** (Page 4 of 5)

4. Check for **SEA BREEZE EFFECT**:

Only if ALL of the following conditions are met, then the Sea Breeze effect is YES.

If one or more conditions are NOT met, then the Sea Breeze effect is NO.

- Stability Class A, B or C
- Time of day 6 AM to 7 PM
- Wind Direction (from) is between 0 through East to 180 degrees

Sea Breeze Impact (Yes or No) _____

5. Select a DOSE CALCULATION WORKSHEET

A. Using the guide below, select a worksheet from Attachment 9.

Stab. Class	Seabreeze Impact	Dose Calc Worksheet	Stab. Class	Seabreeze Impact	Dose Calc Worksheet	Stab. Class	Dose Calc Worksheet
A	YES	1				D	7
A	NO	2	C	YES	5	E	8
B	YES	3	C	NO	6	F	9
B	NO	4				G	10

6. Copy information to the selected DOSE CALCULATION WORKSHEET:

A. From line 1A2, copy the **WIND DIRECTION** to line A of Dose Calculation Worksheet.

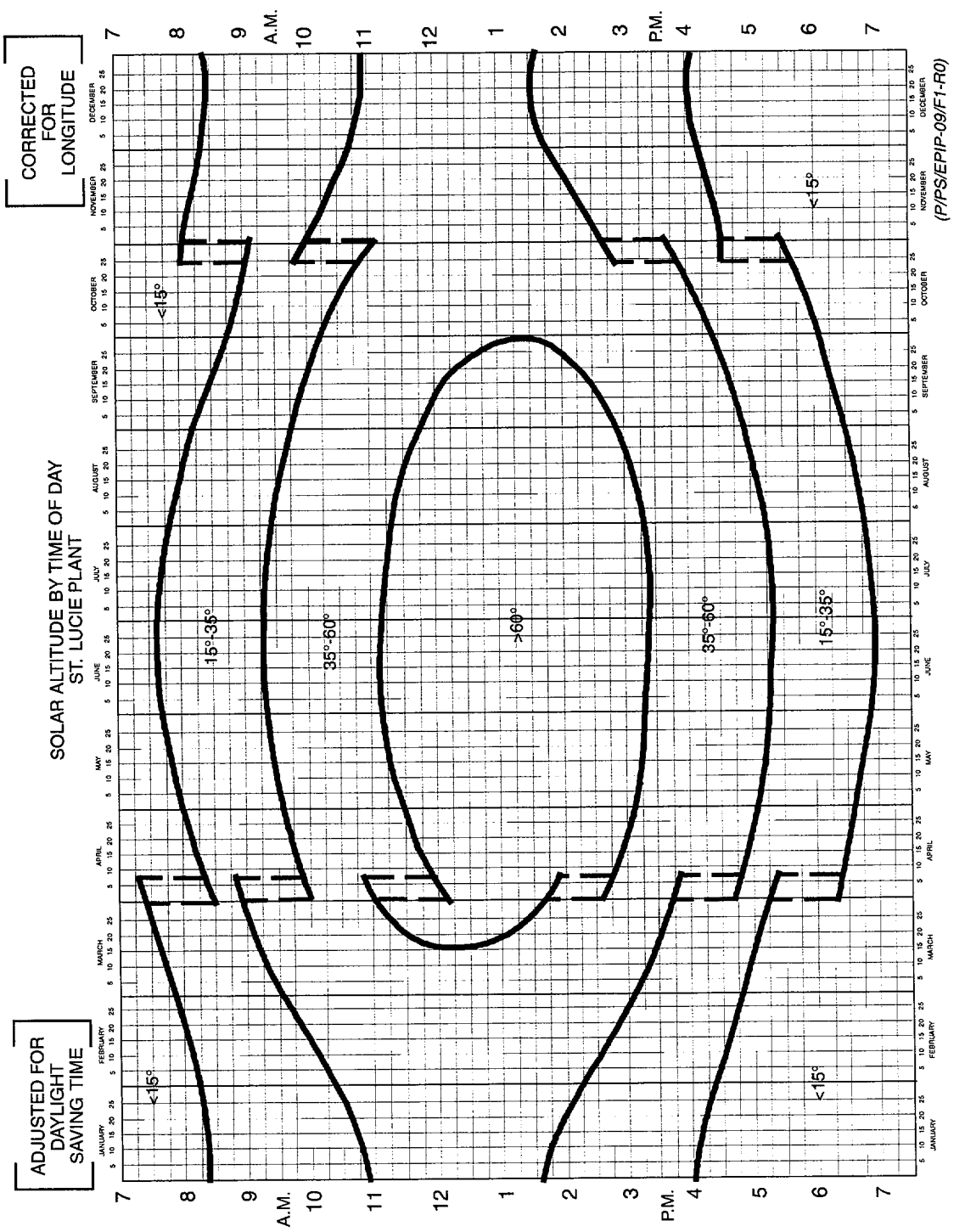
B. From line 1A3, copy **WIND SPEED** in mph to line 2 of Dose Calculation Worksheet.

C. From line 3A, copy the **AFFECTED SECTORS** to line A of Dose Calculation Worksheet.

7. This data sheet is completed, proceed to release rate determination.

ATTACHMENT 7
METEOROLOGICAL DATA (Page 9 of 10) **METHOD 2 - NOAA / NWS** (Page 5 of 5)

FIGURE 1. SOLAR ALTITUDE



END OF METHOD 2

ATTACHMENT 7
METEOROLOGICAL DATA (Page 10 of 10) **METHOD 3 - DEFAULT** (Page 1 of 1)

NOTE
This method is to be used only if Site Met Tower and NOAA/NWS data are not available.

1. If Daytime Hours (1 hour after sunrise to 1 hour before sunset), Then:

   A. Select DOSE CALCULATION WORKSHEET 7.

   B. Enter **AFFECTED SECTORS** = ALL in line A.

   C. Circle Default in line B.

   D. Enter **WIND SPEED** = 5 mph in line 2.

2. If Not Daytime, Then:

   A. Select DOSE CALCULATION WORKSHEET 9.

   B. Enter **AFFECTED SECTORS** = ALL in line A.

   C. Circle Default in line B.

   D. Enter **WIND SPEED** = 3 mph in line 2.

This data sheet is completed, proceed to release rate determination.

END OF METHOD 3

END OF ATTACHMENT 7

ATTACHMENT 8
RELEASE RATE DATA
(Page 1 of 23)

NOTE
If both units are in a declared emergency and both units have or had a release, the site release rate is the sum of both units' release rates.

1. Determine Site Release Rate

   A. Complete applicable Data Sheet from this attachment, as appropriate for each affected unit and accident type. The five techniques are listed below in preferential order. Use the next techniques, in order, to supplement any missing data. Indicate the technique(s) used on the selected WORKSHEET from Attachment 9.

NOTE
Grab sampling is the primary method. It is unlikely that results will be available in the early phases of an emergency. Dose assessment should not be delayed waiting for these results. Therefore, the Effluent Monitor method may be used initially. Dose assessment using grab sample data should be performed as soon as that data is available.

1. CHEMISTRY GRAB SAMPLING - Primary Method for all accident types

For Unit 1, use Data Sheet 1A.

For Unit 2, use Data Sheet 2A.

2. EFFLUENT MONITORS - Alternate for all accident types, when Method 1 is unavailable.

For Unit 1, use Data Sheet 1B.

For Unit 2, use Data Sheet 2B.

3. CONTAINMENT HIGH RANGE RADIATION MONITOR - Alternate for LOCA only, when techniques 1 and 2 are unavailable.

Evaluate CHRRM readings by using Data Sheet 3.

ATTACHMENT 8
RELEASE RATE DATA
(Page 2 of 23)

1. **A.** (continued)

   4. POST LOCA MONITORS - Alternate for LOCA only, when techniques 1, 2 and 3 are unavailable.

   Evaluate Post LOCA Monitor readings by using Data Sheet 4.

   5. DEFAULT - Alternate for all accidents, only if no other technique is available.

   For Default calculations for all accidents, use Data Sheet 5.

ATTACHMENT 8
RELEASE RATE DATA
(Page 3 of 23)

DATA SHEET 1A
UNIT 1 GRAB SAMPLE
(Page 1 of 4)

1. Gather **ACCIDENT DATA**:

   A. Date and time of data: _____/_____

   B. Ask Emergency Coordinator:

   1. Accident Type_____

   2. Is core overheating or melting (circle): **YES** **NO**

   a. If YES, PF = **4.4**; If NO, PF = **1.0**

   b. Enter **PF** = _____

   3. Potential **DURATION** of release (if unknown, use 2):_____ hours

2. Evaluate applicable **RELEASE PATHWAY(S)**:

   A. Based on Accident Type, select release pathway in the following table.

   B. Check the ON fans.

   C. Add up the flows in the spaces provided.

UNIT 1-PLANT VENT

Fan		√on	¶4 SCFM
1-HVE-6A	Shield Bldg	____	6600
1-HVE-6B		____	6600
1-HVE-7A	H_2 Purge	____	950
1-HVE-7B		____	950
1-HVE-8A	RCB Exhaust	____	52500
1-HVE-8B		____	52500
1-HVE-10A	RAB Exhaust	____	92563
1-HVE-10B		____	92563

(Add) Plant Vent Total = _____

UNIT 1-FUEL BUILDING

Fan		√on	¶4 SCFM
1-HVE-15	New Fuel	____	10563
1-HVE-16A	Fuel Pool	____	11385
1-HVE-16B		____	11385
1-HVE-17	H&V Room	____	6250

(Add) Fuel Bldg. Total = _____

ECCS AREA

Fan	¶4 SCFM
1-HVE-9A	33000
1-HVE-9B	33000

   D. Enter total pathway SCFM in the table below (Step 4) in the column labeled "SCFM".

ATTACHMENT 8
RELEASE RATE DATA
(Page 4 of 23)

DATA SHEET 1A
UNIT 1 GRAB SAMPLE
(Page 2 of 4)

NOTE
Chemistry Grab Sample results can be obtained from the TSC Chemistry Supervisor or TSC Dose Assessor.

3. Enter **GRAB SAMPLE DATA**:

   A. Enter grab sample assay results for Gross Noble Gas µCi/cc concentration in the table below (Step 4) in the column labeled "µCi/cc".

   B. Enter grab sample assay results for DEQ Iodine-131 µCi/cc concentration in the table below (Step 4) in the column labeled "µCi/cc".

      1. If DEQ Iodine-131 µCi/cc concentration is unavailable, perform Step 4 for Noble Gas concentration only.

4. Determine **UNIT 1 RELEASE RATE**:

   A. Complete the table below:
   (µCi/cc x SCFM x factor = Ci/sec)

Pathway	TYPE	µCi/cc	¶4 SCFM	factor	Noble Gas, Ci/sec	Iodine, Ci/sec
Plant Vent	Noble Gas			4.72 E -04		
	Iodine					
Fuel Bldg.	Noble Gas			4.72 E -04		
	Iodine					
ECCS - A	Noble Gas		33,000	4.72 E -04		
	Iodine					
ECCS - B	Noble Gas		33,000	4.72 E -04		
	Iodine					

ATTACHMENT 8
RELEASE RATE DATA
(Page 5 of 23)

DATA SHEET 1A
UNIT 1 GRAB SAMPLE
(Page 3 of 4)

4. (continued)

B. If DEQ Iodine-131 grab sample results are not available, Then estimate the Iodine Release Rate by:

1. Select Iodine Factor based on current Accident Type and Release Pathway.

PATHWAY	LOCA	SGTR	MSLB	WASTE GAS DTR	FUEL HANDLING	CASK DROP
Plant Vent	**0.01**	**1. E-06**	**1.0**	**4. E-05**	**0**	**0**
ECCS	**0.01**	0	0	0	0	0
Fuel Bldg.	0	0	0	0	**0.04**	**1.3**
Steamline	0	**1. E-03**	0	0	0	0

2. Enter Gross Noble Gas Ci/sec and Iodine Factor in the following equation and perform the calculation.

$$\underset{\text{Gross Noble Gas Ci/sec}}{\_\_\_\_\_} \times \underset{\text{Iodine Factor}}{\_\_\_\_\_} = \underset{\text{DEQ Iodine 131 Ci/sec}}{\_\_\_\_\_}$$

3. Enter DEQ Iodine 131 Ci/sec in the appropriate column in the table in Step 5.

5. Determine the **SITE RELEASE RATE**:

A. Complete the table below:

	Noble Gas, Ci/sec	**Iodine, Ci/sec**
Total the Unit 1 release rates determined above		
IF Unit 2 is AFFECTED, enter its release rates		
Add A and B to obtain the SITE RELEASE RATES		

ATTACHMENT 8
RELEASE RATE DATA
(Page 6 of 23)

DATA SHEET 1A
UNIT 1 GRAB SAMPLE
(Page 4 of 4)

6. Enter the SITE RELEASE RATES in the selected DOSE CALCULATION WORKSHEET:

A. On line C, circle Grab Sample.

B. Enter the **NOBLE GAS RELEASE RATE** into line 8.

C. Enter the **IODINE RELEASE RATE** into line 1.

D. Enter the **DURATION** (if 2 affected units, use longest) into line 6.

E. Enter the **PF** (Particulate Factor) (if 2 affected units, use largest) into line 11.

7. This data sheet is completed, follow the instructions on the DOSE CALCULATION WORKSHEET.

END OF DATA SHEET 1A

ATTACHMENT 8
RELEASE RATE DATA
(Page 7 of 23)

DATA SHEET 2A
UNIT 2 GRAB SAMPLING
(Page 1 of 4)

1. Gather **ACCIDENT DATA**:

A. Date and time of data: _____/_____

B. Ask Emergency Coordinator:

1. Accident Type_____

2. Is core overheating or melting (circle): **YES** **NO**

a. If YES, PF = **4.4**; If NO, PF = **1.0**

b. Enter **PF** = _____

3. Potential **DURATION** of release (if unknown, use 2):_____ hours

2. Evaluate applicable **RELEASE PATHWAY(S)**:

A. Based on Accident Type, select release pathway in the following table.

B. Check the ON fans.

C. Add up the flows in the spaces provided.

UNIT 2-PLANT VENT

Fan		√on	¶4 SCFM
2-HVE-6A	Shield Bldg	____	6600
2-HVE-6B		____	6600
2-HVE-7A	H_2 Purge	____	2500
2-HVE-7B		____	2500
2-HVE-8A	RCB Exhaust	____	52500
2-HVE-8B		____	52500
2-HVE-10A	RAB Exhaust	____	105625
2-HVE-10B		____	105625

(Add) Plant Vent Total = _____

UNIT 2-FUEL BUILDING

If NOT Diverted to Plant Vent, Use Stated Flow

Fan		√on	¶4 SCFM
2-HVE-15	New Fuel	____	12125
2-HVE-16A	Fuel Pool	____	12500
2-HVE-16B	Fuel Pool	____	12500
2-HVE-17	Bldg H&V	____	7500

(Add) Fuel Bldg. Total = _____

ECCS AREA

Fan	¶4 SCFM
2-HVE-9A	33000
2-HVE-9B	33000

D. Enter total pathway SCFM in the table below (Step 4) in the column labeled "SCFM".

ATTACHMENT 8
RELEASE RATE DATA
(Page 8 of 23)

DATA SHEET 2A
UNIT 2 GRAB SAMPLING
(Page 2 of 4)

NOTE
Chemistry Grab Sample results can be obtained from the TSC Chemistry Supervisor or TSC Dose Assessor.

3. Enter **GRAB SAMPLE DATA**:

   A. Enter grab sample assay results for Gross Noble Gas µCi/cc concentration in the table below (Step 4) in the column labeled "µCi/cc".

   B. Enter grab sample assay results for DEQ Iodine-131 µCi/cc concentration in the table below (Step 4) in the column labeled "µCi/cc".

      1. If DEQ Iodine-131 µCi/cc concentration is unavailable, perform Step 4 for Noble Gas concentration only.

4. Determine **UNIT 2 RELEASE RATE**:

   A. Complete the table below:
   (µCi/cc x SCFM x factor = Ci/sec)

Pathway	TYPE	µCi/cc	¶4 SCFM	factor	Noble Gas, Ci/sec	Iodine, Ci/sec
Plant Vent	Noble Gas			4.72 E -04		
	Iodine					
Fuel Bldg.	Noble Gas			4.72 E -04		
	Iodine					
ECCS - A	Noble Gas		33,000	4.72 E -04		
	Iodine					
ECCS - B	Noble Gas		33,000	4.72 E -04		
	Iodine					

ATTACHMENT 8
RELEASE RATE DATA
(Page 9 of 23)

DATA SHEET 2A
UNIT 2 GRAB SAMPLING
(Page 3 of 4)

4. (continued)

B. If DEQ Iodine-131 grab sample results are not available, Then estimate the Iodine Release Rate by:

1. Select Iodine Factor based on current Accident Type and Release Pathway.

PATHWAY	LOCA	SGTR	MSLB	WASTE GAS DTR	FUEL HANDLING	CASK DROP
Plant Vent	**0.01**	**1. E-06**	**1.0**	**4. E-05**	**0.04**	**1.3**
ECCS	**0.01**	0	0	0	0	0
Fuel Bldg.	0	0	0	0	**0.04**	**1.3**
Steamline	0	**1. E-03**	0	0	0	0

2. Enter Gross Noble Gas Ci/sec and Iodine Factor in the following equation and perform the calculation.

$$\frac{\text{Gross Noble Gas Ci/sec}}{\text{Gross Noble Gas Ci/sec}} \times \frac{\text{Iodine Factor}}{\text{Iodine Factor}} = \frac{\text{DEQ Iodine 131 Ci/sec}}{\text{DEQ Iodine 131 Ci/sec}}$$

3. Enter DEQ Iodine 131 Ci/sec in the appropriate column in the table in Step 5.

5. Determine the **SITE RELEASE RATE**:

A. Complete the table below:

	Noble Gas, Ci/sec	**Iodine, Ci/sec**
Total the Unit 2 release rates determined above		
IF Unit 1 is AFFECTED, enter its release rates		
Add A and B to obtain the SITE RELEASE RATES		

ATTACHMENT 8
RELEASE RATE DATA
(Page 10 of 23)

DATA SHEET 2A
UNIT 2 GRAB SAMPLING
(Page 4 of 4)

6. Enter the SITE RELEASE RATES in the selected DOSE CALCULATION WORKSHEET:

A. On line C, circle Grab Sample.

B. Enter the **NOBLE GAS RELEASE RATE** into line 8.

C. Enter the **IODINE RELEASE RATE** into line 1.

D. Enter the **DURATION** (if 2 affected units, use longest) into line 6.

E. Enter the **PF** (Particulate Factor) (if 2 affected units, use largest) into line 11.

7. This data sheet is completed, follow the instructions on the DOSE CALCULATION WORKSHEET.

END OF DATA SHEET 2A

ATTACHMENT 8 **DATA SHEET 1B**
RELEASE RATE DATA **UNIT 1 EFFLUENT MONITOR**
(Page 11 of 23) (Page 1 of 3)

1. Gather **ACCIDENT DATA**:

A. Date and time of data: _____/_____

B. Ask Emergency Coordinator:

1. Accident Type_____

2. Is core overheating or melting (circle): **YES** **NO**

a. If YES, PF = **4.4**; If NO, PF = **1.0**

b. Enter **PF** = _____

3. Potential **DURATION** of release (if unknown, use 2):_____ hours

2. Evaluate applicable **RELEASE PATHWAY(S)**:

A. Based on Accident Type, select release pathway in the following table.

B. Check the ON fans.

C. Add up the flows in the spaces provided.

UNIT 1-PLANT VENT

Fan		√on	¶4 SCFM
1-HVE-6A	Shield Bldg	___	6600
1-HVE-6B		___	6600
1-HVE-7A	H_2 Purge	___	950
1-HVE-7B		___	950
1-HVE-8A	RCB Exhaust	___	52500
1-HVE-8B		___	52500
1-HVE-10A	RAB Exhaust	___	92563
1-HVE-10B		___	92563

(Add) Plant Vent Total = _____

UNIT 1-FUEL BUILDING

Fan		√on	¶4 SCFM
1HVE-15	New Fuel	___	10563
1-HVE-16A	Fuel Pool	___	11385
1-HVE-16B		___	11385
1-HVE-17	H&V Room	___	6250

(Add) Fuel Bldg. Total = _____

ECCS AREA

Fan	¶4 SCFM
1-HVE-9A	33000
1-HVE-9B	33000

D. Enter total pathway SCFM in the table below (Step 5) in the column labeled "SCFM".

ATTACHMENT 8 **DATA SHEET 1B**
RELEASE RATE DATA **UNIT 1 EFFLUENT MONITOR**
(Page 12 of 23) (Page 2 of 3)

3. Enter **EFFLUENT MONITOR DATA**:

> **NOTE**
> Attachment 4 provides additional information on effluent monitor selection based on accident type and release pathway.

A. Based on Release Pathway, select applicable Effluent Monitor.

B. Enter monitor data in the table below (Step 5) in the column labeled "DATA".

4. Input **IODINE FACTOR**:

A. Select Iodine Factor based on current Accident Type and Release Pathway.

PATHWAY	LOCA	SGTR	MSLB	WASTE GAS DTR	FUEL HANDLING	CASK DROP
Plant Vent	**0.01**	**1. E-06**	**1.0**	**4. E-05**	0	0
ECCS	**0.01**	0	0	0	0	0
Fuel Bldg.	0	0	0	0	**0.04**	**1.3**
Steamline	0	**1. E-03**	0	0	0	0

B. Enter in the table below (Step 5) in the column labeled "IF".

5. Determine **Unit 1 RELEASE RATE**:

A. Complete the table below:
(DATA x SCFM x factor = N.G. Ci/sec x Iodine Factor = Iodine Ci/sec)

Pathway	DATA	¶4 SCFM	factor	Noble Gas, Ci/sec	IF	Iodine Ci/sec
Plant Vent	uCi/cc		4.72 E-04			
ECCS-A	uCi/cc	33,000	4.72 E-04			
ECCS-B	uCi/cc	33,000	4.72 E-04			
Fuel Bldg.	uCi/cc		4.72 E-04			
Steamline A	mr/hr	1.0	1.24 E-02			
Steamline B	mr/hr	1.0	1.24 E-02			

ATTACHMENT 8 **DATA SHEET 1B**
RELEASE RATE DATA **UNIT 1 EFFLUENT MONITOR**
(Page 13 of 23) (Page 3 of 3)

6. Determine the Site Release Rate.

A. Complete the table below:

	Noble Gas, Ci/sec		Iodine, Ci/sec
Enter the Unit 1 release rates determined from this worksheet			
IF Unit 2 is AFFECTED, enter its release rates			
Add A and B to obtain the SITE RELEASE RATES			

7. Enter the SITE RELEASE RATES in the selected DOSE CALCULATION WORKSHEET:

A. On line C, circle Effluent Monitor.

B. Enter the **NOBLE GAS RELEASE RATE** into line 8.

C. Enter the **IODINE RELEASE RATE** into line 1.

D. Enter the **DURATION** (if 2 affected units, use longest) into line 6.

E. Enter the **PF** (Particulate Factor) (if 2 affected units, use largest) into line 11.

8. This data sheet is completed, follow the instructions on the DOSE CALCULATION WORKSHEET.

END OF DATA SHEET 1B

ATTACHMENT 8 **DATA SHEET 2B**
RELEASE RATE DATA **UNIT 2 EFFLUENT MONITOR**
(Page 14 of 23) (Page 1 of 3)

1. Gather **ACCIDENT DATA**:

   A. Date and time of data: _____/_____

   B. Ask Emergency Coordinator:

   1. Accident Type_____

   2. Is core overheating or melting (circle): **YES** **NO**

   a. If YES, PF = **4.4**; If NO, PF = **1.0**

   b. Enter **PF** = _____

   3. Potential **DURATION** of release (if unknown, use 2):_____ hours

2. Evaluate applicable **RELEASE PATHWAY(S)**:

   A. Based on Accident Type, select release pathway in the following table.

   B. Check the ON fans.

   C. Add up the flows in the spaces provided.

UNIT 2 - PLANT VENT

Fan		√on	¶4 SCFM
2-HVE-6A	Shield Bldg	___	6600
2-HVE-6B		___	6600
2-HVE-7A	H_2 Purge	___	2500
2-HVE-7B		___	2500
2-HVE-8A	RCB Exhaust	___	52500
2-HVE-8B		___	52500
2-HVE-10A	RAB Exhaust	___	105625
2-HVE-10B		___	105625

(Add) Plant Vent Total = _____

UNIT 2 - FUEL BUILDING
IF NOT DIVERTED

Fan		√on	¶4 SCFM
2HVE-15	New Fuel	___	12125
2-HVE-16A	Fuel Pool	___	12500
2-HVE-16B		___	12500
2-HVE-17	H&V Room	___	7500

(Add) Fuel Bldg. Total =_____

ECCS AREA

Fan	¶4 SCFM
2-HVE-9A	33000
2-HVE-9B	33000

   D. Enter total pathway SCFM in the table below (Step 5) in the column labeled "SCFM".

ATTACHMENT 8 **DATA SHEET 2B**
RELEASE RATE DATA **UNIT 2 EFFLUENT MONITOR**
(Page 15 of 23) (Page 2 of 3)

3. Enter **EFFLUENT MONITOR DATA**:

> **NOTE**
> Attachment 5 provides additional information on effluent monitor selection based on accident type and release pathway.

A. Based on Release Pathway, select applicable Effluent Monitor.

B. Enter monitor data in the table below (Step 5) in the column labeled "DATA".

4. Input **IODINE FACTOR**:

A. Select Iodine Factor based on current Accident Type and Release Pathway.

PATHWAY	LOCA	SGTR	MSLB	WASTE GAS DTR	FUEL HANDLING	CASK DROP
Plant Vent	**0.01**	**1. E-06**	**1.0**	**4. E-05**	**0.04**	**1.3**
ECCS	**0.01**	0	0	0	0	0
Fuel Bldg.	0	0	0	0	**0.04**	**1.3**
Steamline	0	**1. E-03**	0	0	0	0

B. Enter under "IF" Column in Step 5.

5. Determine **RELEASE RATE**:

A. Complete the table below:
(DATA x SCFM x factor = N.G. Ci/sec x Iodine Factor = Iodine Ci/sec)

Pathway	**DATA**	¶4 **SCFM**	**factor**	Noble Gas, Ci/sec	**IF**	Iodine Ci/sec
Plant Vent	uCi/cc		4.72 E-04			
ECCS-A	uCi/cc	33,000	4.72 E-04			
ECCS-B	uCi/cc	33,000	4.72 E-04			
Fuel Bldg.	uCi/cc		4.72 E-04			
Steamline A	mr/hr	1.0	1.24 E-02			
Steamline B	mr/hr	1.0	1.24 E-02			

ATTACHMENT 8 **DATA SHEET 2B**
RELEASE RATE DATA **UNIT 2 EFFLUENT MONITOR**
(Page 16 of 23) (Page 3 of 3)

6. Determine the Site Release Rate

A. Complete the table below:

	Noble Gas, Ci/sec		Iodine, Ci/sec
Enter the Unit 2 release rates determined from this worksheet			
IF Unit 1 is AFFECTED, enter its release rates			
Add A and B to obtain the SITE RELEASE RATES			

7. Enter the SITE RELEASE RATES in the selected DOSE CALCULATION WORKSHEET:

A. On line C, circle Effluent Monitor.

B. Enter the **NOBLE GAS RELEASE RATE** into line 8.

C. Enter the **IODINE RELEASE RATE** into line 1.

D. Enter the **DURATION** (if 2 affected units, use longest) into line 6.

E. Enter the **PF** (Particulate Factor) (if 2 affected units, use largest) into line 11.

8. This data sheet is completed, follow the instructions on the DOSE CALCULATION WORKSHEET.

END OF DATA SHEET 2B

ATTACHMENT 8
RELEASE RATE DATA
(Page 17 of 23)

DATA SHEET 3
UNIT 1 OR 2 CHRRM
(Page 1 of 3)

NOTE
If both units are using this method, then complete one worksheet for each unit.

1. Gather **ACCIDENT DATA**:

   A. Unit # (circle): **1** **2**

   B. Date and time of data: _____/_____

   C. Ask Emergency Coordinator:

      1. Accident Type_____

      2. Is core overheating or melting (circle): **YES** **NO**

         a. If YES, PF = **4.4**; If NO, PF = **1.0**

         b. Enter **PF** = _____

      3. Potential **DURATION** of release (if unknown, use 2):_____ hours

2. Obtain **CHRRM READING** and **HOURS SINCE REACTOR TRIP**:

   A. Highest CHRRM reading: _____ R/hr;

   B. Copy the CHRRM reading in R/hr to Steps 5A and B.

   C. Date and Time of Reactor Trip: _____/_____

   D. Hours Since Reactor Trip: _____ hours;

ATTACHMENT 8
RELEASE RATE DATA
(Page 18 of 23)

DATA SHEET 3
UNIT 1 OR 2 CHRRM
(Page 2 of 3)

3. Determine **CORE FRACTION FACTOR (CF)**:

   A. In the table below, find the CF that corresponds with Hours Since Reactor Trip.

   B. Enter CF value in Steps 5A and B.

Hours Since Reactor Trip	CF	Hours Since Reactor Trip	CF
0	5.00 E - 07	> 2.0 to ≤ 4.0	6.25 E - 06
> 0 to ≤ 0.5	1.00 E - 06	> 4.0 to ≤ 8.0	1.25 E - 05
> 0.5 to ≤ 1.0	1.67 E - 06	> 8.0	2.22 E - 05
> 1.0 to ≤ 2.0	3.33 E - 06		

4. Determine **NOBLE GAS REDUCTION FACTOR (NGRF)**:

   A. Find NGRF in the table below.

   B. Enter it in Step 5A.

Hours Since Rx Trip	NGRF	Hours Since Rx Trip	NGRF	Hours Since Rx Trip	NGRF	Hours Since Rx Trip	NGRF
0	1.0	> 4 to ≤ 5	0.44	> 9 to ≤ 10	0.26	> 14 to ≤ 15	0.16
> 0 to ≤ 1	0.90	> 5 to ≤ 6	0.39	> 10 to ≤ 11	0.23	> 15 to ≤ 16	0.16
> 1 to ≤ 2	0.70	> 6 to ≤ 7	0.35	> 11 to ≤ 12	0.21	> 16 to ≤ 17	0.14
> 2 to ≤ 3	0.60	> 7 to ≤ 8	0.32	> 12 to ≤ 13	0.19	> 17 to ≤ 18	0.14
> 3 to ≤ 4	0.50	> 8 to ≤ 9	0.28	> 13 to ≤ 14	0.18	> 18	0.13

5. Determine **RELEASE RATES**:

   A. Calculate the Noble Gas Release Rate:

_____R/hr **x** _____ (CF) **x** _____ (NGRF) **x 40** = _____ Noble Gas Ci/sec

   B. Calculate Iodine Release Rate:

   1. If the Iodine Removal System IS in use, Then Iodine Conversion Value (ICV) = **0.6**, If NOT in use, Then ICV = **1.6**.

_____R/hr **x** _____ (CF) **x** _____ (ICV) = _____ Iodine Ci/sec

ATTACHMENT 8
RELEASE RATE DATA
(Page 19 of 23)

DATA SHEET 3
UNIT 1 OR 2 CHRRM
(Page 3 of 3)

6. Determine the **SITE RELEASE RATE**:

A. Complete the table below.

	Noble Gas	Iodine
Enter the release rates determined from this worksheet		
IF the other Unit is AFFECTED, enter its release rates		
Add A and B to obtain the SITE RELEASE RATES		

7. Enter the SITE RELEASE RATES in the selected DOSE CALCULATION WORKSHEET:

A. On line C, circle CHRRM.

B. Enter the **NOBLE GAS RELEASE RATE** into line 8.

C. Enter the **IODINE RELEASE RATE** into line 1.

D. Enter the **DURATION** (if 2 affected units, use longest) into line 6.

E. Enter the **PF** (Particulate Factor) (if 2 affected units, use largest) into line 11.

8. This data sheet is completed, follow the instructions on the DOSE CALCULATION WORKSHEET.

END OF DATA SHEET 3

ATTACHMENT 8
RELEASE RATE DATA
(Page 20 of 23)

DATA SHEET 4
UNIT 1 OR 2 POST LOCA
(Page 1 of 2)

NOTE
If both units are using this method, then complete one worksheet for each unit.

1. Gather **ACCIDENT DATA**:

   A. Unit # (circle): **1** **2**

   B. Date and time of data: _____/_____

   C. Ask Emergency Coordinator:

      1. Accident Type_____

      2. Is core overheating or melting (circle): **YES** **NO**

         a. If YES, PF = **4.4**; If NO, PF = **1.0**

         b. Enter **PF** = _____

      3. Potential **DURATION** of release (if unknown, use 2):_____ hours

2. Obtain **POST LOCA READING**:

   A. From Unit #_____, record the Highest POST LOCA reading _____ mR/hr

3. Determine **Unit RELEASE RATE**:

   A. Based on the 2A, find the release rates in the table below.

   B. Enter them in Step 4.

Post Loca Monitor Reading (mR/hr)	Noble Gas Release Rate (Ci/sec)	Iodine Release Rate, (Ci/sec) with Iodine Removal System	
		In Use	Not in Use
≤ 60	Negligible	Negligible	Negligible
> 60 ≤ 100	2.0	0.03	0.1
> 100 ≤ 1000	10.0	0.14	0.4
> 1000	40.0	0.60	1.6

ATTACHMENT 8
RELEASE RATE DATA
(Page 21 of 23)

DATA SHEET 4
UNIT 1 OR 2 POST LOCA
(Page 2 of 2)

4. Determine the **SITE RELEASE RATE**:

   A. Complete the table below.

	Noble Gas	Iodine
If used, enter the AFFECTED Unit's release rates determined from this worksheet		
IF the other Unit is AFFECTED enter its release rates		
Add A and B to obtain the SITE RELEASE RATES		

5. Enter the SITE RELEASE RATES in the selected DOSE CALCULATION WORKSHEET:

   A. On line C, circle Post LOCA.

   B. Enter the **NOBLE GAS RELEASE RATE** into line 8.

   C. Enter the **IODINE RELEASE RATE** into line 1.

   D. Enter the **DURATION** (if 2 affected units, use longest) into line 6.

   E. Enter the **PF** (Particulate Factor) (if 2 affected units, use largest) into line 11.

6. This data sheet is completed, follow the instructions on the DOSE CALCULATION WORKSHEET.

END OF DATA SHEET 4

ATTACHMENT 8
RELEASE RATE DATA
(Page 22 of 23)

DATA SHEET 5
UNIT 1 OR 2 DEFAULT
(Page 1 of 2)

CAUTION
Use this method only if there is no data to use in other methods.

1. Gather **ACCIDENT DATA**:

   A. Unit # (circle): **1** **2**

   B. Date and time of data: _____/_____

   C. Ask Emergency Coordinator:

      1. Accident Type_____

      2. Is core overheating or melting (circle): **YES** **NO**

         a. If YES, PF = **4.4**; If NO, PF = **1.0**

         b. Enter **PF** = _____

      3. Potential **DURATION** of release (if unknown, use Default Duration from the table below):_____ hours

2. Determine the **SITE RELEASE RATE**:

   A. For the accident type, select and circle the Noble Gas and Iodine Release Rates in the table below.

Accident Type	Default Duration	Release Rates, Ci/sec	
		Noble Gas	Iodine
LOCA WITHOUT Iodine Removal System in use	2 hours	37	1.6
LOCA WITH Iodine Removal System in use	2 hours	37	0.6
Steam Generator Tube Rupture	0.5 hours	2.0	4.0 E - 05
Main Steam Line Break	0.5 hours	0.04	0.01
Fuel Handling	0.5 hours	11	4.0 E - 03
Cask Drop	0.5 hours	2.0	0.03
Waste Gas Decay Tank Rupture	0.5 hours	2.0	2.0 E - 06

/R6A

ATTACHMENT 8
RELEASE RATE DATA
(Page 23 of 23)

DATA SHEET 5
UNIT 1 OR 2 DEFAULT
(Page 2 of 2)

2. (continued)

B. Complete the table below.

	Noble Gas	Iodine
Enter the release rates determined from this worksheet		
IF the other Unit is AFFECTED enter its release rates		
Add A and B to obtain the SITE RELEASE RATES		

3. Enter the SITE RELEASE RATES in the selected DOSE CALCULATION WORKSHEET:

A. On line C, circle Default.

B. Enter the **NOBLE GAS RELEASE RATE** into line 8.

C. Enter the **IODINE RELEASE RATE** into line 1.

D. Enter the **DURATION** (if 2 affected units, use longest) into line 6.

E. Enter the **PF** (Particulate Factor) (if 2 affected units, use largest) into line 11.

4. This data sheet is completed, follow the instructions on the DOSE CALCULATION WORKSHEET.

END OF DATA SHEET 5

END OF ATTACHMENT 8

ATTACHMENT 9
MANUAL DOSE CALCULATION — WORKSHEET 1

(Page 1 of 10) **Stability Class = A Seabreeze = YES**

A. Enter Meteorological Summary Data:

Unit_____ Wind Direction From _____ Affected Sectors_____

B. Circle Meteorological Data Source(s) used:

ERDADS / Tower NOAA / NWS Default

C. Circle Release Rate Method used: (if dual unit, then indicate Method for each unit)

Grab Sample Effluent Monitor CHRRM

POST LOCA Default Attachment 10 / 12

D. Date and time of data from release rate determination: _____/_____

Follow the instructions to calculate doses @						
line	Instruction for THYROID DOSES (CDE)	1 Mile	2 Miles	5 Miles	10 Miles	
1	Enter the **IODINE RELEASE RATE**, Ci/sec					**SNF**
2	Enter the **WIND SPEED**, mph					**SNF**
3	Divide line 1 by line 2					
4	Iodine Dose Factors,	2.3 E + 04	8.1 E + 03	2.3 E + 03	8.0 E + 02	
5	Multiply line 3 by line 4 to obtain **THYROID DOSE RATE** (CDE), mrem/hr					**SNF**
6	Enter **DURATION** of release, hours					**SNF**
7	Multiply line 5 by line 6 to obtain **PROJECTED THYROID DOSE** (CDE), mrem					**PAR**
line	Instructions for TOTAL DOSES (TEDE)	1 mile	2 miles	5 miles	10 miles	
8	Enter **NOBLE GAS RELEASE RATE**, Ci/sec					**SNF**
9	Enter **WIND SPEED** from line 2, above					
10	Divide line 8 by line 9					
11	Enter the **PARTICULATE FACTOR**					
12	Multiply line 10 by line 11					
13	Nobel Gas Dose Factors	5.0	2.6	0.73	0.26	
14	Multiply line 12 by line 13					
15	Enter (Line 5 multiplied by 0.04)					
16	Add line 14 and 15 to obtain **TOTAL DOSE RATE (TEDE)**, mrem/hr					**SNF**
17	Enter **DURATION** from line 6, above					
18	Multiply line 16 by line 17 to obtain **TOTAL DOSE (TEDE)**, mrem					**PAR**
19	Forward this worksheet (or a copy) to the Emergency Coordinator {EOF HP Manager if done in EOF}					

E. Dose Calculations completed; continue monitoring releases and assessing doses.

END OF WORKSHEET 1

ATTACHMENT 9
MANUAL DOSE CALCULATION — WORKSHEET 2

(Page 2 of 10) **Stability Class = A Seabreeze = NO**

A. Enter Meteorological Summary Data:

Unit_____ Wind Direction From _____ Affected Sectors_____

B. Circle Meteorological Data Source(s) used:

ERDADS / Tower NOAA / NWS Default

C. Circle Release Rate Method used: (if dual unit, then indicate Method for each unit)

Grab Sample Effluent Monitor CHRRM

POST LOCA Default Attachment 10 / 12

D. Date and time of data from release rate determination: _____/_____

Follow the instructions to calculate doses @						
line	Instruction for THYROID DOSES (CDE)	1 Mile	2 Miles	5 Miles	10 Miles	
1	Enter the **IODINE RELEASE RATE**, Ci/sec					**SNF**
2	Enter the **WIND SPEED**, mph					**SNF**
3	Divide line 1 by line 2					
4	Iodine Dose Factors,	3.8 E + 03	1.8 E + 03	7.9 E + 02	4.0 E + 02	
5	Multiply line 3 by line 4 to obtain **THYROID DOSE RATE (CDE)**, mrem/hr					**SNF**
6	Enter **DURATION** of release, hours					**SNF**
7	Multiply line 5 by line 6 to obtain **PROJECTED THYROID DOSE (CDE)**, mrem					**PAR**
line	Instructions for TOTAL DOSES (TEDE)	1 Mile	2 Miles	5 Miles	10 Miles	
8	Enter **NOBLE GAS RELEASE RATE**, Ci/sec					**SNF**
9	Enter **WIND SPEED** from line 2, above					
10	Divide line 8 by line 9					
11	Enter the **PARTICULATE FACTOR**					
12	Multiply line 10 by line 11					
13	Noble Gas Dose Factors	0.82	0.57	0.25	0.13	
14	Multiply line 12 by line 13					
15	Enter (Line 5 multiplied by 0.04)					
16	Add line 14 and 15 to obtain **TOTAL DOSE RATE (TEDE)**, mrem/hr					**SNF**
17	Enter **DURATION** from line 6, above					
18	Multiply line 16 by line 17 to obtain **TOTAL DOSE (TEDE)**, mrem					**PAR**
19	Forward this worksheet (or a copy) to the Emergency Coordinator {EOF HP Manager if done in EOF}					

E. Dose calculations completed; continue monitoring releases and assessing doses.

END OF WORKSHEET 2

ATTACHMENT 9
MANUAL DOSE CALCULATION WORKSHEET 3
(Page 3 of 10) **Stability Class = B Seabreeze = YES**

A. Enter Meteorological Summary Data:

Unit_____ Wind Direction From _____ Affected Sectors_____

B. Circle Meteorological Data Source(s) used:

ERDADS / Tower NOAA / NWS Default

C. Circle Release Rate Method used: (if dual unit, then indicate Method for each unit)

Grab Sample Effluent Monitor CHRRM

POST LOCA Default Attachment 10 / 12

D. Date and time of data from release rate determination: _____/_____

Follow the instructions to calculate doses @						
line	Instruction for THYROID DOSES (CDE)	1 Mile	2 Miles	5 Miles	10 Miles	
1	Enter the **IODINE RELEASE RATE**, Ci/sec					**SNF**
2	Enter the **WIND SPEED**, mph					**SNF**
3	Divide line 1 by line 2					
4	Iodine Dose Factors,	3.0 E + 04	1.1 E + 04	3.0 E + 03	1.1 E + 03	
5	Multiply line 3 by line 4 to obtain **THYROID DOSE RATE (CDE)**, mrem/hr					**SNF**
6	Enter **DURATION** of release, hours					**SNF**
7	Multiply line 5 by line 6 to obtain **PROJECTED THYROID DOSE (CDE)**, mrem					**PAR**
line	Instructions for TOTAL DOSES (TEDE)	1 Mile	2 Miles	5 Miles	10 Miles	
8	Enter **NOBLE GAS RELEASE RATE**, Ci/sec					**SNF**
9	Enter **WIND SPEED** from line 2, above					
10	Divide line 8 by line 9					
11	Enter the **PARTICULATE FACTOR**					
12	Multiply line 10 by line 11					
13	Noble Gas Dose Factors	9.6	3.4	0.97	0.36	
14	Multiply line 12 by line 13					
15	Enter (Line 5 multiplied by 0.04)					
16	Add line 14 and 15 to obtain **TOTAL DOSE RATE (TEDE)**, mrem/hr					**SNF**
17	Enter **DURATION** from line 6, above					
18	Multiply line 16 by line 17 to obtain **TOTAL DOSE (TEDE)**, mrem					**PAR**
19	Forward this worksheet (or a copy) to the Emergency Coordinator {EOF HP Manager if done in EOF}					

E. Dose calculations completed; continue monitoring releases and assessing doses.

END OF WORKSHEET 3

ATTACHMENT 9
MANUAL DOSE CALCULATION WORKSHEET 4
(Page 4 of 10) **Stability Class = B Seabreeze = NO**

A. Enter Meteorological Summary Data:

Unit_____ Wind Direction From _____ Affected Sectors_____

B. Circle Meteorological Data Source(s) used:

ERDADS / Tower NOAA / NWS Default

C. Circle Release Rate Method used: (if dual unit, then indicate Method for each unit)

Grab Sample Effluent Monitor CHRRM

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D. Date and time of data from release rate determination: _____/_____

Follow the instructions to calculate doses @						
line	Instruction for THYROID DOSES (CDE)	1 Mile	2 Miles	5 Miles	10 Miles	
1	Enter the **IODINE RELEASE RATE**, Ci/sec					**SNF**
2	Enter the **WIND SPEED**, mph					**SNF**
3	Divide line 1 by line 2					
4	Iodine Dose Factors,	2.3 E + 04	6.0 E + 03	1.1 E + 03	5.7 E + 02	
5	Multiply line 3 by line 4 to obtain **THYROID DOSE RATE (CDE)**, mrem/hr					**SNF**
6	Enter **DURATION** of release, hours					**SNF**
7	Multiply line 5 by line 6 to obtain **PROJECTED THYROID DOSE (CDE)**, mrem					**PAR**
line	Instructions for TOTAL DOSES (TEDE)	1 Mile	2 Miles	5 Miles	10 Miles	
8	Enter **NOBLE GAS RELEASE RATE**, Ci/sec					**SNF**
9	Enter **WIND SPEED** from line 2, above					
10	Divide line 8 by line 9					
11	Enter the **PARTICULATE FACTOR**					
12	Multiply line 10 by line 11					
13	Noble Gas Dose Factors	7.4	1.9	0.36	0.18	
14	Multiply line 12 by line 13					
15	Enter (Line 5 multiplied by 0.04)					
16	Add line 14 and 15 to obtain **TOTAL DOSE RATE (TEDE)**, mrem/hr					**SNF**
17	Enter **DURATION** from line 6, above					
18	Multiply line 16 by line 17 to obtain **TOTAL DOSE (TEDE)**, mrem					**PAR**
19	Forward this worksheet (or a copy) to the Emergency Coordinator {EOF HP Manager if done in EOF}					

E. Dose calculations completed; continue monitoring releases and assessing doses.

END OF WORKSHEET 4

ATTACHMENT 9
MANUAL DOSE CALCULATION — WORKSHEET 5
(Page 5 of 10) **Stability Class = C Seabreeze = YES**

A. Enter Meteorological Summary Data:

Unit_____ Wind Direction From _____ Affected Sectors_____

B. Circle Meteorological Data Source(s) used:

ERDADS / Tower NOAA / NWS Default

C. Circle Release Rate Method used: (if dual unit, then indicate Method for each unit)

Grab Sample Effluent Monitor CHRRM

POST LOCA Default Attachment 10 / 12

D. Date and time of data from release rate determination: _____/_____

Follow the instructions to calculate doses @						
line	Instruction for THYROID DOSES (CDE)	1 Mile	2 Miles	5 Miles	10 Miles	
1	Enter the **IODINE RELEASE RATE**, Ci/sec					**SNF**
2	Enter the **WIND SPEED**, mph					**SNF**
3	Divide line 1 by line 2					
4	Iodine Dose Factors,	6.0 E + 04	1.7 E + 04	3.9 E + 03	1.5 E + 03	
5	Multiply line 3 by line 4 to obtain **THYROID DOSE RATE (CDE)**, mrem/hr					**SNF**
6	Enter **DURATION** of release, hours					**SNF**
7	Multiply line 5 by line 6 to obtain **PROJECTED THYROID DOSE (CDE)**, mrem					**PAR**
line	Instructions for TOTAL DOSES (TEDE)	1 Mile	2 Miles	5 Miles	10 Miles	
8	Enter **NOBLE GAS RELEASE RATE**, Ci/sec					**SNF**
9	Enter **WIND SPEED** from line 2, above					
10	Divide line 8 by line 9					
11	Enter the **PARTICULATE FACTOR**					
12	Multiply line 10 by line 11					
13	Noble Gas Dose Factors	19.0	5.3	1.2	0.48	
14	Multiply line 12 by line 13					
15	Enter (Line 5 multiplied by 0.04)					
16	Add line 14 and 15 to obtain **TOTAL DOSE RATE (TEDE)**, mrem/hr					**SNF**
17	Enter **DURATION** from line 6, above					
18	Multiply line 16 by line 17 to obtain **TOTAL DOSE (TEDE)**, mrem					**PAR**
19	Forward this worksheet (or a copy) to the Emergency Coordinator {EOF HP Manager if done in EOF}					

E. Dose calculations completed; continue monitoring releases and assessing doses.

END OF WORKSHEET 5

ATTACHMENT 9
MANUAL DOSE CALCULATION WORKSHEET 6

(Page 6 of 10) **Stability Class = C Seabreeze = NO**

A. Enter Meteorological Summary Data:

Unit_____ Wind Direction From _____ Affected Sectors_____

B. Circle Meteorological Data Source(s) used:

ERDADS / Tower NOAA / NWS Default

C. Circle Release Rate Method used: (if dual unit, then indicate Method for each unit)

Grab Sample Effluent Monitor CHRRM

POST LOCA Default Attachment 10 / 12

D. Date and time of data from release rate determination: _____/_____

Follow the instructions to calculate doses @						
line	Instruction for THYROID DOSES (CDE)	1 Mile	2 Miles	5 Miles	10 Miles	
1	Enter the **IODINE RELEASE RATE**, Ci/sec					**SNF**
2	Enter the **WIND SPEED**, mph					**SNF**
3	Divide line 1 by line 2					
4	Iodine Dose Factors,	6.0 E + 04	1.7 E + 04	3.3 E + 03	9.5 E + 02	
5	Multiply line 3 by line 4 to obtain **THYROID DOSE RATE (CDE)**, mrem/hr					**SNF**
6	Enter **DURATION** of release, hours					**SNF**
7	Multiply line 5 by line 6 to obtain **PROJECTED THYROID DOSE (CDE)**, mrem					**PAR**
line	Instructions for TOTAL DOSES (TEDE)	1 Mile	2 Miles	5 Miles	10 Miles	
8	Enter **NOBLE GAS RELEASE RATE**, Ci/sec					**SNF**
9	Enter **WIND SPEED** from line 2, above					
10	Divide line 8 by line 9					
11	Enter the **PARTICULATE FACTOR**					
12	Multiply line 10 by line 11					
13	Noble Gas Dose Factors	19.0	5.3	1.0	0.30	
14	Multiply line 12 by line 13					
15	Enter (Line 5 multiplied by 0.04)					
16	Add line 14 and 15 to obtain **TOTAL DOSE RATE (TEDE)**, mrem/hr					**SNF**
17	Enter **DURATION** from line 6, above					
18	Multiply line 16 by line 17 to obtain **TOTAL DOSE (TEDE)**, mrem					**PAR**
19	Forward this worksheet (or a copy) to the Emergency Coordinator {EOF HP Manager if done in EOF}					

E. Dose calculations completed; continue monitoring releases and assessing doses.

END OF WORKSHEET 6

ATTACHMENT 9
MANUAL DOSE CALCULATION WORKSHEET 7
(Page 7 of 10) **Stability Class = D Seabreeze = NO**

A. Enter Meteorological Summary Data:

Unit_____ Wind Direction From _____ Affected Sectors_____

B. Circle Meteorological Data Source(s) used:

ERDADS / Tower NOAA / NWS Default

C. Circle Release Rate Method used: (if dual unit, then indicate Method for each unit)

Grab Sample Effluent Monitor CHRRM

POST LOCA Default Attachment 10 / 12

D. Date and time of data from release rate determination: _____/_____

Follow the instructions to calculate doses @						
line	Instruction for THYROID DOSES (CDE)	1 Mile	2 Miles	5 Miles	10 Miles	
1	Enter the **IODINE RELEASE RATE**, Ci/sec					**SNF**
2	Enter the **WIND SPEED**, mph					**SNF**
3	Divide line 1 by line 2					
4	Iodine Dose Factors,	1.7 E + 05	6.0 E + 04	1.7 E + 04	5.7 E + 03	
5	Multiply line 3 by line 4 to obtain **THYROID DOSE RATE (CDE)**, mrem/hr					**SNF**
6	Enter **DURATION** of release, hours					**SNF**
7	Multiply line 5 by line 6 to obtain **PROJECTED THYROID DOSE (CDE)**, mrem					**PAR**
line	Instructions for TOTAL DOSES (TEDE)	1 Mile	2 Miles	5 Miles	10 Miles	
8	Enter **NOBLE GAS RELEASE RATE**, Ci/sec					**SNF**
9	Enter **WIND SPEED** from line 2, above					
10	Divide line 8 by line 9					
11	Enter the **PARTICULATE FACTOR**					
12	Multiply line 10 by line 11					
13	Noble Gas Dose Factors	53.0	19.0	5.3	1.8	
14	Multiply line 12 by line 13					
15	Enter (Line 5 multiplied by 0.04)					
16	Add line 14 and 15 to obtain **TOTAL DOSE RATE (TEDE)**, mrem/hr					**SNF**
17	Enter **DURATION** from line 6, above					
18	Multiply line 16 by line 17 to obtain **TOTAL DOSE (TEDE)**, mrem					**PAR**
19	Forward this worksheet (or a copy) to the Emergency Coordinator {EOF HP Manager if done in EOF}					

E. Dose calculations completed; continue monitoring releases and assessing doses.

END OF WORKSHEET 7

ATTACHMENT 9
MANUAL DOSE CALCULATION — WORKSHEET 8

(Page 8 of 10) **Stability Class = E Seabreeze = NO**

A. Enter Meteorological Summary Data:

Unit_____ Wind Direction From _____ Affected Sectors_____

B. Circle Meteorological Data Source(s) used:

ERDADS / Tower NOAA / NWS Default

C. Circle Release Rate Method used: (if dual unit, then indicate Method for each unit)

Grab Sample Effluent Monitor CHRRM

POST LOCA Default Attachment 10 / 12

D. Date and time of data from release rate determination: _____/_____

Follow the instructions to calculate doses @						
line	Instruction for THYROID DOSES (CDE)	1 Mile	2 Miles	5 Miles	10 Miles	
1	Enter the **IODINE RELEASE RATE**, Ci/sec					**SNF**
2	Enter the **WIND SPEED**, mph					**SNF**
3	Divide line 1 by line 2					
4	Iodine Dose Factors,	3.0 E + 05	1.2 E + 05	3.8 E + 04	1.4 E + 04	
5	Multiply line 3 by line 4 to obtain **THYROID DOSE RATE (CDE)**, mrem/hr					**SNF**
6	Enter **DURATION** of release, hours					**SNF**
7	Multiply line 5 by line 6 to obtain **PROJECTED THYROID DOSE (CDE)**, mrem					**PAR**
line	Instructions for TOTAL DOSES (TEDE)	1 Mile	2 Miles	5 Miles	10 Miles	
8	Enter **NOBLE GAS RELEASE RATE**, Ci/sec					**SNF**
9	Enter **WIND SPEED** from line 2, above					
10	Divide line 8 by line 9					
11	Enter the **PARTICULATE FACTOR**					
12	Multiply line 10 by line 11					
13	Noble Gas Dose Factors	94.0	39.0	12.0	4.5	
14	Multiply line 12 by line 13					
15	Enter (Line 5 multiplied by 0.04)					
16	Add line 14 and 15 to obtain **TOTAL DOSE RATE (TEDE)**, mrem/hr					**SNF**
17	Enter **DURATION** from line 6, above					
18	Multiply line 16 by line 17 to obtain **TOTAL DOSE (TEDE)**, mrem					**PAR**
19	Forward this worksheet (or a copy) to the Emergency Coordinator {EOF HP Manager if done in EOF}					

E. Dose calculations completed; continue monitoring releases and assessing doses.

END OF WORKSHEET 8

ATTACHMENT 9
MANUAL DOSE CALCULATION WORKSHEET 9
(Page 9 of 10) **Stability Class = F Seabreeze = NO**

A. Enter Meteorological Summary Data:

Unit_____ Wind Direction From _____ Affected Sectors_____

B. Circle Meteorological Data Source(s) used:

ERDADS / Tower NOAA / NWS Default

C. Circle Release Rate Method used: (if dual unit, then indicate Method for each unit)

Grab Sample Effluent Monitor CHRRM

POST LOCA Default Attachment 10 / 12

D. Date and time of data from release rate determination: _____/_____

Follow the instructions to calculate doses @						
line	Instruction for THYROID DOSES (CDE)	1 Mile	2 Miles	5 Miles	10 Miles	
1	Enter the **IODINE RELEASE RATE**, Ci/sec					**SNF**
2	Enter the **WIND SPEED**, mph					**SNF**
3	Divide line 1 by line 2					
4	Iodine Dose Factors,	5.3 E + 05	2.5 E + 05	7.9 E + 04	3.5 E + 04	
5	Multiply line 3 by line 4 to obtain **THYROID DOSE RATE (CDE)**, mrem/hr					**SNF**
6	Enter **DURATION** of release, hours					**SNF**
7	Multiply line 5 by line 6 to obtain **PROJECTED THYROID DOSE (CDE)**, mrem					**PAR**
line	Instructions for TOTAL DOSES (TEDE)	1 Mile	2 Miles	5 Miles	10 Miles	
8	Enter **NOBLE GAS RELEASE RATE**, Ci/sec					**SNF**
9	Enter **WIND SPEED** from line 2, above					
10	Divide line 8 by line 9					
11	Enter the **PARTICULATE FACTOR**					
12	Multiply line 10 by line 11					
13	Noble GasDose Factors	1.7 E + 02	7.8 E + 01	2.5 E + 01	1.1 E + 01	
14	Multiply line 12 by line 13					
15	Enter (Line 5 multiplied by 0.04)					
16	Add line 14 and 15 to obtain **TOTAL DOSE RATE (TEDE)**, mrem/hr					**SNF**
17	Enter **DURATION** from line 6, above					
18	Multiply line 16 by line 17 to obtain **TOTAL DOSE (TEDE)**, mrem					**PAR**
19	Forward this worksheet (or a copy) to the Emergency Coordinator {EOF HP Manager if done in EOF}					

E. Dose calculations completed; continue monitoring releases and assessing doses.

END OF WORKSHEET 9

ATTACHMENT 9
MANUAL DOSE CALCULATION — WORKSHEET 10
(Page 10 of 10) **Stability Class = G Seabreeze = NO**

A. Enter Meteorological Summary Data:

Unit_____ Wind Direction From _____ Affected Sectors_____

B. Circle Meteorological Data Source(s) used:

ERDADS / Tower NOAA / NWS Default

C. Circle Release Rate Method used: (if dual unit, then indicate Method for each unit)

Grab Sample Effluent Monitor CHRRM

POST LOCA Default Attachment 10 / 12

D. Date and time of data from release rate determination: _____/_____

Follow the instructions to calculate doses @						
line	Instruction for THYROID DOSES (CDE)	1 Mile	2 Miles	5 Miles	10 Miles	
1	Enter the **IODINE RELEASE RATE**, Ci/sec					**SNF**
2	Enter the **WIND SPEED**, mph					**SNF**
3	Divide line 1 by line 2					
4	Iodine Dose Factors,	9.1 E + 05	4.7 E + 05	1.8 E + 05	7.9 E + 04	
5	Multiply line 3 by line 4 to obtain **THYROID DOSE RATE (CDE)**, mrem/hr					**SNF**
6	Enter **DURATION** of release, hours					**SNF**
7	Multiply line 5 by line 6 to obtain **PROJECTED THYROID DOSE (CDE)**, mrem					**PAR**
line	Instructions for TOTAL DOSES (TEDE)	1 Mile	2 Miles	5 Miles	10 Miles	
8	Enter **NOBLE GAS RELEASE RATE**, Ci/sec					**SNF**
9	Enter **WIND SPEED** from line 2, above					
10	Divide line 8 by line 9					
11	Enter the **PARTICULATE FACTOR**					
12	Multiply line 10 by line 11					
13	Noble Gas Dose Factors	2.9 E + 02	1.5 E + 02	5.7 E + 01	2.5 E + 01	
14	Multiply line 12 by line 13					
15	Enter (Line 5 multiplied by 0.04)					
16	Add line 14 and 15 to obtain **TOTAL DOSE RATE (TEDE)**, mrem/hr					**SNF**
17	Enter **DURATION** from line 6, above					
18	Multiply line 16 by line 17 to obtain **TOTAL DOSE (TEDE)**, mrem					**PAR**
19	Forward this worksheet (or a copy) to the Emergency Coordinator {EOF HP Manager if done in EOF}					

E. Dose calculations completed; continue monitoring releases and assessing doses.

END OF WORKSHEET 10

END OF ATTACHMENT 9

ATTACHMENT 10
RESPONDING TO AN UNMONITORED CONTAINMENT BURP
(Page 1 of 6)

1. Purpose

This attachment provides methods for TSC and/or EOF Dose Assessment personnel to define release rates from a containment burp and includes NRCs RTM-91 methods for estimating dose rates based on plant/reactor conditions.

2. Discussion

A. A containment burp is any suspected release from the containment that may be indicated by a rapid decrease of the containment pressure or rapid decrease in the Containment High Range Radiation Monitor that is determined, by operations or engineering, not due to changes in equipment operation (e.g., additional containment spray, additional containment coolers, etc.).

B. It must be remembered and understood that the methodology provided in this appendix includes conservative assumptions and is intended to provide the means to estimate an upper bound to the release, not an exact release rate.

3. Contents

Section 1: Provides guidance in estimating release rates during a LOCA resulting from rapid containment depressurizations; that is, an unmonitored burp release. The guidance is further sub-divided into three cases:

Case 1 - Rapid decrease in CHRRM reading during burp

Case 2 - No change in CHRRM reading during burp

Case 3 - Increase in CHRRM reading during burp

Section 2: Provides guidance in estimating doses based on plant/reactor conditions following the methodology in NRC RTM-91.

ATTACHMENT 10
RESPONDING TO AN UNMONITORED CONTAINMENT BURP
(Page 2 of 6)

4. Basis

Section 1:

Assumes CHRRM is responding only to Noble Gases
Assumes Curies in (from core) < < Curies lost
2 E + 06 R/hr = 100% Core Inventory of Noble Gas (1 ÷ $CF_{T=0}$, CF from EPIP-09)
6.43 E + 08 Curies of Noble Gas is 100% Core Inventory (PSL2 UFSAR)
322 = 6.43 E + 08 Curies ÷ 2 E + 06 R/hr

Section 2:

NRC's Response Technical Manual RTM-91 Vol. 1, Rev. 1, pg. C-2.

5. Percent Mass Loss

A. Use Attachment 11, Estimate of Containment "% Mass Loss", to determine the values required in the following calculations.

ATTACHMENT 10
RESPONDING TO AN UNMONITORED CONTAINMENT BURP
(Page 3 of 6)

Section 1 - Case 1: Rapid Decrease in CHRRM Reading
(Applicable to Unit 1 or Unit 2)

NOTE

1. A CHRRM drop of about 3 percent per hour may be due to radiological decay.
2. The CHRRM may drop by as much as 10 percent very quickly if containment spray is actuated due to Iodine washout.

1. Enter date and time of data: _____/_____

2. Calculate Delta-CHRRM:

Start CHRRM _____ - End CHRRM _____ = _____ Delta-CHRRM, R/hr

3. Calculate Duration:

A. Clock Time End _____ - Clock Time Start _____ = _____ Delta-Clock

B. Convert Delta-Clock to Delta-Seconds: _____ Δ sec

4. Estimate Curies Lost:

Delta CHRRM _____ x 322 Ci N.G. per R/hr = _____ Noble Gas Curies Lost

5. Estimate Noble Gas Release Rate (loss rate):

Noble Gas Curies lost _____ ÷ _____ Δ sec = _____ Noble Gas Ci/sec

6. Estimate the Iodine Release Rate:

N.G. Ci/sec _____ x 0.01 (Iodine Factor) = _____ Iodine Ci/sec

7. Utilize the current meteorological conditions and appropriate Dose Calculation Worksheets or enter as Direct if using the computer, to estimate Offsite Doses.

END OF CASE 1

ATTACHMENT 10
RESPONDING TO AN UNMONITORED CONTAINMENT BURP
(Page 4 of 6)

Section 2 - Case 2: Constant CHRRM Reading
(Applicable to Unit 1 or Unit 2)

NOTE
Engineering may be requested to evaluate the percent mass lost in the burp.

1. Enter date and time of data: _____/_____

2. Estimate Noble Gas Curies in the containment:

   CHRRM R/hr _____ x 322 Ci N.G. per R/hr = _____ Noble Gas Curies in can

3. Calculate Duration:

   A. Clock Time End _____ - Clock Time Start _____ = _____ Delta-Clock

   B. Convert Delta-Clock to Delta-Seconds: _____ Δ sec

4. Estimate Curies Lost:

   A. Determine "% Mass Loss" (Attachment 11)

   B. N.G. Curies in can _____ x _____ % mass lost ÷ 100 = _____ Noble Gas Curies lost

5. Estimate Noble Gas Release Rate (loss rate):

   Noble Gas Curies lost _____ ÷ _____ Δ sec = _____ Noble Gas Ci/sec

6. Estimate the Iodine Release Rate:

   N.G. Ci/sec _____ x 0.01 (Iodine Factor) = _____ Iodine Ci/sec

7. Utilize the current meteorological conditions and appropriate Dose Calculation Worksheets or enter as Direct if using the computer, to estimate Offsite Doses.

END OF CASE 2

ATTACHMENT 10
RESPONDING TO AN UNMONITORED CONTAINMENT BURP
(Page 5 of 6)

Section 1 - Case 3: Increasing CHRRM Reading
(Applicable to Unit 1 or Unit 2)

NOTE
Engineering may be requested to evaluate the percent mass lost in the burp.

1. Enter date and time of data: _____/_____

2. Calculate average CHRRM reading

   (Start CHRRM _____ + End CHRRM _____) ÷ 2 = _____ Avg CHRRM, R/hr

3. Estimate Noble Gas Curies in the containment:

   Avg. CHRRM R/hr_____x 322 Ci N.G. per R/hr =_____Noble Gas Curies in can

4. Calculate Duration:

   A. Clock Time End _____ - Clock Time Start _____ = _____ Delta-Clock

   B. Convert Delta-Clock to Delta-Seconds: _____ Δ sec

5. Estimate Curies Lost:

   A. Determine "% Mass Loss" (Attachment 11)

   B. N.G. Curies in can _____x_____% mass lost ÷ 100 = _____Noble Gas Curies lost

6. Estimate Noble Gas Release Rate (loss rate):

   Noble Gas Curies lost _____ ÷ _____ Δ sec = _____ Noble Gas Ci/sec

7. Estimate the Iodine Release Rate:

   N.G. Ci/sec _____ x 0.01 (Iodine Factor) = _____ Iodine Ci/sec

8. Utilize the current meteorological conditions and appropriate Dose Calculation Worksheets or enter as Direct if using the computer, to estimate Offsite Doses.

END OF CASE 3

ATTACHMENT 10
RESPONDING TO AN UNMONITORED CONTAINMENT BURP
(Page 6 of 6)

SECTION 2
(Applicable to Unit 1 or Unit 2)

Use this method IF there is not radiological data (e.g., CHRRM, containment grab sample, etc.) AND the accident has progressed past gap failure AND the containment has undergone catastrophic failure (e.g., know there should be pressure and there is none).

NOTE
The following method provides DOSES, not release rates. Doses based on stability class D and four m.p.h. wind speed.

REACTOR ACCIDENT CONSEQUENCE OVERVIEW
Containment Leakage

Core Condition	Containment Status	Mitigating System Status (A)	Acute Dose (rem) 1 hour Release @ 1 mile(B)	
			WB	THY
MELT Release From Core 4500°F	Early total Failure (< 1 hr)	No Mitigation	1000+	10^5+
		Mitigated	250	10^4
	Late total failure (2 - 12 hr)	N/A	250	10^4
	Major Leakage (100% / day)	N/A	10	10^3
	Design leakage	N/A	10^{-2}	1
Gap Release From Core 1500°F	Early total Failure (< 1 hr)	No Mitigation	50	10^4
		Mitigated	10	10^3
	Late total failure (2 - 12 hr)	N/A	5	10^3
	Major Leakage (100% / day)	N/A	10^{-1}	10
	Design Leakage	N/A	10^{-4}	10^{-2}

Notes: (A) Sprays, filters
(B) 1 hour cloud immersion and inhalation plus 3 hours of ground shine

END OF SECTION 2

END OF ATTACHMENT 10

ATTACHMENT 11
¶2 ESTIMATE OF CONTAINMENT "% MASS LOSS"

(Page 1 of 2)

(Applicable to Unit 1 or Unit 2)

1. Purpose

The purpose of this calculation is to provide a method to estimate containment % mass release to the environment during a post-LOCA containment depressurization transient (containment "burp").

2. Discussion

A. The scope of this calculation is St. Lucie Units 1 and 2.

B. The dose assessment group can use the containment mass release data to estimate the radiation release to the environment (using Attachment 4, TSC/EOF Dose Assessment Guidance for Responding to an Unmonitored Containment Burp) provided the containment radiological conditions are known.

C. The containment de-pressurization event should be large (greater than 5.0 psi change), over a short period of time since the methodology does not accurately credit the effect of containment heat removal systems.

3. Acquire the following data:

> **NOTE**
> The "time span" for data observation should be the same as used for the calculation on Attachment 4, Case 2 or 3.

A. Containment Pressure just before blowdown transient:_____ psig {P_{start}}

B. Containment Temperature just before blowdown transient:_____ deg F {T_{start}}

C. Containment Pressure just after blowdown transient:_____ psig {P_{end}}

D. Containment Temperature just after blowdown transient:_____ deg F {T_{end}}

ATTACHMENT 11
ESTIMATE OF CONTAINMENT "% MASS LOSS"

(Page 2 of 2)

(Applicable to Unit 1 or Unit 2)

4. Estimate Initial Containment Atmosphere Density:

$$\frac{144 \times (14.7 + ...P_{start})}{53.3 \times (460 + ...T_{start})} = \_\_\_ \text{ Initial Density}$$

5. Estimate End Containment Atmosphere Density:

$$\frac{144 \times (14.7 + ...P_{end})}{53.3 \times (460 + ...T_{end})} = \_\_\_ \text{ End Density}$$

6. Estimate % Mass Lost:

$$\left(1 \text{ minus } \left(\frac{.....\text{End Density}}{.....\text{Initial Density}}\right)\right) \times 100 = \_\_\_\_\_\% \text{ mass lost}$$

END OF ATTACHMENT 11

ATTACHMENT 12
FIELD TEAM MEASUREMENTS ASSESSMENT
(Page 1 of 3)

¶3 This attachment provides methods to estimate a release rate from Field Monitoring Team survey meter measurements and provides guidance on comparing field measurements to dose projections.

NOTE
Survey meter Gamma (closed window) results must be from plume centerline; that is, the maximum value from a lateral transverse of the plume.

1. DATE:_____, TIME:_____, Unit:_____

2. If the survey meter measurement was at 1 mile value, Then go to Step 4.

3. Estimate the 1 mile value:

Estimated 1 mile value = Survey meter results x (downwind distance, miles)^{Z}
Where the exponent **Z** = 2 for Stability Class A, B
1.5 for Stability Class C, D
1.0 for Stability Class E, F, G

$$\underset{\text{meter results}}{\_\_\_\_\_}\ \text{mr/hr} \times \left[\frac{\_\_\_\_\_}{\underset{\text{downwind distance}}{\_\_\_\_\_}\ (\text{miles})^{(\_\_\_\_\_Z)}} \right] = \_\_\_\_\_\ \text{Estimated Dose Rate @ 1 mile mr/hr}$$

4. For the meteorological conditions at time of sampling, select the Dose Calculation Worksheet (DCW).

A. Use Wind Speed in Miles Per Hour, mph

B. Copy from Line 13, the 1 mile Dose factor as the DF for use in Step 5.

5. Estimate Noble Gas Release Rate: Estimated 1 mile mr/hr ÷ DF x Wind Speed

$$\frac{\_\_\_\_\_\text{mr/hr} \times \_\_\_\_\_\text{mph}}{\_\_\_\_\_\text{DF}} = \_\_\_\_\_\ \text{Noble Gas Ci/sec}$$

ATTACHMENT 12
FIELD TEAM MEASUREMENTS ASSESSMENT
(Page 2 of 3)

6. Estimate Iodine Release Rate (IF = Iodine Factor, see the affected units' Effluent Monitor Worksheet):

_____N.G. Ci/sec x _____(IF) = _____Iodine (131 Deq) Ci/sec

7. Utilize the current meteorological conditions and appropriate Dose Calculation Worksheets, or enter release rates as Direct if using the computer, to estimate Offsite Doses from this attachment.

Comparing Field Measurements To Dose Projections

NOTE

1. "Reasonable comparison" between Field Measurements & Dose Calculations is if the two are within an order of magnitude. Too many assumptions preclude better precision.

2. A survey team measurements `off centerline' will yield a low estimated release rate. The Field Monitoring Coordinator (EOF) has a method for estimating centerline values for these situations.

Survey Meter DDE Readings

The computerized dose calculation program estimates the `survey meter reading' DDE and for the pre-designated sampling locations (refer to Field Survey Map for descriptions of the locations). This Survey Meter Estimate is sum of immersion in plume of Noble Gas, and plume shine from iodine & particulates. The noble gasses are the majority of the exposure source. The program adjusts for gap versus core mix of noble gasses in response to the Core Damage Situation question.

The manual method does not calculate a DDE from immersion in noble gas. Referring to a Dose Calculation Worksheet apropos to the met conditions, a value could be estimated by multiplying the value calculated on line 10 by the Dose Factors listed on line 13. These Dose Factors are based on a core mix of noble gasses, and include the X/Q for the prevailing meteorological conditions.

ATTACHMENT 12
FIELD TEAM MEASUREMENTS ASSESSMENT
(Page 3 of 3)

Thyroid CDE

Thyroid dose projections, both procedure & computer, are based on a release of I-131 Deq Ci/sec. The field teams measure I-131 in the plume; their procedure has a time dependent factor to account for the dose from the other iodines. The factor starts at about 1.4 and decays to 1 (one) over about 24 hours. Dividing projected thyroid dose rate, mr/hr by 1.3 E + 9 will estimate the Iodine 131(Deq) concentration uCi/cc.

Time of Sample v. Time of Release

Time of field measurement minus (downwind distance, miles / wind speed, m.p.h.) will yield the `time' of the release rate estimated. The computerized calculations use a time window 15 or 30 minutes long. Select the latest printout that has a Release Observation Time before the time estimated above.

Estimating Dose Rates Or Concentrations At Other Distances (e.g., 1, 2, 5, 10 miles)

Estimated Value @ Dist x = Measured value times $(DWD/Dist\ x)^Z$
Where: DWD = Measurement downwind distance, miles
Dist x = other distance, miles
Z = exponent based on stability class
(ref EPA-520 Rev. 6/79, page 5.10.)

END OF ATTACHMENT 12