ARKANSAS POWER & LIGHT COMPANY
Arkansas Nuclear One

TITLE: RECORD OF CHANGES AND REVISIONS | FORM NO. 1000.06A

MAGNITUDE OF RELEASE PROCEDURE | REV. # 8 PC #

MAGNITUDE OF RELEASE - COMPUTER METHOD
1904.01 REV. 1

Safety Related

UN-Controlled Copy # 104

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10	1		28	1										
11	1		29	1										
12	1		30	1										
13	1		31	1										
14	1		32	1										
15	1		33	1										
16	1		34	1										
17	1		35	1										
18	1		36	1										

APPROVED BY: James M Levine
(General Manager)

APPROVAL DATE
5/17/82

REQUIRED EFFECTIVE DATE:

1.0 PURPOSE

NOTE: This procedure provides a computer approach to the calculations described in 1904.02, "Magnitude of Release - Unit 1."

The purpose of this procedure is to provide an initial estimate of the radiological conditions at the ANO Exclusion Area Boundary, provide information to determine the Emergency Action Level, define the offsite area(s) potentially affected by an airborne radiological release, provide an estimate of the whole body and child thyroid dose rates and refine projections based on available field monitoring data using a computer to perform the necessary calculations.

2.0 SCOPE

2.1 This procedure is applicable to airborne radioactive releases from ANO, Unit One as indicated by normal ventilation system stack monitors; if the monitors are off scale, refer to 1904.03, "Auxiliary Building Ventilation Exhaust Emergency Radiation Monitor".

2.2 This procedure does not take into account effects caused by precipitation.

3.0 REFERENCES

3.1 References Used in Procedure Preparation:

3.1.1 Arkansas Nuclear One Emergency Plan

3.1.2 "Manual for Protective Actions, Appendix D", Environmental Protection Agency

3.1.3 "Workbook of Atmospheric Dispersion Estimates", U.S. Department of Health, Education and Welfare

3.1.4 Memorandum Number CL-1460 (By A. L. Smith)

3.1.5 Memorandum Number CL-1571 (By A. L. Smith)

3.1.6 Radio Shack TRS-80 Pocket Computer User's Manual

3.1.7 Radio Shack Minisette-9 Owner's Manual

3.1.8 1904.02, "Magnitude of Release - Unit 1"

3.2 References Used in Conjunction with this Procedure:

3.2.1 1903.10, "Emergency Action Level Response"

3.2.2 1903.43, "Duties of the Emergency Radiation Team"

3.2.3 1904.03, "Auxiliary Building Ventilation Exhaust Emergency Radiation Monitor"

3.2.4 1904.04, "Magnitude of Release - GERMS"

3.3 Related ANO References:

3.3.1 2904.01, "Magnitude of Release - Computer Method"

4.0 DEFINITIONS

4.1 $\sigma\theta$ (sigma theta) - The standard deviation of the net change of the horizontal wind direction

4.2 Δt (delta t) - The vertical temperature differential between the upper and lower temperature sensors on the meterological tower (in degrees centigrade).

4.3 X/Q - The ratio of the concentration of radioactive material (at a specific location) and the release rate (at the origin) in units of μCi/cc/Ci/sec.

4.4 [ ] - Brackets represent a labeled computer button.

4.5 Abbreviations

4.5.1 C.T. = Child Thyroid Dose Rate

4.5.2 W.B. = Whole Body Dose Rate

4.5.3 OK = "Non-radiological" Incident

4.5.4 U.E. = Unusual Event

4.5.5 S.E. = Site Emergency

4.5.6 G.E. = General Emergency

4.5.7 DEF = Define Mode

4.5.8 PRO = Program Mode

5.0 RESPONSIBILITIES

5.1 The Shift Operations Supervisor is responsible for determining if an unplanned gaseous release to the environment is indicated by symptoms such as high stack monitor readings, area radiation monitor alarms or other indications.

5.2 The Duty Emergency Coordinator, or his designee, is responsible for performing the magnitude of release calculations.

5.3 The Duty Emergency Coordinator is responsible for notifying appropriate groups per 1903.10, "Emergency Action Level Response".

5.4 The Offsite Radiological Monitoring Section of the Emergency Radiation Team is responsible for determining offsite radiological hazards per 1903.43, "Duties of the Emergency Radiation Team".

6.0 LIMITS AND PRECAUTIONS

6.1 This procedure provides an initial projection of the radiological conditions; field monitoring is necessary to determine the actual conditions.

6.2 Conversion factors which are provided to establish the child thyroid iodine dose rate are based on design basis accidents and should be considered less reliable than the calculated whole body dose rate.

6.3 Actual terrain and weather conditions will generally limit the accuracy of the projected doses at a specific location.

6.4 The diffusion overlays used in this procedure represent long-term average conditions for a ground level release.

6.5 The computer display is made of glass. Special care should be exercised to prevent dropping, bending, etc., this device.

6.6 When performing manual or programmed calculations, the computer should be in the RUN Mode.

6.7 When you enter numbers, characters, and instructions into the Computer (via the keyboard) this data is stored but it is not executed until you press the [ENTER] key.

6.8 The REM plug must be removed in order to operate the Fast-Forward and Rewind functions on the cassette tape recorder.

6.9 The tape heads and tape handling parts should be kept clean - use a cassette cleaner/demagnetizer tape, if possible.

6.10 Volume level can be very important when reading in data from the recorder; make slight adjustments when required to obtain the proper data transfer.

6.11 Be sure the connections between the Pocket Computer, Cassette Interface, and Recorder are secure and dirt-free.

6.12 If problems occur when using AC power for the recorder, use battery power instead (sometimes the AC power connection also adds some "hum" to the signal which upsets proper digital recordings).

7.0 DETERMINATION OF EXISTING METEROLOGICAL CONDITIONS AND THE GASEOUS RELEASE RATE

NOTE: Site meterological data may be obtained utilizing the "R MONIT" command from a GERMS (chromatics) terminal; station No. 1 (40' elevation sensor) should be used, if possible, for readings other than $\sigma\theta$; $\sigma\theta$ (indicated as wind direction variability) may be obtained from station No. 2.

NOTE: If site meteorological data is unavailable, limited meteorological data may be obtained from the following groups. [If the Pasquil Atmospheric Stability Category cannot be obtained, assume Category "G" (most conservative).]

A. National Weather Service (Meteorologist-in-Charge) [771-0971; or ▽ ; or 771-1080 (recording)]

B. KARV Radio (968-1184)

C. MSS Dispatcher

7.1 Record the current date and time in Lines 1 and 2 respectively of Form 1904.01A.

7.2 Record the $\sigma\theta$ from recorder AAR 9300 on Form 1904.01A, Line 3. If $\sigma\theta$ is not available, record the Δt from recorder AAR 9300 and note appropriately.

7.3 Record the prevailing wind direction (40' elev., if available) from recorder WDR 9300 on Form 1904.01A, Line 4.

7.4 Record the wind speed (40' elev., if available) from recorder WSR 9300 on Form 1904.01A, Line 5.

7.5 Record the net counts per minute and the corresponding system flow rates for each of the following monitors that are in service on Form 1904.01A.

7.5.1 Stack (RE-7400,FR-8001), Lines 6 and 7, respectively.

7.5.2 Penetration Room (RI-2120,FI-2120), Lines 8 and 9, respectively.

7.5.3 Penetration Room (RI-2130,FI-2130), Lines 10 and 11, respectively.

7.5.4 Hydrogen Purge (RI-7441, RI-7441A, FI-7441), Lines 12, 13 and 14, respectively.

7.5.5 Hydrogen Purge (RI-7442, RI-7442A, FI-7442), Lines 15, 16 and 17, respectively.

7.5.6 "A" Steam Header (RI-2682), Line 18.

7.5.7 No safeties/atmospheric dumps open (this is only applicable if the steam generator has primary-to-secondary leakage due to tube rupture; by using this method of calculation, the length of the release is not considered - it is only considered to be a portion of the instantaneous release rate for the time of the calculation; for the initial release, assume 14 safeties open; for follow-up determinations, assume 2 safeties open unless verified to be more or less) Line 19.

7.5.8 "B" Steam Header (RI-2681), Line 20.

7.5.9 No safeties/atmospheric dumps open (see note on Step 7.5.7), Line 21.

7.5.10 [illegible] building (refer to 2904 series procedures).

7.6 Make the following determinations:

7.6.1 If this is the initial calculation, proceed to Section 8.0 (Data Conversion).

7.6.2 Compare the present readings to the values on which the latest projections have been made.

A. If the values have not deviated from the most recently checked column on Form 1904.02A by more than the following list, it is not necessary to make new projections. New data should be taken as specified by the Duty Emergency Coordinator or the Dose Assessment Supervisor.

Indication	Allowable Deviation
Wind Direction	±20 degrees
Wind Speed	±20%
$\sigma\theta$	± New Atmospheric Stability Category
Δt	± New Atmospheric Stability Category
CPM	±20%
Flow Rate	±20%

B. When the data recorded changes more than the allowable deviation and a new projection is made on that data, you may identify the data by marking the parenthetic box "()" in the top of that column on Form 1904.01A.

8.0 DATA CONVERSION

8.1 Complete Form 1904.01B to determine the current meteorological conditions and applicable factors.

NOTE: If SPING data is to be used, skip Step 8.2 and proceed to Section 9.0.

8.2 Complete Form 1904.01C to determine the gaseous release rate.

9.0 DETERMINATION OF DOSE RATES AND MAXIMUM PERMISSIBLE CONCENTRATION

9.1 Obtain the computer, overlays and map from the appropriate emergency kit:

9.1.1 Control Room

9.1.2 Technical Support Center

9.1.3 Emergency Control Center

9.2 Complete Form 1904.01D to indicate the following obtained information:

9.2.1 Whole body dose rate at the indicated distances.

9.2.2 Child thyroid dose rate at the indicated distances.

9.2.3 The ratio of the actual to the maximum permissible concentration of Xe-133 at the indicated distances.

9.3 If an Emergency Action Level is NOT indicated, return to Section 7.0. New data should be taken as specified by the Duty Emergency Coordinator or the Dose Assessment Supervisor.

9.4 If an Emergency Action Level is declared (initial projection only), identify, as necessary, the meteorological and effluent monitor data on Form 1904.01A which was used in making the projection by checking the parenthetic box "( )" at the top of that column.

10.0 PLUME DEFINITION

NOTE: The attachments contained in this procedure are provided for ILLUSTRATION ONLY. The scaled overlays and maps necessary to do the actual calculations with are located in the emergency kits.

10.1 Select the overlay (Attachments 1-7) which corresponds to the existing atmospheric stability category (Form 1904.01B, Line 1.2).

10.2 Place the selected overlay on the ANO area map (Attachment 8) with the origin directly over the ANO site center and align plume centerline with the downwind direction.

NOTE: The maximum downwind extent of the affected area may also be determined by the projected extent of the plume boundary.

10.3 Locate the general vicinity of the plume boundary (from Form 1904.01D Line 5.1.3) on the overlay corresponding to the Atmospheric Stability Category.

10.3.1 Any sectors which are contained (or partially contained) within the plume boundary line should be designated as an affected area. Record this information on line 7.0 of Form 1904.01D.

NOTE: The following steps account for the uncertainty in the local wind direction caused by the Mt. Nebo/Spring Mountain terrain features.

10.3.2 If the plume centerline lies in sector 10 and the plume boundary extends beyond 6 miles, the affected area should also include sectors 9, 10 and 11 (from subsector G to the projected extent of the plume).

10.3.3 If the plume centerline lies in sector 11 and the plume boundary extends beyond 6 miles, the affected area should also include sectors 10, 11 and 12 (from subsector G to the projected extent of the plume).

10.4 If it is necessary to calculate plume arrival time (in hours) for a specific location, divide the distance (in miles) from the plant to the location by the windspeed (in mph).

10.5 If it is necessary to calculate the projected integrated dose (mR) for a specific location, multiply the local dose rate (mR/hr) by the estimated duration of the release (hr).

11.0 NOTIFICATIONS

11.1 Provide radiological release information to appropriate groups per 1903.10, "Emergency Action Level Response".

11.2 The Emergency Radiation Team may be dispatched to obtain field radiological data at the discretion of the Duty Emergency Coordinator/Recovery Manager. They shall be dispatched upon declaration of a Site Emergency. If the Emergency Radiation Team is dispatched, refer to Section 12.0.

11.3 Return to Section 7.0 of this procedure (or section 7.0 of 1904.04, "Magnitude of Release - GERMS," if SPING data is being used). New data should be taken as specified by the Duty Emergency Coordinator/Dose Assessment Supervisor.

NOTE: This section may be used during periods that monitoring teams have been dispatched, to improve dose projections based upon the comparison of projected and measured whole body dose rates at field locations on the plume centerline. This section is designed to complement rather than replace the ongoing dose projections of Sections 7.0 through 10.0.

12.0 VERIFICATION OF PROJECTED DOSE RATES BY FIELD MEASUREMENT

12.1 Based on wind direction, the Duty Emergency Coordinator/Offsite Monitoring Supervisor should dispatch offsite radiological monitoring teams to sample the plume at the appropriate locations to be specified at the time of the incident. Preselected survey points in each sector and zone are shown on the area map (Attachment 8).

12.2 The radiation survey at each location should include a direct exposure rate measurement (mR/hr) and an air sample to determine iodine concentration (μCi/cc). As the survey teams approach the assigned survey location, continuous radiation measurements should be taken to identify the location of the highest radiation level. As survey results are obtained, the radiological monitoring team should report the results to the Duty Emergency Coordinator/Offsite Monitoring Supervisor and proceed as directed.

NOTE: Real-time determinations should be compared to projected levels for corresponding time periods.

12.3 Determination of Iodine Dose Factor by Field Measurement.

12.3.1 Record on Form 1904.01E, the appropriate Field Location in Column 1, the Iodine Concentration in Column 2, and Whole Body Dose Rate in Column 3.

12.3.2 Calculate the Iodine Dose Factor for each field location in Column 4. (The most recent calculated Iodine Dose Factor may be used for future Child Thyroid Dose Projections.)

12.4 Determination of Whole Body Overlay Scale Factor

12.4.1 Scale factors may be determined to refine future whole body dose estimates based upon field measurements. Because the dose rate may change rapidly with distance from the plume centerline, scale factors should be based only upon a comparison of a projected plume centerline dose rate with the highest measured field dose rate determined by traversing the plume at the projected downwind distance. This ensures that the projected plume centerline dose rate is compared with the actual plume centerline dose rate.

12.4.2 If a projected Whole Body Dose Rate has been determined (Form 1904.01D) for a plume centerline location, record the Whole Body Dose Rate in Column 5.

12.4.3 Calculate the ratio of the Measured Dose Rate to the Projected Dose Rate and record in Column 6 of Form 1904.01E.

12.4.4 The most recent calculated ratios may be used for future Whole Body Dose Rate Projections. Multiply the scale factor which was used in the Whole Body Dose Rate Projection (Form 1904.01B, Line 2.1) for the specific field location by the ratio in Column 6 and enter the result in Column 7 of Form 1904.01E.

13.0 ATTACHMENTS AND FORMS

13.1 Form 1904.01A - Existing Conditions Summary

13.2 Form 1904.01B - Data Conversion Work Sheet

13.3 Form 1904.01C - Gaseous Release Rate Work Sheet

13.4 Form 1904.01D - EAL/Offsite Dose Projection Work Sheet

13.5 Form 1904.01E - Dose Factor Determination by Field Measurement

13.6 Attachment 1 - Diffusion Overlay (Atomspheric Stability Category A)

13.7 Attachment 2 - Diffusion Overlay (Atmospheric Stability Category B)

13.8 Attachment 3 - Diffusion Overlay (Atmospheric Stability Category C)

13.9 Attachment 4 - Diffusion Overlay (Atmospheric Stability Category D)

13.10 Attachment 5 - Diffusion Overlay (Atmospheric Stability Category E)

13.11 Attachment 6 - Diffusion Overlay (Atmospheric Stability Category F)

13.12 Attachment 7 - Diffusion Overlay (Atmospheric Stability Category G)

13.13 Attachment 8 - Area Map

13.14 Attachment 9 - Keyboard Layout

13.15 Attachment 10 - Battery Replacement

13.16 Attachment 11 - Program Loading/Verification

13.17 Attachment 12 - Program Listing

13.18 Attachment 13 - Memory Contents

13.19 Attachment 14 - Hydrogen Purge Monitor Conversion Factors

ARKANSAS POWER & LIGHT COMPANY
Arkansas Nuclear One

TITLE: EXISTING CONDITIONS SUMMARY
FORM NO. 1904.01A
REV. 0 1 PC 0

		READING				
		( )	( )	( )	( )	( )
LINE	ITEM	1	2	3	4	5
1	DATE					
2	TIME (HHMM)					
3	σθ (degrees) [· ( ) Δt (°C)] (AAR 9300)					
4	WIND DIRECTION (WDR 9300) FROM, IN DEGREES					
5	WIND SPEED (WSR 9300) MPH					
6	STACK (RE-7400) CPM					
7	STACK (FR-8001) FLOW RATE (CFM)					
8	PENETRATION ROOM (RI-2120) CPM					
9	PENETRATION ROOM (FI-2120) FLOW RATE (CFM)					
10	PENETRATION ROOM (RI-2130) CPM					
11	PENETRATION ROOM (FI-2130) FLOW RATE (CFM)					
12	HYDROGEN PURGE (RI-7441) CPM					
13	HYDROGEN PURGE, HIGH RANGE (RI-7441A) mR/hr					
14	HYDROGEN PURGE (FI-7441) FLOW RATE (CFM)					
15	HYDROGEN PURGE (RI-7442) CPM					
16	HYDROGEN PURGE, HIGH RANGE (RI-7442A) mR/hr					
17	HYDROGEN PURGE (FI-7442) FLOW RATE (CFM)					
18	"A" STEAM HEADER (RI-2682) MR/HR					
19	NO. SAFETIES/ATMOSPHERIC DUMPS OPEN (HEADER "A")					
20	"B" STEAM HEADER (RI-2681) MR/HR					
21	NO. SAFETIES/ATMOSPHERIC DUMPS OPEN (HEADER "B")					
22	INITIALS					

REVIEWED BY: _____

ARKANSAS POWER & LIGHT COMPANY
Arkansas Nuclear One

TITLE: METEOROLOGICAL DATA WORK SHEET
FORM NO. 1904.01B
REV. 01 PC 0

Date _____

1.0 ATMOSPHERIC STABILITY CATEGORY

1.1 Record the $\sigma\theta$ (AAR 9300). If this is not available, record the Δt (AAR9300).

$\sigma\theta$ _____ degrees or Δt _____ °C

1.2 Determine from the following table the atmospheric stability category corresponding to the value determined in Step 1.1 above and record the category below:

Atmospheric Stability Category	$\sigma\theta$	ΔT
A or 1	>22.5°	<-0.87°
B or 2	17.5° to 22.5°	-0.87° to -0.78°
C or 3	12.5° to 17.5°	-0.78° to -0.69°
D or 4	7.5° to 12.5°	-0.69° to -0.23°
E or 5	3.8° to 7.5°	-0.23° to +0.69°
F or 6	2.1° to 3.8°	+0.69° to + 1.8°
G or 7	<2.1°	>1.8°

Atmospheric Stability Category = _____ (Number)

2.0 FACTORS

2.1 Enter the current scale factor. _____ (No Units)

2.1.1 If field data is available, enter the most recent entry from Form 1904.01E (Column 7).

2.1.2 If field data if not available, enter "1".

2.2 Select the iodine dose factor. _____ mR/hr (thyroid) / mR/hr (whole body)

2.2.1 If field data is available, enter the most recent entry from Form 1904.01E, (Column 4).

2.2.2 If field data is not available and SPING Data is to be used, the Iodine dose factor is calculated as follows (refer to 1904.04C, Line 8):

$$\text{Iodine Dose Factor} = \frac{\text{Total Iodine Release Rate}}{\text{Total Noble Gas Release Rate}}$$ *1191

ARKANSAS POWER & LIGHT COMPANY
Arkansas Nuclear One

TITLE: METEOROLOGICAL DATA WORK SHEET
FORM NO. 1904.01B
REV. #1 PC #

Date _____

2.2.3 If field data (or SPING Data) are not available, select and enter the appropriate dose factor from the following list based on the current plant conditions:

Plant Condition	Iodine Dose Factor
Waste Gas Tank Rupture	0.049
Steam Generator Tube Rupture (to condenser)	0.054
Fuel Handling Accident	1.7
Large-Break LOCA	63
Rod Ejection Accident	814
None of the above	9.3

Performed By _____ / _____
Initials Time

Reviewed By _____

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TITLE: GASEOUS RELEASE RATE WORKSHEET
FORM NO. 1904.01C
REV. # 1 PC #

PART 1 TOTAL GASEOUS RELEASE RATE

Item	System Name & Monitor Number	Column 1 Monitor Reading (cpm)	Column 2 Ventilation System Flow Rate (CFM)	Column 3 Monitor Calibration Conversion Factor	Column 4 Q_{gas} (Ci/S)
1	Stack (RE-7400; FR-8001)			2.05E-11	
2	Penetration Room (RI-2120; FI-2120)			1.23E-12	
3	Penetration Room (RI-2130; FI-2130)			1.23E-12	
4	Hydrogen Purge (RI-7441; FI-7441)			9.28E-12	
5	Hydrogen Purge (RI-7442; FI-7442)			9.28E-12	
6	Hydrogen Purge, High Range (RI-7441A;FI-7441)+	[redacted]			
7	Hydrogen Purge, High Range (RI-7442A;FI-7442)+				
8	Aux. Bldg. Vent. Exhaust Emer. Rad. Monitor*				
9	"A" Steam Safeties (RI-2682)**				
10	"B" Steam Safeties (RI-2681)**				
11	Other:				
12	Total	XXX	XXX	XXX	

PART 2 NOTES

1. Determination of Gaseous Release Rate (Q_{gas}) = Column 1 x Column 2 x Column 3

*2. Aux. Bldg. Vent. Exhaust Emergency Radiation Monitor Release Rate Data from Form 1904.03B, Column 9.

**3. Net mR/hr * No. Safeties Open * 0.0178 $\frac{Ci/Sec}{mR/hr}$ = Qgas,
Net mR/hr * gpm EFW Flow $\frac{gr}{or}$ 1.12E-5 = Qgas
Net mR/hr * No. lb/hr Steam exhausted * 2.23E-8 = Qgas

+4. Qgas = Net mR/hr * Conv. Factor (See Attachment 14) * CFM Vent Flow * 4.72E-4 $\frac{Ci\text{-}cc}{\mu Ci/ft^3}$

5. Total Gaseous Release Rate, Q_{gas} = sum of values in Column 4

Performed by: _____ / _____
INITIAL TIME

Reviewed by: _____

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TITLE: EAL/OFFSITE DOSE PROJECTION WORK SHEET | FORM NO. 1904.01D
REV. 0 PC 0

INSTRUCTIONS

1.0 Press the [ON] button.

1.1 If a dot is not visible in the upper right hand corner of the display, replace the batteries per Attachment 10 - Battery Replacement.

1.2 If the batteries are replaced, the program must be reloaded and verified per Attachment 11 - Program Loading Verification.

2.0 Press the [MODE] button repeatedly, as necessary, until the word "RUN" is indicated in the upper portion of the display.

NOTE: At least one test case contained in Attachment 11 - Program Loading/Verification should be performed prior to initial use.

_____
Initials

3.0 Type RUN (followed by [ENTER])

4.0 Type the appropriate responses, as indicated (followed by [ENTER]) to each question as it is displayed.

4.1 Unit Number (1/2)

4.2 Wind Direction (From) - 1904.01A, Line 4 (or 1904.04A, Line 4, if SPING data is used)

4.3 Windspeed (MPH) - 1904.01A, Line 5 (or 1904.04A, Line 5, if SPING data is used)

4.4 Stability Class (1-7) - 1904.01B, Step 1.2

4.5 Whole Body Scale Factor - 1904.01B, Step 2.1

4.6 Iodine Dose Factor - 1904.01B, Step 2.2

4.7 Q-Gas (Noble Gas in Ci/Sec) - 1904.01C, Line 12 (or 1904.04C, Line 8, if SPING data is used)

4.8 Other Unit (data) - As indicated

5.0 When the computer prints an answer, the following actions should be taken:

5.1 Record the answer in the appropriate column below; then press [ENTER] to display the next answer (through Line 5.1.5E).

5.1.1	Emergency Action Level	OK U.E. Alert S.E. G.E.
5.1.2	Downwind Direction	Degrees
5.1.3	Plume Outer Boundary	Sec/m^3

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TITLE: ~~EAL/OFFSITE DOSE PROJECTION WORK SHEET~~ FORM NO. ~~1904.01D~~
REV. # 1 PC #

5.1.4 Projected Dose Rates (Annual Average Meteorology)

	DOWNWIND DISTANCE (MILES)	WHOLE BODY (mR/hr)	CHILD THYROID (mR/hr)	MPC RATIO
A.	0.65			

5.1.5 Projected Dose Rates (Real-Time Meteorology)

	DOWNWIND DISTANCE (MILES) OR LOCATION	WHOLE BODY (mR/hr)	CHILD THYROID (mR/hr)	MPC RATIO
A.	0.65			
B.	1.0			XXX
C.	2.0			XXX
D.	5.0			XXX
E.	10.0			XXX
F.	OTHER: (LIST)			XXX
				XXX
				XXX
				XXX

6.0 The dose rates at any field location (5.1.5F) may be estimated by the following method.

6.1 Interpolate the χ/Q value from the appropriate overlay for the desired location.

NOTE: Ensure that the computer is still in the RUN mode.

6.2 Type the value obtained in Step 6.1 followed by pressing the [SHIFT] B [ENTER] keys. The computer will display the projected whole body dose rate (mR/hr) for that location.

6.3 Press [SHIFT] X [ENTER]. The computer will then display the projected child thyroid dose rate for the same location.

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TITLE: EAL/OFFSITE DOSE PROJECTION WORK SHEET
FORM NO. 1904.01D
REV. 1 PC 1

7.0 AFFECTED SECTORS (From step 10.4 of this procedure):

_____

Performed By _____ / _____
Initials Time

Reviewed By _____

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TITLE: DOSE FACTOR DETERMINATION BY FIELD MEASUREMENT
FORM NO. 1904.01E
REV. # 1 PC #

(1) Field Location	(2) Iodine Conc. (μCi/cc)	(3) Whole Body Dose Rate (mR/hr)	(4) Iodine Dose Factor	(5) Projected WB Dose Rate (From Form 1904.01D)	(6) Ratio of Whole Body Dose Rate	(7) Current Scale Factor

CALCULATION:

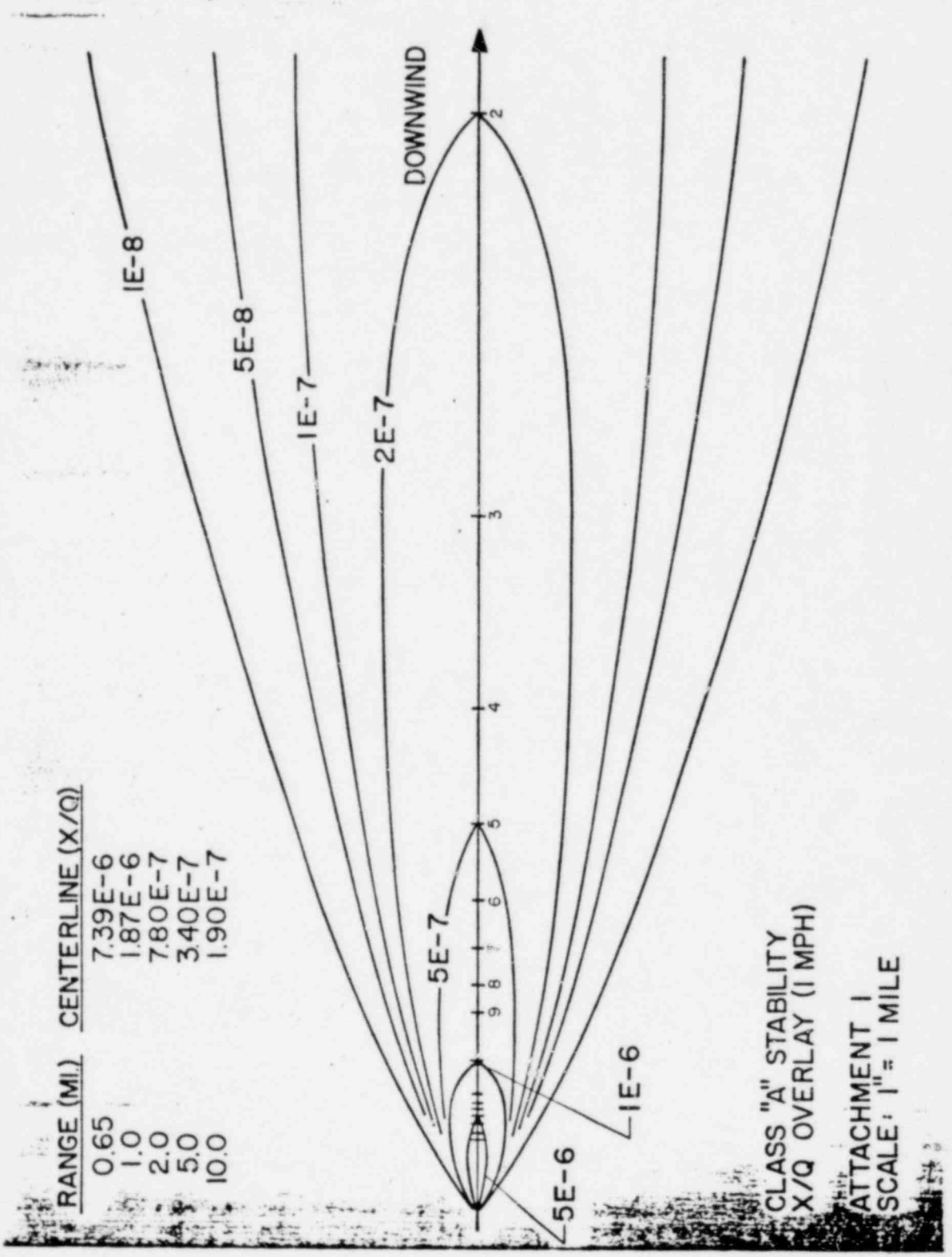
Column 4: Determination of Iodine Dose Factor: $\frac{\text{Column 2 X 5.6E8}}{\text{Column 3}}$ (mR/hr/μCi/cc)

Column 6: Determination of Ratio of Whole Body Dose Rates: $\frac{\text{Column 3}}{\text{Column 5}}$

Column 7: Determination of Current Scale Factor: Form 1904.01B, Line 2.1 X Column 6

Performed By _____ / _____
Initials/Time

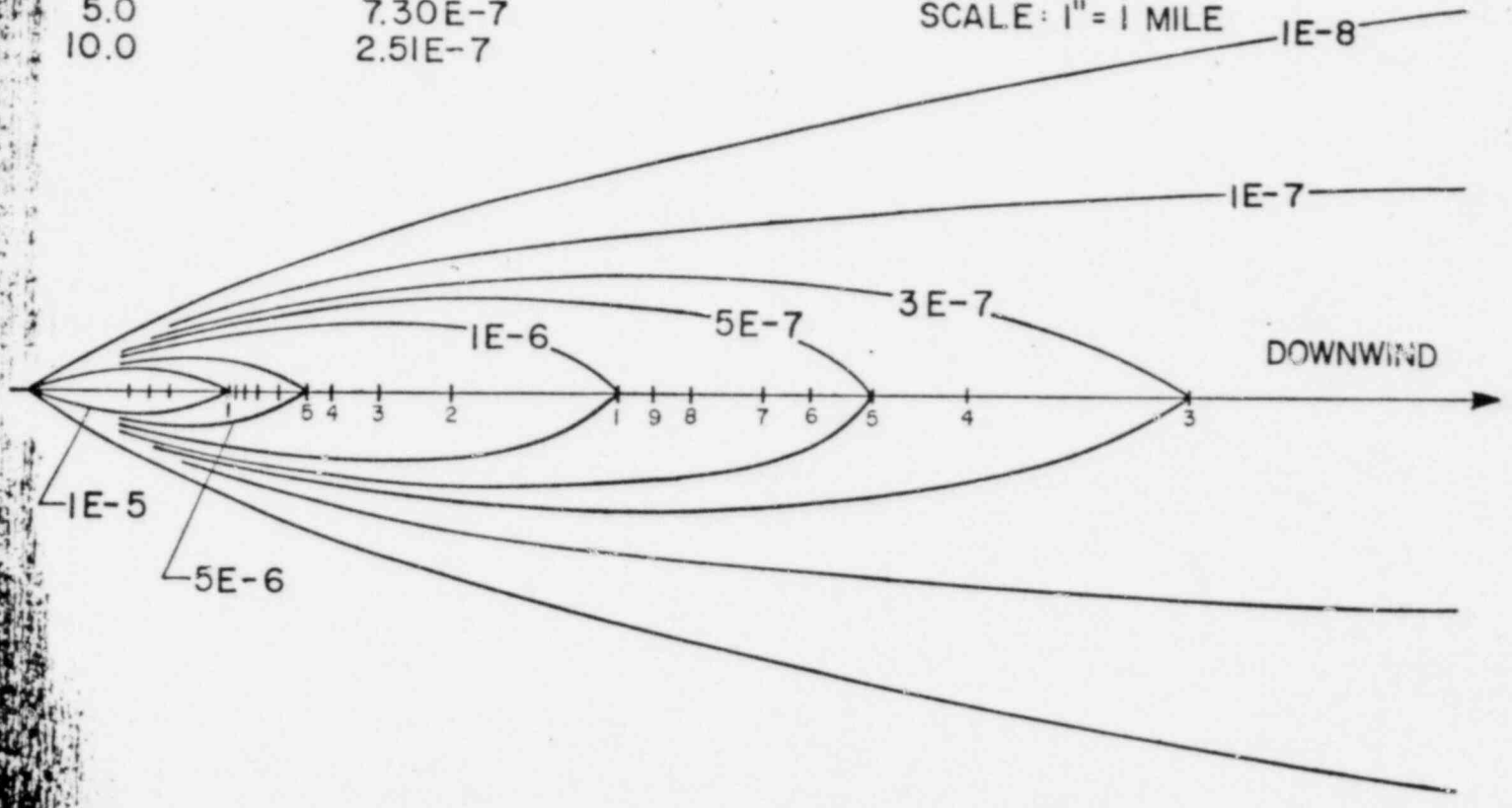
Reviewed By _____


DOWNWIND
1E-8
5E-8
1E-7
2E-7
5E-7
1E-6
5E-6
RANGE (MI.) CENTERLINE (X/Q)
0.65 7.39E-6
1.0 1.87E-6
2.0 7.80E-7
5.0 3.40E-7
10.0 1.90E-7
CLASS "A" STABILITY
X/Q OVERLAY (1 MPH)
ATTACHMENT 1
SCALE: 1" = 1 MILE

RANGE (MI.)	CENTERLINE (X/Q)
0.65	4.10E-5
1.0	1.68E-5
2.0	4.18E-6
5.0	7.30E-7
10.0	2.51E-7

CLASS "B" STABILITY
X/Q OVERLAY (1 MPH)

ATTACHMENT 2
SCALE: 1" = 1 MILE



ARKANSAS NUCLEAR ONE

PLANT MANUAL SECTION: MAGNITUDE OF RELEASE PROC

PROCEDURE/WORK PLAN TITLE: MAGNITUDE OF RELEASE - COMPUTER METHOD

NO: 1904.01

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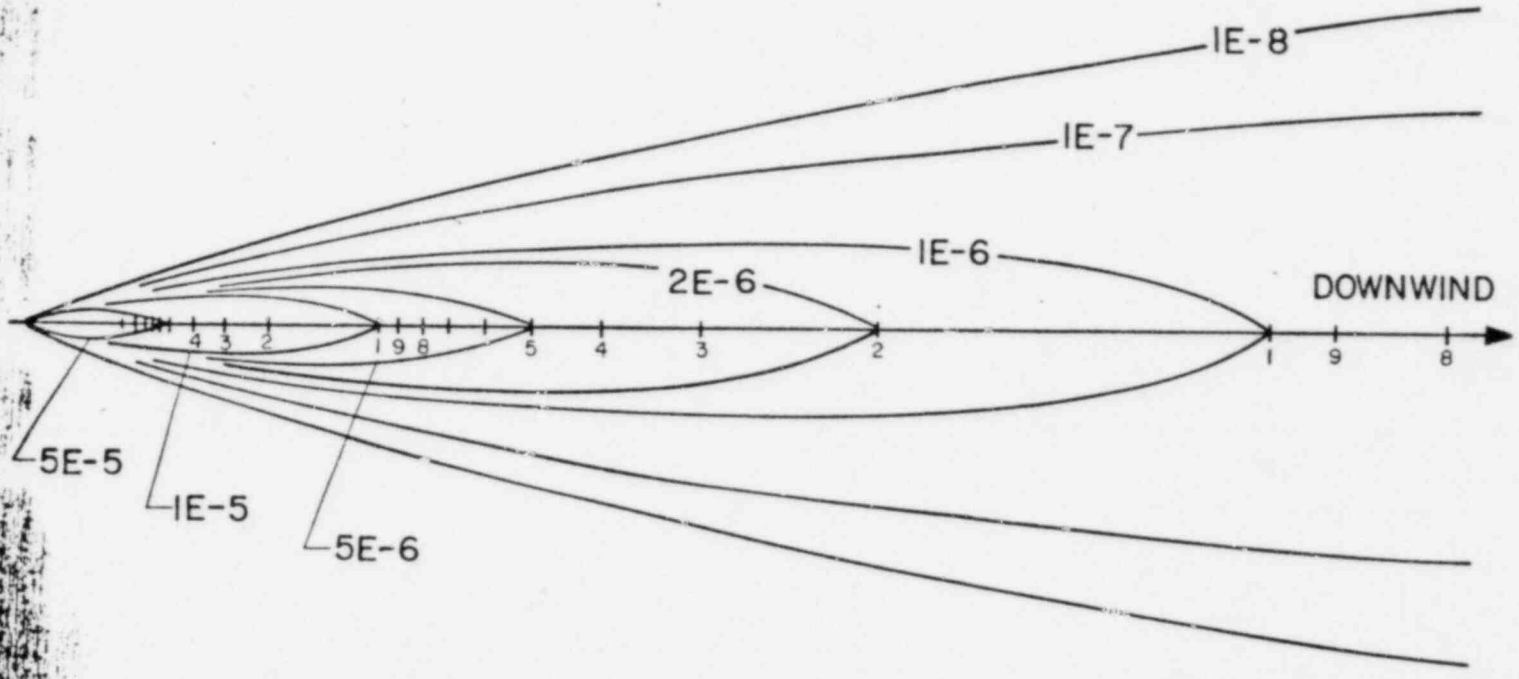
CHANGE DATE

RANGE (MI.)	CENTERLINE (X/Q)
0.65	1.05E-4
1.0	4.64E-5
2.0	1.41E-5
5.0	2.63E-6
10.0	7.74E-7

CLASS "C" STABILITY
X/Q OVERLAY (1 MPH)

ATTACHMENT 3
SCALE: 1" = 1 MILE



ARKANSAS NUCLEAR ONE

PLANT MANUAL SECTION: MAGNITUDE OF RELEASE PROC.

PROCEDURE/WORK PLAN TITLE: MAGNITUDE OF RELEASE - COMPUTER METHOD

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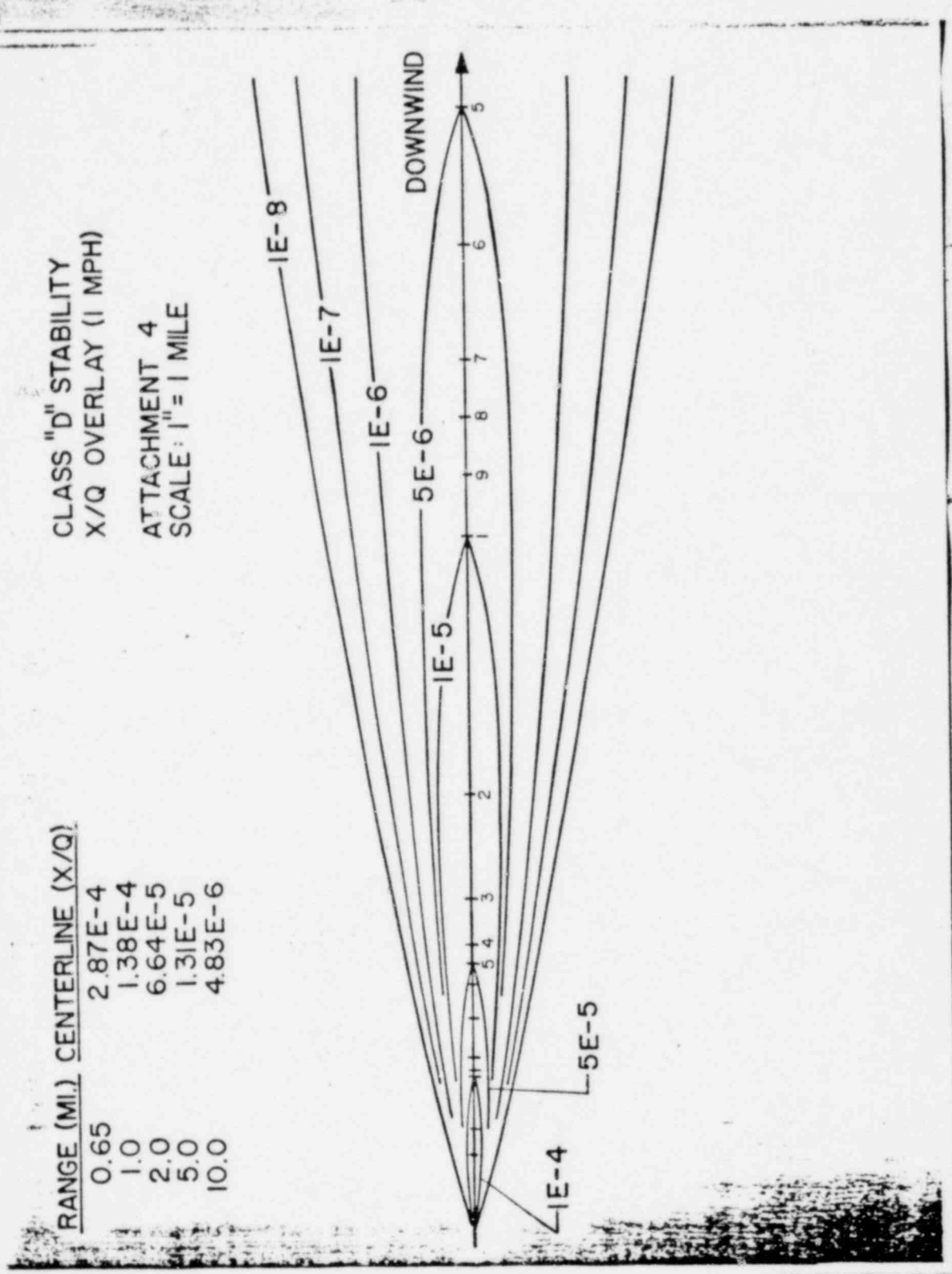
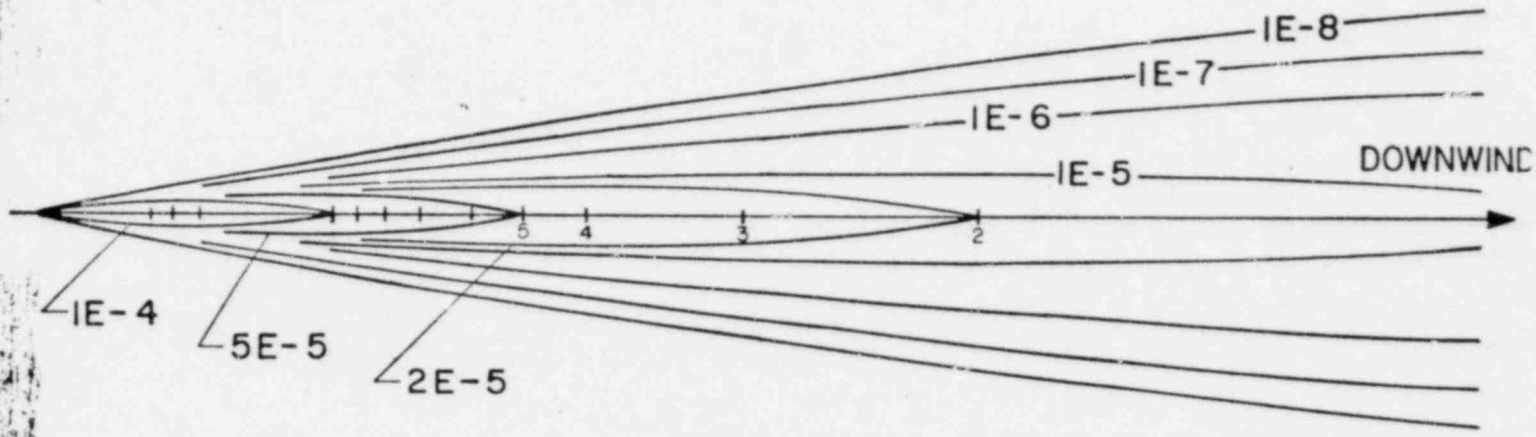

CLASS "D" STABILITY
X/Q OVERLAY (1 MPH)
ATTACHMENT 4
SCALE: 1"= 1 MILE
DOWNWIND
1E-8
1E-7
1E-6
5E-6
1E-5
5E-5
1E-4
RANGE (MI.) CENTERLINE (X/Q)
0.65 2.87E-4
1.0 1.38E-4
2.0 6.64E-5
5.0 1.31E-5
10.0 4.83E-6

RANGE (MI.)	CENTERLINE (X/Q)
0.65	4.84 E-4
1.0	2.62 E-4
2.0	1.02 E-4
5.0	2.92 E-5
10.0	1.14 E-5

CLASS "E" STABILITY
X/Q OVERLAY (1 MPH)

ATTACHMENT 5
SCALE: 1" = 1 MILE



ARKANSAS NUCLEAR ONE

PLANT MANUAL SECTION: MAGNITUDE OF RELEASE PROC.

PROCEDURE/WORK PLAN TITLE: MAGNITUDE OF RELEASE - COMPUTER METHOD

NO: 1904.01

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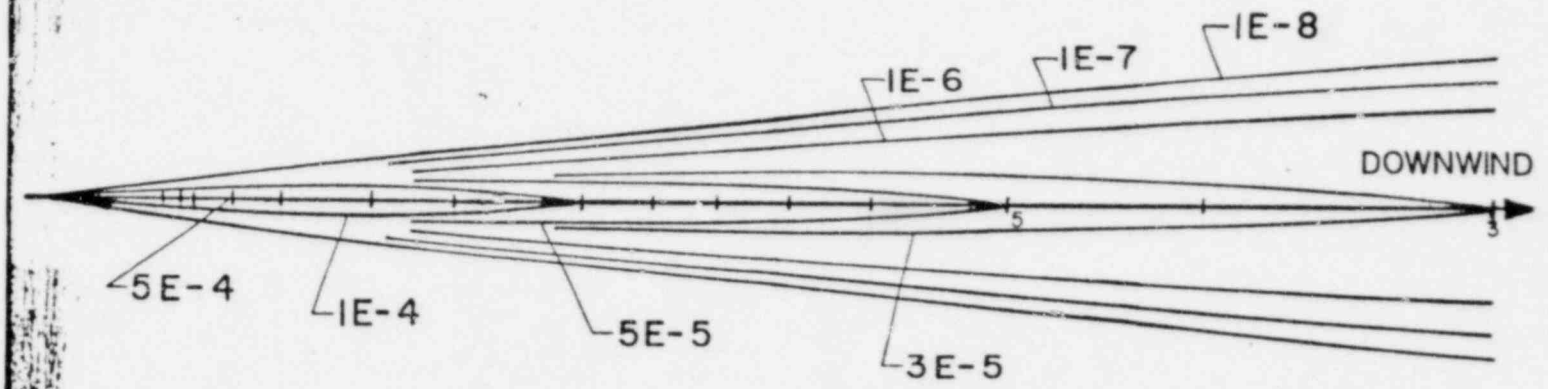
REVISION 1 DATE 5/14/82

CHANGE DATE

RANGE (MI.)	CENTERLINE (X/Q)
0.65	8.37E-4
1.0	5.01E-4
2.0	2.22E-4
5.0	7.23E-5
10.0	3.05E-5

CLASS "F" STABILITY
X/Q OVERLAY (1 MPH)

ATTACHMENT 6
SCALE : 1"= 1 MILE



ARKANSAS NUCLEAR ONE

PLANT MANUAL SECTION: MAGNITUDE OF RELEASE PROC

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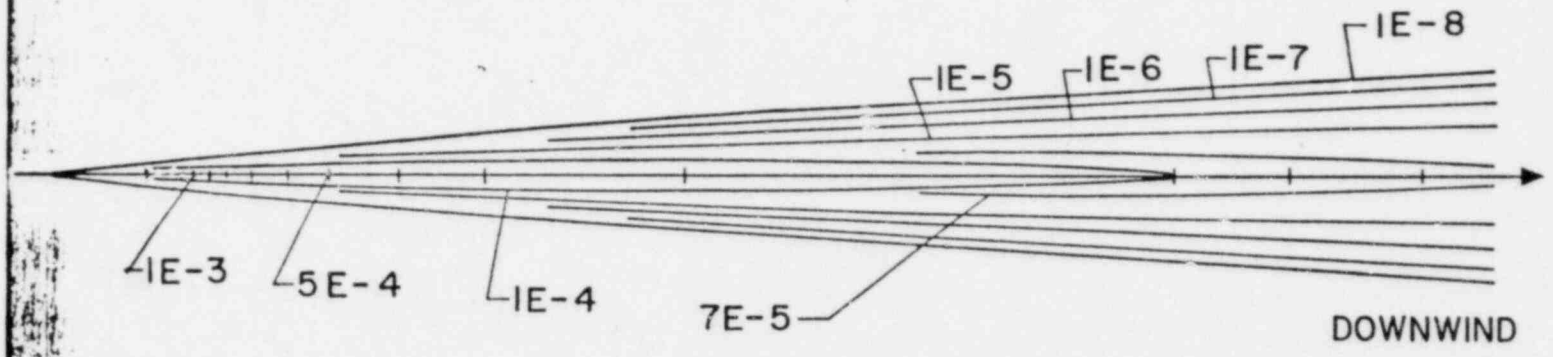
CHANGE DATE

RANGE (MI.)	CENTERLINE (X/Q)
0.65	2.06E-3
1.0	9.61E-4
2.0	4.78E-4
5.0	1.72E-4
10.0	7.46E-5

CLASS "G" STABILITY
X/Q OVERLAY (1 MPH)

ATTACHMENT 7
SCALE: 1" = 1 MILE



ARKANSAS NUCLEAR ONE

PLANT MANUAL SECTION: MAGNITUDE OF RELEASE PROC

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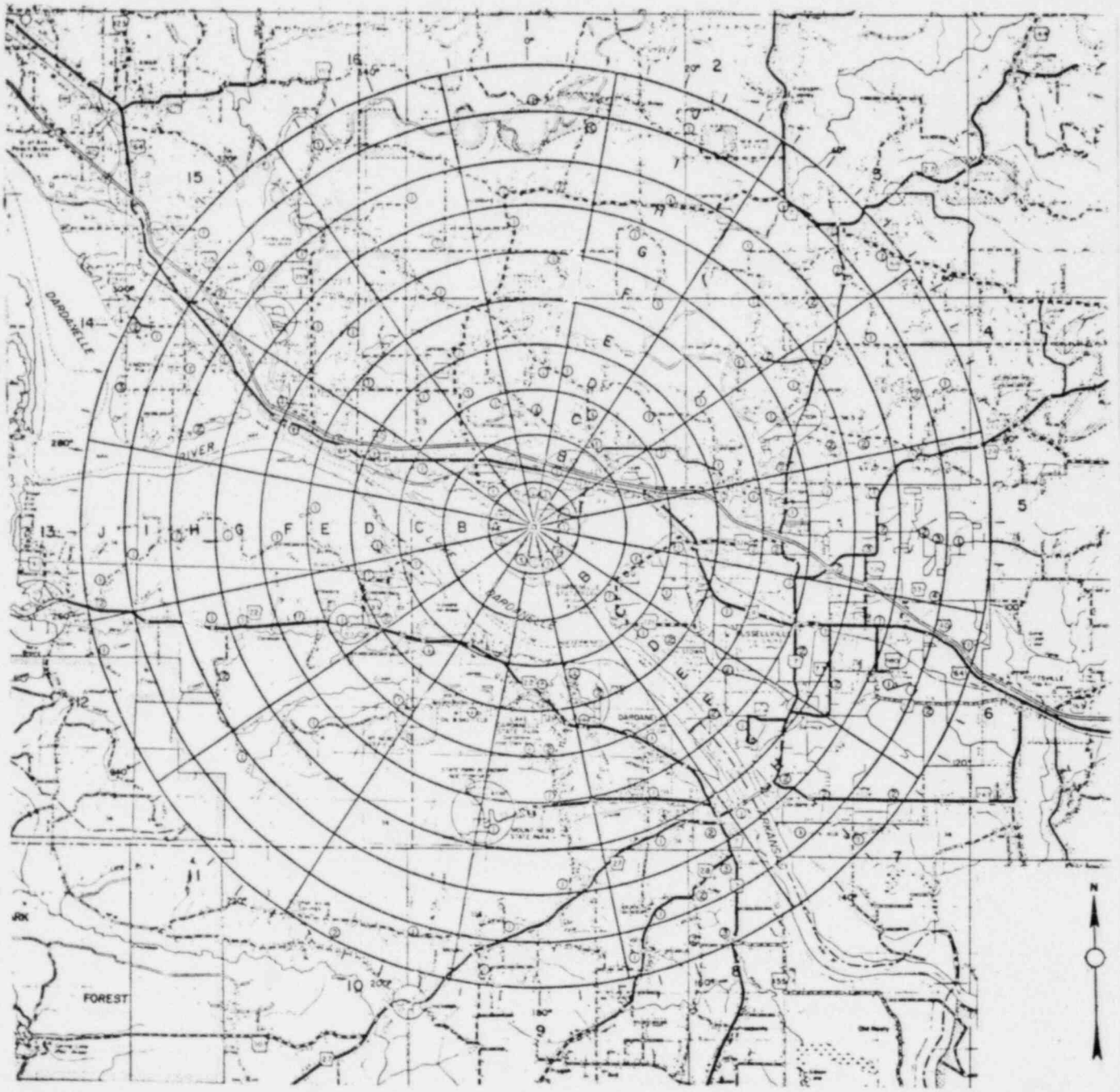
CHANGE DATE

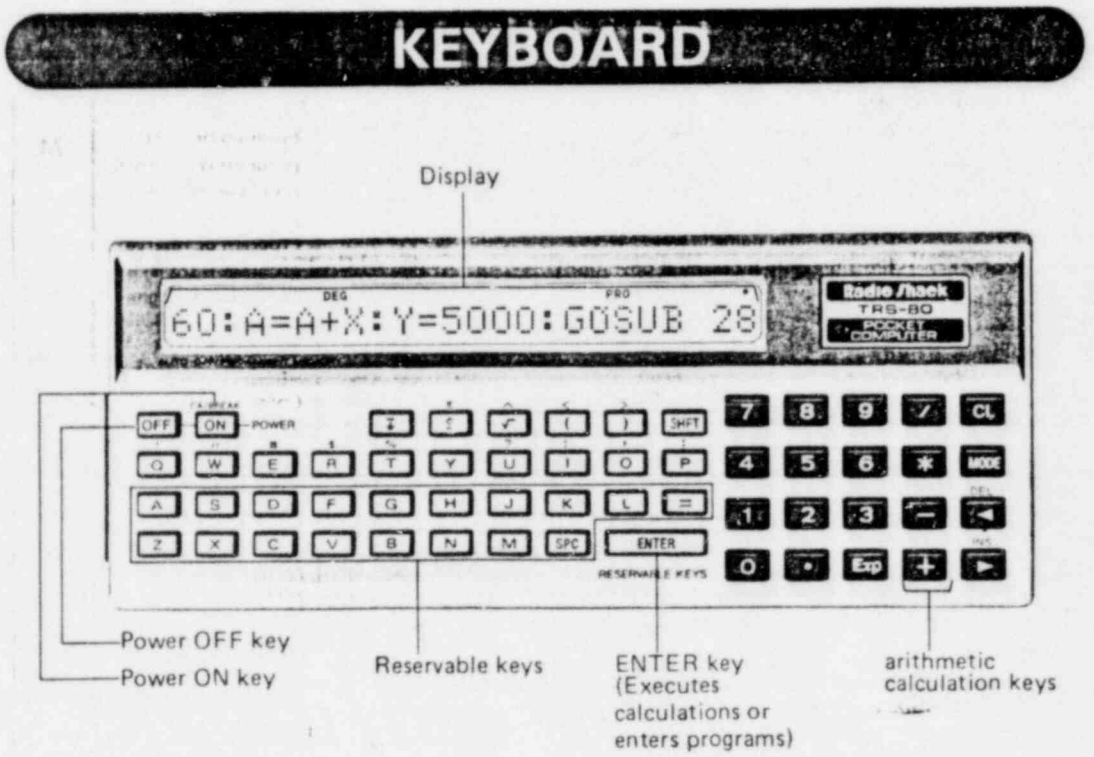
ATTACHMENT 8

AREA MAP



ATTACHMENT 9

KEYBOARD LAYOUT



ATTACHMENT 10 Page 1 of 2

BATTERY REPLACEMENT

1.0 Computer

NOTE: This computer uses Type 675 batteries; mercury batteries should be used when possible.

1.1 Press the [OFF] button.

NOTE: Two (2) types of screws hold the back cover in place.

1.2 Remove the screws from the back cover.

NOTE: Use a dry cloth to wipe off the surface of the new batteries before installing.

1.3 Replace the batteries, placing the "+" side up.

1.4 Hook the tabs on the back cover into the slots on the computer.

1.5 Push the back cover in slightly while replacing the screws.

NOTE: Do not use a pencil.

1.6 Using a hard, pointed object, carefully push the Reset switch on the back cover to clear the computer.

1.7 Press the [OFF] and then [ON] button to clear the computer.

NOTE: When the batteries are correctly installed "> DEG (MODE) ." will be displayed.

2.0 Cassette Interface

NOTE: This device uses Type AA batteries; alkaline batteries should be used when possible.

2.1 Remove the sliding door located on the underside of the interface.

2.2 Replace the batteries as indicated on the interface.

3.0 Cassette Tape Recorder

NOTE: An optional AC adapter may be used, as necessary, if battery replacement is not feasible.

ATTACHMENT 1C

a) Press down on the battery compartment cover (on the back) and remove.

b) Replace the batteries as indicated on the recorder.

c) Replace the battery cover.

ATTACHMENT 11 Page 1 of 4

PROGRAM LOADING/VERIFICATION

1.0 Connecting the Pocket Computer to the Cassette Interface

NOTE: Before attaching or removing the Computer from the Interface, be sure to turn off the Computer with the [OFF] key. If the computer is connected or disconnected with power ON, all keys may become inoperative. In this case, press the ALL RESET switch on the bottom of the Computer. This will clear the entire Computer.

1.1 Press the [OFF] button.

1.2 Remove the cover from the left side of Computer. It may be snapped into place on the bottom of the Cassette Interface, if desired.

1.3 Fit the projecting parts on the Cassette Interface in the grooves of the Computer.

NOTE: If parts do not mate properly, do not force them. Carefully shift the Computer left or right to be sure all mating surfaces are correct.

1.4 Slide the Computer carefully to fit securely onto the Cassette Interface.

2.0 Connecting the Cassette Interface to a Tape Recorder

2.1 Connect red plug into the MIC jack on the Cassette Recorder.

2.2 Connect gray plug into the EAR phone jack on the Recorder.

3.0 Loading a Program From a Magnetic Tape

3.1 Load tape in the tape recorder.

3.2 Rewind the tape completely; connect the black plug into the REMOTE jack on the Recorder.

3.3 Press the [ON] button.

3.4 Press the [MODE] button repeatedly, as necessary, until the word "Run" is indicated in the upper portion of the display.

3.5 Push the PLAY button on the tape recorder.

3.6 Set the VOLUME control to approximately 3/4 of its full scale value.

3.7 Set Tone to maximum treble (if this option is available).

3.8 Type NEW [ENTER].

3.9 Press the [MODE] button repeatedly until the word "RESERVE" is indicated in the upper portion of the display.

3.10 Type NEW [ENTER].

3.11 Press the [MODE] button repeatedly until the word "RUN" is indicated in the upper portion of the display.

NOTE: When the program has been transferred, the Computer will automatically stop the tape motion and display the PROMPT (>) symbol.

3.12 Type CLOAD "MR-PGM" [ENTER]

3.12.1 If an error occurs (error code "5" is displayed), start over from the beginning. If the error continues, adjust volume up or down slightly and repeat steps 3.1 to 3.12.

3.12.2 If the error code is not displayed but tape motion continues, transferring is improper. Press [ON] key to stop the tape. Repeat steps 3.1 to 3.12.

3.12.3 If the error remains or the tape continues to run after several attempts to correct the problem, try cleaning or demagnetizing the Recorder's tape head.

3.13 Type INPUT #"MR-MEM" [ENTER].

3.14 Press the [MODE] button until the word "RESERVE" appears in the upper portion of the display.

3.15 Type CLOAD "MR-RES [ENTER].

3.16 Stop the recorder.

3.17 Press the [MODE] button repeatedly, as necessary, until the word "RUN" appears in the upper portion of the display.

NOTE: The following methods may be used to indicate that the program has been loaded correctly. The first method causes the Computer to automatically search for the specified file name and compare the contents on tape with the contents in memory. The second method checks the general program operation by inputing given initial data and manually comparing the output data to the calculated results.

4.0 PROGRAM TESTS

4.1 Comparison Method.

4.1.1 Disconnect the black plug from the REMote jack and completely rewind the tape.

4.1.2 Reconnect the black plug to the REMote jack.

4.1.3 Press the PLAY button of the recorder.

4.1.4 Type CLOAD? "MR-PGM [ENTER]

A. If the programs are verified as being identical, the prompt symbol (>) will be displayed.

B. If the programs differ, execution will be interrupted and an Error Code 5 will be displayed. If this occurs, you may try again to either reload or re-verify the programs. A slight adjustment in the recorder volume level may improve the transfer.

NOTE: Ensure that the computer is turned OFF prior to removing it from the interface.

C. Upon completion, the computer may be removed from the interface, as appropriate.

4.2 Test Cases

4.2.1 Using the general operational method described in Sections 3.0 to 6.0 of 1904.01D, enter the appropriate input data from at least one of the following test cases. Compare the output data with the indicated results.

TEST CASE 3	1	2	3	4	5
INPUT:					
Unit #	1	1	2	2	2
Wind Dir.	17	215	100	360	180
Windspeed	4.5	3	18	6	1.5
Stab. Class	7	6	5	3	1
W.B. Scale Factor	1.1	.8	.9	.1	1.5
Iodine Dose Factor	.069	.2	.1	3.4	9.2
Q-Gas	5E-3	1E-1	1.1	7	25
Other Unit	[Enter]	[Enter]	[Enter]	[Enter]	[Enter]
RESULTS:					
EAL	O.K.	U.E.	ALERT	S.E.	G.E.
Downwind Dir.	197	35	280	180	0
.05 mR/hr X/Q	9.98E-4	3.07E-5	6.86E-6	2.26E-6	8.08E-9
.65 mi WB:A	3.45E-3	6.90E-2	1.38E0	8.82E0	3.15E1
.65 mi CT:A	2.38E-4	1.38E-2	1.38E-1	2.99E1	2.89E2
.65 MPC:A	6.62E-2	1.32E0	1.46E1	9.34E1	3.33E2
.65 mi WB:R	1.03E-1	1.36E0	3.52E0	2.32E0	4.57E1
.65 mi CT:R	7.11E-3	2.72E-1	3.52E-1	7.89E0	4.20E2
.65 mi MPC:R	8.66E0	7.48E1	8.95E1	4.10E1	6.31E2
1 mi WB	4.81E-2	8.14E-1	1.90E0	1.02E0	1.15E1
1 mi CT	3.32E-3	1.62E-1	1.90E-1	3.49E0	1.06E2
2 mi WB	2.39E-2	3.60E-1	7.42E-1	3.11E-1	4.82E0
2 mi CT	1.65E-3	7.21E-2	7.42E-2	1.06E0	4.43E1
5 mi WB	8.61E-3	1.17E-1	2.12E-1	5.81E-2	2.10E0
5 mi CT	5.94E-4	2.34E-2	2.12E-2	1.97E-1	1.93E1
10 mi WB	3.73E-3	4.95E-2	8.30E-2	1.71E-2	1.17E0
10 mi CT	2.57E-4	9.91E-3	8.30E-3	5.82E-2	1.08E1
Arbitrary X/Q	1E-7	1.9E-7	3.9E-7	1.2E-6	8.08E-9
Local WB	~5.01E-6	~3.09E-4	~2.84E-3	~2.65E-2	~5.0E-2
Local CT	~3.46E-7	~6.17E-5	~2.84E-4	~9.03E-2	~4.60E-1

A. If the data compares favorably, then the overall program is operating properly.

B. If the data does not compare, you may try to reload or re-verify the program. A slight adjustment in the recorder volume level may improve the transfer.

NOTE: Ensure that the computer is turned OFF prior to removing it from the interface.

C. Upon completion, the computer may be removed from the interface, as appropriate.

ATTACHMENT 1?

PROGRAM LISTING

```
100 Input "Unit #(1/2)?"; A
110 Input "Wind Dir. (From)?"; C
120 Input "Windspeed (MPH)?"; D
130 Input "Stab. Class #(1-7)?"; B
140 Input "WB Scale Factor (or 1)?"; F
150 Input "Iodine Factor?"; G
160 Input "Q-Gas (Ci/sec)?"; E
200  H = C-180
210  IF H<O LET H = C + 180
220  I = E * A (A + 24)
230  J = I * G
240  K = I * A (A + 26)
260  L = E * F * A (28 + B)   * (.81*(A-1) + 1)/D
262  M = L * G
264  N = L * A (35 + B) / (.81*(A-1) + 1)
266  Input "Other Unit Data (y = 1)?"; X
268  IF (X< >1) GOTO 294
270  Input "BDY WB:   AVG?"; X:I = I + X
274  Input "C T : A?"; X: J = J + X
278  Input "MPC : A?"; X: K = K + X
282  Input "WB:     Real ?"; X : L + L + X
286  Input "CT:R    ?"; X : M = M + X
290  Input "MPC : R  ?"; X " N = N + X
294  IF ((M< = 25) * (L< = 5)) GOTO 298
296  Print "G.E." : GOTO 314
298  IF ((J< = 25) * (I< = 5) GOTO 302
300  Print "S.E." : GOTO 314
302  IF (K< = 10) GOTO 306
304  Print "Alert": GOTO 314
306  IF (K< = 1) GOTO 310
```

```
308  Print "U.E." : GOTO 314
310  Print "O.K."
314  W = A (B + 42) * .05/L
316  FOR X = 1 TO 4
318  A(14 + X) = A(7* X + B + 42) * L/A(B + 42)
320  A(18 + X) = A(7* X + B + 42) * M/A(B + 42)
330  NEXT X
390  Print Using; "Downwind Dir. = "; H
400  Using "#.## ^^^"
405  Print ".05 MR /HR X/Q = "; W
410  Print ".65 WB:AVG =" ; I
420  Print ".65 CT:A ="; J
430  Print ".65 MPC:A ="; K
440  Print ".65 WB:REAL ="; L
450  Print ".65 CT:R  ="; M
452  Print ".65 MPC:R    ="; N
478  Print "1 mi. WB (Real) ="; O
480  Print "1 mi CT (Real) ="; S
490  Print "2 mi WB ="; P
500  Print "2 mi CT ="; T
510  Print "5 mi WB ="; Q
520 Print "5 mi CT ="; U
530  Print "10 mi WB ="; R
540  Print "10 mi CT ="; V
999  END
```

RESERVE KEY FUNCTIONS

KEY SEQUENCE	FUNCTION	PURPOSE
[Shift] V	RUN 390	Review Output Variables
[Shift] B	*L/A(B + 42)	Whole body dose rate for specified X/Q value
[Shift] C	*M/A(B + 42)	Child thyroid doserate for specified X/Q value
[Shift] X	*G	Projected whole body to child thyroid dose rate conversion

ATTACHMENT 13 Page 1 of 3

MEMORY CONTENTS

Memory Location	Variable Name	Description	Value
1	A	Unit Number	(NOTE: The memory contents of locations 1-23 depend upon program input)
2	B	Stability Class No.	
3	C	Wind Direction	
4	D	Wind Speed	
5	E	Q-Gas	
6	F	WB Factor	
7	G	Iodine Factor	
8	H	Downwind Direction	
9	I	Line 7A 0.65 W.B. (ANN)	
10	J	" 9A " C.T. (ANN)	
11	K	" 11A " MPC (ANN)	
12	L	" 7B " W.B. (REAL)	
13	M	" 9B " C.T. (REAL)	
14	N	' 11B " MPC (REAL)	
15	O	1 mi W.B.	
16	P	2 " "	
17	Q	5 " "	
18	R	10 " "	
19	S	1 mi C.T.	
20	T	2 " "	
21	U	5 " "	
22	V	10 " "	
23	W	X/Q for .05 MR/hr	
24	X	Loop Counter	

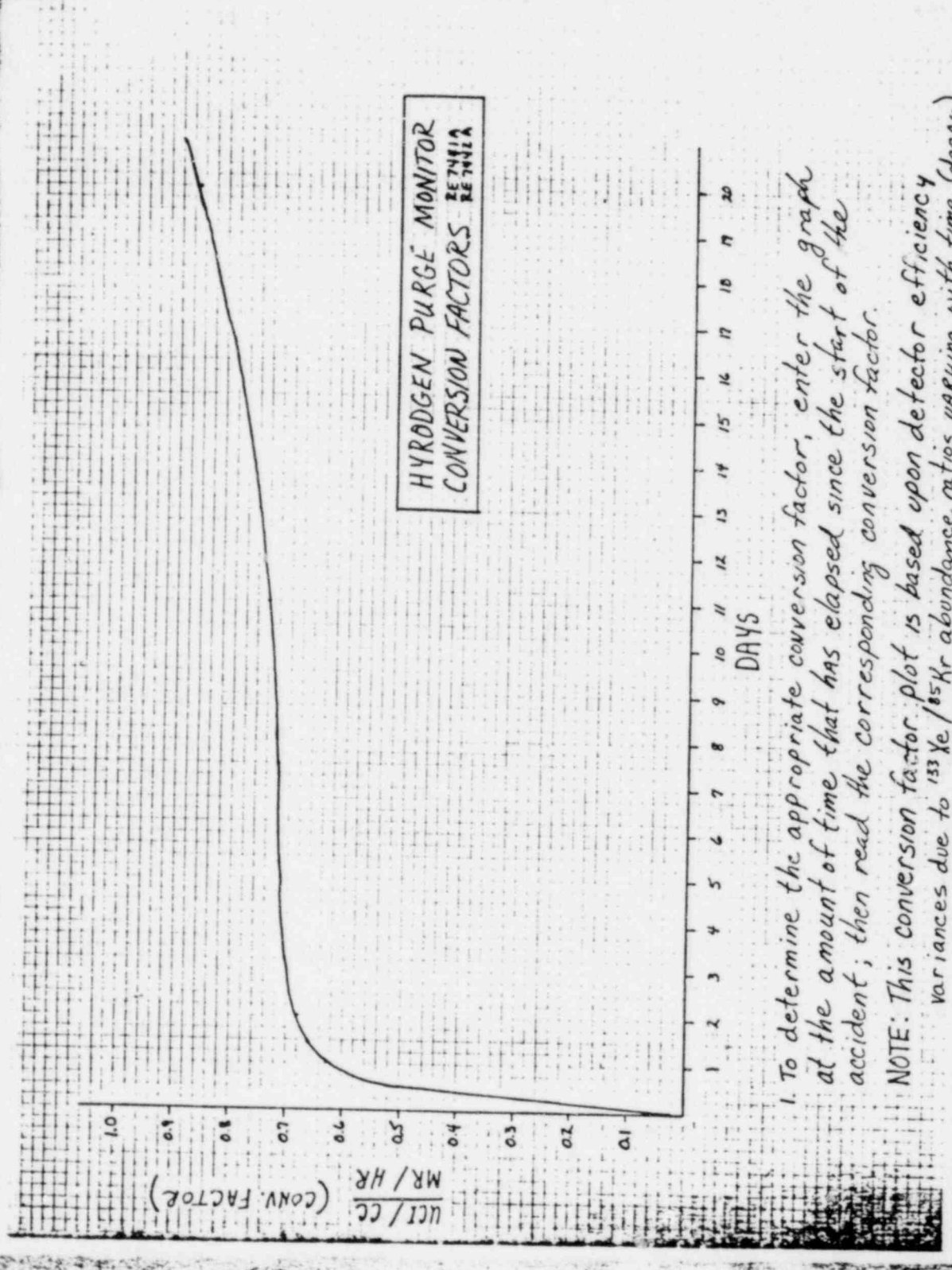
ATTACHMENT 13

Memory Location	Description		Value
25	Ann. Avg. W.B. Factor	(1)	0.69
26	" " " "	(2)	1.26
27	" " MPC "	(1)	19.2
28	" " " "	(2)	10.6
29	ANO-1 W.B. Factors	(A)	1.01
30	" " "	(B)	5.14
31	" " "	(C)	11.0
32	" " "	(D)	23.5
33	" " "	(E)	35.4
34	" " "	(F)	51.0
35	" " "	(G)	84.4
36	ANO-1 MPC Factors	(A)	25
37	" " "	(B)	27
38	" " "	(C)	32
39	" " "	(D)	41
40	" " "	(E)	46
41	" " "	(F)	55
42	" " "	(G)	84
43	0.65 mi X/Q	(A)	7.39E-6
44	" " "	(B)	4.10E-5
45	" " "	(C)	1.05E-4
46	" " "	(D)	2.87E-4
47	" " "	(E)	4.84E-4
48	" " "	(F)	8.37E-4
49	" " "	(G)	2.06E-3
50	1.0 mi X/Q	(A)	1.87E-6

ATTACHMENT 13

Memory Location	Description		Value
51	1.0 mi X/Q	(B)	1.68E-5
52	" " "	(C)	4.64E-5
53	" " "	(D)	1.38E-4
54	" " "	(E)	2.62E-4
55	" " "	(F)	5.01E-4
56	" " "	(G)	9.61E-4
57	2.0 mi X/Q	(A)	7.80E-7
58	" " "	(B)	4.18E-6
59	" " "	(C)	1.41E-5
60	" " "	(D)	6.64E-4
61	" " "	(E)	1.02E-4
62	" " "	(F)	2.22E-4
63	" " "	(G)	4.78E-4
64	5.0 mi X/Q	(A)	3.40E-7
65	" " "	(B)	7.30E-7
66	" " "	(C)	2.63E-6
67	" " "	(D)	1.31E-5
68	" " "	(E)	2.92E-5
69	" " "	(F)	7.23E-5
70	" " "	(G)	1.72E-4
71	10.0 mi X/Q	(A)	1.90E-7
72	" " "	(B)	2.51E-7
73	" " "	(C)	7.74E-7
74	" " "	(D)	4.83E-6
75	" " "	(E)	1.14E-5
76	" " "	(F)	3.05E-5
77	" " "	(G)	7.46E-5

ATTACHMENT 14



1. To determine the appropriate conversion factor, enter the graph at the amount of time that has elapsed since the start of the accident; then read the corresponding conversion factor.

NOTE: This conversion factor plot is based upon detector efficiency variances due to ^{133}Xe / ^{85}Kr abundance ratios varying with time. (der 4)

ARKANSAS POWER & LIGHT COMPANY
Arkansas Nuclear One

TITLE: RECORD OF CHANGES AND REVISIONS | FORM NO. 1000.06A

MAGNITUDE OF RELEASE PROCEDURE | REV. # 8 PC #

MAGNITUDE OF RELEASE - GERMS
1904.04 REV. 1

Safety Related

UN - Controlled Copy # 104

PAGE	REV	PC#	PAGE	REV	PC#	PAGE	REV	PC#	PAGE	REV	PC#	PAGE	REV	PC#
1	1		19	0										
2	0		20	0										
3	1		21	0										
4	0		22	0										
5	1		23	0										
6	0		24	0										
7	0		25	0										
8	0													
9	0													
10	1													
11	0													
12	1													
13	1													
14	1													
15	0													
16	0													
17	0													
18	0													

APPROVED BY:

James M Levine
(General Manager)

APPROVAL DATE
5/17/82
REQUIRED EFFECTIVE DATE:

1.0 PURPOSE

The purpose of this procedure is to provide an initial estimate of the radiological conditions at the ANO Exclusion Area Boundary, provide information to determine the Emergency Action Level, define the offsite area(s) potentially affected by an airborne radiological release, provide an estimate of the whole body and child thyroid dose rates and refine projections based on available field monitoring data.

2.0 SCOPE

2.1 This procedure is applicable to airborne radioactive releases from ANO, Unit One as indicated by the Eberline SPING-4 monitors via the Eberline control terminal. THIS PROCEDURE PROVIDES A METHOD THAT IS SECONDARY TO AND PROVIDES BACKUP FOR THAT METHOD OF 1904.01, "Magnitude of Release - Computer Method".

2.2 This procedure does not take into account effects caused by precipitation.

3.0 REFERENCES

3.1 References Used in Procedure Preparation:

3.1.1 Arkansas Nuclear One Emergency Plan

3.1.2 "Manual for Protective Actions, Appendix D", Environmental Protection Agency

3.1.3 "Workbook of Atmospheric Dispersion Estimates", U.S. Department of Health, Education and Welfare

3.1.4 Memorandum Number CL-1460 (By A. L. Smith)

3.1.5 Memorandum Number CL-1571 (By A. L. Smith)

3.1.6 Eberline Technical Manual - SPING 3/4

3.1.7 Eberline Technical Manual - CT2

3.1.8 Eberline Technical Manual - CRT1

3.2 References Used in Conjunction with this Procedure

3.2.1 1903.10, "Emergency Action Level Response"

3.2.2 1903.43, "Duties of the Emergency Radiation Team"

3.2.3 1904.01, "Magnitude of Release - Computer Method"

3.3 Related ANO References

3.3.1 1904.01, "Magnitude of Release - Computer Method"

7.0 DETERMINATION OF EXISTING METEROLOGICAL CONDITIONS AND THE GASEOUS RELEASE RATE

7.1 Record the current date and time in Lines 1 and 2 respectively of Form 1904.04A. If onsite meterological data is unavailable, enter "OOS" (Out of Service) in the appropriate space.

NOTE: Site meterological data may be obtained utilizing the "R MONIT" command from a GERMS (chromatics) terminal; station No. 1 (40' elevation sensor) should be used, if possible, for readings other than $\sigma\theta$; $\sigma\theta$ (indicated as wind direction variability) may be obtained from station No. 2.

7.2 Record the $\sigma\theta$ from recorder AAR 9300 on Form 1904.04A, Line 3. If $\sigma\theta$ is not available, record the Δt from recorder AAR 9300 and note appropriately.

7.3 Record the prevailing wind direction (40' elev., if available) from recorder WDR 9300 on Form 1904.04A, Line 4.

7.4 Record the wind speed (40' elev., if available) from recorder WSR 9300 on Form 1904.04A, Line 5.

7.5 Record the radioactive release data as indicated on the Eberline CT2 for each of the following release points that are in service on Form 1904.04A:

7.5.1 At the Eberline Control Terminal (CT), insert the key into the "keyboard" switch and activate the control terminal.

7.5.2 Set the History Format select knob to "Release Rate."

7.5.3 For each of the channels to be interrogated, depress the [Last Min] pushbutton then enter the 2-digit monitor ID number and then the two digit channel ID. Then depress the [ENTER] pushbutton.

NOTE: A printout of the 23 previous 10-minute averages plus the current value will appear.

A. Containment Purge [RX-9820; Monitor 01] Channel 03 - Line 6A; Channels 05, 07 or 09, - Line 6B; µCi/min.

B. Radwaste Area [RX-9825 Monitor 02] Channel 03 - Line 7A; Channels 05, 07 or 09 - Line 7B; µCi/min.

C. Fuel Handling Area [RX-9830; Monitor 03] Channel 03 - Line 8A; Channels 05, 07 or 09 - Line 8B; µCi/min.

D. Penetration Room/H_2 Purge [RX-9835 Monitor 04] Channel 03 - Line 9A; Channels 05, 07 or 09 - Line 9B; µCi/min.

E. PASS Building (covered by 2904.04, "Magnitude of Release - Germs").

7.8.2 Compare the present readings to the values on which the latest projections have been made.

A. If the values have not deviated from the most recently checked column on Form 1904.04A by more than the following list, it is not necessary to make new projections. New data should be taken as specified by the Duty Emergency Coordinator or the Dose Assessment Supervisor.

Indication	Allowable Deviation
Wind Direction	±20 degrees
Wind Speed	±20%
$\sigma\theta$	± New Atmospheric Stability Category
Δt	± New Atmospheric Stability Category
Release Rate/mR/hr	±20%
Flow Rate	±20%

B. When the data recorded changes more than the allowable deviation and a new projection is made on that data, you may identify the data by marking the parenthetic box "()" in the top of that column on Form 1904.04A.

8.0 DATA CONVERSION

NOTE: If the TRS-80 pocket computer is to be used to perform the necessary calculations, skip Step 8.1 and proceed to Step 8.2.

8.1 Complete Form 1904.04B to determine the atmospheric stability category and the downwind direction. If site meteorological data is unavailable, limited meteorological data may be obtained from the following groups, as indicated::

NOTE: You must specify verbally that it is a Pasquil atmospheric stability category that you are requesting.

8.1.1 National Weather Service [771-0971,or ▽ ▽] (projected windspeed, wind direction, Pasquil atmospheric stability category)

8.1.2 KARV Radio [968-1184]. (Wind speed and direction)

8.1.3 MSS Dispatcher. (Weather wire information)

8.2 Complete Form 1904.04C to determine the gaseous release rate.

NOTE: If the TRS-80 pocket computer is to be used to perform the necessary calculations, skip the remaining portions of this procedure and proceed to 1904.01, "Magnitude of Release - Computer Method" (Section 8.0).

ARKANSAS POWER & LIGHT COMPANY
Arkansas Nuclear One

TITLE: EXISTING CONDITIONS SUMMARY

FORM NO. 1904.04A

REV. # PC #

LINE	ITEM	READING ( ) 1	( ) 2	( ) 3	( ) 4
1	DATE				
2	TIME (HHMM)				
3	NOTE: ~ 10 min. average σθ degrees [or ( ) Δt (°C)]				
4	NOTE: ~ 10 min. average Wind Direction (From, °)				
5	NOTE: ~ 10 min. average Wind Speed (MPH)				
6	Containment Purge (Rx-9820; Monitor 01)	[redacted]			
6A	Iodine Release Rate (μCi/min) [Channel 03]				
6B	Noble Gas Release Rate (μCi/min) [Channel ( ) 05 ( ) 07 ( ) 09]				
7	Radwaste Area (Rx-9825; Monitor 02)	[redacted]			
7A	Iodine Release Rate (μCi/min) [Channel 03]				
7B	Noble Gas Release Rate (μCi/min.) [Channel ( ) 05 ( ) 07 ( ) 09]				
8	Fuel Handling Area (Rx-9830; Monitor 03)	[redacted]			
8A	Iodine Release Rate (μCi/min) [Channel 03]				
8B	Noble Gas Release Rate (μCi/min.) [Channel ( ) 05 ( ) 07 ( ) 09]				
9	Penetration Room/Hydrogen Purge (Rx-9835; Monitor 04)	[redacted]			
9A	Iodine Release Rate (μCi/min) [Channel 03]				
9B	Noble Gas Release Rate (μCi/min) Channel ( ) 05 ( ) 07 ( ) 09]				
10	"A" Steam Header, (RI-2682) mR/hr				
11	No. Safeties/Atmospheric Dumps Open (involving contamination)				
12	( ) Steam Exhausted (lbs/hr) or ( ) EFW Flow (GPM)				
13	"B" Steam Header, (RI-2681) mR/hr				
14	No. Safeties/Atmospheric Dumps Open (involving contamination)				
15	( ) Steam Exhausted (lbs/hr) or ( ) EFW Flow (GPM)				
16	Unmonitored Release Paths(s), (Ci/Sec)				

REVIEWED BY _____

ARKANSAS POWER & LIGHT COMPANY
Arkansas Nuclear One

TITLE: GASEOUS RELEASE RATE WORKSHEET

FORM NO. 1904.04C

REV. # 1 PC #

LINE NO.	ITEM NO.	IODINE RELEASE RATE (1) (μCi/Min)	IODINE RELEASE RATE (1) Ci/Sec)	NOBLE GAS RELEASE RATE+ (1) μCi/min	NOBLE GAS RELEASE RATE+ (1) Ci/Sec
1	CONT. PRG. (RX-9820)				
2	RADWASTE APEA (RX-9825)				
3	FUEL HD. AREA (RX-9830)				
4	PEN RM/H, PURGE (RX-9835)				
5	"A" STM. HDR.* (RI-2682) (2)	[redacted]			
6	"B" STM. HDR.* (RI-2681) (2)				
7	UNMONITORED PATH				
8	TOTALS (Ci/Sec)				

NOTES:

(1) Ci/Sec = μCi/min * 1.67E-8

(2) Ci/Sec = mR/hr * Number of Safeties/Atmospheric Dumps Open * 0.0152 $\frac{\text{Ci/Sec}}{\text{mR/hr}}$

or, Ci/Sec = mR/hr * lbs/hr * 1.9E-8

or, Ci/Sec = mR/hr * GPM * 1.12E-5

Performed by: _____ / _____
Initial Time

Reviewed by: _____

ARKANSAS POWER & LIGHT COMPANY
Arkansas Nuclear One

TITLE: EMERGENCY ACTION LEVEL DETERMINATION
FORM NO. 1904.04D
REV. # 1 PC #

CALCULATION OF DOSE RATE & MPC AT THE EXCLUSION AREA BOUNDARY (0.65 MILES)

Line		Column A ANNUAL AVERAGE CONDITIONS Category: N/A	Units	Column B EXISTING CONDITIONS Category:
1.0	Enter the Total Gaseous Release Rate (Ci/Sec) (From 1904.04C) in Columns A & B.	_____	Ci/Sec	_____
2.0	Select and Enter the Whole Body dose factor from the following list which corresponds to the existing Atmospheric Stability Category (from 1904.04B) in Column B.	0.69	mR/hr / Ci/Sec	_____
3.0	Calculate the Uncorrected Whole Body Dose Rate at the Exclusion Area Boundary (Line 1.0 X Line 2.0) and enter the products in Column A and B, respectively.	_____	mR/hr	_____
4.0	Enter the existing windspeed (from 1904.04B) in Column B.	XXXXXXXXXXX	(mph)	_____
5.0	Correct the Whole Body Dose Rate for windspeed (Line 3B ÷ Line 4B) and enter results in Column B.	XXXXXXXXXXX	mR/hr	_____

Atmospheric Stability Category	WB Dose Factor
A	1.01
B	5.14
C	11.0
D	23.5
E	35.4
F	51.0
G	84.4

ARKANSAS POWER & LIGHT COMPANY
Arkansas Nuclear One

TITLE: EMERGENCY ACTION LEVEL DETERMINATION | FORM NO. 1904.04D

REV. # 1 PC #

		Column A ANNUAL AVERAGE Conditions	Units	Column B EXISTING Conditions
6.0	Transfer value from Line 3A to Line 6A. Transfer Line 5B to Line 6B.	_____	mR/hr(whole body)	_____
7.0	Calculate the iodine dose factor as follows (refer to 1904.04C, Line 8): Iodine Dose Factor = $\frac{\text{Total Iodine Release Rate}}{\text{Total Noble Gas Release Rate}}$ *1191			
	Enter the Iodine dose factor in Columns A and B.	_____	mR/hr (thyroid)/mR/hr (whole body)	_____
8.0	Calculate the projected Child Thyroid Dose Rate at the Exclusion Area Boundary (Line 6 X Line 7) and enter the results in Columns A and B, respectively.	_____	mR/hr(child thyroid)	_____
9.0	Select and enter the appropriate Xe-133 MPC Factor corresponding to the existing Atmospheric Stability Category (from 1904.04B, Step 1.2) in Column B.	19.2	MPC/mR/hr	_____

Atmospheric Stability Category	Xe-133 MPC Factor
A	25
B	27
C	32
D	41
E	46
F	55
G	84