Davis-Besse Nuclear Power Station

Unit No. 1

Administrative Procedure AD 1827.10

Emergency Off-Site Dose Estimates

NUCLEAR SAFETY RELATED

Record of Approval and Changes

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13	Amazing	4/26/83	C.T. Daft/JL	5/5/83	TOMurray	5/5/83

1. PURPOSE AND SCOPE

1.1 The purpose of this procedure is to estimate off-site whole body exposure rates from Xenon-133, and thyroid exposure rates to adults and children from I-131 for accidental, uncontrolled releases.

1.2 Radioactive particulate material is not addressed because protective actions are based on assuming the iodine exposure pathway is critical, and should provide sufficient protection from radioactive particulate material. (Based on information from Section 5.1.2 of EPA-520/175-001, Revised 6/79.)

2. REFERENCES

2.1 NRC Regulatory Guide 1.4, Assumptions Used for Evaluating the Potential Consequences of a Loss of Coolant Accident for Pressurized Water Reactors

2.2 Manual of Protective Action Guides and Protective Actions for Nuclear Incident EPA-520/1-75-001, September 1975 (Revised June 1979)

2.3 Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants, NUREG-0654/FEMA-REP-1, Rev. 1

2.4 NRC Regulatory Guide 1.23, Onsite Meteorological Programs

2.5 The Davis-Besse Nuclear Power Station Emergency Plan and EI 1300 Series, Implementing Procedures

2.6 AD 1827.12, Protective Action Guidelines

2.7 AD 1839.00, Station Operations

2.8 TED NQAM

2.9 FSAR, Section 17.2

2.10 Admin. Memo 37, ECS Pager and Telephone Numbers

2.11 NRC Regulatory Guide 1.145, Atmospheric Dispersion Models for Potential Accident Consequence Assessments at Nuclear Power Plants

3. RESPONSIBILITIES

In the event of the accidental release of gaseous radioactivity,

the Shift Supervisor shall make an initial evaluation of the situation and classify the emergency in accordance with EP 1202.37, High Airborne Activity.

3.1 For local releases, any calculation of release rates and dose rates should be done under the direction of the Shift Supervisor by:

1. An Administrative Assistant, or
2. Other qualified, available personnel.*

*The STA may perform release and dose rate calculations if the STA feels that performing such calculations does not interfere with his primary responsibilities of maintaining a broad perspective of the event and consulting with the Shift Supervisor.

Requirements for notification of other persons to deal with these types of releases are found in the EI 1300 series, Emergency Plan Implementing Procedures, and EP 1202.37, High Airborne Activity, and AD 1839.00, Station Operations.

3.2 For conditions that require Emergency Plan implementation, release rates and dose rates should be performed under the direction of the Emergency Duty Officer (EDO). The Shift Supervisor, acting as interim EDO, should designate:

1. An Administrative Assistant, or
2. Other qualified, available personnel,*

to perform these calculations. If the Emergency Control Center has been activated, the designated EDO should direct response personnel within the ECC to perform the dose calculations relieving the Shift Supervisor of this responsibility.

*The STA may perform release and dose rate calculations if the STA feels that performing such calculations does not interfere with his primary responsibilities of maintaining a broad perspective of the event and consulting with the Shift Supervisor.

4. PROCEDURE

4.1 Releases from the station vent using the prime computer, T1-59 calculator, or hand calculations.

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4.1.1 The prime computer is programmed to compute offsite dose rates in accordance with EPA-520/1-75-001.

1. Logging of System

(1) If terminal is turned off:

a) Depress upper half of black "power" switch located on lower right side of terminal.

b) Push "reset" button. (By pulling the keyboard forward, the reset button can be found on the right rear of the keyboard, directly behind the console switches.)

c) Type at the keyboard:

LOGIN TSC

d) Press the "return" key.

(2) If terminal is turned on:

a) If one of the following messages is displayed on the screen, follow the instructions shown:

THE FUNCTION KEYS ARE ACTIVE -

DEPRESS fa FOR FUNCTION SUMMARY

or

LOGGED OUT - PUSH fb TO LOG IN

b) If no messages are displayed:

(a) Press "View Alpha" key. (Top row of keyboard.)

(b) Type at the keyboard:

LO

(c) Press "return" key.

(d) Message will appear:

OK, LO
TSC (5) LOGGGED OUT AT
TIME USED =
SESSION CHARGES -
OK, _

(e) Follow instructions for terminal turned off, beginning with Step 2.

2. Upon logging into the system, this message will appear on the screen:

   - PLEASE BE PATIENT -
   - LOADING FUNCTION KEYS -
   - THIS WILL TAKE APPROXIMATELY 3 MINUTES -

3. Approximately three minutes later, the terminal will display:

   THE FUNCTION KEYS ARE ACTIVE -

   DEPRESS fa FOR FUNCTION SUMMARY

4. Depress key labeled "fa".

5. The terminal will display the TSC menu.

   NOTE: The color scheme of all menus is as follows:

   Blue - Currently available
   Yellow - Proposed-currently unavailable
   Spare
   Green - Special purpose

6. Depress function key assigned to "Dose Calculations".

7. Terminal will display:

   THE FUNCTION KEYS ARE ACTIVE -

   DEPRESS fa FOR FUNCTION SUMMARY

8. Depress function key "fa".

9. From this point, make all program selections by use of the function keys and follow instructions given in the individual programs.

   NOTE: The instructions within the program will enable you to display:

   Calculation Inputs
   Dose Calculations
   Offsite Dose Map
   Met Data

The calculation inputs are received from the Modcomp, Met Tower, and the DPD 11/34. The capability does exist to hand input the release rate.

10. Ending Session at Terminal

a) Return to TSC menu by use of function key "fc".

b) Depress "fb" to log out.

c) The following message will be displayed:

LOGGED OUT - PUSH fb TO LOG IN

d) Leave terminal in this state.

4.1.2 The T1-59 is also programmed to compute offsite dose rates in accordance with EPA-520/1-75-001. See Attachment 1 for instructions.

4.1.3 Hand calculations may also be performed by completing Data Sheets No. 1 and No. 2.

4.2 Release from points other than the station vent.

4.2.1 To calculate the resulting offsite whole body or thyroid dose rates, insert the Ci/sec value calculated below into either the prime computer T1-59 calculator, or Data Sheets No. 1 and No. 2.

4.2.2 Releases from MSSV's, Auxiliary Feed Pump Turbine Exhaust, and Atmospheric Vent Valves.

1. Calculate the release of Xe-133 from the SJAE as follows:

Release Rate (Ci/sec) = (CONV FACT)(SJAE ACT)(SJAE FLOW)

Where: CONV FACT = 6.6 E-11 (RE 1003A) or 1.2 E-11 (RE 1003B)
SJAE ACT = RE 1003A or B reading in cpm
SJAE FLOW = F1 1002 in cfm

2. In the event of a reactor trip, quantify the gaseous release of Xe-133 and I-131 via any and all other release points using the following calculation:

Release Rate (Ci/sec) = 6.3 E-5 (LR)(RCS Conc'n)

Where: RCS Conc'n = latest I-131 or Xe-133 concentration in the RCS in µCi/cc.

LR = latest leak rate in gpm as determined from EP 1202.57, Appendix C, or Appendix D, Step 7.

NOTES: 1 I-131 and Xe-133 are expected to be the highest dose contributors, however, any radionuclide may be used in the above calculation.

2 The above calculation conservatively assumes all the activity leaking to the secondary side is escaping. That assumption is accurate if the MSIV's go closed for the first minute following the trip. When the MSIV's open the calculation becomes more conservative.

3 Emphasis should be placed on the latest leak rate determination as it could be reduced upon power reduction.

4 If steam continues to be released with the MSIV's open, and the affected S/G still not isolated, a sample of the S/G steam on the affected S/G should be collected and analyzed. The following compartive evaluation can be made for radioactive release rate:

Release Rate (Ci/sec) = 3.5 E-6 (STM FLOW)(SG STM CONC)

Where: STM FLOW = Total Steam Flow, #/hr. (if an estimate of steam flow cannot be determined, use the maximum flow of 1 E+6 #/hr.)

SG STM CONC = Concentration of nuclide, µCi/cc

3. If the MSIV's remained closed following a reactor trip, and three is a S/G tube leak, Xe-133 in Ci/sec can be determined use RE 600 or RE 609 as follows:

   1) The analyzer/gross switch must be positioned in the Gross Mode.

      NOTE: These switches are normally in the Analyzer Mode to selectively monitor N-16.

      When the switches are changed to the Gross Mode, high alarms will result because the setpoints were selected based on N-16.

   2) Net cpm readings are calculated by subtracting a 100 cpm from the actual readings. (100 cpm are the normal background readings in the Gross Mode.)

   3) While in the Gross Mode, convert the cpm readings on RE 600 and RE 609 into μCi/cc Xe-133 by multiplying cpm times 1 E-5 (μCi/cc)/cpm.

   4) To obtain Ci/sec of Xe-133 being released, multiply μCi/cc times 3.5.

      NOTE: Steps 1. through 4. above are based on 1 E+6 lb/hr saturated steam flow at 995 psi with a specific volume of 0.45 ft^3/lb, and a Bechtel to TED letter (BT-10372) dated June 4, 1980.

4.3 Use AD 1827.12 Protection Action Guidelines to determine the protective actions to be initiated. The EDO should make Plume Exposure recommendations per this procedure.

4.4 If an evacuation is initiated, it should include an area 22 1/2° to 45° each side of the plume centerline (based on Appendix I from NUREG-065-4 FEMA-REP-1). Actual evacuations will be made using the Evacuation Sub-areas given in AD 1827.12.

4.5 If evaluations or RMT sample results indicate ingestion exposure that exceeds the plume exposure evacuation area, recommendations for further evacuation should be made by the Emergency Operations Manager in accordance with ingestion exposure Protective Action Guidelines given in AD 1827.12.

4.6 Should the NRC request direct contact with the individual performing offsite dose calculations, it is the responsibility of the Emergency Duty Officer to ensure that the requesting NRC official is contacted directly by an appropriate cognizant individual. Any available phone could be used for this purpose.

DATA SHEET No. 1

Estimated Downwind Whole Body Exposure from Xenon-133

(1.)	Record the date and time	Date _____ Time _____
(2.)	Record Xe-133 activity being released from the appropriate meters for RE 2024C and RE 2025C	RE 2024C reading _____ CPM RE 2025C reading _____ CPM
	NOTE: If these readings are off scale, the Xe-133 in the Station Vent is to be obtained using the Emergency Station Vent sampler described in AD 1850.04.	
(3.)	From Figure 1, record the corresponding concentration in μCi/cc	RE 2024C conc'n _____ μCi/cc RE 2025C conc'n _____ μCi/cc
(4.)	Record the flow rate through the Unit Vent from Computer Point F885 or (F883) and convert to CFM	_____ KCFM x 10^3 $\frac{\text{CFM}}{\text{KCFM}}$ = _____ CFM Flow rate from F885 (F883)
(5.)	Convert Unit Vent flow rate to cc/sec	_____ CFM (4.72×10^2) = _____ cc/sec
(6.)	Calculate the estimated release rate for Xe-133 by multiplying the highest value from (3.) times (5.)	_____ $\frac{\mu\text{Ci}}{\text{cc}}$ x _____ cc/sec = _____ $\frac{\mu\text{Ci}}{\text{sec}}$ From (3.), highest value From (5.)
(7.)	Convert release rate (Q) in (6.) to Ci/sec	_____ $\frac{\mu\text{Ci}}{\text{sec}}$ x (1×10^{-6} $\frac{\text{Ci}}{\mu\text{Ci}}$) = _____ Ci/sec From (6.)
(8.)	Record the wind direction (use 612' elev. if available) from the instrumentation as listed in Table 1. Then add or subtract 180° to obtain the downwind direction (this value should not exceed 360°)	_____ ± 180° = _____ Wind direction Downwind direction
(9.)	Record the wind speed (use 612' elev. if available) from the instrumentation as listed in Table 1. Then convert the wind speed from mph to m/sec	_____ mph x 0.447 $\frac{\text{m/sec}}{\text{mph}}$ = _____ m/sec Wind Speed

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DATA SHEET No. 1 (Continued)

(10.) Determine Stability Class by any of the following

Stability Class_____

(a) Read ΔT from computer point T698 then from Table 2-A, record the Stability Class, or

(b) Determine ΔT by 821' °F versus 612' °F then from Table 2-A, record the Stability Class, or if not available,

(c) Read the Standard Deviation of Wind Direction at the 35 meter level (612' elev.) from the PDP 11/03 printout* (Column SD under 35M) then from Table 2-B, record the Stability Class, or, if not available,

(d) Read the Standard Deviation of Wind Direction at the 75 meter level (821' elev.) from the PDP 11/03 printout* (Column SD under 75M) then from Table 2-B, record the Stability Class.

*See Attachment 2, Instructions for Accessing DEC PDP 11/34 on G.E. Time Sharing.

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(11.) Using Table 3, enter $X\bar{\mu}/Q$ (m^{-2}) for distances of 1, 2, 5, 10, and 20 miles for the stability class in (10.), and enter in Column A. (NOTE: Real time $X\bar{\mu}/Q$ can be used if known)

(12.) Divide Column A by the windspeed (m/sec) from (9.), and enter in Column B.

(13.) Multiply Column B by the Xe-133 (Ci/sec) from (7.) and enter in Column C, which are the concentrations at 1, 2, 5, 10, and 20 miles downwind.

(14.) Multiply Column C by 3.3×10^4 to calculate the estimated whole body dose rate from Xe-133 and enter in Column D. (Based on Regulatory Guide 1.109, table B-1)

DATA SHEET No. 1 (Continued)

Downwind Distance (miles)	Column A $\frac{X\bar{\mu}}{Q}$ (m^{-2})	Column B $\frac{X\bar{\mu}}{Q}$ (wind speed) (sec/m^3)	Column C Xe-133 concentrations ($\mu Ci/cc$)	Column D Whole body exposure from Xe-133 (mR/hr)
1				
2				
5				
10				
20				

DATA SHEET No. 2

Estimated Downwind Thyroid Dose to Adults and Children from I-131

(1.)	Record the date and time	Date _____ Time _____
(2.)	Record the I-131 activity from RE 2024B and RE 2025B CAUTION: Noble gases can make the I-131 appear falsely high. Have C&HP personnel verify the I-131 detected. If the incident continues, insert silver zeolite filters. (i) Record the time and cpm for RE 2024B and RE 2025B (ii) Approximately 10 minutes later, record the time and cpm for RE 2024B and RE 2025B (iii) Subtract cpm in (i) from (ii) and divide by the difference in minutes to obtain cpm/min for RE 2024B and RE 2025B	RE 2024B: (i) 1st count: time ____ (a), ____ (b) cpm (ii) 2nd count: time ____ (c), ____ (d) cpm (iii) $\frac{cpm}{min} = \frac{(d-b)}{(c-a)} =$ _____ = _____ RE 2025B: (i) 1st count: time ____ (a), ____ (b) cpm (ii) 2nd count: time ____ (c), ____ (d) cpm (iii) $\frac{cpm}{min} = \frac{(d-b)}{(c-a)} =$ _____ = _____
11 (3.)	From Figure 2, record the corresponding concentration in µCi/cc	RE 2024B conc'n _____ µCi/cc RE 2025B conc'n _____ µCi/cc
(4.)	Calculate the estimated release rate for I-131 by multiplying the highest value from (3.) times 4.44×10^7	_____ (From (3.), highest Value) $\frac{\mu Ci}{cc} \times \frac{4.44 \times 10^7 \text{ cc/sec}}{1} =$ _____ $\frac{\mu Ci}{sec}$
11 (5.)	Convert release rate (Q) in (4.) to Ci/sec	_____ (From (4.)) $\frac{\mu Ci}{sec} \times (1 \times 10^{-6} \frac{Ci}{\mu Ci}) =$ _____ Ci/sec
(6.)	Same as (8.) on Data Sheet No. 1	_____ Downwind direction
(7.)	Same as (9.) on Data Sheet No. 1	_____ m/sec wind speed

DATA SHEET No. 2 (Continued)

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(8.) Same as (10.) on Data Sheet No. 1 Stability Class _____

(9.) Using Table 3 enter $X\bar{\mu}/Q$ (m^{-2}) for distances of 1, 2, 5, 10, and 20 miles for the stability class in (8.), and enter in Column A. (NOTE: Real time $X\bar{\mu}/Q$ can be used if known)

(10.) Divide Column A by the windspeed (m/sec) from (7.), and enter in Column B.

(11.) Multiply Column B by the I-131 (Ci/sec) from (5.) and enter in Column C, which are the concentrations at 1, 2, 5, 10, and 20 miles downwind.

(12.) Multiply Column C by 1.1×10^9 to determine the estimated adult thyroid dose rate from I-131 in mR/hr and enter in Column D. *

(13.) Multiply Column D by 2 to determine the estimated child thyroid dose rate from I-131 mR/hr and enter in Column E. *

* The constants used in (12.) and (13.) above have a maximum difference of ±20% from time zero to 120 hours after reactor shutdown; this error is acceptable. The actual values are shown in Figure 3 for information.

Downwind Distance (miles)	Column A $\frac{X\bar{\mu}}{Q}$ (m^{-2})	Column B $\frac{\chi\bar{\mu}}{Q}$ (wind speed) (sec/m^3)	Column C I-131 concentrations (μCi/cc)	Column D Adult thyroid dose rate from I-131 (mR/hr)	Column E Child thyroid dose rate from I-131 (mR/hr)
1					
2					
5					
10					
20					

TABLE 1

Data Acquisition and Display System at ECC

(Time) Tower	MET TOWER	Modcomp (Date) (Time)
821 ft.	- Wind Velocity -	612 ft.
Ø.Ø MPH Ø.Ø		Ø.Ø MPH Ø.Ø
821 ft.	- Wind Direction -	612 ft.
ØØ.Ø DEG ØØ.Ø		ØØ.Ø DEG ØØ.Ø
821 ft. - 612 ft.	- Temperature -	612 ft.
Ø.Ø °F Ø.Ø		Ø.Ø °F Ø.Ø
STATION VENT FLOW		ØØ.Ø KCFM
Panel in Control Room		
0-50	0-360°	-4 to +8
SI996 Wind Velocity 612' Elev.	ZI997 Wind Direction 612' Elev.	TDI998D Temp 821'-612'

Computer Points in Control Room

	Computer Point
Wind Velocity, 612' Elev., in MPH	A901
Wind Velocity, 821' Elev., in MPH	A902
Wind Direction, 612' Elev., in degrees	A900
Wind Direction, 821' Elev., in degrees	A903
Temperature, 612' Elev., in °F	T699
Temperature, 821' Elev., in °F	T697
Temp. Diff., 821'-612', in °F	T698
Station Vent Flow, in KCFM	F885

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TABLE 2-A

Pasquill Stability Class vs. ΔT

Class	ΔT = 821'°F minus 612'°F
A Extremely unstable	< -2.2°F
B Moderately unstable	-2.2°F to -2.0°F
C Slightly unstable	-2.0°F to -1.8°F
D Neutral	-1.8°F to -0.6°F
E Slightly stable	-0.6°F to 1.8°F
F Moderately stable	1.8°F to 4.7°F
G Extremely stable	> 4.7°F

(Derived from NRC Regulatory Guide 1.23)

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TABLE 2-B

Classification of Atmospheric Stability
by Standard Deviation of Wind Direction

Stability Classification	Pasquill Categories	SD * (degrees)
Extremely unstable	A	SD ≥ 22.5
Moderately unstable	B	22.5 > SD ≥ 17.5
Slightly unstable	C	17.5 > SD ≥ 12.5
Neutral	D	12.5 > SD ≥ 7.5
Slightly stable	E	7.5 > SD ≥ 3.8
Moderately stable	F	3.8 > SD ≥ 2.1
Extremely stable	G	2.1 > SD

*Standard deviation of horizontal wind direction fluctuation over a period of 15 minutes to 1 hour.

TABLE 3

$\underline{X\bar{\mu}/Q\ (m^{-2})}$ for Stability Classes as a Function of Downwind Distances of 1, 2, 5, 10, and 20 miles

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Miles \ Class	A	B	C	D	E	F	G
1	1.2×10^{-6}	5.5×10^{-6}	2.1×10^{-5}	7.0×10^{-5}	1.3×10^{-4}	3.0×10^{-4}	4.5×10^{-4}
2	6.0×10^{-7}	1.4×10^{-6}	5.0×10^{-6}	2.2×10^{-5}	4.6×10^{-5}	1.0×10^{-4}	1.5×10^{-4}
5	2.9×10^{-7}	3.8×10^{-7}	1.1×10^{-6}	6.0×10^{-6}	2.2×10^{-5}	3.0×10^{-5}	4.5×10^{-5}
10	1.7×10^{-7}	2.1×10^{-7}	3.2×10^{-7}	2.0×10^{-6}	4.7×10^{-6}	1.1×10^{-5}	1.65×10^{-5}
20	9.0×10^{-8}	1.2×10^{-7}	1.7×10^{-7}	6.8×10^{-7}	2.0×10^{-6}	5.1×10^{-6}	7.65×10^{-6}

The values for classes A through F were derived from Figure 5-3, Page 5.22 of EPA-520/1-75-001, Revised 6/79. The values assumed an inversion lid at 1000 meters altitude and a ground level release. The values for class G were determined as per Reg. Guide 1.145 guidelines dated August 1979.

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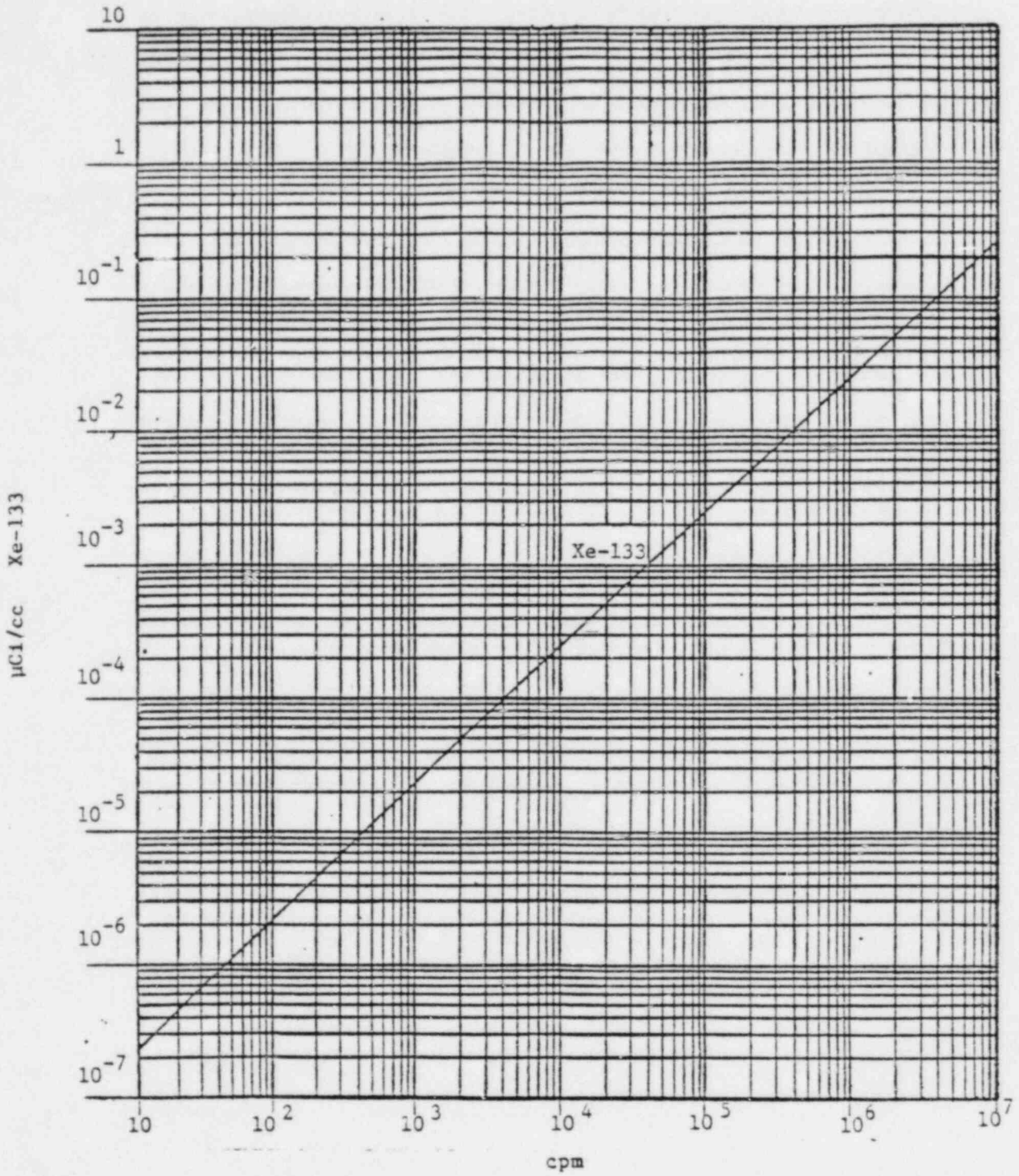
FIGURE 1

Conversion Chart for Noble Gas Releases (RE 2024C and RE 2025 C)



(Copied from the Victoreen Calibration Manual)

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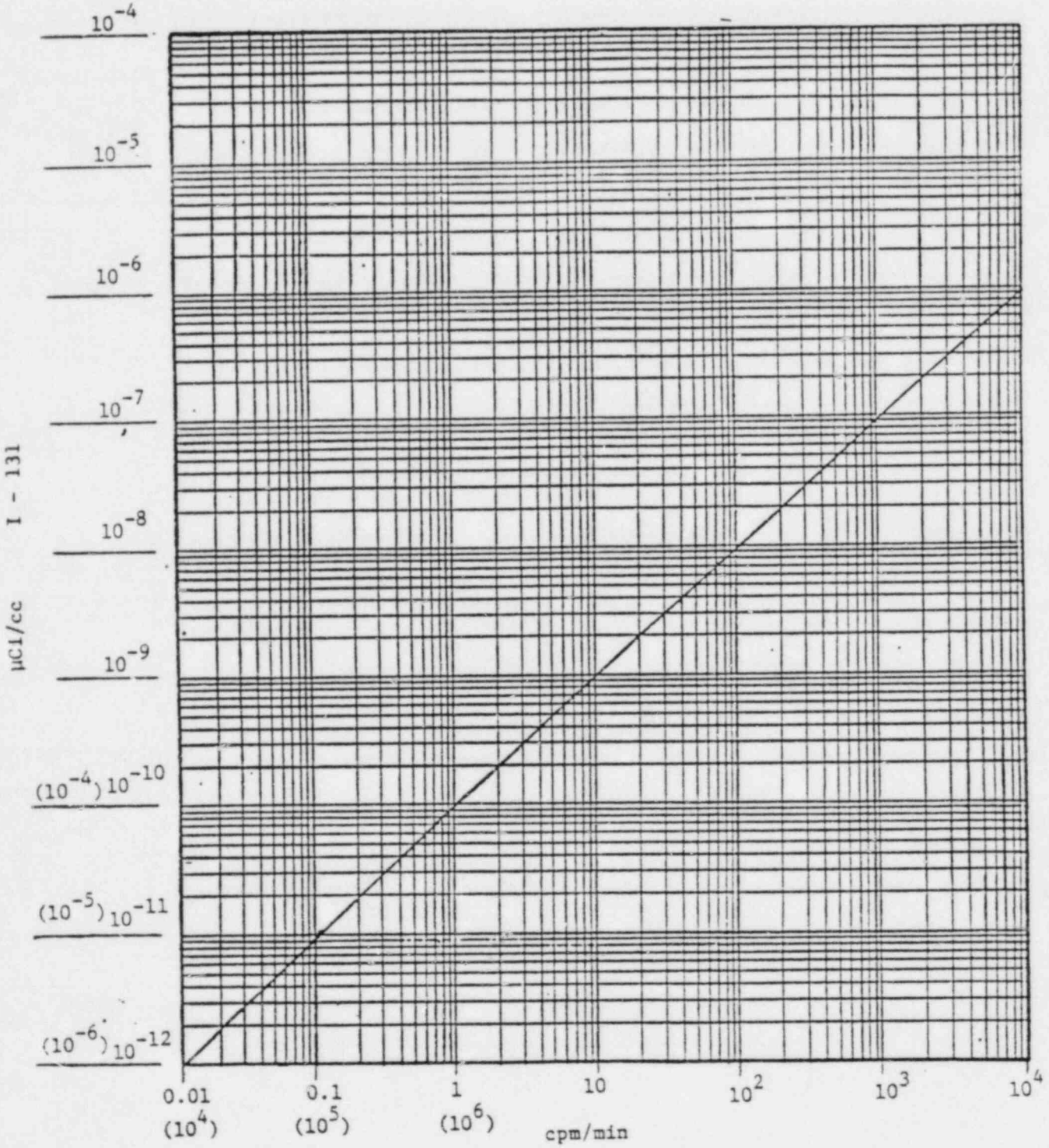
FIGURE 2

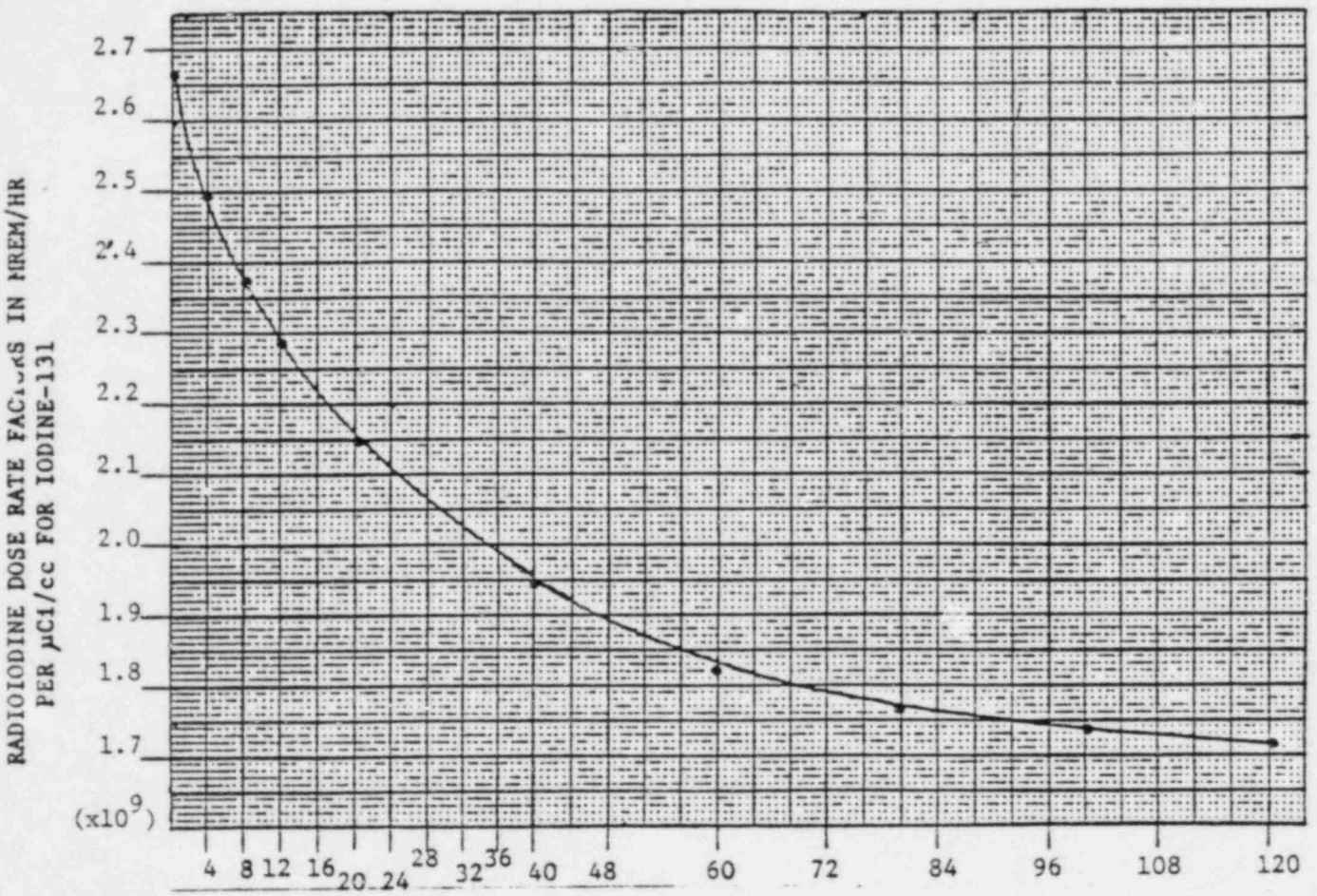
Conversion Chart for Iodine Releases (RE 2024 B and RE 2025 B)



(Copied from Victoreen Calibration Manual)

FIGURE 3

Radioiodine Dose Rate Factors for Infant Thyroid Dose Rate
vs.
Time After Reactor Shutdown



The constant 2.2×10^9 has a maximum difference of ±20% from time zero to 120 hours after reactor shutdown for the infant thyroid dose rate. This is based on the worst case of radioiodine activities in the fuel core 90 days after irradiation, Regulatory Guide 1.109 and NUREG-0133.

OFFSITE DOSE CALCULATIONS USING TI PROGRAMMABLE CALCULATOR

A miniprogram for the TI programmable calculator and its printer has been developed to simplify the offsite dose calculations. The program is divided into six sections which are discussed below. Samples of runs of each section are attached; circled items are inputs. Each section performs a different type of calculation, and each can be performed independently with the exception that either the noble gas or iodine release rate calculation must be performed once before any other section is run.

The program is not permanently stored and must be loaded into the calculator prior to use.

11 NOTE: The program does not include Table 3 $X\bar{\mu}/Q$ values for stability class G, thus for those instances where a stability class G exists, hand calculations should be performed, however, if time constraints require using the calculator, stability class F should be used. (The values obtained using F stability class will be approximately 50% low.)

LOADING PROGRAM:

The program is encoded on both sides of two magnetic cards kept with the calculator. Handle these cards only by the edges. The sides are marked 1-4. To load the program, perform the following steps in order:

11 1) Turn on the printer, and then the calculator (printer switch on right side), then press; 1, 2nd, OP, 17 on the calculator, the calculator should display 879.09.

2) Press "1" and "+/-"

3) Feed the end of the magnetic card labeled "1" into the program slot on calculator side - the calculator will automatically feed the card through the calculator and out the other side - pull the card out by the edges.

11 NOTE: If the calculator read the card properly, the (-1) will be shown in the display; if the (-1) is flashing, the card was read improperly. If this occurs, press clear and reenter the card.

4) Press "2" and "+/-"

5) Repeat the feeding process with side 2 of first card

6) Press "3" and "+/-"

7) Repeat the feeding process with side 3 of second card

8) Press "4" and "+/-"

9) Repeat the feeding process with side 4 of second card

10) Proceed by pressing A for noble gas or B for iodine release rate calculations, either program will print a line of output on the printer which finalizes the program within the calculator.

11) Finally, run programs E (see page 5 of 9) and 2nd A'(see page 6 of 9) to test that each of the main programs will run with fixed data. These test routines ensure that the program was loaded in the correct sequence into the calculator memory. Compare your printout with the output listed below each of the programs (E and 2nd A'). If an error (an incorrect output line or a flashing display) was encountered during either of the test runs, the user can reload the program (following the above procedure) or if the error continues contact the calculator programmer (Technical Section) for assistance.

PROCEDURE:

Once the program has been loaded as stated above, start any of the calculations by pressing the A, B, C, or D buttons (top row of calculator) corresponding to the functions described below:

NOTE: To enter data, simply input the values in standard or scientific format, then press "R/S". (If an error is made in the entry, press "CE" and reenter the value.) Also note that the calculator may be used in the normal manual mode without affecting the programming; when manual calculations are complete, to re-initiate a program simply press the button(s) corresponding to the desired calculation.

A - NOBLE GAS RELEASE RATE

This program calculates the noble gas release rates in curies/sec from the stack. As input, it requires the countrate from the noble gas monitors (RE2024C, 2025C) and the stack flow rate in KCFM.

FIRST PRESS A

N CPM — ENTER COUNTRATE IN CPM FROM RE2024C OR 2025C, THEN PRESS R/S

5.52 06

S FLO KCFM — ENTER STACK FLOW RATE IN KCFM FROM COMPUTER POINT F885, THEN PRESS R/S

98.

6.383328 00 C/SC ← OUTPUT IS IN CURIES/SEC

B - IODINE RELEASE RATE

This program calculates the iodine release rate in curies/sec from the stack. As input, it requires the countrate from the iodine monitors RE2024B, 2025B) at two different times and the time span between the readings.

11 FIRST PRESS B

I CPM (20.) ← ENTER THE INITIAL COUNTRATE FROM RE2024B OR 2025B, THEN PRESS R/S

T MIN (10.) ← ENTER THE TIME SPAN BETWEEN READINGS, THEN PRESS R/S

I CPM (4.56 06) ← ENTER THE FINAL COUNTRATE FLOW RE2024B OR 2025B, THEN PRESS R/S

1.9243116-03 C/SC → OUTPUT IS IN CURIES/SEC

C - PREDICTED OFFSITE DOSE RATES - NOBLE GAS

This program calculates the whole body dose rates due to noble gases at various distances from the station. Required inputs are wind speed, stability class, and noble gas release rate.

Note that stability class input is numerical with A=1, B=2, C=3, D=4, E=5, F=6.

11 FIRST PRESS C

WND SP MPH (12.) ← ENTER THE WIND SPEED IN MILES PER HOUR, THEN PRESS R/S

STBCL (5.) ← ENTER THE STABILITY CLASS (NUMERICAL VALUE), THEN PRESS R/S

C/SEC (6.38) ← ENTER THE NOBLE GAS RELEASE RATE IN CURIES/SEC, THEN PRESS R/S

5.364 M/SC → THIS OUTPUT IS WIND SPEED IN METERS/SEC

1.5462342-04 UC/C → PREDICTED NOBLE GAS CONCENTRATION AT 1 MILE IN µCi/cc

WBDR=
5.1025727 00 MR/H → WHOLE BODY DOSE RATE AT 1 MILE IN MILLIREM/HOUR

5.4712901-05 UC/C
WBDR= SAME AS ABOVE 2 MILES
1.8055257 00 MR/H

2.616704-05 UC/C
WBDR= SAME AS ABOVE AT 5 MILES
8.635123-01 MR/H

5.5902312-06 UC/C
WBDR= SAME AS ABOVE AT 10 MILES
1.8447763-01 MR/H

2.3788218-06 UC/C
WBDR= SAME AS ABOVE AT 20 MILES
7.8501119-02 MR/H

D - PREDICTED OFFSITE DOSE RATES - IODINE

This program calculates the adult and child thyroid dose rates due to iodine at various distances from the plant. Required inputs are wind speed, stability class, and iodine release rate.

Note that stability class input is numerical with A=1, B=2, C=3, D=4, E=5, F=6.

11 FIRST PRESS D

WND SP MPH (12.) ← ENTER WIND SPEED IN MILES PER HOUR, THEN PRESS R/S

STBCL (5.) ← ENTER STABILITY CLASS (NUMERICAL VALUE), THEN PRESS R/S

C/SEC (1.92-03) ← ENTER IODINE RELEASE RATE IN CURIES/SEC, THEN PRESS R/S

5.364 M/SC → THIS OUTPUT IS WIND SPEED IN METERS/SEC

4.6532438-08 UC/C
ATDR= → IODINE CONCENTRATION AT 1 MILE IN μCi/cc

5.1185682 01 MR/H
CTDR= → ADULT THYROID DOSE RATE IN MR/HR AT 1 MILE

1.0237136 02 MR/H → CHILD THYROID DOSE RATE IN MR/HR AT 1 MILE

```
  1.6465324-08   UC/C
ATDR=
  1.8111857 01   MR/H      SAME AS ABOVE AT 2 MILES
CTDR=
  3.6223714 01   MR/H

  7.8747204-09   UC/C
ATDR=
  8.6621924 00   MR/H      SAME AS ABOVE AT 5 MILES
CTDR=
  1.7324385 01   MR/H

  1.6823266-09   UC/C
ATDR=
  1.8505593 00   MR/H      SAME AS ABOVE AT 10 MILES
CTDR=
  3.7011186 00   MR/H

  7.1588367-10   UC/C
ATDR=
  7.8747204-01   MR/H      SAME AS ABOVE AT 20 MILES
CTDR=
  1.5749441 00   MR/H
```

E - TEST ROUTINE C - THE PREDICTED OFFSITE DOSE RATES - NOBLE GAS

This program calculates the whole body dose rates due to noble gases at various distances from the station. The calculator will generate the input from this test run of routine C, so no additional input is needed. Compare your output with the printout listed below.

```
          TEST C=N G                    TEST ROUTINE C

11                                PRESS E

WND SP MPH                        THE WIND SPEED IN MILES PER HOUR
        1.
STBCL                             THE STABILITY CLASS E=5 (NUMERIC VALUE)
        5.
C/SEC                             THE NOBLE GAS RELEASE RATE IN CURIES/SEC
        1.
      0.447      M/SC  ------>    THIS OUTPUT IS WIND SPEED IN METERS/SEC

  2.9082774-04   UC/C  ------>    PREDICTED NOBLE GAS CONCENTRATION AT 1 MILE IN
WBDR=                             µCi/cc
  9.5973154 00   MR/H  ------>    WHOLE BODY DOSE RATE AT 1 MILE IN MILLIREM/HOUR
```

```
  1.0290828-04   UC/C
WBDR=                        SAME AS ABOVE AT 2 MILES
  3.3959732 00   MR/H

  4.9217002-05   UC/C
WBDR=                        SAME AS ABOVE AT 5 MILES
  1.6241611 00   MR/H

  1.0514541-05   UC/C
WBDR=                        SAME AS ABOVE AT 10 MILES
  3.4697987-01   MR/H

  4.4742729-06   UC/C
WBDR=                        SAME AS ABOVE AT 20 MILES
  1.4765101-01   MR/H
```

2nd, A' - TEST ROUTINE D - THE PREDICTED OFFSITE DOSE RATES - IODINE

This program calculates the adult and child thyroid dose rates due to iodine at various distances from the plant. The calculator will generate the input for this test run of routine D, so no additional input is needed. Compare your output with the printout listed below.

```
    TEST D = IDN                          TEST ROUTINE D

11                                PRESS 2nd, A'

WND SP MPH
          1. ------------------> THE WIND SPEED IN MILES PER HOUR
STBCL
          6. ------------------> THE STABILITY CLASS F=6 (NUMERIC VALUE)
C/SEC
          1. ------------------> THE IODINE RELEASE RATE IN CURIES/SEC

       0.447      M/SC ------> THIS OUTPUT IS WIND SPEED IN METERS/SEC

  6.7114094-04    UC/C ------> IODINE CONCENTRATION AT 1 MILE IN μCi/cc
ATDR=
  7.3825503 05    MR/H ------> ADULT THYROID DOSE RATE IN MR/HR AT 1 MILE
CTDR=
  1.4765101 06    MR/H ------> CHILD THYROID DOSE RATE IN MR/HR AT 1 MILE

  2.2371365-04    UC/C
ATDR=
  2.4608501 05    MR/H         SAME AS ABOVE AT 2 MILES
CTDR=
  4.9217002 05    MR/H
```

6.7114094-05	UC/C	
ATDR=		
7.3825503 04	MR/H	SAME AS ABOVE AT 5 MILES
CTDR=		
1.4765101 05	MR/H	
2.4608501-05	UC/C	
ATDR=		
2.7069351 04	MR/H	SAME AS ABOVE AT 10 MILES
CTDR=		
5.4138702 04	MR/H	
1.1409396-05	UC/C	
ATDR=		
1.2550336 04	MR/H	SAME AS ABOVE AT 20 MILES
CTDR=		
2.5100671 04	MR/H	

11

CONDENSED INSTRUCTIONS FOR PERFORMING TI PROGRAMMABLE CALCULATOR DOSE CALCULATIONS

LOAD:

1) Turn on printer and calculator, then press; 1, 2nd, OP, 17 on the calculator, the calculator should display 879.09.

2) Press "1" and "+/-", load side 1

   NOTE: If the calculator read the card properly, the (-1) will be shown in the display.

3) Repeat step 2, pressing the corresponding number for side 2, 3, and 4

4) Press either "A" or "B"; then press "E" and then "2nd A'" below, to test the program of errors (compare your printout with the one listed with this procedure).

PRESS "A" FOR NOBLE GAS RELEASE RATE

11
Enter: Countrate from RE2024C or 2025C, Press R/S
Enter: Stack flow in KCFM, Press R/S
Output: Noble gas release rate in curies/sec

PRESS "B" FOR IODINE RELEASE RATE

11
Enter: Initial countrate from RE2024B or 2025B, Press R/S
Enter: Time between readings, Press R/S
Enter: Final countrate from RE2024B or 2025B, Press R/S
Output: Iodine release rate in curies/sec

PRESS "C" FOR WHOLE BODY DOSE RATES FROM NOBLE GASES

11
Enter: Wind speed in miles per hour, Press R/S
Enter: Stability class*, Press R/S
Enter: Release rate in curies/sec, Press R/S
Output: Wind speed in meters/sec
Output: Noble gas concentration in µCi/cc and whole body dose rate in mr/hr at 1, 2, 5, 10, and 20 miles

PRESS "D" FOR THYROID DOSE RATES FROM IODINE

11
Enter: Wind speed in miles per hour, Press R/S
Enter: Stability class*, Press R/S
Enter: Release rate in curies/sec, Press R/S
Output: Wind speed in meters/sec
Output: Iodine concentration in µCi/cc, adult thyroid dose rate in mr/hr and child thyroid dose rate in mr/hr at 1, 2, 5, 10, and 20 miles

*Use numerical value for stability class: A=1, B=2, C=3, D=4, E=5, F=6

PRESS "E" TO TEST "C" FOR WHOLE BODY DOSE RATES FROM NOBLE GASES

Enter: No Data Input is needed
11 Output: Whole body dose rate in mr/hr compare with data on page 5 of 9

PRESS "2nd, A'" TO TEST "D" FOR THYROID DOSE RATES FROM IODINE

Enter: No Data Input is needed
11 Output: Adult and child thyroid dose rates, both in mr/hr, compare with data on page 6 of 9

Instructions For Accessing DEC PDP 11/34 For Meterological Data

1. Turn phone accessed data terminal on.

2. Ensure unit is in ready mode (LOCAL button on).

3. Check the options:

   a) PARITY - off

   b) DUPLEX - full.

   c) BAUD - 300 or 30 CPS

4. Dial phone number: 2379. When the frequency tone is heard, press the DATA button. Hang up phone receiver.

5. Computer/Operator correspondence:

   a. Computer will type: _

   b. Operator will type: HELLO 100,100
   Return carriage

   c. Computer will type: PASSWORD: (See Note on Pg. 28 for correct password)

   d. Operator will type:
   Return carriage

   NOTE: Password will not be printed

   e. Computer will type: RSX-11M BL26 MULTI-USER SYSTEM

   GOOD AFTERNOON
   8-JUL-82 13:23 LOGGED ON TERMINAL TT10

   Toledo Edison Company
   Davis-Besse Site
   Environmental Monitoring Computer System

   UNAUTHORIZED ACCESS INTO THIS SYSTEM IS PROHIBITED BY FEDERAL LAW.

   NOTE: The system time on this computer remains at Eastern Standard Time the year around.

```
>@LOGIN.CMD
>SET/SLAV-TI:
>;
>;        DAVIS-BESSE WEATHER DATA
>;
>RUN SURVEY

SELECT OPTION

1 - DISPLAY HOURLY AVERAGE WEATHER DATA
2 - DISPLAY 15 MINUTE AVERAGE DATA
3 - LIST WEATHER TOWER GENERAL INFORMATION
4 - LIST DEFINITIONS OF WEATHER DATA ABBREVIATIONS
    OR CARRIAGE RETURN TO LOG OFF

ENTER OPTION (1, 2, 3, or 4):
```

f. Operator will type: (Enter option of your choice)
Return carriage NOTE: Computer is on EST

g. For Option 1 -
Computer will type: Please enter the starting month, day, and hour you wish to look at or RETURN to return to option list (MM, DD, HH, or RETURN).

Operator will type: (Enter month, day, and hour of choice. Example: 07, 08, 10).

Return carriage

Computer will type: Please enter the ending month, day, and hour you wish to look at (MM, DD, HH):

Operator will type: (Enter month, day, and hour of your choice. Example: 07, 08, 15).

h. For Option 2 -
Computer will type: _____is the current time (EST). Any hours you ask for which are greater than this hour will assume to be hours which occurred yesterday. A total of 24 hours worth of 15-minute average data is available.

Enter the starting and ending hours (0-23), or 24 to get all all 24 hours, or RETURN to return to option list [SHR, EHR, or 24 or RETURN]:

i. Computer will print out requested data and return to option list.

j. If more data is required, repeat Steps f - j.

k. If you wish to sign off, push RETURN and computer will print:

```
>:
>SET /NOSLAVE=TI:
>BYE
 TASK "...AT." TERMINATED
 ABORTED VIA DIRECTIVE OR MCR
 AND WITH PENDING IO REQUESTS

 HAVE A GOOD AFTERNOON
 >
 08-JUL-82 13:25 TT10:  LOGGED OFF
```

l. Push TERM READY to return printer to a stand-by condition.

NOTE: Passwords for accessing the 11/34 Met Data from the following locations are:

Location	Password
Ottawa County	DBOTT
Ohio State	DBOHIO
Region III	DBNRC3
Washington	DBNRCW
Emer. Control Center (ECC)	TEDEPG
Control Room	CONTRM

METEOROLOGICAL PARAMETER ABREVIATION DEFINITIONS

WSPD -- Wind speed in miles per hour. WSPD's are given at the 100 meter, 75 meter, and the 10 meter levels.

WD -- Wind direction in degrees, north = 0. WD's are given at the 100 meter, 75 meter, and the 10 meter levels.

SD -- Standard deviation (sigma theta) of the horizontal wind direction. SD's are given at the 100 meter, 75 meter, and the 10 meter levels.

100 DT -- Temperature differential in degrees fahrenheit between the 100 meter and the 10 meter levels.

75 DT -- Temperature differential in degrees fahrenheit between the 75 meter and the 10 meter levels.

AMB TEMP -- Temperature in degrees fahrenheit at the 10 meter level.

10 DW PNT -- Dew point temperature in degrees fahrenheit at the 10 meter level.

100 DW PNT-- Dew point temperature in degrees fahrenheit at the 100 meter level. 100 DW PNT's are only available for 15 minute average data.

RAIN -- Precipitation in inches (down to 1/100 of an inch) at the 1 meter level. Precipitation is never averaged, instead, it is totalled.

END

DAVIS-BESSE REVISION COVER SHEET

50-346

May 11, 1983
DATE

TO: Director of NRC

FROM: EMERGENCY PLANNING & PREPAREDNESS SUPV.

SUBJECT: Davis-Besse EMERGENCY PLAN SUPPORTING PROCEDURES Manual Changes

This letter transmits additions and revisions to the Davis-Besse

EMERGENCY PLAN SUPPORTING PROCEDURES Manual. Control Copy 502

Instructions for the material are as follows:

REMOVE AND RETURN	INSERT
Revision Index, Rev. 176	Revision Index, Rev. 177
AD 1827.10.12 T-6491	AD 1827.10.13

Date Revision Entered _____

Addressee Signature _____

RETURN TO THE OFFICE MANAGER - STOP #3050

X005
1/2

THE TOLEDO EDISON COMPANY
DAVIS-BESSE NUCLEAR POWER STATION
EMERGENCY PLAN SUPPORTING PROCEDURES
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