WCGS EMERGENCY PLAN IMPLEMENTING PROCEDURES

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FEBRUARY 17, 1986

ATTACHMENT 4.0

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FORM EP 02-3 REV. 0	TEMPORARY PROCEDURE CHANGE NOTICE	SHEET 1 of 1

PROCEDURE TITLE:	PROCEDURE NO./REVISION	TCN NO.
Training Programs	EPP02-1.2/3	02-1.2-1

REASON FOR TCN:

Correction of errors on the WCGS Radiological Emergency Response Plan Initial Training Module Matrix

AFFECTED STEPS:

Attachment 4.0

CHANGE REQUIRED:

Delete Module 4 as a requirement for the following ERO positions:

Shift Supervisor - DED
Supervising Operators
Administrative Emergency Coordinator
Radiological Assessment Coordinator
Dose Assessment Coordinator
Maintenance Emergency Coordinator
Operations Support Center Supervisor
Onsite Survey Team Director
Administrative Resource Manager

PREPARED BY: [signature] SIGNATURE 1/30/86 DATE

APPROVED BY ERC: [signature] SIGNATURE 2/3/86 DATE

AUTHORIZED BY VP-NUCLEAR: [signature] SIGNATURE 2/10/86 DATE

DC29 2-17-86

FORM KMF-32 REV. 8/85

Date: 2-28-86

Sheet: 1 of 1

NUCLEAR DEPARTMENT POLICY/PROCEDURE MANUAL
REMOVE AND INSERT INSTRUCTION

REMOVE	INSERT

WCGS RADIOLOGICAL EMERGENCY RESPONSE PLAN IMPLEMENTING PROCEDURES

NOTE: Please refer to the transmittal for pertinent documents to be removed and/or inserted into the manual.

1) Remove EPP TofC, Rev. 10 (3 pages)	1) Insert EPP TofC, Rev. 11 (3 pages)
2) Remove EPP 01-7.1, Rev. 2 (31 pages)	2) Insert EPP 01-7.1, Rev. 3 (32 pages)
3) Remove EPP 01-7.2, Rev. 4 (16 pages)	3) Insert EPP 01-7.2, Rev. 5 (16 pages)
4) Remove EPP 01-7.3, Rev. 4 (24 pages)	4) Insert EPP 01-7.3, Rev. 5 (24 pages)
5) Remove EPP 01-8.1, Rev. 3 (12 pages)	5) Insert EPP 01-8.1, Rev. 4 (12 pages)
5) Remove EPP 01-8.2, Rev. 2 (21 pages)	6) Insert EPP 01-8.2, Rev. 3 (23 pages)
7) Remove EPP 01-8.3, Rev. 0 (22 pages)	7) Insert EPP 01-8.3, Rev. 1 (25 pages)

WCGS EMERGENCY PLAN IMPLEMENTING PROCEDURES

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FEBRUARY 28, 1986

KANSAS GAS & ELECTRIC COMPANY
WOLF CREEK GENERATING STATION

RADIOLOGICAL EMERGENCY RESPONSE PLAN IMPLEMENTING PROCEDURE

RADIOLOGICAL RELEASE INFORMATION SYSTEM (RRIS)

EPP 01-7.1

Revision 3

Kevin J Moles — EMERGENCY PLANNING COORDINATOR REVIEW — DATE 2/18/86

Stan Devena — EMERGENCY PLANNING ADMINISTRATOR REVIEW — DATE 2-18-86

J Zell — PSRC APPROVAL RECOMMENDATION — DATE 2/25/86

Glenn L Koester — V.P. NUCLEAR APPROVAL — DATE 2/27/86

RELEASED DC44 — DATE 2-28-86

1.0 PURPOSE

This procedure provides guidance to dose projection/ assessment personnel in the operation of the Radioactive Release Information System (RRIS).

2.0 APPLICABILITY

This procedure is applicable to designated Control Room, Technical Support Center (TSC) and Emergency Operations Facility (EOF) dose projection/assessment personnel during and after a radiological emergency. It shall be utilized after the RRIS is operable to automatically project or calculate the radiological doses and dose rates to the public surrounding the WCGS.

3.0 DEFINITIONS

3.1 RRIS

Radioactive Release Information System

3.2 QKLOOK

A fast running model in the RRIS which calculates offsite radiological conditions based on straight line gaussian dispersion equations.

3.3 TOTPUF

A more detailed dispersion model which tracks actual plume location and integrated doses and air concentrations.

3.4 X/Q

A factor based on meteorological dispersion characteristics which relates atmospheric radionuclide release rates to offsite air concentrations.

3.5 EVENT

A condition on the RRIS System, based on an automatic signal from the ERFIS computer, or a manually entered signal, which initiates automatic running of real time QKLOOK and TOTPUF models and recording of pre-event, event and post-event data.

4.0 INSTRUCTIONS

4.1 PRECAUTIONS

4.1.1 If the RRIS is inoperable, immediately proceed to EPP 01-7.2, "Manual Determination of Release Rate" and EPP 01-7.3, "Manual Dose Projection Determination."

4.1.2 Master status, which involves the control of TOTPUF and the editing of input parameters, will be transferred from the Control Room terminal to the TSC terminal to the EOF terminal as these facilities are staffed and activated.

4.1.2.1 Master status transfer should only occur when the receiving facility is activated.

4.1.2.2 Master status should not be requested by a non-master terminal without first contacting the master terminal operator by telephone.

4.1.3 All models begin running using real-time data when the RRIS receives the Initiation of Event signal from the ERFIS computer. If the "Event in Progress" alarm is not listed on the RRIS alarm summary and a radiological release is in progress, the operator should manually initiate the event from the RRIS function menu. If a radiological release is not in progress, the operator shall not initiate an event until directed to do so by the DAC or DAS.

4.1.4 To assure that input data to the QKLOOK and TOTPUF models is good, the operator should check the validity of the Met Tower Data, the Rad Data, Release Rate Data and the Effluent Flow/Fan inputs for each dose calculation update by selecting the data displays from the function menu (in realtime, not historical mode). Validation should be repeated if parameters change significantly.

4.1.4.1 Use the primary (or secondary) values automatically selected by the RRIS if these values are available and valid.

4.1.4.2 If the primary or secondary value is unavailable or known to be incorrect and a correct value or estimate is known manually enter the value. The Control Room must be called for Rad or Effluent Flow/Fan Data. Met Data must be telephoned from Met Tower.

4.1.4.3 If none of these inputs are available, use default Rad values determined from last "good" quality primary/ secondary value. If there is reason to suspect that actual conditions may be worse, then use Step 4.1.4.4.

4.1.4.4 Use predetermined, conservative release cases stored in the RRIS in the absence of all the above data (see Attachment 10.0, "Predetermined Release Parameters Stored in RRIS Release Model").

4.1.5 Once the release point(s) have been identified, the isotopic spectrum being used by the RRIS for a release point should be validated and updated as more recent sample information becomes available.

4.2 INITIAL ACTIONS

4.2.1 Verify the red light on the CRT (health light) and the red light on the reset key on the upper left side of the keyboard are lit. If lights are lit, proceed to Step 4.2.2. If lights are not lit, perform the following:

4.2.1.1 Verify the ON/OFF switches on the right front sides of the CRT and the video generator are in the ON position.

4.2.1.2 Verify the AC cords are plugged in.

4.2.1.3 If Steps 4.2.1.1 and 4.2.1.2 fail to correct the problem, proceed to EPP 01-7.2 and 01-7.3.

4.2.2 To initialize the system, press home key, wait a few seconds and a display should appear. If not, check to see if the key switch on the right side of the keyboard is in the vertical position. If the key switch is in the vertical position, RRIS is inoperable. Proceed to EPP 01-7.2 and 01-7.3.

4.2.3 Review Attachment 11.0, "Flowchart for RRIS Operator Actions."

4.2.4 TOTPUF Model

4.2.4.1 Although not displayed initially, TOTPUF is automatically initiated in an event and should be left running, in real time mode only, throughout the event. Predictive or historical modes should not be used for TOTPUF during an event. To see results of TOTPUF, "TOTPUF" should be selected from the "Model Display Selection" menu. "TOTPUF CONTROL" should not be selected from the function menu except as noted in this procedure or the RRIS User's Manual (see Reference 5.4).

4.2.4.2 Map or tabular displays of:

- Air concentration
- Gamma dose rate (whole body)
- Beta dose rate

provides indication of the actual and present location of the plume. Plume location on the site area maps is shown by operator selected isopleths (Attachment 6.0, "Isopleth Value Selection"). Tabular values are at distances of 3/4, 2, 5, 10, and 50 miles and at azimuths from 0.0 to 337.5 degrees at 22.5 degree increments.

4.2.4.3 Map or tabular displays of:

- Time integrated air concentration
- Gamma dose (whole body)
- Beta dose
- Thyroid dose

integrate these values for all areas of plume passage since the beginning of the TOTPUF model initiation.

4.2.4.4 Hardcopies of tabular data should be made (see Attachments 2.0 through 5.0) when requested by the DAC/DAS or REC/RAM and at half hour intervals during the event to provide real time dose and dose rate information.

4.2.4.5 If the maximum puff limit for the TOTPUF model is reached, an alarm is displayed stating that only old puffs will be followed. If this occurs, go to Attachment 9.0, "Actions following "Maximum Puff Limit Reached - Only Old Puffs will be Followed" Alarm".

4.2.5 <u>QKLOOK Model</u>

4.2.5.1 QKLOOK is automatically initiated and displayed on all terminals (master and non-master) using real time data in an event. ("QKLOOK" must be selected on "Model Display Selection" to see QKLOOK results).

4.2.5.2 The straight line mode of QKLOOK displays isopleth or tabular results for a single time interval (i.e. no integration of successive results) out to 50 miles for:

- X/Q
- Gamma dose (whole body)
- Beta dose
- Thyroid dose
- Plume arrival time (tabular display only)

Hardcopy records of tabular results are available.

4.2.5.3 To project results from future releases, QKLOOK (straight line mode) should be used according to Attachment 8.0, "QKLOOK Diffusion and Dose Calculations Using Predictive MET and RAD Data." If future conditions can be projected, predictive dose calculations should be performed every half hour.

4.2.5.4 Real time or historical mode may be run on any terminal to evaluate the results of a single time interval (Attachment 7.0, "QKLOOK Diffusion and Dose Calculations Using Real Time MET and RAD Data").

4.2.5.5 Segmented mode of QKLOOK uses a single time segment of RAD data and gives resulting X/Q and doses using subsequent intervals of MET data. Real time, predictive, or historical modes and hard copies of inputs and results are available as with the straight line version of QKLOOK.

4.3 SUBSEQUENT ACTIONS

4.3.1 All calculations and results shall be reviewed by the RAM or REC for accuracy before release.

4.3.2 Following termination of the release, both QKLOOK and TOTPUF may be used in historical or predictive modes to re-evaluate offsite doses and incorporate additional information. If new releases begin, TOTPUF should be begun in real time mode immediately.

5.0 REFERENCES

5.1 WCGS Radiological Emergency Response Plan

5.2 EPP 01-7.2, "Manual Determination of Release Rate"

5.3 EPP 01-7.3, "Manual Dose Projection Determination"

5.4 RRIS-VAXIAA01-M2-U Users Manual for the SNUPPS RRIS

6.0 RECORDS

6.1 For actual emergencies, all hardcopies/photographs of data produced by the RRIS shall be retained by the REC/RAM. After the emergency has been terminated, these hardcopies/photographs shall be forwarded to the Emergency Planning Coordinator (EPC). The EPC shall forward these to the WCGS vault for storage. These records will be retained for the life of the plant. These shall be considered QA records.

6.2 For drills and exercises, all hardcopies/photographs of data produced by the RRIS shall be retained by the REC/RAM. After the drill/exercise is terminated, these hardcopies/photographs shall be forwarded to the Emergency Planning Coordinator (EPC). The EPC shall retain these documents for at least one year. These documents shall not be considered QA records.

7.0 ATTACHMENTS

7.1 Attachment 1.0, "Radioactivity Release Rate Summary"

7.2 Attachment 2.0, "Display of Tabular Data for X/Q"

7.3 Attachment 3.0, "Display of Tabular Data for Beta-Gamma Dose/Dose Rate"

7.4 Attachment 4.0, "Display of Tabular Data for Thyroid Inhalation Dose"

7.5 Attachment 5.0, "Display of Tabular Data for Plume Arrival Time"

7.6 Attachment 6.0, "Isopleth Value Selection"

7.7 Attachment 7.0, "QKLOOK Diffusion and Dose Calculations Using Real Time MET and RAD Data"

7.8 Attachment 8.0, "QKLOOK Diffusion and Dose Calculations Using Predictive MET and RAD Data"

7.9 Attachment 9.0, "Actions following "Maximum Puff Limit Reached - Only Old Puffs will be Followed" Alarm"

7.10 Attachment 10.0, "Predetermined Release Parameters Stored in RRIS RELEASE Model"

7.11 Attachment 11.0, "Flowchart for RRIS Operator Actions"

ATTACHMENT 1.0

RADIOACTIVITY RELEASE RATE SUMMARY

Description

This display shows the release activity, flow rate, and release rate for each release point.

Instruction

1. To see the display of Radioactivity Release Rate Summary, select with the lightpen the identifier next to "RAD REL RATE SUMMARY" on the Function Menu.

2. Note the Function Menu is erased from the screen and the Radioactivity Release Rate Summary display appears on the screen.

3. Note that if any parameters were altered in the Radiological Data display or FLOW displays, the new value is shown in the Radioactivity Release Rate Summary, after the next 15 minute update.

4. To obtain a hardcopy, depress with the lightpen the identifier next to "HARDCOPY" in the lower right hand corner of the screen.

5. To return to the Function Menu, depress with the lightpen the identifier next to "FUNCTION MENU" in the lower right hand corner of the screen.

6. Validity of the data used in the Radioactivity Release Rate Summary may be assessed by selecting the "RAD DATA" and the "EFF FLOW/FAN" displays from the function menu.

ATTACHMENT 2.0

DISPLAY OF TABULAR DATA FOR X/Q

Description

X/Q's (QKLOOK Model only) are displayed for distances of 3/4, 2, 5, 10, and 50 miles from the power plant site and at azimuths of 0.0 to 337.5 degrees, in 22.5 degree increments.

Instruction

1. To see the X/Q display, select with lightpen "X/Q" on the Function Menu.

2. Note the Function Menu is erased from the screen and the X/Q display appears on the screen.

3. To obtain a hardcopy, depress with the lightpen the identifier next to "HARDCOPY" in the lower right hand corner of the screen.

4. To return to the Function Menu, depress with the lightpen the identifier next to "FUNCTION MENU" in the lower right hand corner of the screen.

ATTACHMENT 3.0

DISPLAY OF TABULAR DATA FOR BETA GAMMA DOSE/DOSE RATE

Description

Gamma Dose Rates (TOTPUF Model only) and Gamma Doses are displayed for distances of 3/4, 2, 5, 10, and 50 miles from the power plant site and at azimuths of 0.0 to 337.5 degrees, in 22.5 degree increments.

Instructions

1. To see the Whole Body Gamma Dose Rates display, select with the lightpen the identifier next to "DOSE RATE - GAMMA" on the Function Menu.

2. Note the Function Menu is erased from the screen and the Whole Body Gamma Dose Rates display appears on the screen.

3. To obtain a hardcopy, depress with the lightpen the identifier next to "HARDCOPY" in the lower right hand corner of the screen.

4. To return to the Function Menu, depress with the lightpen the identifier next to "FUNCTION MENU" in the lower right hand corner of the screen.

5. To see the Whole Body Gamma Dose display, select with the lightpen the identifier next to "DOSE - GAMMA" on the Function Menu.

6. Note the Function Menu is erased from the screen and the Whole Body Gamma Dose display appears on the screen.

7. To obtain a hardcopy, depress with the lightpen, the identifier next to "HARDCOPY" in the lower right hand corner of the screen.

8. To return to the Function Menu, depress with the lightpen the identifier next to "FUNCTION MENU" in the lower right hand corner of the screen.

9. Repeat Steps 1 through 7 for BETA DOSE/DOSE RATE by selecting "DOSE RATE - BETA" and "DOSE - BETA" with the lightpen.

ATTACHMENT 4.0

DISPLAY OF TABULAR DATA FOR THYROID INHALATION DOSE

Description

Inhalation Thyroid Doses (TOTPUF Model only) are displayed for distances of 3/4, 2, 5, 10, and 50 miles from the power plant site and at azimuths of 0.0 to 337.5 degrees, in 22.5 degree increments.

Instruction

1. To see the Inhalation Thyroid Dose display, select with the lightpen the identifier next to "DOSE - THYROID" on the Function Menu.

2. Note the Function Menu is erased from the screen and the Inhalation Thyroid Dose display appears on the screen.

3. To obtain a hardcopy, depress with the lightpen the identifier next to "HARDCOPY" in the lower right hand corner of the screen.

4. To return to the Function Menu, depress with the lightpen the identifier next to "FUNCTION MENU" in the lower right hand corner of the screen.

ATTACHMENT 5.0

DISPLAY OF TABULAR DATA FOR PLUME ARRIVAL TIME

Description

Arrival times (QKLOOK Model only) are displayed for distances of 3/4, 2, 5, 10, and 50 miles from the power plant site and at azimuths of 0.0 to 337.5 degrees, in 22.5 degree increments. The plume arrival time indicates the travel time in hours and minutes (for predictive cases) or the actual clock time (for real time cases) at which the plume would contact a particular point. It displays times at the locations described above if the location is within a distance of twice the horizontal dispersion coeffecient of the plume at the point on the plume where the distance from the radial location to the plume is measured.

Instructions

1. To see the Plume Arrival display, select with the lightpen "PLUME ARRIVAL" on the Function Menu.

2. Note the Function Menu is erased from the screen and the Plume Arrival display appears on the screen.

3. To obtain a hardcopy, depress with the lightpen the identifier next to "HARDCOPY" in the lower right hand corner of the screen.

4. To return to the Function Menu, depress with the lightpen the identifier next to "FUNCTION MENU" in the lower right hand corner of the screen.

ATTACHMENT 6.0
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ISOPLETH VALUE SELECTION

Description

The Isopleth Value Selection display allows the user to select up to five isopleth levels for each of the following: X/Q, Air Concentration, Time-Integrated Air Concentration, Thyroid Dose, Beta Dose, Beta Dose Rate, Gamma Dose, and Gamma Dose Rate. Suggested Isopleth values are shown below. Desired isopleth levels must be selected before a model is run to be displayed on the map (RRIS will not recalculate QKLOOK isopleths after a model has run - see Attachments 7.0 and 8.0).

Suggested Isopleth Values

Category	Suggested Initial Isopleth Values
χ/Q	1.00 E-4 sec/m^3
	1.00 E-5
	1.00 E-6
	1.00 E-7
	1.00 E-8
Air concentration, Time integrated air concentration	1.00 E-4 Ci/m^3 or $Ci\text{-}HR/m^3$
	1.00 E-6
	1.00 E-8
	1.00 E-10
Beta Dose	1.00 E+00 mR
Gamma Dose	1.00 E+1
Thyroid Dose	1.00 E+2
Beta Dose Rate	1.00 E+3
Gamma Dose Rate	1.00 E+4

NOTE: TOTPUF model run time is dependent on the number of Isopleths selected (i.e., the more Isopleths chosen, the longer the model will take to run).

Instructions

1. To see the Isopleth Value Selection, select with the lightpen the identifier next to "SELECT ISOPLETH LEVEL" on the Function Menu.

2. The Function Menu will be erased from the screen and the Isopleth Value Selection menu display will appear on the screen.

ISOPLETH VALUE SELECTION

3. The display will list the following categories of isopleths; X/Q, Time-Integrated Air Concentration, Beta-Dose, Gamma-Dose, Air Concentration, Thyroid Dose, Beta Dose Rate, Gamma Dose Rate. Each category may contain up to five isopleth levels.

4. All selection identifiers will be shown as disabled until you have chosen either "ADD" or "DELETE".

5. Select with the lightpen the identifier next to "ADD".

6. Note that the identifier is now highlighted and will stay highlighted until another function selection has been made.

7. The identifier beside the next available calculation which you may add in each category is now shown in a solid line versus the dotted lines of the disabled identifiers signifying that it is enabled for addition.

8. Select with the lightpen the enabled identifier below one of the displayed model output types for addition of isopleth level.

9. Note that the identifier is now highlighted and a prompt is given in the lower portion of the display to "ENTER THE NEW VALUE".

10. Type in the desired isopleth new value on the keyboard as shown on the display.

    Note: The new value will now be displayed and the identifier beside it now shows as disabled and is no longer highlighted.

11. The next available area, if any, will now show as enabled.

12. To delete an isopleth value, select with the lightpen the identifier next to "DELETE".

13. Note that the highlighting for "ADD" has been removed and the identifier beside "DELETE" is now highlighted.

ISOPLETH VALUE SELECTION

14. Note the selection identifiers with isopleth values are enabled and identifiers without isopleth values are now disabled.

15. To make a deletion, select with the lightpen the identifier next to the value you wish to delete.

16. The isopleth level selected for deletion will be erased from the display, will no longer be used for model calculations, and the identifier will be disabled.

17. To obtain a hardcopy, depress with the lightpen the identifier next to "HARDCOPY" in the lower right hand corner of the screen.

18. To return to the Function Menu, depress with the lightpen, the identifier next to "FUNCTION MENU" in the lower right hand corner of the screen.

QKLOOK DIFFUSION AND DOSE CALCULATIONS USING REAL TIME MET AND RAD DATA

NOTE: The real time, straight line QKLOOK model starts running automatically when an event is initiated - no operator action is necessary. This instruction should be used to restart the real time mode after QKLOOK has been used for Historial or Predictive calculations.

Description

The QKLOOK model computes X/Q and dose values in either straight line mode or segmented modes. The model will compute both isopleths and tabular data for the input data.

In segmented mode, the model will run for as many time intervals selected or until the combined distance traveled (as computed by wind speed X time), for all intervals, equals fifty miles.

In straight line mode, the model will run until it has processed all the intervals requested.

Instructions

1. To see the QKLOOK Control Display, select with the lightpen the identifier next to "QKLOOK CONTROL" on the Function Menu.

2. The Function Menu will be erased from the screen and the QKLOOK Control display will appear on the screen.

   Note: When each page of model input is complete, a "DONE" identifier will be displayed at the bottom of the screen. When the user has checked all data input for accuracy and has made hardcopies of the page (if desired), the user should select with the lightpen the identifier next to "DONE". This will enable the next page of data input (if needed) or a message indicating input is complete will be displayed. Selecting the "FUNCTION MENU" identifier before the input complete message has been displayed will cancel all input.

QKLOOK DIFFUSION AND DOSE CALCULATIONS
USING REAL TIME MET AND RAD DATA

3. A prompt will be displayed to "SELECT PLUME TYPE:".

4. Select with the lightpen the identifier next to one of the plume types; segmented or straight line.

5. In segmented mode, the model tracks the radionuclides released during the first interval only, updating the results of that release for subsequent chaning meterological conditions.

6. In straight line mode, the model calculates results based on MET and RAD data for one interval at a time.

7. A prompt will be displayed to "SELECT RELEASE POINT:".

8. Select with the lightpen the identifier for the release point desired.

9. A prompt will be displayed to "SELECT TIME FRAME:".

10. Select with the lightpen the identifier next to "REAL TIME".

11. To obtain a hardcopy, depress with the lightpen the identifier next to "HARDCOPY" in the lower right hand corner of the screen.

12. After receiving the message "QKLOOK INPUT Complete", return to the Function Menu by depressing with the lightpen, the identifier next to "FUNCTION MENU" in the lower right hand corner of the screen.

NOTE: Although doses for a 15 minute time interval (not dose rate) are the displayed results of QKLOOK, dose rates may be estimated by:

(dose for 15 minute interval _____ mRem) x (4) =
_____ dose rate in mRem/hr.

QKLOOK DIFFUSION AND DOSE CALCULATIONS USING PREDICTIVE MET AND RAD DATA

NOTE: Only the straight line version of QKLOOK should be used for predictive cases.

Description

The QKLOOK model computes X/Q values and doses using MET and RAD data for a single interval, calculating both tabular data and isopleths resulting from the input values. Up to ten successive intervals may be run; the model will run until it has processed all the intervals requested.

To run the QKLOOK model in predictive mode, the user must enter all data manually. The RRIS System, however, provides default values from the data that is currently selected. Therefore, when preparing to run QKLOOK in predictive mode, it may be helpful to select a historical period that contains data similar to that desired for the predictive run. The default values are repeated for as many intervals as are selected for the run. The applicable default values from the selected time are:

1. Stability,

2. 10 meter wind speed and wind direction,

3. If Radwaste or Unit Vent is selected, the default RMS values will be those for Noble Gas.

Isotopic spectrum values will be zeroed.

Instructions

1. To see the QKLOOK Control Display, select with the lightpen the identifier next to "QKLOOK CONTROL" on the Function Menu.

QKLOOK DIFFUSION AND DOSE CALCULATIONS
USING PREDICTIVE MET AND RAD DATA

2. The Function Menu will be erased from the screen and the QKLOOK Control display will appear on the screen.

Note: When each page of model input is complete, a "DONE" identifier will be displayed at the bottom of the screen. When the user has checked all data input for accuracy and has made hardcopies of the page (if desired), the user should select with the lightpen the identifier next to "DONE". This will enable the next page of data input (if needed) or a message indicating input is complete will be displayed. Selecting the "FUNCTION MENU" identifier before the input complete message has been displayed, will cancel all input.

3. A prompt will be displayed to "SELECT PLUME TYPE:".

4. Select with the lightpen the identifier next to "Straight line".

5. A prompt will be displayed to "SELECT RELEASE POINT:".

6. Select with the lightpen the identifier for the release point desired.

7. A prompt will be displayed to "SELECT TIME FRAME:".

8. Select with the lightpen "PREDICTIVE".

9. A prompt will be displayed to "ENTER # OF TIME SLOTS (1-10)".

Note: If the user plans to run RELEASE, the start time will always be valid, but the model will only generate doses using the data for the number of time intervals specified in the release case chosen. Specifically, each release case will generate valid isotopic spectra for a predefined number of time intervals. For example, a user wants to run release case 1 for 20 historical time periods. Release case 1 will only return valid data for 12 time intervals; so the last 8 will return 0 for all nuclides. No warning will be given as to this event.

QKLOOK DIFFUSION AND DOSE CALCULATIONS
USING PREDICTIVE MET AND RAD DATA

10. Enter the number of predictive segments to calculate on the keyboard. For a single case, one segment should be chosen.

11. At the time of the selection, the current display will be erased from the screen and the QKLOOK Control Meterological Data Input menu will be displayed, showing the default values from the time period selected.

12. A prompt is displayed tc "SELECT METEROLOGICAL VALUE TO ALTER:".

13. Select with the lightpen the identifier next to the meterological value you wish to alter.

14. If you selected a value under wind speed, a prompt will be displayed to "ENTER WIND SPEED".

15. Type in the new wind speed value on the keyboard.

16. If you selected a value under wind direction, a prompt will be displayed to "ENTER WIND DIRECTION:".

    Type in the new wind direction value on the keyboard. The range is 0 degrees to 360 degrees.

17. If you selected a value under stability class, a prompt will be displayed to "ENTER STABILITY CLASS:".

    Type in the new stability class value on the keyboard. The valid values are A through G.

18. To obtain a hardcopy, depress with the lightpen, the identifier next to "HARDCOPY" in the lower right hand corner of the screen.

19. Select with the lightpen the identifier next to "DONE" in the lower portion of the screen when inputting of meterological data is complete.

20. At the time of the selection, the current display will disappear and the QKLOOK Control RELEASE display will appear.

QKLOOK DIFFUSION AND DOSE CALCULATIONS
USING PREDICTIVE MET AND RAD DATA

21. A prompt "DO YOU WANT TO RUN RELEASE?" will be displayed.

    Select with the lightpen the identifier next to "YES" or "NO".

22. If "YES" was selected, a prompt will be displayed to "SELECT ONE RELEASE CASE"; following this selection, the "QKLOOK INPUT Complete" message will be displayed. To view results return to the FUNCTION MENU by selecting the "Function Menu" with the lightpen.

23. The Radiological/Flow Data input screen will appear if "NO" is selected. These values may be altered or the default values appearing may be used depending on the desired inputs for the predictive case. When inputs are completed, depress the "DONE" identifier.

24. The Isotopic Spectrum Data Input screen will appear (no default isotopic values are given); isotopes should be entered based on known or predicted isotopic concentrations as desired. Select the "DONE" identifier when isotope entry is complete.

25. The "QKLOOK INPUT Complete" message will appear on the screen. Return to the Function Menu to choose results to be displayed.

NOTE: The QKLOOK Model is based on assumed interval lengths of 15 minutes. To project doses for longer periods of time than this, tabular dose results may be multiplied by the number of 15 minute segments in the desired predicted time. (For example, if the predicted dose for the next 3 hours is desired, the tabular QKLOOK doses should be multiplied by 12, which is the number of 15-minute intervals in 3 hours.

If total predicted doses are desired, tabular results of QKLOOK projected doses should be added to the tabular doses at corresponding locations as obtained by the real time TOTPUF outputs.

ACTIONS FOLLOWING "MAXIMUM PUFF LIMIT REACHED - ONLY OLD PUFFS WILL BE FOLLOWED" ALARM

If the Release release rate magnitude is stable or increasing at the time the alarm is received, perform Section "A" below. If the magnitude of the release rate is decreasing rapidly or is significantly less than the peak value when the alarm is received, perform Section "B".

A. Since maximum projected doses and dose rates will be nearest the release point while releases are occurring, it is important to continue calculating these near-site conditions. The effect of "losing" more distant puffs that have already dispersed is acceptable in this case (these puffs may be added back in at a later time by re-running TOTPUF in historical mode). The steps to be followed, therefore, are:

1. Obtain tabular hardcopies of all dose, dose rate, and air concentration values (these tabular results may be added to subsequent tabular results for total resulting doses and integrated air concentrations).

2. Restart TOTPUF in Real Time Mode by:

   a. Selecting "TOTPUF Control" from the Function Menu using the lightpen.

   b. Selecting the box next to "REAL TIME" when prompted. Following the display of the "TOTPUF input complete" message, return to the Function Menu by selecting the Function Menu box with the lightpen.

3. Steps (1) and (2) above should be performed as quickly as possible to prevent the loss of information (preferably early in the same interval in which the alarm is received).

B. Since no new significant doses or dose rates are being added in this case, it is more important to continue following puffs already released. The steps to be followed are:

1. As long as release rates are small, continue to allow TOTPUF to run until puffs are outside the area of interest (old puff location can be tracked with "Air Concentration" or Gamma, Beta, or Thyroid "DOSE" isopleth displays).

Important: Release Rates (on RAD data or Release Rate Summary Displays) should be observed frequently during this time: if release rates begin to increase significantly, immediately perform Section "A" of this attachment)

2. When old puffs are outside the area of interest, hardcopy all tabular results and re-initiate a new real time TOTPUF run as in Section "A" above.

PREDETERMINED RELEASE PARAMETERS
STORED IN RRIS RELEASE MODEL

RELEASE CASE 1

Case 1 is a fuel handling accident in the Fuel Building. Table 10.1 lists the assumptions including the initial air concentration of activity in the Fuel Building. The accident assumes 1 fuel assembly out of 193 fuel assemblies is involved in the accident. The accident starts when activity from one assembly enters the atmosphere of the fuel handling building. The activity is assumed to be released to the environment via the building exhaust at the rate of 9000 CFM. Ninety percent of the Iodine is filtered out by the exhaust filters. The noble gases are not filtered.

The set up of the release input assumes the activity is initially in the Fuel Building. The flow rate out of the building is equal to 0.593 vol/hr.

TABLE 10.1
FUEL-HANDLING ACCIDENT IN FUEL BUILDING

Isotope	Initial Concentration in Fuel Bldg (uCi/cc)	Initial Activity in Fuel Bldg (Curies)
I-131	2.073 E-2	5.34 E+2
I-132	5.465 E-15	1.41 E-10
I-133	2.422 E-3	6.22 E+1
I-134	0	0
I-135	2.031 E-6	5.23 E-2
Kr-83m	7.944 E-17	5.23 E-12
Kr-85	1.454 E-1	3.75 E+3
Kr-85m	1.891 E-7	4.87 E-3
Kr-87	0	0
Kr-88	5.151 E-11	1.33 E-6
Kr-89	0	0
Xe-131m	2.413 E-2	6.22 E+2
Xe-133m	4.661 E-2	1.20 E+3
Xe-133	3.846	9.91 E+4
Xe-135m	0	0
Xe-135	3.187 E-3	8.21 E+1
Xe-137	0	0
Xe-138	0	0

Accident Assumptions

Volume of building =910,000 ft^3

Building exhaust flow rate = 9,000 CFM

Volume release rate = C.593 Vol/HR

Exhaust filter efficiency (for iodines) = 90 %

Release is from one assembly out of 193 fuel assemblies

Release duration = 2 hours

Initial activity in fuel building is given above.

RELEASE CASE 2

Case 2 is a fuel handling accident in the Containment Building. The assumptions for case 2 are given in Table 10.2. The release model assumes initial activity is in the Containment Building. Only the leak path from containment to the environment via the Auxiliary Building and filter is calculated. The flow rate from containment to the Aux Building is 7.50 E-05 Vol/Hr. The flow rate from the Auxiliary Building to the environment is 0.318 Vol/Hr.

TABLE 10.2
FUEL-HANDLING ACCIDENT IN CONTAINMENT

Isotope	Initial Concentration in Ctmt (uCi/cc)	Initial Activity in Ctmt (Curies)
I-131	9.053 E-3	6.41 E+2
I-132	2.387 E-15	1.69 E-10
I-133	1.058 E-3	7.49 E+01
I-134	0	0
I-135	8.870 E-7	6.28 E-2
Kr-83m	3.470 E-17	2.46 E-12
Kr-85	6.352 E-2	4.50 E+3
Kr-85m	8.262 E-8	5.85 E-3
Kr-87	0	0
Kr-88	2.250 E-11	1.59 E-6
Kr-89	0	0
Xe-131m	1.054 E-2	7.46 E+2
Xe-133m	2.036 E-2	1.44 E+3
Xe-133	1.680	1.19 E+5
Xe-135m	0	0
Xe-135	1.392 E-3	9.86 E+1
Xe-137	0	0
Xe-138	0	0

Accident Assumptions:

Free volume in containment = 2,500,000 ft^3

Volume of Aux Bldg = 1,700,000 ft^3

Leak rate from containment to environment = 0.02% volume/day

Leak rate from containment to Aux Bldg = 0.18% volume/day

Aux Bldg flow rate = 9,000 CFM

Exhaust filter efficiency (for iodines) = 90%

Release is from 1.2 assemblies out of 193 fuel assemblies.

Initial activity in containment is given above.

RELEASE CASE 3

Case 3 is a loss of coolant accident (LOCA). The assumptions for case 3 are given in Table 10.3. The leak rate from the containment to the environment is 8.33 E-06 Vol/day. All initial activity is assumed to be in the Containment Building.

TABLE 10.3
LOSS OF COOLANT ACCIDENT (LOCA)

Isotope	Initial Concentration in Ctmt (uCi/cc)	Initial Activity in Ctmt (Curies)
I-131	3.157 E+2	2.24 E+7
I-132	4.792 E+2	3.39 E+7
I-133	7.077 E+2	5.01 E+7
I-134	8.278 E+2	5.86 E+7
I-135	6.424 E+2	4.55 E+7
Kr-83m	2.091 E+2	1.48 E+7
Kr-85	2.065 E+1	1.46 E+6
Kr-85m	6.532 E+2	4.62 E+7
Kr-87	1.176 E+3	8.33 E+7
Kr-88	1.612 E+3	1.14 E+8
Kr-89	2.004 E+3	1.42 E+8
Xe-131m	1.307 E+1	9.25 E+5
Xe-133m	6.970 E+1	4.93 E+6
Xe-133	2.831 E+3	2.00 E+8
Xe-135m	7.841 E+2	5.55 E+7
Xe-135	2.701 E+3	1.91 E+8
Xe-137	2.569 E+3	1.82 E+8
Xe-138	2.404 E+3	1.70 E+8

Accident Assumptions:

Free volume of containment =2,500,000 ft^3

Containment leak rate to environment = 0.02%/day

Initial activity in containment given above.

RELEASE CASE 4

Case 4 is a waste gas tank rupture. The assumptions for case 4 are listed in Table 10.4. The flow rate from the Radwaste Building in the environment is found to be 0.640 Vol/HR. All the initial activity is assumed to be in the Radwaste Building. 90% of the iodine is filtered out by the filters.

TABLE 10.4
WASTE GAS TANK RUPTURE

Isotope	Activity Released to Radwaste Bldg (Curies)
I-131	8.30 E-1
I-132	3.80 E-3
I-133	1.60 E-1
I-134	7.50 E-4
I-135	2.60 E-2
Xe-131m	5.14 E+2
Xe-133m	1.68 E+2
Xe-133	1.25 E+4
Xe-135m	1.40 E-1
Xe-135	3.28 E+2
Xe-138	1.60 E-1
KR-85m	4.35 E+1
Kr-85	7.66 E+3
Kr-87	4.20 E+0
Kr-88	4.25 E+1

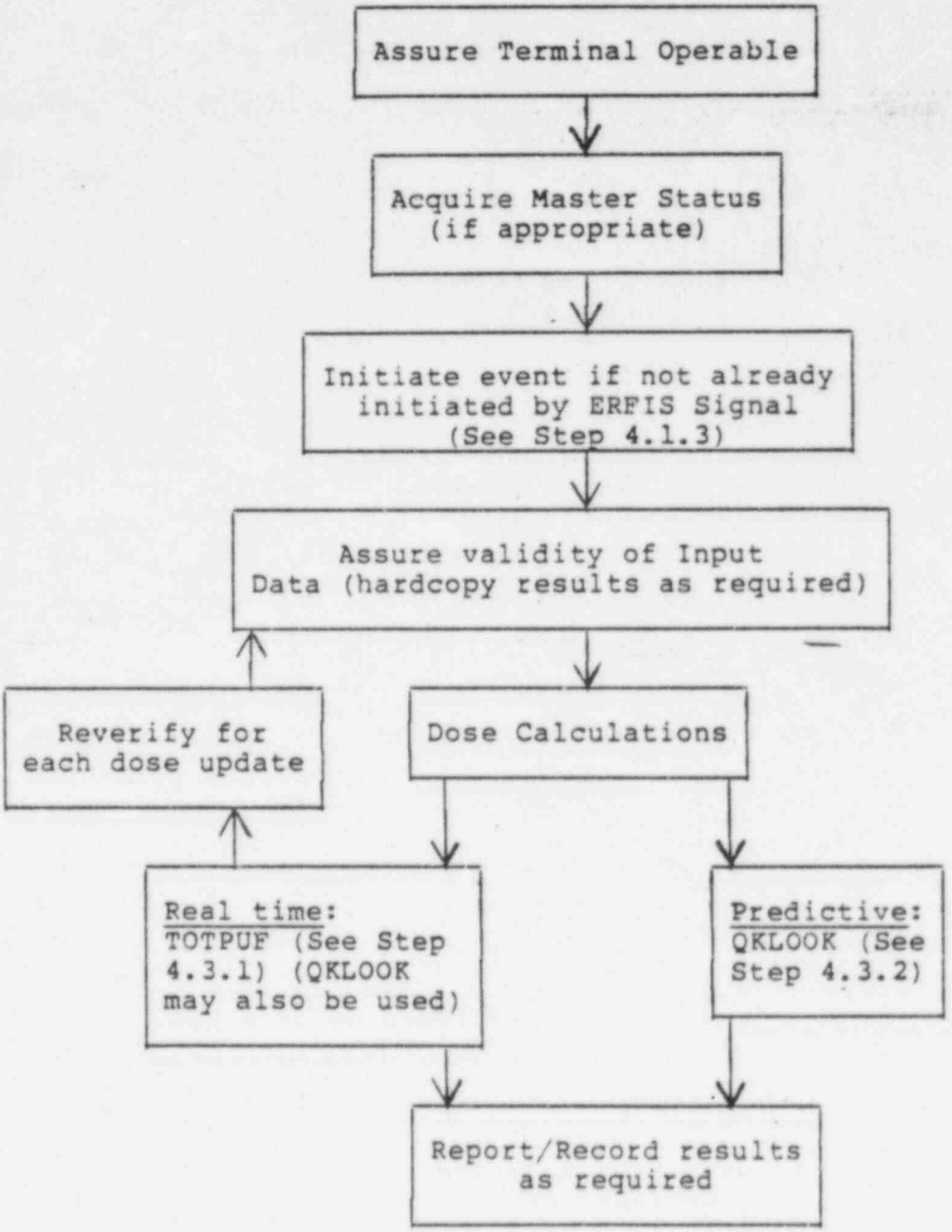
Accident Assumptions:

Radwaste bldg volume	=1,120,000 ft^3
Exhaust flow	= 12,000 CFM
Exhaust filter efficiency (for iodines)	= 90%
Volume Release Rate	= 0.640 Vol/HR

Activity from tank is assumed released to Radwaste Building.

ATTACHMENT 11.0

FLOWCHART FOR RRIS OPERATOR ACTIONS



KANSAS GAS AND ELECTRIC COMPANY
WOLF CREEK GENERATING STATION

RADIOLOGICAL EMERGENCY RESPONSE PLAN IMPLEMENTING PROCEDURE

MANUAL DETERMINATION OF RELEASE RATE

EPP 01-7.2

Revision 5

Kevin J Moles — EMERGENCY PLANNING COORDINATOR REVIEW — DATE 2/18/86

Stan Devera — EMERGENCY PLANNING ADMINISTRATOR REVIEW — DATE 2-18-86

J Zell — PSRC APPROVAL RECOMMENDATION — DATE 2/25/86

Glenn L Koester — V.P. NUCLEAR APPROVAL — DATE 2/27/86

RELEASED DC44 — DATE 2-28-86

1.0 PURPOSE

1.1 This procedure provides guidance and instruction for determining release rates of airborne radioactivity when the Radiological Release Information System (RRIS) is inoperable during emergency conditions at Wolf Creek Generating Station (WCGS).

2.0 APPLICABILITY

2.1 This procedure shall be utilized when the RRIS computer is inoperable during emergency conditions.

2.2 The estimated release rate and total release values calculated in accordance with this procedure shall be used in conjunction with EPP 01-7.3, "Manual Dose Projection Determination" and EPP 01-10.1, "Protective Action Recommendations", as a basis for determining what offsite protective actions should be recommended to State and County officials.

2.3 This procedure will be implemented by WCGS emergency response personnel in the following manner:

2.3.1 Prior to manning the Technical Support Center (TSC), Control Room personnel who are trained in this procedure, shall perform these calculations.

2.3.2 After the TSC is activated, but prior to the activation of the Emergency Operations Facility (EOF), Dose Assessment Coordinator (DAC) shall assure that the RRIS Operator implements this procedure.

2.3.3 Upon activation of the EOF, the Radiological Assessment Manager (RAM) shall assure that the RRIS operator implements this procedure.

3.0 DEFINITIONS

3.1 RELEASE RATE

The quantity of radioactive material being released to the environment expressed in curies per second (Ci/sec).

3.2 SOURCE TERM

The calculated quantity of radioactive material available for release or being released to the environment.

4.0 INSTRUCTIONS

4.1 PRECAUTIONS

4.1.1 Calculations contained in this procedure should be reviewed by the DED or REC at the TSC, or the DEM or RAM at the EOF, prior to changing the Status Board or dissemination of results to other emergency response personnel.

4.1.2 Upon activation of the EOF, the RRIS Operator and/or Dose Assessment Supervisor (DAS) shall have the RAM or DEM review intermediate calculations, when appropriate.

4.1.3 Review of offsite determination of release rates will be performed by the DAC/DAS.

4.2 INITIAL ACTIONS

4.2.1 The DAC or DAS, as appropriate, shall:

4.2.1.1 If RRIS is inoperable, assure the completion of Attachment 1.0, "Onsite Determination of Vent Release Rate," Form EP 7.2-1

4.2.1.2 If vent monitor(s) are inoperable, consider the dispatch of Onsite Survey Team(s) to collect appropriate grab samples from the unmonitored locations in accordance with CHM 01-007, "Sampling of Unit and Radwaste Vents for Radioactive Gases and Tritium" or CHM 01-005, "Exchange of Unit and Radwaste Vent Particulate and Iodine Filter Cartridges."

4.2.1.2.1 Recommend that Offsite Monitoring Teams be dispatched to determine offsite dose rates in accordance with EPP 01-8.2, "Offsite Radiological Monitoring."

4.2.1.2.2 Record results on Attachment 1.0.

4.2.1.3 If a steam generator tube rupture is suspected or verified, assure the completion of Attachment 4.0, "Steam Generator Tube Rupture Release Rate Determination," Form EP 7.2-4.

4.2.1.4 As required to calculate the release rate using off-site data (backcalculations), assure the completion of Attachment 5.0, "Release Rate Calculation Using Offsite Field Team Data (Backcalculations)", Form EP 7.2-5.

4.2.1.5 To determine the containment leak rate contribution to the containment release rate, assure the completion of Attachment 6.0, "Containment Release Rate Calculation," Form EP 7.2-6.

4.2.1.6 Review completed Attachments.

4.2.1.7 Inform REC/RAM of results.

4.3 SUBSEQUENT ACTIONS

4.3.1 The DAC/DAS shall:

4.3.1.1 Continue to evaluate the results supplied by the attachments.

4.3.1.2 As new results are received, assure they are posted on the appropriate Status Boards.

5.0 REFERENCES

5.1 — WCGS Radiological Emergency Response Plan

5.2 EPP 01-7.3, "Manual Dose Projection Determination"

5.3 EPP 01-10.1, "Protective Action Recommendations" |

5.4 WCGS Final Safety Analysis Report, Chapter 15.0 |

5.5 CHM 01-005, "Exchange of Unit and Radwaste Vent Particulate and Iodine Filter Cartridges" |

5.6 CHM 01-007, "Sampling of Unit and Radwaste Vents for Radioactive Gas and Tritium" |

6.0 RECORDS

6.1 Form EP 7.2-1 "Onsite Determination of Vent Release Rate"

6.2 Form EP 7.2-2 "Exhaust Fan Status"

6.3 Form EP 7.2-4 "Steam Generator Tube Rupture Release Rate Determination"

6.4 Form EP 7.2-5 "Release Rate Calculation Using Offsite Field Team Data (Backcalculations)"

6.5 Form EP 7.2-6 "Containment Release Rate Calculation"

6.6 The records generated by this procedure during an actual emergency shall be forwarded to the Emergency Planning Coordinator (EPC) at the termination of the emergency. The EPC forwards the records to the WCGS vault for storage. These records will be retained for the life of the plant. These records shall be considered QA records.

6.7 The records generated by this procedure during drills and exercise shall be forwarded to the EPC upon termination of the drill or exercise. The EPC shall maintain these records for at least one year. These records shall be considered non-QA records.

7.0 ATTACHMENTS

7.1 Attachment 1.0, "Onsite Determination of Vent Release Rate"

7.2 Attachment 2.0, "Exhaust Fan Status"

7.3 Attachment 3.0, "Design Basis Accident Release Rates"

7.4 Attachment 4.0, "Steam Generator Tube Rupture Release Rate Determination"

7.5 Attachment 5.0, "Release Rate Calculation Using Offsite Field Team Data (Backcalculations)"

7.6 Attachment 6.0, "Containment Release Rate Calculation"

FORM EP 7.2-1 REV. 1 ATTACHMENT 1.0
(Page 1 of 2)

ONSITE DETERMINATION OF VENT RELEASE RATE
(See Back for Instructions)

DATE: _____ TIME: _____

#1 UNIT VENT FLOW RATE = _____ CFM

☐ Calculated (from Attachment 2.0) ☐ Measured

#2 UNIT VENT CONCENTRATION = _____ uCi/cc Noble Gas

☐ Monitor ☐ Plant Sample ☐ Default Value

#3 UNIT VENT CONCENTRATION = _____ uCi/cc Iodine

☐ Monitor ☐ Plant Sample ☐ Default Value

UNIT VENT RELEASE RATE =

#4 (_____ uCi/cc)(_____ CFM)(4.72E-4) = _____ Ci/sec Noble Gas

#5 (_____ uCi/cc)(_____ CFM)(4.72E-4) = _____ Ci/sec Iodine

#6 RADWASTE VENT FLOW RATE = _____ CFM

☐ Calculated (from Attachment 2.0) ☐ Measured

#7 RADWASTE VENT CONCENTRATION = _____ uCi/cc Noble Gas

☐ Monitor ☐ Plant Sample ☐ Default Value

#8 RADWASTE VENT CONCENTRATION = _____ uCi/cc Iodine

☐ Monitor ☐ Plant Sample ☐ Default Value

RADWASTE VENT RELEASE RATE =

Concentration X Flow Rate X Conversion Factor = Release Rate

#9 (_____ uCi/cc)(_____ CFM)(4.72E-4) = _____ Ci/sec Noble Gas

#10 (_____ uCi/cc)(_____ CFM)(4.72E-4) = _____ Ci/sec Iodine

TOTAL RELEASE RATE =

#11 Unit Vent Release Rate (Noble Gas) + Radwaste Vent Release Rate (Noble Gas) = Total Noble Gas Release Rate

#4 + #9 = _____ Ci/sec Noble Gas

#12 Unit Vent Release Rate (Iodine) + Radwaste Vent Release Rate (Iodine) = Total Iodine Release Rate

#5 + #10 = _____ Ci/sec Iodine

Prepared By: _____

Reviewed By: _____

INSTRUCTIONS

1 Obtain Radiation Monitoring System (RMS) readings from the Control Room for the Unit Vent and/or Radwaste Vent flow rate(s) in cubic feet per minute (CFM) and insert at Item #1 and #6, respectively.

If vent flow rate is unavailable, determine flow rate by using EPP 01-7.2, Attachment 2.0, "Exhaust Fan Status," Form EP 7.2-2.

#2 Obtain the noble gas activity concentration (uCi/cc) of the unit vent from the RMS display. If vent monitor is out of service, refer to Onsite Survey Team data or Attachment 3.0, "Design Basis Accident Release Rates."

#3 Obtain iodine activity concentration (uCi/cc) of the unit vent from the RMS display. If vent monitor is offscale or out of service, refer to Onsite Survey Team data or Attachment 3.0, "Design Basis Accident Release Rates."

#4 Multiply concentration in Item #2 by flow rate in Item #1 and the conversion factor to obtain release rate of noble gas through the unit vent.

#5 Multiply concentration in Item #3 by flow rate in Item #1 and the conversion factor to obtain release rate of iodine through the unit vent.

6 See Item #1, then proceed to Item #7.

#7 Obtain the noble gas activity concentration (uCi/cc) of the radwaste vent from the RMS display. If vent monitor is out of service, refer to Onsite Survey Team data or Attachment 3.0, "Design Basis Accident Release Rates."

#8 Obtain iodine activity concentration (uCi/cc) of the radwaste vent from the RMS display. If vent monitor is offscale or out of service, refer to Onsite Survey Team data or Attachment 3.0, "Design Basis Accident Release Rates."

#9 Multiply concentration in Item #7 by flow rate in Item #6 and the conversion factor to obtain release rate of noble gas through the radwaste vent.

#10 Multiply concentration in Item #8 by flow rate in Item #6 and the conversion factor to obtain release rate of iodine through the radwaste vent.

#11 Add the release rate in Item #4 and the release rate in Item #9 to obtain the total release rate of noble gas.

#12 Add the release rate in Item #5 and the release rate in Item #10 to obtain the total release rate of iodine.

13 Report results to either the DAC (TSC) or DAS (EOF).

ATTACHMENT 2.0

EXHAUST FAN STATUS

NOTE: Contact Control Room for fan status

Exhaust System	Fan ID	Design Flow Unit Vent Flow	Enter Design Flow on
Aux Bldg HVAC	CGL03A	12,000 (slow) 32,000 fast	_____CFM
	CGL03B	12,000 (slow) 32,000 fast	_____CFM
Control Bldg HVAC	CGK02A	6,000	_____CFM
	CGK02B	6,000	_____CFM
Fuel Bldg HVAC	CGG02A	9,000	_____CFM
	CGG02B	9,000	_____CFM
Condenser Air Removal HVAC	CGE01B	1,000	_____CFM
	CGE01A	1,000	_____CFM
Containment Purge Exhaust	CGT01	20,000	_____CFM
	CGT02	4,000	_____CFM
Main Steam Enclosure Building Exhaust Fans	CGF03A	17,000	_____CFM
	CGF03B	17,000	_____CFM
		Unit Vent Total Flow	_____CFM

Radwaste Vent Flow

Radwaste Building Exhaust	CGH01A	12,000	_____CFM
	CGH01B	12,000	_____CFM
		Radwaste Vent Total Flow	_____CFM

ATTACHMENT 3.0
(Page 1 of 1)

DESIGN BASIS ACCIDENT RELEASE RATES

FSAR Section	Type of Accident	Release Rate (Ci/sec)	Iodine / Noble Gas Ratio*
15.6-6	LOCA		
	Noble Gas	27.92	0.087
	Iodine	2.44	
15.1-3	Main Steam Line Break (Most limiting)		
	Noble Gas	0.00066	15.15
	Iodine	0.01	
15.2-3	Loss of Non-emergency AC		
	Noble Gas	0.00066	0.14
	Iodine	0.000092	
15.3-3	Locked Rotor		
	Noble Gas	0.83	0.005
	Iodine	0.0042	
15.4-4	RCCA Ejection		
	Noble Gas	0.06	0.006
	Iodine	0.0034	
15.6-2	CVCS Letdown Line Break Outside Containment		
	Noble Gas	0.08	0.006
	Iodine	0.00046	
15.6-4	Steam Generator Tube Rupture		
	Noble Gas	0.29	0.38
	Iodine	0.11	
15.7-7	Fuel Handling Accident		
	Noble Gas	14.52	0.0007
	Iodine	0.01	
15.7-3	Waste Gas Decay Tank Rupture		
	Noble Gas	2.95	0.00007
	Iodine	0.0002	
	Steam Turbine Driven Auxilliary Feed Pump PAL 02		
	Noble Gas	1.40	0.014
	Iodine	0.02	

* Precaution: If given the Noble Gas concentration only, multiply by ratio to obtain the Iodine concentration. If given the Iodine concentration only, divide by ratio to obtain the Noble Gas concentration.

FORM EP 7.2-4 REV. 1

ATTACHMENT 4.0
(Page 1 of 2)

STEAM GENERATOR TUBE RUPTURE
RELEASE RATE DETERMINATION
(See Back for Instructions)

DATE: _____ TIME: _____

Steam Flow Rate Determination

#1 Release Rate Determination

A. Affected Steam Flow (lbm/hr) x Release Valve Monitor Reading (mr/hr) = $\frac{\text{lbm}}{\text{hr}} \cdot \frac{\text{mr}}{\text{hr}}$

S/G-A _____ x _____ = _____

S/G-B _____ x _____ = _____

S/G-C _____ x _____ = _____

S/G-D _____ x _____ = _____

TOTAL = _____

#2 Noble Gas Release Rate

TOTAL x conversion factor = Noble Gas Release Rate

_____ x $\frac{1.44E\text{-}5 \text{ Ci/sec}}{\text{mr/hr} \cdot \text{lbm/hr}}$ = _____ Ci/sec

#3 Iodine Release Rate

Noble Gas Release Rate x conversion factor = Iodine Release Rate

_____ Ci/sec x .38 = _____ Ci/sec

Performed By: _____

Reviewed By: _____

ATTACHMENT 4.0
(Page 2 of 2)

INSTRUCTIONS

#1 Obtain the steam flow rate(s) (lbm/hr) from the affected steam generator(s) steam line and insert into the first half of the equation.

Obtain the release valve monitor reading (mr/hr) from the Control Room or RMS and insert into the second half of the equation. If the release valve monitors are out of service, insert the appropriate noble gas/iodine ratio from EPP 01-7.2, Attachment 3.0, "Design Basis Accident Release Rates."

Multiply the two halves to obtain a release rate determination for each affected steam generator.

Add all the release rate determinations to obtain a TOTAL.

#2 Multiply the TOTAL (from #1) by the conversion factor to obtain the noble gas release rate (Ci/sec).

#3 Multiply the noble gas release rate by the conversion factor to obtain the iodine release rate (Ci/sec).

#4 Report results to DAC (TSC) or DAS (EOF).

ATTACHMENT 5.0
(Page 1 of 2)
RELEASE RATE CALCULATION USING OFFSITE
FIELD TEAM DATA (Backcalculations)

DATE: _____ TIME: _____ LOCATION _____

#1 Whole Body Dose Rate to Noble Gas Concentration

$$\frac{\text{mRem/Hr}}{3.36\text{E }4\ *} = \text{_____ Ci/m}^3 \text{ Noble Gas}$$

#2 Offsite Concentration(s) to Plant Release Rate(s)

$$\frac{\text{Concentration (uCi/cc or Ci/m}^3)}{\text{X/Q value (sec/m}^3)} = \text{Ci/sec}$$

$$\frac{\text{Ci/m}^3}{\text{sec/m}^3} = \text{_____ Ci/sec} \quad \text{Noble Gas Release Rate}$$

#3 $\frac{\text{uCi/cc}}{\text{sec/m}^3} = \text{_____ Ci/sec}$ Iodine Release Rate (NOTE: Use this if data is available; Otherwise, proceed to Step 4).

#4 Iodine Release Rate Estimate (Offsite Iodine Concentration Unknown)
Note: Skip this step if step 3 is completed.

Noble Gas Release Rate x Attachment 3.0 Iodine/Noble Gas Ratio = Iodine Release Rate

_____ Ci/sec x _____ = _____ Ci/sec Iodine Release Rate

Performed by _____

Reviewed by: _____

Assumptions:

1) Offsite dose rate measured while submersed in semi-infinite cloud.
2) All noble gas released is Xe-133.
*3) Dose rate conversion factor is 3.36 E 4 $\frac{\text{mrem x m}^3}{\text{Hr . Ci}}$ based on 1 and 2 above.

NOTE: 1 Ci/m^3 = 1 uCi/cc

ATTACHMENT 5.0
(Page 2 of 2)

INSTRUCTIONS

#1 Obtain gamma (closed window) whole body dose rate readings at a location on or near a known X/Q value and record. This location is determined by using the maps and proper stability class isopleths available in the emergency lockers.

Insert this reading into the left side of the equation.

Divide the reading by the conversion factor to obtain the noble gas concentration at that location.

#2 Divide the noble gas concentration by the known X/Q value to obtain the noble gas release rate.

#3 Obtain the iodine concentration at the location from the DAC or DAS. If reading is unavailable, refer to step #4.

Divide this concentration by the known X/Q value to obtain the iodine release rate.

#4* Refer to EPP 01-7.2, Attachment 3.0 to obtain the appropriate iodine/noble gas ratio.

Multiply this ratio by the concentration in step #1 to obtain the iodine release rate.

#5 Report results to DAC (TSC) or DAS (EOF).

*Note: Skip this step if step 3 is completed.

FORM EP 7.2-6 REV. 1

ATTACHMENT 6.0
(Page 1 of 3)
CONTAINMENT RELEASE RATE CALCULATION

DATE: _____ TIME: _____

1. In-Containment
   Hi-Range Monitor Reading _____ R/hr

2. Time Post Accident in Hours _____ hour(s)

3. From Table below select the Ci/R/hr from the block beneath the hour block that corresponds to hour(s) in 2 above.

Post Reactor Trip Hours	0	1	3	10	24
Ci/R/hr	86	160	270	500	1200

   and record _____ (Ci/R/hr)

4. Calculation for DBA Leak Rate.

   a. In-Containment Monitors:

   [Containment Hi-Range Monitor Reading] x [Curies per R per hour from step 3] x [Conversion Factor DBA % of free volume] = Ci/sec

   _____ R/hr x _____ Ci/R/hr x 2.32E-8 sec^{-1} = _____ Ci/sec

   b. Containment Air Sample

   DBA Leak Rate x Containment Concentration

   1.64 E-3 m^3/sec x _____ Ci/m^3 = _____ Ci/sec

5. Calculation for known or estimated leak rate if other than DBA leak rate.

   a. In-Containment Monitors:

   [Containment Hi Range Monitor Reading] x [Curies per R per hour from step 3] x [Known or Estimated Flow Rate m^3/sec / V_1 Volume m^3 of Containment] = Ci/sec

   _____ R/hr x _____ Ci/R/hr x _____ m^3/sec / _____ m^3 = _____ Ci/sec

   b. Containment Air Sample:

   Leak Rate Containment Concentration

   _____ m^3/sec x _____ Ci/m^3 = _____ Ci/sec

Containment Pressure _____ at t_1 _____

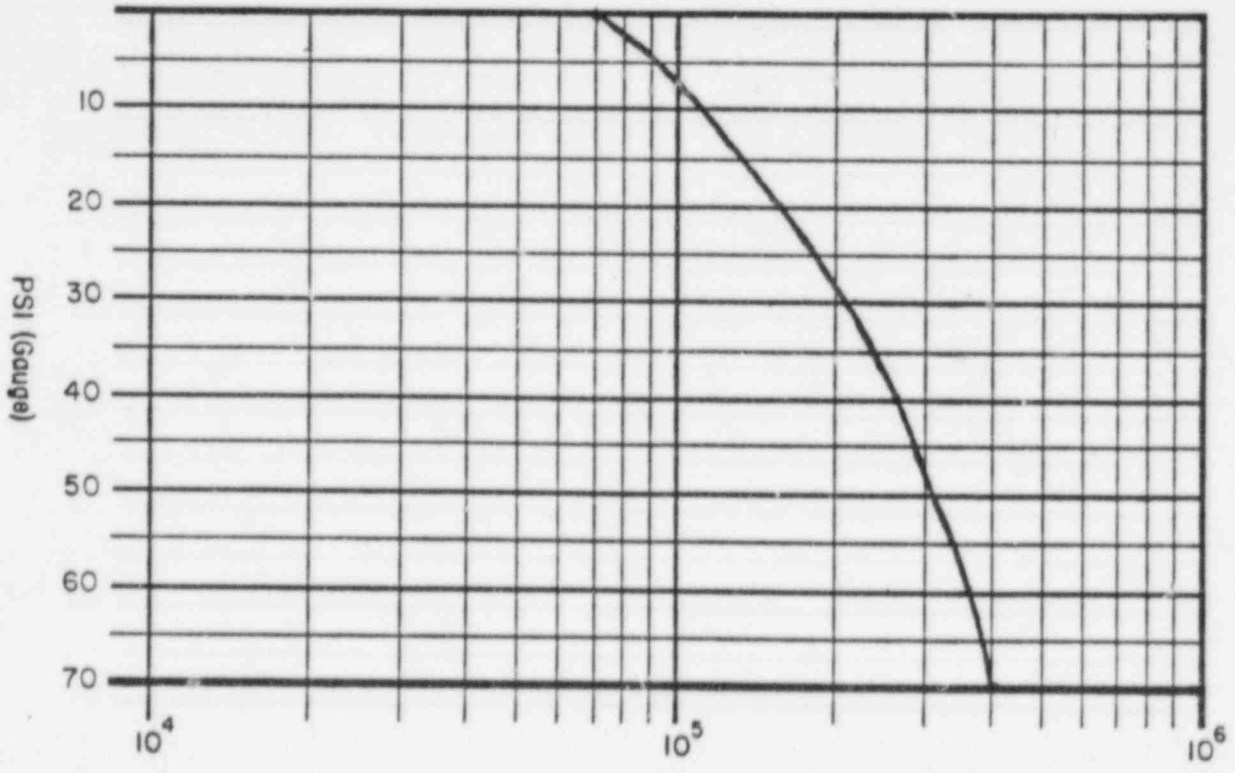
Containment Pressure _____ at t_2 _____

Flow Rate (m^3/sec) = $\frac{(V_1) - (V_2)}{\Delta t}$ Δt (sec) = ($t_2 - t_1$ in sec.)

_____ m^3/sec = $\frac{(\quad) - (\quad)}{(\quad)}$

Performed By: _____

REC Review _____



INSTRUCTIONS FOR COMPLETING FORM EP 7.2-6

#1 The containment release rate may be estimated based on High Range In-Containment Monitor readings and completion of this form.

#2 The design basis leak rate of 0.2% free volume per 24 hours (3.47 ft^3/min or 1.64 x 10^3 cc/sec) may be multiplied by known or estimated containment concentrations to quantify this release source if requested by the REC or DED. (RAM or DEM at the EOF). Use Step 4.

#3 If containment integrity is lost perform the following:

#4 Obtain from the Operations Status Board the high range monitor reading in containment and record.

#5 Record the initial containment pressure and time (t_1).

#6 Record the initial available containment volume (V_1) from the graph.

7 Obtain an additional containment pressure value at time (t_2). Record the value. Record the available containment volume (V_2) from the graph.

$$\text{Flow Rate } (m^3/\text{sec}) = \frac{(V_1) - (V_2)}{\Delta t}$$

#7a Calculate time difference (Δt) in seconds.

#8 Calculate the flow rate in m^3/sec and record the flow rate in Step 5.

#9 Calculate the number of Ci/R/hr using Steps 2 and 3. Record in Step 5.

#10 Calculate the release rate by performing Step 5. Report data to REC or DED (RAM or DEM at the EOF). As appropriate, use the results of this step as input for manual dose calculations as called out in EPP 01-7.3, Attachment 1.0.

KANSAS GAS AND ELECTRIC COMPANY
WOLF CREEK GENERATING STATION

RADIOLOGICAL EMERGENCY RESPONSE PLAN IMPLEMENTING PROCEDURE

MANUAL DOSE PROJECTION DETERMINATION

EPP 01-7.3

Revision 5

Kevin J Moles — 2/18/86
EMERGENCY PLANNING COORDINATOR REVIEW — DATE

Stan Devens — 2-18-86
EMERGENCY PLANNING ADMINISTRATOR REVIEW — DATE

J Zell — 2/25/86
PSRC APPROVAL RECOMMENDATION — DATE

Glenn L Koester — 2/27/86
V.P. NUCLEAR APPROVAL — DATE

RELEASED DC44 — 2-28-86
DATE

1.0 PURPOSE

1.1 This procedure provides guidance for estimating offsite dose rates and integrated doses to the whole body and thyroid in the event of a release of airborne radioactive material from Wolf Creek Generating Station (WCGS) and the Radioactive Release Information System (RRIS) becomes inoperable.

2.0 APPLICABILITY

2.1 This procedure shall be implemented by WCGS emergency response personnel in the following manner:

2.1.1 Prior to the activation of the Technical Support Center (TSC), the on-duty Shift Supervisor shall be responsible for implementation of this procedure.

2.1.2 Following the activation of the TSC, but prior to the activation of the Emergency Operations Facility (EOF), the Radiological Emergency Coordinator (REC) or the Dose Assessment Coordinator (DAC) shall assure that the RRIS Operator implements this procedure.

2.1.3 Upon activation of the EOF, the Radiological Assessment Manager (RAM) or the Dose Assessment Supervisor (DAS) shall assure that the RRIS Operator implements this procedure.

3.0 DEFINITIONS

3.1 EXCLUSION AREA BOUNDARY (EAB)

That area surrounding the station, in which Kansas Gas and Electric Company (KG&E) has the authority to determine all activities including exclusion or removal of personnel and property from the area.

3.2 EMERGENCY PLANNING ZONE (EPZ)

That area surrounding the station in which emergency preparedness planning is conducted for the protection of the public. With respect to protecting the public from the plume exposure resulting from an incident, the EPZ encompasses an area with a radius of approximately 10 miles surrounding the facility. With respect to the ingestion exposure pathway, the EPZ encompasses an area with a radius of about 50 miles.

3.3 INTEGRATED DOSE

That dose of ionizing radiation that has been received during a given period of time by a population or group.

3.4 PASQUILL ATMOSPHERIC STABILITY CLASSIFICATIONS

The Pasquill atmospheric stability classifications are a measure of the stability or instability of an air mass based upon the vertical temperature differential between two points.

3.5 PROJECTED DOSE

That dose of ionizing radiation that is likely to be received by a population or group if no protective action measures are implemented.

3.6 PROJECTED INTEGRATED DOSE

The summation of the Integrated Dose (previous) and the Projected Dose (future).

3.7 PROTECTIVE ACTIONS

Those emergency measures taken to prevent or minimize radiological exposures to affected population groups.

3.8 SOURCE TERM

The calculated quantity of radioactive material available for release or being released to the environment.

3.9 X/Q

A factor based on meteorological dispersion characteristics which relates atmospheric radionuclide release rates to offsite air concentrations.

4.0 INSTRUCTIONS

4.1 PRECAUTIONS

4.1.1 The dose projection capabilities of the manual calculation method depend solely upon meteorological data, which become less exact at greater distances from the release point and/or at longer time intervals after the release.

4.1.2 The projected offsite doses calculated in accordance with this procedure may be used in conjunction with EPP 01-10.1, "Protective Action Recommendations", as a basis for determining any offsite protective actions to be recommended to State and County officials.

4.1.3 This procedure shall be used in conjunction with EPP 01-7.2, "Manual Determination of Release Rate."

4.1.4 The HP-41CV calculator used for manual dose calculation maintains a running total of real time integrated dose (past) and provides projected integrated dose (future).

4.1.5 The HP-41CV automatically adds the results of each calculation to the value contained in the memory register to accomplish the integral function. If base data for the calculation changes, the memory of the calculator must be manually cleared to assure proper results.

4.1.6 Wind direction is given as the direction <u>from</u> which the wind is blowing.

4.2 INITIAL ACTIONS

4.2.1 Obtain the dose assessment material from Control Room, TSC or EOF storage lockers. This material consists of the following equipment:

4.2.1.1 A base map covering a 10-mile radius out from WCGS (Plume Exposure Pathway EPZ).

4.2.1.2. A set of six plume overlays, one for each of the six Pasquill atmospheric stability classes. These overlays are used to estimate the location of the affected downwind areas as a result of the plume expansion.

4.2.1.3 A programmable calculator, and two sets of the appropriate dose projection program on magnetic program cards.

4.2.2 Perform offsite dose calculations by using one of the two methods listed below:

a) Programmable calculator, whose specific instructions are listed in Attachment 1.0, "Instructions for Using the Programmable Calculator for Manual Offsite Dose Calculations";

b) Manual Calculation Worksheets, Attachments 2.0 and 3.0.

4.2.3 Upon completion of an offsite dose calculation, compare the whole body and thyroid dose estimates with the values specified in EPP 01-10.1, "Protective Action Recommendations."

4.2.4 Assure that the Duty Emergency Director (DED) or Duty Emergency Manager (DEM) is informed of the dose rate and projected integrated whole-body and thyroid doses.

4.3 SUBSEQUENT ACTIONS

4.3.1 Offsite dose projection calculations should be performed at least once per hour during the first eight hours after the accident unless it is determined that releases of airborne radioactivity from the plant have been terminated.

4.3.2 Offsite dose projection calculations should be updated if any of the following conditions occur:

4.3.2.1 Release rates increase by more than 25 percent,

4.3.2.2 Wind direction changes by more than 22.5°,

4.3.2.3 Atmospheric stability classification changes,

4.3.2.4 Wind speed changes by more than 50 percent; or

4.3.2.5 Prior to any planned releases.

4.3.2.6 If a major error is discovered in input parameters, i.e. release rates, the programmable calculator's real time integrated exposure may be set to zero by using the SET/CLR routine.

4.3.3 All personnel performing the offsite dose calculations at the TSC should keep the REC informed as to the status of all offsite dose projection calculation results. As appropriate, the REC shall advise the DED regarding the status of offsite dose calculations and provide recommendations if dose projections warrant implementation of protective actions.

4.3.4 All personnel performing offsite dose calculations at the EOF should keep the RAM informed as to the status of all offsite dose projection calculation results. The RAM shall advise the Duty Emergency Manager (DEM) regarding the status of offsite dose calculations and provide recommendations if dose projections warrant implementation of protective actions.

4.3.5 Attachment 6.0, "Thyroid Dose Equivalent Worksheet," Form EP 7.3-6, is used to project adult thyroid dose equivalent for individuals making reentries into known or suspected iodine airborne areas.

5.0 REFERENCES

5.1 WCGS Radiological Emergency Response Plan

5.2 EPP 01-3.2, "Followup Notifications"

5.3 EPP 01-7.1, "Radiological Release Information System"

5.4 EPP 01-7.2, "Manual Determination of Release Rate"

5.5 EPP 01-10.1, "Protective Action Recommendations"

5.6 USNRC Regulatory Guide 1.109, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10CFR50, Appendix I", (Rev. 1, October 1977)

5.7 USNRC Regulatory Guide 1.111, "Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light Water Cooled Reactors", (Rev. 1, July 1977)

5.8 USNRC Regulatory Guide 1.145, "Atmospheric Dispersion Models for Potential Accident Consequence Assessments at Nuclear Power Plants", (August 1979)

5.9 USNRC Regulatory Guide 1.23, "Meteorological Programs in Support of Nuclear Power Plants", (September 1980)

5.10 USNRC Regulatory Guide 1.4, "Assumptions Used for Evaluating the Potential Radiological Consequences of a Loss of Coolant Accident for Pressurized Water Reactors", (Rev. 2, June 1974)

6.0 RECORDS

6.1 Form EP 7.3-2, "Manual Calculation Worksheet"

6.2 Form EP 7.3-6, "Thyroid Dose Equivalent Worksheet"

6.3 Form EP 7.3-7, "Integrated Dose By Sectors"

6.4 The records generated by this procedure during an actual emergency shall be forwarded to the Emergency Planning Coordinator (EPC) at the termination of the emergency. The EPC forwards the records to the WCGS vault for storage. These records will be retained for the life of the plant. These records shall be considered QA records.

6.5 The records generated by this procedure during drills and exercise shall be forwarded to the EPC upon termination of the drill or exercise. The EPC shall maintain these records for at least one year. These records shall be considered non-QA records.

7.0 ATTACHMENTS

7.1 Attachment 1.0, "Instructions for using the programmable calculator for Manual Dose Calculations"

7.2 Attachment 2.0, "Manual Calculation Worksheet"

7.3 Attachment 3.0, "Instructions for Using Manual Calculation Worksheet"

7.4 Attachment 4.0, "Atmospheric Stability Classifications"

7.5 Attachment 5.0, "Z Table"

7.6 Attachment 6.0, "Thyroid Dose Equivalent Worksheet"

7.7 Attachment 7.0, "Integrated Dose By Sectors"

7.8 Attachment 8.0, "Test Case Data for HP-41CV E-Plan Program"

ATTACHMENT 1.0
(Page 1 of 7)

INSTRUCTIONS FOR USING THE PROGRAMMABLE
CALCULATOR FOR MANUAL DOSE CALCULATIONS

A. To set up and program calculator:

1. Plug in the calculator and printer. Turn the calculator and printer ON. Turn the printer to NORM position.

   NOTE: Calculator must be in user mode

2. Press [ ], E NOTE: [ ] is the yellow key.

   The calculator should display "CLR REGISTERS?" If the calculator does not display "CLR REGISTERS?" proceed to Step 3. If calculator displays "CLR REGISTERS?", proceed to Step 15.

3. Turn the calculator OFF.

4. Press "ON" while depressing [←]. Calculator should display "MEMORY LOST".

5. Press XEQ, ALPHA, S, I, Z, E, ALPHA, 0, 4, 8.

6. Load the program "X/Q" into the calculator by entering the magnetic cards provided through the card reader in the proper sequence.

NOTE: There are nine magnetic cards to be loaded, both sides must be run through the calculator for a total of 17 evolutions (except the last card).

NOTE: [ ] is the symbol for the yellow key.

7. Press [ ], ASN, ALPHA, X, [ ], ÷ , Q, ALPHA, [ ], A.

8. Press [ ], ASN, ALPHA, R, M, S, ALPHA, [ ], B.

9. Press [ ], ASN, ALPHA, F, I, E, L, D, ALPHA, [ ], C.

10. Press [ ], ASN, ALPHA, I, N, T, D, O, S, E, ALPHA, [ ], D

11. Press [ ], ASN, ALPHA, S, E, T, [ ], ÷ , C, L, R, ALPHA, [ ], E

12. Press [ ], ASN, ALPHA, S, T, E, A, M, ALPHA, [ ], F

13. Press USER

14. Press [ ], E

15. Press Y, [R/S]

16. Press [R/S], after entering each response.

B. To perform calculations, the operator should read the prompts displayed in the printer and feed in the information (INPUT) as requested

1. Any subroutine on the program flow chart may be accessed by pushing [ ] and then the corresponding letter. IMPORTANT: If desiring to access a subroutine and "ALPHA" is in the calculator display, it is necessary to press ALPHA (to remove it from the display) before accessing a subroutine.

2. Under no circumstances is the [PRGM] Key to be pushed. Also never unplug power sources with the calculator or printer ON.

3. If desired, the program can be verified to be operating correctly by using the inputs and verifiying the outputs as shown on Attachment 8.0, "Test Case Data for HP-41CV E-Plan Program." Any or all three input options can be checked at any time. It would be easiest to perform these checks before dose calculations are made. These checks can also be made any time the accuracy of the dose calculations is questioned.

4. After entering responses to prompts displayed by the calculator, hit [R/S].

5. Answers requiring a YES or NO response are answered by Y or N respectively.

6. If X/Q is not executed for calculation updates then the program assumes meterological conditions are unchanged since the last time X/Q was executed.

7. For executing RMS if the iodine monitor (uCi/cc) is inoperable or offscale determine the iodine concentration by multiplying the noble gas concentration (uCi/cc) by the appropriate default value in EPP 01-7.2, Attachment 3.0.

8. If performing calculations based on FIELD data to compare with dose projections based on source term data, the prompt UPDTE INT HRS =? should be responded to with a zero. The reason is that the integrated dose for the time interval being considered should not be added into the integrated dose already calculated.

9. To maintain integrated doses following a wind shift, use the following rules:

   a. If the wind shift is greater than 22.5 degrees, the integrated centerline dose at the new direction is set to zero.

   b. If the wind shift is less than 22.5 degrees, the integrated dose at the new centerline direction is assumed equal to the values at the previous direction.

KEY TO PROMPTS FROM PROGRAMMABLE CALCULATOR

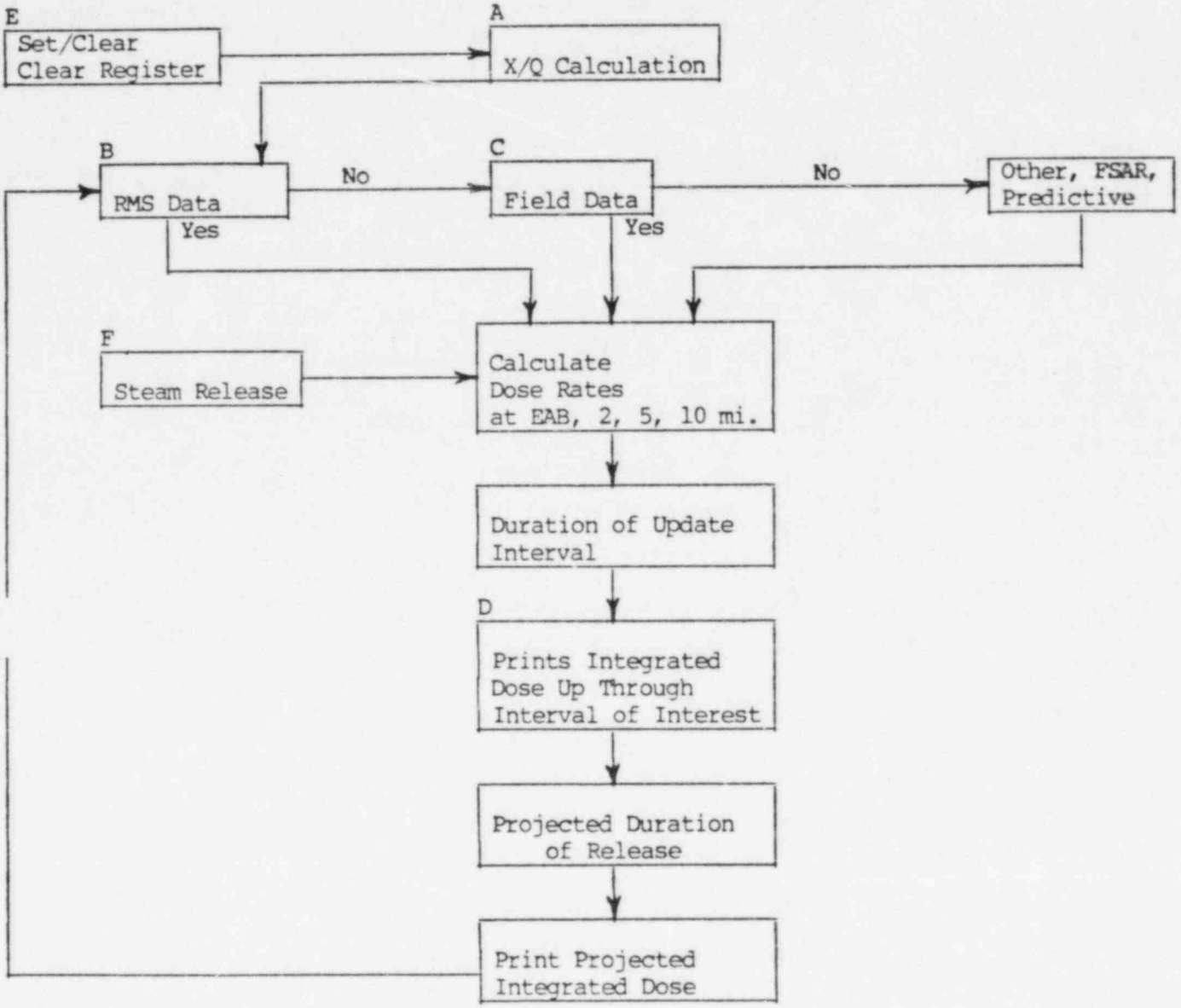
PROMPT	INPUT
WIND SPD = ?	Wind speed in MPH
STAB CLASS = ?	Enter A thru F (Ref. EPP 01-7.3, Attachment 4.0)
STEAM RELEASE	Press [ ], F to access this program.
NO. RLFS OPEN = ?	Enter the number of relief valves open.
PRESSURE = ?	Enter the pressure (PSIG) of the steam generator associated with the release.
PORV OPEN?	Enter "Y" if the PORV is open or "N" if it is closed.
MREM/HR = ?	Enter the mR/hr reading on the steamline plume monitor associated with the release. (Ref. EPP 01-7.2, Attachment 4.0)
RMS DATA?	Enter "Y" if flow rate and concentration data is available. Enter "N" if not available.
FLOW CFM = ?	Enter the flow rate in CFM through the release point. (Ref EPP 01-7.2, Attachment 1.0)
NOB GAS UCI/CC?	Enter the noble gas concentration in uCi/cc at the release point. (Ref. EPP 01-7.2, Attachment 1.0)
IOD UCI/CC = ?	Enter the iodine concentration in uCi/cc at the release point. (Ref. EPP 01-7.2, Attachment 1.0)
FIELD DATA?	Enter "Y" if dose rates and/or iodine concentrations are available at a specific distance. Enter "N" if not available.
DIST MI. = ?	Enter the distance in miles from the plant to the point from which the field data is available.
MREM/HR = ?	Enter the dose rate in mrem/hr the field team is reporting. These values must be centerline dose rates. (Ref. EPP 01-7.2, Attachment 5.0)

PROMPT	INPUT
IOD UCI/CC = ?	Enter the iodine concentration (uCi/cc) which the field team is reporting. This concentration must be a centerline value. (Ref. EPP 01-7.2, Attachment 5.0)
NOB GAS CI/S = ?	Enter the noble gas release rate in Ci/sec as determined in EPP 01-7.2, Attachments 1.0, 3.0, 4.0, 5.0 or 6.0
IOD CI/SEC = ?	Enter the iodine release rate in Ci/sec as determined in EPP 01-7.2, Attachments 1.0, 3.0, 4.0, 5.0 or 6.0
UPDTE INT HRS?	Enter the duration (HRS) of the release since the last update calculation of the integrated dose.
PROJ REL DUR?	Enter the projected duration (HRS) of the release now in progress.

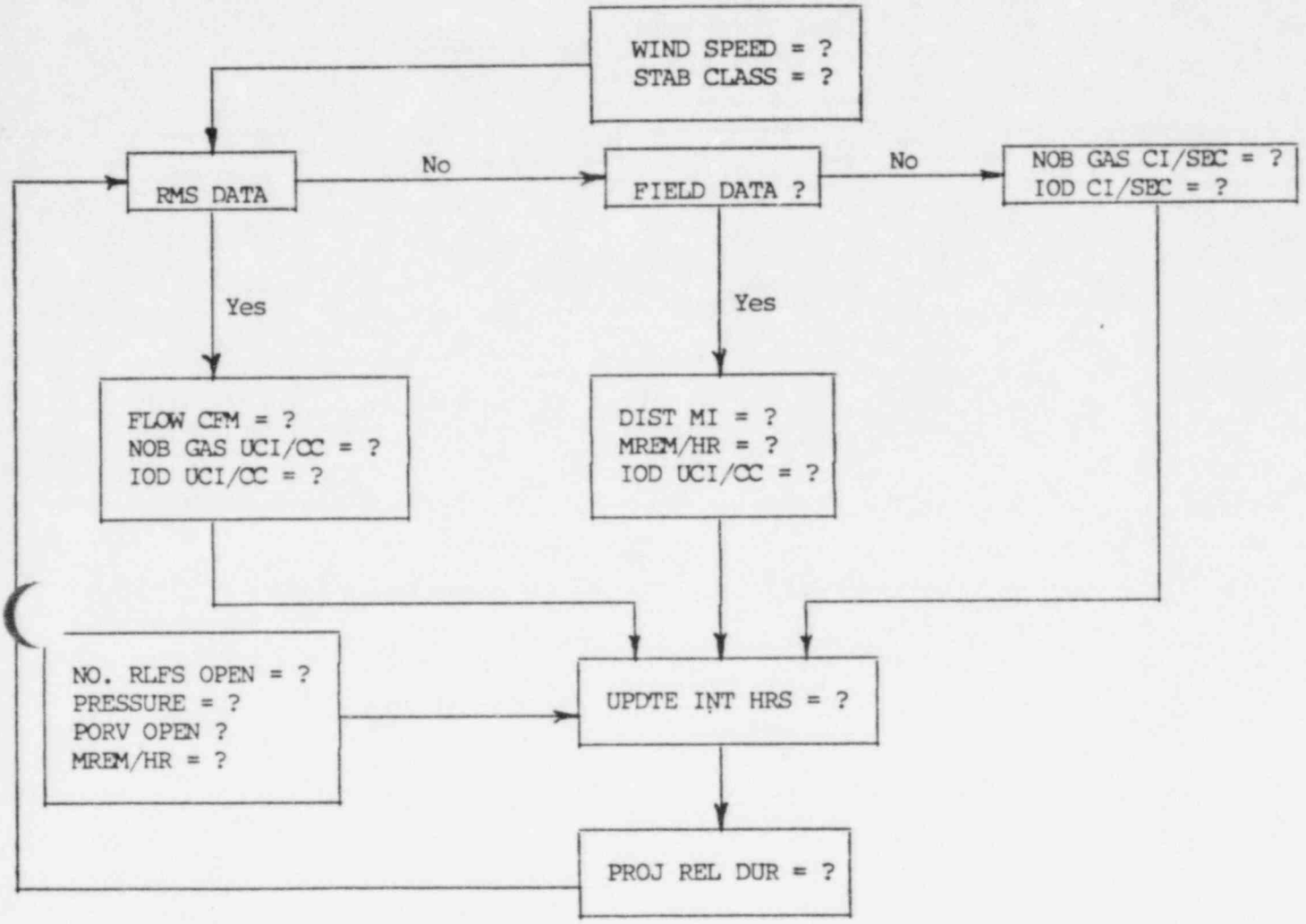
If executing SET/CLR, the following prompts will appear:

CLR REGISTERS ?	Enter "Y" if you wish to clear all registers. "N" if not.

PROGRAMMABLE CALCULATOR
PROGRAM FLOW CHART



FLOW CHART FOR PROMPTS



FORM EP 7.3-2 REV. 1

ATTACHMENT 2.0
MANUAL CALCULATION WORKSHEET

I. INFORMATION REQUIRED

A. Wind Stability Classification _____
B. RR_{WB} _____
C. RR_{THY} _____
D. Date/Time _____
E. Calculation Performed by _____
F. Calculation Reviewed by _____

II. WHOLE BODY DOSE RATE CALCULATIONS

1 DISTANCE	2 Z No. TABLE A or B		3 WIND SPEED mph or kph		4 X/Q (sec/M^3)		5 RR_{NG} (Ci/sec)	6 DF_{NG} $\frac{(mrem)(m^3)}{hr \cdot Ci}$		7 RR_{IOD} (Ci/sec)	8 DF_{IOD} $\frac{(mrem \cdot m^3)}{hr \cdot Ci}$		9 DR_{WB} mrem/hr		10 4 hr(mrem)		11 24 hr(mrem)
EAB		x		=		x	(	x 3.35E4) + (	x 2.3+E6)			=		x		x	
2 mile		x		=		x	(	x 3.35E4) + (	x 2.3+E6)			=		x		x	
5 mile		x		=		x	(	x 3.35E4) + (	x 2.3+E6)			=		x		x	
10 mile		x		=		x	(	x 3.35E4) + (	x 2.3+E6)			=		x		x	

III. CHILD THYROID DOSE RATE CALCULATIONS

12 DISTANCE	13 RR_{IOD} (Ci/sec)		14 DF_{THY} $\frac{(mrem \times m^3)}{hr \cdot Ci}$		15 X/Q (sec/m^3)		16 DR_{THY} $\frac{(mrem)}{hr}$		17 4 hr Int. Dose (mrem)		18 24 hr Int. Dose (mrem)
EAB		x	1.85E9	x		=		x		x	
2 mile		x	1.85E9	x		=		x		x	
5 mile		x	1.85E9	x		=		x		x	
10 mile		x	1.85E9	x		=		x		x	

IV. DOSE RATE CALCULATIONS BASED ON FIELD TEAM DATA

19 DR_A mrem/hr		20 X/Q_B sec/m^3		21 X/QA sec/m^3		22 DR_B mrem/hr
	x		x		=	
	x		x		=	
	x		x		=	
	x		x		=	
	x		x		=	
	x		x		=	
	x		x		=	

INSTRUCTIONS FOR USING MANUAL CALCULATION WORKSHEET

INFORMATION REQUIRED FOR CALCULATIONS

A. Wind Stability Classification
is obtained from the radiological status board or use Attachment 4.0 to calculate if unavailable.

B. Wind Speed
is obtained from the status board or Control Room. Enter the value in Column 3. Circle the proper units, i.e. mph (miles per hour) or kph (kilometers per hour).

C. Radiological Release Rate for Noble Gas (RR_{NG}) is obtained from the Radiological Status Board or may be determined by EPP 01-7.2, "Manual Release Rate Determination".

D. Radiological Release Rate for Iodine (RR_{IOD}) is obtained from the radiological status board or may be determined by EPP 01-7.2, "Manual Release Rate Determination".

E. Date/Time calculation initiated.

F. Name of person performing calculation.

G. Name of person reviewing calculation.

INSTRUCTIONS FOR WHOLE BODY DOSE RATE CALCULATIONS

A. Obtain the Z number, refer to Attachment 5.0. Use the table on Attachment 5.0 for windspeed entered in Column 3. Circle which table the Z value is from.

B. Take the wind speed number (Column 3) and divide it into the Z number in Column 2 and record in Column 4. This is the X/Q number.

C. Record the Radiological Release Rate for Noble Gas (RR_{NG}) obtained in Step I. C. above and record in Column 5.

INSTRUCTIONS FOR USING MANUAL CALCULATION WORKSHEET

D. Record the Radiological Release Rate for Iodine (RR_{IOD}) obtained in Step I. D. above and record in Column 7.

E. Multiply the RR_{NG} (5) by the Dose Conversion Factor for Noble Gas (CF_{NG}) in Column 6 and add the product to the product of RR_{IOD} (7) multiplied by the Dose Conversion Factor for Iodine in Column 8.

NOTE: Numbers in ( ) refer to columns on worksheet.

F. Multiply the sum from the above step by the X/Q (4) and record in Column 9. This is the Dose Rate for the Whole Body (DR_{WB}).

G. Multiply DR_{WB} (9) by four to determine the projected four hour Whole Body dose and record in Column 10.

H. Multiply the four hour projected dose (10) by six to obtain the projected 24 hour Whole Body dose and record in Column 11.

I. Perform the above calculations for each distance listed in Column 1.

J. Results should be given to the Dose Assessment Supervisor for review prior to being given to the Radiological Emergency Coordinator or Radiological Emergency Manager and posting of status board.

INSTRUCTIONS FOR CHILD THYROID DOSE RATE CALCULATIONS

A. Record the Radiological Release Rate for Iodine (RR_{IOD}) obtained in Step I. D. above and record in Column 12.

B. Record the X/Q values obtained in Step II. B. in Column 14.

C. Multiply RR_{IOD} (12) by the Dose Conversion Factor for Child Thyroid (CF_{THY}) under Column 13 and by the X/Q (14) and record in the Child Thyroid Dose Rate Column (DR_{THY}) under Column 15.

D. To obtain the four hour Projected Child Thyroid Dose, multiply DR_{THY} (15) by four and record in Column 16 (4 hr Int. Dose).

INSTRUCTIONS FOR USING MANUAL CALCULATION WORKSHEET

E. To obtain the 24 hour Projected Child Thyroid Dose, multiply the number in Column 16 (4 hr Int. Dose) by six and record in Column 17.

F. Results should be given to the Dose Assessment Coordinator (DAC) or the Dose Assessment Supervisor (DAS) for review prior to being given to the Radiological Emergency Coordinator (REC) or Radiological Assessment Manager (RAM) and posting of status board.

IV. INSTRUCTIONS FOR DOSE RATE CALCULATIONS BASED ON FIELD TEAM DATA

NOTE: Whole Body, Thyroid Dose and Dose Rate calculations are based using a direct relationship between dose and X/Q values. Therefore, once reliable field data has been obtained for one known X/Q location all others may be calculated by the calculation worksheet.

A. Obtain the Dose Rate (DR_A) from the Radiological Field Team(s) for a known X/Q point and record in Column 18 (DR_A).

B. Record the X/Q value for the survey point in Step IV. A. above in Column 20 (X/Q_A).

C. Record the X/Q value for the new location for which dose rate is to be determined in Column 19 (X/Q_B).

D. Multiply the DR_A (18) by X/Q_B (19) and divide the product by X/Q_A (20). Record the quotient in Column 21 (DR_B).

E. DR_B (21) is the dose rate at the new point.

F. Repeat Steps A through E for each new point where dose rates are required.

ATMOSPHERIC STABILITY CLASSIFICATIONS

1.0 For temperature differential in ^{O}C. The temperature differential is obtained from the base of the met tower.

NOTE: The 60-10m Delta T is the preferred height for determining stability class if it is available.

STABILITY CLASS	DELTA T (^{O}C) (85-10m)	DELTA T (^{O}C) (60-10m)	DELTA T (^{O}C) (35-10m)
A	<-1.42	<-0.95	<-0.47
B	-1.42 to -1.27	-0.95 to -0.85	-0.47 to -0.42
C	-1.27 to -1.12	-0.85 to -0.75	-0.42 to -0.37
D	-1.12 to -0.37	-0.75 to -0.25	-0.37 to -0.12
E	-0.37 to 1.12	-0.25 to 0.75	-0.12 to 0.37
F	1.12 to 3.00	.75 to 2.00	0.37 to 1.00
G	> 3.00	> 2.00	> 1.00

Example: 1. If the T is available for the 85-10 differential and the T is -1.5, the stability class is A.

2. If the T is available for the 85-10 differential and the T is -1.32, the stability class is B.

2.0 For temperature differential in ^{O}F

STABILITY CLASS	DELTA T (^{O}F) (85-10m)	DELTA T (^{O}F) (60-10m)	DELTA T (^{O}F) (35-10m)
A	<-2.56	-1.71	<-0.85
B	-2.56 to -2.29	-1.71 to -1.53	-0.85 to -0.76
C	-2.29 to -2.02	-1.53 to -1.35	-0.76 to -0.67
D	-2.02 to -0.67	-1.35 to -0.45	-0.67 to -0.22
E	-0.67 to 2.02	-0.45 to 1.35	-0.22 to 0.67
F	2.02 to 5.40	1.35 to 3.60	0.67 to 1.80
G	> 5.40	> 3.60	> 1.80

3.0 If delta T sensors are inoperative for the time frame or the accident sequence doesn't allow for proceeding to the met tower, use an anemometer from the emergency kits and the table on the following page to determine the stability class.

4.0 Additional weather information may be obtained from the National Weather Service in Topeka at (913) 295-2631.

STABILITY CLASS BY OBSERVATION

SURFACE WIND		DAY			NIGHT	
MPH	m/sec	Clear Scat. Clouds	Light Overcast Broken Clouds	Overcast	Broken Clouds Overcast	Clear Scat. Clouds
<4.5	<2	A	A-B	B	E	F
4.5-7.8	2-3.5	A-B	B	C	E	F
7.8-10	2-3.5	B	B-C	C	D	E
10-13	4.5-6	C	C-D	D	D	D
>13	>6	C	D	D	D	D

ATTACHMENT 5.0
(Page 1 of 1)

Z TABLE

For wind speed in mph use Table A. For wind speed in km/hr use Table B to determine Z value.

Table A (units are $\frac{\text{sec. mph}}{M^3}$)

Stab. Class / Distance	A	B	C	D	E	F	G
EAB (3/4 mile)	1.80E-6	1.16E-5	3.49E-5	1.11E-4	2.09E-4	5.02E-4	1.26E-3
2 mile	6.2E-7	8.73E-7	6.6E-6	2.4E-5	4.80E-5	1.13E-4	2.83E-4
5 mile	2.8E-7	3.6E-7	1.44E-6	5.49E-6	1.39E-5	3.58E-5	8.95E-5
10 mile	1.6E-7	2.02E-7	4.69E-7	2.4E-6	5.62E-6	1.59E-5	3.98E-5

Table B (units are $\frac{\text{sec. km/hr}}{M^3}$)

Stab. Class / Distance	A	B	C	D	E	F	G
EAB (3/4 mile)	2.91E-6	1.87E-5	5.65E-5	1.8E-4	3.39E-4	8.14E-4	2.04E-3
2 mile	1.00E-6	1.41E-6	1.07E-5	3.89E-5	7.78E-5	1.83E-4	4.58E-4
5 mile	4.54E-7	5.83E-7	2.34E-6	8.89E-6	2.25E-5	5.80E-5	1.45E-4
10 mile	2.59E-7	3.27E-7	7.60E-7	3.89E-6	9.11E-6	2.59E-5	6.98E-5

FORM EP 7.3-6 REV. 1

ATTACHMENT 6.0
(Page 1 of 1)

THYROID DOSE EQUIVALENT WORKSHEET

LOCATION _____
DATE _____ TIME _____

- [ ] Actual
- [ ] Planned
- [ ] On Site
- [ ] Off Site

Adult Thyroid
Emergency Worker Projection

RADIOIODINE ISOTOPE	DOSE FACTOR (REM/uCi) inhaled	X	RADIOIODINE CONCENTRATION (uCi/cc)	=	REM/cc inhaled
131	1.5E+0				
132	1.4E-2				
133	2.7E-1				
134	3.7E-3				
135	5.6E-2				
					SUM

BREATHING RATE (cc/hr)	X	EXPOSURE DURATION (hours)	X	TOTAL (REM/cc)	=	THYROID DOSE EQUIVALENT (REM)
9.13E+5					=	

Child Thyroid
Off Site Projection

RADIOIODINE ISOTOPE	DOSE FACTOR (REM/uCi) inhaled	X	RADIOIODINE CONCENTRATION (uCi/cc)	=	REM/cc inhaled
131	4.4E+0				
132	5.2E-2				
133	1.0E+0				
134	1.4E-2				
135	2.1E-1				
					SUM

BREATHING RATE (cc/hr)	X	EXPOSURE DURATION (hours)	X	TOTAL (REM/cc)	=	THYROID DOSE EQUIVALENT (REM)
4.22E+5					=	

Remarks: _____

_____

_____

_____
DOSE ASSESSMENT COORDINATOR SIGNATURE

ATTACHMENT 7.0

INTEGRATED DOSE BY SECTORS

Whole Body/Thyroid

Integrated Dose (mRem) By Sectors

		North				East				South				West			
Time	Distance	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R
	3/4 mile (EAB)																
	2																
	5																
	10																
	3/4 mile (EAB)																
	2																
	5																
	10																
	3/4 mile (EAB)																
	2																
	5																
	10																
	3/4 mile (EAB)																
	2																
	5																
	10																
	3/4 mile (EAB)																
	2																
	5																
	10																
	3/4 mile (EAB)																
	2																
	5																
	10																
	3/4 mile (EAB)																
	2																
	5																
	10																

Updated By

ATTACHMENT 8.0
(Page 1 of 1)

TEST CASE DATA FOR HP-41CV E-PLAN PROGRAM

Met Data

6.211 miles/hr
Stability Class E

Input Data[A]	RMS Option	[C]Release Rate Option
Noble Gas	uCi/cc = 5.915	Noble Gas 27.92 Ci/sec
Iodine	uCi/cc = 5.169E-1	Iodine 2.44 Ci/sec
Flowrate	ft^3/min = 10,000	[B]Field Team Option
		10.01 miles 6 mRem/hr WB
		2.205E-6 uCi/cc I-131

Output Data

* Noble Gas Ci/sec = 27.92
* Iodine Ci/sec = 2.44
* X/Q @ EAB = 3.37E-5
* Whole Body Dose Rates
EAB = 0.224 Rem/hr
2mi = 0.051 Rem/hr
5mi = 0.015 Rem/hr
10mi= 0.006 Rem/hr

* Thyroid Dose Rate
EAB = 152.119 Rem/hr Inhaled
2mi = 34.881 Rem/hr Inhaled
5mi = 10.077 Rem/hr Inhaled
10mi= 4.086 Rem/hr Inhaled

1/2 Hour Interval Update

* Whole Body Dose
EAB = 0.112 Rem
2mi = 0.026 Rem
5mi = 0.007 Rem
10mi= 0.003 Rem

* Thyroid Dose
EAB = 76.062 Rem
2mi = 17.441 Rem
5mi = 5.038 Rem
10mi= 2.043 Rem

Plus, 7.5 Hour Projection

* Whole Body Dose (Effective 8 hour Exposure)
EAB = 1.792 Rem
2mi = 0.411 Rem
5mi = 0.119 Rem
10mi= 0.048 Rem

* Thyroid Dose
EAB = 1216.990 Rem
2mi = 279.055 Rem
5mi = 80.616 Rem
10mi= 32.686 Rem

* Rounding errors are to be ignored.

KANSAS GAS AND ELECTRIC COMPANY
WOLF CREEK GENERATING STATION

RADIOLOGICAL EMERGENCY RESPONSE PLAN IMPLEMENTING PROCEDURE

ONSITE RADIOLOGICAL MONITORING

EPP 01-8.1

Revision 4

Kevin J. Moles — EMERGENCY PLANNING COORDINATOR REVIEW — DATE 2/18/86

Stan Devera — EMERGENCY PLANNING ADMINISTRATOR REVIEW — DATE 2-18-86

J Zell — PSRC APPROVAL RECOMMENDATION — DATE 2/25/86

Glenn L Koester — V.P. NUCLEAR APPROVAL — DATE 2/27/86

RELEASED DC44 — DATE 2-28-86

1.0 PURPOSE

This procedure provides guidelines for onsite monitoring of radiological conditions in the event of a radiological emergency at Wolf Creek Generating Station (WCGS).

2.0 APPLICABILITY

This procedure is applicable to the Duty Emergency Director (DED), Radiological Emergency Coordinator (REC), Radiological Assessment Coordinator (RAC), Dose Assessment Coordinator (DAC), Technical Support Center (TSC) Field Team Communicator, Onsite Survey Team Director (OSTD), Operations Support Center (OSC) Supervisor and other personnel assigned to support the activities of the Onsite Survey Teams.

3.0 DEFINITIONS

3.1 Emergency Response Facility - Those facilities including the Control Room, the TSC, and the OSC, from which instructions to Onsite Survey Teams may originate.

3.2 Onsite - Onsite is that area within the Owner Controlled Area fence for purposes of this procedure.

4.0 INSTRUCTIONS

4.1 PRECAUTIONS

4.1.1 Each Onsite Survey Team shall be composed of at least two (2) individuals, of which at least one (1) individual shall be a Health Physics Technician.

NOTE: The REC may dispatch an individual to the Control Room to monitor habitability and/or to a location outside the Power Block to perform surveys.

4.1.2 No onsite radiological survey activity shall be performed if that activity would result in personnel exposure in excess of 10CFR, Part 20 limits unless authorized by the Duty Emergency Manager (DEM) or the DED in his absence.

4.1.3 Individuals performing onsite radiological survey activities shall exercise As Low As Reasonably Achievable (ALARA) concepts.

4.1.4 Each Onsite Survey Team should keep at least one dose rate monitoring instrument on at all times to minimize the chance of unexpected exposure.

4.1.5 Onsite Survey Teams should not enter or remain in areas where general area dose rates are in excess of 5 R/hr without approval from the RAC or DAC.

4.1.6 Onsite Survey Team personnel shall use protective clothing and respirators, as appropriate, to minimize internal exposure and skin contamination.

4.1.7 The RAC or DAC should consider the use of Potassium Iodide (KI) tablets, in accordance with EPP 01-9.3, "Radioprotective Drugs", in the event that high levels of radioiodine are suspected.

4.1.8 Onsite Survey Team personnel shall assure that all radio and telephone data transmissions are carefully worded and clearly understood by the communicator receiving that information.

4.1.9 Onsite Survey Teams shall, in case of loss of communications, contact the Onsite Field Team Communicator, RAC or DAC via the intraplant page or telephone system:

Onsite Field Team Communicator - Ext. 359
DAC - 353
RAC - 389

4.2 INITIAL ACTIONS

4.2.1 The RAC and/or DAC shall request the formation of Onsite Survey Teams through the Maintenance Emergency Coordinator (MEC).

4.2.2 The RAC and/or DAC shall inform the MEC of current plant conditions, recommended routes and monitoring objectives.

4.2.3 The RAC shall assign a communicator for the Onsite Survey Teams which enter the power block buildings.

4.2.4 The DAC shall inform the TSC Field Team Communicator of the formation of Onsite Survey Teams which will perform their survey activities outside the power block buildings.

4.2.5 The MEC shall notifiy the OSC Supervisor of the need for Onsite Survey Teams as requested by the RAC/DAC.

4.2.6 The OSC Supervisor shall direct the OSTD to form the appropriate Onsite Survey Teams and prepare for their dispatch.

4.2.7 The OSTD shall perform the following:

4.2.7.1 Assign individuals to form an Onsite Survey Team. Each team requires a minimum of two (2) individuals, one of which must be a Health Physics Technician.

4.2.7.2 Assign an individual as the Onsite Survey Team Leader.

4.2.7.3 Brief the Onsite Survey Team on the current and projected emergency conditions and the monitoring objectives. This briefing should include the following:

a. Magnitude and composition of any actual or potential radiological releases; e.g. the source of leakage, release rate, and expected duration.

b. Projected onsite dose rates, airborne activities and contamination levels.

c. Current and projected meteorological conditions.

d. Survey results from any preliminary radiological monitoring activities conducted onsite.

e. Review requirements for protective clothing, respiratory protection, dosimetry types and placements, and survey equipment.

f. Initial destination

4.2.7.4 Issue the Onsite Survey Team communication identification.

4.2.7.5 Assign the Onsite Survey Team a vehicle appropriate to their monitoring objectives.

4.2.7.6 Obtain the Attachment 1.0, "Onsite Survey Team Checklist", Form EP 8.1-1, from the Onsite Survey Team after they have completed their part and complete and sign the checklist, thereby authorizing their departure.

4.2.7.7 Dispatch the Onsite Survey Team through either the TSC Field Team Communicator or the RAC - assigned Communicator.

4.2.8 The Onsite Survey Teams shall perform the following:

4.2.8.1 Obtain necessary monitoring and survey equipment from emergency lockers.

4.2.8.2 Perform all required operability checks on equipment.

4.2.8.3 Obtain the appropriate keys necessary to access areas of the plant to complete monitoring objectives.

4.2.8.4 Dress out in appropriate protective clothing and obtain necessary respiratory protective equipment, as directed.

4.2.8.5 Obtain the necessary dosimetry. As a minimum, Onsite Survey Team personnel shall wear a thermoluminescent dosimeter (TLD) and a low range and high range self-reading dosimeter.

4.2.8.6 Record the serial numbers and initial readings of the dosimetry devices for each Onsite Survey Team member on Form EP 9.1-4, "Emergency Dosimeter Log", located in the Emergency Locker.

4.2.8.7 Complete applicable parts of Attachment 1.0, "Onsite Survey Team Checklist", Form EP 8.1-1, and submit it to the OSTD for approval for dispatch.

4.2.8.8 Attend a briefing regarding the emergency conditions and monitoring objectives by the OSTD.

4.2.8.9 Establish and maintain radio communications with the TSC Field Team Communicator and/or the RAC - assigned Communicator.

4.2.9 The TSC Field Team Communicator shall verify communication identification and team membership when the Onsite Survey Team establishes radio communications.

4.2.10 The RAC - assigned Communicator shall verify communication identification and team membership when the in-plant Onsite Survey Team establishes radio communications.

4.3 Subsequent Actions

4.3.1 The RAC/DAC shall perform the following:

4.3.1.1 Direct their respective Onsite Survey Teams to desired sampling or monitoring locations. If applicable, refer to Attachment 2.0, "Onsite Radiological Monitoring Locations".

4.3.1.2 Direct their respective Onsite Survey Teams as to types of monitoring and/or sampling to be performed.

4.3.1.3 Review and approve incoming field data, Attachment 3.0, "Radiological Monitoring Data Sheet," Form EP 8.1-3, for survey results.

4.3.1.4 Direct the updating of Radiological Status Board through the TSC Radiological Status Board Recorder.

4.3.2 The MEC shall coordinate with the RAC/DAC to monitor the activities of all Onsite Survey Teams.

4.3.3 The OSTD shall perform the following:

4.3.3.1 Assure the logging in and analysis of all incoming field samples at the OSC Bio-Assay Laboratory.

4.3.3.2 Review and assure dosimetry entries of incoming field teams.

4.3.4 The Onsite Survey Team shall perform the following:

4.3.4.1 Proceed to monitoring locations as directed.

4.3.4.2 Observe dose rate monitoring instrumentation while enroute to monitoring locations.

4.3.4.3 Communicate the arrival of the Onsite Survey Team at the designated sampling location to the TSC Field Team Communicator or RAC - assigned Communicator.

4.3.4.4 Perform, as directed, data collection, sampling and record keeping as follows:

4.3.4.4.1 Record all sampling locations, times, measurements and sample data on Attachment 3.0, "Radiological Monitoring Data Sheet", Form EP 8.1-3, or plant survey maps, as appropriate.

4.3.4.4.2 Place all air samples in separate bags and label with the following information, as applicable:

- date and time
- location
- individual/field team
- type and description
- air monitor sample times (start & stop)
- air monitor sample flows (start & stop)
- radiation reading at contact

4.3.4.4.3 Dose Rate Measurement Procedure (ion chamber):

a. Measure the dose rate with the Beta shield open for a Beta/Gamma reading.

b. Measure the dose rate with the Beta shield closed for a Gamma reading.

c. Quantify the Beta dose by subtracting the Gamma reading from the Beta/Gamma reading and multiplying by the beta correction factor on the instrument.

4.3.4.4.4 Air Sample Collection:

a. Assemble a particulate filter (coarse side out) and a silver zeolite cartridge (flow arrow pointed at sampler) in the sampling head and install the head on the sampler.

b. Place the sampler so that a representative sample may be collected. Plug the sampler into the vehicle inverter (vehicle must be running) or electrical outlet and start the sampler noting the actual flow rate and starting time.

c. Allow the sampler to run for the requested time (normally at least 10 mins.). Note the final flow rate, stop the sampler and record stop time.

d. Remove the particulate filter and silver zeolite cartridge from the sampler head and determine their gross activities if requested.

4.3.4.5 Communicate to the TSC Field Team Communicator/RAC - assigned Communicator that requested sampling is completed and request further instructions.

NOTE: Onsite Survey Teams should move to a low background area, as applicable, during periods when radiological monitoring activites are not being conducted or when data is recorded.

4.3.4.6 Upon completion of all onsite radiological monitoring activities the following shall be performed:

4.3.4.6.1 Submit all samples collected and corresponding data sheets to the OSC Bio-Assay Laboratory for further analysis and retention.

NOTE: Samples that have significant activity should be placed in a shielded area to reduce personnel exposures and radiation fields in the Bio-Assay Laboratory.

4.3.4.6.2 Assure completion of a "Radiological Sample Inventory Log", Form EP 11.3-2 for onsite samples. Completed inventory logs should be routed to the Onsite Survey Team Director.

4.3.5 The TSC Field Team Communicator/RAC - assigned Communicator shall perform the following:

4.3.5.1 Communicate all directions from the RAC/DAC to the proper Onsite Survey Team.

4.3.5.2 Track locations and status of all Onsite Survey Teams.

4.3.5.3 Record communicated data from the Onsite Survey Teams on Attachment 3.0, "Radiological Monitoring Data Sheet", Form EP 8.1-3, or plant survey maps, as appropriate, and submit it to the RAC/DAC for approval.

4.3.6 Recording, Transmitting and Receiving Data

4.3.6.1 To assure that a permanent record of all onsite survey activities is maintained, copies of Form EP 8.1-3, "Radiological Monitoring Data Sheets," are provided in the OSC Emergency Kits or cabinets.

4.3.6.2 Upon completing the instructed survey and sample collection activities, Onsite Survey Team personnel shall record the data and transmit to the TSC Field Team Communicator or RAC - assigned Communicator.

4.3.6.3 Field data received by the communicator shall be recorded on appropriate survey maps or on Form EP 8.1-3 "Radiological Monitoring Data Sheet", as appropriate.

4.3.6.4 Upon receiving and recording field data reported by the teams, the completed data sheets shall be used for subsequent evaluation and posting.

4.3.6.5 Upon completion of the onsite survey activities, all samples should be returned to the OSC for analysis.

5.0 REFERENCES

5.1 Wolf Creek Generating Station Radiological Emergency Response Plan

5.2 EPP 01-9.1, "Exposure Control and Personnel Protection"

5.3 EPP 01-9.3, "Radioprotective Drugs"

5.4 EPP 01-11.3, "Logs and Record Keeping"

6.0 RECORDS

6.1 Form EP 8.1-1, "Onsite Survey Team Checklist"

6.2 Form EP 8.1-3, "Radiological Monitoring Data Sheet"

6.3 The records generated by this procedure during an actual emergency shall be forwarded to the Emergency Planning Coordinator (EPC) at the termination of the emergency. The EPC forwards the records to the WCGS vault for storage. These records will be retained for the life of the plant. These records shall be considered QA records.

6.4 The records generated by this procedure during drills and exercise shall be forwarded to the EPC upon termination of the drill or exercise. The EPC shall maintain these records for at least one year. These records shall be considered non-QA records.

7.0 ATTACHMENTS

7.1 Attachment 1.0, "Onsite Survey Team Checklist"

7.2 Attachment 2.0, "Onsite Radiological Monitoring Locations"

7.3 Attachment 3.0, "Radiological Monitoring Data Sheet"

FORM EP 8.1-1 Rev. 0

ATTACHMENT 1.0
(Page 1 of 1)

ONSITE SURVEY TEAM CHECKLIST

Team Members

Leader _____

Member _____

Member _____

Member _____

Radio Call ID for this team is _____

The Team Leader shall sign his initials when an item is complete or write "N/A" for not applicable.

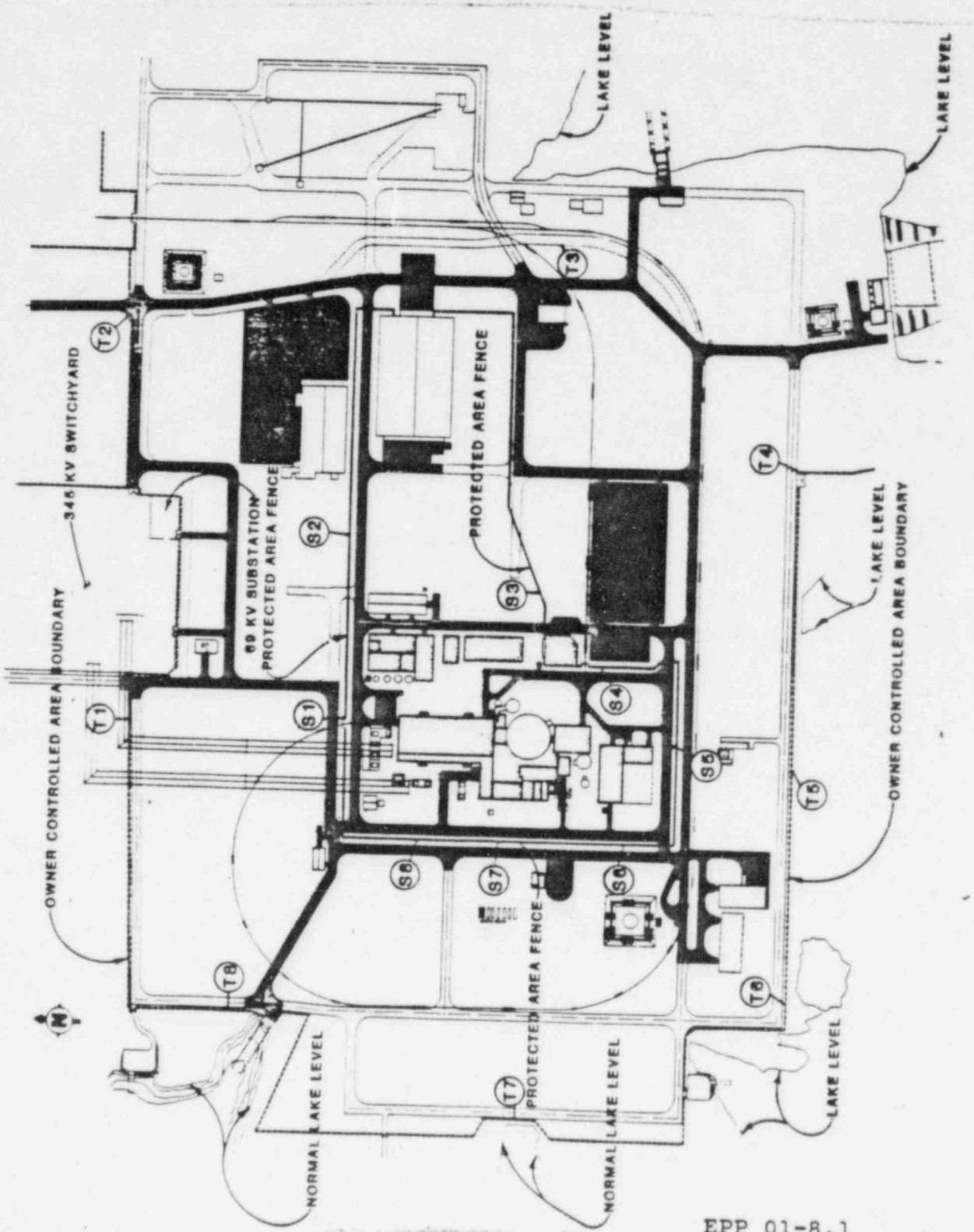
	TEAM LEADER INITIALS
1. Instruments checked for proper response	_____
2. Obtained Survey Maps	_____
3. Obtained appropriate keys.	_____

	OSTD INITIALS
4. Properly dressed with required anti-contamination clothing, respirator equipment and dosimeters	_____
5. Briefing completed on:	
a. Additional protective clothing, respirator, dosimetry requirements	_____
b. Emergency conditions and monitoring objectives, suggested route and alternate	_____
6. Team members were issued KI	_____
7. Exposure extension authorized.	_____
8. Established radio contact with TSC and informed applicable Communicator of Team Identification.	_____

_____
Onsite Survey Team Director

ONSITE RADIOLOGICAL MONITORING LOCATIONS

ATTACHMENT 2.0
(Page 1 of 1)



RADIOLOGICAL MONITORING DATA SHEET

FORM EP 8.1-3 REV. 0

RADIOLOGICAL MONITORING DATA SHEET

Instrument	Dose Rate	Count Rate	Air Sampler
Serial Number			
Calibration Date			
Efficiency			

Date: _____
Team Designation _____

Dose Rate Beta Correction Factor _____

Sample		Dose Rate (Window)		Air Sample Data													Comments
				Time		Flow Rate		Vol.	Particulate				Iodine				
Time	Loc#	mr/Hr OPEN	mr/Hr CLOSED	ON	OFF	ON	OFF	Ft^3	CPM Bkgd	CPM Gross	CPM NET	uCi/cc ACTIVITY	CPM Bkgd	CPM Gross	CPM NET	uCi/cc ACTIVITY	Note any environmental samples taken and misc. information

PARTICULATE ACTIVITY CALCULATION

$\frac{\text{(Gross CPM) - (Bkgd CPM)}}{*(6.04\ E\ x\ 09)(\text{VOL } Ft^3)} = \frac{\text{NCPM}}{*(6.04\ E\ x\ 09)(\text{VOL } Ft^3)}$ = Activity in uCi/cc

IODINE ACTIVITY CALCULATION

$\frac{\text{(Gross CPM) - (Bkgd CPM)}}{*(6.04\ E\ x\ 07)(\text{VOL } Ft^3)} = \frac{\text{NCPM}}{*(6.04\ E\ x\ 07)(\text{VOL } Ft^3)}$ = Activity in uCi/cc

NOTE: Turn in Data Sheet to Emergency Operations Facility Environmental Laboratory (Bio-Assay Laboratory at the Operations Support Center).

*This constant includes filter eff. and counter eff.

ABBREVIATIONS

Gross CPM = Gross Counts per Minute
Bkgd CPM = Background Counts per Minute
Vol. = Volume in Cubic Feet
Eff. = Efficiency
uCi = Microcuries
cc = Cubic Centimeter

Member Signatures: _____

KANSAS GAS AND ELECTRIC COMPANY
WOLF CREEK GENERATING STATION

RADIOLOGICAL EMERGENCY RESPONSE PLAN IMPLEMENTING PROCEDURE

OFFSITE RADIOLOGICAL MONITORING

EPP 01-8.2

Revision 3

Kevin J Moles — 2/18/86
EMERGENCY PLANNING COORDINATOR REVIEW — DATE

Stan Devena — 2-18-86
EMERGENCY PLANNING ADMINISTRATOR REVIEW — DATE

J Zell — 2/25/86
PSRC APPROVAL RECOMMENDATION — DATE

Glenn L Koester — 2/27/86
V.P. NUCLEAR APPROVAL — DATE

RELEASED DC44 — 2-28-86
DATE

1.0 PURPOSE

This procedure establishes the criteria and instructions for assessing offsite radiological conditions in the event of a radiological emergency at Wolf Creek Generating Station (WCGS).

2.0 APPLICABILITY

This procedure applies to the Dose Assessment Coordinator (DAC) in the Technical Support Center (TSC), the Radiological Assessment Supervisor (RAS) in the Emergency Operations Facility (EOF), and other personnel assigned to, or associated with, Offsite Monitoring Teams. This procedure shall be initiated following the declaration of a Site Area Emergency or General Emergency or as directed by the Duty Emergency Director (DED).

3.0 DEFINITIONS

3.1 EMERGENCY RESPONSE FACILITY

Those facilities, EOF, TSC, and the Operations Support Center (OSC), where instructions to Offsite Monitoring Teams may originate.

3.2 PRE-DETERMINED EMERGENCY SAMPLING LOCATIONS

Those offsite monitoring locations, as identified in Attachment 2.0, used for consistency in offsite monitoring as agreed to by KG&E, Coffey County, and the State of Kansas.

3.3 OFFSITE

Offsite is that area outside the owner controlled area for purposes of this procedure.

4.0 INSTRUCTIONS

4.1 PRECAUTIONS

4.1.1 Each Offsite Monitoring Team shall be composed of at least two (2) individuals, of which, at least one (1) individual is a Health Physics Technician, trained in offsite monitoring.

4.1.2 All offsite monitoring activities shall be conducted so that exposures are maintained as low as reasonably achievable (ALARA).

4.1.3 Each Offsite Monitoring Team shall keep a dose rate or count rate monitoring instrument on at all times to detect unexpected or excessive exposure from the plume while performing radiological monitoring activities.

4.1.4 Offsite Monitoring Team personnel shall use protective clothing and respirators as directed by the DAC or RAS, or upon their own determination of need to minimize skin contamination and internal exposure.

4.1.5 The Radiological Emergency Coordinator (REC) at the TSC (RAM at EOF) should consider the use of Potassium Iodide (KI) tablets, in accordance with EPP 01-9.3, "Radioprotective Drugs," in the event that high levels of radioiodine are suspected.

4.1.6 Offsite Monitoring Team personnel shall not exceed 10CFR, Part 20 exposure limits without approval from the Duty Emergency Director (DED) or later the Duty Emergency Manager (DEM).

4.1.7 Offsite Monitoring Team personnel shall assure that all transmissions of data are clear and concise.

4.1.8 Offsite Monitoring Teams shall use Operations radios on Channel 4 as the primary method of communication while dispatched and public telephone as a back-up. Utilize the following numbers in case of a loss of communication:

Radiological Assessment Supervisor (EOF);
PH.# 364-8831 Ext. 391
TSC Field Team Communicator;
PH.# 364-8831 Ext. 359

4.2 INITIAL ACTIONS

4.2.1 Assignment to Offsite Monitoring Teams will be accomplished by the Onsite Survey Team Director (OSTD) at the OSC before EOF activation. This function will be accomplished by the RAS at the EOF after its activation.

NOTE: A minimum of four monitoring teams composed of any combination of Offsite Monitoring Teams and/or Joint Radiological Monitoring Teams shall be organized as soon as practicable whenever a radiological release is imminent or in progress.

4.2.2 Dispatch and direction of Offsite Monitoring Teams will be initially accomplished at the OSC and TSC respectively until the EOF is activated. Once the EOF is activated, dispatch and direction of Offsite Monitoring Teams is accomplished at the EOF.

4.2.3 The RAS shall perform the following:

NOTE: The OSTD shall perform the following when Offsite Monitoring Teams are being dispatched from the OSC.

NOTE: The RAS may assign the following functions to the EOF Coordinator.

4.2.3.1 Assign individuals to form an Offsite Monitoring Team. Each team requires a minimum of two (2) individuals, one of which must be a Health Physics Technician trained in offsite monitoring.

4.2.3.2 Assign an individual as Offsite Monitoring Team Leader.

4.2.3.3 A briefing of the Offsite Monitoring Teams on the current and projected emergency conditions and the monitoring objectives. This briefing should include the following:

a. Magnitude and composition of any actual or potential radiological releases to the environment, e.g. the source of leakage and the release rate, the composition of the release (noble gas, radioiodine, or particulate) and the expected duration of the release.

b. Projected offsite dose rates, and/or airborne activity.

c. Current and projected meteorological conditions, including the wind speed, wind direction, and any other information concerning those areas or sectors that are or may be affected by the release.

d. Survey results from any preliminary radiological monitoring activities conducted offsite.

NOTE: If the State and County monitoring team members join the Offsite Monitoring Team in the field, assure that they also receive the above briefing.

e. Requirements for protective clothing.

f. Initial destination

4.2.3.4 Issue the Offsite Monitoring Team communication identification.

4.2.3.5 Assign the Offsite Monitoring Team a vehicle appropriate to their monitoring objectives.

4.2.3.6 Obtain the Attachment 1.0, "Offsite Monitoring Team Checklist", Form EP 8.2-1, from the Offsite Monitoring Team after they have completed their part and complete and sign the checklist, thereby authorizing their departure.

4.2.3.7 Dispatch the Offsite Monitoring Team through the applicable Field Team Communicator.

4.2.4 The EOF Field Team Communicator shall perform the following:

NOTE: The TSC Field Team Communicator shall perform the following when the EOF has not been activated.

4.2.4.1 Verify communication identification when the Offsite Monitoring Team establishes initial radio communications or whenever the Teams are turned over to the EOF.

4.2.4.2 Notify the RAS (Dose Assessment Coordinator at the TSC) when the Offsite Monitoring Teams are ready to depart.

4.2.5 The Offsite Monitoring Team shall perform the following:

4.2.5.1 Select an Emergency Kit located at the Emergency Lockers and perform an inventory check against the inventory list provided in the kit.

NOTE: Inventory of the kit's contents is not required if the kit seal is intact.

4.2.5.2 Perform the required operability checks on the equipment contained within the Emergency Kit.

NOTE: If inoperable instruments are discovered, backup instrumentation and/or batteries are available in the Emergency Locker.

4.2.5.3 Obtain the keys to the radiological emergency response vehicle from security officers at the Personnel Access Control Station (PACS) or the EOF and assure it is fueled and properly equipped to support the monitoring objectives.

4.2.5.4 Obtain appropriate dosimetry devices from Emergency Kit(s) and respirators from the emergency cabinet. As a minimum, Offsite Monitoring Team personnel shall wear a thermoluminescent dosimeter (TLD), a low range, and a high range direct reading pencil dosimeters.

NOTE: Two (2) extra respirators should be taken for potential use by JRMT members.

4.2.5.4.1 Record the serial numbers and initial readings of the dosimetry devices for each Offsite Monitoring Team member on Form EP 9.1-4, "Emergency Dosimeter Log", located in the Emergency Locker.

4.2.5.5 Complete applicable parts of Attachment 1.0, "Offsite Monitoring Team Checklist", Form EP 8.2-1, and submit it to the EOFC (Onsite Survey Team Director at the OSC) for approval for departure.

4.2.5.6 Attend a briefing regarding the emergency conditions and monitoring objectives by the RAS (Onsite Survey Team Director at the OSC).

4.2.5.7 Establish and maintain radio communications with the EOF Field Team Communicator (or the TSC Field Team Communicator if the EOF is not activated).

4.3 SUBSEQUENT ACTIONS

4.3.1 The RAS (Dose Assessment Coordinator at the TSC) shall perform the following:

4.3.1.1 Assess the need for Offsite Monitoring Team personnel thyroid dose determination and Potassium Iodide (KI) administration in accordance with EPP 01-9.3, "Radioprotective Drugs."

4.3.1.2 Review incoming field data, Attachment 4.0, "Radiological Monitoring Data Sheet", Form EP 8.1-3.

4.3.1.3 Assure that the Dose Assessment Supervisor (DAC at TSC) receives the field data following status board updates.

4.3.1.4 Direct the updating of status boards through the EOF Radiological Status Recorder (TSC Radiological Status Recorder at the TSC).

4.3.1.5 Attachment 8.0, "Field Team Message Form," Form EP 8.2-8, may be utilized for instructions given to the field teams.

4.3.1.6 Assure the proper documentation, and analysis of, all incoming field samples at the EOF Environmental Laboratory.

NOTE: The Onsite Survey Team Director shall assume this responsibility at the OSC Bio-Assay Laboratory in the event the EOF is not activated.

4.3.1.7 Coordinate the integration of County and State personnel into Offsite Monitoring Teams as outlined in EPP 01-8.3, "Joint Radiological Monitoring Team Formation and Operation."

4.3.2 The EOF Field Team Communicator (TSC Field Team Communicator at the TSC) shall perform the following:

4.3.2.1 Communicate all directions from the RAS (Dose Assessment Coordinator at the TSC) to the proper Offsite Monitoring Team.

4.3.2.2 The EOF Field Team Communicator (TSC Field Team Communicator at the TSC) should use Attachment 7.0, "Field Monitoring Team Data," Form EP 8.2-7, to track Offsite Monitoring Team data by location.

4.3.2.3 Record communicated data from the Offsite Monitoring Teams on Attachment 4.0, verify calculations and submit the information to the RAS (Dose Assessment Coordinator at the TSC) for approval.

4.3.3. The Offsite Monitoring Team shall perform the following:

4.3.3.1 Advise the TSC or EOF Field Team Communicators of plume location and movements.

4.3.3.2 Proceed, as directed, to an offsite monitoring location by referencing Attachment 2.0, "Pre-Determined Emergency Sampling Locations", or Attachment 3.0, "Environmental TLD and Air Sampling Locations".

4.3.3.3 Observe count rate and/or dose rate monitoring instrumentation while enroute to monitoring locations or when directed to conduct plume traverse/plume tracking activities as follows:

a. Hold the detector of the monitoring instrumentation inside the vehicle and above the lap. The vehicle windows should be open.

b. Upon observing a count rate or dose rate above normal background, notify the EOF Field Team Communicator (TSC Field Team Communicator at the TSC) of your location.

NOTE: Because of its greater sensitivity as a detector of beta/gamma radiation relative to a dose rate instrument, the count rate instrument will provide the first indication of radiation from a plume.

c. Conduct further plume traverse/tracking only as directed by the applicable Field Team Communicator. If traverse/tracking instructions are requested, the Offsite Monitoring Team shall, to the best of their ability, identify and transmit the location of the maximum readings noted, as well as, plume boundaries.

NOTE: Maintain an estimate of the time spent in the plume.

4.3.3.4 Communicate the arrival of the Offsite Monitoring Team at the designated sampling location to the applicable Field Team Communicator.

4.3.3.5 Perform, as directed, field data collection, sampling and record keeping as follows:

NOTE: It may be necessary to collect field samples and then move, after informing the applicable Field Team Communicator, to a low background area in order to estimate sample activities in the field.

4.3.3.5.1 Record all sampling locations, times, measurements and sample data on Attachment 4.0, "Radiological Monitoring Data Sheet," Form EP 8.1-3. Communicate data to the applicable Field Team Communicator as soon as possible.

4.3.3.5.2 Place all field samples in separate sample containers and label with the following information, if applicable:

- date and time
- location
- individual/field team
- type and description
- air monitor samples times (start & stop)
- air monitor samples flows (initial & final)
- radiation reading at contact

4.3.3.5.3 Dose Rate Measurement Procedure:

a. Perform dose rate measurements with the dose rate detector approximately five (5) feet above ground level.

b. Measure the dose rate with the beta shield open for a beta/gamma reading.

c. Measure the dose rate with the beta shield closed for a gamma reading.

d. Quantify the beta dose by subtracting the gamma reading from the beta/gamma reading and multiplying this result by the beta correction factor on the instrument.

NOTE: Direct contact with the plume is indicated by significant beta measurements. Conversely, the absence of beta radiation indicates exposure to "sky shine radiation," gamma radiation from plume overhead.

4.3.3.5.4 Air Sample Collection:

a. Assemble a particulate filter (coarse side out) and a silver zeolite cartridge (flow arrow pointed at sampler) in the sampling head and install the head on the sampler.

b. Place the sampler so that a representative sample may be collected. Plug the sampler into the vehicle inverter (vehicle must be running) and start the sampler noting the actual flow rate and starting time.

NOTE: Offsite air sample flow rates should be set at 2.0 cfm for 10 min., providing whole body dose rates permit. Higher sample rates and/or shorter sample times may be utilized to minimize exposures.

c. Allow the sampler to run for the requested time (normally at least 10 mins.). Note the final flow rate , stop the sampler and record stop time.

d. Remove the particulate filter and silver zeolite cartridge from the sampler head, bag and label, and determine their gross activities if requested. If dose rates are prohibitive, bag the entire air sampler and move to a low background area.

NOTE: Before measurement, aspirate the cartridge with a 3-second draw of fresh (non-plume) air or wave vigorously in air with both ends open for 20 seconds.

4.3.3.5.5 Determination of Gross Particulate Activity

a. Measure a background count rate using a count rate instrument with an HP-210 probe.

b. Place the filter in a planchette in the sample holder, inlet side facing up.

c. Measure the particulate filter count rate by placing an HP-210 probe in the sample holder.

d. Bag and label the particulate filter and discard the used planchette in a plastic bag.

e. Calculate gross particulate activity as follows:

PARTICULATE ACTIVITY CALCULATION

$$\frac{(\text{Gross CPM}) - (\text{Bkgd CPM})}{*(6.04\text{ E }09)\ (\text{VOL FT}^3)} = \frac{\text{NCPM}}{*(6.04\text{ E }09)(\text{VOL FT}^3)} = \text{Activity in uCi/cc}$$

where: *This constant includes filter eff. (0.96) and counter eff. (0.10)
NCPM = (Gross CPM - Bkgd CPM)
vol, ft^3 = (time, min) (flow, avg)

NOTE: Attachment 5.0, "Particulate Sampler Conversion Graph," may be utilized to verify calculations or in the event of calculator failure. If the calculator fails, notify the EOF.

4.3.3.5.6 Determination of Gross Iodine Activity:

a. Determine a background count rate using a count rate instrument with a HP-210 probe.

b. Aspirate cartridge according to Note in 4.3.3.5.4.d

c. Bag and label the silver zeolite cartridge.

d. Measure the silver zeolite cartridge count rate by placing an HP-210 probe directly at contact to the inlet side of the cartridge.

e. Calculate gross iodine activity as follows:

IODINE ACTIVITY CALCULATION

$$\frac{\text{(Gross CPM)} - \text{(Bkgd CPM)}}{*(6.04\text{ E }07)(\text{VOL FT}^3)} = \frac{\text{NCPM}}{*(6.04\text{ E }07)(\text{VOL FT}^3)} = \text{Activity in uCi/cc}$$

where: *This constant includes filter eff. (0.96) and counter eff. (0.01)

NCPM = (Gross CPM - Bkgd CPM)
vol, ft^3 = (time, min) (flow, avg)

NOTE: Attachment 6.0, "Iodine Sampler Conversion Graph," may be utilized to verify calculations or in the event of calculator failure. If the calculator fails, notify the EOF.

4.3.3.5.7 Ground Deposition Survey (direct scan):

NOTE: Ground measurements should be made in an undisturbed, open area away from vehicles, buildings, roads, evacuated areas, or piled gravel or soil. Care should be exercised to prevent puncture of the mylar window and/or contamination of the probe.

a. Determine the background count rate using a count rate instrument with an HP-210 probe approximately three (3) feet above ground level.

b. Determine a gross count rate approximately two (2) inches above ground level.

c. Determine the net count rate (NCPM) by subtracting the background count rate (Bkgd CPM) from the gross count rate (Gross CPM).

d. Record results in the comments section of Attachment 4.0, "Radiological Monitoring Data Sheets," Form EP 8.1-3.

4.3.3.5.8 Ground Deposition Survey (smear):

NOTE: The area to be swiped should be a flat, smooth surface (e.g., a car hood other than that of the team vehicle), using care not to shake off the collected material.

a. Swipe a $100cm^2$ area using a smear pad.

b. Measure the background count rate using a count rate instrument with an HP-210 probe.

c. Place the smear in a planchette in the sample holder.

d. Measure the gross count rate by placing an HP-210 probe in the sample holder.

e. Bag and label the smear pad.

f. Determine the net smearable contamination (sample cpm) by subtracting the background count rate from the gross count rate.

g. Calculate the smearable contamination in uCi/m^2 as follows:

$$uCi/m^2 = \frac{(NCPM)}{2.2x10^3}$$

where:

$2.2x10^3$ includes detector efficiency, area correction and dpm conversion

h. Record the results in terms of uCi/m^2 in the comments section of Attachment 4.0, "Radiological Monitoring Data Sheet," Form EP 8.1-3 and on the sample label.

4.3.3.5.9 Soil Sample Collection:

NOTE: Soil samples should be obtained in areas free of any vegetation.

a. Wearing gloves, remove approximately the top 1/2 inch of soil from a 1 m^2 area using a trowel.

b. Bag and label the soil sample.

4.3.3.5.10 Vegetation Sample Collection:

a. Wearing gloves, cut vegetation growth down to approximately 1 inch from ground level in a 1 m^2 area.

b. Bag and label the vegetation sample.

4.3.3.5.11 Snow Sample Collection:

NOTE: Snow samples should be collected in areas free from vegetation, buildings, etc.

a. Wearing gloves, collect approximately the top 3 inches of snow in a 1 m^2 area.

b. Bag and label the snow sample in double plastic bag.

c. Transfer the snow sample once it has melted to a labeled sample bottle.

4.3.3.5.12 Liquid Sample Collection:

NOTE: Sources of water to be sampled should normally be undisturbed, stagnant bodies, such as ponds or cattle troughs.

a. Wearing gloves, immerse a one liter bottle in water source until full. Avoid getting potentially contaminated water on the skin.

b. Place the liquid sample bottle in a plastic bag and label.

4.3.3.6 Communicate to the applicable Field Team Communicator that sampling is completed and request further instructions.

NOTE: Offsite Monitoring Teams shall move to an area away from direct plume exposure during periods when radiological monitoring activities are not being conducted.

4.3.3.7 Upon completion of all offsite radiological monitoring activities the following shall be performed:

4.3.3.7.1 Submit all field samples collected and corresponding data sheets to the EOF Environmental Laboratory (Bio-Assay Laboratory at the OSC) for further analysis and retention.

NOTE: Samples that have significant activity should be placed in a shielded area to reduce personnel exposures and radiation fields in the laboratory.

4.3.3.7.2 Complete a "Radiological Sample Inventory Log," Form EP 11.3-2 for offsite samples. Completed inventory logs should be routed to the RAS (OSTD at the OSC).

4.3.3.7.3 Enter final dosimetry readings on Form EP 9.1-4, "Emergency Dosimeter Log," for each Offsite Monitoring Team member.

5.0 REFERENCES

5.1 Wolf Creek Generating Station Radiological Emergency Response Plan

5.2 EPP 01-8.3, "Joint Radiological Monitoring Team Formation and Operation"

5.3 EPP 01-9.1, "Exposure Control and Personnel Protection"

5.4 EPP 01-9.3, "Radioprotective Drugs"

5.5 EPP 01-11.3, "Logs and Record Keeping"

5.6 HPH 03-002, "Radiation Survey Methods"

5.7 HPH 03-003, "Airborne Radioactivity Surveys"

5.8 HPH 03-011, "Contamination Survey Methods"

6.0 RECORDS

6.1 Form EP 8.2-1, "Offsite Monitoring Team Checklist"

6.2 Form EP 8.1-3, "Radiological Monitoring Data Sheet"

6.3 Form EP 8.2-7, "Field Monitoring Team Data"

6.4 Form EP 8.2-8, "Field Team Message Form"

6.5 The records generated by this procedure during an actual emergency shall be forwarded to the Emergency Planning Coordinator (EPC) at the termination of the emergency. The EPC forwards the records to the WCGS vault for storage. These records will be retained for the life of the plant. These records shall be considered QA records.

6.6 The records generated by this procedure during drills and exercises shall be forwarded to the EPC upon termination of the drill or exercise. The EPC shall maintain these records for at least one year. These records shall be considered non-QA records.

7.0 ATTACHMENTS

7.1 Attachment 1.0, "Offsite Monitoring Team Checklist"

7.2 Attachment 2.0, "Pre-Determined Emergency Sampling Locations"

7.3 Attachment 3.0, "Environmental TLD and Air Sampling Locations"

7.4 Attachment 4.0, "Radiological Monitoring Data Sheet"

7.5 Attachment 5.0, "Particulate Sampler Conversion Graph"

7.6 Attachment 6.0, "Iodine Sampler Conversion Graph"

7.7 Attachment 7.0, "Field Monitoring Team Data"

7.8 Attachment 8.0, "Field Team Message Form"

FORM EP 8.2-1 REV. 1

ATTACHMENT 1.0

OFFSITE MONITORING TEAM CHECKLIST

Date/Time _____ Communication I.D. _____

Vehicle No. _____

Team Members

_____ KG&E

_____ KG&E

_____ KG&E

_____ KG&E

	Team Member Initials
Offsite monitoring kit inventory complete	____/____
Equipment operability checks complete	____/____
Offsite vehicle fueled and properly equipped	____/____
Proper dosimetry (TLD, hi - lo pencils) and respirators obtained	____/____
Initial dosimetry readings entered (Form EP 9.1-4)	____/____
Communication established and identification issued	____/____

****

Individual responsibilities assigned.	____/____
Team briefing conducted on emergency conditions and monitoring objectives.	____/____

DAC requested to inform Security that team is preparing to leave site.

Comments: _____

_____

_____

_____

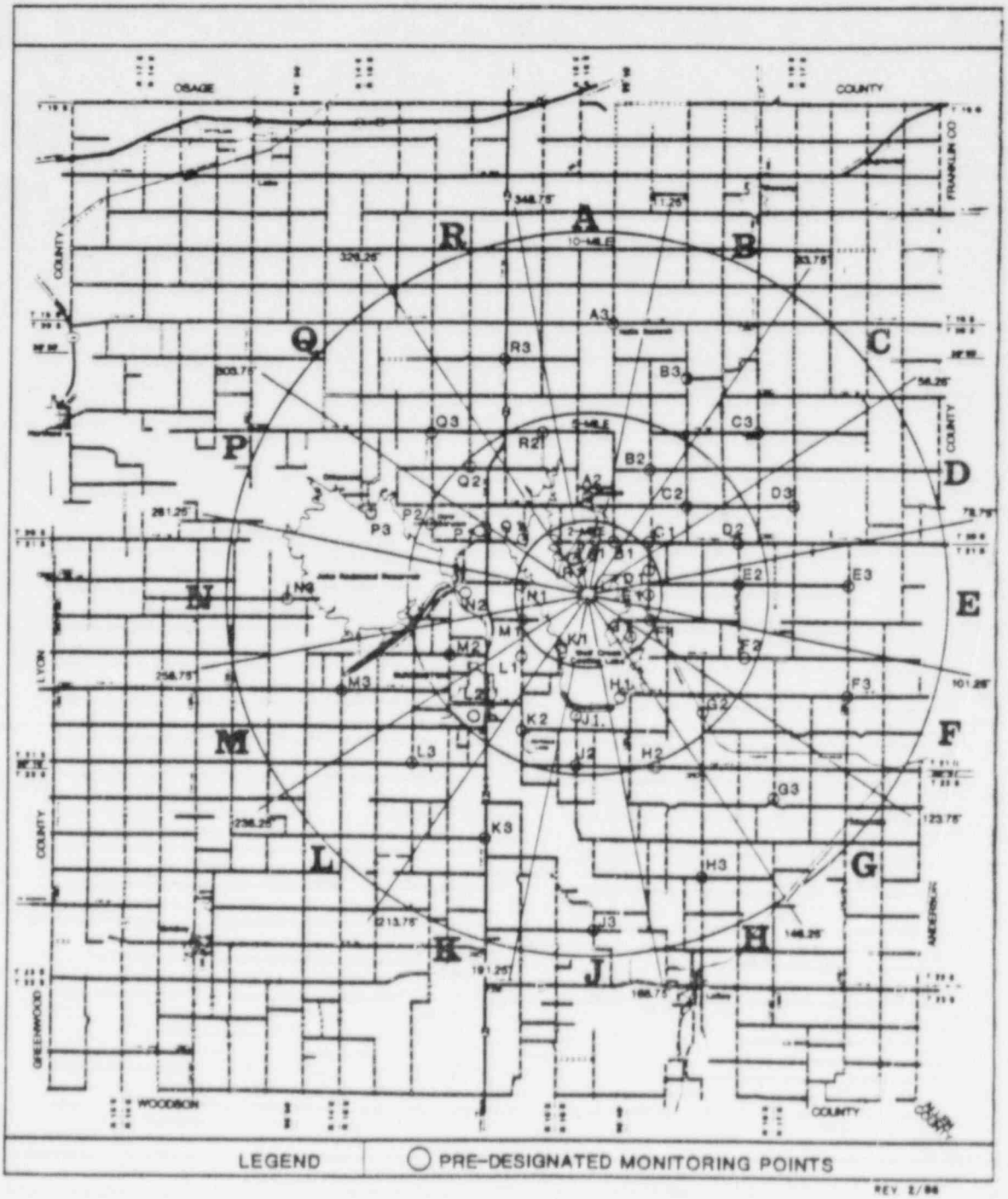
_____

_____

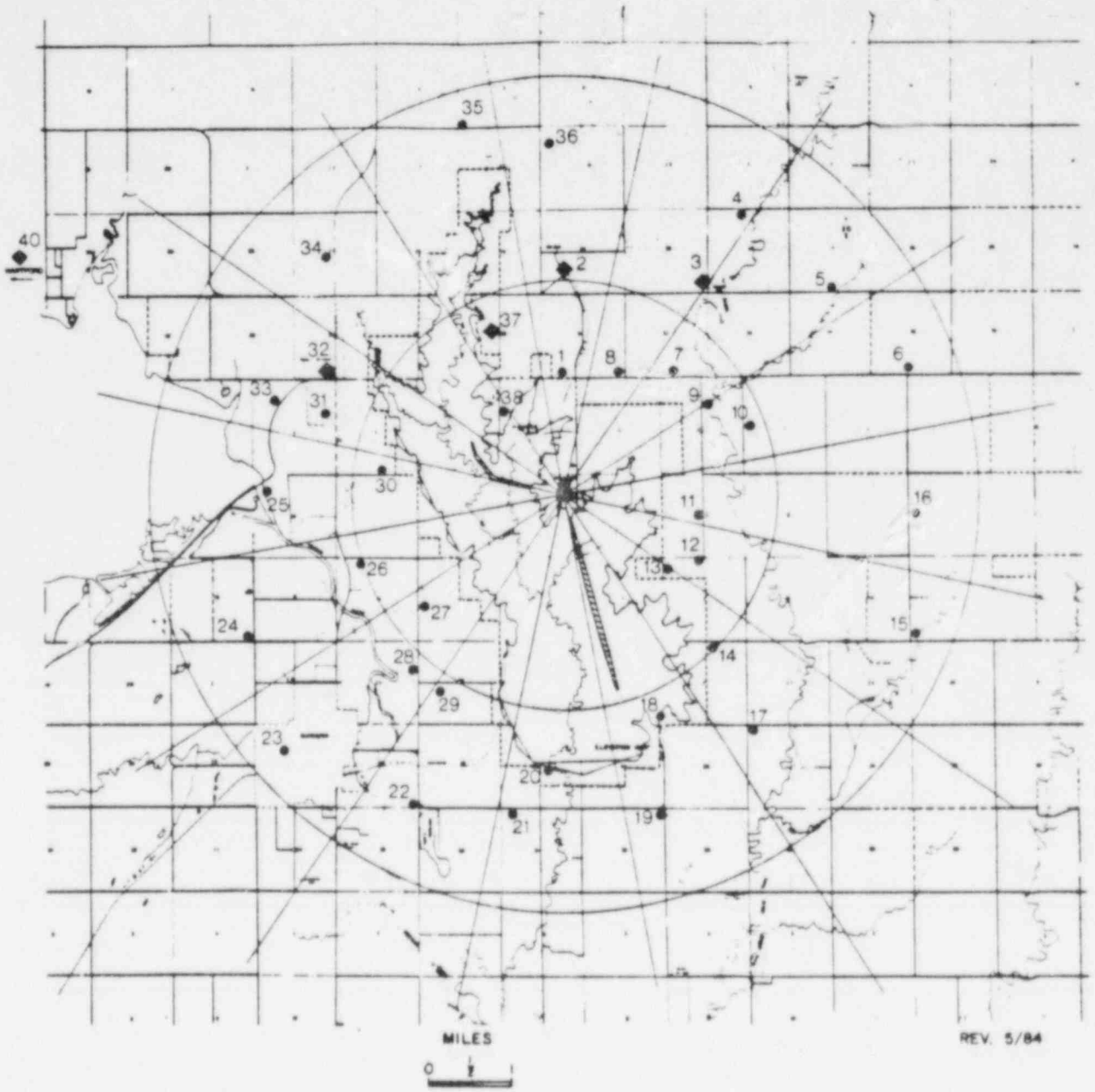
_____ _____

Radiological Assessment Supervisor (EOF) / Onsite Survey Team Director (OSC) — Date

ATTACHMENT 2.0
PRE-DETERMINED EMERGENCY SAMPLING LOCATIONS



ATTACHMENT 3.0
ENVIRONMENTAL TLD AND AIR SAMPLING LOCATIONS



ATMOSPHERIC SAMPLING

• - TLD

◆ - PARTICULATE IODINE AND TLD

FORM EP 8.1-3 REV. 0

Instrument	Dose Rate	Count Rate	Air Sampler
Serial Number			
Calibration Date			
Efficiency			

Date: _____
Team Designation _____

Dose Rate Beta Correction Factor _____

Sample		Dose Rate (Window)		Air Sample Data													Comments
				Time		Flow Rate		Vol.	Particulate				Iodine				
Time	Loc#	mr/Hr OPEN	mr/Hr CLOSED	ON	OFF	ON	OFF	Ft^3	CPM Bkgd	CPM Gross	CPM NET	uCi/cc ACTIVITY	CPM Bkgd	CPM Gross	CPM NET	uCi/cc ACTIVITY	Note any environmental samples taken and misc. information

PARTICULATE ACTIVITY CALCULATION

$$\frac{(\text{Gross CPM}) - (\text{Bkgd CPM})}{*(6.04 \text{ E x } 09)(\text{VOL } FT^3)} = \frac{\text{NCPM}}{*(6.04 \text{ E x } 09)(\text{VOL } FT^3)} = \text{Activity in uCi/cc}$$

IODINE ACTIVITY CALCULATION

$$\frac{(\text{Gross CPM}) - (\text{Bkgd CPM})}{*(6.04 \text{ E x } 07)(\text{VOL } FT^3)} = \frac{\text{NCPM}}{*(6.04 \text{ E x } 07)(\text{VOL } FT^3)} = \text{Activity in uCi/cc}$$

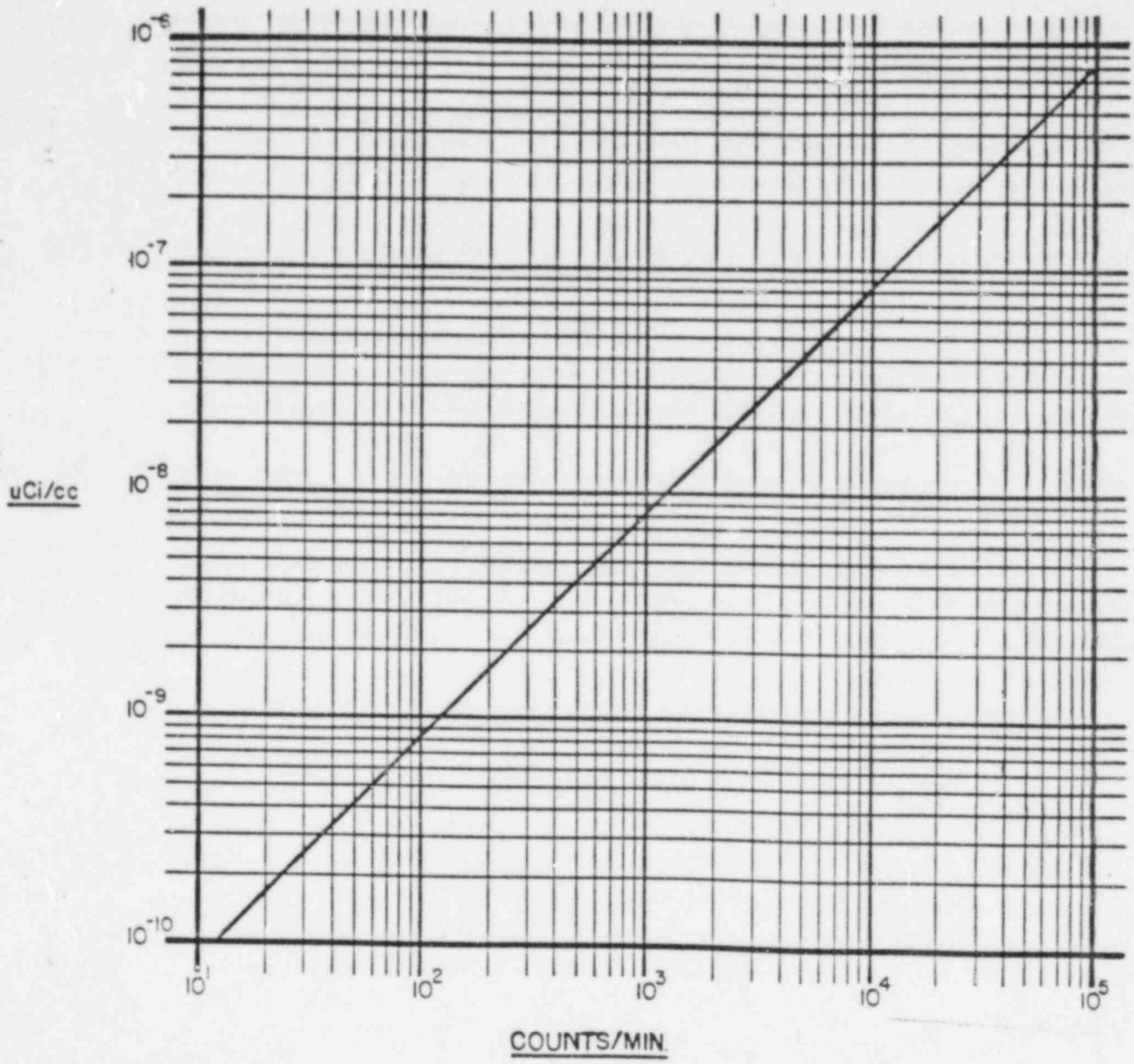
ABBREVIATIONS
Gross CPM = Gross Counts per Minute
Bkgd CPM = Background Counts per Minute
Vol. = Volume in Cubic Feet
Eff. = Efficiency
uCi = Microcuries
cc = Cubic Centimeter

Member Signatures: _____
_____
_____

NOTE: Turn in Data Sheet to Emergency Operations Facility Environmental Laboratory (Bio-Assay Laboratory at the Operations Support Center).

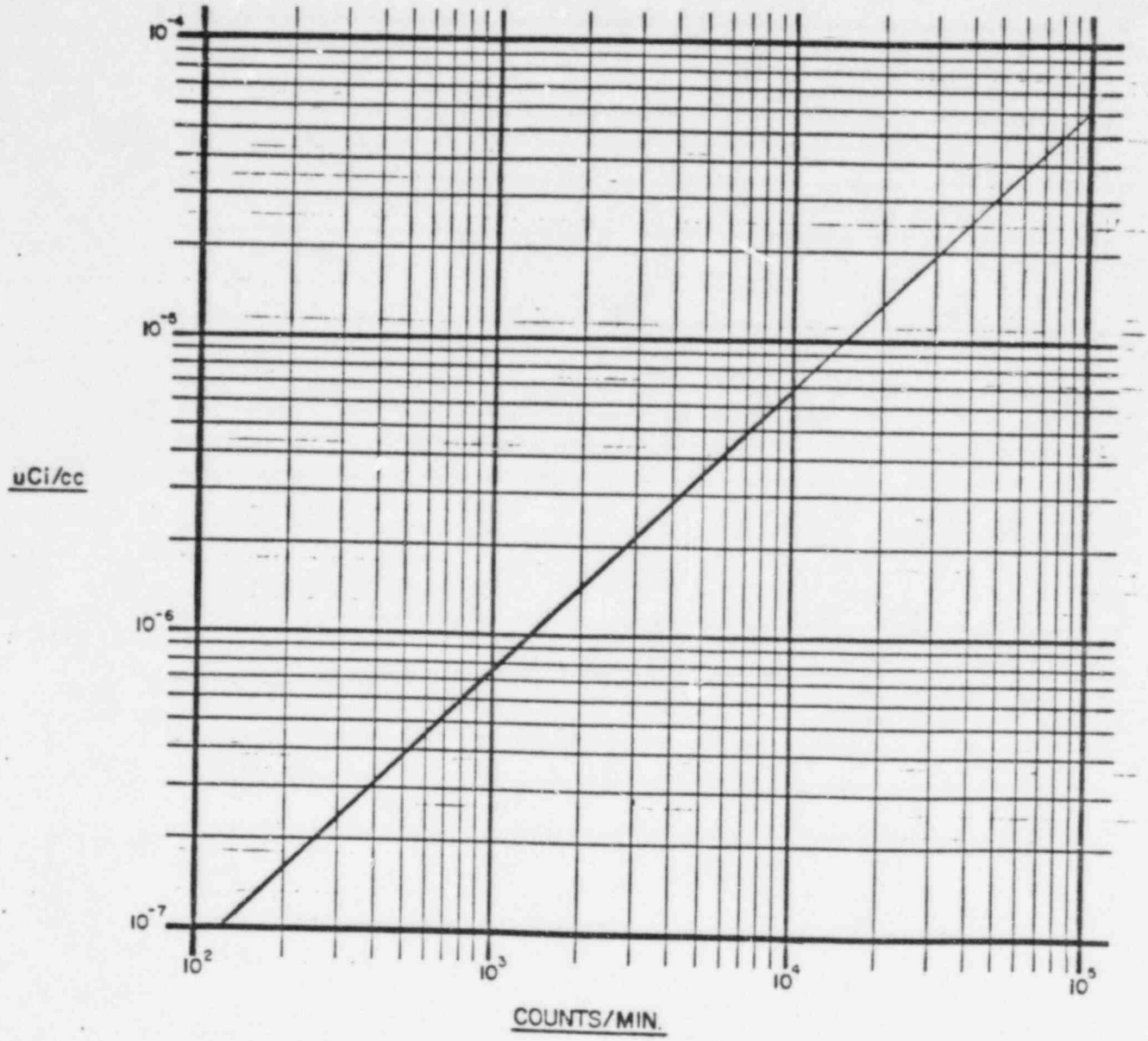
*This constant includes filter eff. and counter eff.

ATTACHMENT 5.0
PARTICULATE SAMPLER CONVERSION GRAPH



NOTE: This graph assumes a 20 Ft^3 Air Sample
Multiply uCi/cc accordingly.

ATTACHMENT 6.0
IODINE SAMPLER CONVERSION GRAPH



NOTE: This graph assumes a 20 Ft^3 Air Sample
Multiply uCi/cc accordingly.

FORM EP 8.2-7 REV. 0

ATTACHMENT 7.0
FIELD MONITORING TEAM DATA

TEAM DESIGNATION: _____
TIME: _____
LOCATION: _____

5 FOOT HEIGHT DOSE RATE:	WINDOW OPEN	_____	mr/hr.
	WINDOW CLOSED	_____	mr/hr.
SILVER ZEOLITE CARTRIDGE COUNT RATE		_____	cpm
PARTICULATE FILTER COUNT RATE		_____	cpm
GROSS IODINE ACTIVITY		_____	uCi/cc
GROSS PARTICULATE ACTIVITY		_____	uCi/cc
GROUND DEPOSITION		_____	uCi/m^2 or cpm

PERFORM SOIL SAMPLE (Y/N)

PERFORM SNOW SAMPLE (Y/N)

PERFORM LIQUID SAMPLE (Y/N)

SAMPLE SHIELDED (Y/N)

TRANSPORT SAMPLES TO EOF (Y/N)

SELF READING POCKET DOSIMETER READING _____ mr

RECEIVED BY: _____

FORM EP 8.2-8 REV. 0

ATTACHMENT 8.0
FIELD TEAM MESSAGE FORM

TIME _____ TEAM(S) _____

INSTRUCTIONS: _____

_____

_____

_____

_____

_____

_____

****

TIME COMMUNICATED _____ MESSAGE REPEATED BACK ____ YES ____ NO

EOF/TSC FIELD TEAM COMMUNICATOR _____

****

REPLY: _____

_____

_____

_____

_____

_____

_____

TIME RECEIVED _____ MESSAGE REPEATED BACK ____ YES ____ NO

RETURN TO DAC/RAS

KANSAS GAS AND ELECTRIC COMPANY
WOLF CREEK GENERATING STATION

RADIOLOGICAL EMERGENCY RESPONSE PLAN IMPLEMENTING PROCEDURE

JOINT RADIOLOGICAL MONITORING TEAM

FORMATION AND OPERATION

EPP 01-8.3

Revision 1

Kevin J. Moles — EMERGENCY PLANNING COORDINATOR REVIEW — DATE 2/18/86

Stan Devena — EMERGENCY PLANNING ADMINISTRATOR REVIEW — DATE 2-18-86

J Zell — PSRC APPROVAL RECOMMENDATION — DATE 2/25/86

Glenn L Koester — V.P. NUCLEAR APPROVAL — DATE 2/27/86

RELEASED DC44 — DATE 2-28-86

1.0 PURPOSE

The purpose of this procedure is to provide guidance for the formation, deployment and operation of Joint Radiological Monitoring Teams (JRMTs) in the event of a radiological emergency at the Wolf Creek Generating Station (WCGS).

2.0 APPLICABILITY

This procedure applies to all personnel assigned to the JRMTs and those personnel responsible for providing the direction of these teams. This procedure shall be utilized for team formation after the activation of the Emergency Operations Facility (EOF).

3.0 DEFINITIONS

3.1 JOINT RADIOLOGICAL MONITORING TEAMS (JRMTs)

The JRMTs are offsite radiological monitoring teams comprised of one member from Kansas Gas and Electric Company (KG&E), and one member from the State of Kansas and/or Coffey County.

3.2 EMERGENCY RESPONSE FACILITY (ERF)

Emergency Response Facilities are those emergency facilities at which members of the JRMTs will receive direction during the formation and deployment of teams. These facilities will be the EOF, State Forward Staging Area, Coffey County Emergency Operations Center (County EOC), or other locations as directed.

3.3 PRE-DETERMINED EMERGENCY SAMPLING LOCATIONS

Those offsite monitoring locations , as identified in Attachment 2.0, used for consistency in offsite monitoring as agreed to by KG&E, Coffey County, and the State of Kansas.

3.4 OFFSITE

Offsite is that area cutside the WCGS owner-controlled area for purposes of this procedure.

4.0 INSTRUCTIONS

4.1 PRECAUTIONS

4.1.1 Each JRMT shall be composed of at least two (2) individuals, of which, at least one (1) individual is a KG&E Health Physics Technician, trained in offsite monitoring.

4.1.2 All offsite monitoring activities shall be conducted such that exposures are maintained as low as reasonably achievable (ALARA).

4.1.3 Each JRMT shall keep a dose rate or count rate monitoring instrument on at all times to detect unexpected or excessive exposure from the plume while performing radiological monitoring activities.

4.1.4 JRMT personnel shall don protective clothing and respirators as directed by the Radiological Assessment Supervisor (RAS) or as appropriate to minimize skin contamination and internal exposure.

4.1.5 The KG&E and State of Kansas radiological assessment managers at the EOF should consider the use of Potassium Iodide (KI) tablets, in accordance with applicable procedures and EPP 01-9.3, "Radioprotective Drugs", in the event that high levels of radioiodine are actual or imminent.

4.1.6 KG&E JRMT personnel shall not exceed 10CFR, part 20 exposure limits without approval from the Duty Emergency Manager (DEM). State of Kansas and Coffey County monitoring team personnel exposure shall be authorized by State of Kansas radiological assessment management.

4.1.7 JRMT personnel shall assure that all transmissions of data are clear and concise.

4.1.8 JRMT personnel shall use Operations radios on Channel 4 or equivalent State frequency as the primary method of communication while dispatched and public telephone as a back-up. Utilize the following number in case of a loss of communication.

Radiological Assessment Supervisor (EOF)
PH.# 364-8831 EXT-391

4.2 INITIAL ACTIONS

4.2.1 The formation and deployment of JRMT shall be accomplished from the EOF upon activation or as directed by the Radiological Assessment Supervisor (RAS).

4.2.2 The JRMT shall consist of at least two members, one of which shall be a KG&E Health Physics Technician who will act as Team Leader.

4.2.3 JRMT personnel will be assigned an emergency response vehicle if available. In cases where no vehicle is available, personal vehicles may be used to transport team members.

4.2.4 The RAS shall perform the following:

4.2.4.1 Direct State and County personnel to assume JRMT responsibilities upon arrival to the EOF or designated location.

NOTE: Obtain JRMT State member assignments from State RAM, then inform EOFC of the assignments.

4.2.4.2 Assure a briefing is conducted by the EOF Coordinator (EOFC) prior to team dispatch.

4.2.4.3 Issue the JRMT communication identification as required.

4.2.4.4 Assure the completion of the Attachment 1.0, "Joint Radiological Monitoring Team Checklist," Form EP 8.3-1.

4.2.4.5 Direct the EOFC to coordinate the formation and dispatch of the JRMT.

NOTE: A minimum of four monitoring teams composed of any combination of Offsite Monitoring Teams and/or JRMT shall be organized as soon as practicable whenever a radiological release is imminent or is in progress.

4.2.4.6 Brief the EOFC, as appropriate.

4.2.4.7 Direct the JRMTs through the Field Team Communicator once prepared.

4.2.4.8 Provide the State of Kansas Radiological Assessment Manager (SRAM) and Coffey County Radiological Officer with JRMT assignments and operational status.

4.2.5 The EOFC shall perform the following:

4.2.5.1 Conduct a briefing prior to JRMT dispatch on the following items as applicable:

4.2.5.1.1 Magnitude and composition of any actual or potential radiological releases to the environment.

4.2.5.1.2 The source of leakage and the release rate.

4.2.5.1.3 Composition of the release (noble gas, radioiodine, or particulate).

4.2.5.1.4 Expected duration of release.

4.2.5.1.5 Projected or measured offsite dose rates and/or airborne activity.

4.2.5.1.6 Current and projected meteorological conditions (wind speed, wind direction).

4.2.5.1.7 Location to join WCGS Offsite Monitoring Teams if applicable.

4.2.5.2 Complete Attachment 1.0, prior to dispatching teams.

4.2.5.3 Issue JRMT personnel proper personnel monitoring devices and record such information on Forms EP 9.1-2, "Emergency Exposure Authorization" and EP 9.1-3, "New TLD Dosimetry Issue Log."

4.2.5.4 Assure radiological monitoring equipment operability.

4.2.5.5 Assure adequate JRMT personnel exposure limits are implemented by the State RAM.

4.2.5.6 Submit completed Attachment 1.0 to the RAS.

4.2.5.7 Notify RAS that JRMTs are ready to be dispatched.

4.2.5.8 Perform EOF habitability checks every 30 minutes unless instructed otherwise by the RAS.

4.2.6 The EOF Field Team Communicator shall perform the following:

4.2.6.1 Verify communication identification when the JRMT establishes radio communications with the EOF.

4.2.6.2 Notify the RAS when the JRMT are ready to depart.

4.2.7 The JRMT shall perform the following:

4.2.7.1 Request an emergency kit from the EOFC and perform an inventory check against the inventory list provided in the kit.

NOTE: An inventory of the kit's contents is only required if the kit seal has been broken.

4.2.7.2 Perform the required operability checks on the equipment contained within the emergency kit.

NOTE: If inoperable instruments are discovered, backup instrumentation and/or batteries are available in the emergency locker.

4.2.7.3 If available, obtain the keys to the assigned radiological emergency response vehicle from the EOFC and assure that the vehicle is fueled and properly equipped prior to dispatch.

NOTE: If no KG&E emergency response vehicle is available, the use of personal vehicles may be authorized.

4.2.7.4 Obtain appropriate dosimetry and respiratory protection devices from the EOFC. As a minimum, JRMT personnel shall wear a thermoluminescent dosimeter (TLD), low range and high range direct reading pencil dosimeters.

NOTE: Two extra respirators should be taken for JRMT members.

4.2.7.4.1 Assure the EOFC records the serial numbers and initial readings of the dosimetry devices for each JRMT member on Form EP 9.1-4, "Emergency Dosimeter Log," located in the Emergency Dosimeter Log Book in the emergency locker.

4.2.7.5 Establish and maintain radio communications with the EOF Field Team Communicator.

4.2.7.6 Complete applicable parts of the Attachment 1.0, and submit it to the EOFC for approval to depart.

4.2.7.7 Attend a briefing by the EOFC regarding the emergency conditions and monitoring objectives.

NOTE: If circumstances warrant, JRMTs may be formed and/or dispatched at locations other than the EOF.

4.3 SUBSEQUENT ACTIONS

4.3.1 The RAS shall perform the following:

4.3.1.1 In coordination with offsite agency radiological managers assess the need for JRMT personnel to utilize Potassium Iodide (KI) based on a thyroid dose determination in accordance with EPP 01-9.3, "Radioprotective Drugs" or applicable procedures.

4.3.1.2 Review incoming field data, Attachment 4.0.

4.3.1.3 Assure that the Dose Assessment Supervisor (DAS) receives the information on Attachment 4.0.

4.3.1.4 Direct the updating of status boards through the EOF Radiological Status Recorder.

4.3.1.5 Attachment 8.0, "Field Team Message Form," Form EP 8.2-8, may be utilized for instructions given to the field teams.

4.3.1.6 Coordinate establishment of new or relief JRMTs.

4.3.1.7 Forward completed copies of Attachment 4.0 to the DAS for retention and further processing.

4.3.1.8 Forward completed copies of Attachment 1.0 to the RAM for retention and further processing.

4.3.2 The EOFC shall:

4.3.2.1 Distribute appropriate dosimetry and respiratory protection devices to the JRMT personnel.

4.3.2.2 Record the serial numbers of the dosimetry devices and initial readings of the pencil dosimeters before issuing to JRMT personnel.

4.3.2.3 Assure the proper documentation of all incoming field samples at the EOF Environmental Laboratory.

4.3.2.4 Document and prepare for shipment all radiological monitoring samples.

4.3.2.5 Establish radiological ingress/egress points for returning JRMTs and incoming personnel.

4.3.2.6 Obtain dosimeters from returning JRMTs and record results as applicable

4.3.3 The EOF Field Team Communicator shall perform the following:

4.3.3.1 Communicate all directions from the RAS to the proper JRMT.

4.3.3.2 The EOF Field Team Communicator should use Attachment 7.0, "Field Monitoring Team Data," Form EP 8.2-7, to track JRMT status locations.

4.3.3.3 Record communicated data from the JRMT on Attachment 4.0, verify calculations and submit the information to the RAS for approval.

4.3.4 The JRMT shall perform the following:

4.3.4.1 Advise the EOF Field Team Communicator of the Plume location and movements.

4.3.4.2 Proceed, as directed, to offsite monitoring locations by referencing Attachment 2.0, or Attachment 3.0.

4.3.4.3 Observe count rate and/or dose rate monitoring instrumentation while enroute to monitoring locations or when directed to conduct plume traverse/plume tracking activities as follows:

a. Hold the detector of the monitoring instrumentation inside the vehicle and above the lap. The vehicle windows should be open.

b. Upon observing a count rate or dose rate above normal background, notify the EOF Field Team Communicator of the location.

NOTE: Because of its greater sensitivity as a detector of beta/gamma radiation relative to a dose rate instrument, the count rate instrument will provide the first indication of encountering radiation from a plume.

c. Conduct further plume traverse/tracking only as directed by the EOF Field Team Communicator. If traverse/tracking instructions are requested, the JRMT shall, to the best of their ability, identify and transmit the location of the maximum readings noted, as well as, plume boundaries.

NOTE: Maintain an estimate of the time spent in the plume.

4.3.4.4 Communicate the arrival of the JRMT at the designated sampling location to the EOF Field Team Communicator

4.3.4.5 Perform, as directed, field data collection, sampling and record keeping as follows:

NOTE: It may be necessary to collect field samples and then move, after informing the EOF Field Team Communicator, to a low background area in order to estimate sample activities in the field.

4.3.4.5.1 Record all sampling locations, times, measurements and sample data on Attachment 4.0. Communicate data to the EOF Field Team Communicator as soon as possible.

4.3.4.5.2 Place all field samples in separate sample containers and label with the following information, if applicable:

- date and time
- location
- individual/field team
- type and description
- air monitor samples times (start & stop)
- air monitor samples flows (initial & final)
- radiation reading at contact

4.3.4.5.3 Dose Rate Measurement Procedure:

a. Perform dose rate measurements with the dose rate detector approximately five (5) feet above ground level.

b. Measure the dose rate with the beta shield open for a beta/gamma reading.

c. Measure the dose rate with the beta shield closed for a gamma reading.

d. Quantify the beta dose by subtracting the gamma reading from the beta/gamma reading and multiplying this result by the beta correction factor on the instrument.

NOTE: Direct contact with the plume is indicated by significant beta measurements. Conversely, the absence of beta radiation indicates exposure to "sky shine radiation," gamma radiation from plume overhead.

4.3.4.5.4 Air Sample Collection:

a. Assemble a particulate filter (coarse side out) and a silver zeolite cartridge (flow arrow pointed at sampler) in the sampling head and install the head on the sampler.

b. Place the sampler so that a representative sample may be collected. Plug the sampler into the vehicle inverter (vehicle must be running) and start the sampler noting the actual flow rate and starting time.

NOTE: Offsite air sample flow rates should be set at 2.0 cfm for 10 min., providing ALARA considerations are not exceeded. Situations where these considerations may be approached could dictate an increase in flow rate and/or reduction in sample time.

c. Allow the sampler to run for the requested time (preferably at least 10 mins.). Upon stopping the sampler, note the final flow rate and stopping time.

d. Remove the particulate filter and silver zeolite cartridge from the sampler head and determine their gross activities if requested. If dose rates are prohibitive, bag the entire air sampler and move to a low background location.

NOTE: Before measurement, aspirate the cartridge with a 3-second draw of fresh (non-plume) air or wave vigorously in air with both ends open for 20 seconds.

4.3.4.5.5 Determination of Gross Particulate Activity

a. Measure a background count rate (CPM) using a count rate instrument with an HP-210 probe.

b. Place the filter in a planchette in the sample holder, inlet side facing up.

c. Measure the particulate filter count rate by placing an HP-210 probe in the sample holder.

d. Bag and label the particulate filter and discard the used planchette in a plastic bag.

e. Calculate gross particulate activity as follows:

PARTICULATE ACTIVITY CALCULATION

$$\frac{\text{NCPM}}{(6.04\text{E }09)\ (\text{VOL FT}^3)} = \text{Activity in uCi/cc}$$

Where:

NCPM = (Gross CPM) - (Bkgd CPM)

6.04E 09 = (28320)(2.22E 06)(Filter eff)(Counter eff)

VOL ft^3 = (Sample time, min) (Sampler flow, avg.)

NOTE: Filter efficiency is conservatively assumed to be 96% and counter efficiency is 10%.

Attachment 5.0, "Particulate Sampler Conversion Graph," may be utilized to verify calculations, or in the event of calculator failure. If calculator fails, notify the EOF.

4.3.4.5.6 Determination of Gross Iodine Activity:

a. Determine a background count (Bkgd CPM) rate using a count rate instrument with a HP-210 probe.

b. Aspirate cartridge according to Note in 4.3.4.5.4.d

c. Bag and label the silver zeolite cartridge.

d. Measure the silver zeclite cartridge count rate by placing an HP-210 probe directly at contact to the inlet side of the cartridge.

e. Calculate gross iodine activity as follows:

IODINE ACTIVITY CALCULATION

$$\frac{\text{NCPM}}{*(6.04\text{E }07)\ (\text{VOL FT}^3)} = \text{Activity in uCi/cc}$$

Where:

NCPM = (Gross CPM) - (Bkgd CPM)

6.04E 07 = (28320)(2.22E 06)(Filter eff)(Counter eff)

VOL ft^3 = (Sample time, min) (Sampler flow, avg.)

NOTE: Filter efficiency is conservatively assumed to be 96% and counter efficiency is 0.1%.

Attachment 6.0, "Iodine Sampler Conversion Graph," may be utilized to verify calculations, or in the event of calculator failure. If calculator fails, notify the EOF.

4.3.4.5.7 Ground Deposition Survey (direct scan):

NOTE: Ground measurements should be made in an undisturbed, open area away from vehicles, buildings, roads, evacuated areas, or piled gravel or soil. Care should be exercised to prevent puncture of the mylar window and/or contamination of the probe.

a. Determine the background count rate (Bkgd CPM) using a count rate instrument with an HP-210 probe at approximately three (3) feet above ground level.

b. Determine a gross count rate at approximately two (2) inches above ground level.

c. Determine the net ground count rate by subtracting the background count rate from the gross ground count rate.

d. Record results in the Comments Section of Attachment 4.0.

4.3.4.5.8 Ground Deposition Survey (smear):

NOTE: The area to be swiped should be a flat, smooth surface (e.g., a car hood other than that of the team vehicle), using care not to shake off the collected material.

a. Swipe a 100cm^2 area using a smear pad.

b. Measure the background count rate using a count rate instrument with an HP-210 probe.

c. Place the smear in a planchette in the sample holder.

d. Measure the gross count rate by placing an HP-210 probe in the sample holder.

e. Bag and label the smear pad.

f. Determine the net smearable contamination (NCPM) by subtracting the background count rate (Bkgd CPM) from the gross count rate (Gross CPM).

g. Calculate the smearable contamination in uCi/m^2 as follows:

$$uCi/m^2 = \frac{NCPM}{2.2E03}$$

Where:

NCPM = (Gross CPM) - (Bkgd CPM)

2.2E03 includes detector efficiency, area correction and dpm/uCi conversion factor.

h. Record the results in terms of uCi/m^2 in the comments Section of Form EP 8.1-3 and on the sample label.

4.3.4.5.9 Soil Sample Collection:

NOTE: Soil samples should be obtained in areas free of any vegetation.

a. Wearing gloves, remove approximately the top 1/2 inch of soil from a 1 m^2 area using a trowel.

b. Bag and label the soil sample.

4.3.4.5.10 Vegetation Sample Collection:

a. Wearing gloves, cut vegetation growth down to approximately 1 inch from ground level in a 1 m^2 area.

b. Bag and label the vegetation sample.

4.3.4.5.11 Snow Sample Collection:

NOTE: Snow samples should be collected in areas free from vegetation, buildings, etc.

a. Wearing gloves, collect approximately the top 3 inches of snow in a 1 m^2 area.

b. Bag and label the snow sample in double plastic bag.

c. Once melted transfer the snow sample to a labeled sample bottle.

4.3.4.5.12 Liquid Sample Collection:

NOTE: Sources of water to be sampled should normally be undisturbed, stagnant bodies, such as ponds or cattle troughs.

a. Wearing gloves, immerse a one liter bottle in water source until full. Avoid getting potentially contaminated water on the skin.

b. Place the liquid sample bottle in a plastic bag and label.

4.3.4.5.13 Determination of Thyroid Dose Equivalent

a. Determine the radioiodine concentration, uCi/cc.

b. Determine the time spent in the plume.

NOTE: A uniform iodine concentration is assumed for exposure in all areas of the plume. Therefore, if the radioiodine concentration is from a centerline air sample the results will be conservative.

c. Calculate the thyroid dose equivalent as follows:

Radioiodine Concentration (uCi/cc)		Dose Factor (REM/uCi)		Breathing Rate (cc/hr)		Exposure duration (hours)		Thyroid Dose Equivalent (REM)
_____	X	1.5	X	1.2E+06	x	_____	=	_____

d. Report the results back to the EOF as soon as possible.

Determination of MPC hours.

a. Determine radioiodine concentration.

b. Determine the time spent in the plume.

c. Calculate the MPC hours as follows if no respirator is used.

Radioiodine Concentration (uCi/cc)		Exposure Duration (hours)		MPC Factor (uCi/cc/MPC)		MPC hours
_____	X	_____	divided by	9. E-09	=	_____

d. Report the results back to the EOF as soon as possible.

NOTE: The administrative action level is 40 MPC hours in one week. If you suspect exceeding this limit notify the EOF.

4.3.4.6 Communicate to the EOF Field Team Communicator that sampling is completed and request further instructions.

NOTE: JRMT shall move to an area away from direct plume exposure during periods when radiological monitoring activities are not being conducted.

4.3.4.7 Upon completion of all offsite radiological monitoring activities or as directed by the RAS the following shall be performed:

4.3.4.7.1 Submit all field samples collected and corresponding data sheets to the EOFC for documentation and retention or further analysis.

NOTE: Samples that have significant activity should be placed in a shielded area to reduce personnel exposures and radiation fields.

4.3.4.7.2 The EOFC should complete a "Radiological Sample Inventory Log," Form EP 11.3-2 for offsite samples. Completed inventory logs should be routed to the RAS.

4.3.4.7.3 Enter final dosimetry readings on Form EP 9.1-4, "Emergency Dosimeter Log," for each JRMT member.

5.0 REFERENCES

5.1 Wolf Creek Generating Station Radiological Emergency Response Plan

5.2 HPH 03-002, "Radiation Survey Methods"

5.3 HPH 03-003, "Airborne Radioactivity Surveys"

5.4 HPH 03-011, "Contamination Survey Methods"

5.5 EPP 01-9.1, "Exposure Control and Personnel Protection"

5.6 EPP 01-9.3, "Radioprotective Drugs"

5.7 EPP 01-11.3, "Logs and Record Keeping"

5.8 State of Kansas, Annex A, Nuclear Facilities Incidents Response Plan to Assistance R, Nuclear Emergencies of the State Disaster Emergency Plan.

5.9 Coffey County Contingency Plan for Incidents Involving Commercial Nuclear Power.

6.0 RECORDS

6.1 Form EP 8.3-1, "Joint Radiological Monitoring Team Checklist"

6.2 Form EP 8.1-3, "Radiological Monitoring Data Sheet"

6.3 Form EP 8.2-7, "Field Monitoring Team Data"

6.4 Form EP 8.2-8, "Field Team Message Form"

6.5 The records generated by this procedure during an actual emergency shall be forwarded to the Emergency Planning Coordinator (EPC) at the termination of the emergency. The EPC forwards the records to the WCGS vault for storage. These records will be retained for the life of the plant. These records shall be considered QA records.

6.6 The records generated by this procedure during drills and exercises shall be forwarded to the EPC upon termination of the drill or exercise. The EPC shall maintain these records for at least one year. These records shall be considered non-QA records.

ATTACHMENTS

7.1 Attachment 1.0, "Joint Radiological Monitoring Team Checklist"

7.2 Attachment 2.0, "Pre-Determined Emergency Sampling Locations"

7.3 Attachment 3.0, "Environmental TLD and Air Sampling Locations"

7.4 Attachment 4.0, "Radiological Monitoring Data Sheet"

7.5 Attachment 5.0, "Particulate Sampler Conversion Graph"

7.6 Attachment 6.0, "Iodine Sampler Conversion Graph"

7.7 Attachment 7.0, "Field Monitoring Team Data"

7.8 Attachment 8.0, "Field Team Message Form"

FORM EP 8.3-1 REV 1

ATTACHMENT 1.0

JOINT RADIOLOGICAL MONITORING TEAM CHECKLIST

Date/Time _____ Communication I.D. _____
Vehicle No. _____

Team Members

_____ KG&E/County/State

_____ KG&E/County/State

_____ KG&E/County/State

_____ KG&E/County/State

	Team Member Initials
Offsite monitoring kit inventory complete	____/____
Equipment operability checks complete	____/____
Offsite vehicle fueled and properly equipped	____/____
Proper dosimetry (TLD, hi - lo pencils) and respirators obtained	____/____
Initial dosimetry readings entered (Form EP 9.1-4)	____/____
Communication established and identification issued	____/____

****

Individual responsibilities assigned.	____/____
Team briefing conducted on emergency conditions and monitoring objectives.	____/____

RAS requested to inform Security that team is preparing to leave the EOF.

Comments: _____

_____

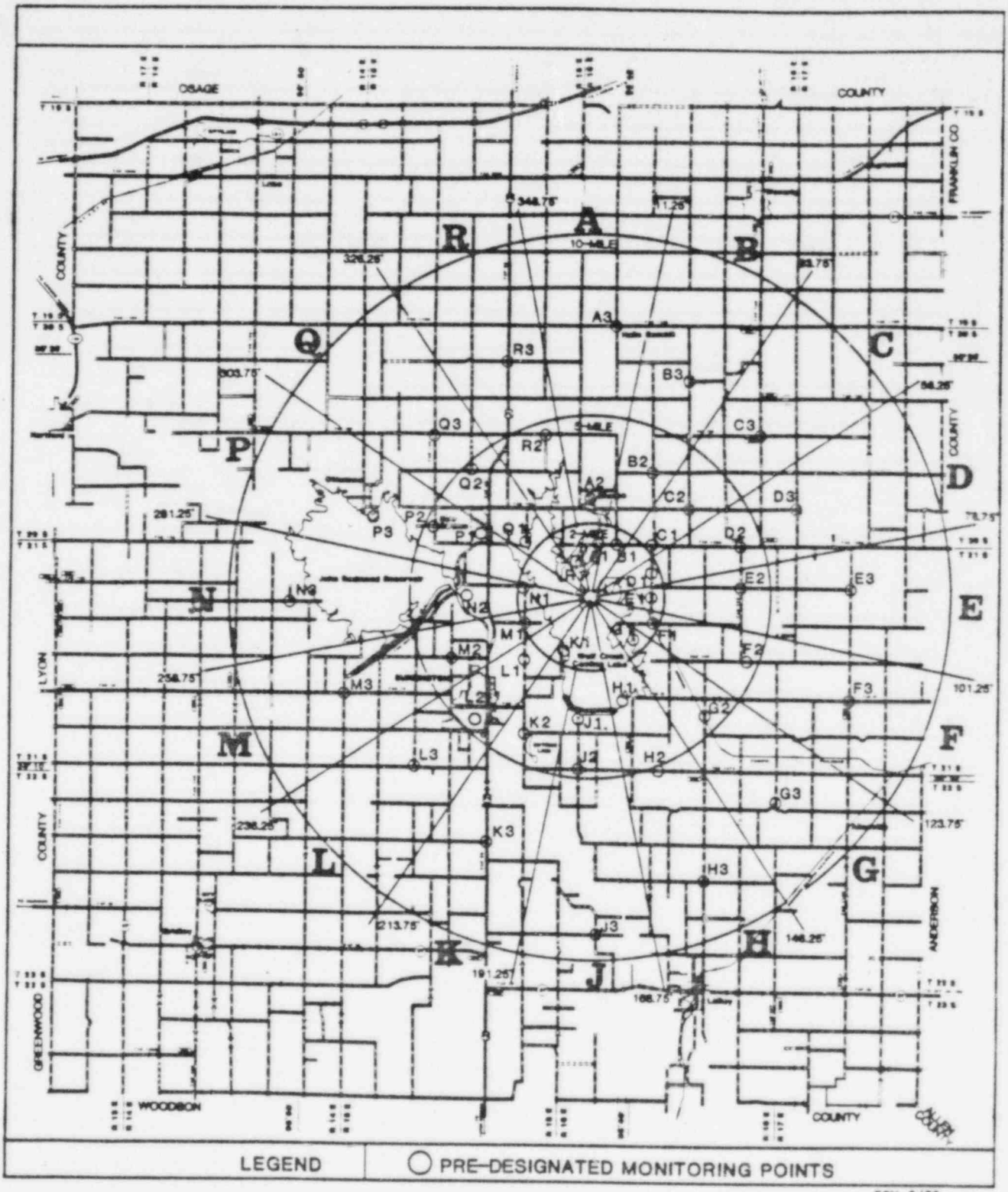
_____

_____

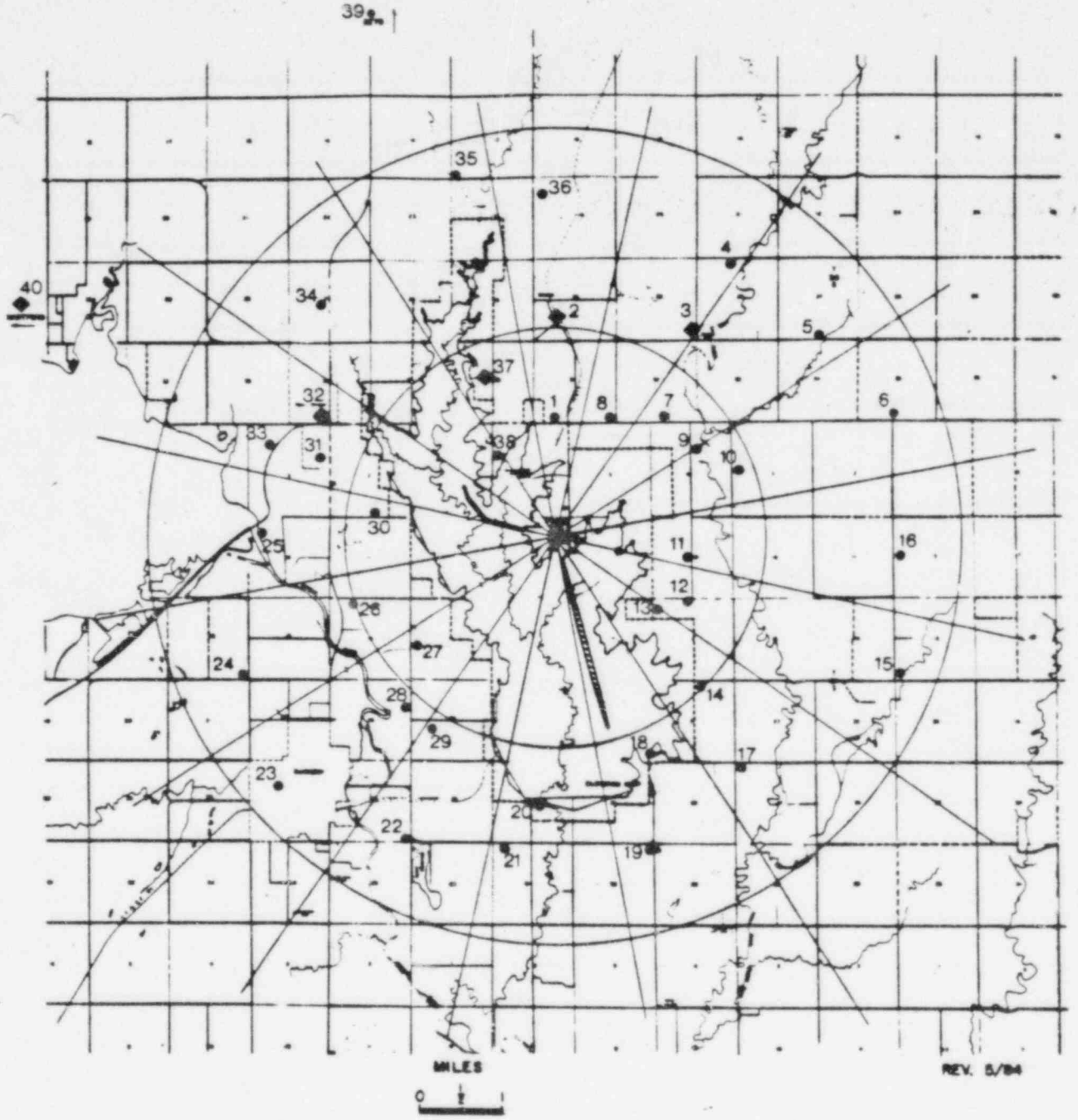
_____

_____ _____
Radiological Assessment Supervisor Date

ATTACHMENT 2.0
PRE-DETERMINED EMERGENCY SAMPLING LOCATIONS



ATTACHMENT 3.0
ENVIRONMENTAL TLD AND AIR SAMPLING LOCATIONS



ATMOSPHERIC SAMPLING

• - TLD

◆ - PARTICULATE IODINE AND TLD

FORM EP 8.1-3 REV. 0

RADIOLOGICAL MONITORING DATA SHEET

Date: _____

Team Designation _____

Instrument	Dose Rate	Count Rate	Air Sampler
Serial Number			
Calibration Date			
Efficiency			

Dose Rate Beta Correction Factor _____

Sample		Dose Rate (Window)		Air Sample Data: Time		Flow Rate		Vol.	Particulate				Iodine				Comments
Time	Loc#	mr/Hr OPEN	mr/Hr CLOSED	ON	OFF	ON	OFF	Ft^3	CPM Bkgd	CPM Gross	CPM NET	uCi/cc ACTIVITY	CPM Bkgd	CPM Gross	CPM NET	uCi/cc ACTIVITY	Note any environmental samples taken and misc. information

PARTICULATE ACTIVITY CALCULATION

$$\frac{(\text{Gross CPM}) - (\text{Bkgd CPM})}{*(6.04\ E \times 09)(\text{VOL } FT^3)} = \frac{\text{NCPM}}{*(6.04\ E \times 09)(\text{VOL } FT^3)} = \text{Activity in uCi/cc}$$

IODINE ACTIVITY CALCULATION

$$\frac{(\text{Gross CPM}) - (\text{Bkgd CPM})}{*(6.04\ E \times 07)(\text{VOL } FT^3)} = \frac{\text{NCPM}}{*(6.04\ E \times 07)(\text{VOL } FT^3)} = \text{Activity in uCi/cc}$$

ABBREVIATIONS

Gross CPM = Gross Counts per Minute
Bkgd CPM = Background Counts per Minute
Vol. = Volume in Cubic Feet
Eff. = Efficiency
uCi = Microcuries
cc = Cubic Centimeter

Member Signatures: _____

_____

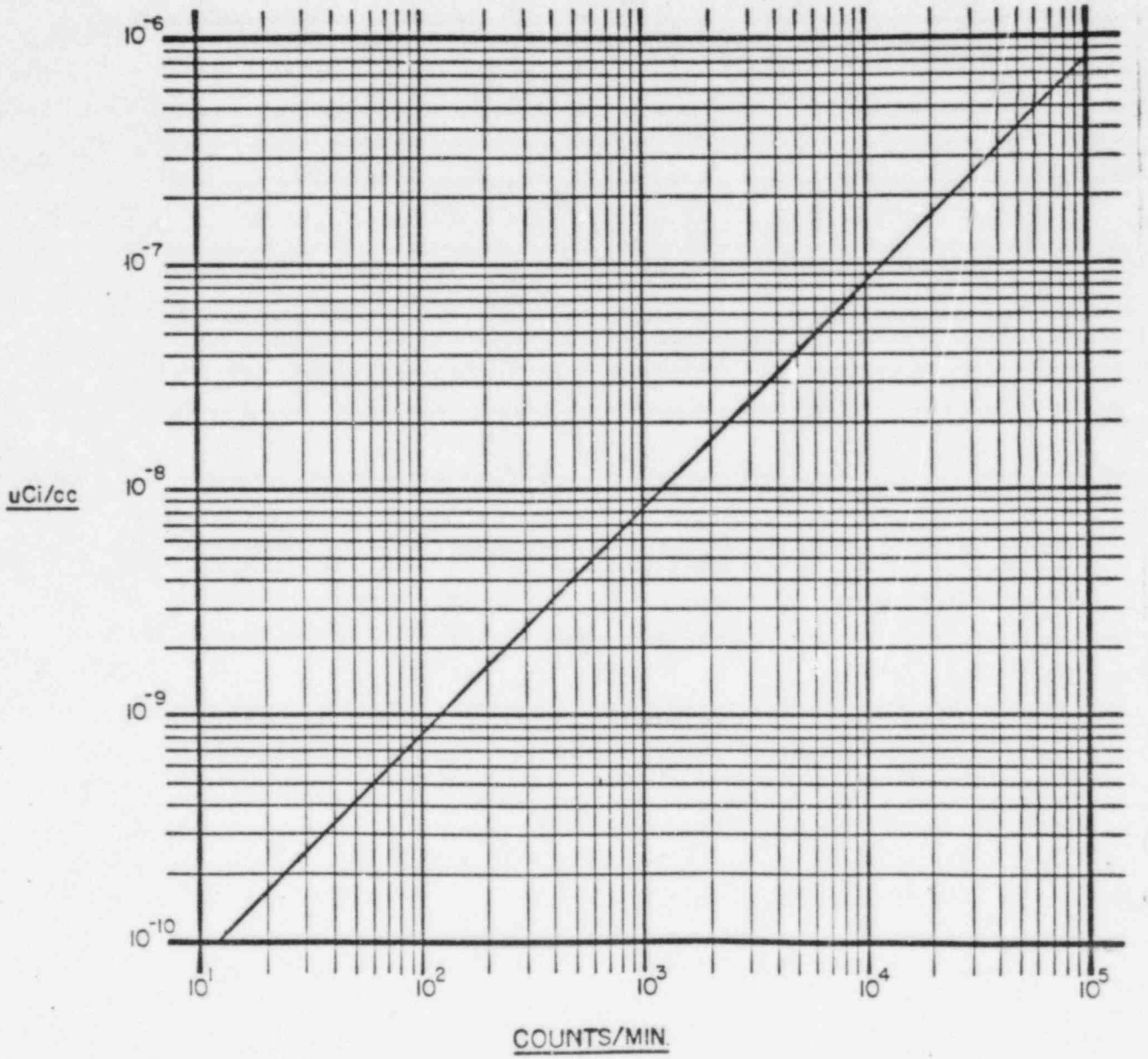
_____

NOTE: Turn in Data Sheet to Emergency Operations Facility Environmental Laboratory (Bio-Assay Laboratory at the Operations Support Center).

*This constant includes filter eff. and counter eff.

ATTACHMENT 5.0

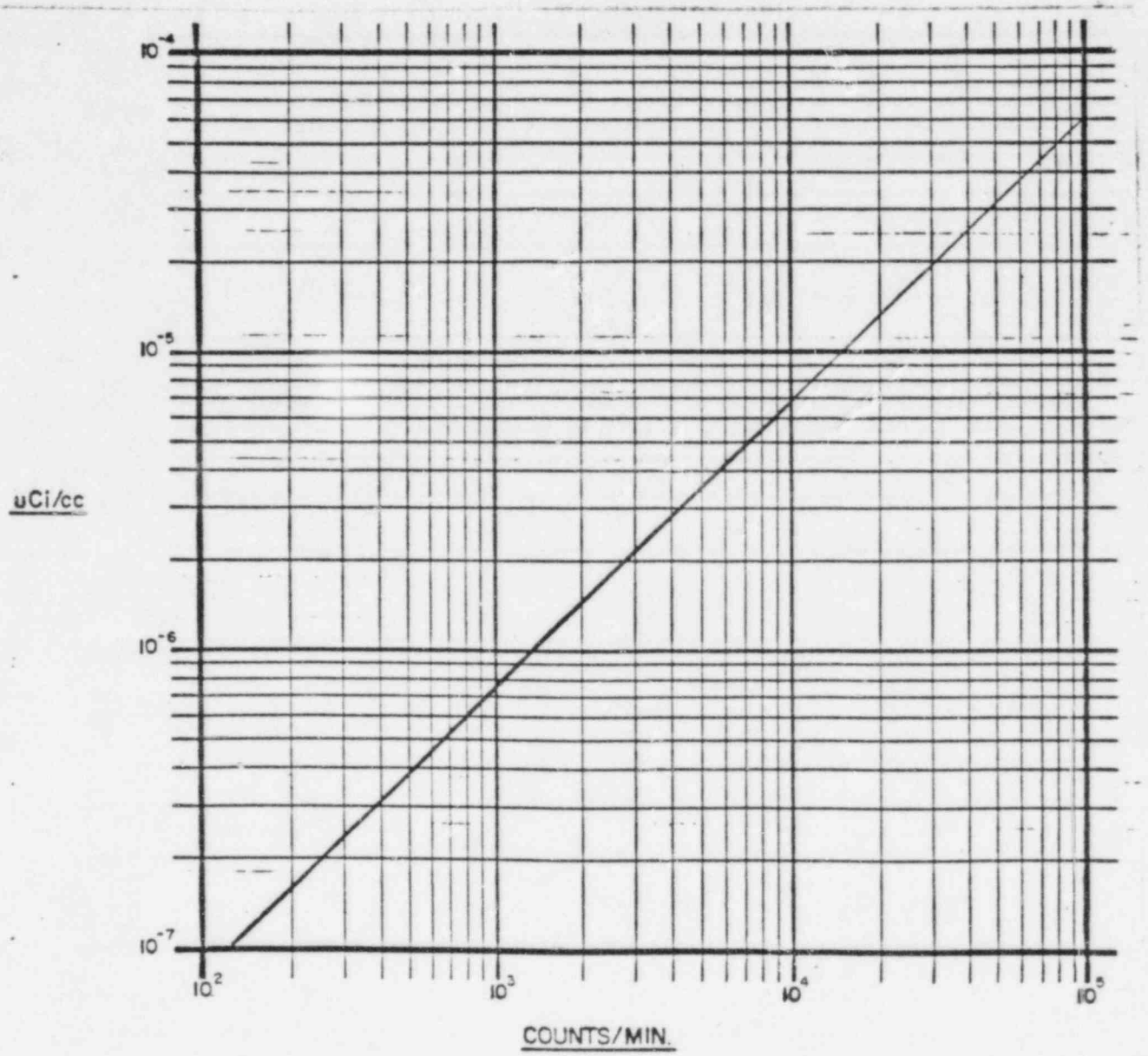
PARTICULATE SAMPLER CONVERSION GRAPH



NOTE: This graph assumes a 20 Ft^3 Air Sample
Multiply uCi/cc accordingly.

ATTACHMENT 6.0

IODINE SAMPLER CONVERSION GRAPH



NOTE: This graph assumes a 20 Ft^3 Air Sample, multiply uCi/cc accordingly.

FORM EP 8.2-7 REV 0

ATTACHMENT 7.0
FIELD MONITORING TEAM DATA

TEAM DESIGNATION: _____
TIME: _____
LOCATION: _____

5 FOOT HEIGHT DOSE RATE:	WINDOW OPEN	_____	mr/hr.
	WINDOW CLOSED	_____	mr/hr.
SILVER ZEOLITE CARTRIDGE COUNT RATE		_____	cpm
PARTICULATE FILTER COUNT RATE		_____	cpm
GROSS IODINE ACTIVITY		_____	uCi/cc
GROSS PARTICULATE ACTIVITY		_____	uCi/cc
GROUND DEPOSITION		_____	uCi/m^2 or cpm

PERFORM SOIL SAMPLE (Y/N)

PERFORM SNOW SAMPLE (Y/N)

PERFORM LIQUID SAMPLE (Y/N)

SAMPLE SHIELDED (Y/N)

TRANSPORT SAMPLES TO EOF (Y/N)

SELF READING POCKET DOSIMETER READING _____ mr

RECEIVED BY: _____

FORM EP 8.2-8 REV. 0

ATTACHMENT 8.0
FIELD TEAM MESSAGE FORM

TIME _____ TEAM(S) _____

INSTRUCTIONS: _____

_____

_____

_____

_____

_____

_____

****

TIME COMMUNICATED _____ MESSAGE REPEATED BACK ____ YES ____ NO

EOF/TSC FIELD TEAM COMMUNICATOR _____

****

REPLY: _____

_____

_____

_____

_____

_____

_____

TIME RECEIVED _____ MESSAGE REPEATED BACK ____ YES ____ NO

RETURN TO DAC/RAS