

EIP-ZZ-00216
September 27, 1983
Revision 0

CALLAWAY PLANT
EMERGENCY PLAN IMPLEMENTING PROCEDURE
EIP-ZZ-00216
POTASSIUM IODIDE ADMINISTRATION

RESP. DEPT. EMERGENCY PREPAREDNESS
EMERGENCY PREPAREDNESS PREPARED BY RICHARD GRUNDSTROM
APPROVED BY Steve E. Meltzinger DATE 9-30-83
DATE ISSUED 10-4-83

This procedure contains the following:

Pages	<u>1</u>	through	<u>9</u>
Attachments	<u>1</u>	through	<u>7</u>
Appendices	<u></u>	through	<u></u>
Checklist	<u></u>	through	<u></u>

INFORMATION ONLY
UNCONTROLLED
COPY

8401030326 831227
PDR ADOCK 05000483
F PDR

Table of Contents

<u>Section</u>	<u>Page Number</u>
1.0 Purpose and Scope	1
2.0 Responsibilities	1
3.0 Initiating Conditions	1
4.0 Procedure	2
4.1 Limits and Precautions	2
4.2 Determining the Need for Potassium Iodide	3
4.3 Distribution of Potassium Iodide	6
4.4 Follow Up Actions	7
5.0 Final Conditions	8
6.0 Records	8
7.0 References	8
8.0 Attachments	9
Attachment 1, NOMOGRAM, I-131	
Attachment 2, NOMOGRAM, I-133	
Attachment 3, NOMOGRAM, I-135	
Attachment 4, NOMOGRAM, Gross Radioiodine	
Attachment 5, Correction Factor Graph	
Attachment 6, Dose Equivalent Worksheet	
Attachment 7, Potassium Iodide Distribution Record	

POTASSIUM IODIDE ADMINISTRATION

1.0 PURPOSE AND SCOPE

The purpose of this procedure is to provide guidance to the Health Physics Coordinator in the administration of Potassium Iodide (KI), as a thyroid-radioiodine blocking agent, to emergency workers and contractors employed by Union Electric.

2.0 RESPONSIBILITIES

2.1 The Health Physics Coordinator has the following responsibilities:

2.1.1 Determining when KI is needed.

2.1.2 Authorizing the distribution of KI.

2.1.3 Ensuring KI distribution is properly documented.

2.2 Health Physics Technicians are responsible for distributing KI to emergency workers as directed by the Health Physics Coordinator.

3.0 INITIATING CONDITION

This procedure shall be implemented under either of the following conditions:

3.1 When the radioiodine concentration in air is greater than or equal to the MPC, and there is a potential for the thyroid dose equivalent due to airborne radioiodine to equal or exceed 10 Rem.

3.2 At the discretion of the Health Physics Coordinator.

4.0 PROCEDURE

4.1 Limits and Precautions

- 4.1.1 Potassium Iodide (KI) should not be taken by persons who know they are allergic to iodine.
 - 4.1.1.1 Allergic reaction could be fever and joint pains, or swelling of parts of the face and body and at times severe shortness of breath requiring immediate medical attention.
 - 4.1.1.2 Any side effects (skin rash, swelling in the facial area, running nose, diarrhea, upset stomach) associated with the following sources could indicate a possible Iodine allergy:
 - 4.1.1.2.1 Seafood (especially kelp and shellfish).
 - 4.1.1.2.2 X-ray contrast Media Studies (Kidney Studies, Intravenous Pyelogram, I.V.P.).
 - 4.1.1.2.3 Iodized Salt.
 - 4.1.1.2.4 Expectorants containing Iodine (stimulates secretion of mucus from the respiratory tract).
 - 4.1.1.2.5 Topical disinfectants containing Iodine (Tincture of Iodine).
- 4.1.2 Taking more than the recommended dose of KI may cause undesirable side effects.
 - 4.1.2.1 Possible side effects include skin rashes, swelling of the salivary glands, and "Iodism" (metallic taste, burning mouth and throat, sore teeth and gums, symptoms of a head cold, and sometimes stomach upset and diarrhea).

- 4.1.3 If severe side effects or allergic reactions occur, the person(s) should stop taking KI and a physician should be consulted for further instructions.
- 4.1.4 The dosage for emergency workers should be one tablet (130 mg) KI once a day for the duration of exposure and following the exposure for a total of 10 days.
 - 4.1.4.1 Persons should not take KI for more than 10 days without consulting a physician.
 - 4.1.4.2 Larger doses will not increase effectiveness because the thyroid can only "hold" limited amounts of iodine.
- 4.1.5 The effectiveness of KI as a thyroid - radio-iodine blocking agent is a function of time. The effectiveness of KI administration is as follows:
 - 4.1.5.1 Before or concurrently with exposure - 90% effective.
 - 4.1.5.2 3-4 hours after exposure - 50% effective.
 - 4.1.5.3 12 hours after exposure - some limited effect.
- 4.1.6 KI need only be taken by emergency workers who have been or will be exposed to radioiodine in which the thyroid could receive a dose equivalent of 10 Rem or greater.
- 4.2 DETERMINING THE NEED FOR POTASSIUM IODIDE
 - 4.2.1 KI should be administered to emergency workers when the thyroid dose equivalent is greater than or equal to 10 Rem caused by inhalation of radioiodine.
 - 4.2.2 The dose equivalent can be determined by using either nomograms and/or calculations.

- 4.2.3 Attachments 1 through 3 are nomograms which may be used to determine the thyroid dose equivalent for I-131, I-133, and I-135, respectively.
- 4.2.3.1 To use the nomograms, obtain the concentration of the appropriate radioiodine, for the nomogram, in $\mu\text{ci/cc}$ and duration time of exposure in hours.
- 4.2.3.2 Draw a straight line connecting the radioiodine concentration with the exposure time.
- 4.2.3.3 The point where the line intersects the thyroid dose equivalent line indicates the dose equivalent in Rem.
- 4.2.4 Attachment 4 is a nomogram used to determine the thyroid dose equivalent for gross radioiodine when an isotopic analysis can not be obtained.
- 4.2.4.1 Initially use the nomogram as indicated in steps 4.2.3.1, 4.2.3.2, and 4.2.3.3.
- 4.2.4.2 Using the space provided on Attachment 4, multiply the dose by the correction factor from Attachment 5, Correction Factor Graph to determine the dose to the thyroid.

NOTE The correction factor corrects for the change in the concentrations of the various radioiodines due to radioactive decay, from the time the reactor was shut down to the time of sampling.

- 4.2.4.3 The nomogram for I-131 should be used in place of the gross radioiodine nomogram if 200 hours or more have passed since reactor shutdown and an isotopic analysis is not available.

NOTE All radioiodine is assumed to be I-131 beyond 200 hours past reactor shutdown.

- 4.2.5 The thyroid dose equivalent can be calculated using Attachment 6, Dose Equivalent Worksheet.

- 4.2.5.1 The formula for calculating the dose equivalent is:

$$D_T = B T (\Sigma C DF)$$

Where D_T = Dose equivalent to the thyroid in Rem

B = Breathing rate assumed at 1.2 E6 cc/Hr.

T = Duration of exposure in hours

C = Concentration of radioiodine in air in $\mu\text{Ci/cc}$ for each radioiodine isotope. The primary nuclides of interest are I-131, I-132, I-133, I-134, and I-135.

DF = Inhalation dose factor for adults in $\text{Rem}/\mu\text{Ci}$ for each radioiodine isotope. Converted from Regulatory Guide 1.109, Revision 1, Table E-7. These are indicated on Attachment 6.

4.3 DISTRIBUTION OF POTASSIUM IODIDE

- 4.3.1 The Health Physics Coordinator, upon deciding to distribute KI, shall:
- 4.3.1.1 Direct Health Physics Technicians to issue KI tablets (130 mg) for the day of exposure and following the exposure for a total of 10 days, to each emergency worker who could receive 10 Rem to the thyroid from inhalation of radioiodine.
- 4.3.1.2 Consult a physician prior to authorizing emergency workers to take KI in excess of 10 days.
- 4.3.1.3 Consult a physician if any individual(s) has an allergic reaction or side effects.
- 4.3.1.4 Review the Potassium Iodide Distribution Record(s), Attachment 7, for completeness, correctness and the number of days individuals are taking KI.
- 4.3.2 The Health Physics Technicians shall:
- 4.3.2.1 Obtain the KI from the First Aid Room (1984' Level) and check the expiration date of each bottle prior to its distribution. KI should not be issued from bottles which are beyond their expiration date.
- 4.3.2.2 Distribute KI to emergency workers as instructed by the Health Physics Coordinator.
- 4.3.2.2.1 Each emergency worker shall be asked if they are aware of any allergies to iodine.

NOTE If individuals do not know if they are allergic to iodine, it is unlikely they are allergic to iodine.

- 4.3.2.2.2 If an individual indicates they are allergic to iodine, do not issue any KI to that individual. And consult with the Health Physics Coordinator for further instructions.
- 4.3.2.3 Record the distribution of KI for each individual on a Potassium Iodide Distribution Record, Attachment 6.
- 4.3.2.4 Forward a copy of Potassium Iodide Distribution Record(s) to the Health Physics Coordinator for his information and use.
- 4.3.2.5 Watch for individuals who may have an allergic reaction or side effects.
- 4.3.2.6 Inform the Health Physics Coordinator if any individual(s) have an allergic reaction or side effects.
- 4.4 FOLLOW-UP ACTIONS
 - 4.4.1 The Health Physics Coordinator shall:
 - 4.4.1.1 Direct a whole body/thyroid count and/or bioassay analysis to be performed on each emergency worker, exposed to radioiodine and issued KI, at the earliest opportunity.
 - 4.4.1.2 Ensure the dose from confirmed or measured deposition of radioiodine is calculated.
 - 4.4.1.3 Ensure any instructions given by a physician are carried out as appropriate.
 - 4.4.1.4 Forward the Potassium Iodide Distribution Record to the individual(s) Personnel Exposure Record File.

5.0 FINAL CONDITIONS

- 5.1 Distribution of Potassium Iodide is complete and,
- 5.2 Radioiodine air concentrations are below MPC and,
- 5.3 All follow-up actions are completed or initiated and,
- 5.4 Records are forwarded to the individual's exposure record file.

6.0 RECORDS

6.1 COMMERCIAL RECORDS

- 6.1.1 Potassium Iodide Distribution Record will be kept in individual(s) exposure record file.
- 6.1.2 Completed nomograms and/or worksheets will be forwarded to the Supervisor Emergency Preparedness for proper disposition.

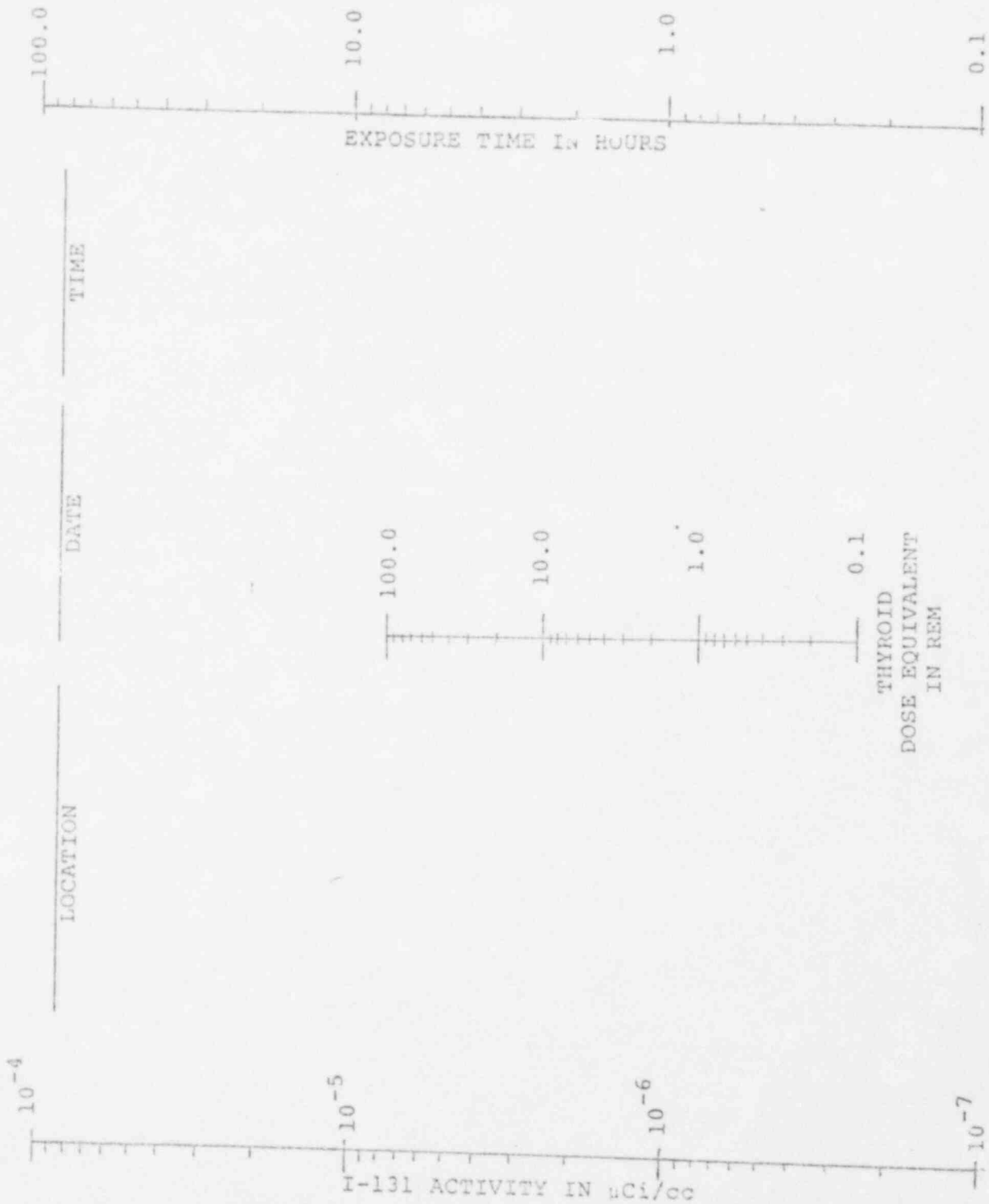
7.0 REFERENCES

- 7.1 Callaway Plant Radiological Emergency Response Plan (RERP)
- 7.2 Regulatory Guide 1.109, Revision 1

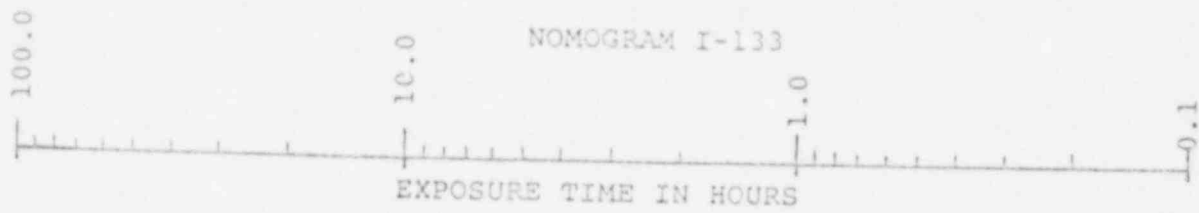
8.0 ATTACHMENTS

- 8.1 Attachment 1, NOMOGRAM, I-131
- 8.2 Attachment 2, NOMOGRAM, I-133
- 8.3 Attachment 3, NOMOGRAM, I-135
- 8.4 Attachment 4, NOMOGRAM, Gross Radioiodine
- 8.5 Attachment 5, NOMOGRAM, Correction Factor
Graph
- 8.6 Attachment 6, Dose Equivalent Worksheet
- 8.7 Attachment 7, Potassium Iodide Distribution
Record.

NOMOGRAM I-131



HEALTH PHYSICS COORDINATOR
SIGNATURE



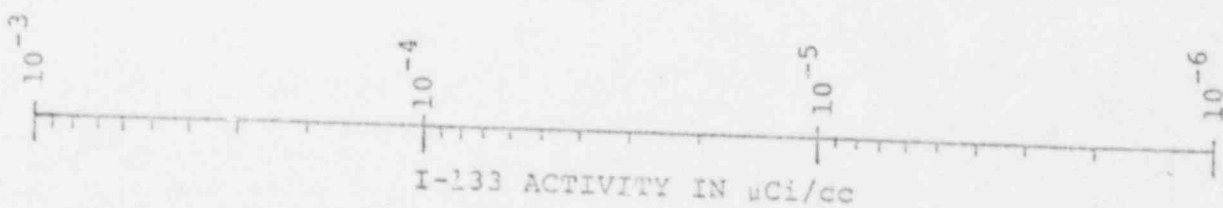
TIME

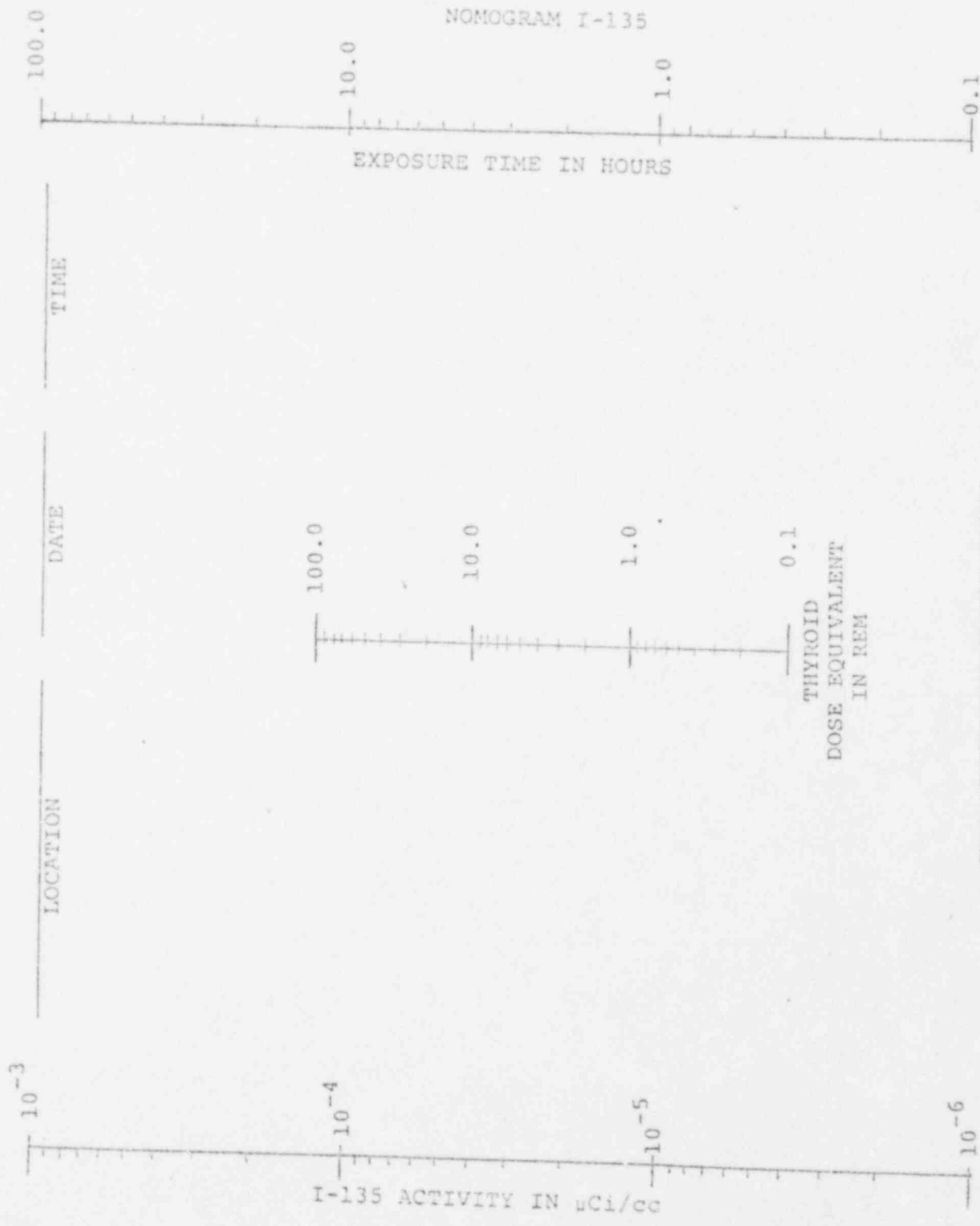
DATE

LOCATION



HEALTH PHYSICS COORDINATOR
 SIGNATURE



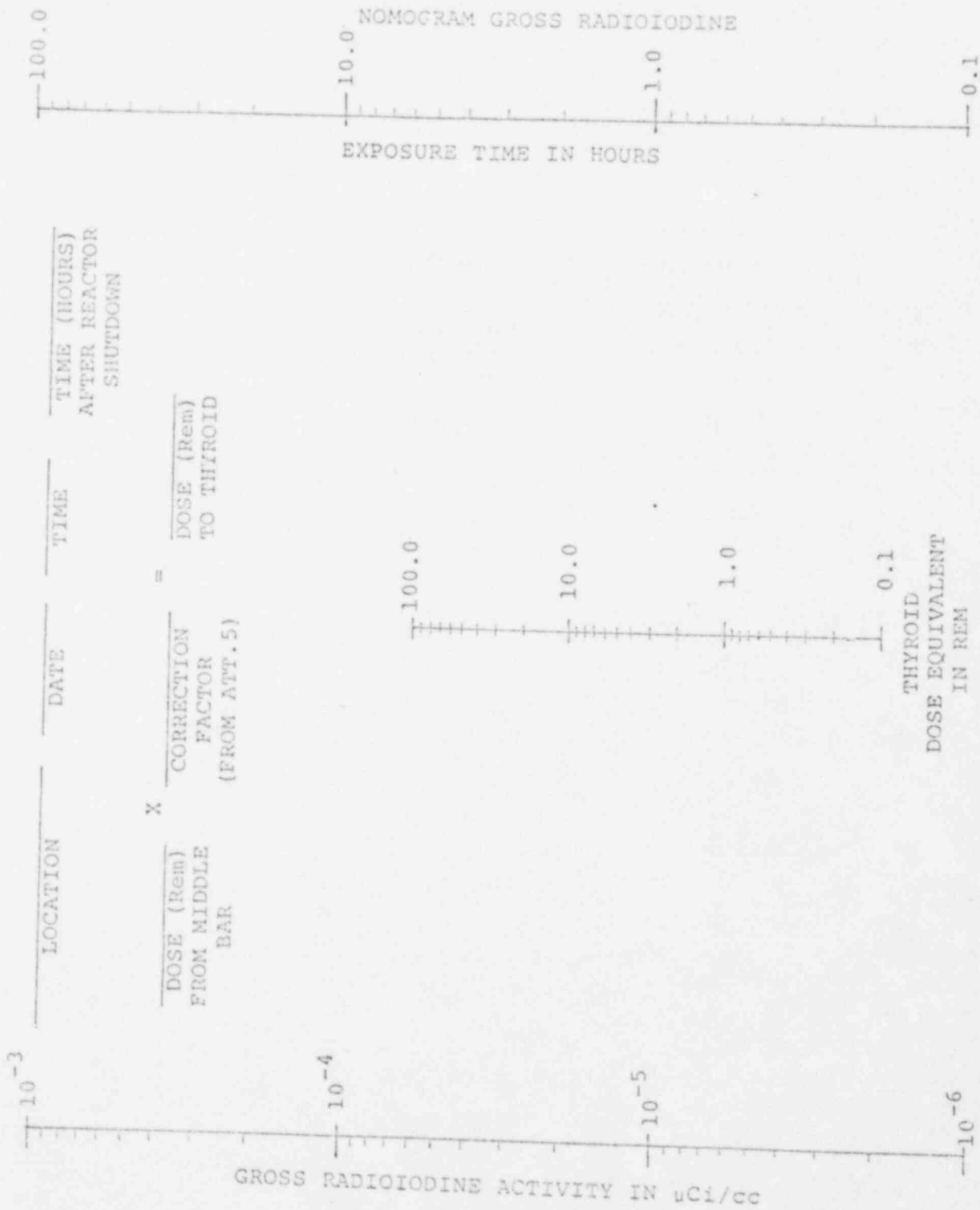


LOCATION _____

DATE _____

TIME _____

HEALTH PHYSICS COORDINATOR
SIGNATURE _____



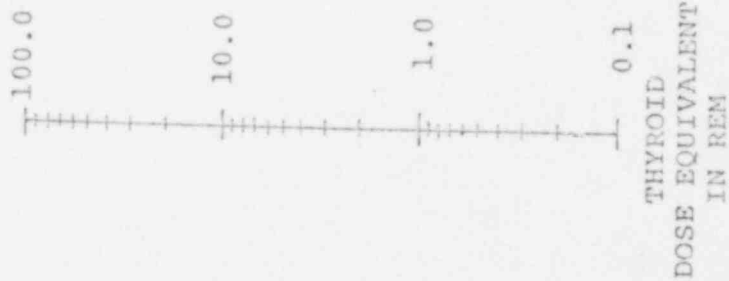
TIME (HOURS)
AFTER REACTOR
SHUTDOWN

TIME

DATE

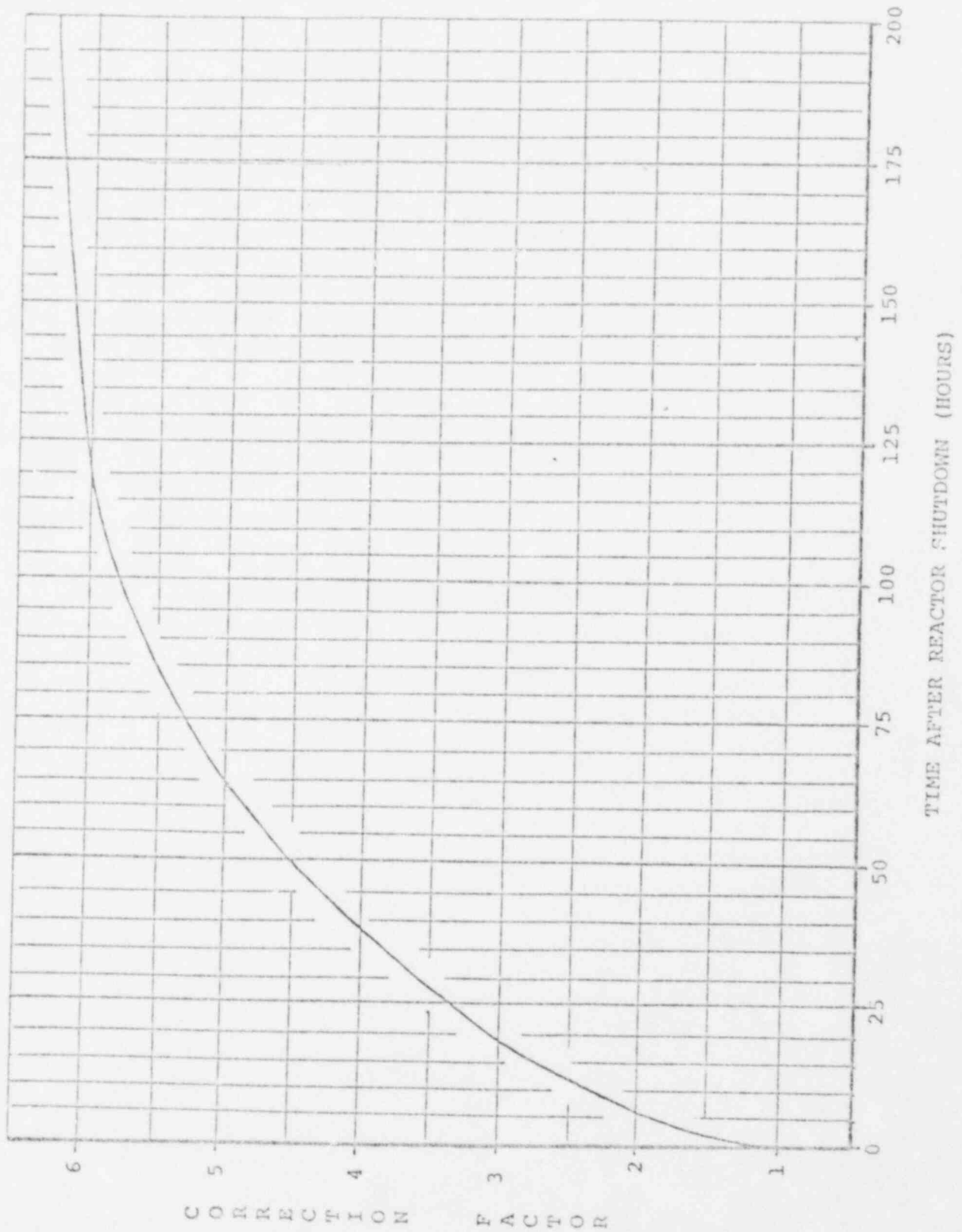
LOCATION

$$\begin{array}{c}
 \text{DOSE (Rem)} \\
 \text{FROM MIDDLE} \\
 \text{BAR}
 \end{array}
 \times
 \begin{array}{c}
 \text{CORRECTION} \\
 \text{FACTOR} \\
 \text{(FROM ATT. 5)}
 \end{array}
 =
 \begin{array}{c}
 \text{DOSE (Rem)} \\
 \text{TO THYROID}
 \end{array}$$



HEALTH PHYSICS COORDINATOR
 SIGNATURE

CORRECTION FACTOR GRAPH



DOSE EQUIVALENT WORKSHEET

LOCATION _____

DATE _____ TIME _____

IODINE ISOTOPE	DOSE FACTOR (REM/ μ Ci)	X	RADIOIODINE CONCENTRATION (μ Ci/CC)	=	REM/CC
131	1.5				
132	1.4E-2				
133	2.7E-1				
134	3.7E-3				
135	5.6E-2				

	1.2E6				SUM	=	
BREATHING RATE (CC/HR)		X	EXPOSURE DURATION (HOURS)	X	TOTAL (REM/CC)	=	THYROID DOSE EQUIVALENT

REMARKS: _____

 Health Physics Coordinator
 Signature

POTASSIUM IODIDE DISTRIBUTION RECORD

NAME _____

SOCIAL SECURITY NUMBER _____

Received one tablet (130 MG) Potassium Iodide on:

Date										
Consecutive Days	1	2	3	4	5	6	7	8	9	10
Checked for Side Effects										

Additional Days

Date										
Consecutive Days	11	12	13	14	15	16	17	18	19	20
Checked for Side Effects										

Physician consulted? Yes/No (Circle)

If yes, Physician _____
Name Date/Time

Physician's Instructions: _____

Remarks: _____

Health Physics Coordinator
Signature

EIP-ZZ-01211
September 30, 1983
Revision 0

CALLAWAY PLANT
EMERGENCY PLAN IMPLEMENTING PROCEDURE
EIP-ZZ-01211
INITIAL DOSE ASSESSMENT

RESP. DEPT. Emergency Response PREPARED BY Richard Gruvasteen
APPROVED BY Arthur E. Mutterberger DATE 10-3-83
DATE ISSUED 10-19-83

This procedure contains the following:

Pages	<u>1</u>	through	<u>7</u>
Attachments	<u>1</u>	through	<u>2</u>
Appendices	<u></u>	through	<u></u>
Checklist	<u></u>	through	<u></u>

INFORMATION ONLY
UNCONTROLLED
COPY

DEFICIENCY LIST

Section	Deficiency Description	Constraints
4.1	Meteorological instrumentation is not and may not be installed in control room.	None at this time
4.2, 4.3, 4.5, 8.1.6, 8.1.7, TABLE 3.1, 3.2 and 3.3	Sensitivity Correction Factors, isotopic mix and steam release rate for a steam effluent release not available.	None
4.3, 8.1.5, 8.1.6, 8.1.7, TABLES 3.1, 3.2, and 3.3	Isotopic mixes for the accident types have to be verified	None
4.5, 8.1.8, TABLE 5.1	Contingency Release Rate Table has to be developed, Bechtel has to verify and complete Technical Basis.	None
TABLE 1.3	Units may change to meters/sec pending installation of meteorological equipment and RRIS	None
ATTACHMENT 2 NOTE	Information not available to ensure correct Units	None
2B	Steam release rate through atmospheric release valves not Available.	
TABLES 3.1, 3.2 and 3.3	Sensitivity Correct Factor, Whole Body Dose Rate Factor, and Child Thyroid/Whole Body Ratio has to be calculated for Loss of coolant accident.	None

INITIAL DOSE ASSESSMENT

1.0 PURPOSE AND SCOPE

The purpose of this procedure is to provide a means of rapidly determining the initial off-site dose rates for a potential or actual major release of radioactive material to the environment, when the Radioactive Release Information System (RRIS) is not available.

This procedure shall be used until effluent samples have been taken and analyzed; at which time subsequent dose assessments will be in accordance with Intermediate Phase and Subsequent Dose Assessment, EIP-ZZ-02211.

2.0 RESPONSIBILITY

The Health Physics Coordinator is responsible for performing the initial dose assessment in accordance with this procedure.

3.0 INITIATING CONDITION

This procedure shall be initiated when the RRIS is not available and, either of the following conditions exist:

- 3.1 An Emergency has been declared with the classification of ALERT or higher and a release of radioactive material has occurred or has the potential to occur.
- 3.2 As determined by the Health Physics Coordinator, or Emergency Coordinator.

4.0 PROCEDURE

The Health Physics Coordinator shall perform the following steps utilizing Attachment 2, Dose Assessment Worksheet when any of the initiating conditions (3.0) occur:

- 4.1* Determine the Meteorological Dispersion Factor
- 4.1.1 Fill in the information needed to complete Box 1A in Attachment 2 by obtaining the information from the Control Room instrumentation.
- 4.1.2 If the primary tower information is not available in the Control Room, utilize the secondary tower indications and complete Box 1B.
- 4.1.3 If no meteorological data can be obtained from the Control Room, dispatch an individual to the meteorological tower to relay the needed information. First to the primary meteorological tower and then to the secondary tower as an alternate, if needed.
- NOTE If an individual is dispatched to either meteorological tower, ensure he has the telephone number to contact the Health Physics Coordinator.
- 4.1.4 Using the DELTA-T (90m-10m) determine the PASQUILL STABILITY CLASS from Table 1.1. If DELTA-T (90m-10m) is unavailable use DELTA-T (60m-10m).
- 4.1.5 If either DELTA-T values are not available, determine the PASQUILL STABILITY CLASS with the WIND DEVIATION (Sigma Theta) from the Secondary Tower using Table 1.2. The Average Wind Speed must be greater than 2.24 mph to use this method.
- 4.1.6 Record the STABILITY CLASS in Block 1C.
- 4.1.7 Using Table 1.3 and the correct STABILITY CLASS transfer the correct $\bar{x}\bar{u}/Q$ values to the appropriate block in column 4A.

4.1.8 Transfer the Wind Speed (\bar{U}) from block 1 to the column 4B.

4.2* DETERMINE THE RELEASE RATES

Release rates can be determined for the Unit Vent, Radwaste Building Vent and Atmospheric Relief Valves following the appropriate steps below. Dose Assessment for other release pathways should be in accordance with EIP-ZZ-02211.

4.2.1 From the Radiation Monitoring Panel in the control Room obtain the monitor readings for the release pathway: Unit Vent, Radwaste Building Vent, or Atmospheric Release Valves. Record the readings in Block 2A.

NOTE If more than one release path exists, a separate attachment 2 has to be completed for each path.

4.2.1.1 If the Radiation Monitoring Panel is inoperative or values cannot be obtained, go to Step 4.5 for contingency calculations.

4.2.2 Transfer the monitor reading for the release path from Block 2A to column 4C.

4.2.3 Determine the effluent flow rate utilizing one of the steps below.

4.2.3.1 Determine the unit vent exhaust flow rate utilizing information from the Control Room instrumentation. Check on or off for each exhaust fan tag ID listed on Table 2.1, Determination of Unit Vent Flow Rate. Add all design rated flows for fans which are operating. Record flow rate on 2B and 4D.

4.2.3.2 The Radwaste Building vent exhaust rate is prerecorded in 2B. If the release is from the Radwaste Building vent, transfer the value to 4D.

4.2.3.3 The Steam Effluent Release Rate via the Atmospheric Release Valve is pre-recorded in 2B. If the release is from this path, transfer the value to 4D.

4.3* DETERMINE THE CORRECTION FACTORS AND RATIOS

4.3.1 Utilizing Table 3.1, determine the sensitivity correction factor for the correct monitor and accident type. Note the accident type in 3A and record the correct sensitivity correction factor in 3B.

NOTE The sensitivity correction factor corrects the monitor readings, which is based on XE-133 calibration, for the various isotopic mixes caused by the different type accidents. Select the accident type which most closely resembles the accident in progress.

4.3.2 Based upon the accident type, select the correct Whole Body Dose Rate Factor from Table 3.2 and record the values in 3C and 4F.

4.3.3 Based on the accident type, select the correct Child Thyroid/Whole Body Ratio from 3.3 and record in 3D and 4H.

4.4 CALCULATIONS

4.4.1 Perform the calculations in Box 4. Column G results give the Whole Body Dose Rates. Column G multiplied by Column H gives the Child Thyroid Dose Rate, Column I.

4.5* CONTINGENCY CALCULATION

This step provides a method for estimating release rates, utilizing conservative accident assumptions, in the event that no data is available from the Radiation Monitoring System. This step should only be used until other data is available, as it is unlikely that an actual accident condition would be similar to those postulated.

4.5.1 Utilizing Table 5.1, Contingency Release Rate Table, determine the Noble Gas Release Rate for the accident type.

4.5.2 Substitute this value for the monitor reading on 2A and 4C, and note "Yes" in 2C.

4.5.3 In the event that the indicators for the exhaust fan ID are inoperable, utilize the total for the correct "Normal Fan Line Ups" from Table 2.1, for the Effluent Flow Rate in 2B.

4.6 PROTECTIVE ACTION RECOMMENDATIONS

Upon completing the calculations in Attachment 2, assist the Emergency Coordinator in making any necessary protective action recommendations, in accordance with EIP-ZZ-00212, Protective Action Recommendations.

4.6.1 To make a Protective Action Recommendation, the Emergency Coordinator will need the following information:

4.6.1.1 Projected Whole Body Dose Rate from Attachment 2, 4G.

4.6.1.2 Projected Child Thyroid Dose Rate from Attachment 2, 4I.

4.6.1.3 Plume Travel Time and Affected Sectors; the Plume Travel Time can be determined utilizing Table 6.1. The Affected Sectors can be determined utilizing Figure 6.1.

- 4.6.1.3.1 Plot the Plume Centerline on Figure 6.1 by plotting a point on the 10 mile radius 180 degree from the direction the wind is from. Draw a line from that point to the plant at center of radius circle.
- 4.6.1.3.2 Protective Actions should be recommended for the sector in which the centerline lays and the adjacent sectors on each side.

5.0 FINAL CONDITIONS

- 5.1 All Initial Dose Assessments are completed.
- 5.2 Any Subsequent Dose Assessments are being performed in accordance with EIP-ZZ-02211.

6.0 QA RECORDS

- 6.1 Completed Dose Assessment Worksheet, Attachment 2.

7.0 REFERENCES

- 7.1 EIP-ZZ-02211, Intermediate Phase and Subsequent Dose Assessment

8.0 ATTACHMENTS

8.1 TABLES

- 8.1.1 Table 1.1, Determination of PASQUILL Stability Class Using DELTA-T
- 8.1.2 Table 1.2, Determination of PASQUILL Stability Class Using Wind Deviations
- 8.1.3 Table 1.3, $\bar{x}\bar{u}/Q$ Values
- 8.1.4 Table 2.1, Determination of Unit Vent Flow Rates
- 8.1.5* Table 3.1, Sensitivity Correction Factor
- 8.1.6* Table 3.2, Whole Body Dose Rate Factor

- 8.1.7* Table 3.3, Child Thyroid/Whole Body Ratio
- 8.1.8* Table 5.1, Contingency Release Rate Table
- 8.1.9 Table 6.1, Plume Travel Time
- 8.1.10 Figure 6.1, 10-Mile Emergency Planning Zone
- 8.2 Attachment 2, Dose Assessment Worksheet

TABLE 1.1

DETERMINATION OF PASQUILL STABILITY CLASS USING DELTA-T

STABILITY CLASS	DELTA-T (60m-10m) °C	DELTA-T (90m-10m) °C
A - Extremely Unstable	$\Delta T \leq -0.95$	$\Delta T \leq -1.50$
B - Moderately Unstable	$-0.95 < \Delta T \leq -0.85$	$-1.50 < \Delta T \leq -1.35$
C - Slightly Unstable	$-0.85 < \Delta T \leq -0.75$	$-1.35 < \Delta T \leq -1.20$
D - Neutral	$-0.75 < \Delta T \leq -0.25$	$-1.20 < \Delta T \leq -0.40$
E - Slightly Stable	$-0.25 < \Delta T \leq 0.75$	$-0.40 < \Delta T \leq 1.20$
F - Moderately Stable	$0.75 < \Delta T \leq 2.00$	$1.20 < \Delta T \leq 3.20$
G - Extremely Stable	$2.00 < \Delta T$	$3.20 < \Delta T$

TABLE 1.2

DETERMINATION OF PASQUILL STABILITY CLASS USING WIND DEVIATION

STABILITY CLASS	WIND DEVIATION - SIGMA THETA (DEGREES)
A - Extremely Unstable	$\text{SIGMA THETA} \geq 22.5$
B - Moderately Unstable	$22.5 > \text{SIGMA THETA} \geq 17.5$
C - Slightly Unstable	$17.5 > \text{SIGMA THETA} \geq 12.5$
D - Neutral	$12.5 > \text{SIGMA THETA} \geq 7.5$
E - Slightly Stable	$7.5 > \text{SIGMA THETA} \geq 3.8$
F - Moderately Stable	$3.8 > \text{SIGMA THETA} \geq 2.1$
G - Extremely Stable	$2.1 > \text{SIGMA THETA}$

* TABLE 1.3

$\frac{\bar{u}}{Q}$ VALUES (sec-mph/m³)

DISTANCE	STABILITY CLASS						
	A	B	C	D	E	F	G
EAB	4.4E-6	2.6E-5	7.2E-5	2.5E-4	4.7E-4	1.1E-3	2.5E-3
2 Miles	1.2E-6	2.0E-6	1.3E-5	5.1E-5	8.9E-5	2.4E-4	6.0E-4
5 Miles	5.5E-7	7.1E-7	2.9E-6	1.3E-5	2.8E-5	7.2E-5	1.8E-4
10 Miles	3.6E-7	4.2E-7	9.9E-7	4.9E-6	1.2E-5	3.2E-5	8.3E-5

DETERMINATION OF UNIT VENT FLOW RATE

NOTE: DESIGN RATED FLOWS are from the SHUPPS FSAR Chapter 9.

$$\frac{R_{\text{CO}_2} + R_{\text{CH}_4}}{O}$$

* TABLE 3.1

SENSITIVITY CORRECTION FACTOR TABLE

ACCIDENT TYPE	WIDE RANGE GAS MONITOR TAG ID AND RANGE			STEAM EFFLUENT MONITOR
	GT-RE-21B or GT-RE-10B	GT-RE-21B or GT-RE-10B	GT-RE-21B or GT-RE-10B	
	LOW RANGE	MID-RANGE	HIGH RANGE	
FUEL HANDLING ACCIDENT-REACTOR BLDG.	1.04	9.89 E-1	9.94 E-1	AB-RE-111
FUEL HANDLING ACCIDENT - FUEL BLDG.	1.04	9.89 E-1	9.94 E-1	AB-RE-112
MAIN STEAM BREAK	1.21	1.61	1.64	AB-RE-113
CVCS LETDOWN LINE RUPTURE	1.21	1.61	1.64	AB-RE-114
WASTE GAS DECAY TANK RUPTURE	1.53	1.05	1.09	FC-RE-385
LIQUID RADWASTE TANK FAILURE	2.16	6.12	5.38	
ROD CLUSTER CONTROL ASSEMBLY	2.63	6.46	6.50	
LOCKED ROTOR ACCIDENT	2.63	6.44	6.48	
S/G TUBE RUPTURE	1.21	1.61	1.64	
LOSS OF COOLANT ACCIDENT	(Later)	(Later)	(Later)	(Later)
ATMOSPHERIC RELEASE VALVE DUMP				

WHOLE BODY DOSE RATE FACTOR AND
CHILD THYROID/WHOLE BODY RATIO TABLES

ACCIDENT TYPE	*TABLE 3.2	*TABLE 3.3
	WHOLE BODY DOSE RATE FACTOR ($\mu\text{Rem-m}^3/\text{Ci-hr}$)	CHILD THYROID/ WHOLE BODY RATIO
FUEL HANDLING ACCIDENT INSIDE REACTOR BLDG.	3.24 E-2	3.1 E1
FUEL HANDLING ACCIDENT INSIDE FUEL HANDLING BLDG.	3.24 E-2	3.0 E0
MAIN STEAM BREAK	3.94 E-1	9.3 E2
CVCS LETDOWN LINE RUPTURE	2.78 E-2	1.0 E1
WASTE GAS DECAY TANK RUPTURE	4.57 E-1	1.8 E-1
LIQUID RADWASTE TANK FAILURE	6.74 E-1	1.5 E-1
S/G TUBE RUPTURE	3.94 E-1	1.7 E-1
ROD CLUSTER CONTROL ASSEMBLY EJECTION	5.45 E-1	3.1 E-1
LOCKED ROTOR ACCIDENT	5.45 E-1	3.4 E-1
LOSS OF COOLANT ACCIDENT	(Later)	(Later)
ATMOSPHERIC RELEASE VALVE DUMP	(Later)	(Later)

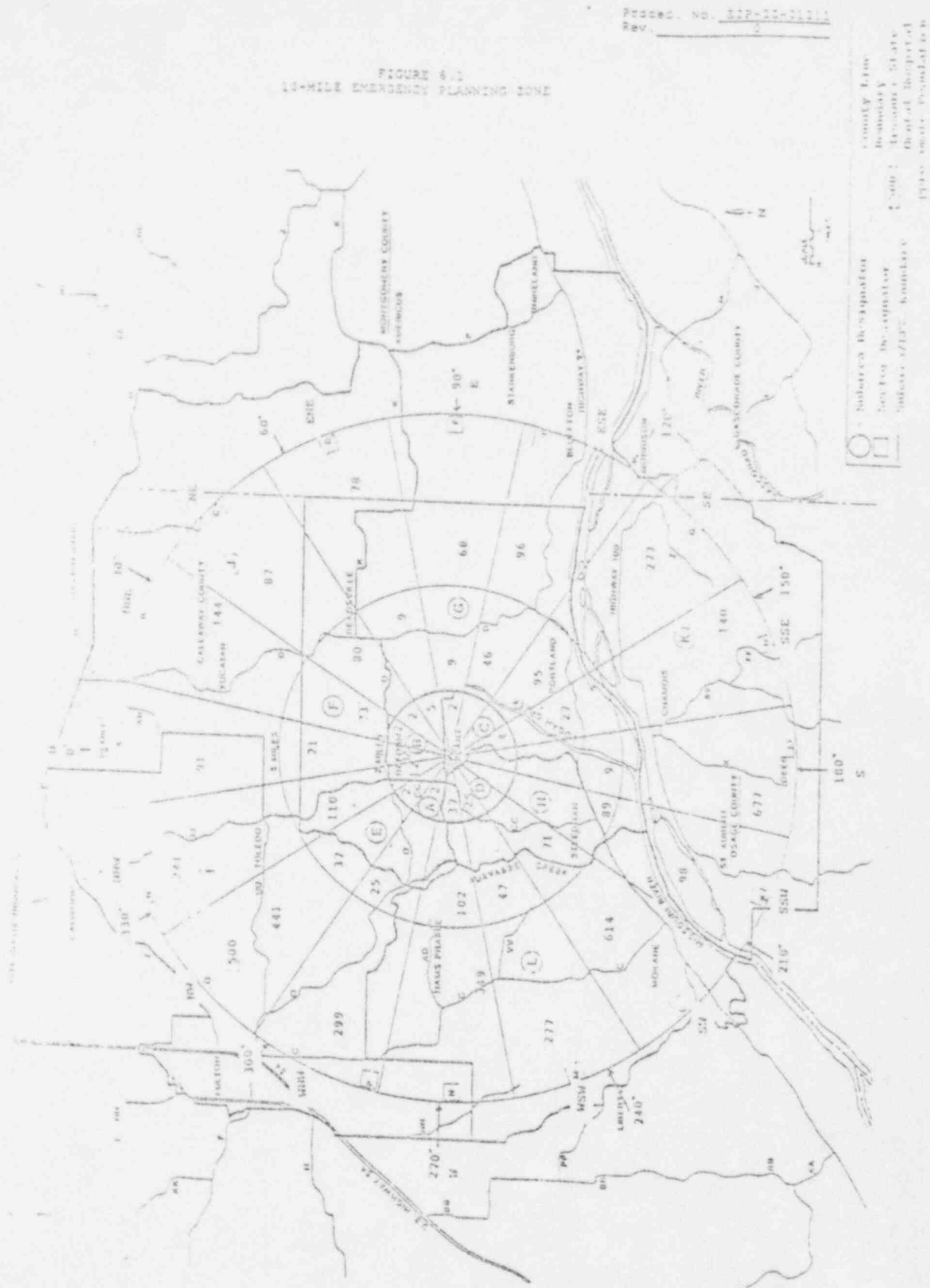
*TABLE 5.1

CONTINGENCY RELEASE RATE TABLE

(TO BE DEVELOPED)

TABLE 6.1
PLUME TRAVEL TIME (MINUTES) TABLE

WIND SPEED (mph)	DISTANCE (MILES)			
	EAB	2	5	10
.5	90.0	240.0	600.0	1200.0
1.0	45.0	120.0	300.0	600.0
2.0	22.5	60.0	150.0	300.0
4.0	11.3	30.0	75.0	150.0
6.0	7.5	20.0	50.0	100.0
8.0	5.6	15.0	37.5	75.0
10.0	4.5	12.0	30.0	60.0
12.0	3.8	10.0	25.0	50.0
14.0	3.2	8.6	21.4	42.8
16.0	2.8	7.5	18.8	37.5
18.0	2.5	6.7	16.7	33.3
20.0	2.3	6.0	15.0	30.0
30.0	1.5	4.0	10.0	20.0
50.0	0.9	2.4	6.0	12.0



DOSE ASSESSMENT WORKSHEET

DATE _____

TIME _____

1) METEOROLOGICAL DISPERSION FACTOR

A) PRIMARY TOWER		B) SECONDARY TOWER	
DELTA-T (60m-10m) = _____ °C		TEMP. (10m) = _____ °C	
DELTA-T (90m-10m) = _____ °C		WIND SPEED (10m) (U) = _____ MPH	
WIND SPEED (10m) (U) = _____ MPH		WIND DIRECTION (10m) = FROM _____ °	
WIND DIRECTION (10m) = FROM _____ °		WIND DEVIATION (10m) = _____ °	
C) STABILITY CLASS			
FROM TABLE 1.1 OF 1.1			

2) RELEASE RATE

A) MONITOR READING $\mu\text{Ci/cc}$		B) EFFLUENT FLOW RATE cc/sec	
UNIT VENT		UNIT VENT _____ (Table 2.1)	
NOBLE GAS (GT-RE-118) _____		RADWASTE _____ 5.664 E6	
LOW MID HIGH _____		ATMOSPHERIC RELEASE VALVE _____ (Later)	
RADWASTE VENT			
NOBLE GAS (GT-RE-109) _____			
LOW MID HIGH _____			
ATMOSPHERIC RELEASE VALVE			
STEAM EFFLUENT MONITOR			
AB-RE-111 _____ AB-RE-114 _____			
AB-RE-112 _____ FC-RE-385 _____			
AB-RE-113 _____			
		C) CONTINGENCY CALCULATION	
		YES/NO (CIRCLE)	

3) MISCELLANEOUS

A) ACCIDENT TYPE _____	
B) SENSITIVITY CORRECTION FACTOR _____ (unitless) (Table 3.1)	
C) WHOLE BODY DOSE RATE FACTOR _____ $\frac{\text{mRem-hr}}{\mu\text{Ci-hr}}$ (Table 3.2)	
D) CHILD THYROID/WHOLE BODY RATIO _____ (unitless) (Table 3.3)	

4) CALCULATIONS

A	B	C	D	E	F	G	H	I
Table 1.1	Block 1A or 1B	Block 2A	Block 2B	3B	3C		3D	
$\frac{U}{U_0}$	C	RELEASE RATE		SENSITIVITY CORRECTION FACTOR	WHOLE BODY DOSE RATE FACTOR	WHOLE BODY DOSE RATE	CHILD THYROID/WHOLE BODY RATIO	CHILD THYROID DOSE RATE
$\left(\frac{\text{sec-hr}}{\text{Mj-M1}}\right)$	M1/H	$\times \frac{1}{\mu\text{Ci/cc}}$	$\times \frac{1}{\text{cc/sec}}$	$\times \text{(unitless)}$	$\times \frac{\text{mRem-hr}}{\mu\text{Ci-hr}}$	$\times \frac{\text{mRem}}{\text{hr}}$	$\times \text{(unitless)}$	$\times \frac{\text{mRem}}{\text{hr}}$
EAS								
2								
5								
10								
OTHERS								

* NOTE: 1) Units change to (Later) for Atmospheric Release Valve Dump
Performed By _____

EIP-ZZ-02211
September 30, 1983
Revision 0

CALLAWAY PLANT
EMERGENCY PLAN IMPLEMENTING PROCEDURE

EIP-ZZ-02211

INTERMEDIATE PHASE AND SUBSEQUENT DOSE ASSESSMENT

RESP. DEPT. Emergency Preparedness PREPARED BY Richard Grunstrom

APPROVED BY Steven E. Nuttall DATE 10-3-83

DATE ISSUED 10-19-83

This procedure contains the following:

Pages	<u>1</u>	through	<u>10</u>
Attachments	<u>1</u>	through	<u>13</u>
Appendices	<u></u>	through	<u></u>
Checklist	<u></u>	through	<u></u>

INFORMATION ONLY
UNCONTROLLED
COPY

DEFICIENCY LIST

Section	Deficiency Description	Constraints
Attachment 1 1.4 Table 1.3	Stability class based on Sigma Theta has to be justified.	None
Steps 1.4, 3.3 Table 1.4, 1.5	Subject to change upon purchase and installation of new meteorological equipment	None
Attachment 1 Step 1.1	Analog Strip Recorders not installed in Control Room	None
4.2.1 Attachment 3 Table 3.1	Sensitivity factors are based upon the Manufacturer's Calibration Report. Actual factors may vary based upon installation and actual Calibration Factors	None
Table 3.2 and 3.3	Whole Body Dose Rate Factors and Child Thyroid Whole Body Ratio are subject to change based upon the outcome of a Verification of Technical Basis	None
4.2.5 and Attachment 7	Sensitivity Factors have to be obtained from the manufacturer and the isotopic mixture of the release has to be supplied by Bechtel	None
Attachment 9	QS-22 not approved	None
4.2.7 Attachment 11	Will be completed upon completion of Verification of Technical Basis and Reformatting	None
Table 10.1	Populations in listed population centers are not available at this time	None
Tables 3.1, 3.2 and 3.3	Calculations have to be made for loss of	None

Table of Contents

<u>Section</u>	<u>Page Number</u>
1.0 Purpose and Scope	1
2.0 Responsibilities	1
3.0 Initiating Conditions	1
4.0 Procedure	2
5.0 Final Conditions	8
6.0 Records	8
7.0 References	9
8.0 Attachments	9
Attachment 1 - Determination of Meteorological Dispersion Factors (X/Q) and Plume Dimensions	
Attachment 2 - Determination of Release Pathway and Effluent Flow Rates	
Attachment 3 - Dose Rate Projection Based on Noble Gas Monitors	
Attachment 4 - Dose Rate Projection Based known on Effluent Isotopic Release Rate	
Attachment 5 - Estimation of Dose Rate Based on Field Monitoring Data	
Attachment 6 - Estimation of Dose Rate Based on Isotopic Analysis of Environmental Samples	
Attachment 7 - Dose Rate Projection Based on Steam Effluent Monitors	
Attachment 8 - Dose Rate Projection Based on Isotopic Analysis of Containment Air Samples	
Attachment 9 - Dose Projection/Assessment for Particulate Activity	
Attachment 10 - Integrated Dose Assessment	
Attachment 11 - Contingency Calculations	
Attachment 12 - Dose Assessment Summary Sheet	
Attachment 13 - Radiological Release Accident Flow Chart	

INTERMEDIATE PHASE AND SUBSEQUENT DOSE ASSESSMENT

1.0 PURPOSE AND SCOPE

The purpose of this procedure is to provide the methods for determining projected off-site dose rates during the intermediate phase of an emergency and for any dose assessments which are beyond the scope of EIP-ZZ-01211, Initial Dose Assessment. This procedure is a backup means of dose assessment when the Radioactive Release Information System (RRIS) is not available. This procedure also provides guidance in directing field monitoring team activities.

2.0 RESPONSIBILITIES

2.1 The Health Physics Coordinator is initially responsible for all actions contained in this procedure and giving directions to the Dose Assessment Coordinator upon his arrival.

2.2 The Dose Assessment Coordinator is responsible for the dose assessment and field monitoring activities as outlined in this procedure. The Dose Assessment Coordinator shall ensure that the dose projection calculations are updated as needed, based on changes in radiological and meteorological data.

2.3 The Radiological Assessment Coordinator shall assume the overall responsibility of the activities of this procedure, upon activation of the EOF.

3.0 INITIATING CONDITIONS

This procedure shall be initiated when a release of radioactive material has occurred or has the potential to occur, the RRIS is not available and either of the following conditions exist.

3.1 An Emergency has been declared with the classification of ALERT or higher and dose assessment is beyond the scope of EIP-ZZ-01211.

3.2 As determined by the Health Physics Coordinator, Radiological Assessment Coordinator, Emergency Coordinator or the Recovery Manager.

4.0 PROCEDURE

The Health Physics Coordinator or Dose Assessment Coordinator shall perform dose assessment in accordance with this procedure when any of the initiating conditions (3.0) occur. Attachment 13, Radiological Release Accident Flow Chart, provides guidance for determining which activities should be initiated. This procedure is arranged in the most likely order that the activities will be implemented.

4.1 METEOROLOGICAL DISPERSION FACTOR (X/Q) DETERMINATION

The Health Physics Coordinator/Dose Assessment Coordinator shall determine the Meteorological Dispersion Factors (X/Q), Plume Dimensions and Affected Sectors using Attachment 1, Determination of Meteorological Dispersion Factors (X/Q) and Plume Dimensions, utilizing available meteorological equipment. Record the appropriate information on Attachment 12, Dose Assessment Summary Sheet.

4.2

DETERMINATION OF PROJECTED DOSE RATES

The Health Physics Coordinator/Dose Assessment Coordinator shall determine the Projected or Measured Whole Body Dose Rate and the Projected or Measured Child Thyroid Dose Rate at the Exclusion Area Boundary (EAB), 2-mile, 5-mile, and 10-mile zones or any other selected distances requested and record the results on Attachment 12, Dose Assessment Summary Sheet, using one of the following attachments:

NOTE The starting time for which the data is applicable shall be noted as the "time" on the forms, in the attachments, where indicated. (near performed by).

4.2.1*

Attachment 3 - Dose Rate Projection Based On Noble Gas Monitors

This attachment provides a fast method to project the offsite Whole Body and Child Thyroid Dose Rates, utilizing data from the Wide Range Noble Gas Monitors in the Radiation Monitoring System. This attachment should be used initially, if possible, until further detailed calculations or sampling can be performed.

4.2.2

Attachment 4 - Dose Rate Projection Based On Effluent Isotopic Analysis

This attachment provides the method to project Whole Body and Child Thyroid Dose Rates utilizing isotopic analysis of samples from the release pathway.

4.2.3 Attachment 5 - Estimation Of Dose Rate Based
On Field Monitoring Team Data

This attachment provides the methods for estimating Whole Body and Child Thyroid dose rates at various locations utilizing actual field measurements taken by the Field Monitoring Teams at one location.

4.2.4 Attachment 6 - Estimation Of Dose Rate Based
On Isotopic Analysis Of Environmental Sam-
ples

This attachment provides the methods for estimating the Whole Body and Child Thyroid Dose Rates, utilizing isotopic analysis of air sampler taken by Field Monitoring Teams.

4.2.5* Attachment 7 - Dose Rate Projection Based On
Steam Effluent Monitors

This attachment provides the method for projecting offsite Whole Body and Child Thyroid dose rates, utilizing data from the Effluent Steam Monitors in the Radiation Monitoring System, for releases via the Secondary Side Atmospheric Relief Valves and Auxiliary Feedwater Turbine Discharge.

4.2.6 Attachment 8 - Dose Rate Projection Based On
Isotopic Analysis Of Containment Air
Samples.

This attachment provides a method of projecting offsite Whole Body and Child Thyroid dose rates, utilizing data from Containment Air Samples for unmonitored leakage from containment.

4.2.7* Attachment 11 - Contingency Calculations

This attachment provides a method to project offsite Whole Body and Child Thyroid doses, utilizing conservative accident assumptions, in the event that no data is available from the Radiation Monitoring System. As it is unlikely that actual accident conditions would be similar to those postulated, this attachment should only be used until other data is available.

4.3 SURFACE CONTAMINATION DETERMINATION

- 4.3.1 The Health Physics Coordinator/Dose Assessment Coordinator shall determine the projected or measured surface contamination levels and dose rates from contaminated surfaces using Attachment 9, Dose Projection/Assessment for Particulate Activity, and record the results on Attachment 12, Dose Assessment Summary Sheet.

4.4 INHALATION/INGESTION DOSE COMMITMENT DETERMINATION

- 4.4.1 When isotopic analysis of environmental air samples taken by Field Monitoring Teams becomes available, the Health Physics Coordinator/Dose Assessment Coordinator shall determine the Critical Organ, the Critical Population Segment and the Inhalation Dose Commitment for the general public, from inhalation of particulate radioactivity, using Attachment 9, Dose Projection/Assessment of Particulate Activity, and record on Attachment 12, Dose Assessment Summary Sheet.

- 4.4.2 When isotopic analysis of environmental samples (soil, vegetation, milk, drinking water, foodstuffs, etc.) become available, the Health Physics Coordinator/Dose Assessment Coordinator shall determine the Critical Organ, Critical Population Segment and the Ingestion Dose Commitment for the general public from ingestion of contaminated milk, drinking water or foodstuffs, using Attachment 9, Dose Projection/Assessment of Particulate Activity. Record the surface contamination levels, milk or drinking water contamination levels, foodstuff contamination Levels, pasture grass contamination and the ingestion dose commitment on Attachment 12, Dose Assessment Summary Sheet.
- 4.5 PROTECTIVE ACTION RECOMMENDATIONS
- 4.5.1 The Health Physics Coordinator/Radiological Assessment Coordinator, using Attachment 12, Dose Assessment Summary Sheet, shall assist the Emergency Coordinator/Recovery Manager in making Protective Action Recommendations.
- 4.6 FIELD MONITORING TEAM DIRECTIONS
- The Health Physics Coordinator/Radiological Assessment Coordinator shall direct Field Monitoring Team activity as follows:
- 4.6.1 Direct Field Monitoring Team(s) be formed per EIP-ZZ-00220, Emergency Team Formation.
- 4.6.2 Direct the Dose Assessment Coordinator to:
- 4.6.2.1 Implement EIP-ZZ-00223, Field Monitoring.
- 4.6.2.2 Brief the Radiological Controls Coordinator on offsite radiological conditions.
- 4.6.2.3 Determine the affected sectors to which Field Monitoring Teams should be dispatched.

4.6.2.4 Instruct the Field Team Communicator to establish communications with the Field Monitoring Teams and dispatch teams to the affected sectors. Provide the following to the Field Team Communicator:

4.6.2.4.1 Direct teams to don protective clothing, if warranted.

NOTE Protective clothing should not be used unless the general public has been evacuated or issued instructions.

4.6.2.4.2 Field Monitoring Locations to be sampled. Locations are designated in EIP-ZZ-00223, Field Monitoring, Attachment 5, Field Monitoring Sampling Location.

NOTE The initial sampling location should be that sampling location at the EAB nearest to the plume centerline, in order to verify the emergency classification. Subsequent locations should be chosen based on factors such as topographical features and wind direction changes, in order to locate the plume centerline (highest concentration). Major population centers should be monitored as a precautionary measure.

4.6.2.4.3 The type of samples to be collected (i.e., air, water, vegetation, soil, etc).

4.6.2.4.4 The type of measurements to be taken (i.e., dose rate, count rate, I-131 analysis, etc).

4.6.2.3.5 Locations to which environmental samples shall be delivered if other than the EOF.

4.6.2.3.6 Debriefing instructions.

4.7 CUMULATIVE EXPOSURE AND TOTAL POPULATION EX-
POSURE DETERMINATION

4.7.1 The Health Physics Coordinator/Dose Assess-
ment Coordinator shall track the Cumulative
Whole Body Exposure and Cumulative Child
Thyroid Exposure in each affected sector in
the EAB, 2 mile, 5 mile and 10 mile zones
using Attachment 10, Integrated Dose Assess-
ment, and record the results on the Dose As-
sessment Status Board. If requested, the
Total Population Whole Body or Child Thyroid
Exposure will also be calculated.

4.8 STATUS BOARD

4.8 The Health Physics Coordinator/Dose Assess-
ment Coordinator shall ensure that all sig-
nificant dose assessment information is
recorded on the Dose Assessment Status
Board, and updated as needed.

5.0 FINAL CONDITIONS

5.1 All necessary dose assessment calculations
have been performed.

5.2 All records have been handled in accordance
with EIP-ZZ-00250, Communications and
Records Keeping.

6.0 RECORDS

6.1 QA RECORDS

Completed tables from

6.1.1 Attachment 1, Determination of Meteorologi-
cal Dispersion Factors (X/Q) and Plume
Dimensions.

6.1.2 Attachment 3, Dose Rate Projection Based on
Noble Gas Monitors

- 6.1.3 Attachment 4, Dose Rate Projection Based on Known Effluent Isotopic Release Rates
- 6.1.4 Attachment 5, Estimation of Dose Rate Based on Field Monitoring Team Data
- 6.1.5 Attachment 6, Estimation of Dose Rate Based on Isotopic Analysis of Environmental Samples
- 6.1.6 Attachment 7, Dose Rate Projection Based on Steam Effluent Monitors
- 6.1.7 Attachment 8, Dose Rate Projection Based on Isotopic Analysis of Containment Air Samples
- 6.1.8 Attachment 9, Dose Projection/Assessment for Particulate Activity
- 6.1.9 Attachment 10, Integrated Dose Assessment
- 6.1.10 Attachment 11, Contingency Calculations
- 6.1.11 Attachment 12, Dose Assessment Summary Sheet
- 7.0 REFERENCES
- 7.1 USNRC Regulatory Guide 1.109, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the purposes of Evaluating Compliance with 10CFR50, Appendix I, Revision 1, October 1977."
- 7.2 USNRC Regulatory Guide 1.145, "Atmospheric Dispersion Models for Potential Accident Consequence Assessments at Nuclear Power Plants, Revision 1."
- 7.3 USNRC Regulatory Guide 1.23, "Meteorological Programs in Support of Nuclear Power Plants, Revision 1."
- 7.4 SNUPPS, Final Safety Analysis Report, Chapters 2, 7, 11, 15 and 15A.

- 7.5 EIP-ZZ-01211, Initial Dose Assessment
- 8.0 ATTACHMENTS
- 8.1 Attachment 1, Determination of Meteorological Dispersion Factors (X/Q) and Plum Dimensions
- 8.2 Attachment 2, Determination of Release Pathway and Effluent Flow Rates
- 8.3 Attachment 3, Dose Rate Projection Based on Noble Gas Monitors
- 8.4 Attachment 4, Dose Rate Projection Based on Known Effluent Isotopic Release Rate
- 8.5 Attachment 5, Estimation of Dose Rate Based on Field Monitoring Team Data
- 8.6 Attachment 6, Estimation of Dose Rate Based on Isotopic Analysis of Environmental Samples
- 8.7 Attachment 7, Dose Rate Projection Based on Steam Effluent Monitors
- 8.8 Attachment 8, Dose Rate Projection Based on Isotopic Analysis Of Containment Air Samples
- 8.9 Attachment 9, Dose Projection/Assessment for Particulate Activity
- 8.10 Attachment 10, Integrated Dose Assessment
- 8.11 Attachment 11, Contingency Calculations
- 8.12 Attachment 12, Dose Assessment Summary Sheet
- 8.13 Attachment 13, Radiological Release Accident Flow Chart

DETERMINATION OF METEOROLOGICAL DISPERSION FACTORS (X/Q)
AND PLUME DIMENSIONS

This attachment provides a method for determination of meteorological dispersion factors and plume dimensions using onsite meteorological data from the Primary or Secondary Meteorological Towers.

0 DETERMINE PASQUILL STABILITY CLASS

- 1* Obtain the meteorological data (previous 15-minute average) from the Control Room Analog Strip Recorders. Record the primary tower information in the appropriate location on Form 1A and secondary tower information if available.
- 2 If meteorological data is not available in the Control Room, obtain the information as follows:
 - 2.1 Dispatch an individual to the shed at the primary meteorological tower to relay this data from the analog strip recorder charts.
 - 2.2 If information is not available at the primary meteorological tower, dispatch an individual to the back-up shelter in the Communications Equipment Room in the EOF to relay this data from the analog strip recorder (WIND SPEED, WIND DIRECTION and WIND DEVIATION (Sigma Theta) are available from the Secondary Meteorological Tower).
- 3 Using the DELTA-T (90m-10m) determine the PASQUILL STABILITY CLASS from TABLE 1.2. If DELTA-T (90m-10m) is unavailable use DELTA-T (60m-10m.)
- 4* If either DELTA-T values are not available, determine the PASQUILL STABILITY CLASS with the WIND DEVIATION (Sigma Theta) from the Secondary Tower using TABLE 1.3 The Average Wind Speed must be greater than 2.24 mph to use this method.

NOTE WIND DEVIATION (Sigma Theta) is the standard deviation of horizontal wind direction fluctuation.

Record the STABILITY CLASS on FORM 1A.

DETERMINATION OF X/Q

Using this STABILITY CLASS, determine the \bar{X}_u/Q for each selected distance of interest from TABLE 1.4 and record on FORM 1A.

NOTE If a distance falls between two values, use the higher XI/Q value.

- 2.2 Using the XI/Q values, determine the METEOROLOGICAL DISPERSION FACTOR(S) $=(X/Q)$ for each SELECTED DISTANCE by dividing XI by the WINDSPEED(U).

- 2.3 Record X/Q on FORM 1A.

3.0 DETERMINATION OF PLUME TRAVEL TIME AND PLUME WIDTH

- 3.1 Using the WIND SPEED (U), determine the PLUME TRAVEL TIME for each selected distance of interest from TABLE 1.5, and record on FORM 1A.

NOTE If the wind speed or selected distance falls between two values, use the lower plume travel time.

- 3.2 Using the STABILITY CLASS, determine the PLUME WIDTH for each selected distance of interest from TABLE 1.6 and record on FORM 1A.

NOTE The PLUME WIDTH is the perpendicular distance from the plume centerline to where the concentration is less than 10% of plume centerline concentration.

- 3.3* If the STABILITY CLASS is D, E, F or G and the wind speed is less than 13 mph, using the STABILITY CLASS and WIND SPEED, determine the PLUME WIDTH CORRECTION DISTANCE from TABLE 1.7 and add the PLUME WIDTH CORRECTION DISTANCE to the PLUME WIDTH. Record on FORM 1A.

NOTE The PLUME WIDTH CORRECTION DISTANCE is added to the PLUME WIDTH to conservatively account for the combined effects of increased plume meander and building wake on diffusion in the horizontal crosswind direction under light wind and stable or neutral atmospheric conditions.

4.0 DETERMINATION OF AFFECTED SECTORS

- 4.1 Plot the Plume Centerline and PLUME WIDTH on the Status Board 10 mile EPZ map to determine affected sectors.

- 4.1.1 Draw the Plume Centerline by plotting the point 180 from where the wind direction is from on the 10 mile radius circle, and draw a line from that point to the plant or center of radius.

TABLE 1.2

DETERMINATION OF PASQUILL STABILITY CLASS USING DELTA-T

STABILITY CLASS	DELTA-T (60m-10m) °C	DELTA-T (90m-10m) °C
A - Extremely Unstable	$\Delta T \leq -0.95$	$\Delta T \leq -1.50$
B - Moderately Unstable	$-0.95 < \Delta T \leq -0.85$	$-1.50 < \Delta T \leq -1.35$
C - Slightly Unstable	$-0.85 < \Delta T \leq -0.75$	$-1.35 < \Delta T \leq -1.20$
D - Neutral	$-0.75 < \Delta T \leq -0.25$	$-1.20 < \Delta T \leq -0.40$
E - Slightly Stable	$-0.25 < \Delta T \leq 0.75$	$-0.40 < \Delta T \leq 1.20$
F - Moderately Stable	$0.75 < \Delta T \leq 2.00$	$1.20 < \Delta T \leq 3.20$
G - Extremely Stable	$2.00 < \Delta T$	$3.20 < \Delta T$

TABLE 1.3

DETERMINATION OF PASQUILL STABILITY CLASS USING WIND DEVIATION

STABILITY CLASS	WIND DEVIATION - SIGMA THETA (DEGREES)
A - Extremely Unstable	$\text{SIGMA THETA} \geq 22.5$
B - Moderately Unstable	$22.5 > \text{SIGMA THETA} \geq 17.5$
C - Slightly Unstable	$17.5 > \text{SIGMA THETA} \geq 12.5$
D - Neutral	$12.5 > \text{SIGMA THETA} \geq 7.5$
E - Slightly Stable	$7.5 > \text{SIGMA THETA} \geq 3.8$
F - Moderately Stable	$3.8 > \text{SIGMA THETA} \geq 2.1$
G - Extremely Stable	$2.1 > \text{SIGMA THETA}$

* TABLE 1.4

$\frac{\overline{Xu}}{Q}$ VALUES (sec-mph/m³)

DISTANCE	STABILITY CLASS						
	A	B	C	D	E	F	G
EAB	4.4 E-6	2.6 E-5	7.2 E-5	2.5 E-4	4.7 E-4	1.1 E-3	2.5 E-3
1 Mile	2.4 E-6	1.6 E-5	4.7 E-5	1.8 E-4	3.0 E-4	7.5 E-4	1.9 E-3
2 Miles	1.2 E-6	2.0 E-6	1.3 E-5	5.1 E-5	8.9 E-5	2.4 E-4	6.0 E-4
3 Miles	8.9 E-7	1.1 E-6	6.3 E-6	2.6 E-5	5.4 E-5	1.3 E-4	3.1 E-4
4 Miles	7.1 E-7	8.9 E-7	4.0 E-6	1.8 E-5	3.4 E-5	8.9 E-5	2.3 E-4
5 Miles	6.5 E-7	7.1 E-7	2.9 E-6	1.3 E-5	2.8 E-5	7.2 E-5	1.8 E-4
6 Miles	4.7 E-7	5.9 E-7	2.2 E-6	9.8 E-6	2.2 E-5	5.4 E-5	1.4 E-4
7 Miles	4.2 E-7	5.1 E-7	1.8 E-6	8.2 E-6	1.9 E-5	4.8 E-5	1.2 E-4
8 Miles	4.0 E-7	4.7 E-7	1.4 E-6	7.4 E-6	1.6 E-5	4.2 E-5	1.0 E-4
9 Miles	3.7 E-7	4.6 E-7	1.2 E-6	6.0 E-6	1.5 E-5	3.6 E-5	9.3 E-5
10 Miles	3.6 E-7	4.2 E-7	9.9 E-7	4.9 E-6	1.2 E-5	3.2 E-5	8.3 E-5
12 Miles	2.7 E-7	3.2 E-7	6.8 E-7	4.2 E-6	9.5 E-6	2.6 E-5	6.5 E-5
15 Miles	2.4 E-7	2.8 E-7	4.9 E-7	2.7 E-6	6.8 E-6	1.9 E-5	4.9 E-5

STABILITY CLASS	120.0	120.0	180.0	120.0	75.0	90.0	70.0	60.0	67.0	60.0	60.0	64.0
5	90.0	120.0	180.0	120.0	75.0	90.0	70.0	60.0	67.0	60.0	60.0	64.0
0	45.0	60.0	90.0	60.0	50.0	60.0	52.5	48.0	54.0	50.0	51.4	56.3
0	22.5	30.0	45.0	40.0	37.5	45.0	42.0	40.0	45.0	42.8	45.0	50.0
0	11.3	15.0	30.0	30.0	30.0	36.0	35.0	34.3	38.6	37.5	40.0	45.0
0	7.5	10.0	22.5	24.0	30.0	30.0	30.0	30.0	33.8	33.3	36.0	40.0
0	5.6	7.5	18.0	20.0	25.0	25.7	26.3	26.7	30.0	30.0	34.0	40.0
0	4.5	6.0	15.0	17.1	21.4	22.5	23.3	24.0	27.0	28.0	32.0	40.0
0	3.8	5.0	12.8	15.0	18.8	20.0	21.0	21.6	24.0	24.0	28.0	36.0
0	3.2	4.3	11.2	13.3	16.7	18.0	19.0	19.6	22.0	22.0	26.0	34.0
0	2.8	3.8	10.0	12.0	15.0	16.0	16.0	16.0	18.0	18.0	22.0	30.0
0	2.5	3.4	9.0	11.0	14.0	15.0	15.0	15.0	17.0	17.0	21.0	28.0
0	2.3	3.0	8.0	10.0	13.0	14.0	14.0	14.0	16.0	16.0	20.0	28.0
0	2.0	2.7	7.0	9.0	12.0	13.0	13.0	13.0	15.0	15.0	19.0	26.0
0	1.5	2.0	6.0	8.0	11.0	12.0	12.0	12.0	14.0	14.0	18.0	24.0
0	0.9	1.2	3.6	4.8	6.0	7.2	8.4	9.6	10.8	12.0	14.4	18.0

TABLE 1.6
 PLUME WIDTH (MILES) TABLE

STABILITY CLASS	1	2	3	4	5	6	7	8	9	10	12	15
A	0.31	0.40	1.07	1.33	1.73	2.00	2.27	2.40	2.53	2.67	3.47	4.00
B	0.24	0.29	0.87	1.07	1.33	1.60	1.87	2.00	2.13	2.27	2.93	3.33
C	0.19	0.23	0.60	0.80	0.93	1.07	1.20	1.33	1.47	1.60	2.00	2.40
D	0.11	0.13	0.40	0.53	0.60	0.69	0.77	0.83	0.93	1.06	1.20	1.16
E	0.08	0.11	0.29	0.40	0.45	0.53	0.59	0.64	0.67	0.80	0.91	0.80
F	0.06	0.07	0.21	0.27	0.31	0.37	0.40	0.44	0.49	0.53	0.64	0.53
G	0.04	0.05	0.15	0.17	0.20	0.24	0.27	0.29	0.32	0.35	0.43	0.33

TABLE 1.7
 PLUME WIDTH CORRECTION DISTANCE (MILES)

STABILITY CLASS	0.5	1.0	2.0	4.0	6.0	8.0	10.0	12.0
D	.08	.08	.08	.08	.06	.04	.02	.01
E	.12	.12	.12	.12	.08	.05	.02	.01
F	.12	.12	.12	.12	.08	.04	.02	.01
G	.13	.13	.13	.13	.08	.04	.02	.01

Procedure No. EIP-22-02211

Rev. 0

METEOROLOGICAL DISPERSION FACTORS (X/Q) AND PLUME DIMENSIONS DATA SHEET

PRIMARY TOWER

DELTA-T (60m-10m) = _____ °C
 DELTA-T (90m-10m) = _____ °C
 WIND SPEED (10m) (u) = _____ m/s
 WIND DIRECTION (10m) = FROM _____

SECONDARY TOWER

TEMP. (10m) = _____ °C
 WIND SPEED (10m) (u) = _____ m/s
 WIND DIRECTION (10m) = FROM _____
 WIND DEVIATION (10m) = _____

STABILITY CLASS _____

DISTANCE
 EAS

$\frac{X}{Q}$
 (SEC-FM/H³)

PLUME
 TRAVEL TIME
 (min)

PLUME WIDTH
 CORRECTION FACTOR
 (MILES)

CORRECTED
 PLUME WIDTH
 (MILES)

1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					

DATE: _____

TIME: _____

FORM 1A

PREPARED BY: _____

DETERMINATION OF RELEASE PATHWAY AND EFFLUENT
FLOW RATES

1.0 RELEASE PATHWAY DETERMINATION

- 1.1 Determine the RELEASE PATHWAY for the particular monitor of interest using TABLE 2.1 and 2.2.

2.0 EFFLUENT FLOW RATE DETERMINATION

NOTE As there are no instruments that measure the actual exhausting air flow, determine the FLOW RATE by adding the DESIGN RATED FLOW of each exhaust fan operating in the release pathway.

- 2.1 Request the Exhaust Fan Tag ID for each operating exhaust fan from the Control Room.
- 2.2 From TABLE 2.3 determine the Design Rated Flow (CFM) for each operating fan.
- 2.3 Add all Design Rated Flows for the operating fans and record on Attachment 12.

TABLE 2.1

IDENTIFICATION OF RELEASE PATHWAYS AND DETECTORS

RELEASE PATHWAY	MONITOR TAG ID	DETECTOR MODEL NO.	TYPE OF DETECTOR	METHOD OF DETECTION
Plant Unit Vent	GI-RE-21A	RD-60-300	Particulate Iodine	Beta Scintillation Gamma Scintillation
Plant Unit Vent	GI-RE-21B	RD-52 RD-72-01 RD-72-02	Low Range Gas Mid Range Gas High Range Gas	Beta Scintillation Gamma-Beta Scintillation Gamma-Beta Scintillation
Radwaste Vent	GI-RE-10A	RD-60-300	Particulate Iodine	Beta Scintillation Gamma Scintillation
Radwaste Vent	GI-RE-10B	RD-52 RD-72-01 RD-72-02	Low Range Gas Mid Range Gas High Range Gas	Beta Scintillation Gamma-Beta Scintillation Gamma-Beta Scintillation
Atmospheric Relief Valve	AB-RE-111 AB-RE-112 AB-RE-113 AB-RE-114	RD-12	Gamma	Geiger Mueller
Auxiliary Feedwater Turbine Discharge	FC-RE-385	RD-12	Gamma	Geiger Mueller
Containment High Range Area Radiation Monitor	GI-RE-59 GI-RE-60	RD-23	Gamma	Ionization Chamber

Callaway Effluent Release Pathways

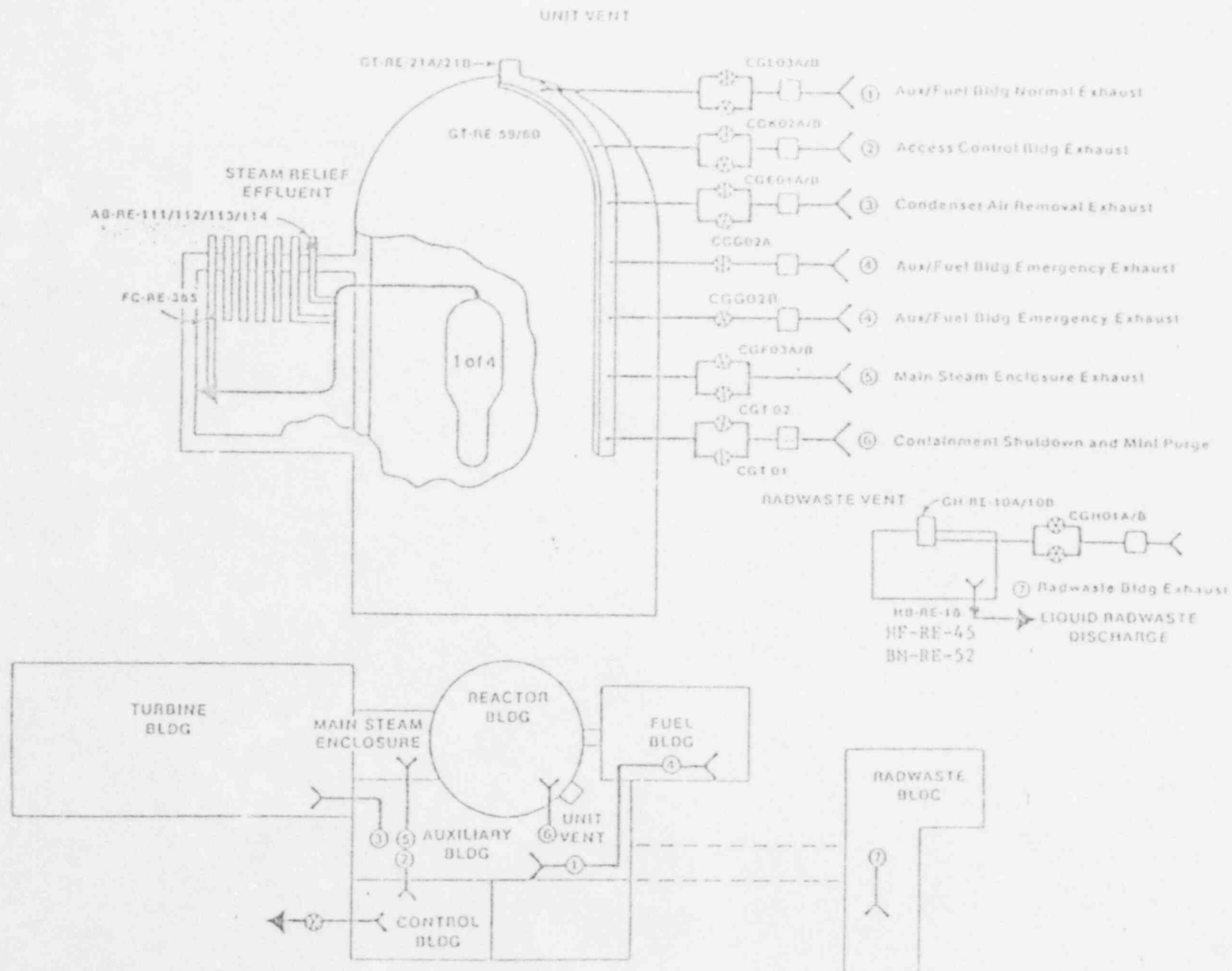


FIGURE 2.2

REVISED BY SEP-82-01211

Fuel Handling Bldg. Emergency Exhaust	CGG02A	9,000	23,000	23,000	23,000	23,000
	CGG02B	9,000				
Main Steam Enclosure Bldg. Exhaust	CGF03A	23,000	6,000	6,000	6,000	6,000
	CGF03B	23,000				
Access Control Exhaust	CGK02A	6,000	1,000	1,000	1,000	1,000
	CGK02B	6,000				
Condenser Air Removal Filtration	CGE01A	1,000	Shutdown	Shutdown	Shutdown	20,000
	CGE01B	1,000				
Containment Shutdown Purge Exhaust	CGT01	20,000	4,000	4,000	4,000	Shutdown
Containment Mini Purge Exhaust	CGT02	4,000				
Total Station Vent Flow			66,000	56,000	43,000	82,000
Radwaste Bldg. Exhaust	CGH-01A	12,000	12,000	12,000	12,000	12,000
	CGH-01B	12,000				

NOTE DESIGN RATED FLOWS from Technical Specifications for RRIS (Radioactive Release Information System) for the Standardized Nuclear Unit Power Plant System (Specification No. 10466 J-374A).

Proced. No. EIP-22-01211
Rev. 0

DOSE RATE PROJECTION BASED ON NOBLE GAS MONITORS

This attachment provides a fast method to project the offsite Whole Body and Child Thyroid Dose Rates, utilizing data from the Wide Range Noble Gas Monitors in the Radiation Monitoring System. This attachment should be used initially, if possible, until further detailed calculations or sampling can be performed.

1.0 DETERMINATION OF NOBLE GAS RELEASE RATE

Determine (Q) - the NOBLE GAS RELEASE RATE (Ci/sec), as follows.

- 1.1 Record the Noble Gas Effluent MONITOR TAG ID, RANGE (LOW, MID, HIGH) and READING (uCi/cc) on FORM 3A.
- 1.2 Record the RELEASE PATHWAY and the EFFLUENT FLOW RATE (CFM) from Attachment 2, Determination of Release Pathway and Effluent Flow Rates on FORM 3A.
- 1.3 Determine the SENSITIVITY FACTOR for the particular NOBLE GAS MONITOR and the ACCIDENT TYPE from TABLE 3.1 and record on FORM 3A.
- 1.4 Complete the calculation on FORM 3A to determine the NOBLE GAS RELEASE RATE.

NOTE An isotopic mix of various noble gases is assumed in each of the accident classifications. If no accident classification is possible, use the most conservative classification - MAIN STEAM BREAK.

2.0 DETERMINATION OF PROJECTED WHOLE BODY DOSE RATE

Using the NOBLE GAS RELEASE RATE, determine the PROJECTED WHOLE BODY DOSE RATE for each selected distance of interest using the following data and FORM 3A.

- 2.1 Record the METEOROLOGICAL DISPERSION FACTOR(S)-(X/Q) from Attachment 1, Determination of Meteorological Dispersion Factor(s) (X/Q) and Plume Dimensions, for each selected distance of interest and record on FORM 3A.
- 2.2 Determine the WHOLE BODY DOSE FACTOR, using the ACCIDENT TYPE and TABLE 3.2 and record on FORM 3A.
- 2.3 Complete the calculation on FORM 3A.

3.0 DETERMINATION OF THE PROJECTED CHILD THYROID DOSE RATE

Using the PROJECTED WHOLE BODY DOSE RATE(S), determine the PROJECTED CHILD THYROID DOSE RATE, using the CHILD THYROID/WHOLE BODY RATIO and FORM 3A.

3.1 Determine the CHILD THYROID/WHOLE BODY RATIO for the particular Accident Type, using the TABLE 3.3 and record on FORM 3A.

3.2 Complete the calculation on FORM 3A.

DOSE RATE PROJECTIONS BASED ON NOBLE GAS MONITORS

MONITOR TAG ID. _____

RELEASE PATHWAY _____

RANGE: LOW MID HIGH

ACCIDENT TYPE _____

$$\frac{\text{READING}}{(\mu\text{Ci/cc})} \times \frac{\text{FLOW RATE}}{(\text{CFM})} \times \frac{\text{SENSITIVITY FACTOR}}{(\text{cc/sec-CFM})} = \frac{\text{NOBLE GAS RELEASE RATE}}{(\mu\text{Ci/sec})}$$

PROJECTED WHOLE BODY DOSE RATE CALCULATION WORKSHEET

$$\frac{\text{NOBLE GAS RELEASE RATE}}{(\mu\text{Ci/sec})} \times \frac{\text{METEOROLOGICAL DISPERSION FACTOR}}{(\text{sec/m}^3)} \times \frac{\text{WHOLE BODY DOSE RATE FACTOR}}{(\text{mRem-m}^3/\mu\text{Ci-hr})} = \frac{\text{PROJECTED WHOLE BODY DOSE RATE}}{(\text{mRem/hr})}$$

EAB				
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
12				
15				

DATE: _____

TIME: _____

FORM 3A
ATTACHMENT 2
PAGE 4 of 4

PROJECTED CHILD THYROID DOSE RATE CALCULATION WORKSHEET

$$\frac{\text{PROJECTED WHOLE BODY DOSE RATE}}{(\text{mRem/hr})} \times \frac{\text{CHILD THYROID/WHOLE BODY RATIO}}{(\text{Ratio})} = \frac{\text{PROJECTED CHILD THYROID DOSE RATE}}{(\text{mRem/hr})}$$

EAB			
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
12			
15			

PERFORMED BY: _____

DOSE RATE PROJECTION BASED ON KNOWN EFFLUENT ISOTOPIC RELEASE RATE

This attachment provides the methods for calculating projected Whole Body and Child Thyroid Dose Rates, when the effluent flow rate and the concentration of each radioactive isotope released is known.

- 1.0 DETERMINATION OF WHOLE BODY RELEASE RATE
 - 1.1 Record the EFFLUENT FLOW RATE from Attachment 2, Determination of Release Pathway and Effluent Flow Rates and record on FORM 4A.
 - 1.2 Record the known concentration of each noble gas isotope on FORM 4A.
 - 1.3 Complete the calculation on FORM 4A.
- 2.0 DETERMINATION OF CHILD THYROID RELEASE RATE
 - 2.1 Record the EFFLUENT FLOW RATE from Attachment 2, Determination of Release Pathway and Effluent Flow Rates FORM 4B.
 - 2.2 Record the known concentration of each iodine isotope on FORM 4B.
 - 2.3 If the effluent sample was taken upstream of a ESF filter in the release pathway, assume a RELEASE FRACTION of 0.10 and record on FORM 4B. Otherwise, the RELEASE FRACTION is 1.0.
 - 2.4 Complete the calculation on FORM 4B.
- 3.0 DETERMINATION OF PROJECTED WHOLE BODY AND CHILD THYROID DOSE RATES

Using the WHOLE BODY RELEASE DOSE RATE FACTOR, and the CHILD THYROID RELEASE DOSE RATE FACTOR, determine the PROJECTED WHOLE BODY DOSE RATE and the PROJECTED CHILD THYROID DOSE RATE for the selected distances of interest, using FORM 4A and 4B.

 - 3.1 Record the METEOROLOGICAL DISPERSION FACTORS (X/Q) from Attachment 1, Determination of Meteorological Dispersion Factors (X/Q) and Plume Dimensions, on FORM 4A and 4B.
 - 3.2 Complete the calculations on FORM 4A and 4B.

WHOLE BODY RELEASE RATE CALCULATION WORKSHEET

CONCENTRATION (uCi/cc)	WHOLE BODY DOSE RATE FACTOR $\frac{\text{mRem-m}^3\text{-cc}}{\text{cc-l-sec-CPM}}$	DOSE CORRECTED CONCENTRATION $\frac{\text{mRem-m}^3}{\text{cc-sec-CPM}}$
17-134	4.07 5-1	
17-135	52.9	
17-136	.888	
17-137	319	
17-138	781	
17-139	893	
18-131m	4.92	
18-133m	13.5	
18-133	15.8	
18-135m	168	
18-136	97.4	
18-137	78.4	
18-138	475	

TOTAL DOSE CORRECTED CONCENTRATION $\frac{\text{mRem-m}^3}{\text{cc-sec-CPM}}$	x	FLOW RATE (CPM)	x	WHOLE BODY RELEASE DOSE RATE FACTOR $\frac{\text{mRem-m}^3}{\text{cc-sec}}$
-----------------------------------------------------------------------------------------	---	-----------------------	---	--------------------------------------------------------------------------------------------

PROJECTED WHOLE BODY DOSE RATE CALCULATION WORKSHEET

METEOROLOGICAL DISPERSION FACTOR (X/Q) (sec/m ³)	WHOLE BODY RELEASE DOSE RATE FACTOR (mRem-m ³ /sec-hr)	PROJECTED WHOLE BODY DOSE RATE (mRem/hr)
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		

DATE: _____ PERFORMED BY: _____
 TIME: _____

ESTIMATION OF DOSE RATE BASED ON FIELD MONITORING TEAM DATA

This attachment provides the methods for estimating Whole Body and Child Thyroid Dose Rates at various locations, utilizing actual field measurements taken by the Field Monitoring Teams.

1.0 SURVEY LOCATION DATA

- 1.1 From the Field Monitoring Data determine the field monitoring location which has the highest radiological survey readings, and record the data for that location on FORM 5A.
- 1.2 Record the METEOROLOGICAL DISPERSION FACTOR-(X/Q) for that location from Attachment 1, Determination of Meteorological Dispersion Factor(s) (X/Q) and Plume Dimensions, on FORM 5A.

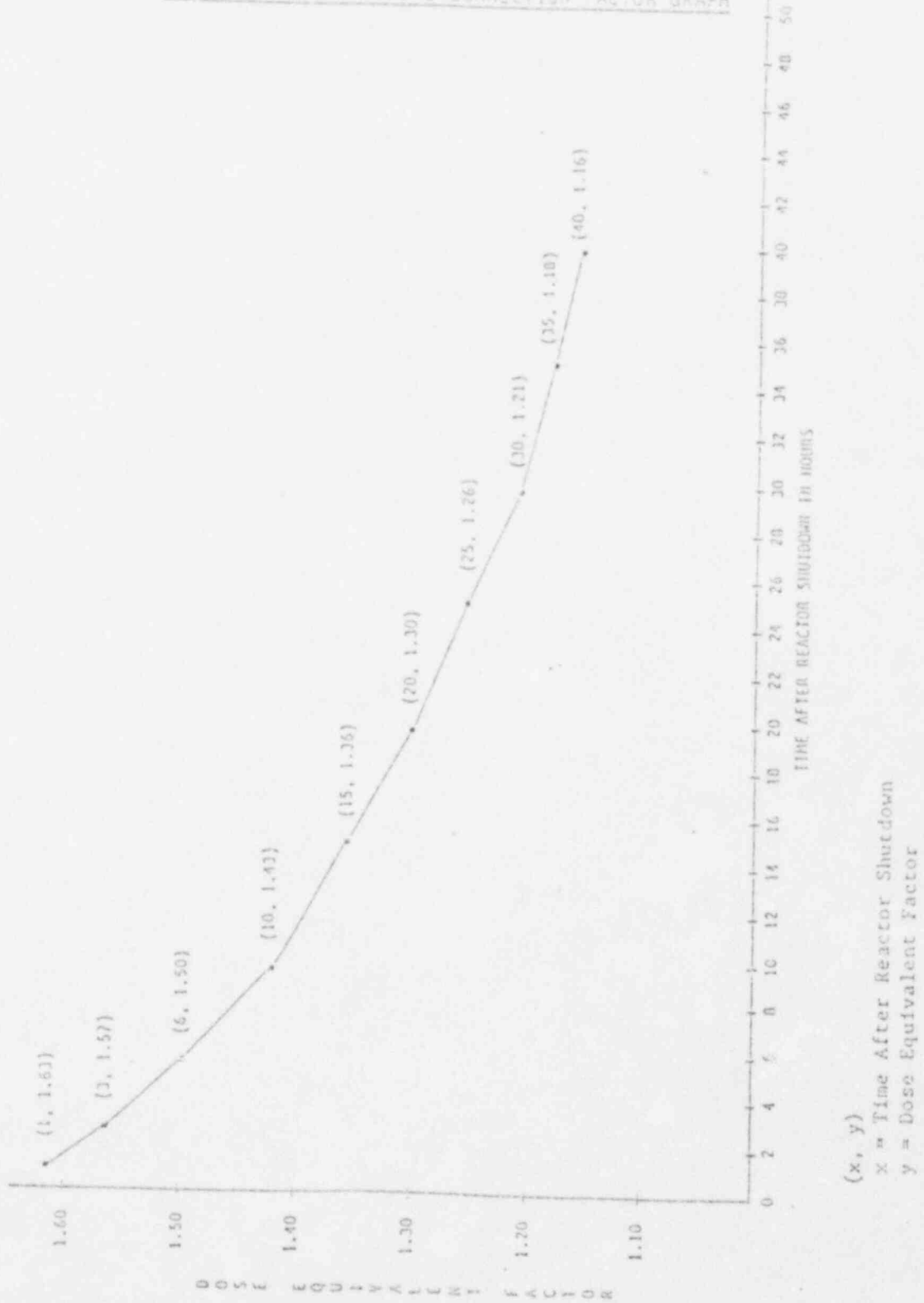
NOTE Field Monitoring shall be performed in accordance with EIP-ZZ-00223, Field Monitoring. Data will be radioed by the Field Monitoring Team(s) to the Field Team Communicator, who shall log the data and relay it to the Dose Assessment Coordinator.

2.0 ESTIMATION OF WHOLE BODY AND CHILD THYROID DOSE RATES

- 2.1 Record the METEOROLOGICAL DISPERSION FACTOR(S)-(X/Q) for each SELECTED DISTANCE of interest from Attachment 1, Determination of Meteorological Dispersion Factors (X/Q) and Plume Dimensions on FORM 5A.
- 3.0 Determine the ESTIMATED WHOLE BODY DOSE RATE for each SELECTED DISTANCE of interest on FORM 5A.
- 4.0 Determine the DOSE EQUIVALENT IODINE CORRECTION FACTOR from TABLE 5.1 and record on FORM 5A.
- 5.0 Determine the ESTIMATED CHILD THYROID DOSE RATE for each SELECTED DISTANCE of interest on FORM 5A.

TABLE 5.1

DOSE EQUIVALENT IODINE CORRECTION FACTOR GRAPH



ESTIMATION OF DOSE RATES BASED ON ISOTOPIC ANALYSIS OF
ENVIRONMENTAL SAMPLES

This attachment provides the methods for calculating Whole Body and Child Thyroid Dose Rates, utilizing the results of ISOTOPIC ANALYSIS of ENVIRONMENTAL SAMPLES taken by the field monitoring team(s). It is probable that the Whole Body dose rate or the Child Thyroid dose rate would be the limiting dose rate in the early stages of an accident. As an accident progresses, dose rates to other body organs (skin, lung, bone, etc.) and age groups (infant, teen, adult) should be calculated.

NOTE Samples collected by field monitoring teams for use in accordance with this attachment have to be returned to the EOF Laboratory (or other designated facility with gamma spectroscopy capability) for gamma analysis. The time expended by Field Monitoring Teams in returning samples to the EOF should be taken into consideration before instructing teams to collect samples for use in accordance with this attachment.
(Specifically Noble Gas samples).

1.0 ESTIMATION OF WHOLE BODY DOSE RATES

- 1.1 Record sample ID, location and time sample taken on FORM 6A.
- 1.2 Determine the MEASURED WHOLE BODY DOSE RATE, using the CONCENTRATION of each noble gas isotope and FORM 6A.

2.0 ESTIMATION OF CHILD THYROID DOSE RATES

- 2.1 Record sample ID, location and time sample taken on FORM 6A.
- 2.2 Determine the CHILD THYROID DOSE RATE, using the CONCENTRATION of each iodine isotope and FORM 6A.

SAMPLE ID
 SAMPLE LOCATION
 TIME SAMPLE TAKEN

Method No. EIP-ZZ-02211
 Rev. 0

WHOLE BODY DOSE RATE CALCULATION WORKSHEET

	CONCENTRATION (uCi/cc)	WHOLE BODY DOSE FACTOR (mRem-cc/uCi-Hr)	MEASURED WHOLE BODY DOSE RATE (mRem/Hr)
KR-83m		8.62E0	
KR-85m		1.33 E5	
KR-85		1.83 E3	
KR-87		6.75 E3	
KR-88		1.67 E6	
KR-89		1.89 E6	
Xe-131m		1.04 E4	
Xe-133m		2.86 E4	
Xe-133		3.35 E4	
Xe-135m		3.56 E5	
Xe-135		2.05 E5	
Xe-137		1.62 E5	
Xe-138		1.01 E6	
TOTAL MEASURED WHOLE BODY DOSE RATE (mRem/Hr)			

SAMPLE ID _____
 SAMPLE LOCATION _____
 TIME SAMPLE TAKEN _____

CHILD THYROID DOSE RATE CALCULATION WORKSHEET

	CONCENTRATION (uCi/cc)	CHILD THYROID DOSE FACTOR (mRem-cc/uCi-hr)	MEASURED CHILD THYROID DOSE RATE (mRem/hr)
I-131		1.85 E9	
I-132		2.21 E7	
I-133		4.39 E8	
I-134		5.78 E6	
I-135		9.03 E7	
TOTAL MEASURED CHILD THYROID DOSE RATE (mRem/hr)			

NAME: _____

DATE: _____

PERFORMED BY: _____

IDENTIFICATION OF STEAM EFFLUENT MONITOR READING

MONITOR TAG ID	READING (mRem/Hr)
AB-RE-111	_____
AB-RE-112	_____
AB-RE-113	_____
AB-RE-114	_____
FC-RE-385	_____

STEAM EFFLUENT MONITOR READING (mRem/Hr) \times SENSITIVITY FACTOR (uCi-Hr/mRem-sec) \times NOBLE GAS RELEASE RATE (uCi/sec)

	(later)	
--	---------	--

PROJECTED WHOLE BODY DOSE RATE CALCULATION

	NOBLE GAS RELEASE RATE (uCi/sec)	\times	METEOROLOGICAL DISPERSION FACTOR (sec/Hr)	\times	WHOLE BODY DOSE FACTOR (mRem-Hr/uCi-Hr)	\times	PROJECTED WHOLE BODY DOSE RATE (mRem/Hr)
EAB					(later)		
1					(later)		
2					(later)		
3					(later)		
4					(later)		
5					(later)		
6					(later)		
7					(later)		
8					(later)		
9					(later)		
10					(later)		
12					(later)		
15					(later)		

PROJECTED CHILD THYROID DOSE RATE CALCULATION

	PROJECTED WHOLE BODY DOSE RATE (mRem/Hr)	\times	CHILD THYROID/WHOLE BODY RATIO	\times	PROJECTED CHILD THYROID DOSE RATE (mRem/Hr)
EAB			(later)		
1			(later)		
2			(later)		
3			(later)		
4			(later)		
5			(later)		
6			(later)		
7			(later)		
8			(later)		
9			(later)		
10			(later)		
12			(later)		
15			(later)		

DATE: _____

TIME: _____

PERFORMED BY: _____

DOSE RATE PROJECTION BASED ON ISOTOPIC ANALYSIS OF
CONTAINMENT AIR SAMPLES

This attachment provides a method of projecting offsite Whole Body and Child Thyroid dose rates from unmonitored leakage from containment, utilizing isotopic analysis of containment air samples.

1.0 IDENTIFICATION OF SAMPLE, X/Q AND CONTAINMENT LEAKAGE RATE

- 1.1 Record sample ID on FORMS 8A and 8B.
- 1.2 Determine the METEOROLOGICAL DISPERSION FACTOR(S) (X/Q) for each selected distance of interest from Attachment 1, Determination of Meteorological Dispersion Factor(s) and Plume Dimensions and record on FORMS 8A and 8B.
- 1.3 Determine the CONTAINMENT LEAKAGE RATE ($-\lambda_{11}$) and RECORD on FORM 8A and 8B.

NOTE If unknown, use 2.31 E-8/sec (or 0.2 percent of the containment volume/day).

2.0 DETERMINATION OF PROJECTED WHOLE BODY DOSE RATES

- 2.1 Record the known CONCENTRATION of each noble gas isotope in the containment atmosphere on FORM 8A.
- 2.2 Complete the calculations on FORM 8A.
- 2.3 Record PROJECTED WHOLE BODY DOSE RATES on Attachment 12.

3.0 DETERMINATION OF PROJECTED CHILD THYROID DOSE RATE

- 3.1 Record the known concentration of each iodine isotope in the containment atmosphere on FORM 8B.
- 3.2 Complete the calculations on FORM 8B.
- 3.3 Record the PROJECTED CHILD THYROID DOSE RATES on Attachment 12.

WHOLE BODY DOSE FACTOR CORRECTED RELEASE RATE
CALCULATION WORKSHEET

SAMPLE ID _____

NOBLE GAS CONCENTRATION (uCi/cc)	CONTAINMENT LEAKAGE RATE (l/sec)	WHOLE BODY DOSE FACTOR $\left(\frac{\text{mRem-Hr-cc}}{\text{uCi-Hr}} \right)$	WHOLE BODY DOSE FACTOR CORRECTED RELEASE RATE $\left(\frac{\text{mRem-m}^3}{\text{sec-Hr}} \right)$
Kr-83m		6.10E5	
Kr-83m		9.44E9	
Kr-85		1.30E8	
Kr-87		4.78E8	
Kr-88		1.18E11	
Kr-88		1.34E11	
Kr-89		7.39E8	
Xe-131m		2.02E9	
Xe-133m		2.37E9	
Xe-133		2.52E10	
Xe-133m		1.46E10	
Xe-135		1.15E10	
Xe-137		7.13E10	
Xe-138			

TOTAL WHOLE BODY DOSE
 FACTOR CORRECTED
 RELEASE RATE
 $\left(\frac{\text{mRem-Hr}}{\text{sec-Hr}} \right)$

PROJECTED WHOLE BODY DOSE RATE
CALCULATION WORKSHEET

METEOROLOGICAL DISPERSION FACTOR (sec/m ³)	TOTAL WHOLE BODY DOSE FACTOR CORRECTED RELEASE RATE (mRem-Hr/sec-Hr)	PROJECTED WHOLE BODY DOSE RATE (mRem/Hr)
EAB		
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
12		
15		

DATE: _____
 TIME: _____
 PERFORMED BY: _____

CHILD THYROID DOSE FACTOR CORRECTED RELEASE RATE

CALCULATION WORKSHEET

SAMPLE ID

	IODINE CONCENTRATION ($\mu\text{Ci/cc}$)	x	CONTAINMENT LEAKAGE RATE (1/sec)	x	CHILD THYROID DOSE FACTOR ($\frac{\text{mRem-M}^3\text{-cc}}{\text{UCI-hr}}$)	x	CHILD THYROID DOSE FACTOR RELEASE RATE ($\frac{\text{mRem-M}^3}{\text{sec-hr}}$)
1-131					1.31E14		
1-132					1.56E12		
1-133					3.11E13		
1-134					4.09E11		
1-135					6.39E12		

TOTAL CHILD THYROID
DOSE FACTOR CORRECTED
RELEASE RATE
($\frac{\text{mRem-M}^3}{\text{sec-hr}}$)

PROJECTED CHILD THYROID DOSE RATE

CALCULATION WORKSHEET

	METEOROLOGICAL DISPERSION FACTOR (sec/M^3)	x	TOTAL CHILD THYROID DOSE FACTOR CORRECTED RELEASE RATE ($\frac{\text{mRem-M}^3}{\text{sec-hr}}$)	x	PROJECTED CHILD THYROID DOSE RATE (mRem/Hr)
EAB					
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
12					
15					

DATE:

TIME:

PERFORMED BY:

*DOSE PROJECTION/ASSESSMENT FOR PARTICULATE ACTIVITY

This section provides the methods for projecting offsite surface contamination levels utilizing data from the appropriate particulate effluent monitor or from isotopic analysis of an effluent particulate sample. The method for dose assessment for the inhalation and ingestion pathways is also included.

This attachment is generally to be used to determine the long term affect of the accident on the environment. It may not be necessary to utilize this attachment for initial dose assessments.

Environmental samples should be collected in accordance with the Radiological Environmental Monitoring Program (identified in QS-22). Collection locations for sampling may be modified as determined by field surveys and/or dose projections and calculations performed in accordance with this procedure. (This also includes Section 1 of this attachment.)

1.0 DETERMINATION OF PROJECTED OFFSITE CONTAMINATION LEVELS

- 1.1 Record the PARTICULATE EFFLUENT MONITOR TAG ID and EFFLUENT PARTICULATE ACTIVITY CONCENTRATION (uCi/cc) on FORM 9A.
- 1.2 Determine the PARTICULATE RELEASE RATE, using the EFFLUENT FLOW RATE (from Attachment 2, Determination of Release Pathway and Effluent Flow Rates) and record on FORM 9A.
- 1.3 Record the Meteorological Dispersion Factor(s) (X/Q) from Attachment 1, for each selected distance of interest.
- 1.4 Determine and record on FORM 9A the length of time (in hours) the release occurred.
- 1.5 Complete the calculations on FORM 9A and record PROJECTED OFF-SITE CONTAMINATION LEVELS on Attachment 12, if actual data is not available.

NOTE This section shall be used until such time as actual field Monitoring Measurements and or analysis of environmental sample is (are) performed.

2.0 DETERMINATION OF DOSE RATES FROM CONTAMINATED SURFACES

- 2.1 Determine the SURFACE CONTAMINATION LEVEL with isotopic analysis of soil samples collected at field locations.

- 2.2 Multiply the SURFACE CONTAMINATION LEVEL by the appropriate CONTAMINATION DOSE RATE CONVERSION FACTOR to obtain the DOSE RATE FROM CONTAMINATED SURFACES and record on FORM 9B.

NOTE CONTAMINATION DOSE RATE CONVERSION FACTORS for isotopes that are not listed may be found in USNRC Regulatory Guide 1.109. These values must be multiplied by $1.0 \text{E}12$ Pci/Ci to correct for units.

- 2.3 Sum the DOSE RATE FROM CONTAMINATED SURFACES for each isotope and record the values obtained on Attachment 12.

3.0 DETERMINATION OF INHALATION DOSE ASSESSMENT

- 3.1 Perform INHALATION DOSE ASSESSMENT for adults and children, utilizing the results of isotopic analysis of particulate air samples collected by Field Monitoring Teams. These assessments are performed and recorded on FORM 9C and 9D.

NOTE This assessment should be performed after initial WHOLE BODY AND CHILD THYROID DOSE PROJECTIONS are complete as inhalation dose equivalents are comparatively small. However, the significance of inhalation dose assessment may be increased if there is a significant holdup of activity prior to release. Inhalation dose assessment should be completed for the whole body, the lung and for any organ whose inhalation dose factor is more restrictive (greater) than that of the lung.

- 3.2 Determine and record the CONCENTRATION of each isotope in the sample on FORM 9C and 9D.
- 3.3 Multiply the concentration of each isotope by the INHALATION DOSE FACTOR to obtain the INHALATION DOSE RATE for the whole body, lung, and restrictive organ (if any).

NOTE INHALATION DOSE FACTORS for isotopes that are not listed may be found in USNRC Regulatory Guide 1.109, Table E-7 (adult) and Table E-9 (child). These values must be multiplied by $6.55 \text{E}11$ (child) or $1.42 \text{E}12$ (adult) to incorporate breathing rates and activity conversion factors ($6.33 \text{E}05$ cc/hr for child, $1.36 \text{E}06$ cc/hour for adult, and $1.0 \text{E}06$ pci/uCi).

- 3.4 Sum these values and multiply by the Exposure Time to obtain the INHALATION DOSE COMMITMENTS.

3.5 Determine the CRITICAL POPULATION SEGMENT AND THE CRITICAL ORGAN of the POPULATION for the ingestion pathway.

3.6 Record the INHALATION DOSE COMMITMENTS on Attachment 12, FORM 12A.

NOTE Not applicable to Forms 10A and 10B

4.0 ASSESSMENT OF INGESTION DOSE COMMITMENTS

4.1 Ingestion dose assessment is performed and recorded on FORMS 9E, 9F, and 9G.

4.2 Record on FORM 9E, 9F and 9G SAMPLE TYPE, SAMPLE LOCATION, and SAMPLE ID.

4.3 Determine the appropriate DAILY INGESTION FACTOR from TABLE 9.1, Daily Ingestion Factor and Record on FORM 9E and 9F.

NOTE FORM 9G has the DAILY INGESTION FACTOR incorporated within the INGESTION DOSE FACTOR.

NOTE INGESTION DOSE FACTORS are from USNRC Regulatory Guide 1.109, Table E-11 for the Adult, Table E-13 for the Child, and Table E-14 for the Infant, these are modified by a unit conversion factor of $1.0E6$ pci/ μ ci.

4.4 Record the ISOTOPIC CONCENTRATION of the sample on FORM 9E, 9F and 9G.

4.5 Perform the calculations on FORM 9E, 9F and 9G to obtain the isotopic INGESTION DOSE COMMITMENT.

4.6 Sum the ISOTOPIC DOSE COMMITMENT values to obtain the Whole Body, GI tract and critical organ INGESTION DOSE COMMITMENTS for the food item.

4.7 Determine the CRITICAL POPULATION SEGMENT and CRITICAL ORGAN of the population for the ingestion pathway.

4.8 Record the INGESTION DOSE COMMITMENTS on Attachment 12, FORM 12A.

NOTE Not applicable to Forms 10A and 10B.

TABLE 9.1
DAILY INGESTION FACTOR

	Infant	Child	Adult
Milk (l/day)	0.9	.9	0.85
Water (l/day)	0.9	1.4	2.0
Meat/Poultry (kg/day)	0	.11	0.3
Vegetables/Fruits (kg/day)	0	1.44	1.6
Fish (kg/day)	0	0.02	0.06

PARTICULATE RELEASE RATE WORKSHEET

PARTICULATE EFFLUENT MONITOR ID _____

$$\boxed{} \times \boxed{} \times 472 \frac{\text{min. cm}^3}{\text{sec-ft}^3} = \boxed{}$$

Effluent Particulate
Activity Concentration
(uCi/cc)

Effluent
Flow Rate
(CFM)

Particulate
Release Rate
(uCi/sec)

PROJECTED OFFSITE CONTAMINATION WORKSHEET

Distance	Particulate Release Rate (uCi/sec)	Metereological Dispersion Factor(L/Q) (sec/m ²)	Release Time (hours)	Conversion Factors x 3.6 E-05*	Projected Offsite Contamination Levels (Ci/m ²)
1AS				3.6 E-05	
1				3.6 E-05	
2				3.6 E-05	
3				3.6 E-05	
4				3.6 E-05	
5				3.6 E-05	
6				3.6 E-05	
7				3.6 E-05	
8				3.6 E-05	
9				3.6 E-05	
10				3.6 E-05	
12				3.6 E-05	
15				3.6 E-05	

* Includes unit conversion factors of 3600 sec/hr and 1 E06 uCi/Ci and a particulate deposition factor of 0.01 m/sec.

FORM 9A

DOSE RATE FROM CONTAMINATED SURFACES

LOCATION _____

SAMPLE ID _____

ISOTOPE	SURFACE CONTAMINATION LEVEL (Ci/m ²)	CONTAMINATION DOSE RATE CONVERSION FACTOR (mrem/m ² /hr·Ci)	DOSE RATE FROM CONTAMINATED SURFACES (mrem/hr)	
			(WB)	(SKIN)
Cr-51		2.60E02 (Skin)		
		2.20E02 (WB)		
Mn-54		6.80E03 (Skin)		
		5.80E03 (WB)		
Fe-59		9.40E03 (Skin)		
		8.00E03 (WB)		
Co-58		8.20E03 (Skin)		
		7.00E03 (WB)		
Co-60		2.00E04 (Skin)		
		1.70E04 (WB)		
Zn-65		4.60E03 (Skin)		
		4.00E03 (WB)		
Sr-89		6.50E-01 (Skin)		
		5.50E-01 (WB)		
Y-90		2.60 (Skin)		
		2.20 (WB)		
Zr-95		5.80E03 (Skin)		
		5.00E03 (WB)		
Nb-95		6.00E03 (Skin)		
		5.10E03 (WB)		
Mo-99		2.20E03 (Skin)		
		1.90E03 (WB)		
I-131		3.40E03 (Skin)		
		2.80E03 (WB)		
I-132		4.50E03 (Skin)		
		3.70E03 (WB)		
Cs-134		1.40E04 (Skin)		
		1.20E04 (WB)		
Cs-137		4.90E03 (Skin)		
		4.20E03 (WB)		
Ba-140		2.40E03 (Skin)		
		2.10E03 (WB)		
La-140		1.70E04 (Skin)		
		1.50E04 (WB)		
Ce-144		3.70E02 (Skin)		
		3.20E02 (WB)		
		(Skin)		
		(WB)		
		(Skin)		
		(WB)		
DATE: _____			TOTAL WB DOSE RATE	
TIME: _____			TOTAL SKIN DOSE RATE	
PERFORMED BY: _____				

FORM 98

INHALATION DOSE COMMITMENT REPORT

LOCATION: _____

SAMPLE ID: _____

ISOTOPE	CONCENTRATION (uCi/gp)	x	INHALATION DOSE FACTOR (mrem-cp/uCi-hr)		x	INHALATION DOSE RATE (mrem/hr of exposure)		
			(WB)	(LUNG)		(WB)	(LUNG)	(OTHER)
Cr-51			1.14E04 (WB)					
			1.54E06 (Lung)					
Mn-54			7.19E05 (WB)					
			1.50E08 (Lung)					
Fe-59			1.21E06 (WB)					
			1.16E08 (Lung)					
Co-58			2.37E05 (WB)					
			1.05E08 (Lung)					
Co-60			1.68E06 (WB)					
			6.81E08 (Lung)					
In-65			5.31E06 (WB)					
			9.86E07 (Lung)					
Sr-89			9.95E05 (WB)					
			1.40E08 (Lung)					
			6.96E08 (WB)					
			1.10E09 (Lung)					
Sr-90			1.13E10 (Bone)					(BONE)
			6.40E03 (WB)					
Y-90			1.94E07 (Lung)					
			2.65E06 (WB)					
Zr-95			2.02E08 (Lung)					
			4.80E05 (WB)					
Nb-95			5.76E07 (Lung)					
			2.62E03 (WB)					
			1.04E07 (Lung)					
			2.83E07 (GI)					
Mo-99			8.31E07 (WB)					(GI)
			1.11E07 (Lung)					
Cs-134			4.26E07 (Bone)					(BONE)
			4.89E07 (WB)					
			8.58E06 (Lung)					
			7.09E07 (Liver)					
Cs-137			2.93E05 (WB)					(LIVER)
			1.45E08 (Lung)					
Ba-140			5.23E03 (WB)					
			1.55E07 (Lung)					
La-140			5.23E07 (GI)					(GI)
			2.10E07 (WB)					
Ce-144			8.88E08 (Lung)					

	INHALATION DOSE (mrem/hr of exposure)	x	EXPOSURE TIME (HOURS)	x	INHALATION DOSE COMMITMENT (mrem)
WHOLE BODY					
LUNG					
BONE					
GI					
LIVER					

DATE: _____

FORM 9C

TIME: _____

PERFORMED BY: _____

INHALATION DOSE COMMITMENT - CHILD

SAMPLE 10

	INHALATION DOSE ($\mu\text{mcm}^3/\text{kg}$ of exposure)	X	EXPOSURE TIME (Hours)	*	INHALATION DOSE COMMITMENT (μmcm^3)
WHOLE BODY					
LUNG					
BONE					
GI					
LIVER					

DATE: _____

FORM 90

TIME:

PERFORMED BY:

INGESTION DOSE ASSESSMENT WORKSHEET - ADULT

Sample Type: Milk ☐ Water ☐ Meat/Poultry ☐ Fish ☐ Vegetables/Fruit ☐

Sample Location: _____ Sample ID: _____

ISOTOPE	ISOTOPIC CONCENTRATION ($\mu\text{Ci}/\text{unit}^*$)	DAILY INGESTION FACTOR (unit/day)	INGESTION DOSE FACTOR (mrem/ μCi)	INGESTION DOSE COMMITMENT (mrem)**
Sr-90			8.84 (WB)	(WB)
			4.94E1 (GI)	(GI)
			1.08E2 (BONE)	(BONE)
Sr-90			1.85E3 (WB)	(WB)
			2.19E2 (GI)	(GI)
			7.58E3 (BONE)	(BONE)
I-131			3.41 (WB)	(WB)
			1.57 (GI)	(GI)
			1.95E3 (THYROID)	(THYROID)
I-131			7.53E-1 (WB)	(WB)
			7.22 (GI)	(GI)
			3.43E2 (THYROID)	(THYROID)
Cs-134			1.21E2 (WB)	(WB)
			2.59 (GI)	(GI)
			1.48E2 (LIVER)	(LIVER)
Cs-137			7.14E1 (WB)	(WB)
			2.11 (GI)	(GI)
			1.09E2 (LIVER)	(LIVER)

* A unit equals 1 liter for milk and water and 1 kg for all others

** mrem/day of exposure

Total Whole Body Ingestion Dose Commitment _____ mrem

Total Thyroid Ingestion Dose Commitment _____ mrem

Total GI Tract Ingestion Dose Commitment _____ mrem

Total Bone Ingestion Dose Commitment _____ mrem

Total Liver Ingestion Dose Commitment _____ mrem

DATE: _____

TIME: _____

PERFORMED BY: _____

INGESTION DOSE ASSESSMENT WORKSHEET - INFANT

Sample Type: Milk ☐ Water ☐

Sample Location: _____ Sample ID: _____

ISOTOPE	ISOTOPIC CONCENTRATION (uCi/liter)	INGESTION DOSE FACTOR (mrem-liter/ ⁻¹ -day)	INGESTION DOSE COMMITMENT (mrem)
Sr-89		6.48E01 (WB)	(WB)
		4.54E01 (GI)	(GI)
		2.26E01 (BONE)	(BONE)
Sr-90		4.24E01 (WB)	(WB)
		2.08E02 (GI)	(GI)
		1.66E04 (BONE)	(BONE)
I-131		1.67E01 (WB)	(WB)
		1.36 (GI)	(GI)
		1.25E04 (THYROID)	(THYROID)
I-133		4.60 (WB)	(WB)
		2.77 (GI)	(GI)
		2.98E02 (THYROID)	(THYROID)
Cs-134		6.39E01 (WB)	(WB)
		1.72 (GI)	(GI)
		6.38E02 (LIVER)	(LIVER)
Cs-137		3.90E01 (WB)	(WB)
		1.72 (GI)	(GI)
		5.50E02 (LIVER)	(LIVER)

* mrem/day of exposure

Total Whole Body Ingestion Dose Commitment _____ mrem
 Total Thyroid Ingestion Dose Commitment _____ mrem
 Total GI Tract Ingestion Dose Commitment _____ mrem
 Total Bone Ingestion Dose Commitment _____ mrem
 Total Liver Ingestion Dose Commitment _____ mrem

DATE: _____

TIME: _____

PERFORMED BY: _____

FORM 9G

INTEGRATED DOSE ASSESSMENT

This attachment provides the method to record Projected and Measured Whole Body and Child Thyroid Dose Rates at one location for comparison and calculation of cumulative exposures.

1.0 IDENTIFICATION OF SAMPLE LOCATION

1.1 Identify the location and record in FORM 10A.

NOTE Maintain a separate Attachment 10, Integrated Dose Assessment, for each location that Dose Assessment is performed.

2.0 DETERMINATION OF THE CUMULATIVE WHOLE BODY DOSE AND CUMULATIVE CHILD THYROID DOSE

2.1 Determine the PROJECTED, ESTIMATED, or MEASURED WHOLE BODY DOSE RATES AND CHILD THYROID DOSE RATES at the location from one of the following attachments and record on FORM 10A.

- Attachment 3 - Dose Projection Based on Noble Gas Effluent Monitors
- Attachment 4 - Dose Projection Based on Effluent Isotopic Analysis
- Attachment 5 - Estimation of Dose Rate Based on Field Monitoring Data
- Attachment 6 - Estimation of Dose Rate Based on Isotopic Analysis of Environmental Samples
- Attachment 7 - Dose Rate Projection Based on Steam Effluent Monitors
- Attachment 8 - Dose Rate Projection Based on Isotopic Analysis of Containment Air Samples

2.2 Determine the ELAPSED TIME from the start of the release to the first calculation. The ELAPSED TIME, thereafter, is the time between subsequent calculations. Record the ELAPSED TIME on FORM 10A.

2.3 Determine the ESTIMATED WHOLE BODY DOSE and ESTIMATED CHILD THYROID DOSE for each period of ELAPSED TIME.

2.4 Determine the total CUMULATIVE WHOLE BODY DOSE and CUMULATIVE CHILD THYROID DOSE by adding all of the ESTIMATED WHOLE BODY DOSES and ESTIMATED CHILD THYROID DOSES for all of the elapsed time periods during the release.

FIGURE 10-1
10-MILE EMERGENCY PLANNING ZONE
POPULATION DENSITY

*TABLE 10.1

POPULATION CENTERS

POPULATION CENTERS	POPULATION	DISTANCE FROM PLANT (MILES)
Chamois	615	6
Fulton	12,248	10
Hams Praire	(TBD)	7
Mokane	398	8
Morrison	234	10
Portland	(TBD)	5
Readsville	(TBD)	4
Rhineland	172	15
Starkenbourg	(TBD)	13
Steedman	(TBD)	4

ESTIMATED WHOLE BODY DOSE AND

CUMULATIVE EXPOSURE CALCULATION WORKSHEET

	ESTIMATED OR MEASURED WHOLE BODY DOSE RATE (mRem/hr)	ELAPSED TIME (hrs)	ESTIMATED WHOLE BODY DOSE (mRem)	CUMULATIVE WHOLE BODY DOSE (mRem)
START TIME:				
END TIME:				
START TIME:				
END TIME:				
START TIME:				
END TIME:				
START TIME:				
END TIME:				
START TIME:				
END TIME:				

ESTIMATED CHILD THYROID DOSE

CUMULATIVE EXPOSURE CALCULATION WORKSHEET

	ESTIMATED OR MEASURED CHILD THYROID DOSE RATE (mRem/hr)	ELAPSED TIME (hrs)	ESTIMATED CHILD THYROID DOSE (mRem)	CUMULATIVE CHILD THYROID DOSE (mRem)
START TIME:				
END TIME:				
START TIME:				
END TIME:				
START TIME:				
END TIME:				
START TIME:				
END TIME:				
START TIME:				
END TIME:				

DATE: _____

PERFORMED BY: _____

TOTAL POPULATION EXPOSURE CALCULATION WORKSHEET

SECTOR	ZONE		DOSE (mRem)	x	POPULATION DENSITY	=	TOTAL POPULATION DOSE (mRem)
		WHOLE BODY					
		CHILD THYROID					
		WHOLE BODY					
		CHILD THYROID					
		WHOLE BODY					
		CHILD THYROID					
		WHOLE BODY					
		CHILD THYROID					
		WHOLE BODY					
		CHILD THYROID					
		WHOLE BODY					
		CHILD THYROID					
		WHOLE BODY					
		CHILD THYROID					
		WHOLE BODY					
		CHILD THYROID					

DATE: _____

TIME: _____

PERFORMED BY: _____

CONTINGENCY CALCULATIONS

This attachment provides a method to project offsite whole body and child thyroid doses, utilizing conservative accident assumptions, in the event that no data is available from the Radiation Monitoring System. As it is unlikely that actual accident conditions would be similar to those postulated, this attachment should only be used until other data is available.

1.0 NOBLE GAS AND IODINE ACTIVITY RELEASED DETERMINATION

1.1* Determine the Noble Gas Activity Released and the Iodine activity Released for each isotope using one of the following tables.

- Table 11.1 - Loss of Coolant Accident Contingency Calculation
- Table 11.2 - Steam Generator Tube Rupture Contingency Calculation
- Table 11.3 - Fuel Handling Accident Inside Reactor Building Contingency Calculation
- Table 11.4 - Fuel Handling Accident Inside Fuel Handling Building Contingency Calculation
- Table 11.5 - Main Steam Break Contingency Calculation
- Table 11.6 - CVCS Letdown Line Rupture Outside Reactor Building Contingency Calculation
- Table 11.7 - Rod Cluster Control Assembly Ejection Contingency Calculation
- Table 11.8 - Locked Rotor Accident Contingency Calculation
- Table 11.9 - Waste Gas Decay Tank Rupture Contingency Calculation
- Table 11.10- Liquid Radwaste Tank Failure Contingency Calculation

1.2* (LATER - REMAINDER OF ATTACHMENT TO BE DEVELOPED UPON COMPLETION OF ABOVE TABLES)

DATE: _____
TIME: _____
PERFORMED BY: _____

CALLAWAY PLANT
EMERGENCY PLAN IMPLEMENTING PROCEDURE

EIP-ZZ-A0010
EMERGENCY DRILLS AND EXERCISES

RESP. DEPT. Emergency Preparedness PREPARED BY Russell Wolfe

APPROVED BY Steven E. Mittleberg DATE 11-21-83

DATE ISSUED 11/23/83

This procedure contains the following:

Pages	<u>1</u>	through	<u>28</u>
Attachments	<u>1</u>	through	<u>11</u>
Appendices	<u></u>	through	<u></u>
Checklists	<u></u>	through	<u></u>

INFORMATION ONLY
UNCONTROLLED
COPY

Proced. No. FIP-22-A0010
Rev. 0
Date 11/20/83

DEFICIENCY LIST

Section	Deficiency Description	Constraints
Attachment 1	A communications test procedure needs to be developed.	None

Table of Contents

<u>Section</u>	<u>Page Number</u>
1.0 Purpose and Scope	1
2.0 Definitions	1
3.0 Responsibilities	2
4.0 Drill/Exercise Planning Guidelines	5
4.1 Determining Drill/Exercise Type and Scope	5
4.2 Developing A Drill and Exercise Schedule	6
5.0 Drill Preparation Guidelines	7
5.1 Drill Approval	7
5.2 Drill Development	8
6.0 Exercise Preparation	10
6.1 Supervisor, Emergency Preparedness	10
6.2 Manager, Nuclear Safety and Emergency Preparedness	11
6.3 Exercise Coordinator	11
7.0 Drill/Exercise Conduct	20
7.1 Drill/Exercise Guidelines	20
7.2 Drill Exercise Critiques	22
8.0 Drill/Exercise Records	24
8.1 Drill Exercise Participants	24
8.2 Drill Exercise Controllers/Observers	25
8.3 Drill/Exercise Coordinator	25
8.4 Supervisor, Emergency Preparedness	26
9.0 Records	27
9.1 QA Records	27
9.2 Commercial Records	27
10.0 References	27
11.0 Attachments	27
Attachment 1 - Drill and Exercise Descriptions and Frequencies	
Attachment 2 - Exercise Scheduling Milestones	
Attachment 3 - Drill Approval Form	
Attachment 4 - Plan/Procedure Implementation Checklist	
Attachment 5 - Pre-Drill/Exercise Checklist	
Attachment 6 - Scenario Form	
Attachment 7 - Controller Guide	
Attachment 8 - Scenario Message Form	
Attachment 9 - Exercise Development Checklist	
Attachment 10 - Controller Observer Comment Sheet	
Attachment 11 - Comment/Recommendation Sheet	

EMERGENCY DRILLS AND EXERCISES

1.0 PURPOSE AND SCOPE

The purpose of this procedure is to provide guidance in developing and conducting emergency drills and exercises.

2.0 DEFINITIONS

2.1 CONTROLLER

An individual assigned to monitor and evaluate a particular area or group during a drill/exercise, and having the responsibility of implementing the scenario and providing guidance, if necessary.

2.2 DRILL

A supervised instruction period aimed at testing, developing, and maintaining proficiency in a particular operation.

2.3 DRILL/EXERCISE COORDINATOR

The individual responsible for drill/exercise development and conduct. The Drill/Exercise Coordinator has the authority to start, stop, or place the drill/exercise on temporary hold.

2.4 DRILL/EXERCISE SCENARIO

A chronological sequence of events used to conduct and control a drill or exercise.

2.5 EXERCISE

An event that tests the overall and integrated ability of Union Electric Emergency organizations and off-site response agencies to respond to a simulated emergency.

2.6 EXERCISE PACKAGE

A final document which is the basis for the conduct of an exercise.

2.7 EXERCISE PROPOSAL

A preliminary document which provides a basic overview, including the tentative date, purpose, objectives, and participants, of the exercise.

2.8 OBSERVER

An individual assigned to evaluate one or more participant's activities during a drill/exercise, but having no authority to influence the conduct of the drill/exercise.

2.9 PARTICIPANT

A response organization (e.g., UE, state, local) member who responds during the drill/exercise in accordance with appropriate plans and procedures to a simulated emergency.

2.10 Visitor

An individual who does not participate or evaluate, but only watches a drill/exercise.

3.0 RESPONSIBILITIES

3.1 VICE PRESIDENT, NUCLEAR

The Vice President, Nuclear, shall:

3.1.1 Review and approve Exercise Proposals.

3.1.2 Review and sign the Exercise Package cover letter.

3.2 MANAGER, CALLAWAY PLANT

The Manager, Callaway Plant, or designee, shall:

- 3.2.1 Approve the conduct of drills which involve participation of UENO personnel.
- 3.2.2 Review and approve Exercise Proposals.
- 3.2.3 Provide support in the development, observation, evaluation, and performance of drills and exercises.
- 3.2.4 Assign a designee to approve drills in which he will participate.

3.3 GENERAL MANAGER, ENGINEERING (NUCLEAR)

The General Manager, Engineering, or designee, shall:

- 3.3.1 Approve the conduct of drills which involve the participation of Corporate Nuclear Function personnel and/or off-site agencies.
- 3.3.2 Review and approve Exercise Proposals.
- 3.3.3 Provide support in the development and conduct of drills and exercises.
- 3.3.4 Assign a designee to approve drills in which he will participate.

3.4 MANAGER, NUCLEAR SAFETY AND EMERGENCY PREPAREDNESS

The Manager, Nuclear Safety and Emergency Preparedness, shall:

- 3.4.1 Be responsible for emergency drills and exercises, including preparation, submission, approval, and conduct.

3.4.2 Initiate effective courses of corrective action and ensure resolution of the emergency preparedness deficiencies defined through the conduct of drills and exercises.

3.4.3 Assign a designee to review and approve Exercise Scenarios, Controller/Observer Packages, and Exercise Packages for exercises in which he will participate.

3.5 MANAGER, NUCLEAR INFORMATION

The Manager, Nuclear Information, or designee, shall:

3.5.1 Provide support in the development of drills and exercises which involve participation of Public Relations (PR) personnel.

3.5.2 Provide assistance in the scheduling of PR personnel participating in drills and exercises.

3.5.3 Coordinate news releases concerning forthcoming drills and exercises with the Manager, Nuclear Safety and Emergency Preparedness.

3.6 MANAGERS, NUCLEAR FUNCTION, AND ASSISTANT MANAGERS, CALLAWAY PLANT

The Managers, Nuclear Function, and Assistant Managers, Callaway Plant, shall:

3.6.1 Provide support in the development and conduct of drills and exercises involving activities related to their respective departments.

3.6.2 Assist in the scheduling of personnel from their respective departments participating in drills and exercises.

3.6.3 Assist in resolving deficiencies identified in emergency preparedness affecting their respective departmental activities.

3.7 SUPERVISOR, EMERGENCY PREPAREDNESS

The Supervisor, Emergency Preparedness shall:

- 3.7.1 Ensure that drills and exercises are conducted at the appropriate frequencies.
- 3.7.2 Ensure that drills and exercises are coordinated with Union Electric Departments and off-site organizations involved in drills and exercises.
- 3.7.3 Ensure that drills and exercises are approved through appropriate channels.
- 3.7.4 Initiate effective courses of corrective actions to resolve emergency preparedness deficiencies identified through the conduct of drills and exercises.
- 3.7.5 Ensure that drills and exercises are documented including the corrective actions taken to resolve emergency preparedness deficiencies.

4.0 DRILL/EXERCISE PLANNING GUIDELINES

4.1 DETERMINING DRILL/EXERCISE TYPE AND SCOPE

The Supervisor Emergency Preparedness, shall ensure that drills and exercises are identified by type and scope (the exercise scope shall be further defined in 6.3.2.1), and that Drill/Exercise Coordinators are identified, taking into consideration the following:

- 4.1.1 Attachment 1, Drill and Exercise Descriptions and Frequencies.
- 4.1.2 Drills are not necessarily required to be conducted independently and may be conducted with other drills or as components of an exercise.

- 4.1.3 Responses to actual situations may satisfy drill requirements, provided that the response actions are properly documented and the situation sufficiently tests the emergency response for the drills in question.
- 4.1.4 Exercises shall include mobilization of UE, appropriate State, and selected local organizations to verify their ability to respond to an accident scenario which requires implementation of on-site and off-site radiological emergency response plans.
- 4.1.5 Exercise scenarios shall be varied from year to year to assure that all the major elements of on-site and off-site emergency plans and organizations are tested within a five year period.
- 4.1.6 Drills and exercises shall be conducted under various weather conditions (e.g., spring, summer, fall, winter).
- 4.1.7 Some drills and exercises shall be unannounced.

4.2 DEVELOPING A DRILL AND EXERCISE SCHEDULE

Upon establishing the type and scope of drills and exercises, the Supervisor, Emergency Preparedness shall ensure that a drill/exercise schedule is developed, utilizing information from the following:

- 4.2.1 Determine the drill/exercise frequencies using Attachment 1 as guidance.
- 4.2.2 Use Attachment 2, Exercise Scheduling Milestones, and ensure sufficient lead-time is available to develop the elements necessary to conduct the exercise.

4.2.3 Coordinate with the Superintendent, Planning and Scheduling; Superintendent, Training; and the following organizations, as appropriate, and determine drill/exercise dates and times.

4.2.3.1 Union Electric Nuclear Operations

4.2.3.2 Union Electric Nuclear Engineering

4.2.3.3 Union Electric Public Relations

4.2.3.4 State Emergency Management Agency (SEMA)

NOTE SEMA is responsible for providing input from the risk Counties.

4.2.3.5 Federal organizations, if Federal response is planned to be part of the exercise.

5.0 DRILL PREPARATION GUIDELINES

5.1 DRILL APPROVAL

5.1.1 SUPERVISOR, EMERGENCY PREPAREDNESS

Upon scheduling a required drill the Supervisor, Emergency Preparedness, shall ensure that the following actions are completed:

5.1.1.1 Complete Items 1-8 of Attachment 3, Drill Approval Form.

5.1.1.2 Forward Attachment 3 and supporting documents to the Manager, Nuclear Safety and Emergency Preparedness for approval.

5.1.2 MANAGER, NUCLEAR SAFETY AND EMERGENCY PRE-
PAREDNESS

The Manager, Nuclear Safety and Emergency Preparedness, shall:

5.1.2.1 Review and approve the completed Attachment 3 and forward to the Manager, Callaway Plant and the General Manager, Engineering (Nuclear), as appropriate.

5.1.2.2 Upon obtaining necessary signatures, retain the original of the completed Attachment 3 and make a copy for the Drill Coordinator.

5.2 DRILL DEVELOPMENT

5.2.1 DRILL COORDINATOR

The Drill Coordinator shall develop the drill using the completed Attachment 3 (5.1.2.2): Attachment 5, Pre-Drill/Exercise Checklist: and the following guidelines.

5.2.1.1 Identify and request support necessary to prepare for the drill through the Supervisor, Emergency Preparedness.

5.2.1.1.1 Ensure items and tasks which are necessary to conduct the drill are identified and completed.

5.2.1.2 Ensure that the scenario elements of the drill are kept confidential among personnel involved in their development.

5.2.1.3 Ensure that personnel involved in the development of scenario elements are not drill participants.

5.2.1.4 Identify Drill Controllers, Observers, and participants by discipline, and/or department/organization, and ensure that they are scheduled.

- 5.2.1.5 Coordinate the drill with UE departments and off-site organizations, as necessary, through the Supervisor, Emergency Preparedness.
- 5.2.1.6 Establish a schedule and agendas of necessary meetings, (e.g. Controller/Observer orientations and briefings, participant meetings, drill coordination meetings, critiques).
- 5.2.1.7 Coordinate the development of a drill scenario, utilizing the information in Sections 1 through 5 of the completed Attachment 3.
 - 5.2.1.7.1 The scenario shall be in sufficient detail to adequately control and evaluate the drill.
 - 5.2.1.7.2 Attachments 6, Scenario Form: 7, Controller Guide: and 8, Scenario Message Form may be utilized as necessary.
 - 5.2.1.7.3 Forward the completed scenario to the Supervisor, Emergency Preparedness for appropriate review and approval.
 - 5.2.1.7.4 Ensure that recent changes to plans, procedures, philosophies, etc., are evaluated and incorporated, as necessary, to ensure proper conduct of the drill.
- 5.2.1.8 Coordinate the development of a Controller/Observer Package utilizing the guidelines of Section 6.3.4, as necessary.
 - 5.2.1.8.1 Forward the completed Controller/Observer Package to the Supervisor, Emergency Preparedness for review and approval.
- 5.2.1.9 Conduct Controller/Observer orientations, as necessary, to ensure that they are aware of their duties, how the drill will be conducted and evaluated, and the use of the Controller/Observer packages.

5.2.1.10 Conduct a pre-drill briefing for Controllers and Observers, preferably a few hours before the drill, and distribute the necessary documents and supplies to the Drill Controller/Observers.

5.2.1.11 Conduct the drill as scheduled utilizing guidance provided in Section 7.0 of this procedure.

6.0 EXERCISE PREPARATION

6.1 SUPERVISOR, EMERGENCY PREPAREDNESS

Upon scheduling a required exercise, the Supervisor, Emergency Preparedness, shall ensure that the following actions are completed:

6.1.1 Assign an Exercise Coordinator, if not previously assigned, and form an Exercise Committee to assist in exercise development. The Exercise Committee shall consist of appropriate representatives from the following organizations:

NOTE The Exercise Coordinator shall be the Exercise Committee Chairman. Exercise Committee members shall not be Exercise Participants, but may be utilized as Controllers.

6.1.1.1 Union Electric Nuclear Operations

6.1.1.2 Union Electric Nuclear Engineering

6.1.1.3 Union Electric Public Relations

6.1.1.4 State Emergency Management Agency (SEMA)

NOTE SEMA is responsible for providing input from the risk Counties.

- 6.1.2 Direct the Exercise Coordinator to develop the exercise including the following with assistance of the Exercise Committee:
 - 6.1.2.1 Exercise Proposal
 - 6.1.2.2 Exercise Scenario
 - 6.1.2.3 Controller/Observer Package
 - 6.1.2.4 Exercise Package
- 6.1.3 Review and approve the items listed in 6.1.2 and forward them to the Manager, Nuclear Safety and Emergency Preparedness.
- 6.1.4 Provide assistance as necessary in the development of the exercise.
- 6.2 MANAGER, NUCLEAR SAFETY AND EMERGENCY PREPAREDNESS

The Manager, Nuclear Safety and Emergency Preparedness, or designee shall:

 - 6.2.1 Review and approve the items in 6.1.2.
 - 6.2.2 Forward the Exercise Proposal to the Manager, Callaway Plant: General Manager, Engineering (Nuclear); and Vice President, Nuclear for approval.
 - 6.2.3 Forward the Exercise Package cover letter to the Vice President, Nuclear, for his signature.
 - 6.2.4 Ensure that the submittal requirements of Attachment 2 are met.
- 6.3 EXERCISE COORDINATOR

The Exercise Coordinator shall coordinate the development of the exercise with the Exercise Committee.

6.3.1 PRE-EXERCISE ACTIVITIES

Upon being tasked to develop and conduct the exercise, the Exercise Coordinator shall prepare for the exercise using Attachment 5, Pre Drill/Exercise Checklist, and the following guidelines as appropriate:

NOTE The items in Section 6.3.2, 6.3.3, and 6.3.4 may be developed concurrently with the items in this Section.

- 6.3.1.1 Identify and request support necessary to prepare for the exercise through the Supervisor, Emergency Preparedness.
- 6.3.1.1.1 Ensure items and tasks which are necessary to conduct the exercise are identified and completed.
- 6.3.1.2 Ensure that scenario elements of the exercise are kept confidential among personnel involved in their development.
- 6.3.1.3 Ensure personnel involved in the development of scenario elements of the exercise are not exercise participants.
- 6.3.1.4 Identify exercise Controllers, Observers, and participants by discipline, and/or department/organization and ensure that they are scheduled.
 - 6.3.1.4.1 A sufficient number of Controllers and Observers shall be designated to support the scenario.
 - 6.3.1.4.2 Observers from Federal, State, and local organizations shall be invited to attend exercises.
- 6.3.1.5 Coordinate the exercise with UE departments and off-site organizations as necessary, through the Supervisor, Emergency Preparedness.

- 6.3.1.6 Establish a schedule and agenda of necessary meetings. These meetings may include:
 - 6.3.1.6.1 Exercise coordination meetings (including meetings with Federal, State, and local officials).
 - 6.3.1.6.2 Controller and Observer orientations and briefings.
 - 6.3.1.6.3 Participant meetings (pre- and post-exercise)
 - 6.3.1.6.4 Critiques
 - 6.3.1.6.5 Corrective action meetings
 - 6.3.1.7 Conduct orientations for Controllers, Observers, and participants to ensure that they are aware of their duties, and the conduct of the exercise.
 - 6.3.1.8 Conduct a pre-exercise briefing with Controllers and Observers, preferably a few hours before the exercise and distribute the necessary documents and supplies.
 - 6.3.1.9 Conduct the exercise utilizing the guidance provided in Section 7.0 of this procedure.
- 6.3.2 EXERCISE PROPOSAL

Develop an Exercise Proposal as follows:

 - 6.3.2.1 Identify and develop the scope of the exercise utilizing Attachment 9, Exercise Development Checklist, and addressing the guidelines in 4.1 and the following:
 - 6.3.2.1.1 Areas where weakness was demonstrated in previous drills and exercises.
 - 6.3.2.1.2 Response to a simulated emergency which results in off-site radiological releases which require response by off-site authorities (SITE or GENERAL EMERGENCY).

- 6.3.2.1.3 Response by on-site and off-site emergency organizations, down to working level activities.
- 6.3.2.1.4 Implementation of emergency plans by organizations which are to participate in the exercise.
- 6.3.2.2 Using the exercise scope and the completed Attachment 9 prepared in 6.3.2.1, develop detailed on-site and off-site objectives which shall be used to establish the scope and boundaries of the Exercise Scenario and to establish areas to be tested. It should be noted in the objectives whether certain items will be simulated (e.g., non-essential personnel or public evacuation, public alert system activation). The following areas should be addressed, as appropriate:
 - 6.3.2.2.1 Accident Classification and Assessment.
 - 6.3.2.2.2 Notification and Communications.
 - 6.3.2.2.3 Activation and Response.
 - 6.3.2.2.4 Emergency Response Facility Activation and Operations.
 - 6.3.2.2.5 Direction and Control (Organizational).
 - 6.3.2.2.6 Radiological Assessment.
 - 6.3.2.2.7 Access Control.
 - 6.3.2.2.8 Public Information.
 - 6.3.2.2.9 Protective Actions (Decision Making).
 - 6.3.2.2.10 Exposure Control.
 - 6.3.2.2.11 Reentry and Recovery.

6.3.2.3 Prepare the Exercise Proposal using the following format as a guideline:

6.3.2.3.1 Cover Letter

The letter contains the purpose of the Exercise Proposal, the proposed exercise time and date, and the individual(s) who should be contacted for further information concerning the proposal. The letter shall be signed by the V.P., Nuclear, upon his review and approval of the proposal. The letter should be a ULNRC.

6.3.2.3.2 Exercise Scope

This section contains the scope developed in 6.3.2.1 including organizations which are anticipated to participate in the exercise (e.g., UE, State, local).

6.3.2.3.3 Exercise Objectives

This section contains the detailed objectives of the exercise as discussed in Step 6.3.2.2

6.3.2.4 Submit the completed Exercise Proposal to the Supervisor, Emergency Preparedness.

6.3.2.5 Prepare to meet with NRC and FEMA representatives approximately 15 days after the Exercise Proposal is submitted to discuss and resolve comments.

6.3.2.6 Resolve the NRC and FEMA comments as necessary.

NOTE Ensure incorporation of any major changes in the objectives as a result of NRC and FEMA comments into the Exercise Scenario which is developed as part of the Exercise Package discussed in Section 6.3.5.

6.3.3

EXERCISE SCENARIO

NOTE The Exercise Scenario shall be strictly controlled so that the exercise remains confidential.

Using the scope and objectives developed in 6.3.2.1 and 6.3.2.2, prepare an Exercise Scenario as follows:

- 6.3.3.1 Develop the basic scenario, using Attachment 6, Scenario Form which is to be used as a planning tool for detailed scenario development.
 - 6.3.3.1.1 The basic scenario should contain the critical exercise events.
 - 6.3.3.1.2 The basic scenario should be concise and provide a quick overview of exercise events.
- 6.3.3.2 Upon completion of the basic scenario, develop a detailed scenario (Attachments 6, 7, & 8 may be used) by the addition of sufficient data to control and evaluate the exercise. The detailed scenario should include, as appropriate:
 - 6.3.3.2.1 Plant data including initial condition.
 - 6.3.3.2.2 Radiological data.
 - 6.3.3.2.3 Meteorological data.
 - 6.3.3.2.4 Chemistry data.
 - 6.3.3.2.5 Off-site data.
 - 6.3.3.2.6 Exercise messages, including message number, time issued, issuer, recipient, and content.

6.3.3.2.7 The anticipated participant reaction to any scenario event.

6.3.3.3 The Exercise Scenario should be formatted for submittal to the NRC via a ULNRC cover letter as follows:

6.3.3.3.1 Assumptions and Basis

This section contains basic assumptions which provide an understanding for the basis of the Exercise Scenario sequence of events.

6.3.3.3.2 Initial Conditions

This section contains the initial conditions (simulated or real) which will exist prior to the onset of the exercise. The initial conditions include plant status, meteorological conditions, radiological conditions, etc.

6.3.3.3.3 Narrative Summary

This section contains a written summary of the Exercise Scenario.

6.3.3.3.4 Scenario Sequence of Events

This section contains the detailed sequence of events which takes into account the time frame in which the events are to occur, the anticipated participant response, and references to messages which are issued to participants to initiate specific events. Attachment 6 may be used in this section.

6.3.3.4 Submit the completed Exercise Scenario to the Supervisor, Emergency Preparedness.

6.3.4 CONTROLLER/OBSERVER PACKAGE

NOTE The Controller/Observer package shall be strictly controlled so that the Exercise is not compromised.

6.3.4.1 The Controller/Observer package should contain as a minimum:

6.3.4.1.1 The overall Controller/Observer organization including assignments, telephone numbers, and other communications means.

6.3.4.1.2 Rules/guidelines for Controllers, Observers, and participants.

6.3.4.1.3 Evaluation criteria for the different facilities/areas to be evaluated.

6.3.4.1.4 The basic scenario prepared in 6.3.3.1 to provide a quick overview of the exercise.

6.3.4.1.5 The detailed scenario prepared in 6.3.3.2 or a completed Controller Guide.

6.3.4.1.6 Messages.

6.3.4.1.7 Training Documentation Form (CA #39)

6.3.4.1.8 Attachment 10, Controller/Observer Comment Sheets.

6.3.4.1.9 Participant Recommendation Comment Sheets.

6.3.4.2 Submit the completed Controller/Observer package to the Supervisor, Emergency Preparedness.

6.3.5 EXERCISE PACKAGE

NOTE The completed Exercise Package shall be strictly controlled so that the exercise is not compromised.

6.3.5.1 The Exercise Package should contain as a minimum:

6.3.5.1.1 Title Page

6.3.5.1.2 Cover Letter

A cover letter which briefly discusses the purpose and use of the Exercise Package. The letter shall be signed by the Vice President, Nuclear.

6.3.5.1.3 Table of Contents

6.3.5.1.4 Acronyms, Abbreviations, and Definitions

6.3.5.1.5 Exercise Scope

6.3.5.1.6 Participating Organizations

6.3.5.1.7 Schedule of Events

The schedule should contain the times, dates, and locations of orientations, meetings, and critiques which will be held for Exercise Controllers, Observers, visitors, and other representatives.

6.3.5.1.8 Exercise Objectives

6.3.5.1.9 Exercise Scenario including data and messages.

6.3.5.1.10 Exercise Conduct Guidelines

This section should be similar to the Controller/Observer Package.

6.3.5.1.11 Critique Agenda

6.3.5.1.12 Supporting Information

Any floor plans, site/area maps, general plant information, etc.

7.0 DRILL/EXERCISE CONDUCT

7.1 DRILL/EXERCISE GUIDELINES

7.1.1 DRILL/EXERCISE COORDINATOR

The Drill/Exercise Coordinator is in charge of the drill/exercise and shall adhere to the following guidelines, as appropriate:

- 7.1.1.1 Ensure Controllers and Observers are briefed prior to the drill/exercise.
- 7.1.1.2 Ensure that Controllers, Observers, and visitors are aware that the Drill/Exercise package is to be strictly controlled and shall not be released or divulged to participants or unauthorized parties.
- 7.1.1.3 Maintain responsibility for starting the drill/exercise, stopping the drill/exercise, or putting the drill/exercise on temporary hold.
 - 7.1.1.3.1 No actions shall be performed which have the potential for affecting plant operations.
 - 7.1.1.3.2 Drill/exercise activities shall be put on hold or suspended, if an actual emergency arises.
 - 7.1.1.3.3 If an unsafe act is reported by a Controller, determine if the drill/exercise should be put on hold or terminated.
- 7.1.1.4 Remain free to move from one location to another to effectively observe and control the drill/exercise.
- 7.1.1.5 Monitor the progress of the drill/exercise and, if absolutely necessary, modify the scenario to correct poor progress or to meet objectives.

- 7.1.1.6 Ensure personnel are aware that all drill or exercise related telephone communications, radio transmissions, and public address communications begin and end with the statement, "This is an exercise (or drill)".
- 7.1.1.7 Ensure Observers and Controllers are in their designated locations prior to the start of the drill/exercise.
- 7.1.1.8 If changes are made to the drill/exercise package, ensure that all Controllers and Observers are aware of the changes.
- 7.1.1.9 Be prepared to mediate any jurisdictional or interagency disagreement.
- 7.1.1.10 Ensure that there is minimal interference from Controllers and Observers to allow maximum participant free play.
- 7.1.1.11 Ensure that a critique is scheduled as soon as possible after the drill/exercise.
- 7.1.1.12 Ensure records are collected and forwarded to the Supervisor, Emergency Preparedness.
- 7.1.2 DRILL/EXERCISE CONTROLLERS
Controllers shall:
 - 7.1.2.1 Perform their duties as designated in the Controller/Observer package.
 - 7.1.2.2 Follow the directives of lead Controllers or the Drill/Exercise Coordinator.
 - 7.1.2.3 Ensure participants, Observers, and Controllers sign Training Documentation Forms (CA #39).

7.1.3 DRILL/EXERCISE OBSERVERS

Observers shall:

7.1.3.1 Perform their duties as designated in the Controller/Observer package.

7.1.3.2 Follow the directives of the Controllers and the Drill/Exercise Coordinator.

7.1.4 DRILL/EXERCISE PARTICIPANTS

Participants shall:

7.1.4.1 Carry out all actions as much as possible.

7.1.4.2 Comply with participant messages and directives given by Controllers.

7.1.5 DRILL/EXERCISE VISITORS

Visitors who have been invited to informally observe a drill or exercise should follow the directions of Controllers and any drill/exercise rules provided as guidance.

7.2 DRILL/EXERCISE CRITIQUES

Upon the completion of drills and exercises, the Drill/Exercise Coordinator, acting as Critique Chairman, shall:

- 7.2.1 Conduct internal (Callaway Plant response) critique sessions with selected Controllers, Observers, and participants as soon as possible after drills/exercises.

NOTE For drills and exercises in which many areas of response are to be evaluated, critiques may be divided into several preliminary sessions. The Controllers, Observers, and participants can meet and have discussions in the locations where personnel were assigned during the drill/exercise (e.g., Control Room, Simulator, TSC, EOF, OSC).

- 7.2.2 Discuss the outcome of the drill/exercise. Discussions should include:
- 7.2.2.1 Weak areas of emergency response.
 - 7.2.2.2 Strong areas of emergency response.
 - 7.2.2.3 Scenario applicability and realism.
 - 7.2.2.4 Recommendations for improving emergency preparedness.
 - 7.2.2.5 Overall conduct of drill/exercise.
- 7.2.3 Inform critique attendees that comments, evaluations, and recommendations are to be documented on the following, as appropriate.
- 7.2.3.1 Controller/Observer evaluation sheets (developed with Controller/Observer Package).
 - 7.2.3.2 Attachment 1G, Controller/Observer Comment Sheets.

- 7.2.3.3 Attachment 11, Comment/Recommendation Sheets.
- 7.2.4 Collect Training Documentation Forms from Controllers.
- 7.2.5 Collect the records which are discussed in Steps 7.2.3 and 7.2.4 from critique attendees.
- 7.2.6 Assimilate comments and recommendations from the critique and forward a summary report including a roster of critique attendees to the Supervisor, Emergency Preparedness, within 24 hours.
- 7.2.7 Ensure that records discussed in Step 7.2.5 are handled in accordance with Section 8.0 of this procedure.
- 7.2.8 Attend the NRC/FEMA critiques and provide an overview of Callaway Plant response to the scenario (exercises only).

8.0 DRILL/EXERCISE RECORDS

8.1 DRILL/EXERCISE PARTICIPANTS

All drill/exercise participants shall adhere to the following guidelines, as appropriate.

NOTE The records and logs in 8.1.1 and 8.1.2 are generated by participants during the exercise and are not associated with records collected by the Drill/Exercise Coordinator in 8.3.1.

- 8.1.1 Ensure that records and logs generated during the exercise are completed and forwarded to the Emergency Response Organization Member in charge of the Emergency Response Facility (ERF) (e.g., Emergency Coordinator, OSC Coordinator) in which the records and logs are associated.
- 8.1.2 Each person in charge of an ERF shall ensure that records and logs generated in association with the operation of the facility are collected and forwarded to the Supervisor, Emergency Preparedness for review and disposition.
- 8.1.3 Each participant shall record any comments on drills/exercises on Attachment 11, Comment/Recommendation Sheet, and forward the comments to the Controller responsible for evaluating their area of emergency response.
- 8.1.4 Each participant shall ensure that they have signed the Training Documentation Form.
- 8.2 DRILL/EXERCISE CONTROLLERS and OBSERVERS
- Controllers and Observers shall adhere to the following record disposition guidelines, as appropriate:
- 8.2.1 Controllers shall ensure that personnel have signed the Training Documentation Form.
- 8.2.2 Upon completion of critiques, ensure that all evaluations, comments, and recommendations are forwarded to the Drill/Exercise Coordinator.

8.3 DRILL/EXERCISE COORDINATOR

The Drill/Exercise Coordinator shall:

8.3.1 Upon completion of critiques, ensure that Training Documentation Forms, evaluations, comments, and recommendations are collected and organized.

8.3.2 Review and forward the records collected in 8.3.1 to the Supervisor, Emergency Preparedness.

8.4 SUPERVISOR, EMERGENCY PREPAREDNESS

The Supervisor, Emergency Preparedness shall:

8.4.1 Review and organize drill/exercise records into four basic categories:

8.4.1.1 Records and forms generated during the drill/exercise by participants (e.g., facility logs, status sheets, facility checklists, calculation sheets, etc.)

NOTE Records and forms generated during drills and exercises are not considered QA Records as indicated in EIPs. Only Records and Forms generated in real emergencies are QA Records.

8.4.1.2 Evaluations, comments, recommendations, and critique summaries generated by Controllers, Observers or participants.

8.4.1.3 Training Documentation Forms which verify participation in a required exercise.

8.4.1.4 Corrective Actions (These records are generated after identification and resolution of corrective actions in accordance with EIP-ZZ-A0020, Maintaining Emergency Preparedness).

- 8.4.2 Ensure that original copies of Drill/Exercise records and forms are stamped "DRILL RECORDS".
- 8.4.3 Forward the original Training Documentation Forms to Training for input into the Training Records and final disposition to Document Control as QA Records.
- 8.4.4 Forward the original Drill/Exercise records to the Records Management Supervisor, Document Control, for disposition.
- 9.0 RECORDS
- 9.1 QA RECORDS
Completed Training Documentation Forms (CA #39).
- 9.2 COMMERCIAL RECORDS
Developmental documents and records generated during conduct of the drill/exercise.
- 10.0 REFERENCES
- 10.1 Callaway Plant Radiological Emergency Response Plan RERP.
- 10.2 Title 10, Code of Federal Regulations.
- 10.3 NUREG-0654/FEMA-REP-1, Rev. 1, Appendix 1.
- 10.4 INPO Good Practice, Emergency Response Exercise Plan, March, 1983.
- 10.5 EIP-ZZ-A0020, Maintaining Emergency Preparedness.
- 11.0 ATTACHMENTS
- 11.1 Attachment 1, Drill and Exercise Descriptions and Frequencies
- 11.2 Attachment 2, Exercise Scheduling Milestones

- 11.3 Attachment 3, Drill Approval Form
- 11.4 Attachment 4, Plan/Procedure Implementation Checklist
- 11.5 Attachment 5, Pre-Drill/Exercise Checklist
- 11.6 Attachment 6, Scenario Form
- 11.7 Attachment 7, Controller Guide
- 11.8 Attachment 8, Scenario Message Form
- 11.9 Attachment 9, Exercise Development Checklist
- 11.10 Attachment 10, Controller Observer Comment Sheet
- 11.11 Attachment 11, Comment/Recommendation Sheet

DRILL AND EXERCISE DESCRIPTIONS AND FREQUENCIES

TYPE	DESCRIPTION	FREQUENCY
Communications Drills	<p>Communications shall be tested in accordance with procedure (later).</p> <p>Communications drills shall include the understanding of the content of messages.</p>	In accordance with procedure (later)
Accountability and Evacuation Drill	This drill tests the ability of Callaway Plant personnel to expeditiously evacuate plant and site areas, and demonstrates the effectiveness of the personnel accountability mechanism.	Annually
Medical Emergency Drill	This drill involves the response to simulated contaminated injured/ill individuals including participation by off-site ambulance services and medical treatment facilities. The drill tests the capabilities of emergency vehicle access to plant areas, on-site Health Physics support, first aid, off-site services, and on- and off-site communications.	Annually
Post Accident Sampling Drill	<p>This drill involves the use of the Post Accident Sampling System (PASS) and alternate means of analysis and sampling, and the response to actual</p> <p>(continued)</p>	Annually

DESCRIPTION	FREQUENCY
(simulated until the plant is operational) radiation levels associated with sampling operations. The drill tests the capabilities of the PASS sampling procedures, and Rad/Chem response personnel.	
This drill involves the response to, and analysis of, simulated elevated airborne and liquid samples, and direct radiation measurements. The drill tests the capabilities of Health Physics response personnel and equipment.	Semi-Annually
This drill involves on- and off-site monitoring including the collection and analysis of environmental samples (e.g., air, water, soil, vegetation), and provisions for communications and record keeping. The drill tests Health Physics monitoring, communications, and analysis capabilities.	Annually
This drill tests the response of the Fire Brigade and is conducted in accordance with APA-ZZ-00743, Fire Team Organization and Duties.	In accordance with APA-ZZ-00743 and the SNUPPS FSAR Callaway Addendum Section 9.5, Appendix E.

TYPE	DESCRIPTION	FREQUENCY
Search and Rescue Drill	This drill tests the response of members of the Search and Rescue Teams, including associated Health Physics support, to a realistic situation.	Annually
Emergency Repair Drill	This drill tests the response of members of the Emergency Repair Teams, including associated Health Physics support, to a realistic situation.	Annually
Control Room Drill	This drill tests the response of the On-Shift Emergency Organization, and should include simulated emergency notifications, callout, and communications. Response by emergency teams and dose assessment personnel may also be tested.	Annually
Technical Support Center (TSC) Drill	This drill tests the response of personnel assigned duties in the TSC. Group drills may be held independently to test responses by individual groups (e.g., dose assessment, communications, technical assessment), and then integrated to exercise TSC operations as a whole.	Annually

TYPE	DESCRIPTION	FREQUENCY
Operational Support Center (OSC) Drill	This drill tests the response of personnel assigned duties in the OSC. The drill includes formation, briefing, dispatching, and debriefing of emergency teams, and associated Health Physics support. Actual communications with the teams should be conducted.	Annually
Emergency Operations Facility (EOF) Drill	This drill tests the response of personnel assigned duties in the Emergency Operations Facility.	Annually
Integrated Drills	A combination of one or more drills which test different facets of UE emergency response, to ensure a coordinated effort.	As needed

TYPE	DESCRIPTION	FREQUENCY
Exercise	<p>The Exercise tests the integrated capability of the UE, State, and local emergency organizations to respond to an emergency.</p> <p>The Exercise shall also include participation by Federal emergency response agencies.</p> <p>Provisions shall be made to start an exercise between 6:00 p.m. and midnight.</p> <p>Provisions shall be made to start an exercise between midnight and 6:00 a.m.</p>	<p>Annually</p> <p>At Least Once Every 5 Years</p> <p>At Least Once Every 6 Years</p> <p>At Least Once Every 6 Years</p>

EXERCISE SCHEDULING MILESTONES

S PRIOR TO
SCHEDULED
EXERCISE

- 75 Days State and licensee jointly submit Exercise Proposal to FEMA and NRC Regions.
- 60 Days FEMA and NRC Regions discuss and meet with licensee/State as necessary and prepare response.
- 45 Days State and licensee submit Exercise Scenario to FEMA and NRC Regions.
- 35 Days FEMA and NRC Regions notify State and licensee of Exercise Scenario acceptability.
- 20 Days State and licensee submit Controller/Observer Package to FEMA and NRC Regions.

DRILL APPROVAL FORM

1. Drill Type _____ Date _____
Time (24 hour clock) _____

2. Drill will be unannounced. No ☐ Yes ☐

3. Drill Objectives (Attach list of objectives)

4. Plans/Procedures to be Implemented (Attach completed Attachment 4, Plan/
Procedure Implementation Checklist.

5. Departments/Organizations participating in or supporting the drill. (Include
Off-site organizations and agencies)

(Additional pages may be used if required)

6. Drill Coordinator _____, _____
Name Title

7. Prepared by _____, _____, _____
Signature Title Date

8. Reviewed by _____, _____
Supervisor, Emergency Preparedness Signature Date

9. Approved by _____, _____
Manager, Nuclear Safety and Signature Date
Emergency Preparedness

10. UENO Participation No ☐ Yes ☐ (If yes, sign below)

Approved by _____, _____
Manager, Callaway Plant Signature Date

11. UE Corporate Nuclear Function, or Off- _____
Site Agency Participation ☐ No ☐ Yes (If yes, sign below)

Approved by _____, _____
General Manager, Signature Date
Engineering (Nuclear)

Return completed form to:
Manager, Nuclear Safety
and Emergency Preparedness

PLAN/PROCEDURE IMPLEMENTATION CHECKLIST

Primary Plan(s) and Procedure(s) which will be tested.
(Use additional sheets if necessary)

[illegible]

PRE-DRILL/EXERCISE CHECKLIST

Initial and date the items below as they are completed. Record NA if item is not applicable.

TYPE OF DRILL _____	DATE OF DRILL _____ / _____ / _____	
		<u>Date</u> <u>Initials</u>
* 1. Exercise Committee formed.	_____ / _____ / _____	_____
* 2. Exercise Proposal completed.		
a. Completed and submitted for approval.	_____ / _____ / _____	_____
b. NRC comments received and incorporated, as necessary.	_____ / _____ / _____	_____
3. Drill/exercise approval received from management.	_____ / _____ / _____	_____
4. Personnel		
a. Participants identified and scheduled.	_____ / _____ / _____	_____
b. Controllers and observers identified and scheduled.	_____ / _____ / _____	_____
c. Badges identified for non-UE personnel.	_____ / _____ / _____	_____
5. Facilities/Equipment		
The items below identified, and if necessary, scheduled, and in place.		
a. Facilities	_____ / _____ / _____	_____
b. Plant Areas	_____ / _____ / _____	_____
c. Equipment	_____ / _____ / _____	_____
d. Communications Equipment	_____ / _____ / _____	_____
e. Vehicles	_____ / _____ / _____	_____
f. Computer Systems	_____ / _____ / _____	_____
g. Other Items _____	_____ / _____ / _____	_____
6. Meetings		
Ensure meetings are scheduled and agendas are prepared as appropriate.		
a. Drill/exercise coordination meetings.	_____ / _____ / _____	_____
b. Controller/observer orientations and briefings.	_____ / _____ / _____	_____
c. Participant meetings (pre- and post-drill/exercise)	_____ / _____ / _____	_____
d. Critiques	_____ / _____ / _____	_____
e. Corrective action meetings.	_____ / _____ / _____	_____

* Exercise Only

	<u>Date</u>	<u>Initials</u>
7. Scenario		
a. Completed and submitted for approval.	/ /	
* b. NRC comments received and incorporated, as necessary.	/ /	
c. Recent changes to plans, procedures, etc., incorporated, as appropriate.	/ /	
8. Controller/Observer Package		
a. Completed and submitted.	/ /	
* b. NRC comments received and incorporated, as necessary.	/ /	
* 9. Exercise Package completed.	/ /	
10. Documents/Supplies		
Sufficient quantities of the following are available and in place to support the drill/exercise.		
a. Plans	/ /	
b. Procedures	/ /	
c. Maps	/ /	
d. Forms	/ /	
e. Controller/Observer package	/ /	
f. Other supplies	/ /	
g. Logistical supplies (pens, paper, clipboards, etc.)	/ /	
11. Drill/Exercise ready to be conducted.	/ /	
* Exercise Only		

Signatures:

Drill/Exercise Coordinator

Supervisor, Emergency Preparedness

Proced. No. EIP-ZZ-A0010
Rev. 0

SCENARIO FORM

REAL TIME	SCENARIO TIME	SEQUENCE OF EVENTS	MESSAGE NUMBERS

Rev. _____ 0

PAGE 1 OF

DATE / /

Proced. No. EIP-ZZ-A0010
Rev. 0

COMMENT/RECOMMENDATION SHEET

NAME _____ DATE _____

EMERGENCY POSITION IN DRILL/EXERCISE _____

COMMENTS

RECOMMENDATIONS

EIP-ZZ-A0020
November 19, 1983
Revision 0

CALLAWAY PLANT
EMERGENCY PLAN IMPLEMENTING PROCEDURE
EIP-ZZ-A0020
MAINTAINING EMERGENCY PREPAREDNESS

RESP. DEPT. EMERGENCY PREPAREDNESS PREPARED BY M. FAULKNER

APPROVED BY John E. Nuttall DATE 11-21-83

DATE ISSUED 11/23/83

This procedure contains the following:

Pages	<u>1</u>	through	<u>11</u>
Attachments	<u>1</u>	through	<u>3</u>
Appendices	<u></u>	through	<u></u>
Checklist	<u></u>	through	<u></u>

INFORMATION ONLY
UNCONTROLLED
COPY

Table of Contents

<u>Section</u>		<u>Page Number</u>
1.0	Purpose and Scope	1
2.0	Responsibilities	1
3.0	Initiating Conditions	3
4.0	Procedure	3
5.0	Final Conditions	9
6.0	Records	10
7.0	References	10
8.0	Attachments	10

Attachment 1 - Emergency Preparedness Action Item Form

Attachment 2 - Emergency Equipment Kit Inventory

Attachment 3 - Emergency Packet Inventory

MAINTAINING EMERGENCY PREPAREDNESS

1.0 PURPOSE AND SCOPE

The purpose of this procedure is to provide guidance in defining and identifying requirements regarding the annual review and the maintenance, modification, and updating processes of Emergency Preparedness at the Callaway Plant.

2.0 RESPONSIBILITIES

2.1 MANAGER, NUCLEAR SAFETY AND EMERGENCY PREPAREDNESS

The Manager, Nuclear Safety and Emergency Preparedness is responsible for:

- 2.1.1 Maintaining and updating the Radiological Emergency Response Plan (RERP) and the Emergency Plan Implementing Procedures (EPIPs).
- 2.1.2 Coordinating the annual review schedule with the Nuclear Safety Review Board.
- 2.1.3 Informing State and Local emergency response agencies of any modification to the RERP or finding of the annual review that affects the interfacing of the RERP with that governmental agency.
- 2.1.4 Drills and exercises in accordance with EIP-ZZ-A0010, Emergency Drills and Exercises.

2.2 SUPERVISOR, EMERGENCY PREPAREDNESS

The Supervisor, Emergency Preparedness is responsible for:

- 2.2.1 Reviewing all documented deficiencies and recommendations regarding Emergency Preparedness, determining if the deficiencies and recommendations are valid, and assigning the proper department/individual for resolution of the deficiency(ies).
- 2.2.2 Tracking Emergency Preparedness action items to ensure that these items are closed out and certifying that the action items are completed.
- 2.2.3 Ensuring that telephone numbers listed in the Emergency Plan Implementing Procedures and the Emergency Telephone Directory are reviewed and updated.
- 2.2.4 Maintaining and updating of emergency packets.

2.3 NUCLEAR SAFETY REVIEW BOARD (NSRB)

The Nuclear Safety Review Board is responsible for the implementation of the annual review of the Emergency Preparedness program.

2.4 SUPERINTENDENT, HEALTH PHYSICS

The Superintendent, Health Physics is responsible for the inventory and maintenance of emergency equipment kits.

2.5 SUPERINTENDENT, TRAINING

The Superintendent, Training is responsible for providing on-site and off-site training, as required to support the Emergency Preparedness program.

3.0 INITIATING CONDITIONS

This procedure shall be implemented:

- 3.1 By the annual NSRB review.
- 3.2 As a result of, but not limited to, necessary revisions identified in the Emergency Preparedness program from the following mechanisms:
 - 3.2.1 Actual emergencies.
 - 3.2.2 Drills and Exercises.
 - 3.2.3 Regulatory Guidance changes.
 - 3.2.4 NRC Appraisals.
 - 3.2.5 NRC generated communications.
 - 3.2.6 Technical Reviews and individual staff use and evaluation.
 - 3.2.7 Emergency Response Facility and equipment evaluations and tests.
 - 3.2.8 Station procedure revisions or changes.
 - 3.2.9 Recommendations or comments as a result of training.
- 3.3 As directed by the Manager, Nuclear Safety and Emergency Preparedness.

4.0 PROCEDURE

4.1 ANNUAL REVIEW

- 4.1.1 An independent Review of the Emergency Preparedness program shall be performed at least once every twelve (12) months under the direction and cognizance of the UE Nuclear Safety Review Board.

- 4.1.2 Implementation of the annual review will be assigned to the Quality Assurance Department and documentation will be handled in accordance with applicable QA procedures.
- 4.1.3 This annual review shall examine but not be limited to:
 - 4.1.3.1 The Callaway Plant RERP.
 - 4.1.3.2 The Emergency Plan Implementing Procedures.
 - 4.1.3.3 RERP Training.
 - 4.1.3.4 Emergency Response Facilities and Equipment.
- 4.1.4 The review shall:
 - 4.1.4.1 Verify compliance of the RERP and its implementing procedures with current regulations and guidelines.
 - 4.1.4.2 Verify that provisions of the operating license have been met.
 - 4.1.4.3 Verify proper and applicable interfaces with Federal, State, County, Local and private support groups, agencies, and organizations.
- 4.1.5 The Supervisor, Emergency Preparedness shall review and investigate any open finding(s) of the review and will assign them to the proper department/individual for resolution.
- 4.1.6 Any portion of the Review involving an evaluation for the adequacy of interfaces with State and Local Governments shall be made available to the affected Governmental Agency by the Manager, Nuclear Safety and Emergency Preparedness, or his designee.
- 4.1.7 All records generated by the annual Review shall be maintained as QA Audit Records and shall be kept on file for a minimum period of five (5) years.

4.2 ACTION ITEM TRACKING

- 4.2.1 In an effort to identify any deficiencies and any areas needing improvement in the Emergency Preparedness program, the Supervisor, Emergency preparedness, or his designee shall:
- 4.2.1.1 Review documented deficiencies and recommendations.
 - 4.2.1.2 Determine the deficiencies which are valid by consulting with involved and affected departments and organizations, regulations, and other applicable sources.
 - 4.2.1.3 Segregate the items identified for corrective actions (action items) into the following categories:
 - 4.2.1.3.1 Plan Modifications
 - 4.2.1.3.2 Procedure Revisions
 - 4.2.1.3.3 Facility Modifications
 - 4.2.1.3.4 Equipment and/or Communication System Modifications
 - 4.2.1.3.5 Training Modifications
 - 4.2.1.3.6 Emergency Equipment Kit/Emergency Packet Modifications
 - 4.2.1.4 Use Attachment 1, Emergency Preparedness Action Item Form, and record the action item descriptions in the indicated space and enter the date and an action item number.
 - 4.2.1.5 Assign responsibilities for resolving the action items to responsible department(s)/individual(s) and provide them with the due date, and other necessary information, and record on the Emergency Preparedness Action Item Form as appropriate.

- 4.2.1.6 Track the resolution of action items and take necessary actions to ensure items are closed out on schedule.
- 4.2.1.7 Ensure the resolution of action items by reviewing and inspecting, as necessary.
- 4.2.1.8 Specify action items as they are completed on the Emergency Preparedness Action Item Form by dating and initialing the appropriate blocks.
- 4.2.1.9 Retain the completed action item form on file for a minimum of two years.
- 4.2.2 Modification/Updating of the Radiological Emergency Response Plan (RERP) and Emergency Plan Implementing Procedures (EPIPs).
 - 4.2.2.1 The necessary revisions and changes to the RERP and EPIPs will be, in most instances, identified by the mechanisms listed in Section 3.0.
 - 4.2.2.2 All revisions to the RERP shall be made in accordance with Quality Assurance Procedure OS-14, Preparation, Review and Document Control of Safety Analysis Reports and Subsequent Changes.
 - 4.2.2.3 Revisions to the Emergency Plan Implementing Procedures shall be prepared in accordance with Administrative Procedure APA-ZZ-00101, Preparation, Review, Approval and Control of Plant Procedures.
 - 4.2.2.4 Any proposed changes or revisions that would decrease the effectiveness of the approved RERP shall not be implemented without application to and the approval of the U.S. Nuclear Regulatory Commission.

- 4.2.2.5 The Supervisor, Emergency Preparedness shall ensure that copies of all RERP and EIPs revisions are sent to the U.S. Nuclear Regulatory Commission within thirty (30) days after the change is put into effect in accordance with APA-ZZ-00220, Records Management.
- 4.2.2.5.1 Two copies of the revision shall be forwarded to the Region III Field Office of the USNRC.
- 4.2.2.5.2 Two copies of the revision shall be forwarded to the Document Control Desk of the USNRC in Washington, D.C.
- 4.2.2.6 Changes or revisions to the Emergency Response Plan that do not decrease the effectiveness of the Plan and if the Plan, as changed, continues to meet the standards established in 10 CFR 50.47 (b) and Appendix E of 10 CFR 50, may be made without prior approval of the USNRC.
- 4.2.2.7 Any change or revision to the RERP or EIPs that affects the interfacing with State and/or Local Government Emergency Response Plans shall be made available to the affected Governmental agency within thirty (30) days after the change is put into effect.
- 4.2.2.8 The Supervisor, Emergency Preparedness, or his designee, shall update the telephone numbers listed in the EIP's and the Emergency Telephone Directory on a continuous basis and shall review these documents at least quarterly to ensure that all telephone numbers are current and that all personnel recorded are qualified for their listed emergency response assignment.
- 4.2.3 Modification of Emergency Response Facilities, Emergency Response Equipment and Emergency Communications Equipment.

- 4.2.3.1 The necessary modifications to the Emergency Response Facilities and equipment will be, in most instances, identified by the mechanisms listed in section 3.0.
- 4.2.3.2 When necessary changes or modifications to Emergency Response Facilities are identified:
 - 4.2.3.2.1 The change or modification will be accomplished by the appropriate Plant Department following the procedures outlined in APA-ZZ-00320, Initiating and Processing Work Requests.
 - 4.2.3.2.2 If the change or modification is of such a degree as to require a Design Change to the Emergency Facility; the change or modification shall be accomplished following the guidance of APA-ZZ-00600, Design Change Control.
- 4.2.3.3 When necessary changes or modifications to Emergency Response Equipment are identified, the changes or modifications to be made shall be requested by the Supervisor, Emergency Preparedness, or his designee, to the appropriate Department, following applicable procedures.
- 4.2.4 Modification of the Emergency Response Training Program.
 - 4.2.4.1 Necessary modifications or changes to the Emergency Response Training Program will be, in most instances, identified by the mechanisms listed in Section 3.0 or as a result of feedback from the training process.
 - 4.2.4.2 Modifications and changes in the Emergency Response Training Program will be coordinated through the Superintendent, Training.

4.3 INVENTORY AND MAINTENANCE OF EMERGENCY
EQUIPMENT KITS AND EMERGENCY PACKETS

- 4.3.1 Emergency Equipment Kits are located in various Emergency Facilities throughout the Plant. Attachment 2, Emergency Equipment Kit Inventory, lists the various Emergency Kits, their location, and the minimum required supplies for each kit.
- 4.3.2 Emergency Equipment Kits shall be inventoried and maintained by Health Physics Department in accordance with Callaway Plant Health Physics Surveillance Procedure HSP-ZZ-00013, Emergency Equipment Inventory.
- 4.3.3 Emergency Packets are located in various Emergency Facilities in locked cabinets or files. Attachment 3, Emergency Packet Inventory, lists the various Emergency Packets and indicates the contents of each packet.
- 4.3.4 A key to each Emergency Packet cabinet or file will be located in the vicinity of the cabinet or file and will be lead sealed to prevent unauthorized use of the packets.
- 4.3.5 Emergency Packets shall be maintained and updated by the Supervisor, Emergency Preparedness.
- 4.3.6 Copies of Controlled Documents that are contained in the Emergency Packets will be requested and controlled in accordance with APA-ZZ-00200, Document Control.

5.0 FINAL CONDITIONS

- 5.1 Required actions have been completed in accordance with this procedure.
- 5.2 Documentation and records generated in accordance with this procedure have been properly handled and filed.

6.0 RECORDS

None

6.1 COMMERCIAL RECORDS

6.1.1 Emergency Preparedness Action Item Form

7.0 REFERENCES

7.1 Callaway Plant Radiological Emergency Response Plan.

7.2 10 CFR 50.47 Paragraph b.

7.3 10 CFR 50.54 Paragraph a and t.

7.4 10 CFR 50, Appendix E, Section IV, G and Section V.

7.5 NUREG-0654, FEMA-REP 1.

7.6 APA-ZZ-00101, Preparation, Review, Approval and Control of Plant Procedures.

7.7 APA-ZZ-00200, Records Management.

7.8 APA-ZZ-00220, Records Management.

7.9 APA-ZZ-00320, Initiating and Processing Work Requests.

7.10 APA-ZZ-00600, Design Change Control.

7.11 HSP-ZZ-00013, Emergency Equipment Inventory.

7.12 OS-14, Preparation, Review and Document Control of Safety Analysis Reports and Subsequent Changes.

7.13 Technical Specifications for Callaway Unit 1, Section 6.5.3.

8.0 ATTACHMENTS

8.1 Attachment 1, Emergency Preparedness Action Item Form

- 8.2 Attachment 2, Emergency Equipment Kit Inventory
- 8.3 Attachment 3, Emergency Packet Inventory

EMERGENCY PREPAREDNESS ACTION ITEM

DATE _____ ACTION ITEM NO. _____

CATEGORY _____

RESPONSIBLE DEPARTMENT/INDIVIDUAL _____

DATE ASSIGNED _____ DATE DUE _____

ACTION ITEM DESCRIPTION

CORRECTIVE ACTION TAKEN

ACTION TAKEN BY _____

SUPERVISOR, EMERGENCY PREPAREDNESS

CLOSE OUT COMPLETE _____
(Initial)

DATE OF CLOSEOUT _____

FOLLOW-UP DATE(S)

EMERGENCY PREPAREDNESS ACTION ITEM FORM

ATTACHMENT 1 Page 1 of 1

CA-#603

EIP-ZZ-A0020

EMERGENCY EQUIPMENT KIT INVENTORY

LOCATION: CONTROL ROOM

TYPE: FACILITY EMERGENCY EQUIPMENT KIT

<u>ITEM</u>	<u># OF ITEMS</u>
Pocket Dosimeter, 0-1R	10
Pocket Dosimeter, 0-200mR	10
Pocket Dosimeter, 0-5R	10
Dosimeter Charger	1
Cartridge, GRMI	6
Cartridge, HEPA Ultra Filter	12
Respirators, Full Face	6
Model 3 w/44-9 Detector	1
Air Sampler, AVS-28A	1
Particulate Filter (Box)	1
Cartridge, Silver Zeolite	10
Portable Radios	4
Flashlights	2
Batteries	
Procedures	
HTP-ZZ-04108	
HTP-ZZ-04121	
HTP-ZZ-01441	
HTP-ZZ-08100	

EMERGENCY EQUIPMENT KIT INVENTORY

LOCATION: TECHNICAL SUPPORT CENTER

TYPE: FACILITY EMERGENCY EQUIPMENT KIT

<u>ITEM</u>	<u># OF ITEMS</u>
Pocket Dosimeter, 0-1R	25
Pocket Dosimeter, 0-200mR	25
Pocket Dosimeter, 0-5R	25
Dosimeter Charger	2
Cartridge, GRMI	30
Cartirdge, HEPA Ultra Filter	30
Respirator, Full Face	15
SCBA	2
R02A	2
Model 14C	2
PIC 6	2
Air Sampler, AVS-28A	1
Particulate Filter (Box)	1
Cartridge, Silver Zeolite	4
PC's (Set)	20
Masking Tape (Roll)	10
Portable Radios	4
Flashlights	2
Batteries	
Procedures	
HTP-ZZ-04102	
HTP-ZZ-04104	
HTP-ZZ-04106	
HTP-ZZ-04121	
HTP-ZZ-01441	
HTP-ZZ-08101	
HTP-ZZ-08100	

EMERGENCY EQUIPMENT KIT INVENTORY

LOCATION: OPERATIONAL SUPPORT CENTER - (Lunch Room)

TYPE: FACILITY EMERGENCY EQUIPMENT KIT

<u>ITEM</u>	<u># OF ITEMS</u>
Pocket Dosimeter, 0-1R	40
Pocket Dosimeter, 0-200mR	40
Pocket Dosimeter, 0-5R	40
Dosimeter Charger	2
Cartridge, GRMI	70
Cartridge, HEPA Ultra Filter	35
Respirator, Full Face	35
SCBA	4
R02A	2
Model 14C	2
Model 3 w/44-9 Detector	2
PRS-2 w/Neutron Detector	1
PIC 6	2
Air Sampler, AVS-28A	2
Particulate Filter (Box)	2
Cartridge, Silver Zeolite	10
PC's, Sets	20
Masking Tape (Rolls)	10
Radiation Warning Sign	10
Warning Rope (Rolls)	2
Step Off Pads	20
Plastic Bags, Large	20
Plastic Bags, Small	50
Radiation Warning Tape (Roll)	2
Portable Radios	6
Flashlights	5
Batteries	
Smear (Box)	10
Procedures	
HTP-ZZ-04102	HTP-ZZ-04121
HTP-ZZ-04104	HTP-ZZ-01441
HTP-ZZ-04106	HTP-ZZ-08101
HTP-ZZ-04108	HTP-ZZ-08100
HTP-ZZ-04109	

EMERGENCY EQUIPMENT KIT INVENTORY

LOCATION: SECURITY BUILDING

TYPE: AMBULANCE EMERGENCY EQUIPMENT KIT

<u>ITEM</u>	<u># OF ITEMS</u>
Pocket Dosimeter, 0-1R	6
Pocket Dosimeter, 0-200mR	6
Dosimeter Charger	1
TLD, Personnel	6
Model 3 w/44-9 Detector	1
PC's (Set)	6
Masking Tape (Rolls)	10
Plastic Bags, Large	5
Plastic Bags, Small	10
Flashlights	2
Blanket	1
Paper Towels (Pkg.)	1
Herculite	1
Radioactive Warning Tape (Roll)	1
Batteries	
Procedures	
HTP-ZZ-04108	
HTP-ZZ-01441	

EMERGENCY EQUIPMENT KIT INVENTORY

LOCATION: TRAINING CENTER

TYPE: EMERGENCY MONITORING EMERGENCY EQUIPMENT KIT

<u>ITEM</u>	<u># OF ITEMS</u>
RCR	2
Model 14C	2
Model 3 w/44-9 Detector	2
Masking Tape (Rolls)	10
Plastic Bags, Large	10
Plastic Bags, Small	20
Radioactive Warning Tape (Roll)	1
Flashlights	2
Portable Radios	2
Batteries	
Procedures	
HTP-ZZ-04102	
HTP-ZZ-04106	
HTP-ZZ-04108	

EMERGENCY EQUIPMENT KIT INVENTORY

LOCATION: EMERGENCY OPERATIONS FACILITY - STOREROOM

TYPE: FIELD MONITORING EMERGENCY EQUIPMENT KIT

ITEM	# OF ITEMS
Pocket Dosimeter, 0-1R	6
Pocket Dosimeter, 0-200mR	6
Pocket Dosimeter, 0-5R	6
Dosimeter Charger	1
Cartridge, HEPA Ultra Filter	6
Cartridge, GRMI	6
Respirators, Full Face	3
R02A	1
Model 14C	1
Model 3 w/44-9 Detector	1
PRS-1w/NAIDetector w/RD-19 or Ludlum 2218	1
Particulate, Filter (Box)	2
Cartridge, Silver Zeolite	10
PC's (Set)	6
Masking Tape (Roll)	10
Plastic Bags, Large	10
Plastic Bags, Small	20
Radioactive Warning Tape (Roll)	1
Flashlight	2
Batteries (By size and type)	(later)
Stopwatch	1
Calculator	1
Bottle 1 Liter	6
1 Gal., Cubic container	10
Air Sampler, AVS-28A	1
Map	1
Gas Marinelli Beakers	3
Tygon Tubing	1
Procedures	
HTP-ZZ-04102	HTP-ZZ-01441
HTP-ZZ-04106	HTP-ZZ-08100
HTP-ZZ-04108	EIP-ZZ-00223
HTP-ZZ-04118	
HTP-ZZ-04121	

EMERGENCY EQUIPMENT KIT INVENTORY

LOCATION: EMERGENCY OPERATIONS FACILITY

TYPE: FACILITY EMERGENCY EQUIPMENT KIT

<u>ITEM</u>	<u># OF ITEMS</u>
Pocket Dosimeter, 0-200 MREM	60
Dosimeter Charger	2
TLD, Personnel	60
Cartridge, HEPA Ultra Filter	20
Cartridge, GRMI	40
Respirator, Full Face	20
R02A	2
Model 14C	2
Model 3 w/44-9 Detector	1
Air Sampler, AVS-28A	2
Particulate Filter (Box)	2
Cartridge, Silver Zeolite	8
PC's, Sets	12
Masking Tape (Rolls)	10
Radiation Warning Sign	6
Warning Rope (Roll)	1
Step Off Pads	20
Plastic Bags, Large	20
Plastic Bags, Small	50
Radiation Warning Tape (Roll)	1
Flashlights	2
Batteries	
Smear (Box)	10
Procedures	
HTP-ZZ-04102	HTP-ZZ-04121
HTP-ZZ-04106	HTP-ZZ-01441
HTP-ZZ-04108	HTP-ZZ-08100

EMERGENCY PACKET INVENTORY
INDEX

<u>EMERGENCY PACKET TITLE</u>	<u>PAGE NO.</u>
Administrative Coordinator	2
Administrative/Logistic Coordinator	3
Chemistry Coordinator	4
Communications Coordinator	5
Control Room Communicator	6
Control Room/TSC Liaison	7
Dose Assessment Coordinator	8, 9 & 10
Emergency Coordinator	11
Emergency Team - Emergency Repair	12
Emergency Team - Search and Rescue	13
EOF Communicator	14
EOF Status Board/Log Keepers	15
Field Team Communicator	16
Health Physics Coordinator	17, 18 & 19
Off-Site Liaison Coordinator	20
Operations and Maintenance Coordinator	21
OCS Coordinator	22
Public Information Coordinator	23
Rad Con Coordinator	24
Recovery Manager	25
Security Coordinator	26
Status Board/Log Keeper - OSC	27
Status Board/Log Keeper - TSC	28
Technical Assessment Coordinator	29
Technical Support Coordinator	30

EMERGENCY PACKET INVENTORY

ADMINISTRATIVE COORDINATOR PROCEDURE PACKET

PROCEDURES (1 each)

<u>Procedure No.</u>	<u>Title</u>
EIP-ZZ-00203	Additional Assistance
EIP-ZZ-00250	Communications and Record Keeping

ATTACHMENTS/FORMS

<u>CA-No.</u>	<u>Attachment Number</u>	<u>Procedure No.</u>	<u>Title</u>	<u>No. of Copies</u>
CA-263	6	EIP-ZZ-00240	Administrative Coordinator Checklist	5
CA-244	1	EIP-ZZ-00250	Facility Log Sheet	20
CA-258	1	EIP-ZZ-00240	TSC Activation Checklist	5

MISCELLANEOUS FORMS AND EQUIPMENT

ZO-8 (25 copies)
Black Pens
#2 Pencils
Erasers
File Folders (Accordion)
Tablets of Paper (lined - one side)
Emergency Telephone Directory

EMERGENCY PACKET INVENTORY

ADMINISTRATIVE/LOGISTIC COORDINATOR

PROCEDURES (1 each)

<u>Procedure No.</u>	<u>Title</u>
EIP-ZZ-00203	Additional Assistance
EIP-ZZ-00250	Communications and Record Keeping
EIP-ZZ-C0010	Duties of the Corporate Emergency Organization

ATTACHMENTS/FORMS

<u>CA-No.</u>	<u>Attachment Number</u>	<u>Procedure No.</u>	<u>Title</u>	<u>No. of Copies</u>
CA-244	1	EIP-ZZ-00250	Facility Log Sheet	20
	Page 7	EIP-ZZ-C0010	Duties of the Admin/ Logistics Coordinator	5
	1	EIP-ZZ-C0010	Activation of EOF	5

MISCELLANEOUS FORMS AND EQUIPMENT

20-8 (25 copies)
 Black Pens
 #2 Pencils
 Erasers
 File Foler (Accordian)
 Tablet of Page (Lined - One Side)
 Emergency Telephone Directory

EMERGENCY PACKET INVENTORY

CHEMISTRY COORDINATOR PROCEDURE PACKET

PROCEDURES (1 each)

<u>Procedure No.</u>	<u>Title</u>
EIP-ZZ-00250	Communications and Record Keeping

ATTACHMENTS/FORMS

<u>CA-No.</u>	<u>Attachment Number</u>	<u>Procedure No.</u>	<u>Title</u>	<u>No. of Copies</u>
CA-267	10	EIP-ZZ-00240	Chemistry Coordinator Checklist	5
CA-244	1	EIP-ZZ-00250	Facility Log Sheet	20
CA-258	1	EIP-ZZ-00240	TSC Activation Checklist	5

MISCELLANEOUS FORMS AND EQUIPMENT

20-8 (25 copies)
Black Pens
#2 Pencils
Erasers
File Folders (Accordion)
Tablets of Paper (lined - one side)
Emergency Telephone Directory

EMERGENCY PACKET INVENTORY

COMMUNICATIONS COORDINATOR PROCEDURE PACKET

PROCEDURES (1 each)

<u>Procedure No.</u>	<u>Title</u>
EIP-ZZ-00201	Notifications
EIP-ZZ-00202	Callout of Emergency Organization
EIP-ZZ-00250	Communications and Record Keeping

ATTACHMENTS/FORMS

<u>CA-No.</u>	<u>Attachment Number</u>	<u>Procedure No.</u>	<u>Title</u>	<u>No. of Copies</u>
CA-232	2	EIP-ZZ-00201	Follow-Up Notification Form	30
	1	EIP-ZZ-00202	On-Site Emergency Organization Callout Tree	5
CA-265	8	EIP-ZZ-00240	Communication Coordinator Checklist	5
CA-244	1	EIP-ZZ-00250	Facility Log Sheet	20
CA-258	1	EIP-ZZ-00240	TSC Activation Checklist	5

MISCELLANEOUS FORMS AND EQUIPMENT

ZO-8 (50 copies)
 Black Pens
 #2 Pencils
 Erasers
 File Folders (Accordion)
 Tablets of Paper (lined - one side)
 Emergency Telephone Directory

EMERGENCY PACKET INVENTORY

CONTROL ROOM COMMUNICATOR PROCEDURE PACKET (2 Sets)

PROCEDURES (1 each)

<u>Procedure No.</u>	<u>Title</u>
EIP-ZZ-00201	Notifications
EIP-ZZ-00202	Callout of Emergency Organization

ATTACHMENTS/FORMS

<u>CA-No.</u>	<u>Attachment Number</u>	<u>Procedure No.</u>	<u>Title</u>	<u>No. of Copies</u>
CA-233	3	EIP-ZZ-00201	Notifications Checklist	5
CA-239	4	EIP-ZZ-00201	Transferring Communi- cations to the TSC	5

MISCELLANEOUS FORMS AND EQUIPMENT

20-8 (50 Copies)
#2 Pencils
Black Pens
Tablets of Paper (lined - one side)
File Folder (Accordion) (1)
Erasers
Emergency Telephone Directory

EMERGENCY PACKET INVENTORY

CONTROL ROOM/TSC LIAISON PROCEDURE PACKET

PROCEDURES (1 each)

<u>Procedure No.</u>	<u>Title</u>
EIP-ZZ-00250	Communications and Record Keeping

ATTACHMENTS/FORMS

<u>CA-No.</u>	<u>Attachment Number</u>	<u>Procedure No.</u>	<u>Title</u>	<u>No. of Copies</u>
	1	EIP-ZZ-00102	Plant Status Report	15
CA-244	1	EIP-ZZ-00250	Facility Log Sheet	20

MISCELLANEOUS FORMS AND EQUIPMENT

ZO-8 (50 copies)
Black Pens
#2 Pencils
Erasers
File Folders (Accordion)
Tablets of Paper (lined - one side)
Emergency Telephone Directory

EMERGENCY PACKET INVENTORY

DOSE ASSESSMENT COORDINATOR PROCEDURE PACKET (2 Sets)

PROCEDURES (1 each)

<u>Procedure No.</u>	<u>Title</u>
EIP-ZZ-01211	Initial Dose Assessment
EIP-ZZ-02211	Intermediate Phase and Subsequent Dose Assessment
EIP-ZZ-00212	Protective Action Recommendations
EIP-ZZ-00220	Emergency Team Formation
EIP-ZZ-00223	Field Monitoring
EIP-ZZ-00250	Communications and Record Keeping
EIP-ZZ-C0010	Duties of the Corporate Emergency Organization

ATTACHMENTS/FORMS

<u>CA-No.</u>	<u>Attachment Number</u>	<u>Procedure No.</u>	<u>Title</u>	<u>No. of Copies</u>
CA-275	1 (pgs. 4 & 5 only)	EIP-ZZ-00210	Radiological Briefing/Debriefing Form	10
CA-276	3 (pgs. 6, 7 & 8 only)	EIP-ZZ-00210	Emergency Exposure Authorization Form	10
CA-277	9 (pg. 4 only)	EIP-ZZ-00210	Radioiodine Activity Concentration Worksheet	10
CA-258	1	EIP-ZZ-00240	TSC Activation	5
	2	EIP-ZZ-01211	Dose Assessment Worksheet	25
CA-555	1 (Form 1A)	EIP-ZZ-02211	Meteorological Dispersion Factors (X/Q) and Plume Dimensions Data Sheet	25
CA-556	3 (Form 3A)	EIP-ZZ-02211	Dose Rate Projections Based on Noble Gas Monitors	25
CA-557 & CA-558	4 (Form 4A & Form 4B only)	EIP-ZZ-02211	Whole Body Release Rate Calculation Worksheet	25
			Projected Child Thyroid Dose Rate Calculation Worksheet	25
CA-559	5 (Form 5A)	EIP-ZZ-02211	Estimated Whole Body and Child Thyroid Dose Rate Calculation Worksheet	25
CA-560	6 (Form 6A)	EIP-ZZ-02211	Whole Body and Child Thyroid Dose Rate Calculation Worksheet	25

EMERGENCY PACKET INVENTORY

DOSE ASSESSMENT COORDINATOR PROCEDURE PACKET (Cont'd.)

ATTACHMENTS/FORMS (Cont'd.)

<u>CA-No.</u>	<u>Attachment Number</u>	<u>Procedure No.</u>	<u>Title</u>	<u>No. of Copies</u>
CA-561	7 (Form 7A)	EIP-ZZ-02211	Projected Whole Body and Child Thyroid Dose Rate Worksheet	25
CA-562 CA-563	8 (Form 8A & Form 8B)	EIP-ZZ-02211	Whole Body Dose Factor Corrected Release Rate Cal- culation Worksheet Child Thyroid Dose Factor Corrected Release Rate Cal- culation Worksheet	25 25
CA-564 CA-565 CA-566 CA-567 CA-568 CA-569 CA-570	9 (Form 9A, 9B, 9C, 9D, 9E, 9F, 9F)	EIP-ZZ-02211	Particulate Release Rate Worksheet Dose Rates From Contaminated Surfaces Inhalation Dose Commitment- Adult Inhalation Dose Commitment- Child Ingestion Dose Assessment Worksheet-Adult Ingestion Dose Assessment Worksheet-Child Ingestion Dose Assessment Worksheet-Infant	25 25 25 25 25 25 25
CA-571 CA-572	10 (Form 10A & Form 10B)	EIP-ZZ-02211	Estimated Whole Body Dose and Cumulative Exposure Calcula- tion Worksheet Total Population Exposure Calculation Worksheet	25 25
CA-573	12 (Form 12A)	EIP-ZZ-02211	Dose Assessment Summary Sheet	25
	4	EIP-ZZ-00212	Projection of Measurement of Dose and Time to PAG Cal- culation Worksheet	5
	5	EIP-ZZ-00212	Protective Action Decision Chart for Plume Exposure Pathway	5

EMERGENCY PACKET INVENTORY

DOSE ASSESSMENT COORDINATOR PROCEDURE PACKET (Cont'd.)

ATTACHMENTS/FORMS (Cont'd.)

<u>CA-No.</u>	<u>Attachment Number</u>	<u>Procedure No.</u>	<u>Title</u>	<u>No. of Copies</u>
	6	EIP-ZZ-00212	Protective Action Decision Chart for Ingestion Expo- sure Pathway	5
	12	EIP-ZZ-00212	Protective Action Recommen- dations	5
CA-236	2	EIP-ZZ-00214	Personnel Decontamination Record	10
CA-237	3	EIP-ZZ-00214	Vehicle/Equipment Decon- tamination Record	20
	1	EIP-ZZ-00216	Nomogram, 1-131	5
	2	EIP-ZZ-00216	Nomogram, 1-133	5
	3	EIP-ZZ-00216	Nomogram, 1-135	5
	4	EIP-ZZ-00216	Nomogram, Gross Radioiodine	5
	6	EIP-ZZ-00216	Dose Equivalent Worksheet	5
CA-269	12	EIP-ZZ-00240	Dose Assessment Coordinator Checklist	
CA-244	1	EIP-ZZ-00250	Facility Log Sheet	20
	Page 5 & 6	EIP-ZZ-C0010	Duties of the Radiological Assessment Coordinator	5

MISCELLANEOUS FORMS AND EQUIPMENT

20-8 (25 copies)	File Folder (Accordion)
Black Pens	Tablets of Paper (lined - one side)
#2 Pencils	Emergency Telephone Directory
Erasers	

EMERGENCY PACKET INVENTORY

EMERGENCY COORDINATOR PROCEDURE PACKET (2 Sets)

PROCEDURES (1 each)

<u>Procedure No.</u>	<u>Title</u>
EIP-ZZ-00101	Classification of Emergencies
EIP-ZZ-00102	Emergency Implementing Actions
EIP-ZZ-00201	Notifications
EIP-ZZ-00202	Callout of Emergency Organization
EIP-ZZ-00203	Additional Assistance
EIP-ZZ-00212	Protective Action Recommendations
EIP-ZZ-00220	Emergency Team Formation
EIP-ZZ-00224	Transportation of Contaminated Injured/Ill Personnel
EIP-ZZ-00225	Re-Entry
EIP-ZZ-00230	Evacuation
EIP-ZZ-00250	Communications and Record Keeping

ATTACHMENTS/FORMS

<u>CA No.</u>	<u>Attachment Number</u>	<u>Procedure No.</u>	<u>Title</u>	<u>No. of Copies</u>
	1	EIP-ZZ-00102	Plant Status Report	10
CA-231	1	EIP-ZZ-00201	Initial Notification Form	5
CA-232	2	EIP-ZZ-00201	Follow-up Notification Form	5
	1	EIP-ZZ-00202	On-Site Emergency Organization Callout Tree	5
	4	EIP-ZZ-00212	Projected or Measured Dose and Time to PAG Calculation Worksheet	5
	5	EIP-ZZ-00212	Chart for Plume Exposure Pathway	5
	6	EIP-ZZ-00212	Protective Action Decision Chart for Ingestion Exposure Pathway	5
	12	EIP-ZZ-00212	Protective Action Recommendations	5
CA-235	1	EIP-ZZ-00220	Emergency Team Formation, Briefing, Dispatch, and Debriefing	5
CA-242	1	EIP-ZZ-00224	Off-Site Notification Checklist	5
CA-257	1	EIP-ZZ-00225	Re-Entry Operational Checklist	5
CA-244	1	EIP-ZZ-00250	Facility Logsheet	20
CA-258	1	EIP-ZZ-00240	TSC Activation Checklist	5

MISCELLANEOUS FORMS AND EQUIPMENT

Z0-8 (25 copies)	#2 Pencils	File Folders (Accordion) (1)
Black Pens	Erasers	Tablets of Paper (Lined - one side)
		Emergency Telephone Directory
		Emergency Organization Chart

EMERGENCY PACKET INVENTORY

EMERGENCY TEAM PROCEDURE PACKET - EMERGENCY REPAIR

PROCEDURES (1 each)

<u>Procedure No.</u>	<u>Title</u>
EIP-ZZ-00222	Emergency Repair

ATTACHMENTS/FORMS

<u>CA-No.</u>	<u>Attachment Number</u>	<u>Procedure No.</u>	<u>Title</u>	<u>No. of Copies</u>
CA-241	1	EIP-ZZ-00222	Emergency Repair Summary	20

MISCELLANEOUS FORMS AND EQUIPMENT

Black Pens
 #2 Pencils
 Erasers
 File Folder (Accordion)
 Tablets of Paper (lined - one side)

EMERGENCY PACKET INVENTORY

EMERGENCY TEAM PROCEDURE PACKET - SEARCH AND RESCUE

PROCEDURES (1 each)

<u>Procedure No.</u>	<u>Title</u>
EIP-ZZ-00221	Search and Rescue

ATTACHMENTS/FORMS

<u>CA-No.</u>	<u>Attachment Number</u>	<u>Procedure No.</u>	<u>Title</u>	<u>No. of Copies</u>
CA- 240	1	EIP-ZZ-00221	Search and Rescue Summary	20

MISCELLANEOUS FORMS AND EQUIPMENT

Black Pens
#2 Pencils
Erasers
File Folders (Accordion)
Tablets of Paper (lined - one side)

EMERGENCY PACKET INVENTORY

EOF COMMUNICATOR

PROCEDURES (1 each)

<u>Procedure No.</u>	<u>Title</u>
EIP-ZZ-00201	Notification
EIP-ZZ-00250	Communications and Record Keeping
EIP-ZZ-C0010	Duties of the Corporate Emergency Organization
EIP-ZZ-C0020	Callout of Corporate Emergency Organization

ATTACHMENTS/FORMS

<u>CA-No.</u>	<u>Attachment Number</u>	<u>Procedure No.</u>	<u>Title</u>	<u>No. of Copies</u>
CA-232	2	EIP-ZZ-00201	Follow-up Notifi- cation Form	30
CA-244	1	EIP-ZZ-00250	Facility Log Sheet	20
	Page 10	EIP-ZZ-C0010	Duties of EOF Communicator	5

MISCELLANEOUS FORMS AND EQUIPMENT

ZO-8 (50 copies)
 Black Pens
 #2 Pencils
 Erasers
 File Folder (Accordian)
 Tablet of Paper (Lined - One Side)
 Emergency Telephone Directory

EMERGENCY PACKET INVENTORY

EOF STATUS BOARD/LOG KEEPER

PROCEDURES (3 each)

<u>Procedure No.</u>	<u>Title</u>
EIP-ZZ-00250	Communications and Record Keeping
EIP-ZZ-C0010	Duties of the Corporate Emergency Organization

ATTACHMENTS/FORMS

<u>CA-No.</u>	<u>Attachment Number</u>	<u>Procedure No.</u>	<u>Title</u>	<u>No. of Copies</u>
CA-244	1	EIP-ZZ-00102	Plant Status Report	50
	1	EIP-ZZ-00250	Facility Log Sheet	100

MISCELLANEOUS FORMS AND EQUIPMENT

Field Information Status Borad (25 copies)
 Dose Assessment Status Borad (30 copies)
 20-8 (50 copies)
 Status Borad Marking Utensils
 Black Pens
 #2 Pencils
 Erasers
 File Folder (Accordion)
 Tablet of Paper (Lined - One Side)
 Emergency Telephone Directory

EMERGENCY PACKET INVENTORY

FIELD TEAM COMMUNICATOR PROCEDURE PACKET (2 Sets)

PROCEDURES (1 each)

<u>Procedure No.</u>	<u>Title</u>
EIP-ZZ-00223	Field Monitoring
EIP-ZZ-00250	Communications and Record Keeping

ATTACHMENTS/FORMS

<u>CA-No.</u>	<u>Attachment Number</u>	<u>Procedure No.</u>	<u>Title</u>	<u>No. of Copies</u>
CA-246	1	EIP-ZZ-00223	Survey Worksheet	25
CA-247	2	EIP-ZZ-00223	Field Monitoring Team Worksheet	25
CA-249	4	EIP-ZZ-00223	Field Team Communicator Data Sheet	25
CA-244	1	EIP-ZZ-00250	Facility Log Sheet	20

MISCELLANEOUS FORMS AND EQUIPMENT

Field Monitoring Sampling Locations Map
 ZO-8 (25copies)
 Map Marking Utensils
 Black Pens
 #2 Pencils
 Erasers
 File Folders (Accordion)
 Tablets of Paper (lined - one side)
 Emergency Telephone Directory
 Dose Assessment Status Board (20 copies)
 Field Information Status Board (20 copies)

EMERGENCY PACKET INVENTORY

HEALTH PHYSICS COORDINATOR PROCEDURE PACKET (2 Sets)

PROCEDURES (1 each)

Procedure No.

EIP-ZZ-00210	In-Plant Radiological Controls During an Emergency
EIP-ZZ-00211	Intermediate Phase and Subsequent Dose Assessment
EIP-ZZ-00212	Protective Action Recommendations
EIP-ZZ-00214	Personnel/Vehicle Monitoring and Decontamination
EIP-ZZ-00216	Potassium Iodide Administration
EIP-ZZ-00220	Emergency Team Formation
EIP-ZZ-00223	Field Monitoring
EIP-ZZ-00224	Transportation of Contaminated Injured/Ill Personnel
EIP-ZZ-00250	Communications and Record Keeping
EIP-ZZ-01211	Initial Dose Assessment

ATTACHMENTS/FORMS

<u>CA-No.</u>	<u>Attachment Number</u>	<u>Procedure No.</u>	<u>Title</u>	<u>No. of Copies</u>
CA-275	1 (pgs. 4 & 5 only)	EIP-ZZ-00210	Radiological Briefing/ Debriefing Form	10
CA-276	3 (pgs. 6, 7 & 8 only)	EIP-ZZ-00210	Emergency Exposure Author- ization Form	10
CA-277	9 (pg. 4 only)	EIP-ZZ-00210	Radioiodine Activity Con- centration Worksheet	10
	2	EIP-ZZ-01211	Dose Assessment Worksheet	25
CA-555	1 (Form 1A)	EIP-ZZ-02211	Meteorological Dispersion Factors (X/Q) and Plume Dimensions Data Sheet	25
CA-556	3 (Form 3A)	EIP-ZZ-02211	Dose Rate Projections Based on Noble Gas Monitors	25
CA-557	4 (Form 4A & Form 4B only)	EIP-ZZ-02211	Whole Body Release Rate Calculation Worksheet	25
CA-558			Projected Child Thyroid Dose Rate Calculation Work- sheet	25
CA-559	5 (Form 5A)	EIP-ZZ-02211	Estimated Whole Body and Child Thyroid Dose Rate Calculation Worksheet	25
CA-560	6 (Form 6A)	EIP-ZZ-02211	Whole Body and Child Thyroid Dose Rate Calculation Work- sheet	25

EMERGENCY PACKET INVENTORY

HEALTH PHYSICS COORDINATOR PROCEDURE PACKET (Cont'd.)

ATTACHMENTS/FORMS (Cont'd.)

<u>CA-No.</u>	<u>Attachment Number</u>	<u>Procedure No.</u>	<u>Title</u>	<u>No. of Copies</u>
CA-561	7 (Form 7A)	EIP-ZZ-02211	Projected Whole Body and Child Thyroid Dose Rate Worksheet	25
CA-562	8 (Form 8A & Form 8B)	EIP-ZZ-02211	Whole Body Dose Factor Corrected Release Rate Cal- culation Worksheet	25
CA-563			Child Thyroid Dose Factor Corrected Release Rate Cal- culation Worksheet	25
CA-564	9 (Form 9A, 9B, 9C, 9D, 9E, 9F, 9F)	EIP-ZZ-02211	Particulate Release Rate Worksheet	25
CA-565			Dose Rates From Contaminated Surfaces	25
CA-566			Inhalation Dose Commitment- Adult	25
CA-567			Inhalation Dose Commitment- Child	25
CA-568			Ingestion Dose Assessment Worksheet-Adult	25
CA-569			Ingestion Dose Assessment Worksheet-Child	25
CA-570			Ingestion Dose Assessment Worksheet-Infant	25
CA-571	10 (Form 10A & Form 10B)	EIP-ZZ-02211	Estimated Whole Body Dose and Cumulative Exposure Calcula- tion Worksheet	25
CA-572			Total Population Exposure Calculation Worksheet	25
CA-573	12 (Form 12A)	EIP-ZZ-02211	Dose Assessment Summary Sheet	25
	4	EIP-ZZ-00212	Projection of Measurement of Dose and Time to PAG Cal- culation Worksheet	5
	5	EIP-ZZ-00212	Protective Action Decision Chart for Plume Exposure Pathway	5

EMERGENCY PACKET INVENTORY

HEALTH PHYSICS COORDINATOR PROCEDURE PACKET (Cont'd.)

ATTACHMENTS/FORMS (Cont'd.)

<u>CA-No.</u>	<u>Attachment Number</u>	<u>Procedure No.</u>	<u>Title</u>	<u>No. of Copies</u>
	6	EIP-ZZ-00212	Protective Action Decision Chart for Ingestion Expo- sure Pathway	5
	12	EIP-ZZ-00212	Protective Action Recommen- dations	5
CA-236	2	EIP-ZZ-00214	Personnel Decontamination Record	10
CA-237	3	EIP-ZZ-00214	Vehicle/Equipment Decon- tamination Record	20
	1	EIP-ZZ-00216	Nomogram, 1-131	5
	2	EIP-ZZ-00216	Nomogram, 1-133	5
	3	EIP-ZZ-00216	Nomogram, 1-135	5
	4	EIP-ZZ-00216	Nomogram, Gross Radioiodine	5
	6	EIP-ZZ-00216	Dose Equivalent Worksheet	5
CA-258	1	EIP-ZZ-00240	TSC Activation Checklist	5
CA-269	12	EIP-ZZ-00240	Health Physics Coord. Cklist.	5
CA-273	5	EIP-ZZ-00241	OSC Activation	5
CA-274	6	EIP-ZZ-00241	OSC Deactivation	5
CA-244	1	EIP-ZZ-00250	Facility Log Sheet	20

MISCELLANEOUS FORMS AND EQUIPMENT

20-8 (25 copies)	File Folder (Accordion)
Black Pens	Tablets of Paper (lined - one side)
#2 Pencils	Emergency Telephone Directory
Erasers	

EMERGENCY PACKET INVENTORY

OFF-SITE LIAISON COORDINATOR PROCEDURE PACKET

PROCEDURES (1 each)

<u>Procedure No.</u>	<u>Title</u>
EIP-ZZ-00201	Notifications
EIP-ZZ-00212	Protective Action Recommendations
EIP-ZZ-00250	Communications and Record Keeping
EIP-ZZ-C0010	Duties of the Corporate Emergency Organization

ATTACHMENTS/FORMS

<u>CA-No.</u>	<u>Attachment Number</u>	<u>Procedure No.</u>	<u>Title</u>	<u>No. of Copies</u>
CA-232	2	EIP-ZZ-00201	Follow-Up Notification Form	20
	12	EIP-ZZ-00212	Protective Action Recommendations	5
CA-244	1	EIP-ZZ-00250	Facility Log Sheet	20
	Page 4	EIP-ZZ-C0010	Duties of the Off-Site Liaison Coordinator	5
	Page 1	EIP-ZZ-C0010	Activation of EOF	5

MISCELLANEOUS FORMS AND EQUIPMENT

ZO-8 (25 copies)
 Black Pens
 #2 Pencils
 Erasers
 File Folders (Accordion)
 Tablets of Paper (Lined - one side)
 Emergency Telephone Directory

EMERGENCY PACKET INVENTORY

OPERATIONS AND MAINTENANCE COORDINATOR PROCEDURE PACKET

PROCEDURES (1 each)

<u>Procedure No.</u>	<u>Title</u>
EIP-ZZ-00213	Technical Assessment
EIP-ZZ-00220	Emergency Team Formation
EIP-ZZ-00221	Search and Rescue
EIP-ZZ-00222	Emergency Repair
EIP-ZZ-00241	Operational Support Center Operations
EIP-ZZ-00250	Communications and Record Keeping

ATTACHMENTS/FORMS

<u>CA-No.</u>	<u>Attachment Number</u>	<u>Procedure No.</u>	<u>Title</u>	<u>No. of Copies</u>
CA-262	5	EIP-ZZ-00240	Operations and Maintenance Coordinator Checklist	5
CA-244	1	EIP-ZZ-00250	Facility Log Sheet	20
CA-258	1	EIP-ZZ-00240	TSC Activation Checklist	5

MISCELLANEOUS FORMS AND EQUIPMENT

ZO-8 (25 copies)
 Black Pens
 #2 Pencils
 Erasers
 File Folder (Accordion)
 Tablets of Paper (lined - one side)
 Emergency Telephone Directory

EMERGENCY PACKET INVENTORY

OSC COORDINATOR PROCEDURE PACKET

PROCEDURES (1 each)

<u>Procedure No.</u>	<u>Title</u>
EIP-ZZ-00220	Emergency Team Formation
EIP-ZZ-00221	Search and Rescue
EIP-ZZ-00222	Emergency Repair
EIP-ZZ-00241	Operational Support Center Operations
EIP-ZZ-00250	Communications and Record Keeping
EIP-ZZ-00230	Evacuation

ATTACHMENTS/FORMS

<u>CA-No.</u>	<u>Attachment Number</u>	<u>Procedure No.</u>	<u>Title</u>	<u>No. of Copies</u>
CA-235	1	EIP-ZZ-00220	Emergency Team Formation, Briefing, Dispatch, and Debriefing	25
CA-244	1	EIP-ZZ-00250	Facility Log Sheet	20
CA-270	2	EIP-ZZ-00241	OSC Activation	5
CA-273	5	EIP-ZZ-00241	OSC Operation	5
CA-274	6	EIP-ZZ-00241	OSC Deactivation	5

MISCELLANEOUS FORMS AND EQUIPMENT

ZO-8 (25 copies)
Black Pens
#2 Pencils
Erasers
File Folders (Accordion)
Tablets of Paper (lined - one side)
Emergency Telephone Directory

EMERGENCY PACKET INVENTORY

PUBLIC INFORMATION COORDINATOR PACKET

PROCEDURES (1 each)

<u>Procedure No.</u>	<u>Title</u>
EIP-ZZ-C0010	Duties of the Corporate Emergency Organization

ATTACHMENTS/FORMS

<u>CA-No.</u>	<u>Attachment Number</u>	<u>Procedure No.</u>	<u>Title</u>	<u>No. of Copies</u>
	Page 11	EIP-ZZ-C0010	Duties of the Public Information Coordinator	5

MISCELLANEOUS FORMS AND EQUIPMENT

ZO-8 (20 copies)
Black Pens
#2 Pencils
File Folder (Accordian)
Tablet of Paper (Lined - One Side)
Emergency Telephone Directory

EMERGENCY PACKET INVENTORY

RAD CON COORDINATOR PROCEDURE PACKET

PROCEDURES (1 each)

<u>Procedure No.</u>	<u>Title</u>
EIP-ZZ-00223	Field Monitoring
EIP-ZZ-00210	In-Plant Rad Con During Emergencies
EIP-ZZ-00214	Personnel/Vehicle Monitoring and Decontamination
EIP-ZZ-00220	Emergency Team Formation
EIP-ZZ-00250	Communications and Record Keeping
EIP-ZZ-00230	Evacuation
EIP-ZZ-00241	Activation of Operational Support Center

ATTACHMENTS/FORMS

<u>CA-No.</u>	<u>Attachment Number</u>	<u>Procedure No.</u>	<u>Title</u>	<u>No. of Copies</u>
CA-275	1 (pgs. 4 & 5 only)	EIP-ZZ-00210	Radiological Briefing/Debriefing Form	25
CA-276	3 (pgs. 6, 7 & 8 only)	EIP-ZZ-00210	Emergency Exposure Authorization Form	25
CA-277	9 (pg. 4 only)	EIP-ZZ-00210	Radioiodine Activity Concentration Worksheet	25
CA-236	2	EIP-ZZ-00214	Personnel Decontamination Record	20
CA-237	3	EIP-ZZ-00214	Vehicle/Equipment Decontamination Record	20
CA-235	1	EIP-ZZ-00220	Emergency Team Formation, Briefing, Dispatch and Debriefing	20
CA-244	1	EIP-ZZ-00250	Facility Log Sheet	20
CA-270	2	EIP-ZZ-00241	OSC Activation	5
CA-273	5	EIP-ZZ-00241	OSC Operation	5
CA-274	6	EIP-ZZ-00241	OSC Deactivation	5

MISCELLANEOUS FORMS AND EQUIPMENT

ZO-8 (25 copies)
 Black Pens
 #2 Pencils
 Erasers
 File Folder (Accordion)
 Tablets of Paper (lined - one side)
 Emergency Telephone Directory

EMERGENCY PACKET INVENTORY

RECOVERY MANAGER

PROCEDURES (1 each)

<u>Procedure No.</u>	<u>Title</u>
EIP-ZZ-00101	Classification of Emergencies
EIP-ZZ-00201	Notifications
EIP-ZZ-00212	Protective Action Recommendations
EIP-ZZ-00225	Re-entry
EIP-ZZ-00250	Communications and Record Keeping
EIP-ZZ-00260	Recovery
EIP-ZZ-C0010	Duties of the Corporate Emergency Organization

ATTACHMENTS/FORMS

<u>CA-No.</u>	<u>Attachment Number</u>	<u>Procedure No.</u>	<u>Title</u>	<u>No. of Copies</u>
CA-231	1	EIP-ZZ-00201	Initial Notification Form	5
CA-232	2	EIP-ZZ-00201	Follow-up Notification Form	5
	4	EIP-ZZ-00212	Projected or Measured Dose and Time to PAG Calculation Worksheet	5
	5	EIP-ZZ-00212	Chart for Plume Exposure Pathway	5
	6	EIP-ZZ-00212	Protective Action Decision Chart for Ingestion Exposure Pathway	5
	12	EIP-ZZ-00212	Protective Action Recommendations	5
CA-257	1	EIP-ZZ-00250	Re-entry Operational Ckl.	5
CA-244	1	EIP-ZZ-00250	Facility Log Sheet	20
	1	EIP-ZZ-C0010	Activation of the EOF	5
Page 2		EIP-ZZ-C0010	Duties of the Recovery Mgr.	5

MISCELLANEOUS FORMS AND EQUIPMENT

ZO-8 (25 copies)	Tablet of Paper (Lined - One Side)
Black Pens	Emergency Telephone Directory
#2 Pencils	EOF Emergency Organization Chart
Erasers	
File Folder (Accordian)	

EMERGENCY PACKET INVENTORY

SECURITY COORDINATOR PROCEDURE PACKET

PROCEDURES (1 each)

<u>Procedure No.</u>	<u>Title</u>
EIP-ZZ-00230	Evacuation
EIP-ZZ-00250	Communications and Record Keeping
SDP-ZZ-PP008	Accountability

ATTACHMENTS/FORMS

<u>CA-No.</u>	<u>Attachment Number</u>	<u>Procedure No.</u>	<u>Title</u>	<u>No. of Copies</u>
CA-244	1	EIP-ZZ-00250	Facility Log Sheet	20
CA-258	1	EIP-ZZ-00240	TSC Activation Checklist	5

MISCELLANEOUS FORMS AND EQUIPMENT

ZO-8 (25 copies)
Black Pens
#2 Pencils
Erasers
File Folders (Accordion)
Tablets of Paper (lined - one side)
Emergency Telephone Directory

EMERGENCY PACKET INVENTORY

STATUS BOARD/LOG KEEPER (OSC) PROCEDURE PACKET (2 Sets)

PROCEDURES (1 each)

<u>Procedure No.</u>	<u>Title</u>
EIP-ZZ-00250	Communications and Record Keeping

ATTACHMENTS/FORMS

<u>CA-No.</u>	<u>Attachment Number</u>	<u>Procedure No.</u>	<u>Title</u>	<u>No. of Copies</u>
CA-270	3	EIP-ZZ-00241	OSC Organization/Status	20
CA-272	4	EIP-ZZ-00241	Health Physics Office Organization/Status	5
CA-244	1	EIP-ZZ-00250	Facility Log Sheet	20

MISCELLANEOUS FORMS AND EQUIPMENT

20-8 (50 copies)
 Status Board Marking Utensils
 Black Pens
 #2 Pencils
 Erasers
 File Folders (Accordion)
 Tablets of Paper (lined - one side)
 Emergency Telephone Directory

EMERGENCY PACKET INVENTORY

STATUS BOARD/LOG KEEPER (TSC) PROCEDURE PACKET (2 Sets)

PROCEDURES (1 each)

<u>Procedure No.</u>	<u>Title</u>
EIP-ZZ-00250	Communications and Record Keeping

ATTACHMENTS/FORMS

<u>CA-No.</u>	<u>Attachment Number</u>	<u>Procedure No.</u>	<u>Title</u>	<u>No. of Copies</u>
	1	EIP-ZZ-00102	Plant Status Report	50
CA-258	1 (pg. 3 only)	EIP-ZZ-00240	On-Site Emergency Organization (TSC)	10
CA-244	1	EIP-ZZ-00250	Facility Log Sheet	20

MISCELLANEOUS FORMS AND EQUIPMENT

Field Information Status Board (10 copies)
 Dose Assessment Board (30 copies)
 20-8 (50 copies)
 Status Board Marking Utensils
 Black Pens
 #2 Pencils
 Erasers
 File Folders (Accordion)
 Tablets of Paper (lined - one side)

EMERGENCY PACKET INVENTORY

TECHNICAL ASSESSMENT COORDINATOR PROCEDURE PACKET

PROCEDURES (1 each)

<u>Procedure No.</u>	<u>Title</u>
EIP-ZZ-00101	Classification of Emergencies
EIP-ZZ-00102	Emergency Implementing Action
EIP-ZZ-00213	Technical Assessment
EIP-ZZ-00240	Technical Support Center Operations
EIP-ZZ-00250	Communications and Record Keeping

ATTACHMENTS/FORMS

<u>CA-No.</u>	<u>Attachment Number</u>	<u>Procedure No.</u>	<u>Title</u>	<u>No. of Copies</u>
CA-258	1	EIP-ZZ-00240	TSC Activation	5
CA-260	3	EIP-ZZ-00240	TSC Deactivation	5
CA-261	4	EIP-ZZ-00240	Technical Assessment Coordinator Checklist	5
CA-244	1	EIP-ZZ-00250	Facility Log Sheet	20

MISCELLANEOUS FORMS AND EQUIPMENT

ZO-8 (25 Copies)
 Black Pens
 #2 Pencils
 Erasers
 File Folder (Accordion)
 Tablets of Paper (lined - one side)
 Emergency Telephone Directory
 Graph Paper

Proced. No. EIP-ZZ-A0020

Rev. 0

EMERGENCY PACKET INVENTORY

TECHNICAL SUPPORT COORDINATOR

PROCEDURES (1 each)

Procedure No.

Title

EIP-ZZ-00213	Technical Assessment
EIP-ZZ-00250	Communications and Record Keeping
EIP-ZZ-C0010	Duties of the Corporate Emergency Organization

ATTACHMENTS/FORMS

<u>CA-No.</u>	<u>Attachment Number</u>	<u>Procedure No.</u>	<u>Title</u>	<u>No. of Copies</u>
CA-244	1	EIP-ZZ-00250	Facility Log Sheet	20
	Page 8	EIP-ZZ-C0010	Duties of Technical Support Coordinator	5
	1	EIP-ZZ-C0010	Activation of EOF	5

MISCELLANEOUS FORMS AND EQUIPMENT

20-8 (25 copies)
Black Pens
#2 Pencils
Erasers
File Folder (Accordian)
Table of Paper (Lined - One Side)
Emergency Telephone Directory

CALLAWAY PLANT
HEALTH PHYSICS DEPARTMENTAL PROCEDURE
HDP-ZZ-01300
INTERNAL DOSIMETRY PROGRAM

RESP. DEPT. Health Physics PREPARED BY JG Crawford
APPROVED BY JRP DATE 10/7/83
DATE ISSUED 10-18-83

This procedure contains the following:

Pages	<u>1</u>	through	<u>12</u>
Attachments	<u>1</u>	through	<u>3</u>
Appendices	<u></u>	through	<u></u>
Checklist	<u></u>	through	<u></u>

INFORMATION ONLY
UNCONTROLLED
COPY

Table of Contents

<u>Section</u>		<u>Page Number</u>
1.0	Purpose and Scope	1
2.0	Definitions	1
3.0	Policy	2
4.0	Procedure	3
4.1	Discussion	3
4.2	Performance of Bioassays	5
4.3	Monitoring Frequency	6
4.4	Follow-Up Bioassays	7
4.5	Handling of Bioassay Results	7
4.5.1	Results Less Than The Investigation Level	7
4.5.2	Results Greater Than Or Equal To Investigation Level	7
4.5.3	Documentation	9
4.6	MPC-HR Accountability and Respiratory Protection Requirements	9
4.7	Internal Exposure Limits	11
4.8	Requests for Increased Internal Exposure	11
5.0	References	11
6.0	Records	12
Attachment 1 - Internal Dose Assessment Summary		
Attachment 2 - Table of Internal Exposure Limits		
Attachment 3 - Request for Increased Exposure (CA-285)		

INTERNAL DOSIMETRY PROGRAM

1.0 PURPOSE AND SCOPE

This procedure sets forth the policy and methodology for conducting the Internal Dosimetry program at the Callaway Plant. It covers the internal dosimetry function from personnel screening to final dose commitment using in vivo or in vitro bioassay analyses.

2.0 DEFINITIONS

2.1 ANNUAL LIMIT ON INTAKE (ALI)

The quantity of a radionuclide taken into the body corresponding to the annual limit set by the International Commission on Radiological Protection (ICRP) and corresponding to a certain dose equivalent commitment over the 50 years post intake due to transformations of the specified radionuclide and any in-growth daughter radionuclides.

2.2 COMMITTED DOSE EQUIVALENT

The total dose equivalent (absorbed dose X quality factor) averaged throughout a tissue in the 50 years after intake of a radionuclide into the body.

2.3 EXCRETION

Elimination of material from the body; the quantity eliminated either directly or through some systemic excretion pathway.

2.4 DEPOSITION

Quantity of a radionuclide deposited in a particular organ.

2.5 INTAKE

Quantity of a radionuclide taken into the body, e.g., by inhalation or ingestion.

2.6 IN VITRO

External to the body.

2.7 IN VIVO

Within the body.

2.8 RETENTION FUNCTION (GENERAL)

The fraction, expressed as a function of time, of some referenced initial quantity of a material or contaminant remaining at some later time in a particular entity. The referenced initial quantity can be the number of atoms or activity of a parent radionuclide given as an intake, uptake, or deposition; and the retention may be defined for both parent and daughters.

2.9 UPTAKE

Quantity of a radionuclide taken up into bodily fluids external to the cells, e.g. by injection into the blood.

2.10 INVESTIGATION LEVEL

A value of dose equivalent or intake above which the results are considered sufficiently important to justify further investigations. Investigation levels are established to correspond to one-twentieth of the annual limit on intake.

3.0 POLICY

3.1 The policy of the Callaway Health Physics Internal Dosimetry Program is to provide for the following:

3.1.1 An internal radiation dosimetry program suitable for the radiation exposure types and levels anticipated during routine and non-routine work operations.

3.1.2 Adequate facilities and knowledgeable personnel for performing bioassays and for maintaining required exposure records.

3.1.3 Providing accurate dose assessment and reliable internal exposure data to assist in maintaining personnel exposure as low as reasonably achievable (ALARA).

4.0 PROCEDURE

4.1 DISCUSSION

4.1.1 Within the Radiological Controlled Area or Radiological Posted Areas at the Callaway Plant where the work environment includes radioactive materials in sealed or unsealed form, there may exist a potential source of internal contamination of workers. While the first lines of defense against internal intakes of radioactive materials are engineering and procedural controls, a comprehensive program for measuring and interpreting quantities of specific radionuclides taken into the body has been established.

4.1.2 The Internal Dosimetry program serves two major functions:

4.1.2.1 Substantiation of the adequacy of engineered and procedural controls or providing evidence for implementing changes in these controls.

- 4.1.2.2 To provide a means for assessing the magnitude and significance of any accidental intake of radioactivity or confirming the absence of any significant intakes.
- 4.1.3 The following are the most significant aspects of the program: to identify the major source terms with respect to internal intakes; to provide data to evaluate the need to implement additional engineering and procedural safeguards and controls to minimize intakes; to identify those individuals or categories of personnel who will be monitored in the bioassay program; to specify the frequencies with which specific individuals or groups will be monitored in the bioassay program; and to specify the bioassay measurement procedures and techniques to be used. The program also serves to provide acceptable procedures and methodology for interpreting results based upon requirements of regulatory agencies and recommendations of standard setting groups or noted authorities in the internal dosimetry field.
- 4.1.4 The program reflects the most current approaches and recommendations to the ICRP, particularly as presented in ICRP Publication 26, "Recommendations of the International Commission of Radiological Protection (ICRP 77a)" and ICRP Publication 30, "Limits for Intakes of Radionuclides by Workers (ICRP 79a)." These methodologies are incorporated into dose calculations to obtain the Committed Dose Equivalent.
- 4.1.5 Intake retention functions are used to obtain the fraction of an intake of a radionuclide expected to be present in a particular physiological compartment in the body or in an excretion compartment as a function of the time post intake. These intake retention functions incorporate current models summarized by the ICRP in the ICRP 30 report.

- 4.1.6 Two techniques are employed to perform bioassay measurements as part of the internal dosimetry program:
- 4.1.6.1 Whole body counting (in vivo measurement) utilizing the Nuclear Data whole body counting system, which consists of the ND-6685 computer system and software, the ND-66 MCA, and the whole body chair equipped with three NaI detectors.
- 4.1.6.2 Bioassay sampling (in vitro measurement) which is normally used as a follow up method as described in Section 4.4, Follow-Up Bioassays.
- 4.1.7 Because inhalation is the major route of intake of radionuclides into the body, estimates of the respiratory tract burden of gamma emitting radionuclides by in vivo counting is a useful bioassay procedure for verifying the adequacy of internal exposure controls. Such measurements are also useful for estimating the intake of radionuclides due to inhalation by application of the respiratory tract particle deposition and retention function appropriate for the size and clearance classification of the particles inhaled. The Committed Dose Equivalent received from the internal deposition shall be added to external exposure with respect to the dose limits of 10CFR20.101 as directed by the Supervisor, Health Physics Technical Support.
- 4.2 PERFORMANCE OF BIOASSAYS
- 4.2.1 In vivo bioassays are conducted in accordance with HTP-ZZ-04521, Operation of the Whole Body Counting System.
- 4.2.2 In vitro bioassays analyses are normally performed by a contractor laboratory as follow up analyses. Excretion samples are handled and documented as per HTP-ZZ-01310, Sample Collection, Preparation, and Shipment of Bioassay Samples.

- 4.2.3 Nasal swab counting as per HTP-ZZ-01301, Collection and Analysis of Nasal Swabs may be used for routine screening of workers as a follow up survey on the effectiveness of the respiratory protection and surveillance programs, as an aid in conducting bioassay evaluations when internal contamination is suspected, or when facial contamination is detected as per HTP-ZZ-06010, Personnel Monitoring for Contamination.
- 4.3 MONITORING FREQUENCY
- 4.3.1 All permanent plant personnel whose duties do not require entry into the RCA or Radiological Posted Areas will be counted annually.
- 4.3.2 Personnel whose duties require entry into an RCA or Radiological Posted Areas will be counted annually. Personnel in this category may be counted more frequently based on radiological aspects of jobs worked, work conditions, or past exposure history.
- 4.3.3 New employees will be counted when they initially arrive on site. This procedure is known as the Baseline Count.
- 4.3.4 Prior to terminating employment, the individual will be counted. This procedure is known as the Final Count.
- 4.3.5 Visitors whose duties require entry into the RCA or Radiological Posted Areas will be counted based on the potential for internal contamination associated with their visit. Health Physics personnel shall make this determination. The counts are called the Entrance and Exit Counts respectively.
- 4.3.6 Individuals having nasal swab analysis greater than 400 DPM beta/gamma shall receive a follow-up whole body count.

4.3.7 Bioassays may be performed as directed by Health Physics supervision when an individual's internal exposure exceeds 40 MPC-HRs in seven consecutive days or for real or suspected accidental internal exposure.

4.4 FOLLOW-UP BIOASSAYS

4.4.1 In addition to follow-up in vivo bioassays, in vitro bioassays can be used to assess intakes and to establish the actual metabolism of the exposed person in order to more accurately assess the internal dose and to provide guidance on the need for other action (e.g., medical consultation, use of diuretics, etc.).

4.4.2 Follow-up bioassays in conjunction with ICRP-30 methodologies may be used to estimate MPC-HR values. In vivo or in vitro analyses may be used for this estimate. In vitro bioassay results may also be used to confirm in vivo measurements in certain cases.

4.5 HANDLING OF BIOASSAY RESULTS

4.5.1 RESULTS LESS THAN THE INVESTIGATION LEVEL

4.5.1.1 Confirmed bioassay results less than the investigation level require no further bioassay follow up.

4.5.1.2 Confirmed bioassay results less than the investigation level but greater than MDA shall be evaluated by the Rad/Chem Foreman (ALARA) for trending, and the individual's Personnel Exposure Record shall be color coded for tracking purposes.

- 4.5.2 RESULTS GREATER THAN OR EQUAL TO THE INVESTIGATION LEVEL
- 4.5.2.1 Exclude the individual from the RCA or Radiological Posted Areas until the evaluation has been completed and the deposition has stabilized.
- 4.5.2.2 Notify the Superintendent, Health Physics of the bioassay result.
- 4.5.2.3 If practicable, obtain a survey of the immediate work area where the incident occurred. If appropriate, take air and surface contamination samples and determine the isotopic content of the samples.
- 4.5.2.4 Utilizing ICRP 30 methodology, perform MPC calculations using initial detected quantities to determine if the 40-MPC-HR-per-week objective may have been exceeded. If MPC calculations verify an intake in excess of >50% of an ALI, ICRP-2 dose calculations shall also be performed to ensure that ICRP-2 based exposure limits are not exceeded.
- 4.5.2.5 Schedule additional analysis for two days after the incident.
- 4.5.2.6 Perform lung-dose-calculations using two-day analysis if the result is greater than the investigation level; then schedule an additional analysis for seven days after the incident for each individual whose analysis result at the two-day point is greater than the investigation level.
- 4.5.2.7 Schedule an additional analysis a week later (two weeks after the incident) for each individual whose analysis result at the seven-day point is greater than the investigation level.
- 4.5.2.8 Schedule monthly or quarterly analysis until the intake is undetectable or stabilized at less than the investigation level.

- 4.5.2.9 An Internal Dose Assessment Summary (Attachment 1) shall be completed by Health Physics Personnel.
- 4.5.2.10 Excretion measurements as follow-up analyses are performed on a case by case basis in accordance with Section 4.4, Follow-Up Bioassays.
- 4.5.3 DOCUMENTATION
- 4.5.3.1 Bioassay results are documented as per Section 7.2, Maintaining Personnel Exposure Records, of HTP-ZZ-01433, Processing Panasonic Whole Body TLDs and Maintaining Personnel Exposure Records.
- 4.6. MPC-HR ACCOUNTABILITY AND RESPIRATORY PROTECTION REQUIREMENTS
- 4.6.1 Respiratory protection devices shall be selected in accordance with HTP-ZZ-08003, Selection of Respiratory Protection Devices.
- 4.6.2 MPC-HRs shall be calculated and tracked in accordance with HTP-ZZ-01461, MPC-HR Tracking, when either of the following conditions exist:
 - 4.6.2.1 When an individual works in an area of airborne radioactivity $\geq 25\%$ MPC.
 - 4.6.2.2 When respiratory protection equipment is required.
- 4.6.3 Individual workers shall not knowingly exceed 30 MPC-HRs in one week.
- 4.6.4 MPC-HR stay times shall be calculated in accordance with HTP-ZZ-01460, Stay Time and Neutron Dose Calculations, for each individual that enters a posted airborne radioactivity area.

- 4.6.5 MPC-HR values which are estimated as per Section 4.4, Follow-Up Bioassays, shall be used to revise MPC-HR values calculated as per HTP-ZZ-01461, MPC-HR Tracking, using the following method:
- 4.6.6 Compare Attachment 1 to MPC-HR Calculations (Attachment 2) of HTP-ZZ-01461, MPC-HR Tracking, to determine the total of the calculated MPC-Hours which corresponds to the MPC-HR total for the intake described on Attachment 1.
- 4.6.7 Perform Section 7.1.4.1, Accessing the Terminal Manager, of HTP-ZZ-01433, Processing Panasonic Whole Body TLDs and Maintaining Personnel Exposure Records, and perform PERS Transaction #4, entering the revised MPC-HR total obtained from Attachment 1.
- 4.6.8 Annotate the Personnel Exposure Record Review Sheet (Attachment 9) of HTP-ZZ-01433, Processing Panasonic Whole Body TLDs and Maintaining Personnel Exposure Records, to indicate the MPC-HR revision.
- 4.6.9 When an individual has exceeded 30 MPC-HRs during a week, Health Physics personnel shall calculate stay times to ensure the individual does not exceed 40 MPC-HRs in that week. Stay times shall be calculated whether respiratory protection devices are used or not when an individual enters into a posted airborne radioactivity area.
- 4.6.10 Should an individual exceed 40 MPC-HRs in one week, the Supervisor, HPTS, shall forward a written report containing the following to the Superintendent, Health Physics:
 - 4.6.10.1 Reason for exceeding the 40 MPC-HR level.
 - 4.6.10.2 Corrective action taken or recommended to prevent reoccurrence.
 - 4.6.10.3 Any significant bioassay findings or follow-up recommendations.

4.6.11 Air concentrations of less than $1\text{E}-10$ microcuries per cubic centimeter of radioiodine do not require Iodine MPC-HR assignments.

4.6.12 No protection factor shall be allowed for radioiodine exposures unless air supplied respiratory protection devices are used.

4.7 INTERNAL EXPOSURE LIMITS

4.7.1 Limits associated with internal exposure are listed on Table of Internal Exposure Limits (Attachment 2).

4.7.2 Alert limits shall be utilized to ensure personnel do not exceed their assigned administrative limits.

4.7.3 Dose Reports generated by Health Physics shall be provided to each Department Head.

4.8 REQUESTS FOR INCREASED INTERNAL EXPOSURE

4.8.1 When personnel approach the MPC-HR Alert levels listed on Attachment 2 their work supervisor shall submit a Request for Increased Exposure (Attachment 3).

4.8.2 When authorization is received, Attachment 3 shall be forwarded to Health Physics and the increased limit entered into the Personnel Exposure Records System (PERS) using Transaction #30 as per Section 7.1.4.1, Accessing the Terminal Manager, of HTP-ZZ-01433, Processing Panasonic Whole Body TLDs and Maintaining Personnel Exposure Records.

5.0 REFERENCES

5.1 10CFR 20.103

5.2 10CFR 20.104

5.3 ICFP Publication 26

5.4 ICRP Publication 30

- 5.5 10CFR 20.101
- 5.6 APA-ZZ-00160, Callaway Plant Health Physics Program
- 5.7 HTP-ZZ-04521, Operation of the Whole Body Counting System.
- 5.8 HTP-ZZ-01310, Sample Collection, Preparation and Shipment of Bioassay Samples
- 5.9 HTP-ZZ-01301, Collection and Analysis of Nasal Swabs
- 5.10 HTP-ZZ-01433, Processing Panasonic Whole Body TLDs and Maintaining Personnel Exposure Records
- 5.11 HTP-ZZ-08003, Selection of Respiratory Protection Devices
- 5.12 HTP-ZZ-01461, MPC-HR Tracking
- 5.13 HTP-ZZ-01460, Stay Time and Neutron Dose Calculations
- 5.14 HTP-ZZ-06010, Personnel Monitoring for Contamination
- 6.0 RECORDS
- 6.1 QA RECORDS
- 6.1.1 Internal Dose Assessment Summary
- 6.1.2 Request for Increased Exposure

INTERNAL DOSE ASSESSMENT SUMMARY

NAME _____ DATE EVALUATED _____

NUCLIDE(s) _____

DATE OF INTAKE _____

1. Summary of Incident
2. Bioassay Data
3. Corroborative Data
4. Evaluation Methodology
5. Results of Evaluation

Radionuclide	Intake (Bq)	MPC (uCi/ml)	ALI (Bq)	MPC-HR

6. Committed Dose Equivalent (mRem) Total

7. Recommendations

Calculated by: _____ /
Rad/Chem Technician Date

Reviewed: _____ /
Supervisor, HPTS Date

Reviewed: _____ /
Rad/Chem Foreman (Dosimetry) Date

Reviewed: _____ /
Supt., Health Physics Date

Route to: Personnel Exposure Record (*H57.25)

cc: Rad/Chem Foreman (ALARA)

TABLE OF INTERNAL EXPOSURE LIMITS

EMPLOYEE CATEGORY	INTERNAL LIMIT
MALE OR FEMALE, AGE > 18 YEARS	(1) Alert level - 30 MPC-HRs in seven consecutive days or 350 MPC Hours in a calendar quarter. (2) Admin Limit - 40 MPC-HRs in seven consecutive days or 420 MPC Hours in any calendar quarter. (3) Federal Limit - 520 MPC-HRs in any calendar quarter.
MALE OR FEMALE, AGE < 18 YEARS *	AS DETERMINED FROM 10CFR 20.104
PREGNANT FEMALE	NO INTERNAL EXPOSURE AUTHORIZED

* Exposure of persons age 18 years or less authorized by Plant Manager.

