Form 34731 (10-81)
(Formerly SPD-1002-1)

DUKE POWER COMPANY
PROCEDURE PREPARATION
PROCESS RECORD

(1) ID No: HP/0/B/1009/16
Change(s) 0 to
0 Incorporated

(2) STATION: Catawba

(3) PROCEDURE TITLE: Distribution of Potassium Iodide Tablets in the Event of a Radioiodine Release

(4) PREPARED BY: Jennifer M. Cameron DATE: 2-17-84

(5) REVIEWED BY: R. D. Kinard DATE: 2-27-84

Cross-Disciplinary Review By: _____ N/R: R. Kinard

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By: _____ Date: _____

(7) APPROVED BY: [signature] Date: 4/3/84

(8) MISCELLANEOUS:

Reviewed/Approved By: _____ Date: _____

Reviewed/Approved By: _____ Date: _____

DUKE POWER COMPANY
CATAWBA NUCLEAR STATION
DISTRIBUTION OF POTASSIUM IODIDE TABLETS
IN THE EVENT OF A RADIOIODINE RELEASE

1.0 PURPOSE

This procedure provides information necessary to distribute Active Potassium Iodide (KI) tablets to in-plant personnel in the event of a release of radioiodine. Also, it outlines storage and supply information to assure sufficient quality and quantity of thyroid blocking material.

2.0 REFERENCES

2.1 HP/0/B/1001/09, Operation/Calibration Procedure for the Body Burden Analyzer

2.2 HP/0/B/1009/10, Body Burden Analysis Following Suspected Uptakes of Mixed Fission or Activation Products

2.3 System Health Physics Manual

2.4 NCRP Report No. 55; Protection of the Thyroid Gland in the Event of Releases of Radioiodine 1977

2.5 NCRP Report No. 651; Management of Persons Accidentally Contaminated With Radioiodine 1980

2.6 NUREG 0654

2.7 May 16, 1983 letter from L. Lewis to C. T. Yongue. Subject: Oconee Nuclear Station HP Procedure HP/0/B/1009/12, File: GS/05-750.01.

3.0 LIMITS AND PRECAUTIONS

3.1 KI must not be administered to a person who knows he (she) is allergic to iodide.

3.2 If a person has an allergic reaction or has severe side effects from taking KI tablets, they should stop taking KI tablets and consult a doctor or public health authority for instructions.

3.3 Personnel shall be advised not to deviate from the prescribed dosages and dosage rates.

3.4 Best results will be achieved when KI tablets are administered immediately (within 2 hours) after an exposure, although administration as late as 24 hours after an emergency will provide some protection.

3.5 Discolored or disfigured tablets, tablets that have reached the expiration date listed on the bottle, and bottles of KI with loose tops shall be discarded.

3.6 Hands of anyone touching the KI tablets must be free of radioactive contamination prior to taking the KI tablets.

4.0 PROCEDURE

4.1 Responsibilities For Distribution

4.1.1 The Station Health Physicist, in conjunction with available medical advice, shall control the distribution of KI tablets.

4.1.2 Persons suspected of having been in the affected area prior to the detection and during the release, persons present in the affected area and persons who will enter the area while a significant amount of radioiodine is present will be instructed by the Health Physics Supervision to immediately register in the KI distribution center (for example, the Technical Support Center).

4.1.2.1 A significant amount of radioiodine for short duration in-plant exposure is that amount taken into the body that would result in a dose of 10 rem or more. For example, exposure to approximately 700 weighted MPC-hours, or

6.1×10^{-6} uCi/ml Airborne I-131 for one hour, would result in a dose of 10 rem.

4.1.2.2 A significant amount of radioiodine for emergency workers in the field is 70 MPC (6.1×10^{-7} µCi/ml) I-131.

4.2 Registration of persons exposed to a significant amount of radioiodine.

4.2.1 When persons notified by Health Physics arrive at the distribution area, record appropriate data per Enclosure 5.1.

4.2.2 With the approval of the Station Health Physicist, the Health Physics representative shall give one (1) tablet to each person and instructions concerning the use of the tablet. Then issue to each person one bottle containing nine (9) KI tablets, and the package insert for the use of the tablets (refer to Enclosure 5.2 for an example of the General Manufacturers Guidelines).

4.2.2.1 Tablets are to be taken only as directed. One (1) tablet per day for the length of the emergency.

4.2.2.2 After the initial dose of KI, subsequent doses will be taken on a daily basis. Tablets should be taken as near a 24-hour schedule as possible.

NOTE: For best results, emphasis must be placed upon the proper use of these tablets.

4.2.3 Tablets removed from full bottle of KI should be stored in 10 ml plastic vials. The expiration date on the bottle from which the tablets were taken and the name of the Health Physics representative shall be recorded on the 10ml vials. Tablets stored in 10 ml plastic vials should then be used for single tablet initial issuance of KI to affected persons.

4.2.4 As directed by the Field Monitoring Coordinator (FMC) or the S&C Coordinator, team members shall ingest one (1) tablet of Potassium Iodide.

4.2.4.1 The FMC and/or S&C Coordinator will provide the information for Enclosure 5.1 and will ensure that distribution of KI per Step 4.2.2 is accomplished by team members.

4.3 Thyroid Burden Analysis Following Radioiodine Exposure

4.3.1 All persons receiving KI tablets should receive a thyroid scan. If the number of people render this step impractical, the Count Room Supervisor will select a representative sample of persons listed on Enclosure 5.1 who received KI tablets.

NOTE: Subsequent action involving thyroid burden analysis should follow guidelines established by HP/0/B/1009/10.

4.3.2 Records of thyroid scan shall be maintained per procedure.

NOTE: Distribute KI before analyzing thyroid concentration. Thyroid scans immediately after an accident could lengthen KI distribution time and cause confusion among personnel.

4.4 Storage Requirements

4.4.1 There are three major storage requirements to be observed:

4.4.1.1 Store in a temperature range of 59° to 86°F.

4.4.1.2 Store in a low humidity area (avoid direct exposure to liquids).

4.4.1.3 Store in an area protected from exposure to light.

4.4.2 Upon receiving a shipment of KI tablets, boxes shall be opened as soon as possible and bottles examined to ensure that an air-tight seal has been maintained. Bottles must be returned to boxes, and boxes must be sealed shut, so as to avoid exposure to light.

4.4.3 To ensure a sufficient supply of tablets, a minimum of 1,000 bottles with 14 tablets per bottle should be maintained on site.

4.5 Shelf Life and Changeout of KI Tablets

4.5.1 Thyro-Block™ tablet bottles are labeled with an expiration date from the factory. As tablets reach the expiration dates, the tablets must be discarded.

NOTE: Replacement tablets should be ordered at least three (3) months prior to the date of expiration listed on the bottles of KI.

4.5.2 Upon receiving a shipment of KI tablets, supplies should be shifted so as to use older tablets before new tablets.

5.0 ENCLOSURES

5.1 Sample of Potassium Iodide Tablet Distribution Data Sheet

5.2 Manufacturers Guidelines for Thyro-Block™ Tablets and Solution

POTASSIUM IODIDE TABLET DISTRIBUTION DATA SHEET

HP BADGE NUMBER	NAME	DEPARTMENT	DATE & TIME OF SUSPECTED EXPOSURE	DATE & TIME OF INITIAL ISSUANCE

Patient Package Insert for

THYRO-BLOCK™

(POTASSIUM IODIDE)
pronounced poe TASS ee um EYE oh dyed
[illegible]
TABLETS and SOLUTION USP

TAKE POTASSIUM IODIDE ONLY WHEN PUBLIC HEALTH OFFICIALS TELL YOU. IN A RADIATION EMERGENCY, RADIOACTIVE IODINE COULD BE RELEASED INTO THE AIR. POTASSIUM IODIDE (A FORM OF IODINE) CAN HELP PROTECT YOU.

IF YOU ARE TOLD TO TAKE THIS MEDICINE, TAKE IT ONE TIME EVERY 24 HOURS. DO NOT TAKE IT MORE OFTEN. MORE WILL NOT HELP YOU AND MAY INCREASE THE RISK OF SIDE EFFECTS. *DO NOT TAKE THIS DRUG IF YOU KNOW YOU ARE ALLERGIC TO IODIDE.* (SEE SIDE EFFECTS BELOW.)

INDICATIONS

THYROID BLOCKING IN A RADIATION EMERGENCY ONLY.

DIRECTIONS FOR USE

Use only as directed by State or local public health authorities in the event of a radiation emergency.

DOSE

Tablets:	ADULTS AND CHILDREN 1 YEAR OF AGE OR OLDER: One (1) tablet once a day. Crush for small children. BABIES UNDER 1 YEAR OF AGE: One-half (1/2) tablet once a day. Crush first.
Solution:	ADULTS AND CHILDREN 1 YEAR OF AGE OR OLDER: Add 6 drops to one-half glass of liquid and drink each day. BABIES UNDER 1 YEAR OF AGE: Add 3 drops to a small amount of liquid once a day.

For all dosage forms: Take for 10 days unless directed otherwise by State or local public health authorities.

Store at controlled room temperature between [illegible] (59 to 86°F). Keep container tightly closed and protect from light. Do not use the solution if it appears brownish in the bottle.

WARNING

Potassium iodide should not be used by people allergic to iodide. Keep out of the reach of children. In case of overdose or allergic reaction, contact a physician or the public health authority.

DESCRIPTION

Each THYRO-BLOCK™ TABLET contains [illegible] mg of potassium iodide.

Each drop of THYRO-BLOCK™ SOLUTION contains 24 mg of potassium iodide.

HOW POTASSIUM IODIDE WORKS

Certain forms of iodine help your thyroid gland work right. Most people get the iodine they need from foods like iodized salt or fish. The thyroid can "store" or hold only a certain amount of iodine.

In a radiation emergency, radioactive iodine may be released in the air. This material may be breathed or swallowed. It may enter the thyroid gland and damage it. The damage would probably not show itself for years. Children are most likely to have thyroid damage.

If you take potassium iodide, it will fill up your thyroid gland. This reduces the chance that harmful radioactive iodine will enter the thyroid gland.

WHO SHOULD NOT TAKE POTASSIUM IODIDE

The only people who should not take potassium iodide are people who know they are allergic to iodide. You may take potassium iodide even if you are taking medicines for a thyroid problem (for example, a thyroid hormone or antithyroid drug). Pregnant and nursing women and babies and children may also take this drug.

HOW AND WHEN TO TAKE POTASSIUM IODIDE

Potassium Iodide should be taken as soon as possible after public health officials tell you. You should take one dose every 24 hours. More will not help you because the thyroid can "hold" only limited amounts of iodine. Larger doses will increase the risk of side effects. You will probably be told not to take the drug for more than 10 days.

SIDE EFFECTS

Usually, side effects of potassium iodide happen when people take higher doses for a long time. You should be careful not to take more than the recommended dose or take it for longer than you are told. Side effects are unlikely because of the low dose and the short time you will be taking the drug.

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).

A few people have an allergic reaction with more serious symptoms. These 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.

Taking iodide may rarely cause overactivity of the thyroid gland, underactivity of the thyroid gland, or enlargement of the thyroid gland (goiter).

WHAT TO DO IF SIDE EFFECTS OCCUR

If the side effects are severe or if you have an allergic reaction, stop taking potassium iodide. Then, if possible, call a doctor or public health authority for instructions.

HOW SUPPLIED

THYRO-BLOCK™ TABLETS (Potassium Iodide, U.S.P.): bottles of 14 tablets (NDC 0037-0472-20). Each white, round, scored tablet contains 130 mg potassium iodide.

THYRO-BLOCK™ SOLUTION (Potassium Iodide Solution, U.S.P.) 30 ml (1 fl. oz.) light-resistant, measured drop dispensing units (NDC 0037-4297-25). Each drop contains 21 mg potassium iodide.

WALLACE LABORATORIES
Division of
Carter-Wallace, Inc.
Cranbury, New Jersey 08512

Form 34731 (10-81)
(Formerly SPD-1002-1)

DUKE POWER COMPANY
PROCEDURE PREPARATION
PROCESS RECORD

(1) ID No: MP/0/B/1009/15
Change(s) 0 to
0 Incorporated

(2) STATION: CATAWBA

(3) PROCEDURE TITLE: OFFSITE DOSE PROJECTIONS - UNCONTROLLED RELEASE OF GASEOUS RADIOACTIVE MATERIAL OTHER THAN THROUGH THE UNIT VENT

(4) PREPARED BY: Gary L. Cantley DATE: 2/3/84

(5) REVIEWED BY: R. D. Kennedy DATE: 2-6-84

Cross-Disciplinary Review By: _____ N/R: N/A

(6) TEMPORARY APPROVAL (IF NECESSARY):

By: _____ (SRO) Date: _____

By: _____ Date: _____

(7) APPROVED BY: _____ Date: 4/3/84

(8) MISCELLANEOUS:

Reviewed/Approved By: _____ Date: _____

Reviewed/Approved By: _____ Date: _____

DUKE POWER COMPANY
CATAWBA NUCLEAR STATION
OFFSITE DOSE PROJECTIONS
UNCONTROLLED RELEASE OF GASEOUS RADIOACTIVE MATERIAL
OTHER THAN THROUGH THE UNIT VENT

1.0 PURPOSE

To describe an approved method for projecting dose commitment from a noble gas or iodine release, other than a unit vent release, during an emergency.

2.0 REFERENCES

2.1 Reg Guide 1.109

2.2 Reg Guide 1.4

2.3 HP/0/B/1009/06, Alternative Method for Determining Dose Rate Within the Reactor Building

2.4 Variables used in HP/0/B/1009/15, Letter File Number CN.: 134.10

3.0 LIMITS AND PRECAUTIONS

3.1 It is assumed that the iodine whole body dose from a release is very small compared to the iodine thyroid dose. Thus, iodine whole body dose is not considered here.

3.2 This procedure applies to releases made from Catawba Nuclear Station only. Many of the values contained in this procedure are site specific.

3.3 This procedure considers all releases to be ground level releases.

4.0 PROCEDURE

4.1 Acquire the following information and record on sample Enclosure 5.1.

NOTE: Should site meteorological data be unavailable, obtain wind speed and wind direction from the National Weather Service (United States Government - National Oceanic & Atmospheric Administration).

NOTE: If appropriate, obtain advance meteorological data to calculate doses due to changing meteorological conditions.

4.1.1 Reactor Unit, date and time of reactor trip.

4.1.2 Lower tower wind speed (mph).

4.1.3 Tower wind direction in degrees from North (North = 0°).

4.1.4 Temperature gradient ($\Delta T^{\circ}C$).

4.1.5 Radiation Monitor (EMF 53A or 53B) reading (R/hr) or calculated per Reference 2.3.

4.1.6 Date and time of calculations.

4.2 Determine the Containment Building leakage rate (LR) and record it on sample Enclosure 5.1.

4.2.1 LR (ml/hr) is the total leak rate for the containment which is one of the following:

4.2.1.1 a "best guess" assumption,

4.2.1.2 the measured leak rate where suitable means are available;

4.2.1.3 The design leakage rate (LR_{DLR}) which is determined by:

LR_{DLR} = Containment Volume • Design Leak Constant

$$= 2.83 \times 10^{9} \text{ ml} \cdot \frac{0.0025}{\text{day}} \cdot \frac{\text{day}}{24 \text{ hr}} \cdot$$

$$= 2.95 \times 10^{6} \text{ ml/hr}$$

4.3 Determine the X/Q values for each point of interest downwind and record on Enclosure 5.1.

If no points have been requested, use the .5, 2, 5 and 10 mile values.

4.3.1 Locate the relative two-hour downwind concentration value (CH) for each point from Enclosure 5.2 and record onto sample Enclosure 5.1.

4.3.2 Convert these values to X/Q by,

$$X/Q = \frac{CH \text{ (MPH-Sec/m}^3\text{)}}{\text{Tower Wind Speed (MPH)}}$$

4.4 Determine the potential whole body dose from submersion in a cloud of noble gas and record on Enclosure 5.1.

4.4.1 Calculate the whole body two (2) hour dose commitment,

$$D_{WB} = DR_{M} \cdot LR \cdot X/Q \cdot U_{NG}$$

Where,

D_{WB} = Whole body two (2) hour dose commitment

DR_{M} = Monitor dose rate

ADC = Average Decay constant for noble gases =

$$2.2622E\text{-}2 \ \frac{\mu Ci \cdot MeV \cdot hr^2}{ml \cdot d \cdot R}$$

LR = Containment leakage rate in ml/hr

X/Q = dispersion factor in sec/m^3

$$U_{NG} = \frac{(3.7E4/sec \cdot \mu Ci)\ (1.6E\text{-}6ergs/MeV)}{2\ (100\ ergs/g\text{-}rad)\ (1.2E\text{-}3g/cm^3)\ (1E6cm^3/m^3)} \times ADC =$$

$$5.7E\text{-}9 \ \frac{hr^2\text{-}m^3 \cdot rad}{ml\text{-}R\text{-}sec}$$

4.3 Determine the potential thyroid dose from uptake of radioiodine and record on Enclosure 5.1.

4.3.1 Locate the time plus one (1) hour after trip on Enclosure 5.3 and record the corresponding Decay Constant on Enclosure 5.1.

4.3.2 Calculate a child's thyroid two (2) hour dose commitment using time plus one (1) hour,

$$DR_T = DR_M \cdot DC \cdot LR \cdot X/Q \cdot U_I$$

Where,

DR_T = thyroid two (2) hour dose commitment

DR_M = monitor dose rate

DC = Decay Constant in $\frac{\mu Ci \cdot mrem \cdot hr^2}{ml \cdot pCi \cdot R}$ for time plus one (1) hour (see Enclosure 5.3)

LR = Leak rate in ml/hr

X/Q dispersion in sec/m^3

U_I = breathing rate for child times uCi to pCi conversion factor

$$(1.17E\text{-}4m^3/sec)\ \ 1E3\ \frac{pCi\text{-}rem}{\mu Ci\text{-}mrem} = 1.17E\text{-}1\ \frac{m^3\text{-}pCi\text{-}rem}{sec\ \text{-}\mu Ci\text{-}mrem}$$

4.6 Determine the potentially affected zones using Enclosure 5.4. Record the affected zones on Enclosure 5.5.

4.7 Complete Enclosure 5.5 and submit it to the Data Analysis Coordinator. Include any comments pertinent to the evaluation of offsite hazards.

5.0 ENCLOSURES

5.1 Sample Projected Offsite Dose Released From Containment

5.2 Sample Table of Two Hour Relative Concentration Factors (C_H)

5.3 Sample Table of Iodine and Noble Decay Constant (DC)

5.4 Sample of Evaluation of Plume Location

5.5 Sample Dose Assessment Report

5.6 Estimation of Containment Leak Rate

ENCLOSURE 5.1
HP/0/B/1009/12
PROJECTED OFFSITE DOSE RELEASED FROM CONTAINMENT

Unit _____ Date/Time of Reactor Trip _____/_____

METEOROLOGICAL DATA

1. Tower wind speed _____ mph
2. Tower wind direction _____ °
3. Temperature gradient (ΔT) _____ °C

MONITOR DATA

1. EMF 53A or 53B/Survey Inst. # _____, DR_M = _____ R/hr
(Circle One)

NOTE: If containment monitor information is not useable, refer to Reference 2.3.

DOSE CALCULATION DATE/TIME _____

1. LR _____ ml/hr
2. C_H @ ____ mi. = _____, X/Q = _____ sec/m³
C_H @ ____ mi. = _____, X/Q = _____ sec/m³
C_H @ ____ mi. = _____, X/Q = _____ sec/m³
C_H @ ____ mi. = _____, X/Q = _____ sec/m³

A. Whole Body 2 hr. dose projection from noble gases:

by $D_{WB} = DR_M \cdot LR \cdot X/Q \cdot 5.7E\text{-}9$,

Miles Out	D_{WB} 2 hr Dose Commitment
_____	_____
_____	_____
_____	_____
_____	_____

ENCLOSURE 3.1
HP/0/B/1009/15
PROJECTED OFFSITE DOSE RELEASED FROM CONTAINMENT

3. Thyroid 2 hr. dose projection from iodine:

DC _____,

by $DR_T = DR_M \cdot DC \cdot LR \cdot X/Q \cdot (1.17E-1)$,

Miles Out	D_{WB} 2 hr Dose Commitment
_____	_____
_____	_____
_____	_____
_____	_____

DEFINITIONS

D_{WB} = whole body 2 hour dose commitment from noble gases

DR_T = thyroid 2 hr dose commitment from iodine

LR = containment leakage rate

X/Q = "Chi over Q" is downwind concentration correction factor

C_H = 2 hr relative downwind concentration - MPH (X/Q • MPH)

DC = Decay constant

DR_M = dose rate at the containment monitor

ENCLOSURE 2
HP/0/B/1009/15

TWO-HOUR RELATIVE CONCENTRATION FACTORS (C_{H})

Temperature Difference (°C)	Stability Class	Distance (Miles)										
		.5	1	2	3	4	5	6	7	8	9	10
1) < -.6	A	1.4E-5	1.2E-6	5.9E-7	4.1E-7	3.2E-7	2.5E-7	2.0E-7	1.9E-7	1.8E-7	1.6E-7	1.5E-7
2) -.6 to -.5	B	1.5E-4	4.5E-5	1.3E-5	6.3E-6	3.9E-6	2.7E-6	1.9E-6	1.4E-6	1.1E-6	8.3E-7	7.8E-7
3) -0.4 to -0.2	C	3.8E-4	1.4E-4	4.9E-5	2.7E-5	1.7E-5	1.2E-5	9.2E-6	7.3E-6	6.0E-6	5.0E-6	4.3E-6
4) -0.1 to +.4	D	6.9E-4	2.5E-4	9.6E-5	5.5E-5	3.5E-5	2.5E-5	2.0E-5	1.6E-5	1.3E-5	1.1E-5	9.7E-6
5) +.5 to +1.2	E	1.1E-3	5.1E-4	2.0E-4	1.2E-4	8.2E-5	6.3E-5	5.1E-5	4.3E-5	3.8E-5	3.3E-5	3.0E-5
6) > 1.2	F	1.8E-3	1.1E-3	4.3E-4	2.7E-4	2.0E-4	1.7E-4	1.3E-4	1.2E-4	8.6E-5	7.8E-5	7.3E-5

From other sources of meteorological data (Section 4.1) use the wind speed and time of day to determine which row of C_{H} values to use:

Time of Day	Wind Speed	Row #
10:00 A.M. - 4:00 P.M.	N/A	3
4:00 P.M. - 10:00 A.M.	> 15 MPH	4
4:00 P.M. - 10:00 A.M.	≤ 15 MPH	6

ENCLOSURE 5.0
TABLE
IODINE & NOBLE DECAY CONSTANT(DC)
0 - 498 HRS
MP/0/B/1009/15

HOUR	DC	HOUR	DC	HOUR	DC	HOUR	DC	HOUR	DC
0	2.0649E-05	100	5.6125E-04	200	6.8707E-04	300	7.4430E-04	400	7.9109E-04
2	5.7902E-05	102	5.6595E-04	202	6.8925E-04	302	7.4537E-04	402	7.9177E-04
4	8.1506E-05	104	5.7050E-04	204	6.9060E-04	304	7.4636E-04	404	7.9285E-04
6	1.0296E-04	106	5.7492E-04	206	6.9194E-04	306	7.4735E-04	406	7.9373E-04
8	1.2295E-04	108	5.7920E-04	208	6.9326E-04	308	7.4833E-04	408	7.9460E-04
10	1.4170E-04	110	5.8335E-04	210	6.9457E-04	310	7.4932E-04	410	7.9540E-04
12	1.5933E-04	112	5.8737E-04	212	6.9586E-04	312	7.5029E-04	412	7.9625E-04
14	1.7591E-04	114	5.9127E-04	214	6.9714E-04	314	7.5127E-04	414	7.9722E-04
16	1.9159E-04	116	5.9504E-04	216	6.9840E-04	316	7.5224E-04	416	7.9809E-04
18	2.0648E-04	118	5.9870E-04	218	6.9965E-04	318	7.5321E-04	418	7.9896E-04
20	2.2071E-04	120	6.0225E-04	220	7.0089E-04	320	7.5418E-04	420	7.9982E-04
22	2.3439E-04	122	6.0569E-04	222	7.0212E-04	322	7.5515E-04	422	8.0068E-04
24	2.4757E-04	124	6.0903E-04	224	7.0333E-04	324	7.5611E-04	424	8.0155E-04
26	2.6034E-04	126	6.1226E-04	226	7.0454E-04	326	7.5707E-04	426	8.0240E-04
28	2.7272E-04	128	6.1540E-04	228	7.0574E-04	328	7.5803E-04	428	8.0326E-04
30	2.8475E-04	130	6.1844E-04	230	7.0692E-04	330	7.5899E-04	430	8.0412E-04
32	2.9645E-04	132	6.2140E-04	232	7.0810E-04	332	7.5994E-04	432	8.0497E-04
34	3.0784E-04	134	6.2426E-04	234	7.0926E-04	334	7.6089E-04	434	8.0583E-04
36	3.1893E-04	136	6.2705E-04	236	7.1042E-04	336	7.6184E-04	436	8.0668E-04
38	3.2975E-04	138	6.2975E-04	238	7.1157E-04	338	7.6279E-04	438	8.0753E-04
40	3.4029E-04	140	6.3238E-04	240	7.1272E-04	340	7.6373E-04	440	8.0837E-04
42	3.5058E-04	142	6.3493E-04	242	7.1385E-04	342	7.6467E-04	442	8.0922E-04
44	3.6062E-04	144	6.3741E-04	244	7.1498E-04	344	7.6561E-04	444	8.1006E-04
46	3.7042E-04	146	6.3983E-04	246	7.1610E-04	346	7.6655E-04	446	8.1090E-04
48	3.7999E-04	148	6.4218E-04	248	7.1721E-04	348	7.6748E-04	448	8.1174E-04
50	3.8933E-04	150	6.4447E-04	250	7.1832E-04	350	7.6842E-04	450	8.1258E-04
52	3.9846E-04	152	6.4670E-04	252	7.1942E-04	352	7.6935E-04	452	8.1342E-04
54	4.0738E-04	154	6.4887E-04	254	7.2051E-04	354	7.7028E-04	454	8.1425E-04
56	4.1609E-04	156	6.5099E-04	256	7.2160E-04	356	7.7120E-04	456	8.1509E-04
58	4.2460E-04	158	6.5306E-04	258	7.2268E-04	358	7.7213E-04	458	8.1592E-04
60	4.3291E-04	160	6.5508E-04	260	7.2376E-04	360	7.7305E-04	460	8.1675E-04
62	4.4103E-04	162	6.5705E-04	262	7.2483E-04	362	7.7397E-04	462	8.1757E-04
64	4.4896E-04	164	6.5897E-04	264	7.2590E-04	364	7.7489E-04	464	8.1840E-04
66	4.5669E-04	166	6.6085E-04	266	7.2696E-04	366	7.7581E-04	466	8.1923E-04
68	4.6425E-04	168	6.6269E-04	268	7.2802E-04	368	7.7672E-04	468	8.2005E-04
70	4.7161E-04	170	6.6450E-04	270	7.2907E-04	370	7.7763E-04	470	8.2087E-04
72	4.7879E-04	172	6.6626E-04	272	7.3012E-04	372	7.7854E-04	472	8.2169E-04
74	4.8579E-04	174	6.6799E-04	274	7.3116E-04	374	7.7945E-04	474	8.2250E-04
76	4.9262E-04	176	6.6969E-04	276	7.3220E-04	376	7.8036E-04	476	8.2332E-04
78	4.9926E-04	178	6.7135E-04	278	7.3323E-04	378	7.8126E-04	478	8.2413E-04
80	5.0573E-04	180	6.7298E-04	280	7.3427E-04	380	7.8217E-04	480	8.2495E-04
82	5.1202E-04	182	6.7458E-04	282	7.3529E-04	382	7.8307E-04	482	8.2576E-04
84	5.1815E-04	184	6.7615E-04	284	7.3632E-04	384	7.8397E-04	484	8.2657E-04
86	5.2410E-04	186	6.7770E-04	286	7.3734E-04	386	7.8486E-04	486	8.2737E-04
88	5.2989E-04	188	6.7922E-04	288	7.3835E-04	388	7.8576E-04	488	8.2818E-04
90	5.3551E-04	190	6.8072E-04	290	7.3936E-04	390	7.8665E-04	490	8.2898E-04
92	5.4097E-04	192	6.8219E-04	292	7.4037E-04	392	7.8754E-04	492	8.2978E-04
94	5.4627E-04	194	6.8364E-04	294	7.4136E-04	394	7.8843E-04	494	8.3058E-04
96	5.5142E-04	196	6.8507E-04	296	7.4236E-04	396	7.8932E-04	496	8.3138E-04
98	5.5641E-04	198	6.8646E-04	298	7.4335E-04	398	7.9020E-04	498	8.3218E-04

DUKE POWER COMPANY
CATAWBA NUCLEAR STATION
ENCLOSURE 5.4
MP/0/B/1009/13
EVALUATION OF PLUME LOCATION

5.4.1. Acquire the following information from sample Enclosure 5.1 and record on sample Enclosure 5.5.

5.4.1.1 Wind direction in degrees from North

5.4.1.2 Wind speed (mph)

5.4.1.3 ΔT (°C)

5.4.1.4 Stability class

5.4.1.5 Thyroid and whole body dose

5.4.2. Determine the affected zones, based on wind direction and wind speed, with the following tables:

Table 3.1 0-2 Mile Affected Zones

Wind Direction	Affected Zones
0° - 360°	A0

Table 3.2 2-5 Mile Affected Zones

Wind Speed < 5 mph		Wind Speed > 5 mph	
Wind Direction	Affected Zones	Wind Direction	Affected Zones
0° - 360°	A1,B1,C1,D1,E1,F1	0.1° - 22°	C1, D1
		22.1° - 73°	C1, D1, E1
		73.1° - 108°	C1, D1, E1, F1
		108.1° - 120°	D1, E1, F1
		120.1° - 139°	E1, F1
		139.1° - 207°	E1, F1, A1
		207.1° - 247°	F1, A1, B1
		247.1° - 263°	A1, B1
		263.1° - 298°	A1, B1, C1
		298.1° - 338°	B1, C1
		338.1° - 360°	B1, C1, D1

DUKE POWER COMPANY
CATAWBA NUCLEAR STATION
ENCLOSURE 3.4
HP/0/B/1009/11
EVALUATION OF PLUME LOCATION

Table 3.3 5-10 Mile Affected Zones

Wind Direction	Affected Zones
0.1° - 27°	C2, D2
27.1° - 69°	C2, D2, E2
69.1° - 95°	D2, E2, F2
95.1° - 132°	D2, E2, F2, F3
132.1° - 144°	E2, F2, F3
144.1° - 160°	E2, F2, F3, A2
160.1° - 201°	F2, F3, A2
201.1° - 229°	F2, F3, A2, B2
229.1° - 249°	F3, A2, B2
249.1° - 259°	A2, A3, B2
259.1° - 290°	A2, A3, B2, C2
290.1° - 304°	A3, B2, C2
304.1° - 333°	B2, C2
333.1° - 360°	B2, C2, D2

3.4.3 Determine the protective action guides (PAG), based on the calculated dose(s) on Sample Enclosure 3.1 and the following information:

3.4.3.1 For doses:

< 1 Rem Whole Body or,

< 5 Rem Thyroid

Recommend no action.

3.4.3.2 For doses:

1-5 Rem Whole Body or,

5-25 Rem Thyroid

Recommend evacuation of children and pregnant women and sheltering of remainder of personnel in the affected area.

DUKE POWER COMPANY
CATAWBA NUCLEAR STATION
ENCLOSURE 3.4
MP/0/B/1009.15
EVALUATION OF PLUME LOCATION

3.4.3.3 For doses:

> 5 Rem Whole Body or,

> 25 Rem Thyroid

Recommend Evacuation of Population in Affected Area.

3.4.4. Record only the affected zones requiring protective action on sample Enclosure 3.5 along with the recommended protective action.

DUKE POWER COMPANY
CATAWBA NUCLEAR STATION
MP/O/B/1009/15
ENCLOSURE 5.5
DOSE ASSESSMENT REPORT

Duke Power Crisis Company Management Plan Off-Site Dose Report - CATAWBA

Prepared By _____ Date/Time _____/_____ Emergency Drill (circle one)

Meteorology

Wind Speed	_____	MPH
Wind Direction	_____	degrees from North
Vertical Temp. Diff.	_____	degrees C/100 ft.
Stability Class (circle one)		A B C D E F G

Source Term	Time	Noble Gas	I-131 equivalent
Containment Rad. Monitor	_____	_____R/hr	_____R/hr
Containment Sample	_____	_____uCi/ml	_____uCi/ml
Unit Vent (Sample of EMF)	_____	_____uCi/ml	_____uCi/ml
Curie Release Rate	_____	_____Ci/sec	_____Ci/sec

Corresponds to:
_____ LOCA _____ LOCA through filter
_____ Core damage _____ Core damage through filter
_____ Tube rupture _____ Gas Decay Tank
_____ New fuel _____ Old fuel Other _____

Dose Projections

		.5 mi	2 mi	5 mi	10 mi
2hr Dose(rem) based on Containment release @_____ml/hr	Whole Body	_____	_____	_____	_____
	Child thyroid	_____	_____	_____	_____
2hr Dose(rem) based on Unit Vent release @_____cfm	Whole Body	_____	_____	_____	_____
	Child thyroid	_____	_____	_____	_____
2hr Dose(rem) based on Steam release	Whole Body	_____	_____	_____	_____
	Child thyroid	_____	_____	_____	_____
2hr Dose(rem) based on _____ release @_____	Whole Body	_____	_____	_____	_____
	Child thyroid	_____	_____	_____	_____

Field Monitoring Data

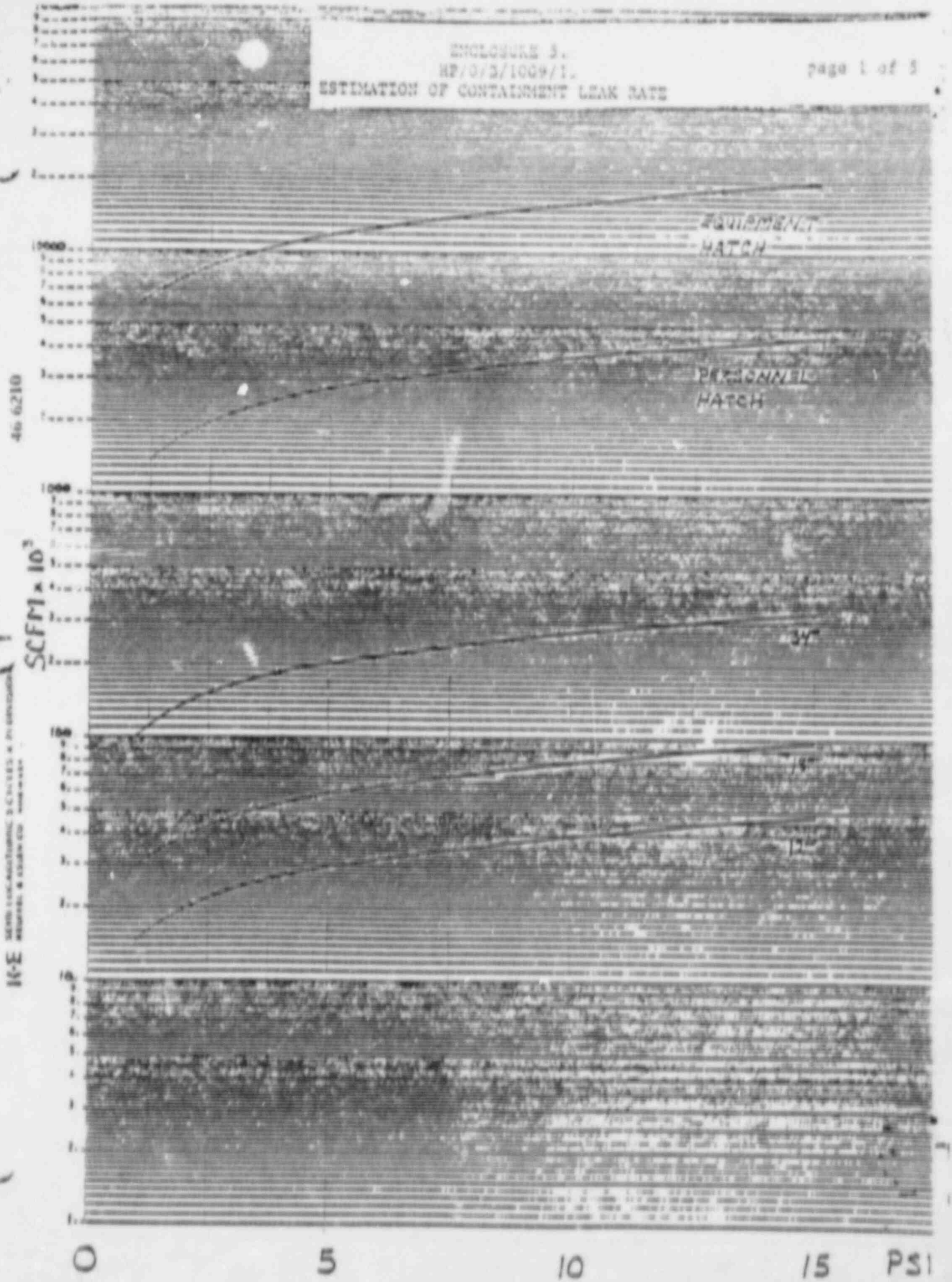
Location	Distance (mi)	Direction	Dose Rate (mrem/hr) Whole body	Child thyroid	Contamination (dpm/100 cm²)
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

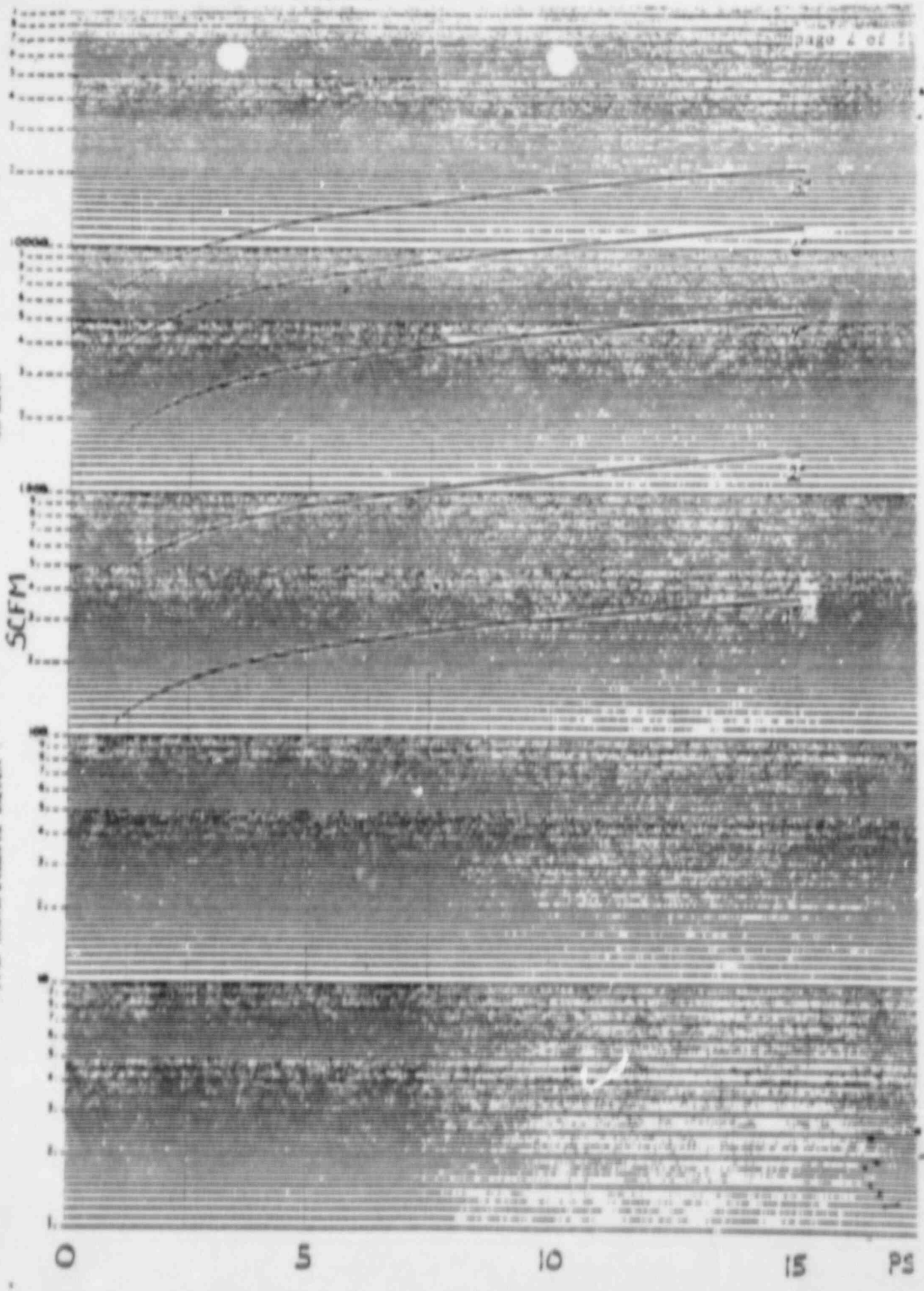
Affected Zones (circle zones)	0-2 mi	2-5 mi	5-10 mi	9-10 mi
	A0	A1 B1 C1 D1 E1 F1	A2 B2 C2 D2 E2 F2	A3 F3

COMMENTS: _____

cc: Data Analysis Coordinator, Station Health Physicist

ESTIMATION OF CONTAINMENT LEAK RATE

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46 6210
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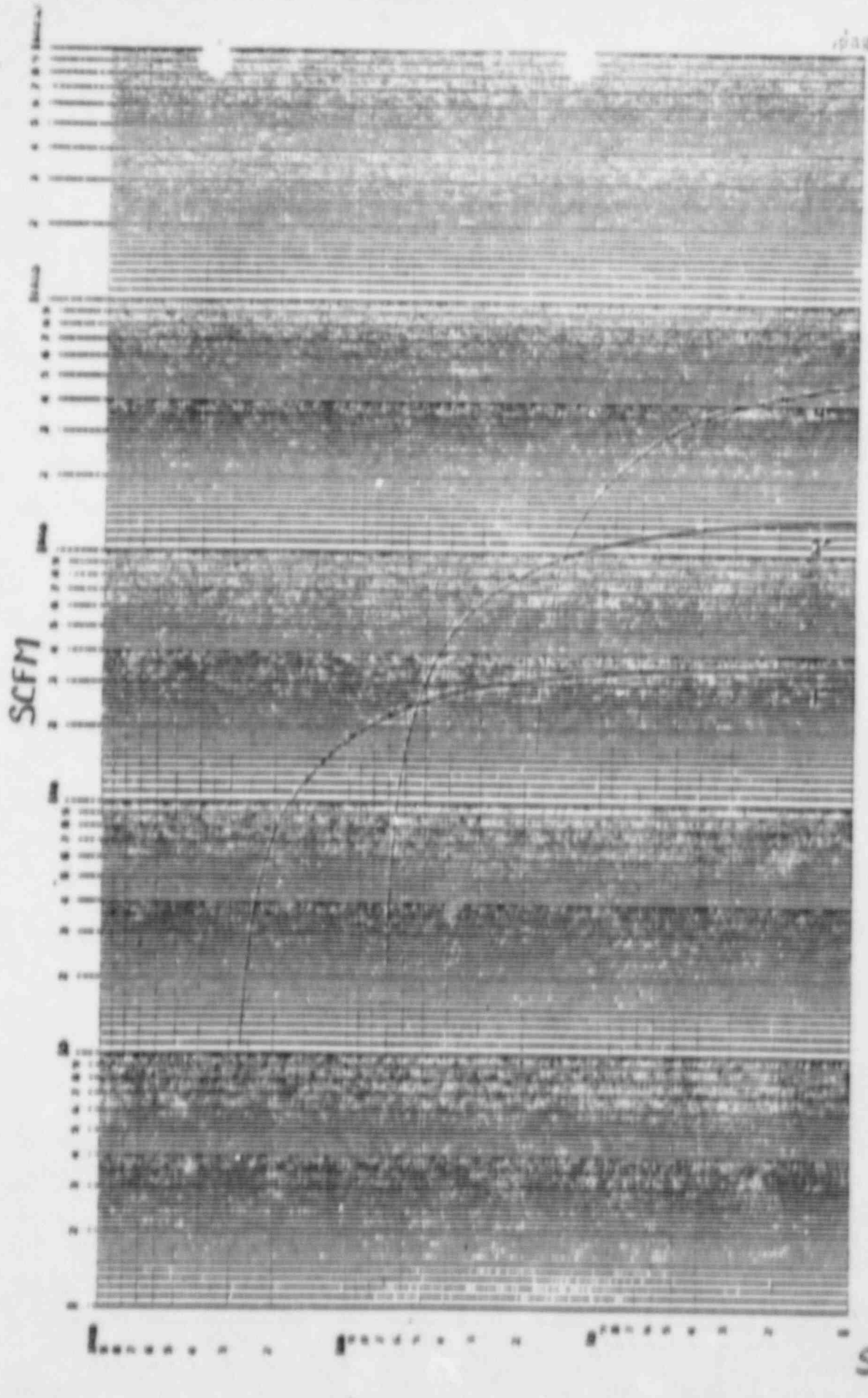
SCFM
SECONDS
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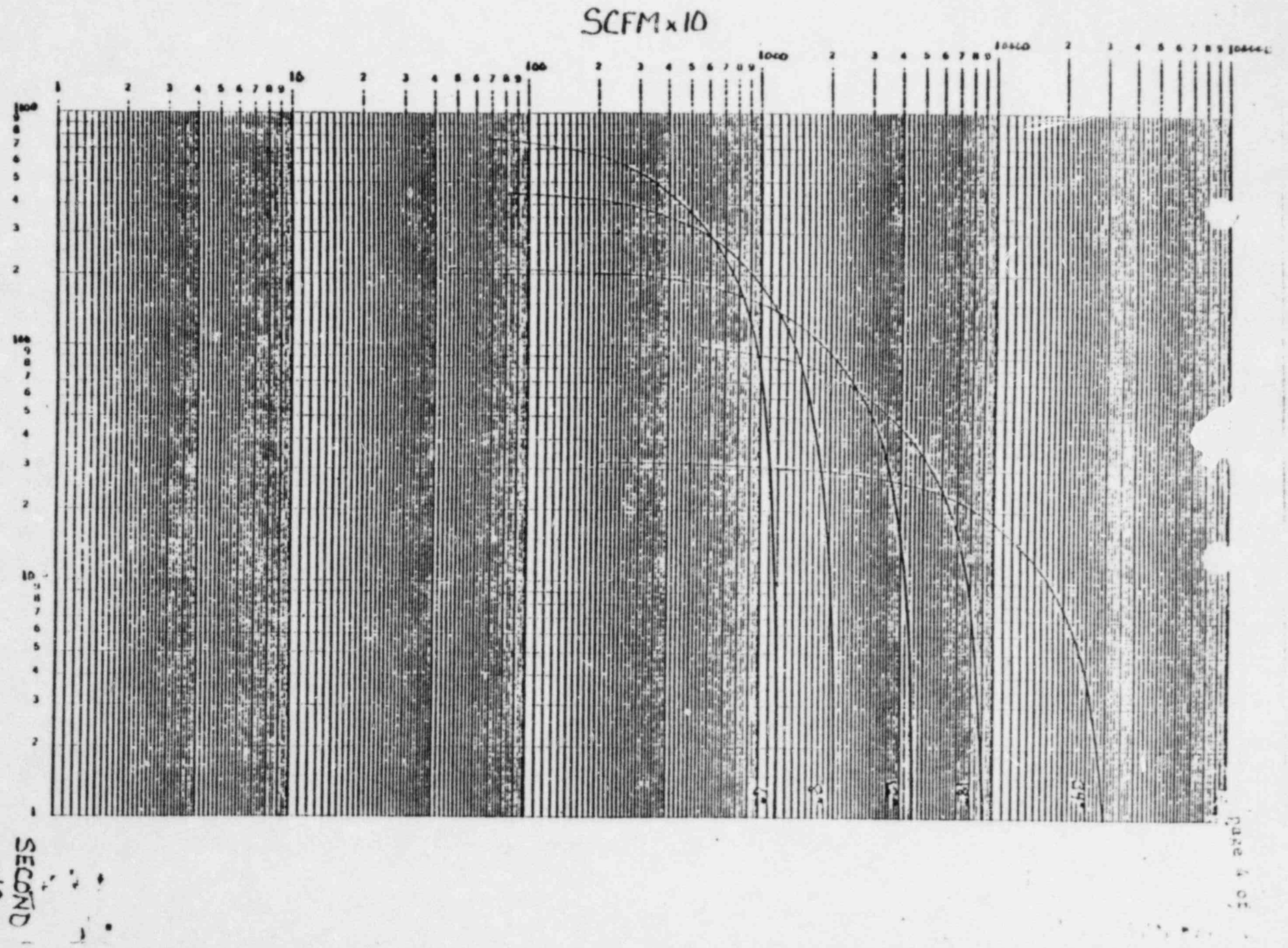
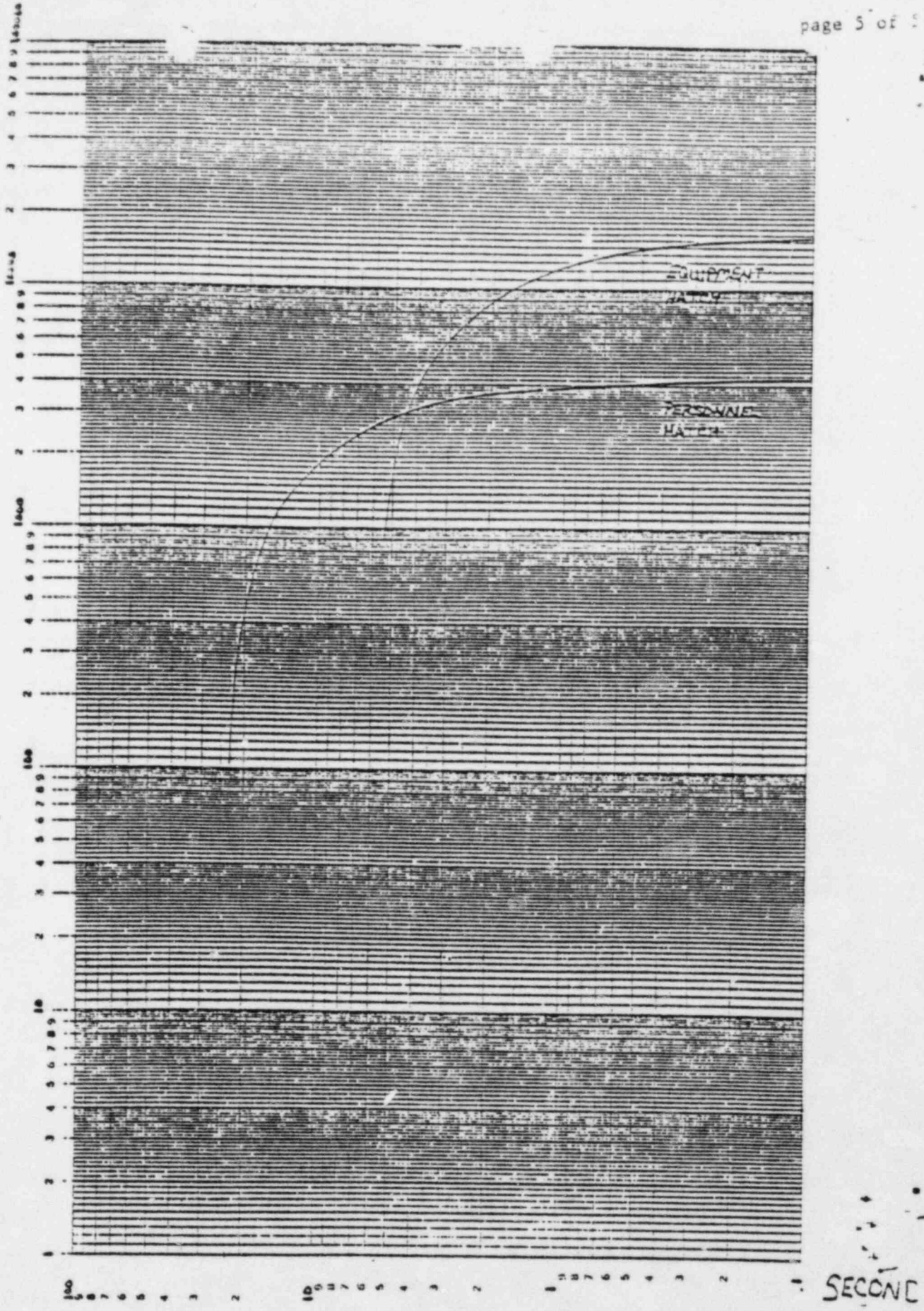
K·E LOGARITHMIC 3 x 5 CYCLES
KEUFFEL & ESSER CO

46 7520





Form 34731 (10-81)
(Formerly SPD-1002-1)

DUKE POWER COMPANY
PROCEDURE PREPARATION
PROCESS RECORD

(1) ID No: HP/0/B/1009/13
Change(s) 0 to
1 Incorporated

(2) STATION: Catawba

(3) PROCEDURE TITLE: OFFSITE DOSE PROJECTION-UNCONTROLLED RELEASE OF RADIOACTIVE MATERIAL THROUGH THE UNIT VENT

(4) PREPARED BY: R. V. Linard DATE: 3-14-84

(5) REVIEWED BY: Phillip N McNamara DATE: 3-19-84

Cross-Disciplinary Review By: _____ N/R: N/A

(6) TEMPORARY APPROVAL (IF NECESSARY):

By: _____ (SRO) Date: _____

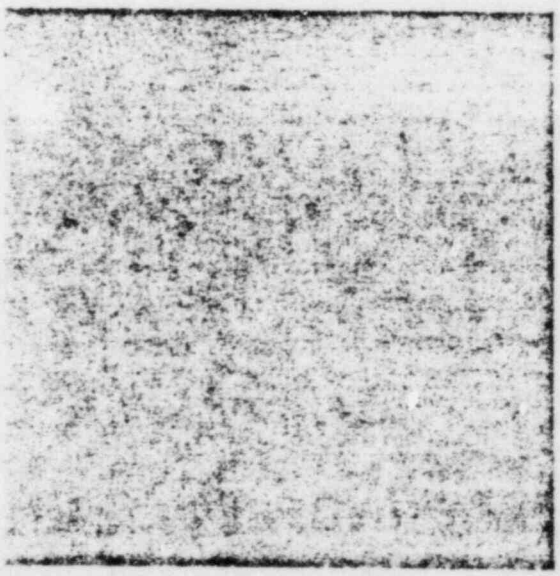
By: _____ Date: _____

(7) APPROVED BY: J. W. Hy Date: 3/19/84

(8) MISCELLANEOUS:

Reviewed/Approved By: _____ Date: _____

Reviewed/Approved By: _____ Date: _____



DUKE POWER COMPANY
CATAWBA NUCLEAR STATION
OFFSITE DOSE PROJECTION - UNCONTROLLED RELEASE
OF RADIOACTIVE MATERIAL THROUGH THE UNIT VENT

1.0 PURPOSE

This procedure describes the method for projecting the potential offsite dose following an uncontrolled release of radioactive materials through the unit vent.

2.0 REFERENCES

2.1 Letter from Civil/Environmental Division CN-1108.1, 1434.00, 1227.00 Atmospheric Dispersion Factor for Emergency Planning

2.2 EPA-520/1-75-001, Manual of Protective Action Guides and Protective Actions for Nuclear Incidents

2.3 Regulatory Guide 1.109, Calculation of Annual Doses to Man From Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10CFR50, Appendix I

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

3.0 LIMITS AND PRECAUTIONS

3.1 Use actual sample data when possible. Radiation monitor readings are susceptible to several sources of error. When radiation monitor readings are used for downwind concentrations, note this in the report of offsite dose assessment.

3.2 Environmental data should be collected and analyzed to verify these calculations. This procedure considers all releases to be ground level releases.

3.3 This procedure applies to releases made from Catawba Nuclear Station only. Many of the values contained in this procedure are site specific.

4.0 PROCEDURE

4.1 Obtain the following information from the Control Room and record it on Enclosure 5.1 (Vent Release Data Sheet).

4.1.1 Time of reactor trip.

4.1.2 Tower wind speed in MPH.
(Lower tower wind speed preferred.)

4.1.3 Direction from which the wind is blowing in degrees from North. (Upper tower wind direction preferred.)

4.1.4 Temperature gradient (ΔT) in degrees C.

4.1.5 Vent discharge flow rate in CFM.

4.1.6 Available weather forecast information.

4.2 Determine the release concentration as follows:

4.2.1 If vent sample analysis is not available, go to Step 4.2.4.

4.2.2 Obtain the following vent sample analysis results and record on Enclosure 5.1.

4.2.2.1 Date/time of sample.

4.2.2.2 Gross noble gas concentration in µCi/ml.

4.2.2.3 Iodine equivalent concentration (or data for calculation).

4.2.2.4 Gamma E-bar value in mev/dis (or data for calculation).

4.2.3 Go to Step 4.3.

4.2.4 Obtain the following unit vent data and record on sample Enclosure 5.1:

4.2.4.1 Date/Time of collection.

4.2.4.2 EMF36 Low and High range readings in cpm (gas monitor).

4.2.4.3 ΔEMF37 reading in cpm (iodine monitor).

4.2.4.4 Δt in minutes for ΔEMF37 reading.

4.2.4.5 Calculate release concentrations as shown on Enclosure 5.1.

4.3 Project the impact of the release on the downwind population by using the manual calculations outlined below.

4.3.1 Determine the X/Q values for each point of interest downwind as follows.

NOTE: If no points have been requested, use the .5, 2, 5 and 10 mile values.

4.3.1.1 From Enclosure 5.2 (Table of Two-Hour Relative Concentration Factors), locate the relative two hour concentration value (CH) for each point and record on sample Enclosure 5.3 (Manual Calculation Worksheet), (Reference 2.3).

4.3.1.2 Convert these values to X/Q by,

$$X/Q = \frac{CH(MPH\text{-}Sec/m^3)}{\text{Wind Speed (MPH)}}$$

4.3.1.3 Record results on Enclosure 5.3 (Manual Calculation Worksheet).

4.3.2 Calculate the gas and iodine downwind concentrations for each point using the equation,

$$Conc_{DW} = Conc_V \cdot F_V \cdot X/Q \cdot U_{DWC}$$

where,

$Conc_{DW}$ = downwind concentration (µCi/ml)

$Conc_V$ = vent discharge concentration (µCi/ml)

F_V = vent discharge flow rate (CFM)

X/Q = dispersion factor in sec/m^3

U_{DWC} = unit conversions derived from,

$$(2.832E\text{-}2 m^3/ft^3)\ (0.017\ min/sec) = 4.8E\text{-}4\ \frac{m^3 \cdot min}{ft^3 \cdot sec}$$

Sample Enclosure 5.3 provides work space for this calculation.

4.3.3 Determine the potential whole body gamma dose downwind using the gas concentrations calculated in 4.3.2 and the equation,

$$D_{WB} = U_G \cdot \bar{E} \cdot Conc_{DW} \cdot Time$$

where,

D_{WB} = whole body gamma dose due to submersion in a cloud of radioactive gas (rem)

U_G = unit conversion derived from,

3.7E4 (dis/sec-μCi)(1cc/1.2E-3g)

(1.602E-6 erg/MeV) (g - rem/100 ergs)

• 1/2 = 2.5E-1 $\frac{\text{dis-rem-cm}^3}{\mu\text{Ci-sec-MeV}}$

(2.5E-1 $\frac{\text{dis-rem-cm}^3}{\mu\text{Ci-sec-Mev}}$)(3600 $\frac{\text{sec}}{\text{hr}}$)

= 9.00 E2 $\frac{\text{dis-rem-cm}^3}{\mu\text{Ci-hr-Mev}}$

NOTE: 1/2 is the constant used (in the case of gamma radiation) when assuming that the receptor is exposed to only one-half the cloud owing to the presence of the ground, (Reference 2.4).

$Conc_{DW}$ = downwind concentration (μCi/ml)

Time = projected duration of exposure (hrs); use 2 hours unless otherwise directed.

$\bar{E}$ = average gamma energy per disintegration (Mev/dis)

NOTE: If $\bar{E}$ cannot be obtained from the sample results, the following values may be used:

Hours from Trip	$\bar{E}$ (Mev/dis)
0-12	0.40
12-48	0.20
48-∞	0.10

4.3.3.1 Record results on Enclosure 5.3.

4.3.4 Determine the potential child thyroid dose downwind using the iodine concentrations calculated in 4.3.2 and the equation,

$D_{THY} = U_I \cdot Conc_{DW} \cdot Time$

where,

D_{THY} = thyroid dose due to uptake of radioactive iodine (rem)

U_I = constants derived from a child's breathing rate (1.17E2 cc/sec.), I-131 dose conversion factor (4.39 E-3 mrem/pCi), and coversion of pCi to µCi (10^6), mrem to rem (10^{-3}), and hrs. to sec (3600 secs/hr) = 1.86E6 $\frac{cc \cdot Rem}{uci \cdot hr}$

$Conc_D$ = downwind concentration of iodine (µCi/ml)

Time = projected exposure time (hrs); use 2 hours unless otherwise directed.

4.3.4.1 Record results on sample Enclosure 5.3.

4.3.4.2 Project the adult thyroid dose by dividing the child dose by two (2).

4.3.4.3 Record results of all calculations on Enclosure 5.5 (Dose Assessment Report).

4.4 Determine the potentially affected area using the method outlined in Enclosure 5.4.

4.4.1 Record sectors on Enclosure 5.5.

4.5 Complete sample Enclosure 5.5 and submit it to the Station Health Physicist. Include any comments and information pertinent to the evaluation of offsite hazards.

4.6 Maintain a file of all worksheets and printouts used in dose calculations.

5.0 ENCLOSURES

5.1 Sample of Vent Release Data Sheet

5.2 Sample of Table of Two Hour Relative Concentration Factors

5.3 Sample of Manual Calculation Worksheet

5.4 Sample of Evaluation of Plume Location

5.5 Sample of Dose Assessment Report

ENCLOSURE 5.1
HP/0/B/1009/13
VENT RELEASE DATA SHEET

Unit _____ Date/time of Rx trip _____/_____

METEOROLOGICAL DATA

1) Lower Tower Wind Speed _____ MPH

2) Upper Tower Wind Direction From _____ °

3) Temp. Gradient (ΔT) _____ °C

4) Vent Flow _____ CFM

5) Date/time _____/_____

VENT SAMPLE ANALYSIS

1) Total Gas _____ μCi/ml

2) I-131 Equiv. _____ μCi/ml

3) Gas $\bar{E}$ _____ Mev/dis (Gamma)

VENT MONITOR DATA

1) EMF-36L (lo range) _____ CPM

2) EMF-36H (hi range) _____ CPM

3) ΔEMF-37 (iodine) _____ CPM; Δt _____ min

CALCULATED DISCHARGE CONCENTRATION

1) Gas (Use hi readings if EMF-36H is > 100 CPM)

$$Conc_{V\text{-}low} = \frac{(EMF\ 36L\ CPM)}{2.70E7\ \frac{CPM\text{-}ml}{\mu Ci}} = \_\_\_\_\ \mu Ci/ml, \text{ or } Conc_{V\text{-}hi} = \frac{(EMF\text{-}36H\ CPM)}{4.0E3\ \frac{CPM\text{-}ml}{\mu Ci}} =$$

_____ μCi/ml

2) Iodine

$$Conc_{V\text{-}I} = \frac{(\Delta EMF\text{-}37\ CPM)\ \ (2.4E\text{-}10\ \mu Ci\ -\ min)}{\Delta t \qquad\qquad ml\ -\ cpm} = \_\_\_\_\_\ \mu Ci/ml$$

ENCLOSURE 5.2
HP/O/B/1009/13
TWO-HOUR RELATIVE CONCENTRATION FACTORS (CH)

	Temperature Difference (°C)	Stability Class	Distance (Miles)										
			.5	1	2	3	4	5	6	7	8	9	10
1)	< - .6	A	1.4E-5	1.2E-6	5.9E-7	4.1E-7	3.2E-7	2.5E-7	2.0E-7	1.9E-7	1.8E-7	1.6E-7	1.5E-7
2)	-.6 to-.5	B-C	1.5E-4	4.5E-5	1.3E-5	6.3E-6	3.9E-6	2.7E-6	1.9E-6	1.4E-6	1.1E-6	8.3E-7	7.8E-7
3)	-0.4 to-0.2	D	3.8E-4	1.4E-4	4.9E-5	2.7E-5	1.7E-5	1.2E-5	9.2E-6	7.3E-6	6.0E-6	5.0E-6	4.3E-6
4)	-0.1 to+.4	E	6.9E-4	2.5E-4	9.6E-5	5.5E-5	3.5E-5	2.5E-5	2.0E-5	1.6E-5	1.3E-5	1.1E-5	9.7E-6
5)	+.5 to +1.2	F	1.1E-3	5.1E-4	2.0E-4	1.2E-4	8.2E-5	6.3E-5	5.1E-5	4.3E-5	3.8E-5	3.3E-5	3.0E-5
6)	> 1.2	G	1.8E-3	1.1E-3	4.3E-4	2.7E-4	2.0E-4	1.7E-4	1.3E-4	1.2E-4	8.6E-5	7.8E-5	7.3E-5

From other sources of meteorological data (Section 4.1) use the wind speed and time of day to determine which row of CH values to use:

Time of Day	Wind Speed	Row #
10:00 A.M. - 4:00 P.M.	N/A	3
4:00 P.M. - 10:00 A.M.	> 15 MPH	4
4:00 P.M. - 10:00 A.M.	≤ 15 MPH	6

ENCLOSURE 5.3
HP/0/B/1009/13
MANUAL CALCULATION WORKSHEET

1) Discharge Concentration ($Conc_V$):

Gas= _____ µci/ml

Iodine = _____ µci/ml

2) Vent Discharge Flow Rate:

F_V = _____ CFM

3) Wind Speed:

_____ MPH

4) Two Hour Relative Conc. Factors

(CH = sec-mph/m^3 X/Q = CH/mph = sec/m^3)

@ ____ Mi CH = _____; X/Q = _____ Sec/m^3

@ ____ Mi CH = _____; X/Q = _____ Sec/m^3

@ ____ Mi CH = _____; X/Q = _____ Sec/m^3

@ ____ Mi CH = _____; X/Q = _____ Sec/m^3

5) Downwind Concentrations:

$Conc_{DW} = Conc_V \cdot F_V \cdot X/Q \cdot (4.8E\text{-}4 \frac{m^3 \cdot min}{ft^3 \cdot sec})$

	A) Gas	B) Iodine
@ ____ Mi	$Conc_{DW}$ = _____ µCi/ml	$Conc_{DW}$ = _____ µCi/ml
@ ____ Mi	$Conc_{DW}$ = _____ µCi/ml	$Conc_{DW}$ = _____ µCi/ml
@ ____ Mi	$Conc_{DW}$ = _____ µCi/ml	$Conc_{DW}$ = _____ µCi/ml
@ ____ Mi	$Conc_{DW}$ = _____ µCi/ml	$Conc_{DW}$ = _____ µCi/ml

Time = _____ hours

6) Potential Whole Body Gamma Dose;

$D_{WB} = (9.00E2) \cdot Conc_{DW} \cdot \bar{E} \cdot Time$

$\bar{E}$ = _____ Mev/dis

@ _____ Mi	D_{WB} = _____ Rem
@ _____ Mi	D_{WB} = _____ Rem
@ _____ Mi	D_{WB} = _____ Rem
@ _____ Mi	D_{WB} = _____ Rem

7) Potential Child Thyroid Dose;

$D_{THY} = (1.86E6) \cdot Conc_{DW} \cdot Time$

D_{THY} = _____ Rem
D_{THY} = _____ Rem
D_{THY} = _____ Rem
D_{THY} = _____ Rem

ENCLOSURE 5.4
HP/O/B/1009/13
EVALUATION OF PLUME LOCATION

1. Acquire the following information from Enclosure 5.1 and record on Enclosure 5.5.

   a) wind direction in degrees from north

   b) wind speed (mph)

   c) ΔT (°C)

   d) Stability Class

   e) thyroid and whole body doses

2. Protective action guides submitted to the Station Health Physicist are to be made based on the calculated dose on Enclosure 5.1 and the following information.

   a) For doses:

      > 5 Rem Whole Body or,

      > 25 Rem Thyroid

      Recommend Evacuation of Population in Affected Area.

   B) For doses:

      1-5 Rem Whole Body or,

      5-25 Rem Thyroid

      Recommend evacuation of children and pregnant women, and sheltering of remainder of personnel in the affected area.

   C) For doses:

      < 1 Rem Whole Body or,

      < 5 Rem Thyroid

      Recommend no action.

3. Determine the affected zones, based on wind direction and wind speed, with the following tables.

Table 3.1 0-2 Mile Affected Zones

Wind Direction	Affected Zone
0° - 360°	AO

ENCLOSURE 5.4
HP/O/B/1009/13
EVALUATION OF PLUME LOCATION

Table 3.2 2-5 Mile Affected Zones

Wind Speed < 5 mph		Wind Speed > 5 mph	
Wind Direction	Affected Zones	Wind Direction	Affected Zones
0° - 360°	A1,B1,C1,D1,E1,F1	0.1° - 22°	C1, D1
		22.1° - 73°	C1, D1, E1
		73.1° - 108°	C1, D1, E1, F1
		108.1° - 120°	D1, E1, F1
		120.1° - 159°	E1, F1
		159.1° - 207°	E1, F1, A1
		207.1° - 247°	F1, A1, B1
		247.1° - 265°	A1, B1
		265.1° - 298°	A1, B1, C1
		298.1° - 338°	B1, C1
		338.1° - 360°	B1, C1, D1

Table 3.3 5-10 Mile Affected Zones

Wind Direction	Affected Zones
0.1° - 27°	C2, D2
27.1° - 69°	C2, D2, E2
69.1° - 95°	D2, E2, F2
95.1° - 132°	D2, E2, F2, F3
132.1° - 144°	E2, F2, F3
144.1° - 160°	E2, F2, F3, A2
160.1° - 201°	F2, F3, A2
201.1° - 229°	F2, F3, A2, B2
229.1° - 249°	F3, A2, B2
249.1° - 259°	A2, A3, B2
259.1° - 290°	A2, A3, B2, C2
290.1° - 304°	A3, B2, C2
304.1° - 333°	B2, C2
333.1° - 360°	B2, C2, D2

4. Record sectors requiring protective action on Sample Enclosure 5.5 along with the recommended protective action.

ENCLOSURE 5.5
DOSE ASSESSMENT REPORT
HP/O/B/1009/13

Duke Power Company Crisis Management Plan Off-Site Dose Report - Catawba

Prepared By _____ Date/Time ____/____ Emergency Drill (Circle One)

Meteorology

Wind Speed	_____	MPH
Wind Direction	_____	Degrees from North
Vertical Temp. Diff.	_____	Degrees C/100ft.
Stability Class (Circle One)		A B C D E F E

Source Term	Time	Noble Gas		1-31 ea.	
Containment Rad. Monitor	_____	_____	R/hr.	_____	R/hr
Containment Sample	_____	_____	uCi/ml	_____	uCi/ml
Unit Vent (Sample or EMF)	_____	_____	uCi/ml	_____	uCi/ml
Curie Release Rate	_____	_____	Ci/sec	_____	Ci/sec

Corresponds to:

____ LOCA		____ LOCA through filter	
____ Core Damage		____ Core Damage through filter	
____ Tube rupture		____ Gas Decay Tank	
____ New Fuel		____ Old fuel	____ Other

Dose Projections

		.5 mi	2 mi	5 mi	10 mi
2 hr Dose (rem) based on Containment release @ _____ ml/hr	Whole Body	_____	_____	_____	_____
	Child thyroid	_____	_____	_____	_____
2 hr Dose (rem) based on Unit Vent release @ _____ cfm	Whole Body	_____	_____	_____	_____
	Child thyroid	_____	_____	_____	_____
2 hr Dose (rem) based on Steam release @ _____	Whole Body	_____	_____	_____	_____
	Child thyroid	_____	_____	_____	_____
2 hr Dose (rem) based on _____ release @ _____	Whole Body	_____	_____	_____	_____
	Child thyroid	_____	_____	_____	_____

Field Monitoring Data

Location	Distance (mi)	Direction	Dose Rate (mrem/hr) Whole Body	Child Thyroid	Contamination (dpm/100 cm2)
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

Affected Zones	0-2 mi	2-5 mi	5-10 mi	9-10 mi
(Circle Zones)	A0	A1 B1 C1 D1 E1 F1	A2 B2 C2 D2 E2 F2	A3 F3

Comments: _____

XC: Data Analysis Coordinator, Station Health Physicist

Form 0472I (10-81)
(Formerly SPD-1002-1)

DUKE POWER COMPANY
PROCEDURE PREPARATION
PROCESS RECORD

(1) ID No: HP/0/B/1009/16
Change(s) 0 to
0 Incorporated

(2) STATION: Catawba

(3) PROCEDURE TITLE: Distribution of Potassium Iodide Tablets in the Event of a Radioiodine Release

(4) PREPARED BY: Jennifer M. Cameron DATE: 2-17-84

(5) REVIEWED BY: R. D. Kinard DATE: 2-27-84

Cross-Disciplinary Review By: _____ N/R: R. Kinard

(6) TEMPORARY APPROVAL (IF NECESSARY):

By: _____ (SRO) Date: _____

By: _____ Date: _____

(7) APPROVED BY: [signature] Date: 4/3/84

(8) MISCELLANEOUS:

Reviewed/Approved By: _____ Date: _____

Reviewed/Approved By: _____ Date: _____

DUKE POWER COMPANY
CATAWBA NUCLEAR STATION
DISTRIBUTION OF POTASSIUM IODIDE TABLETS
IN THE EVENT OF A RADIOIODINE RELEASE

1.0 PURPOSE

This procedure provides information necessary to distribute Active Potassium Iodide (KI) tablets to in-plant personnel in the event of a release of radioiodine. Also, it outlines storage and supply information to assure sufficient quality and quantity of thyroid blocking material.

2.0 REFERENCES

2.1 HP/0/B/1001/09, Operation/Calibration Procedure for the Body Burden Analyzer

2.2 HP/0/B/1009/10, Body Burden Analysis Following Suspected Uptakes of Mixed Fission or Activation Products

2.3 System Health Physics Manual

2.4 NCRP Report No. 55; Protection of the Thyroid Gland in the Event of Releases of Radioiodine 1977

2.5 NCRP Report No. 651; Management of Persons Accidentally Contaminated With Radioiodine 1980

2.6 NUREG 0654

2.7 May 16, 1983 letter from L. Lewis to C. T. Yongue. Subject: Oconee Nuclear Station HP Procedure HP/0/B/1009/12, File: GS/05-750.01.

3.0 LIMITS AND PRECAUTIONS

3.1 KI must not be administered to a person who knows he (she) is allergic to iodide.

3.2 If a person has an allergic reaction or has severe side effects from taking KI tablets, they should stop taking KI tablets and consult a doctor or public health authority for instructions.

3.3 Personnel shall be advised not to deviate from the prescribed dosages and dosage rates.

3.4 Best results will be achieved when KI tablets are administered immediately (within 2 hours) after an exposure, although administration as late as 24 hours after an emergency will provide some protection.

3.5 Discolored or disfigured tablets, tablets that have reached the expiration date listed on the bottle, and bottles of KI with loose tops shall be discarded.

3.6 Hands of anyone touching the KI tablets must be free of radioactive contamination prior to taking the KI tablets.

4.0 PROCEDURE

4.1 Responsibilities For Distribution

4.1.1 The Station Health Physicist, in conjunction with available medical advice, shall control the distribution of KI tablets.

4.1.2 Persons suspected of having been in the affected area prior to the detection and during the release, persons present in the affected area and persons who will enter the area while a significant amount of radioiodine is present will be instructed by the Health Physics Supervision to immediately register in the KI distribution center (for example, the Technical Support Center).

4.1.2.1 A significant amount of radioiodine for short duration in-plant exposure is that amount taken into the body that would result in a dose of 10 rem or more. For example, exposure to approximately 700 weighted MPC-hours, or

6.1×10^{-6} uCi/ml Airborne I-131 for one hour, would result in a dose of 10 rem.

4.1.2.2 A significant amount of radioiodine for emergency workers in the field is 70 MPC (6.1×10^{-7} uCi/ml) I-131.

4.2 Registration of persons exposed to a significant amount of radioiodine.

4.2.1 When persons notified by Health Physics arrive at the distribution area, record appropriate data per Enclosure 5.1.

4.2.2 With the approval of the Station Health Physicist, the Health Physics representative shall give one (1) tablet to each person and instructions concerning the use of the tablet. Then issue to each person one bottle containing nine (9) KI tablets, and the package insert for the use of the tablets (refer to Enclosure 5.2 for an example of the General Manufacturers Guidelines).

4.2.2.1 Tablets are to be taken only as directed. One (1) tablet per day for the length of the emergency.

4.2.2.2 After the initial dose of KI, subsequent doses will be taken on a daily basis. Tablets should be taken as near a 24-hour schedule as possible.

NOTE: For best results, emphasis must be placed upon the proper use of these tablets.

4.2.3 Tablets removed from full bottle of KI should be stored in 10 ml plastic vials. The expiration date on the bottle from which the tablets were taken and the name of the Health Physics representative shall be recorded on the 10ml vials. Tablets stored in 10 ml plastic vials should then be used for single tablet initial issuance of KI to affected persons.

4.2.4 As directed by the Field Monitoring Coordinator (FMC) or the S&C Coordinator, team members shall ingest one (1) tablet of Potassium Iodide.

4.2.4.1 The FMC and/or S&C Coordinator will provide the information for Enclosure 5.1 and will ensure that distribution of KI per Step 4.2.2 is accomplished by team members.

4.3 Thyroid Burden Analysis Following Radioiodine Exposure

4.3.1 All persons receiving KI tablets should receive a thyroid scan. If the number of people render this step impractical, the Count Room Supervisor will select a representative sample of persons listed on Enclosure 5.1 who received KI tablets.

NOTE: Subsequent action involving thyroid burden analysis should follow guidelines established by HP/0/B/1009/10.

4.3.2 Records of thyroid scan shall be maintained per procedure.

NOTE: Distribute KI before analyzing thyroid concentration. Thyroid scans immediately after an accident could lengthen KI distribution time and cause confusion among personnel.

4.4 Storage Requirements

4.4.1 There are three major storage requirements to be observed:

4.4.1.1 Store in a temperature range of 59° to 86°F.

4.4.1.2 Store in a low humidity area (avoid direct exposure to liquids).

4.4.1.3 Store in an area protected from exposure to light.

4.4.2 Upon receiving a shipment of KI tablets, boxes shall be opened as soon as possible and bottles examined to ensure that an air-tight seal has been maintained. Bottles must be returned to boxes, and boxes must be sealed shut, so as to avoid exposure to light.

4.4.3 To ensure a sufficient supply of tablets, a minimum of 1,000 bottles with 14 tablets per bottle should be maintained on site.

4.5 Shelf Life and Changeout of KI Tablets

4.5.1 Thyro-Block™ tablet bottles are labeled with an expiration date from the factory. As tablets reach the expiration dates, the tablets must be discarded.

NOTE: Replacement tablets should be ordered at least three (3) months prior to the date of expiration listed on the bottles of KI.

4.5.2 Upon receiving a shipment of KI tablets, supplies should be shifted so as to use older tablets before new tablets.

5.0 ENCLOSURES

5.1 Sample of Potassium Iodide Tablet Distribution Data Sheet

5.2 Manufacturers Guidelines for Thyro-Block™ Tablets and Solution

POTASSIUM IODIDE TABLET DISTRIBUTION DATA SHEET

HP BADGE NUMBER	NAME	DEPARTMENT	DATE & TIME OF SUSPECTED EXPOSURE	DATE & TIME OF INITIAL ISSUANCE

Patient Package Insert for

THYRO-BLOCK™

(POTASSIUM IODIDE)
(pronounced poe-TASS-e-um [illegible])
(abbreviated: KI)
TABLETS and SOLUTION U.S.P.

TAKE POTASSIUM IODIDE ONLY WHEN PUBLIC HEALTH OFFICIALS TELL YOU. IN A RADIATION EMERGENCY, RADIOACTIVE IODINE COULD BE RELEASED INTO THE AIR. POTASSIUM IODIDE (A FORM OF IODINE) CAN HELP PROTECT YOU.

IF YOU ARE TOLD TO TAKE THIS MEDICINE, TAKE IT ONE TIME EVERY 24 HOURS. DO NOT TAKE IT MORE OFTEN. MORE WILL NOT HELP YOU AND MAY INCREASE THE RISK OF SIDE EFFECTS. *DO NOT TAKE THIS DRUG IF YOU KNOW YOU ARE ALLERGIC TO IODIDE.* (SEE SIDE EFFECTS BELOW.)

INDICATIONS

THYROID BLOCKING IN A RADIATION EMERGENCY ONLY.

DIRECTIONS FOR USE

Use only as directed by State or local public health authorities in the event of a radiation emergency.

DOSE

Tablets:	ADULTS AND CHILDREN 1 YEAR OF AGE OR OLDER: One (1) tablet once a day. Crush for small children. BABIES UNDER 1 YEAR OF AGE: One-half (1/2) tablet once a day. Crush first.
Solution:	ADULTS AND CHILDREN 1 YEAR OF AGE OR OLDER: Add 6 drops to one-half glass of liquid and drink each day. BABIES UNDER 1 YEAR OF AGE: Add 3 drops to a small amount of liquid once a day.

For all dosage forms: Take for 10 days unless directed otherwise by State or local public health authorities.

Store at controlled room temperature between [illegible] and [illegible]°C ([illegible] to 86°F). Keep container tightly closed and protect from light. Do not use the solution if it appears brownish [illegible] of the bottle.

WARNING

Potassium iodide should not be used by people allergic to iodide. Keep out of the reach of children. In case of overdose or allergic reaction, contact a physician or the public health authority.

DESCRIPTION

Each THYRO-BLOCK™ TABLET contains [illegible] mg of potassium iodide.

Each drop of THYRO-BLOCK™ SOLUTION contains 21 mg of potassium iodide.

HOW POTASSIUM IODIDE WORKS

Certain forms of iodine help your thyroid gland work right. Most people get the iodine they need from foods, but iodized salt or fish. The thyroid can "store" or hold only a certain amount of iodine.

In a radiation emergency, radioactive iodine may be released in the air. This material may be breathed or swallowed. It may enter the thyroid gland and damage it. The damage would probably not show itself for years. Children are most likely to have thyroid damage.

If you take potassium iodide, it will fill up your thyroid gland. This reduces the chance that harmful radioactive iodine will enter the thyroid gland.

WHO SHOULD NOT TAKE POTASSIUM IODIDE

The only people who should not take potassium iodide are people who know they are allergic to iodine. You can take potassium iodide even if you are taking medicine for a thyroid problem (for example, a thyroid hormone or antithyroid drug). Pregnant and nursing women and babies and children may also take the drug.

HOW AND WHEN TO TAKE POTASSIUM IODIDE

Potassium Iodide should be taken as soon as possible after public health officials tell you. You should take it once every 24 hours. More will not help you but can put you at risk. You will only be limited amounts of iodine. Larger doses will increase the risk of side effects. You will probably not need to take the drug for more than 10 days.

SIDE EFFECTS

Usually, side effects of potassium iodide happen when people take higher doses for a long time. You should be careful not to take more than the recommended dose or take it for longer than you are told. Side effects are unlikely to happen at the low dose and the short time you will be taking the drug.

Possible side effects include skin rash, 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).

A few people have an allergic reaction with more serious symptoms. These could be fever and joint pains, or a swelling of parts of the face and body and at times severe shortness of breath requiring immediate medical attention.

Taking iodide may rarely cause overactivity of the thyroid gland, underactivity of the thyroid gland, or enlargement of the thyroid gland (goiter).

WHAT TO DO IF SIDE EFFECTS OCCUR

If the side effects are severe or if you have an allergic reaction stop taking potassium iodide. Then, if possible, call a doctor or public health authority for instructions.

HOW SUPPLIED

THYRO-BLOCK™ TABLETS (Potassium Iodide, U.S.P.) bottles of 14 tablets (NDC 0037-0172-20) each white, round, scored tablet contains 130 mg potassium iodide.

THYRO-BLOCK™ SOLUTION (Saturated Iodide Solution, U.S.P.) 30 ml (1 fl. oz.) light resistant, calibrated drop dispensing units (NDC 0037-4284-25). Each drop contains 21 mg potassium iodide.

WALLACE LABORATORIES
[illegible]
[illegible]
[illegible]

Form 34731 (10-81)
(Formerly SPD-1002-1)

DUKE POWER COMPANY
PROCEDURE PREPARATION
PROCESS RECORD

(1) ID No: HP/0/B/1009/15
Change(s) 0 to
0 Incorporated

(2) STATION: CATAWBA

(3) PROCEDURE TITLE: OFFSITE DOSE PROJECTIONS - UNCONTROLLED RELEASE OF GASEOUS RADIOACTIVE MATERIAL OTHER THAN THROUGH THE UNIT VENT

(4) PREPARED BY: Gregg C. Courtney DATE: 2/3/84

(5) REVIEWED BY: R. D. Kincaid DATE: 2-6-84

Cross-Disciplinary Review By: ______ N/R: [signature]

(6) TEMPORARY APPROVAL (IF NECESSARY):

By: ______ (SRO) Date: ______

By: ______ Date: ______

(7) APPROVED BY: [signature] Date: 4/3/84

(8) MISCELLANEOUS:

Reviewed/Approved By: ______ Date: ______

Reviewed/Approved By: ______ Date: ______

DUKE POWER COMPANY
CATAWBA NUCLEAR STATION
OFFSITE DOSE PROJECTIONS
UNCONTROLLED RELEASE OF GASEOUS RADIOACTIVE MATERIAL
OTHER THAN THROUGH THE UNIT VENT

1.0 PURPOSE

To describe an approved method for projecting dose commitment from a noble gas or iodine release, other than a unit vent release, during an emergency.

2.0 REFERENCES

2.1 Reg Guide 1.109

2.2 Reg Guide 1.4

2.3 HP/0/B/1009/06, Alternative Method for Determining Dose Rate Within the Reactor Building

2.4 Variables used in HP/0/B/1009/15, Letter File Number CN.: 134.10

3.0 LIMITS AND PRECAUTIONS

3.1 It is assumed that the iodine whole body dose from a release is very small compared to the iodine thyroid dose. Thus, iodine whole body dose is not considered here.

3.2 This procedure applies to releases made from Catawba Nuclear Station only. Many of the values contained in this procedure are site specific.

3.3 This procedure considers all releases to be ground level releases.

4.0 PROCEDURE

4.1 Acquire the following information and record on sample Enclosure 5.1.

NOTE: Should site meteorological data be unavailable, obtain wind speed and wind direction from the National Weather Service (United States Government - National Oceanic & Atmospheric Administration).

NOTE: If appropriate, obtain advance meteorological data to calculate doses due to changing meteorological conditions.

4.1.1 Reactor Unit, date and time of reactor trip.

4.1.2 Lower tower wind speed (mph).

4.1.3 Tower wind direction in degrees from North (North = 0°).

4.1.4 Temperature gradient ($\Delta T^{\circ}C$).

4.1.5 Radiation Monitor (EMF 33A or 33B) reading (R/hr) or calculated per Reference 2.3.

4.1.6 Date and time of calculations.

4.2 Determine the Containment Building leakage rate (LR) and record it on sample Enclosure 5.1.

4.2.1 LR (ml/hr) is the total leak rate for the containment which is one of the following:

4.2.1.1 a "best guess" assumption,

4.2.1.2 the measured leak rate where suitable means are available;

4.2.1.3 The design leakage rate (LR_{DLR}) which is determined by:

$$LR_{DLR} = \text{Containment Volume} \cdot \text{Design Leak Constant}$$

$$= 2.83 \times 10^{9}\ \text{ml} \cdot \frac{0.0025}{\text{day}} \cdot \frac{\text{day}}{24\ \text{hr}}$$

$$= 2.95 \times 10^{6}\ \text{ml/hr}$$

4.3 Determine the X/Q values for each point of interest downwind and record on Enclosure 5.1.

If no points have been requested, use the .5, 2, 5 and 10 mile values.

4.3.1 Locate the relative two-hour downwind concentration value (CH) for each point from Enclosure 5.2 and record onto sample Enclosure 5.1.

4.3.2 Convert these values to X/Q by,

$$X/Q = \frac{CH\ (\text{MPH-Sec/m}^3)}{\text{Tower Wind Speed (MPh)}}$$

4.4 Determine the potential whole body dose from submersion in a cloud of noble gas and record on Enclosure 5.1.

4.4.1 Calculate the whole body two (2) hour dose commitment,

$$D_{WB} = DR_{M} \cdot LR \cdot X/Q \cdot U_{NG}$$

Where,

D_{WB} = Whole body two (2) hour dose commitment

DR_{M} = Monitor dose rate

ADC = Average Decay constant for noble gases =

$$2.2e22E\text{-}2 \ \frac{\mu Ci \cdot MeV \cdot hr^2}{ml \cdot d \cdot R}$$

LR = Containment leakage rate in ml/hr

X/Q = dispersion factor in sec/m^3

U_{NG} = $\frac{(3.7E4/sec \cdot \mu Ci)\ (1.6E\text{-}6ergs/MeV)}{2\ (100\ ergs/g\text{-}rad)\ (1.2E\text{-}3g/cm^3)\ (1E6cm^3/m^3)}$ X ADC =

$$5.7E\text{-}9 \ \frac{hr^2\text{-}m^3 \text{ - } rad}{ml\text{-}R\text{-}sec}$$

4.5 Determine the potential thyroid dose from uptake of radioiodine and record on Enclosure 5.1.

4.5.1 Locate the time plus one (1) hour after trip on Enclosure 5.3 and record the corresponding Decay Constant on Enclosure 5.1.

4.5.2 Calculate a child's thyroid two (2) hour dose commitment using time plus one (1) hour,

$$DR_T = DR_M \cdot DC \cdot LR \cdot X/Q \cdot U_I$$

Where,

DR_T = thyroid two (2) hour dose commitment

DR_M = monitor dose rate

DC = Decay Constant in $\frac{\mu Ci \cdot mrem \cdot hr^2}{ml \cdot pCi \cdot R}$ for time plus one (1) hour (see Enclosure 5.3)

LR = Leak rate in ml/hr

X/Q dispersion in sec/m^3

U_I = breathing rate for child times uCi to pCi conversion factor

$(1.17E\text{-}4m^3/sec)\ \ 1E3\ \frac{pCi\text{-}rem}{\mu Ci\text{-}mrem} = 1.17E\text{-}1\ \frac{m^3\text{-}pCi\text{-}rem}{sec\ \text{-}\mu Ci\text{-}mrem}$

4.6 Determine the potentially affected zones using Enclosure 5.4. Record the affected zones on Enclosure 5.5.

4.7 Complete Enclosure 5.5 and submit it to the Data Analysis Coordinator. Include any comments pertinent to the evaluation of offsite hazards.

5.0 ENCLOSURES

5.1 Sample Projected Offsite Dose Released From Containment

5.2 Sample Table of Two Hour Relative Concentration Factors (C_H)

5.3 Sample Table of Iodine and Noble Decay Constant (DC)

5.4 Sample of Evaluation of Plume Location

5.5 Sample Dose Assessment Report

5.6 Estimation of Containment Leak Rate

ENCLOSURE 5.1
HP/0/B.1009/15
PROJECTED OFFSITE DOSE RELEASED FROM CONTAINMENT

Unit _____ Date/Time of Reactor Trip _____ / _____

METEOROLOGICAL DATA

1. Tower wind speed _____ mph
2. Tower wind direction _____ °
3. Temperature gradient (ΔT) _____ °C

MONITOR DATA

1. EMF 53A or 53B/Survey Inst. # _____, DR_M = _____ R/hr
(Circle One)

NOTE: If containment monitor information is not useable, refer to Reference 2.3.

DOSE CALCULATION DATE/TIME _____

1. LR _____ ml/hr
2. C_H @ ____ mi. = _____, X/Q = _____ sec/m³
C_H @ ____ mi. = _____, X/Q = _____ sec/m³
C_H @ ____ mi. = _____, X/Q = _____ sec/m³
C_H @ ____ mi. = _____, X/Q = _____ sec/m³

A. Whole Body 2 hr. dose projection from noble gases:

by $D_{WB} = DR_M \cdot LR \cdot X/Q \cdot 5.7E\text{-}9$,

Miles Out	D_{WB} 2 hr Dose Commitment
_____	_____
_____	_____
_____	_____
_____	_____

ENCLOSURE 5.1
HP/0/B/1009/15
PROJECTED OFFSITE DOSE RELEASED FROM CONTAINMENT

B. Thyroid 2 hr. dose projection from iodine:

DC _____,

by $DR_T = DR_M \cdot DC \cdot LR \cdot X/Q \cdot (1.17E-1)$,

Miles Out	D_{WB} 2 hr Dose Commitment
_____	_____
_____	_____
_____	_____
_____	_____

DEFINITIONS

D_{WB} = whole body 2 hour dose commitment from noble gases

DR_T = thyroid 2 hr dose commitment from iodine

LR = containment leakage rate

X/Q = "Chi over Q" is downwind concentration correction factor

C_H = 2 hr relative downwind concentration - MPH (X/Q • MPH)

DC = Decay constant

DR_M = dose rate at the containment monitor

ENCLOSURE 2
HP/O/B/1009/15

TWO-HOUR RELATIVE CONCENTRATION FACTORS (C_H)

Temperature Difference (°C)	Stability Class	Distance (Miles)										
		.5	1	2	3	4	5	6	7	8	9	10
1) < -.6	A	1.4E-5	1.2E-6	5.9E-7	4.1E-7	3.2E-7	2.5E-7	2.0E-7	1.9E-7	1.8E-7	1.6E-7	1.5E-7
2) -.6 to -.5	B	1.5E-4	4.5E-5	1.3E-5	6.3E-6	3.9E-6	2.7E-6	1.9E-6	1.4E-6	1.1E-6	8.3E-7	7.8E-7
3) -0.4 to -0.2	C	3.8E-4	1.4E-4	4.9E-5	2.7E-5	1.7E-5	1.2E-5	9.2E-6	7.3E-6	6.0E-6	5.0E-6	4.3E-6
4) -0.1 to +.4	D	6.9E-4	2.5E-4	9.6E-5	5.5E-5	3.5E-5	2.5E-5	2.0E-5	1.6E-5	1.3E-5	1.1E-5	9.7E-6
5) +.5 to +1.2	E	1.1E-3	5.1E-4	2.0E-4	1.2E-4	8.2E-5	6.3E-5	5.1E-5	4.3E-5	3.8E-5	3.3E-5	3.0E-5
6) > 1.2	F	1.8E-3	1.1E-3	4.3E-4	2.7E-4	2.0E-4	1.7E-4	1.3E-4	1.2E-4	8.6E-5	7.8E-5	7.3E-5

From other sources of meteorological data (Section 4.1) use the wind speed and time of day to determine which row of C_H values to use:

Time of Day	Wind Speed	Row #
10:00 A.M. - 4:00 P.M.	N/A	3
4:00 P.M. - 10:00 A.M.	> 15 MPH	4
4:00 P.M. - 10:00 A.M.	≤ 15 MPH	6

ENCLOSURE 5.0
TABLE
IODINE & NOBLE DECAY CONSTANT(DC)
0 - 498 HRS
HP/0/B/1009/15

HOUR	DC	HOUR	DC	HOUR	DC	HOUR	DC	HOUR	DC
0	2.0649E-05	100	5.6125E-04	200	6.8707E-04	300	7.4408E-04	400	7.9109E-04
2	5.7902E-05	102	5.6395E-04	202	6.8925E-04	302	7.4537E-04	402	7.9197E-04
4	8.1506E-05	104	5.7050E-04	204	6.9060E-04	304	7.4636E-04	404	7.9285E-04
6	1.0296E-04	106	5.7492E-04	206	6.9194E-04	306	7.4705E-04	406	7.9373E-04
8	1.2295E-04	108	5.7920E-04	208	6.9326E-04	308	7.4803E-04	408	7.9460E-04
10	1.4170E-04	110	5.8335E-04	210	6.9457E-04	310	7.4932E-04	410	7.9548E-04
12	1.5933E-04	112	5.8737E-04	212	6.9586E-04	312	7.5029E-04	412	7.9635E-04
14	1.7591E-04	114	5.9127E-04	214	6.9714E-04	314	7.5127E-04	414	7.9722E-04
16	1.9159E-04	116	5.9504E-04	216	6.9840E-04	316	7.5224E-04	416	7.9809E-04
18	2.0648E-04	118	5.9870E-04	218	6.9965E-04	318	7.5321E-04	418	7.9896E-04
20	2.2071E-04	120	6.0225E-04	220	7.0089E-04	320	7.5418E-04	420	7.9982E-04
22	2.3439E-04	122	6.0569E-04	222	7.0212E-04	322	7.5515E-04	422	8.0068E-04
24	2.4757E-04	124	6.0903E-04	224	7.0333E-04	324	7.5611E-04	424	8.0155E-04
26	2.6034E-04	126	6.1226E-04	226	7.0454E-04	326	7.5707E-04	426	8.0240E-04
28	2.7272E-04	128	6.1540E-04	228	7.0574E-04	328	7.5803E-04	428	8.0326E-04
30	2.8475E-04	130	6.1844E-04	230	7.0692E-04	330	7.5899E-04	430	8.0412E-04
32	2.9645E-04	132	6.2140E-04	232	7.0810E-04	332	7.5994E-04	432	8.0497E-04
34	3.0784E-04	134	6.2426E-04	234	7.0926E-04	334	7.6089E-04	434	8.0583E-04
36	3.1893E-04	136	6.2705E-04	236	7.1042E-04	336	7.6184E-04	436	8.0668E-04
38	3.2975E-04	138	6.2975E-04	238	7.1157E-04	338	7.6279E-04	438	8.0753E-04
40	3.4029E-04	140	6.3238E-04	240	7.1272E-04	340	7.6373E-04	440	8.0837E-04
42	3.5058E-04	142	6.3493E-04	242	7.1385E-04	342	7.6467E-04	442	8.0922E-04
44	3.6062E-04	144	6.3741E-04	244	7.1498E-04	344	7.6561E-04	444	8.1006E-04
46	3.7042E-04	146	6.3983E-04	246	7.1610E-04	346	7.6655E-04	446	8.1090E-04
48	3.7999E-04	148	6.4218E-04	248	7.1721E-04	348	7.6748E-04	448	8.1174E-04
50	3.8933E-04	150	6.4447E-04	250	7.1832E-04	350	7.6842E-04	450	8.1258E-04
52	3.9846E-04	152	6.4670E-04	252	7.1942E-04	352	7.6935E-04	452	8.1342E-04
54	4.0738E-04	154	6.4887E-04	254	7.2051E-04	354	7.7029E-04	454	8.1425E-04
56	4.1609E-04	156	6.5099E-04	256	7.2160E-04	356	7.7120E-04	456	8.1509E-04
58	4.2460E-04	158	6.5306E-04	258	7.2268E-04	358	7.7213E-04	458	8.1592E-04
60	4.3291E-04	160	6.5508E-04	260	7.2376E-04	360	7.7305E-04	460	8.1675E-04
62	4.4103E-04	162	6.5705E-04	262	7.2483E-04	362	7.7397E-04	462	8.1757E-04
64	4.4896E-04	164	6.5897E-04	264	7.2590E-04	364	7.7489E-04	464	8.1840E-04
66	4.5669E-04	166	6.6085E-04	266	7.2696E-04	366	7.7581E-04	466	8.1923E-04
68	4.6425E-04	168	6.6269E-04	268	7.2802E-04	368	7.7672E-04	468	8.2005E-04
70	4.7161E-04	170	6.6450E-04	270	7.2907E-04	370	7.7763E-04	470	8.2087E-04
72	4.7879E-04	172	6.6626E-04	272	7.3012E-04	372	7.7854E-04	472	8.2169E-04
74	4.8579E-04	174	6.6799E-04	274	7.3116E-04	374	7.7945E-04	474	8.2250E-04
76	4.9262E-04	176	6.6969E-04	276	7.3220E-04	376	7.8036E-04	476	8.2332E-04
78	4.9926E-04	178	6.7135E-04	278	7.3323E-04	378	7.8126E-04	478	8.2413E-04
80	5.0573E-04	180	6.7298E-04	280	7.3427E-04	380	7.8217E-04	480	8.2495E-04
82	5.1202E-04	182	6.7458E-04	282	7.3529E-04	382	7.8307E-04	482	8.2576E-04
84	5.1815E-04	184	6.7615E-04	284	7.3632E-04	384	7.8397E-04	484	8.2657E-04
86	5.2410E-04	186	6.7770E-04	286	7.3734E-04	386	7.8486E-04	486	8.2737E-04
88	5.2989E-04	188	6.7922E-04	288	7.3835E-04	388	7.8576E-04	488	8.2818E-04
90	5.3551E-04	190	6.8072E-04	290	7.3936E-04	390	7.8665E-04	490	8.2898E-04
92	5.4097E-04	192	6.8219E-04	292	7.4037E-04	392	7.8754E-04	492	8.2978E-04
94	5.4627E-04	194	6.8364E-04	294	7.4138E-04	394	7.8843E-04	494	8.3058E-04
96	5.5142E-04	196	6.8507E-04	296	7.4238E-04	396	7.8932E-04	496	8.3138E-04
98	5.5641E-04	198	6.8648E-04	298	7.4338E-04	398	7.9020E-04	498	8.3218E-04

DUKE POWER COMPANY
CATAWBA NUCLEAR STATION
ENCLOSURE 5.4
HP/0/B/1009/13
EVALUATION OF PLUME LOCATION

5.4.1. Acquire the following information from sample Enclosure 5.1 and record on sample Enclosure 5.5.

5.4.1.1 Wind direction in degrees from North

5.4.1.2 Wind speed (mph)

5.4.1.3 ΔT (°C)

5.4.1.4 Stability class

5.4.1.5 Thyroid and whole body dose

5.4.2. Determine the affected zones, based on wind direction and wind speed, with the following tables:

Table 3.1 0-2 Mile Affected Zones

Wind Direction	Affected Zones
0° - 360°	A0

Table 3.2 2-5 Mile Affected Zones

Wind Speed < 5 mph		Wind Speed > 5 mph	
Wind Direction	Affected Zones	Wind Direction	Affected Zones
0° - 360°	A1,B1,C1,D1,E1,F1	0.1° - 22°	C1, D1
		22.1° - 73°	C1, D1, E1
		73.1° - 108°	C1, D1, E1, F1
		108.1° - 120°	D1, E1, F1
		120.1° - 139°	E1, F1
		139.1° - 207°	E1, F1, A1
		207.1° - 247°	F1, A1, B1
		247.1° - 265°	A1, B1
		265.1° - 298°	A1, B1, C1
		298.1° - 338°	B1, C1
		338.1° - 360°	B1, C1, D1

DUKE POWER COMPANY
CATAWBA NUCLEAR STATION
ENCLOSURE 5.4
HP/0/B/1009/15
EVALUATION OF PLUME LOCATION

Table 3.3 5-10 Mile Affected Zones

Wind Direction	Affected Zones
0.1° - 27°	C2, D2
27.1° - 69°	C2, D2, E2
69.1° - 95°	D2, E2, F2
95.1° - 132°	D2, E2, F2, F3
132.1° - 144°	E2, F2, F3
144.1° - 160°	E2, F2, F3, A2
160.1° - 201°	F2, F3, A2
201.1° - 229°	F2, F3, A2, B2
229.1° - 249°	F3, A2, B2
249.1° - 259°	A2, A3, D2
259.1° - 290°	A2, A3, B2, C2
290.1° - 304°	A3, B2, C2
304.1° - 333°	B2, C2
333.1° - 360°	B2, C2, D2

5.4.3 Determine the protective action guides (PAG), based on the calculated dose(s) on Sample Enclosure 5.1 and the following information:

5.4.3.1 For doses:

< 1 Rem Whole Body or,

< 5 Rem Thyroid

Recommend no action.

5.4.3.2 For doses:

1-5 Rem Whole Body or,

5-25 Rem Thyroid

Recommend evacuation of children and pregnant women and sheltering of remainder of personnel in the affected area.

DUKE POWER COMPANY
CATAWBA NUCLEAR STATION
ENCLOSURE 5.4
HP/0/B/1009/15
EVALUATION OF PLUME LOCATION

5.4.3.3 For doses:

> 5 Rem Whole Body or,

> 25 Rem Thyroid

Recommend Evacuation of Population in Affected Area.

5.4.4. Record only the affected zones requiring protective action on sample Enclosure 5.5 along with the recommended protective action.

DUKE POWER COMPANY
CATAWBA NUCLEAR STATION
HP/0/B/1009/15
ENCLOSURE 5.5
DOSE ASSESSMENT REPORT

Duke Power Crisis Company Management Plan Off-Site Dose Report - CATAWBA

Prepared By _____ Date/Time _____/_____ Emergency Drill (circle one)

Meteorology

Wind Speed	_____	MPH
Wind Direction	_____	degrees from North
Vertical Temp. Diff.	_____	degrees C/100 ft.
Stability Class (circle one)		A B C D E F G

Source Term	Time	Noble Gas	I-131 equivalent
Containment Rad. Monitor	_____	_____R/hr	_____R/hr
Containment Sample	_____	_____µCi/ml	_____µCi/ml
Unit Vent (Sample of EMF)	_____	_____µCi/ml	_____µCi/ml
Curie Release Rate	_____	_____Ci/sec	_____Ci/sec

Corresponds to:
_____ LOCA _____ LOCA through filter
_____ Core damage _____ Core damage through filter
_____ Tube rupture _____ Gas Decay Tank
_____ New fuel _____ Old fuel Other _____

Dose Projections

		.5 mi	2 mi	5 mi	10 mi
2hr Dose(rem) based on Containment release @_____ml/hr	Whole Body	_____	_____	_____	_____
	Child thyroid	_____	_____	_____	_____
2hr Dose(rem) based on Unit Vent release @_____cfm	Whole Body	_____	_____	_____	_____
	Child thyroid	_____	_____	_____	_____
2hr Dose(rem) based on Steam release	Whole Body	_____	_____	_____	_____
	Child thyroid	_____	_____	_____	_____
2hr Dose(rem) based on _____ release @_____	Whole Body	_____	_____	_____	_____
	Child thyroid	_____	_____	_____	_____

Field Monitoring Data

Location	Distance (mi)	Direction	Dose Rate (mrem/hr) Whole body	Child thyroid	Contamination ($dpm/100\ cm^2$)
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

Affected Zones (circle zones)	0-2 mi	2-5 mi	5-10 mi	9-10 mi
	A0	A1 B1 C1 D1 E1 F1	A2 B2 C2 D2 E2 F2	A3 F3

COMMENTS: _____

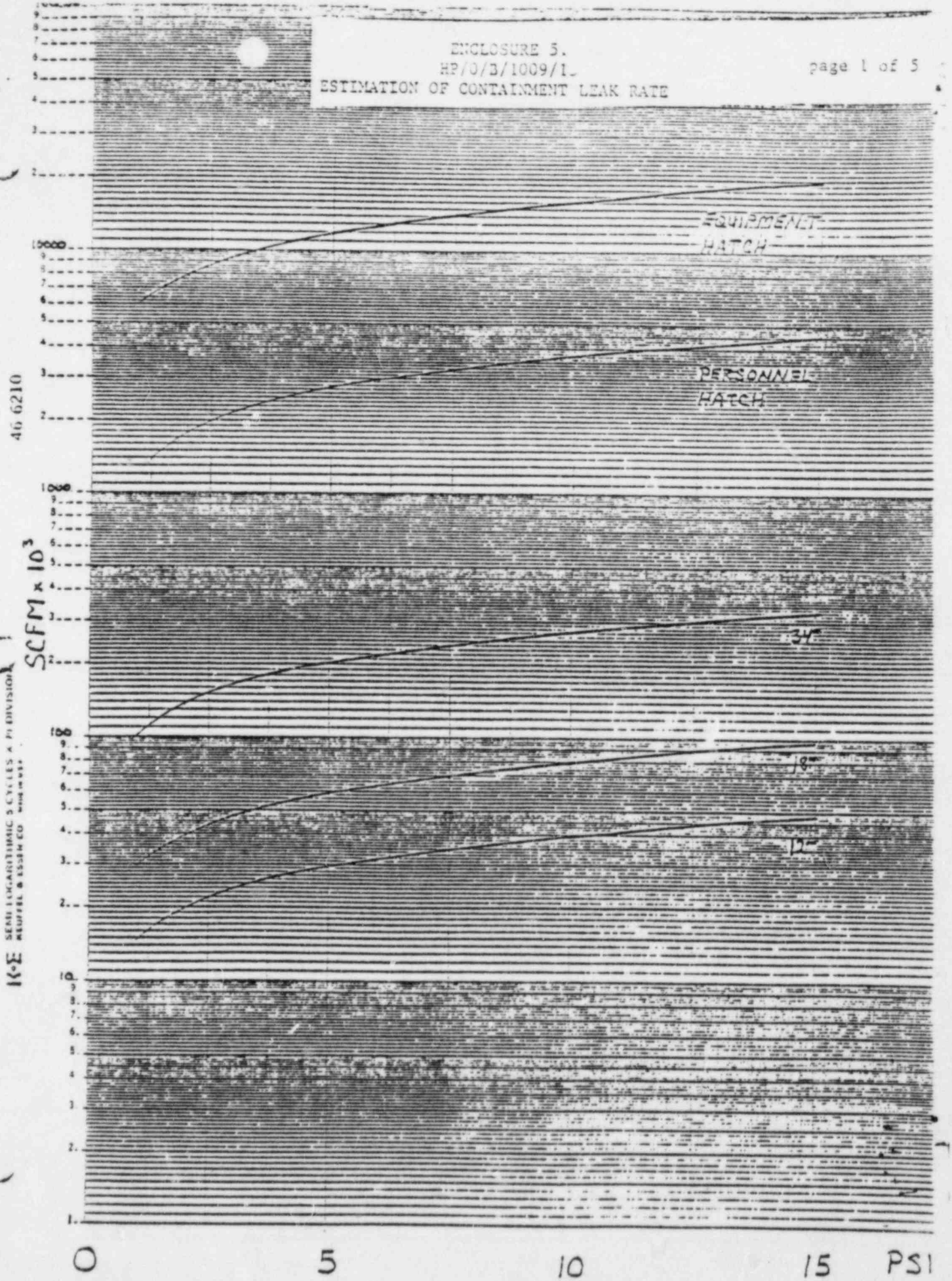
_____

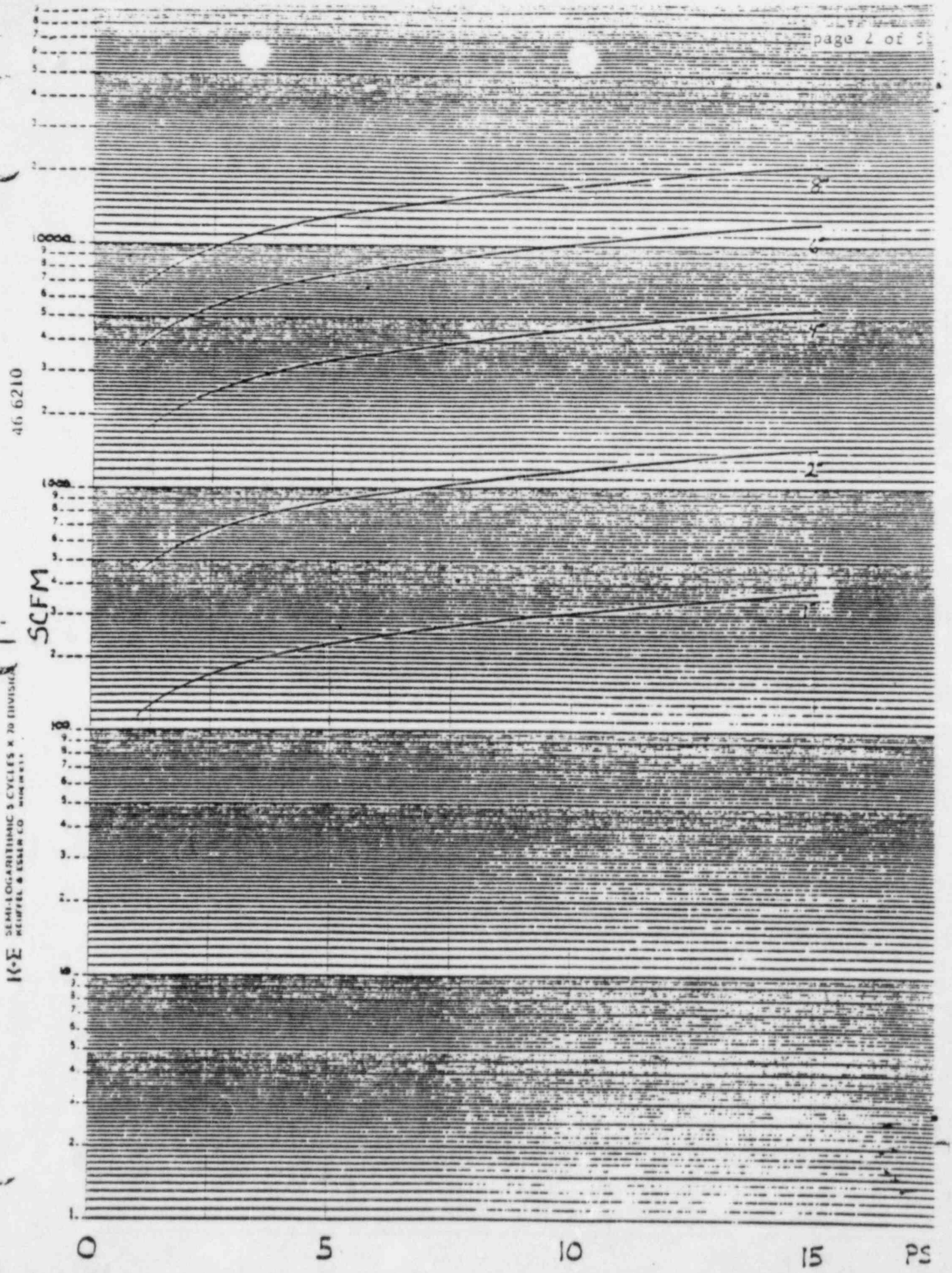
_____

_____

xc: Data Analysis Coordinator, Station Health Physicist

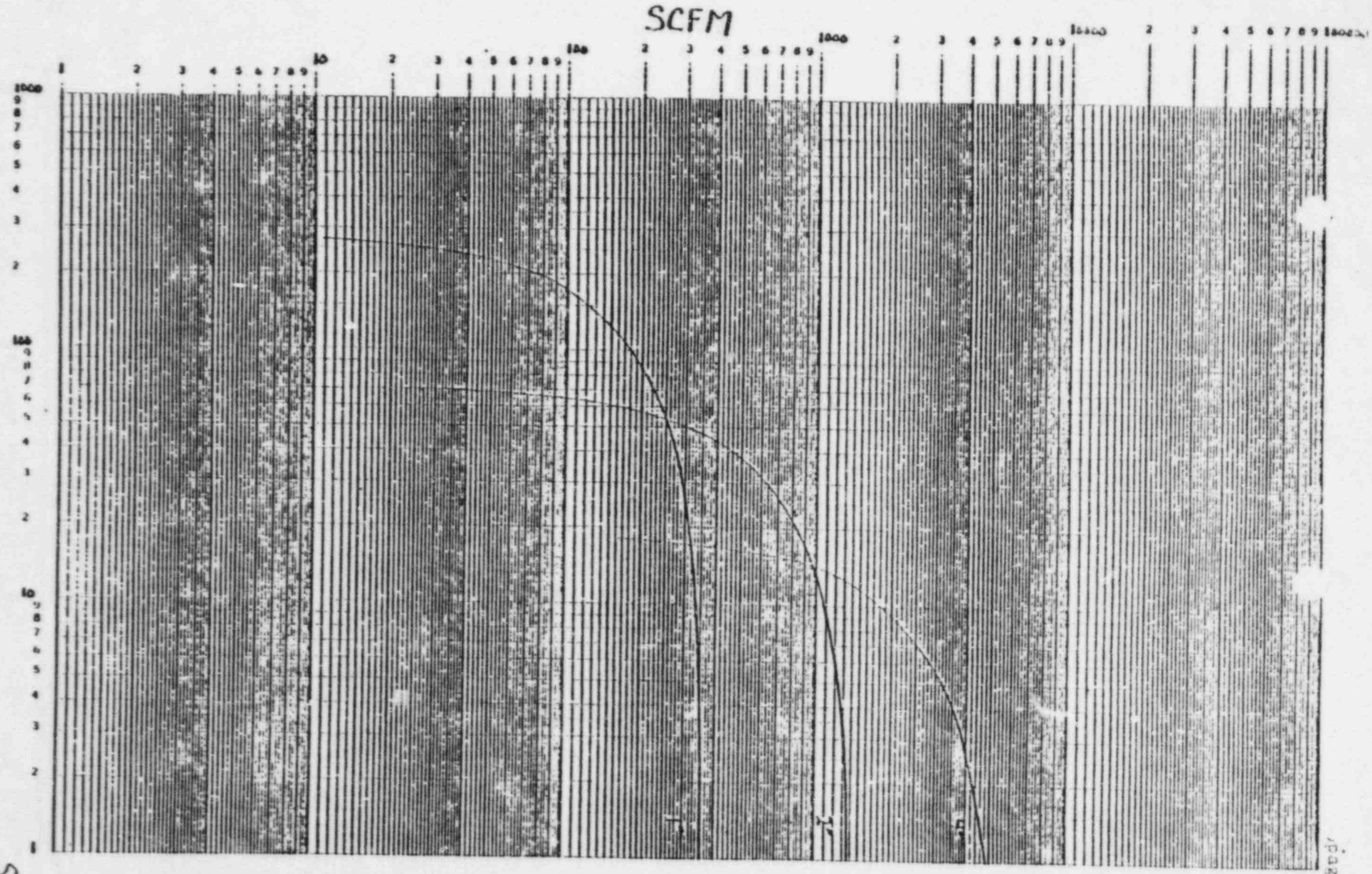
ENCLOSURE 5.
HP/O/B/1009/1.
ESTIMATION OF CONTAINMENT LEAK RATE

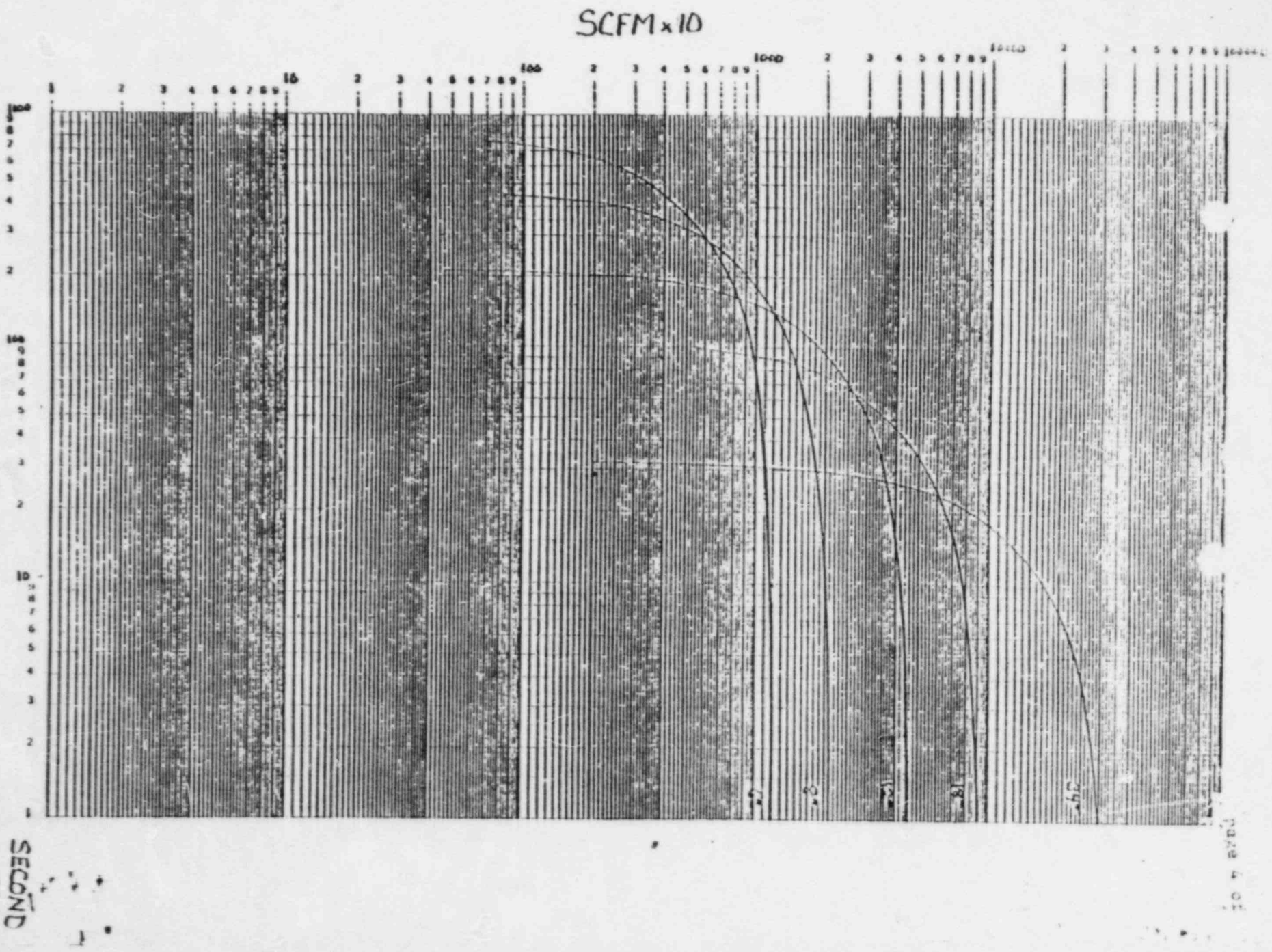


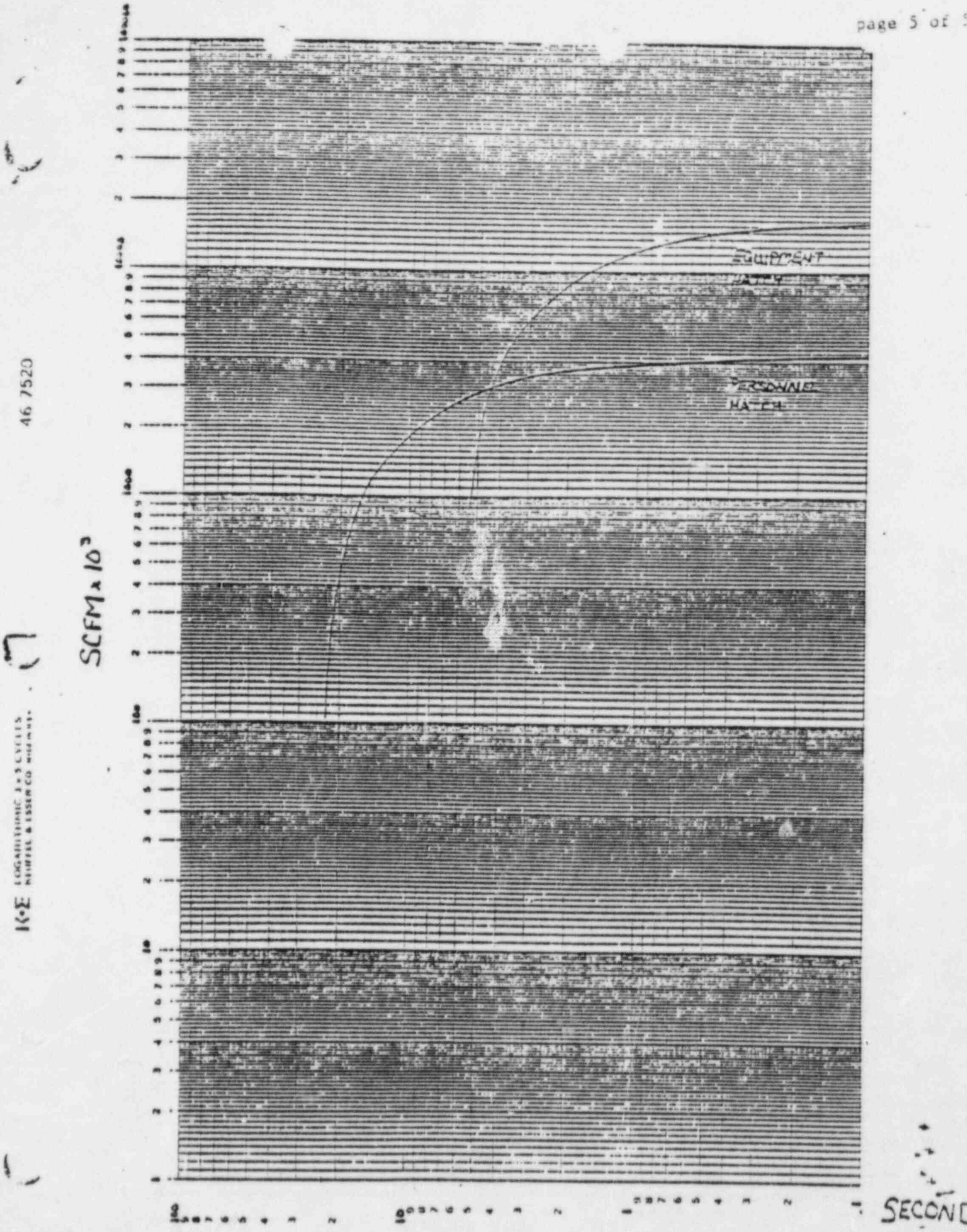


46 6210

K-E SEMI-LOGARITHMIC 5 CYCLES X 70 DIVISIONS
KEUFFEL & ESSER CO


SCFM
SECONDS
x 10³


SCFM x 10
SECOND x 10


EQUIPMENT HATCH
PERSONNEL HATCH
SCFM x 10^3
SECONDS
K+E LOGARITHMIC 3 X 5 CYCLES
KEUFFEL & ESSER CO.
46 7520

Form 34731 (10-81)
(Formerly SPD-1002-1)

DUKE POWER COMPANY
PROCEDURE PREPARATION
PROCESS RECORD

(1) ID No: HP/0/B/1009/13
Change(s) 0 to
1 Incorporated

(2) STATION: Catawba

(3) PROCEDURE TITLE: OFFSITE DOSE PROJECTION-UNCONTROLLED RELEASE OF RADIOACTIVE MATERIAL THROUGH THE UNIT VENT

(4) PREPARED BY: R. V. Linard DATE: 3-14-84

(5) REVIEWED BY: Kathy N McManus DATE: 3-19-84

Cross-Disciplinary Review By: _____ N/R: N/A

(6) TEMPORARY APPROVAL (IF NECESSARY):

By: _____ (SRO) Date: _____

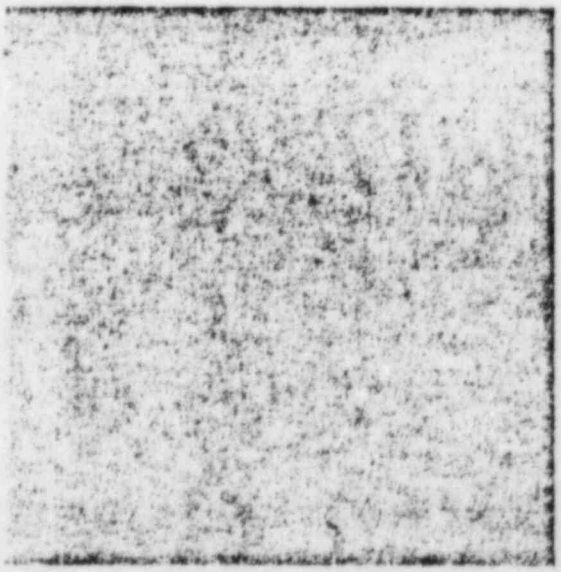
By: _____ Date: _____

(7) APPROVED BY: J. W. Hy Date: 3/19/84

(8) MISCELLANEOUS:

Reviewed/Approved By: _____ Date: _____

Reviewed/Approved By: _____ Date: _____



DUKE POWER COMPANY
CATAWBA NUCLEAR STATION
OFFSITE DOSE PROJECTION - UNCONTROLLED RELEASE
OF RADIOACTIVE MATERIAL THROUGH THE UNIT VENT

1.0 PURPOSE

This procedure describes the method for projecting the potential offsite dose following an uncontrolled release of radioactive materials through the unit vent.

2.0 REFERENCES

2.1 Letter from Civil/Environmental Division CN-1108.1, 1434.00, 1227.00 Atmospheric Dispersion Factor for Emergency Planning

2.2 EPA-520/1-75-001, Manual of Protective Action Guides and Protective Actions for Nuclear Incidents

2.3 Regulatory Guide 1.109, Calculation of Annual Doses to Man From Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10CFR50, Appendix I

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

3.0 LIMITS AND PRECAUTIONS

3.1 Use actual sample data when possible. Radiation monitor readings are susceptible to several sources of error. When radiation monitor readings are used for downwind concentrations, note this in the report of offsite dose assessment.

3.2 Environmental data should be collected and analyzed to verify these calculations. This procedure considers all releases to be ground level releases.

3.3 This procedure applies to releases made from Catawba Nuclear Station only. Many of the values contained in this procedure are site specific.

4.0 PROCEDURE

4.1 Obtain the following information from the Control Room and record it on Enclosure 5.1 (Vent Release Data Sheet).

4.1.1 Time of reactor trip.

4.1.2 Tower wind speed in MPH.
(Lower tower wind speed preferred.)

4.1.3 Direction from which the wind is blowing in degrees from North. (Upper tower wind direction preferred.)

4.1.4 Temperature gradient (ΔT) in degrees C.

4.1.5 Vent discharge flow rate in CFM.

4.1.6 Available weather forecast information.

4.2 Determine the release concentration as follows:

4.2.1 If vent sample analysis is not available, go to Step 4.2.4.

4.2.2 Obtain the following vent sample analysis results and record on Enclosure 5.1.

4.2.2.1 Date/time of sample.

4.2.2.2 Gross noble gas concentration in μCi/ml.

4.2.2.3 Iodine equivalent concentration (or data for calculation).

4.2.2.4 Gamma E-bar value in mev/dis (or data for calculation).

4.2.3 Go to Step 4.3

4.2.4 Obtain the following unit vent data and record on sample Enclosure 5.1:

4.2.4.1 Date/Time of collection.

4.2.4.2 EMF36 Low and High range readings in cpm (gas monitor).

4.2.4.3 ΔEMF37 reading in cpm (iodine monitor).

4.2.4.4 Δt in minutes for ΔEMF37 reading.

4.2.4.5 Calculate release concentrations as shown on Enclosure 5.1.

4.3 Project the impact of the release on the downwind population by using the manual calculations outlined below.

4.3.1 Determine the X/Q values for each point of interest downwind as follows.

NOTE: If no points have been requested, use the .5, 2, 5 and 10 mile values.

4.3.1.1 From Enclosure 5.2 (Table of Two-Hour Relative Concentration Factors), locate the relative two hour concentration value (CH) for each point and record on sample Enclosure 5.3 (Manual Calculation Worksheet), (Reference 2.3).

4.3.1.2 Convert these values to X/Q by,

$$X/Q = \frac{CH(MPH\text{-}Sec/m^3)}{\text{Wind Speed (MPH)}}$$

4.3.1.3 Record results on Enclosure 5.3 (Manual Calculation Worksheet).

4.3.2 Calculate the gas and iodine downwind concentrations for each point using the equation,

$$Conc_{DW} = Conc_V \cdot F_V \cdot X/Q \cdot U_{DWC}$$

where,

$Conc_{DW}$ = downwind concentration (µCi/ml)

$Conc_V$ = vent discharge concentration (µCi/ml)

F_V = vent discharge flow rate (CFM)

X/Q = dispersion factor in sec/m^3

U_{DWC} = unit conversions derived from,

$$(2.832E\text{-}2 m^3/ft^3)\ (0.017\ min/sec) = 4.8E\text{-}4\ \frac{m^3 \cdot min}{ft^3 \cdot sec}$$

Sample Enclosure 5.3 provides work space for this calculation.

4.3.3 Determine the potential whole body gamma dose downwind using the gas concentrations calculated in 4.3.2 and the equation,

$$D_{WB} = U_G \cdot \bar{E} \cdot Conc_{DW} \cdot Time$$

where,

D_{WB} = whole body gamma dose due to submersion in a cloud of radioactive gas (rem)

U_G = unit conversion derived from,

3.7E4 (dis/sec-uCi)(1cc/1.2E-3g)

(1.602E-6 erg/MeV) (g - rem/100 ergs)

$$\cdot\ 1/2 = 2.5E\text{-}1\ \frac{\text{dis-rem-cm}^3}{\mu\text{Ci-sec-MeV}}$$

$$(2.5E\text{-}1\ \frac{\text{dis-rem-cm}^3}{\mu\text{Ci-sec-Mev}})(3600\ \frac{\text{sec}}{\text{hr}})$$

$$= 9.00\ E2\ \frac{\text{dis-rem-cm}^3}{\mu\text{Ci-hr-Mev}}$$

NOTE: 1/2 is the constant used (in the case of gamma radiation) when assuming that the receptor is exposed to only one-half the cloud owing to the presence of the ground, (Reference 2.4).

$Conc_{DW}$ = downwind concentration (µCi/ml)

Time = projected duration of exposure (hrs); use 2 hours unless otherwise directed.

$\bar{E}$ = average gamma energy per disintegration (Mev/dis)

NOTE: If $\bar{E}$ cannot be obtained from the sample results, the following values may be used:

Hours from Trip	$\bar{E}$ (Mev/dis)
0-12	0.40
12-48	0.20
48-∞	0.10

4.3.3.1 Record results on Enclosure 5.3.

4.3.4 Determine the potential child thyroid dose downwind using the iodine concentrations calculated in 4.3.2 and the equation,

$$D_{THY} = U_I \cdot Conc_{DW} \cdot Time$$

where,

D_{THY} = thyroid dose due to uptake of radioactive iodine (rem)

U_I = constants derived from a child's breathing rate (1.17E2 cc/sec.), I-131 dose conversion factor (4.39 E-3 mrem/pCi), and coversion of pCi to uCi (10^6), mrem to rem (10^{-3}), and hrs. to sec (3600 secs/hr) = 1.88E6 $\frac{cc \cdot Rem}{uci \cdot hr}$

$Conc_D$ = downwind concentration of iodine (uCi/ml)

Time = projected exposure time (hrs); use 2 hours unless otherwise directed.

4.3.4.1 Record results on sample Enclosure 5.3.

4.3.4.2 Project the adult thyroid dose by dividing the child dose by two (2).

4.3.4.3 Record results of all calculations on Enclosure 5.5 (Dose Assessment Report).

4.4 Determine the potentially affected area using the method outlined in Enclosure 5.4.

4.4.1 Record sectors on Enclosure 5.5.

4.5 Complete sample Enclosure 5.5 and submit it to the Station Health Physicist. Include any comments and information pertinent to the evaluation of offsite hazards.

4.6 Maintain a file of all worksheets and printouts used in dose calculations.

5.0 ENCLOSURES

5.1 Sample of Vent Release Data Sheet

5.2 Sample of Table of Two Hour Relative Concentration Factors

5.3 Sample of Manual Calculation Worksheet

5.4 Sample of Evaluation of Plume Location

5.5 Sample of Dose Assessment Report

ENCLOSURE 5.1
HP/0/B/1009/13
VENT RELEASE DATA SHEET

Unit _____ Date/time of Rx trip _____/_____

METEOROLOGICAL DATA

1) Lower Tower Wind Speed _____ MPH

2) Upper Tower Wind Direction From _____ °

3) Temp. Gradient (ΔT) _____ °C

4) Vent Flow _____ CFM

5) Date/time _____/_____

VENT SAMPLE ANALYSIS

1) Total Gas _____ μCi/ml

2) I-131 Equiv. _____ μCi/ml

3) Gas $\bar{E}$ _____ Mev/dis (Gamma)

VENT MONITOR DATA

1) EMF-36L (lo range) _____ CPM

2) EMF-36H (hi range) _____ CPM

3) ΔEMF-37 (iodine) _____ CPM; Δt _____ min

CALCULATED DISCHARGE CONCENTRATION

1) Gas (Use hi readings if EMF-36H is > 100 CPM)

$$Conc_{V\text{-}low} = \frac{(EMF\ 36L\ CPM)}{2.70E7\ \frac{CPM\text{-}ml}{\mu Ci}} = \_\_\_\_\ \mu Ci/ml, \text{ or } Conc_{V\text{-}hi} = \frac{(EMF\text{-}36H\ CPM)}{4.0E3\ \frac{CPM\text{-}ml}{\mu Ci}} =$$

_____ μCi/ml

2) Iodine

$$Conc_{V\text{-}I} = \frac{(\Delta EMF\text{-}37\ CPM)\ \ (2.4E\text{-}10\ \mu Ci\ -\ min)}{\Delta t \qquad\qquad ml\ -\ cpm} = \_\_\_\_\_\ \mu Ci/ml$$

ENCLOSURE 5.2
HP/O/B/1009/13
TWO-HOUR RELATIVE CONCENTRATION FACTORS (CH)

	Temperature Difference (°C)	Stability Class	Distance (Miles)										
			.5	1	2	3	4	5	6	7	8	9	10
1)	< - .6	A	1.4E-5	1.2E-6	5.9E-7	4.1E-7	3.2E-7	2.5E-7	2.0E-7	1.9E-7	1.8E-7	1.6E-7	1.5E-7
2)	-.6 to-.5	B-C	1.5E-4	4.5E-5	1.3E-5	6.3E-6	3.9E-6	2.7E-6	1.9E-6	1.4E-6	1.1E-6	8.3E-7	7.8E-7
3)	-0.4 to-0.2	D	3.8E-4	1.4E-4	4.9E-5	2.7E-5	1.7E-5	1.2E-5	9.2E-6	7.3E-6	6.0E-6	5.0E-6	4.3E-6
4)	-0.1 to+.4	E	6.9E-4	2.5E-4	9.6E-5	5.5E-5	3.5E-5	2.5E-5	2.0E-5	1.6E-5	1.3E-5	1.1E-5	9.7E-6
5)	+.5 to +1.2	F	1.1E-3	5.1E-4	2.0E-4	1.2E-4	8.2E-5	6.3E-5	5.1E-5	4.3E-5	3.8E-5	3.3E-5	3.0E-5
6)	> 1.2	G	1.8E-3	1.1E-3	4.3E-4	2.7E-4	2.0E-4	1.7E-4	1.3E-4	1.2E-4	8.6E-5	7.8E-5	7.3E-5

From other sources of meteorological data (Section 4.1) use the wind speed and time of day to determine which row of CH values to use:

Time of Day	Wind Speed	Row #
10:00 A.M. - 4:00 P.M.	N/A	3
4:00 P.M. - 10:00 A.M.	> 15 MPH	4
4:00 P.M. - 10:00 A.M.	≤ 15 MPH	6

ENCLOSURE 5.3
HP/O/B/1009/13
MANUAL CALCULATION WORKSHEET

1) Discharge Concentration ($Conc_V$):

Gas = _____ µCi/ml

Iodine = _____ µCi/ml

2) Vent Discharge Flow Rate:

F_V = _____ CFM

3) Wind Speed:

_____ MPH

4) Two Hour Relative Conc. Factors

(CH = sec mph/m^3 X/Q = CH/mph = sec/m^3)

@ ____ Mi CH = _____; X/Q = _____ Sec/m^3

@ ____ Mi CH = _____; X/Q = _____ Sec/m^3

@ ____ Mi CH = _____; X/Q = _____ Sec/m^3

@ ____ Mi CH = _____; X/Q = _____ Sec/m^3

5) Downwind Concentrations:

$Conc_{DW} = Conc_V \cdot F_V \cdot X/Q \cdot (4.8E\text{-}4 \frac{m^3 \cdot min}{ft^3 \cdot sec})$

	A) Gas	B) Iodine
@ ____ Mi	$Conc_{DW}$ = _____ µCi/ml	$Conc_{DW}$ = _____ µCi/ml
@ ____ Mi	$Conc_{DW}$ = _____ µCi/ml	$Conc_{DW}$ = _____ µCi/ml
@ ____ Mi	$Conc_{DW}$ = _____ µCi/ml	$Conc_{DW}$ = _____ µCi/ml
@ ____ Mi	$Conc_{DW}$ = _____ µCi/ml	$Conc_{DW}$ = _____ µCi/ml

Time = _____ hours

6) Potential Whole Body Gamma Dose;

$D_{WB} = (9.00E2) \cdot Conc_{DW} \cdot \bar{E} \cdot Time$

$\bar{E}$ = _____ Mev/dis

7) Potential Child Thyroid Dose;

$D_{THY} = (1.86E6) \cdot Conc_{DW} \cdot Time$

	D_{WB}	D_{THY}
@ _____ Mi	= _____ Rem	= _____ Rem
@ _____ Mi	= _____ Rem	= _____ Rem
@ _____ Mi	= _____ Rem	= _____ Rem
@ _____ Mi	= _____ Rem	= _____ Rem

ENCLOSURE 5.4
HP/O/B/1009/13
EVALUATION OF PLUME LOCATION

1. Acquire the following information from Enclosure 5.1 and record on Enclosure 5.5.

   a) wind direction in degrees from north

   b) wind speed (mph)

   c) ΔT (°C)

   d) Stability Class

   e) thyroid and whole body doses

2. Protective action guides submitted to the Station Health Physicist are to be made based on the calculated dose on Enclosure 5.1 and the following information.

   a) For doses:

      > 5 Rem Whole Body or,

      > 25 Rem Thyroid

      Recommend Evacuation of Population in Affected Area.

   B) For doses:

      1-5 Rem Whole Body or,

      5-25 Rem Thyroid

      Recommend evacuation of children and pregnant women, and sheltering of remainder of personnel in the affected area.

   C) For doses:

      < 1 Rem Whole Body or,

      < 5 Rem Thyroid

      Recommend no action.

3. Determine the affected zones, based on wind direction and wind speed, with the following tables.

Table 3.1 0-2 Mile Affected Zones

Wind Direction	Affected Zone
0° - 360°	AO

ENCLOSURE 5.4
HP/O/B/1009/13
EVALUATION OF PLUME LOCATION

Table 3.2 2-5 Mile Affected Zones

Wind Speed < 5 mph		Wind Speed > 5 mph	
Wind Direction	Affected Zones	Wind Direction	Affected Zones
0° - 360°	A1,B1,C1,D1,E1,F1	0.1° - 22°	C1, D1
		22.1° - 73°	C1, D1, E1
		73.1° - 108°	C1, D1, E1, F1
		108.1° - 120°	D1, E1, F1
		120.1° - 159°	E1, F1
		159.1° - 207°	E1, F1, A1
		207.1° - 247°	F1, A1, B1
		247.1° - 265°	A1, B1
		265.1° - 298°	A1, B1, C1
		298.1° - 338°	B1, C1
		338.1° - 360°	B1, C1, D1

Table 3.3 5-10 Mile Affected Zones

Wind Direction	Affected Zones
0.1° - 27°	C2, D2
27.1° - 69°	C2, D2, E2
69.1° - 95°	D2, E2, F2
95.1° - 132°	D2, E2, F2, F3
132.1° - 144°	E2, F2, F3
144.1° - 160°	E2, F2, F3, A2
160.1° - 201°	F2, F3, A2
201.1° - 229°	F2, F3, A2, B2
229.1° - 249°	F3, A2, B2
249.1° - 259°	A2, A3, B2
259.1° - 290°	A2, A3, B2, C2
290.1° - 304°	A3, B2, C2
304.1° - 333°	B2, C2
333.1° - 360°	B2, C2, D2

4. Record sectors requiring protective action on Sample Enclosure 5.5 along with the recommended protective action.

ENCLOSURE 5.5
DOSE ASSESSMENT REPORT
HP/O/B/1009/13

Duke Power Company Crisis Management Plan Off-Site Dose Report - Catawba

Prepared By _____ Date/Time ____/____ Emergency Drill (Circle One)

Meteorology

Wind Speed	_____	MPH
Wind Direction	_____	Degrees from North
Vertical Temp. Diff.	_____	Degrees C/100ft.
Stability Class (Circle One)		A B C D E F E

Source Term	Time	Noble Gas	1-31 ea.
Containment Rad. Monitor	_____	_____ R/hr.	_____ R/hr
Containment Sample	_____	_____ uCi/ml	_____ uCi/ml
Unit Vent (Sample or EMF)	_____	_____ uCi/ml	_____ uCi/ml
Curie Release Rate	_____	_____ Ci/sec	_____ Ci/sec

Corresponds to:

_____ LOCA		_____ LOCA through filter	
_____ Core Damage		_____ Core Damage through filter	
_____ Tube rupture		_____ Gas Decay Tank	
_____ New Fuel		_____ Old fuel	_____ Other

Dose Projections

		.5 mi	2 mi	5 mi	10 mi
2 hr Dose (rem) based on Containment release @ _____ ml/hr	Whole Body	_____	_____	_____	_____
	Child thyroid	_____	_____	_____	_____
2 hr Dose (rem) based on Unit Vent release @ _____ cfm	Whole Body	_____	_____	_____	_____
	Child thyroid	_____	_____	_____	_____
2 hr Dose (rem) based on Steam release @ _____	Whole Body	_____	_____	_____	_____
	Child thyroid	_____	_____	_____	_____
2 hr Dose (rem) based on _____ release @ _____	Whole Body	_____	_____	_____	_____
	Child thyroid	_____	_____	_____	_____

Field Monitoring Data

Location	Distance (mi)	Direction	Dose Rate (mrem/hr) Whole Body	Child Thyroid	Contamination (dpm/100 cm2)
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

Affected Zones	0-2 mi	2-5 mi	5-10 mi	9-10 mi
(Circle Zones)	A0	A1 B1 C1 D1 E1 F1	A2 B2 C2 D2 E2 F2	A3 F3

Comments: _____

XC: Data Analysis Coordinator, Station Health Physicist

Form 34721 (10-81)
(Formerly SPO-1002-1)

DUKE POWER COMPANY
PROCEDURE PREPARATION
PROCESS RECORD

(1) ID No: HP/0/B/1009/12
Change(s) 0 to
0 Incorporated

(2) STATION: Catawba

(3) PROCEDURE TITLE: Quantifying Gaseous Release Through Steam-Relief Valves Under Post-Accident Conditions

(4) PREPARED BY: Phillip R. McGowan DATE: 12/12/83

(5) REVIEWED BY: R. D. Kinard DATE: 12-12-83

Cross-Disciplinary Review By: _____ N/R: R. Kinard

(6) TEMPORARY APPROVAL (IF NECESSARY):

By: _____ (SRO) Date: _____

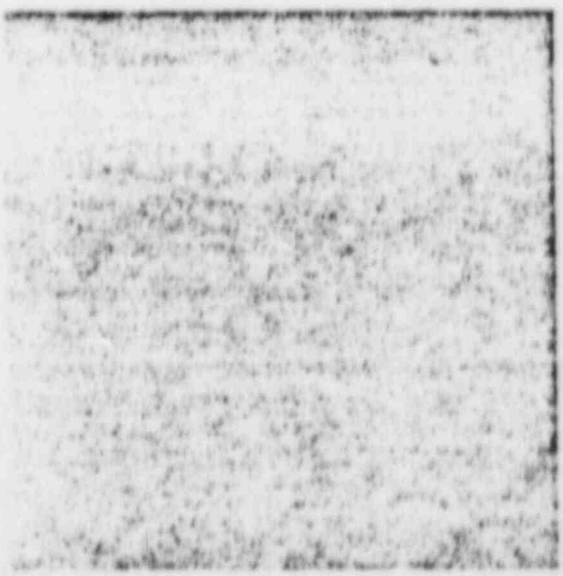
By: _____ Date: _____

(7) APPROVED BY: J. W. Hy Date: 12/15/83

(8) MISCELLANEOUS:

Reviewed/Approved By: _____ Date: _____

Reviewed/Approved By: _____ Date: _____



DUKE POWER COMPANY
CATAWBA NUCLEAR STATION
QUANTIFYING GASEOUS RELEASE THROUGH STEAM-
RELIEF VALVES UNDER POST-ACCIDENT CONDITIONS

1.0 PURPOSE

To describe a method for calculating total noble gas and radioiodine activities released through steam-relief valves under post-accident conditions.

2.0 REFERENCES

2.1 Catawba Nuclear Station FSAR Vol. II, Table 11.1.1-2

2.2 Catawba Nuclear Station Computer System Documentation, Rev. 9/1/83, Sec. 3.2.19.0, Main Steam Release Monitoring

2.3 Letter from Design Engineering Providing Correlation Curves (to be added later):

2.3.1 Figure 1 - Main Steam Line Radiation Monitor Correlation Curve. Correlation Factor, S' vs. Time after Reactor Shutdown.

2.3.2 Figure 2 - Main Steam Line Radiation Monitor Correlation Curve Magnified First Hour Response S' vs. Time.

2.3.3 Figure 3 - N-16 Effect on the Main Steam Line Radiation Monitor.

2.4 ASME Steam Tables

3.0 LIMITS AND PRECAUTIONS

3.1 The value used for specific gravity (.4 $ft^3/lb.$) in Step 4.2.1 is an average based on Tsat of 560°F and Psat of 1100 psia, (Ref. 2.4).

3.2 The Main Steam Release Accumulator Program (MSR) calculates pounds mass (lbm) losses from each steam generator loop. The following table indicates relationship between steam line monitors and steam generator (S/G) loop losses as calculated by MSR, (Ref. 2.2):

1EMF	/ 2EMF	S/G (LOOP)
26	10	S/G A = (PORV (A) + Dump (A) + Safe (A))
27	11	S/G B = (PORV (B) + Dump (B) + Safe (B) + AFWPT (B))
28	12	S/G C = (PORV (C) + Dump (C) + Safe (C) + AFWPT (C))
29	13	S/G D = (PORV (D) + Dump (D) + Safe (D))

3.2.1 The S/G Loop calculations above result in overestimations of losses occurring through loops B and C (accounts for all

AFWPT losses), and underestimates losses occurring through loops A and D (no AFWPT loss accounting).

3.2.2 MSR Program does not account for valve position modulation and overestimates steam loss approximations. Calculations are based on the assumption that valves are fully open when read to be in any condition other than "Closed".

4.0 PROCEDURE

4.1 Obtain and record the information listed below on Main Steam Gaseous Activity Release Record, (enclosure 5.1) following a steam release event, when directed:

4.1.1 Unit number.

4.1.2 Date of the steam release.

4.1.3 Time the steam release started.

4.1.4 Time the steam release ended.

4.1.5 Steam-line EMF readings (R/hr).

4.1.5.1 Use the highest steam-line EMF reading that most closely corresponds with steam release event time interval.

4.1.6 Date and time the EMF readings were recorded.

4.1.7 S' value for each steam-line EMF, (Ref. 2.3).

4.1.7.1 Use Figure 3, N-16 effect on the Main Steam Line Radiation Monitor, of Enclosure 5.2, if steam release event occurs within 90 seconds of reactor trip.

4.1.7.1.1 Subtract N-16 dose rate from monitor reading and apply results to Figure 2.

4.1.7.2 Use Figure 2, Main Steam Line Radiation Monitor Correlation Curve Magnified first hour response S' vs. time, if steam release event occurs within 60 minutes of reactor trip.

4.1.7.2.1 Locate "hours after Rx trip" on X-axis and move up graph to corresponding S' value on Y-axis.

4.1.7.3 Use Figure 1, Main Steam Line Radiation Monitor Correlation Curve, if steam release event occurs greater than one hour after reactor trip.

4.1.7.3.1 Locate "hours after Rx trip" on X-axis and move up graph to corresponding S' value on Y-axis.

4.1.8 Total quantity of steam released in pounds mass (lbm) from each steam generator loop.

4.1.9 Reactor trip date and time.

4.2 Calculate total gas activity released from each S/G loop as follows:

4.2.1 $A_{NG(n)} = S' \times EMF\ (R/hr) \times lbm_{S/G(n)} \times 1.13268\ E\text{-}2\ \frac{(Ci)(cc)}{(lb)(uCi)}$

Where: $A_{NG(n)}$ = total noble gas activity release from S/G Loop A, B, C, or D in Curies

$S' = \frac{uCi/cc}{R/hr}$ Xe - equivalent correlation factor from curve (Sample Enclosure 5.2)

EMF = Main Steam - Line Monitor reading in R/hr

$lbm_{S/G(n)X}$ = total quantity of steam released in pounds mass (lbm) for S/G Loop A, B, C, or D. Includes main steam atmospheric dump and AFWTP losses associated with S/G loop.

$1.13268\ E\text{-}2\ \frac{(Ci)(cc)}{(lb)(uCi)}$ = (.4 ft^3/lb x 28317 cc/ft^3 x 1E-6 Ci/uCi) constant converting pounds mass to ft^3; cubic feet to cc; and uCi to Curies; such that unit analysis for expression balances to Curies.

4.2.2 Record noble gas activity released per S/G on Enclosure 5.1

4.3 Sum noble gas activities released form contributing S/Gs as follows:

4.3.1 $\Sigma A_{NG} = A_{NG(A)} + A_{NG(B)} + A_{NG(C)} + A_{NG(D)}$

4.3.2 Record sum total of noble gas activities released on Enclosure 5.1.

4.4 Calculate the radioiodine activity released from each S/G loop as follows:

4.4.1 $A_{I(n)} = A_{NG(n)} \times 0.03$

Where: $A_{I(n)}$ = total iodine activity released from S/G Loop A, B, C, or D.

0.03 = the fraction of the total noble gas plus iodine activity in the reactor coolant system that is equal to the radioiodine activity, (Ref. 2.1).

4.4.2 Record the radioiodine activity release per S/G's on Enclosure 5.1.

4.5 Sum radioiodine activities released from contributing S/Gs as follows:

4.5.1 $\Sigma A = A + A + A + A$
$I \quad I(A) \quad I(B) \quad I(C) \quad I(D)$

4.5.2 Record sum total of radioiodine activities released on Enclosure 5.1.

4.6 Sign the appropriate line marked "Prepared By" on Enclosure 5.1.

4.7 Record the date and time the calculations were performed on appropriate line of Sample Enclosure 5.1.

4.8 Route results (Enclosure 5.1) to Data Analysis Coordinator.

5.0 ENCLSOURES

5.1 Sample of Main Steam Gaseous Activity Release Record

5.2 Figure 1: Xe-equivalent Conc/R/hr Correlation Curve (Ref 2.3) Page 1 of 3 To Be Added Later

Figure 2: Figure 1 plus N-16 Contributions (Ref 2.3), Page 2 of 3 to be added later

Figure 3: N-16 Dose Rate to Monitor Only (Ref. 2.3) page 3 of 3, to be added latter.

DUKE POWER COMPANY
CATAWBA NUCLEAR STATION
HP/0/B/1009/12
ENCLOSURE 5.1

MAIN STEAM GASEOUS ACTIVITY RELEASE RECORD

Date/Time ____/____

Reactor Trip Date/Time ____/____

Prepared By _____

	Unit No.	Steam Release Time Interval			Steam Line Monitors		Time After Trip (hrs)	S' mci/cc R/hr	Main Steam Release lbm	(Ā NG(n)) Noble Gas Activity Released Per S/G Curies	(Ā I(n)) Iodine Activity Released Per S/G Curies
		Date	Start Time	Stop time	R/hr	Date/ Time					
S/G (A)											
S/G (B)											
S/G (C)											
S/G (D)											
										Ā NG =	Ā I =

Date/Time ____/____

Reactor Trip Date/Time ____/____

Prepared By _____

	Unit No.	Steam Release Time Interval			Steam Line Monitors		Time After Trip (hrs)	S' mci/cc R/hr	Main Steam Release lbm	(Ā NG(n)) Noble Gas Activity Released Per S/G Curies	(Ā I(n)) Iodine Activity Released Per S/G Curies
		Date	Start Time	Stop time	R/hr	Date/ Time					
S/G (A)											
S/G (B)											
S/G (C)											
S/G (D)											
										Ā NG =	Ā I =

DUKE POWER COMPANY
CATAWBA NUCLEAR STATION
HP/0/B/1009/12
ENCLOSURE 5.2

Main Steam Line Radiation Monitor Correlation Curves. Correlation Factor, S' vs. Time After Reactor Shutdown

TO BE ADDED LATER

DUKE POWER COMPANY
CATAWBA NUCLEAR STATION
HP/0/B/1009/12
ENCLOSURE 5.2

Main Steam Line Radiation Monitor Correlation Curve Magnified First Hour Response S' vs Time

TO BE ADDED LATER

DUKE POWER COMPANY
CATAWBA NUCLEAR STATION
HP/O/B/1009/12
ENCLOSURE 5.2

N-16 Effect on the Main Steam Line Radiation Monitor

TO BE ADDED LATER

Form 34731 (10-81)
(Formerly SPD-1002-1)

DUKE POWER COMPANY
PROCEDURE PREPARATION
PROCESS RECORD

(1) ID No: HP/0/B/1009/09
Change(s) 0 to
2 Incorporated

(2) STATION: Catawba

(3) PROCEDURE TITLE: GUIDELINES FOR ACCIDENT AND EMERGENCY RESPONSE

(4) PREPARED BY: R. D. Kinard DATE: 2-16-84

(5) REVIEWED BY: Billy W McNamara DATE: 3-19-84

Cross-Disciplinary Review By: _____ N/R: N/A

(6) TEMPORARY APPROVAL (IF NECESSARY):

By: _____ (SRO) Date: _____

By: _____ Date: _____

(7) APPROVED BY: J. W. Hy Date: 3/19/84

(8) MISCELLANEOUS:

Reviewed/Approved By: _____ Date: _____

Reviewed/Approved By: _____ Date: _____

DUKE POWER COMPANY
CATAWBA NUCLEAR STATION
GUIDELINES FOR ACCIDENT
AND EMERGENCY RESPONSE

1.0 PURPOSE

1.1 To provide guidance for notification/activation of the Health Physics Organization in the event of an emergency situation.

1.2 To assure proper assignment of responsibility.

1.3 To give general guidance for initial response of the Health Physics organization.

1.4 To give general guidance for continuing response of the Health Physics organization.

2.0 REFERENCES

2.1 HP/0/B/1009/04, Environmental Monitoring for Emergency Conditions Within the Ten Mile Radius of Catawba Nuclear Station

2.2 HP/0/B/1009/05, Personnel Monitoring for Emergency Conditions.

2.3 HP/0/B/1009/06, Alternative Method for Determining Dose Rate Within the Reactor Building.

2.4 HP/0/B/1009/07, In-plant Particulate and Iodine Monitoring Under Accident Conditions.

2.5 HP/0/B/1009/08, Contamination Control During Transportation of Contaminated Injured Individuals.

2.6 HP/0/B/1009/10, Body Burden Analysis Following Suspected Uptakes of Mixed Fission or Activation Products.

2.7 HP/0/1009/12, Quantifying Gaseous Releases Through Steam Relief Valves Under Post-Accident Conditions.

2.8 HP/0/B/1009/13, Off-Site Dose Projection - Uncontrolled Release of Radioactive Material Through the Unit Vent.

2.9 HP/0/B/1009/14, Off-Site Dose Projection - Uncontrolled Release of Liquid Radioactive Material.

2.10 HP/0/B/1009/15, Off-Site Dose Projection - Uncontrolled Release of Gaseous Radioactive Material Other Than Through the Unit Vent.

2.11 HP/0/B/1009/16, Distribution of Potassium Iodide Tablets in the Event of a Radioiodine Release.

2.12 HP/0/B/1009/17, Nuclear Post Accident Containment Air System Operation.

2.13 HP/0/B/1009/19, Emergency Radio System Operations, Maintenance, and Communications.

2.14 Catawba Nuclear Station Emergency Plan.

2.15 System Health Physics Manual

2.16 Catawba Nuclear Station, Station Directive 3.8.4, Onsite Emergency Organization

3.0 LIMITS AND PRECAUTIONS

3.1 This procedure shall only be initiated at the direction of Health Physics Supervision.

3.2 This procedure may be initiated in part or whole, depending on the type and severity of emergency.

3.3 This procedure provides general guidance for initial response. Any particular situation may require actions not addressed in this procedure.

3.4 For incidents occurring during backshifts, Health Physics shift personnel shall be responsible for on-site response only until directed otherwise by the Station Health Physicist.

4.0 PROCEDURE

4.1 Upon notification of an emergency condition, the Station Health Physicist shall activate the Health Physics organization by notifying one or all of the following:

4.1.1 Surveillance and Control Coordinator.

4.1.2 Support Functions Coordinator.

4.1.3 Staff Coordinator.

4.1.4 Shift Technician (To advise, if during back shift).

4.2 Individual coordinators will notify alternates and supervisors to be under their direction during the emergency, and will make arrangements through the supervisors for the notification of non-exempt personnel.

4.3 If the emergency is classified above the Notification of Unusual Event category, the Station Health Physicist shall proceed to the Technical Support Center (TSC), and coordinate the overall Health Physics response. Enclosures 5.2 and 5.3 provide general guidelines for response.

4.4 When notified to respond to an emergency, the Surveillance and Control Coordinator shall assume alternate responsibility for the Station Health Physicist, and shall activate the S&C Coordinator identified in Reference 2.16 who will act according to Enclosures 5.4 and 5.5.

4.5 When notified to respond to an emergency, the Support Functions Coordinator shall assume alternate responsibility for the Station Health Physicist and shall activate the Support Functions Coordinator identified in Reference 2.16 who will act according to Enclosures 5.6 and 5.7.

4.6 When notified to respond to an emergency, the Staff Coordinator shall act according to Enclosures 5.8 and 5.9.

4.7 When notified to respond to an emergency, the Field Monitoring Coordinator shall act according to Enclosures 5.10 and 5.11.

4.8 When notified to respond to an emergency, the Operation Support Center (OSC) Supervisor shall act according to Enclosures 5.12 and 5.13.

5.0 ENCLOSURES

5.1 Guidelines For Planned Emergency Exposures

5.2 Station Health Physicist - Initial Response

5.3 Station Health Physicist - Continuing Response

5.4 Surveillance and Control Coordinator - Initial Response

5.5 Surveillance and Control Coordinator - Continuing Response

5.6 Support Functions Coordinator - Initial Response

5.7 Support Functions Coordinator - Continuing Response

5.8 Staff Data Analysis Coordinator - Initial Response

5.9 Staff Data Analysis Coordinator - Continuing Response

5.10 Field Monitoring Coordinator - Initial Response

5.11 Field Monitoring Coordinator - Continuing Response

5.12 OSC Supervisor - Initial Response

5.13 OSC Supervisor - Continuing Response

5.14 Reserve Personnel/Personnel Monitoring Leader Response

5.15 OSC Response Personnel Dose Record Form

5.16 Procurement of Helicopters for Aerial Environmental Surveillance

HP/0/B/1009/09
ENCLOSURE 5.1

GUIDELINES FOR PLANNED EMERGENCY EXPOSURES

1.0 Obtain the verbal or written approval of the Emergency Coordinator to exceed planned maximum limits.

2.0 If it is necessary to remedy a situation immediately hazardous to life and property, an individual (Duke Power personnel, or Outside Services) may receive exposure up to:

Whole Body	5 rems (25 rem)*
Skin of the Whole Body or Thyroid	30 rems (125 rem)*
Extremities	75 rems

* Doses up to this limit may be authorized by the Recovery Manager.

3.0 If it is necessary to save lives or prevent loss of lives and/or extensive damage to property, an individual may volunteer to receive exposure up to:

Whole Body	25 rems (75 rem)*
Skin of the Whole Body or Thyroid	150 rems
Extremities	375 rems

* Doses up to this limit may be authorized by the Recovery Manager, Station Manager or Emergency Coordinator.

4.0 If possible, the individual(s) should be selected by the following conditions:

4.1 Personnel should be volunteers or professional rescue personnel.

4.2 Personnel should be broadly familiar with the potential consequences of such exposure.

4.3 Women capable of reproduction should not take part in these actions.

4.4 All factors being equal, volunteers above the age of 45 should be selected.

5.0 Exposure shall be maintained ALARA.

6.0 Internal exposure should be minimized by the use of the best available respiratory protection, and the contamination should be controlled by the use of available protective clothing.

7.0 Exposures below the guidelines of Section 3.0 may require an occupational penalty.

8.0 Exposures above the guidelines of Section 3.0 should be authorized by the Recovery Manager, Station Manager or Emergency Coordinator and will require a medical decision as to whether the individual may continue in radiological work and should be limited to once in a lifetime.

HP/0/B/1009/09
ENCLOSURE 5.1

9.0 Planned emergency doses shall be recorded, estimated if necessary, and included in the individual's exposure history record.

10.0 Reports of planned emergency exposures shall be reported as per Catawba Nuclear Station Directive 2.8.1 (Reporting Requirements).

HP/0/B/1009/09
ENCLOSURE 5.2
STATION HEALTH PHYSICIST
INITIAL RESPONSE

5.2.1 Assemble supporting materials and take to TSC.

5.2.2 The Station Health Physicist shall as necessary:

5.2.2.1 Establish the exposure limit for blanket dose extension, for Exposure Class 1 to a maximum of 1000 mRem/qtr; for Exposure Class 3 to a maximum of 2500 mRem; for Exposure Class 2 personnel (pregnant females) they shall not be extended above their 500 mRem limit, and should be reassigned to work locations in the Administration Building until radiation levels are evaluated.

5.2.2.2 Govern planned emergency exposures by Enclosure 5.1 (Guidelines For Planned Emergency Exposures).

5.2.2.3 Coordinate the overall Health Physics response.

5.2.2.4 Recommend protective action on-site for assembled personnel and those with work duties.

5.2.2.5 Recommend off-site protective action to the Emergency Coordinator until the CMC (Crisis Management Center) is activated.

5.2.2.6 Initiate, as necessary, HP/0/B/1009/16, Distribution of Potassium Iodide Tablet in the Event of a Radioactive Release.

HP/0/B/1009/09
ENCLOSURE 5.3
STATION HEALTH PHYSICIST
CONTINUING RESPONSE

5.3.1 Interface with the CMC when it is activated.

5.3.2 Coordinate Health Physics shift rotation and augmentation of personnel and equipment.

5.3.3 Should evacuation be required; coordinate the identification of "Non-Essential" personnel with other TSC groups.

5.3.3.1 All females should be given first consideration due to limited use in a radiological exposure situation.

5.3.3.2 Sufficient personnel should be retained to support need for backup personnel.

5.3.4 Direct trending of available information to support Health Physics TSC response.

5.3.5 When CMC is in place, continue Protective Action assessment and recommendations as a confirming response.

HP/0/B/1009/09
ENCLOSURE 5.4
SURVEILLANCE AND CONTROL COORDINATOR
INITIAL RESPONSE

5.4.1 Assemble supporting materials and take to TSC.

5.4.2 Establish radiological access controls for the Station and Control Room.

5.4.2.1 Initiate, as necessary, HP/0/B/1009/07, In-Plant Particulate and Iodine Monitoring Under Accident Conditions.

5.4.2.2 Initiate, as necessary, HP/0/B/1009/08, Contamination Control During Transportation of Contaminated Injured Individuals.

5.4.2.3 Initiate discussions by need for Buddy System for radiological conditions.

5.4.3 If the emergency is classified above the Notification of Unusual Event category:

5.4.3.1 Send the following personnel as necessary to the Operations Support Center (OSC):

5.4.3.1.1 One Supervisor to coordinate Health Physics support and communicate with the TSC and shall act according to Enclosures 5.12 and 5.13.

5.4.3.1.2 One Technician to provide job coverage (sampling, operation maintenance, etc.).

5.4.3.1.3 Two Technicians to monitor and report plant radiological status.

5.4.3.1.4 Two Technicians to provide fire/medical emergency/rescue team/damage control coverage.

5.4.3.1.5 Direct sufficient personnel to the Administration Building, DRC office, as staging area.

5.4.3.2 Identify a Supervisor or Lead Technician to Reserve Personnel/Personnel Monitoring Leader and he/she shall act according to Enclosure 5.14.

5.4.3.3 Proceed to the TSC and coordinate Surveillance and Control response, with emphasis upon OSC activities.

5.4.3.4 Request TSC Security staff to provide locations of officers remaining on post. Evaluate exposure potential for these officers and recommend protective actions as necessary.

HP/0/B/1009/09
ENCLOSURE 5.5
SURVEILLANCE AND CONTROL COORDINATOR
CONTINUING RESPONSE

5.5.1 The S&C Coordinator shall, as necessary:

5.5.1.1 Initiate through RP/PM Leader HP/0/B/1009/05, Personnel Monitoring for Emergency Conditions, when a site assembly occurs due to radiological conditions.

5.5.1.2 Initiate, as necessary, HP/0/B/1009/17, Nuclear Post Accident Containment Air Systems Operation.

5.5.2 Provide direction and support to the OSC Health Physics Supervisor:

5.5.2.1 Coordinate in-plant and on-site monitoring in support of TSC needs.

5.5.2.2 Keep OSC Supervisor appraised of TSC events and activities that may require OSC response (planned maintenance, operation, sampling).

5.5.2.3 Coordinate with OSC and TSC groups to ensure adequate pre-planning occurs to limit radiation exposures.

5.5.2.4 Obtain additional emergency kit items and supplies to support OSC if needed.

5.5.3 Monitor dose rate in TSC. Initiate discussion with Station Health Physicist on the need to evaluate the TSC should dose rate exceed 5 mR/hr and be expected to continue.

HP/0/B/1009/09
ENCLOSURE 5.5
SURVEILLANCE AND CONTROL COORDINATOR
CONTINUING RESPONSE

5.5.1 The S&C Coordinator shall, as necessary:

5.5.1.1 Initiate through RP/PM Leader HP/0/B/1009/05, Personnel Monitoring for Emergency Conditions, when a site assembly occurs due to radiological conditions.

5.5.1.2 Initiate, as necessary, HP/0/B/1009/17, Nuclear Post Accident Containment Air Systems Operation.

5.5.2 Provide direction and support to the OSC Health Physics Supervisor:

5.5.2.1 Coordinate in-plant and on-site monitoring in support of TSC needs.

5.5.2.2 Keep OSC Supervisor appraised of TSC events and activities that may require OSC response (planned maintenance, operation, sampling).

5.5.2.3 Coordinate with OSC and TSC groups to ensure adequate pre-planning occurs to limit radiation exposures.

5.5.2.4 Obtain additional emergency kit items and supplies to support OSC if needed.

5.5.3 Monitor dose rate in TSC. Initiate discussion with Station Health Physicist on the need to evaluate the TSC should dose rate exceed 5 mR/hr and be expected to continue.

HP/0/B/1009/09
ENCLOSURE 5.6
SUPPORT FUNCTIONS COORDINATOR
INITIAL RESPONSE

5.6.1 Assemble supporting materials and take to TSC.

5.6.2 Evaluate the need to establish an alternate location for sample analysis.

5.6.3 Establish a count room sample priority list if emergency radiological sampling is in progress or is going to begin.

5.6.4 Initiate, as necessary, HP/0/B/1009/10, Body Burden Analysis Following Suspected Uptake of Mixed Fission or Activation Products.

5.6.5 If the emergency is classified above the Notification of Unusual Event category:

5.6.5.1 Establish alternate dosimetry issue points for personnel and high range dosimetry, as necessary.

5.6.5.2 Issue blanket dose extensions for OSC personnel, to the limit established by the Station Health Physicist.

5.6.5.3 Provide representatives from Dosimetry and Records Control in the OSC to:

5.6.5.3.1 Record the following information on the OSC Response Personnel Dose Record Form (Sample Enclosure 5.14) as emergency response personnel enter the OSC.

5.6.5.3.1.1 Name

5.6.5.3.1.2 Health Physics Badge Numbers

5.6.5.3.1.3 Social Security Number

5.6.5.3.1.4 Birthdate

5.6.5.3.1.5 Age

5.6.5.3.1.6 Exposure Class

5.6.5.3.1.7 Work Group

5.6.5.3.1.8 Quarterly and yearly dose to date

5.6.5.3.1.9 Permissible lifetime dose

5.6.5.3.1.10 Total lifetime dose to date

NOTE: This may be obtained at the first available opportunity.

HP/0/B/1009/09
ENCLOSURE 5.6
CONTINUED

5.6.5.3.2 As personnel return to OSC from entering a radiation field, dosimeters shall be checked for rezeroing and the following information recorded on the OSC Response Personnel Dose Record Form (Sample Enclosure 5.14):

5.6.5.3.2.1 Date, Time

5.6.5.3.2.2 Dosimeter Reading

5.6.5.3.2.3 Retotal of quarterly dose.

5.6.5.4 Proceed to the TSC and coordinate Support Function Response.

HP/0/B/1009/09
ENCLOSURE 5.7
SUPPORT FUNCTIONS COORDINATOR
CONTINUING RESPONSE

5.7.1 Ensure collection and retention of collected samples is adequate to reconstruct data following the emergency.

5.7.2 Acquire additional anti-contamination clothing, dosimetry, respiratory or monitoring equipment from:

- Existing Station Stock
- CMC Admin and Logistics Groups

5.7.3 Direct implementation of HP/0/B/1001/12, Technical Specification Gaseous Waste Sampling and Analysis as necessary to collect containment and unit vent samples.

- All sampling will be coordinated with OSC Health Physics personnel to determine habitability and RWP requirements.

5.7.4 Retrieve radiation instrumentation from Instrument Issue area and stage in DRC office.

HP/0/B/1009/09
ENCLOSURE 5.8
STAFF (DATA ANALYSIS) COORDINATOR
INITIAL RESPONSE

5.8.1 Assemble supporting materials and take to TSC.

5.8.1.1 Review any assessments made using RP/0/A/5000/11.

5.8.2 Initiate the following procedures as necessary.

5.8.2.1 HP/0/B/1009/13, Off-Site Dose Projection - Uncontrolled Release of Radioactive Material through the Unit Vent.

5.8.2.2 HP/0/B/1009/14, Off-Site Dose Projection - Uncontrolled Release of Liquid Radioactive Material.

5.8.2.3 HP/0/B/1009/15, Off-Site Dose Projection - Uncontrolled Release of Gaseous Radioactive Material other than through the Unit Vent.

5.8.3 Assume the duties of the Data Analysis Coordinator if the emergency is classified above the Notification of Unusual Event Category and:

5.8.3.1 Proceed to the TSC.

5.8.3.2 Initiate activation of the Field Monitoring Organization by notifying the Field Monitoring Coordinator to respond according to Enclosure 5.10 and 5.11.

5.8.3.3 Initiate the following procedures as necessary:

5.8.3.3.1 HP/0/B/1009/06, Alternate Methods for Determining Dose Rates Within the Reactor Building.

5.8.3.3.2 HP/0/B/1009/12, Quantifying Gaseous Release through Steam Relief Valves Under Post-Accident Conditions.

5.8.3.4 Provide special evaluation in areas such as shielding, off-site consquences of a containment loss or steam generator tube rupture, BBA, etc.

HP/O/B/1009/09
ENCLOSURE 5.9
STAFF (DATA ANALYSIS) COORDINATOR
CONTINUING RESPONSE

5.9.1 Evaluate the need to recalculate dose projections based upon:

5.9.1.1 Known changes in meterological status (wind speed, wind direction, ΔT, percipitation).

5.9.1.2 Known changes in EMF readings.

5.9.1.3 Projected change in meterological conditions.

5.9.2 Evaluate total effect of dose projections when making multiple releases (containment, vent releases, etc.).

5.9.3 Evaluate total effect of dose projections when releases are expected to continue for longer than two hours, or to otherwise be effected by extended evacuation times.

HP/0/B/1009/09
ENCLOSURE 5.10
FIELD MONITORING COORDINATOR
INITIAL RESPONSE

5.10.1 Assemble supporting materials and take to TSC.

5.10.1 Initial Response

5.10.2.1 Activate the field monitoring organization by:

5.10.2.1.1 Notifying the TSC Radio Operator to report to the TSC and initiate HP/0/B/1009/19, Emergency Radio Operations, Maintenance and Communications.

5.10.2.1.2 Selecting nine (9) Catawba Nuclear Station Field Monitoring Team (FMT) members to be organized as follows:

Team Call Sign	Number of Members	Transportation
Alpha	2	Land Vehicle
Bravo	2	Land Vehicle
Charlie	2	Land Vehicle
Delta	2	Land Vehicle
Echo	1	Helicopter

5.10.2.1.3 Instruct FMT's to complete checkout steps from HP/0/B/1009/04, Environmental Monitoring for Emergency Conditions Within the Ten Mile Radius of Catawba Nuclear Station.

5.10.2.2 Obtain plant radiological status and evaluate the potential or existence of an off-site release of radioactive material (liquid or gaseous).

5.10.2.3 Obtain meterological information and determine initial sample direction.

5.10.2.4 Determine the need for aerial environmental surveillance based on plant radiological status and meterological information.

5.10.2.4.1 If immediately needed, obtain helicopter support per Enclosure 5.15, Procurement of Helicopters for Aerial Environmental Surveillance.

5.10.2.4.2 If the possibility exist for future need, put helicopter support on standby per Enclosure 5.15.

5.10.2.5 Proceed to the TSC.

HP/0/B/1009/09
ENCLOSURE 5.11
FIELD MONITORING COORDINATOR
CONTINUING RESPONSE

5.11.1 Continuing Response

5.11.1.1 Dispatch FMT's based on plant radiological status and meterological information to sample locations listed in HP/0/B/1009/04.

5.11.1.1.1 Plume location strategy should be to send FMT's back and forth across sectors to locate the plume. Only after the plume is located should detailed field monitoring begin.

5.11.1.2 Direct and implement field monitoring strategies by:

5.11.1.2.1 Reviewing plant radiological status, field data and meterological information approximately every 15 minutes for changes which might affect field monitoring strategies.

5.11.1.2.2 Directing FMT's to monitor locations.

5.11.1.2.3 Instructing FMT's to take, as needed, special samples per HP/0/B/1009/04.

5.11.1.3 Advise the Data Analysis Coordinator to field monitoring results.

5.11.1.4 Maintain an up-to-date 10 mile radius map by:

5.11.1.4.1 Posting current FTM locations.

5.11.1.4.2 Posting latest instrument survey results for each monitoring location.

5.11.1.4.3 Illustrating approximate plume shape and location.

5.11.1.5 Maintain an organized file of all sample results/data generated from FMT activities.

5.11.1.6 Maintain FMT equipment and supplies including protective clothing, liquid nitrogen, etc.; and schedule shift coverage.

5.11.2 CMC Turnover

5.11.2.1 Once CMC is established, coordinate turnover of FMT's to CMC control.

5.11.2.2 Turnover of TSC FMT's to CMC Control shall occur at the intersection of SC 274 and SC 49. Should plume location interfere, alternate turnover location may be established.

HP/O/B/1009/09
ENCLOSURE 5.11
FIELD MONITORING COORDINATOR
CONTINUING RESPONSE

5.11.2.3 Once CMC has assumed control of FMT's, notify the Data Analysis Coordinator and dissolve TSC field monitoring organization.

HP/0/B/1009/09
ENCLOSURE 5.12
OPERATION SUPPORT CENTER
HEALTH PHYSICS SUPERVISOR - INITIAL RESPONSE

5.12.1 Assemble supporting materials and take to OSC.

5.12.2 Contact OSC Operation Supervisor and coordinate Health Physics support for OSC activities. Assist in implementation of RP/0/B/5000/12.

5.12.3 Provide immediate job coverage as necessary. Give due consideration to the fact that plant conditions may be unstable and radiological conditions unknown.

5.12.4 Provide immediate Health Physics coverage as necessary to support Fire Brigade, damage control, medical emergency and other emergency activities.

5.12.5 Direct technicians to obtain preliminary radiological information available in Control Room.

5.12.5.1 Emphasis should be placed upon determining the areas of the plant experiencing increasing radiation levels.

5.12.6 Based upon initial Control Room indications, direct technicians to monitor and report radiological status which will support OSC activities.

5.12.7 Establish control over all OSC personnel radiation exposure and limit to blanket dose extension levels.

5.12.7.1 All activities which cause these levels to be approached or exceeded, require pre-planning and coordination with TSC S&C Coordinator.

5.12.8 Direct assignment of additional dosimetry to provide adequate monitoring for the conditions expected.

5.12.9 Direct the use of protective clothing to limit the spread of contamination consistent with the conditions expected.

5.12.10 Obtain additional instrumentation to support OSC activities (Teletector, neutron instrument alpha instrument, friskars), if necessary.

5.2.11 Require each exit from OSC to Auxiliary Building be preceeded by a briefing on task to be done and radiological conditions expected when applicable.

5.2.12 Coordinate Health Physics activities for assessment and repair teams in accordance with RP/0/B/5000/12.

5.2.13 Post blanket dose extension valves.

HP/0/B/1009/09
ENCLOSURE 5.13
OPERATION SUPPORT CENTER
HEALTH PHYSICS SUPERVISOR - CONTINUING RESPONSE

5.13.1 Maintain routine contact with TSC S&C Coordinator to provide update on OSC activities and to receive plant status reports.

5.13.2 Obtain thru S&C Functions Coordinator additional dosimetry/protective clothing/emergency kit items necessary to support OSC activities.

5.13.3 Coordinate OSC activities requiring pre-planning.

5.13.3.1 Emphasis should be placed upon:

- Dosimetry (Whole Body & Extremities)
- Protective Clothing
- Route to and from task
- Respiratory equipment
- Need for Buddy System because of safety hazard (radiological and non-radiological)
- Establishing dose limits and/or dose rate considerations for high exposure jobs on unknown situations
- Communications equipment
- Additional monitoring instrumentation

5.13.4 Monitor dose rate in OSC. Should General Area reach 5 mR/hr., initiate discussion with S&C Coordinator on the need to evacuate the OSC, should dose rate be expected to continue.

5.13.5 All RE-ENTRY efforts should consider the special problems that may exist:

- High gamma fields
- Increased Beta fields
- High Contamination levels
- High airborne rad levels

HP/0/B/1009/09
ENCLOSURE 5.14
RESERVE PERSONNEL/PERSONNEL MONITORING LEADER

5.14.1 Assemble all Health Physics personnel not initially required for emergency response. Non essential personnel should be evaluated for use in the emergency.

5.14.2 Identify personnel and/or personnel monitoring teams for the following locations.

5.14.2.1 All on-site assembly areas are identified in Station Directive 3.0.7.

5.14.2.2 PAP Area.

5.14.2.3 Construction Personnel Exit Area (Brass Gate).

5.14.2.4 Evacuation Facility (Alpha or Bravo). Two monitoring teams if both location are used.

5.14.3 Initiate, as necessary, HP/0/B/1009/05, Personnel Monitoring for Emergency Conditions.

5.14.4 Initiate random monitoring of vehicles located in the upper and lower parking lots starting with vehicles nearest the affected unit. The monitoring team identified in Step 5.14.2.4 should be used for this purpose.

5.14.5 Coordinate with the TSC Surveillance and Control Coordinator on relocating personnel monitoring teams if background radiation renders normal monitoring locations unfit.

5.14.6 Supervise Health Physics efforts at the Evacuation Facility(s) as per Reference 2.3.

5.14.7 Provide direction to reserve Health Physics personnel:

5.14.7.1 Direct and control personnel in the staging area (DRC office in the Administration Building).

5.14.7.2 Coordinate with Surveillance and Control Coordinator to provide addition manpower, as necessary.

5.14.7.3 Coordinate with Support Functions Coordinator to provide additional manpower, as necessary.

5.14.7.4 Direct activities of Field Monitoring Teams if relieved by CMC personnel.

5.14.7.5 Begin scheduling activities for Health Physics personnel.

5.14.~~6~~ 7.6 Support OSC Supervisor with major activities as required.

CSC RESPONSE PERSONNEL DOSE RECORD FORM

Name: _____ HP Badge No.: _____

Social Security No.: _____ Exposure Class: _____

Birthdate: _____ Age: _____ Work Group: _____

*Quarterly Dose to Date: _____mrem

**Yearly Dose to Date: _____mrem

Permissable Lifetime Dose to Date: _____mrem

Total Lifetime Dose to Date: _____mrem

Date/Time	Dosimeter Reading Out (mrem)	In	*Quarterly Dose Total (mrem)	Comments

*Current Quarter Dose _____mrem Plus Today's Dosimeter Dose _____mrem.

**Current Yearly Dose _____mrem Plus Today's Dosimeter Dose _____mrem.

HP/0/B/1009/09
ENCLOSURE 5.16
PROCUREMENT OF HELICOPTERS FOR AERIAL ENVIRONMENTAL SURVEILLANCE

Inland Airways, Myrtle Beach, S.C., is under contract to Duke Power Company to furnish one helicopter upon request and an additional helicopter within six hours following notification. Once a helicopter is requested, there is a maximum elapsed time of three hours for the helicopter to arrive at Catawba Nuclear Station or other dispatched locations.

Helicopter service is limited to daylight hours and adequate flying weather. The helicopters will hold three people, the pilot and two passengers. To perform surveys, instrumentation may limit the passenger space.

To obtain helicopter(s) for emergency service contact:

	Office	Home
1.	B. A. Turpin	[redacted]
2.	L. W. Johnson	
3.	L. M. Whisenant	
4.	D. M. Staggs	

NOTE: These contacts are in Duke Power Company Transmission Dept., Line Division. The microwave extension for the office numbers is 220.

Form 34731 (10-81)
(Formerly SPD-1002-1)

DUKE POWER COMPANY
PROCEDURE PREPARATION
PROCESS RECORD

(1) ID No: HP/0/B/1009/08
Change(s) 0 to
0 Incorporated

(2) STATION: CATAWBA

(3) PROCEDURE TITLE: CONTAMINATION CONTROL DURING TRANSPORTATION OF CONTAMINATED INJURED INDIVIDUALS

(4) PREPARED BY: Charles M. Mann DATE: MARCH 29, 1984

(5) REVIEWED BY: Ronald F Rind DATE: 3-29-84

Cross-Disciplinary Review By: _____ N/R: N/A

(6) TEMPORARY APPROVAL (IF NECESSARY):

By: _____ (SRO) Date: _____

By: _____ Date: _____

(7) APPROVED BY: J W Hy Date: 4/3/84

(8) MISCELLANEOUS:

Reviewed/Approved By: _____ Date: _____

Reviewed/Approved By: _____ Date: _____

DUKE POWER COMPANY
CATAWBA NUCLEAR STATION
CONTAMINATION CONTROL DURING TRANSPORTATION OF CONTAMINATED INJURED INDIVIDUALS

1.0 PURPOSE

To provide guidance for the control of radioactive contamination due to transportation of a contaminated injured individual(s):

A. At the accident scene.
B. In the First Aid Room.
C. In the Ambulance.
D. During initial treatment in the hospital.

2.0 REFERENCES

2.1 HP/0/B/1000/05, Delineation of RCZ's

2.2 HP/0/B/1003/31, Operation and Calibration: Eberline Model E140N Portable Count Rate Meter

2.3 HP/0/B/1004/06, Personnel Decontamination

2.4 HP/0/B/1004/21, Equipment Decontamination

2.5 HP/0/B/1009/02, Investigation of Possible Overexposure, Personnel Contamination and/or Unusual Radiological Occurrences

2.6 HP/0/B/1009/10, Body Burden Analysis Following Suspected Uptakes of Mixed Fission and Activation Products

2.7 Catawba Nuclear Station Emergency Plan

2.8 NCRP Report No. 65

2.9 10 CFR 20 .103 (a) (1)

3.0 LIMITS AND PRECAUTIONS

3.1 Lifesaving first aid and the preservation of vital functions shall have priority over contamination control.

3.2 If a wound(s) is contaminated, a BBA shall be administered per reference 2.6 at the first opportunity after proper medical attention has been given.

3.3 Appropriate respiratory equipment shall be used to prevent or minimize internal exposure in any planned rescue attempt.

3.4 Utilize as few people as necessary for the rescue and treatment of contaminated injured individuals.

3.5 Ensure that all personnel involved in the rescue and treatment of contaminated injured individuals receive proper monitoring and decontamination, if necessary.

3.6 If the emergency vehicle is found to be contaminated, that vehicle may be released if needed for assistance in life threatening situations and be decontaminated to below acceptable limits at the first opportunity as per Reference 2.4.

3.7 Ensure that valuables which are collected from the injured person are monitored and turned over to security.

3.8 Ensure that the tamper seal on the Medical Decontamination Kit has not be broken. Inventory the kit if it has.

3.9 Ensure that Security has been notified.

3.10 Ensure that HP Duty Supervisor has been notified if injury occurs during backshift.

3.11 Body excretions and vomitus should be collected in separate containers (or bags) and transported with the injured person to the hospital. Containers should be labeled with the type of sample, date and time of collection. All bodily effluents should be returned to Health Physics for radiological analysis.

4.0 PROCEDURE

4.1 Control at Accident Scene

4.1.1 Incapacitated Victims

4.1.1.1 Have victim brought to the RCZ exit nearest the accident scene.

4.1.1.2 Have rescue workers place injured on stretcher in such a way as to minimize cross contamination.

4.1.1.3 Once victim is on stretcher, cover him/her with blanket securely to prevent the spread of contamination while in motion.

4.1.1.4 Ensure a Health Physics representative is available in the First Aid Room to assist medical personnel.

4.1.2 Minor Injuries

4.1.2.1 For victims with minor injuries, have them exit their work area in the normal fashion.

4.1.2.2 Accompany victim to Contaminated Change Room and monitor with available frisker. If contamination is found, decontaminate in accordance with Reference 2.3, using Contaminated Change Room facilities.

4.1.2.3 Have victim report to Contaminated First Aid Room (Auxiliary Building) to receive any additional treatment.

4.1.3 If accident occurred in a normally non-contaminated area and the possibility of accident induced contamination exists, control access to the area as per Reference 2.1.

4.1.4 After victim(s) have been evacuated from accident site and taken to Contaminated First Aid Room, smear survey the route taken. If contamination is found, post area as such and take appropriate steps for decontamination.

4.2 Control in the Contaminated First Aid Room

4.2.1 Prepare victim laydown areas by covering them with a protective covering before placing victim down.

4.2.2 Prepare sufficient facilities for the storage of contaminated waste generated during first aid treatment.

4.2.3 Ensure that all personnel in the First Aid Room are wearing anti-contamination clothing appropriate for the levels of contamination expected.

4.2.4 Upon victim(s) arrival, collect their dosimetry and place in polyethylene bag for subsequent evaluation.

4.2.5 Line the covered victim laydown area(s) with blankets if available and place victim(s) there.

4.2.6 Personnel Monitoring

4.2.6.1 Victims in Anti-C Clothing

4.2.6.1.1 Assume all victims in Anti-C's have surface contamination.

4.2.6.1.2 Remove Anti-C's by cutting midline and peeling to each side.

4.2.6.1.3 Place disrobed victim on clean blanket and fold ANTI-C's into blanket that was previously under victim.

4.2.6.1.4 Proceed to monitor entire body surface with an E140N and HP-210 probe.

4.2.6.1.5 Note contamination levels on Personnel Contamination and Decontamination survey sheets.

4.2.6.2 Victims in Street Clothing

4.2.6.2.1 Monitor victim with E140N and HP-210 probe.

4.2.6.2.2 If contamination is found, remove clothing by cutting midline and peeling to the sides.

4.2.6.2.3 Place disrobed victim on clean blanket and fold clothing into blanket that was previously under victim.

4.2.6.2.4 Resurvey victim.

4.2.6.2.5 Fill out Personnel Contamination and Decontamination Survey Sheet. (Enclosure 5.1).

NOTE: Now, victim(s) can be handled according to their contamination level.

4.2.7 Health Physics in conjunction with medical personnel will determine if victim decontamination should be initiated or if immediate transporation to hospital is necessary.

4.2.8 If decontamination is to be initiated in accordance with Reference 2.3, attempt to use shower, if victim cannot be showered, perform decontamination utilizing damp towels and wiping specific areas.

4.2.9 After decontamination, resurvey victim and complete (Enclosure 5.1).

4.2.10 Prior to victims laydown on ambulance stretcher, insure that the area is securely covered with a protective covering.

4.2.11 Pass victims through double doors of Contaminated First Aid Room to ambulance personnel, being sure to minimize the spread of contamination.

4.2.12 Prior to loading on ambulance, cover all contaminated victims (ex: blankets, sheets), and cover necessary areas of the ambulance to minimize the spread of contamination.

4.2.13 Have a Health Physics Technician and Nurse (if available) accompany the contaminated victim to the hospital with the following items:

Victim's Personnel Contamination and Decontamination Survey Sheet (Enclosure 5.1) E140N and HP-210 Probe

NOTE: If there is significant contamination, additional support should be dispatched to hospital.

4.2.14 First Aid Room should be posted for radiation and contamination present until decontamination can be performed.

4.3 Control in the Ambulance

4.3.1 Refer to (Enclosure 5.1) to obtain degree of contamination present. Contamination control can be determined with the use of this information.

4.3.2 Ensure that ambulance personnel are adequately dressed for degree of contamination present.

4.3.3 Provide polyethylene bag for disposal of all items coming in contact with the victim and return to Catawba Nuclear Station for decontamination or disposal.

4.3.4 Upon arrival at hospital, secure bags appropriately.

4.3.5 Instruct ambulance personnel in proper Health Physics practices while involved in treating the contaminated injured individual.

4.3.6 Upon victims transfer from ambulance to hospital, see that all doors and windows of ambulance are secured and post as a potentially contaminated area until further monitoring can be performed.

4.4 Control During Initial Treatment In Hospital

4.4.1 Ensures that all personnel in the treatment area are wearing proper dosimetry, and that dosimetry has been properly labeled and that dose cards have been filled out before returning them to Health Physics for evaluation.

4.4.2 Control or minimize spread of contamination when entering facility as not to hinder access to emergency room in regards to non-radiological patients and personnel.

4.4.2.1 RCZ should be set up in accordance with Reference 2.1 at the entrance of the treatment area.

4.4.2.2 Ensure that floor covering is taped to the floor of the treatment area.

4.4.2.3 Ensure that ventilation ducts in the treatment area are secured by placing a covering over them.

4.4.3 Control or minimize spread of contamination in regards to treatment.

4.4.3.1 Monitor personnel and equipment leaving the treatment area.

4.4.3.2 Ensure that all personnel in the treatment area are wearing anti-contamination clothing appropriate for the levels of contamination present and that diagnostic equipment is properly covered.

4.4.3.3 Prepare sufficient facilities for the storage of contaminated waste generated during treatment.

4.4.4 During treatment, depending on urgency of treatment, instruct hospital personnel in proper Health Physics practices by radiological advisement and assessment.

NOTE: Do not interfere with treatment.

4.4.5 After treatment, monitor room and equipment. If contaminated, initiate decontamination. This procedure involves proper wrapping and tagging of materials. Transportation of contaminated materials should be a consideration.

5.0 ENCLOSURES

5.1 Sample of Personnel Contamination and Decontamination Survey Sheet

DUKE POWER COMPANY
HP/0/B/1000/008
Enclosure 5.1

INVESTIGATION OF PERSONNEL CONTAMINATION
(CONTAMINATION/DECONTAMINATION ACTIVITY SHEET)

Date _____

Date and Time of Contamination _____

Name of Individual _____ HP Badge Number _____

Individual's Supervisor _____ Work Group _____

Job Description (RWP/SRWP) _____

_____

_____

Cause of Personnel Contamination _____

_____

_____

Check and answer in the space below: ( ) Action recommended to prevent a recurrence of Personnel Contamination.

( ) Decontamination Method used in decontamination of Personnel.

_____

_____

_____

_____

_____

Use additional sheets as necessary.

Use the reverse for recording contamination levels on Personnel. Use additional sheets as necessary during decontamination of Personnel.

HP Instruments Used: Type _____ Number _____ EF./F. _____
Type _____ Number _____ EF./F. _____
Type _____ Number _____ EF./F. _____

Initial contamination survey performed by _____

Decontamination completed by _____

Supervisor _____

Form SPD-1002-1

DUKE POWER COMPANY
PROCEDURE PREPARATION
PROCESS RECORD

(1) ID No: HP/O/B/1009/05
Change(s) C to
2 Incorporated

(2) STATION: Catawba

(3) PROCEDURE TITLE: Personnel/Vehicle Monitoring For Emergency Conditions

(4) PREPARED BY: Donald T. Rode DATE: 1-23-84

(5) REVIEWED BY: R. Clemmer DATE: 1-23-84

Cross-Disciplinary Review By: MEBolet N/R: _____

(6) TEMPORARY APPROVAL (IF NECESSARY):

By: _____ (SRO) Date: _____

By: _____ Date: _____

(7) APPROVED BY: J. W. Cox/wpd Date: 1-24-84

(8) MISCELLANEOUS:

Reviewed/Approved By: _____ Date: _____

Reviewed/Approved By: _____ Date: _____

DUKE POWER COMPANY
CATAWBA NUCLEAR STATION
PERSONNEL/VEHICLE MONITORING
FOR EMERGENCY CONDITIONS

1.0 PURPOSE

To provide guidance for personnel and vehicle monitoring during a site evacuation resulting from a radiological emergency.

2.0 REFERENCES

2.1 HP/0/B/1003/31, Operation and Calibration: Eberline Model E-140N Portable Count Rate Meter

2.2 HP/0/B/1004/06, Personnel Decontamination

2.3 HP/0/B/1004/21, Equipment Decontamination

2.4 HP/0/B/1009/09, Guideline for Accident and Emergency Response

2.5 HP/0/B/1009/16, Distribution of Potassium Iodide Tablets in the Event of a Radioiodine Release

2.6 RP/0/A/5000/10, Conducting a Site Assembly or Evacuation

2.7 Station Directive 3.0.7, Site Assembly/Evacuation

2.8 Station Directive 3.8.3, Contamination Provention, Control, and Decontamination Responsibilities

2.9 Catawba Nuclear Station Emergency Plan

2.10 System Health Physics Manual

3.0 LIMITS AND PRECAUTIONS

3.1 If survey teams are expected to be exposed to I-131 in excess of 10 MPC (9×10^{-8} mCi/ml), and as directed by S&C Coordinator, each team member should ingest one tablet of Potassium Iodide.

3.2 Ensure that the Radiation Monitoring equipment has been battery checked and source response checked as per HP/0/B/1003/31.

3.3 If emergency vehicle is found to be contaminated as per Catawba Nuclear Station Directive 3.8.3, Section 6, and alternative transportation is not available, that vehicle may be released if needed for assistance and be decontaminated to below acceptable limits at the first opportunity as per Catawba Nuclear Station HP/0/B/1004/21 Equipment Decontamination.

4.0 PROCEDURE

4.1 The Surveillance and Control Coordinator shall designate a supervisor or lead technician to assume the responsibilities of the Reserve Personnel/Personnel Monitoring Leader (RP/PM Leader).

4.1.1 The RP/PM Leader shall be responsible for personnel monitoring when an evacuation occurs due to a radiological incident and other responsibilities as outlined in Reference 2.4.

4.1.2 The RP/PM Leader shall discuss, per Step 4.4, with the Surveillance and Control Coordinator the practicalities of relocating monitoring stations when the background is above 350 ccpm for friskers.

4.1.3 The RP/PM Leader shall also arrange for monitoring of the assembly points and initiate action when dose rates approach 2 mr/hr.

4.2 The RP/RM Leader shall dispatch an Emergency Personnel Monitoring Team to the following locatrions upon initiation of a site assembly resulting from a radiological incident.

4.2.1 Personnel Access Portal (PAP)

4.2.2 Construction Personnel Exit Area (Brass Gate).

4.2.3 All on-site assembly points as listed in Reference 2.7.

NOTE: Manpower shall be supplied with respect to the nature of the accident and the availability of Health Physics Personnel.

4.2.4 Each survey team shall have a copy of HP/0/B/1009/05 Personnel Monitoring for Emergency Conditions, Catawba Nuclear Station Directive 3.8.3 Contamination and Decontamination Responsibilities and an Personnel Monitoring Kit.

4.2.5 Upon reaching their designated locations, the survey teams shall verify their position with the RP/PM Leader.

4.2.6 The Construction Personnel Exit Area Team shall insure all personnel receive proper monitoring leaving via this exit during evacuation.

4.2.7 The PAP Area Survey Team shall insure that the portal monitors are used properly and provide additional monitoring in order to expedite evacuation.

4.2.8 If an individual is found to be contaminated as per Catawba Nuclear Station Directive 3.8.3, the survey team shall:

4.2.8.1 Dress the individual in the appropriate protective clothing and when time permits, decontaminate as per Catawba Nuclear Station HP/0/B/1004/06.

4.2.8.2 Notify the RP/PM Leader of all cases of personnel contamination.

4.2.9 Survey teams will be supplemented, relieved or secured as directed.

4.2.10 Survey teams will monitor dose rates at exit areas. Should dose rates exceed 2 mr/hr, team will initiate discussion with RP/PM Leader to expedite any evacuation through that exit point.

4.2.11 The RP/PM Leader should notify the Surveillance and Control Coordinator of all action taken.

4.3 The RP/PM Leader shall assemble another Emergency Monitoring Team upon initiation of a site assembly from a radiological incident for random monitoring of employee vehicle and when site evacuation is initiated, dispatch this team to the Evacuation Facility (site Alpha: Transmission Line Maintenance Warehouse near Hwy SC 274 and SC 161. Site Bravo: Allen Steam Station, Hwy NC 273, South of Belmont).

NOTE: Monitoring equipment for vehicles is located in the Personnel Monitoring Kit located in the PAP area.

4.3.1 If a vehicle is found to be contaminated as per Catawba Nuclear Station Directive 3.8.3, the survey team shall:

4.3.1.1 Prevent further movement of the vehicle.

4.3.1.2 Post the vehicle as a contaminated area.

4.3.1.3 Provide general information on contamination surveys to the RP/PM Leader.

4.3.1.4 Monitor all vehicles in the area for contamination.

4.3.1.5 Decontaminate Vehicle using best method(s) available on property owned by Duke Power Company that does not drain to a water system.

4.3.2 Upon site evacuation and notification of Evacuation Facility (Alpha or Bravo), the RP/PM Leader shall:

4.3.2.1 Move with the monitoring team to the Evacuation Facility.

4.3.2.2 Locate Personnel Survey Kit at evacuation Facility and prepare to monitor incoming personnel. Personnel Survey Kit storage locations are identified on the Evacuation Facility Layout Drawing, Enclosure 5.1.

4.3.2.3 Supervise the monitoring and release of personnel as described in Steps 4.2.3 through 4.2.9 and 4.2.10.

4.3.2.4 List all personnel's names, social security number and Health Physics badge number on Evacuation Personnel Dose Record Sheet, Enclosure 5.2. This form should be used for dose commitment at a later time.

4.3.2.5 Supervise monitoring of employee vehicles and take action as appropriate per Step 4.3.1.

4.3.2.6 Notify Surveillance and Control Coordinator of all actions taken.

4.4 If background radiation readings render friskar and/or portal monitor useless, the RP/PM Leader shall:

4.4.1 Discuss with the Surveillance and Control Coordinator relocating the personnel monitoring location a location of lower background.

4.4.2 Procure from the Temporary Administration Building at 20 watt portamoble radio for communication with the OSC. Check operability of the radio.

4.4.3 Move with the monitoring teams to an area of lower background where personnel control can be maintained and prepare to monitor personnel.

4.4.4 Supervise the monitoring and release of personnel as described in Steps 4.2.3 through 4.2.9 and 4.2.10.

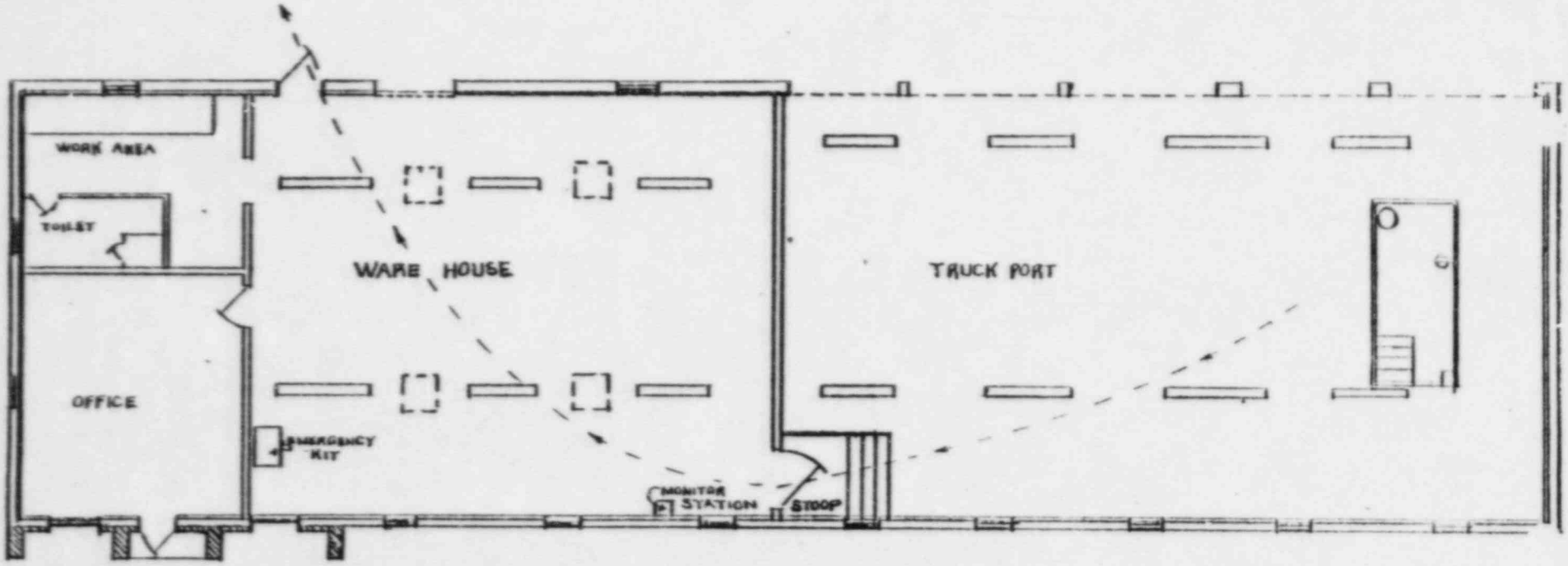
4.4.5 Supervise monitoring of employee vehicles and take actions as appropriate per Step 4.3.1.

4.4.6 Notify Surveillance and Control Coordinator of all actions taken.

5.0 ENCLOSURES

5.1 Evacuation Facilities Layout Drawings

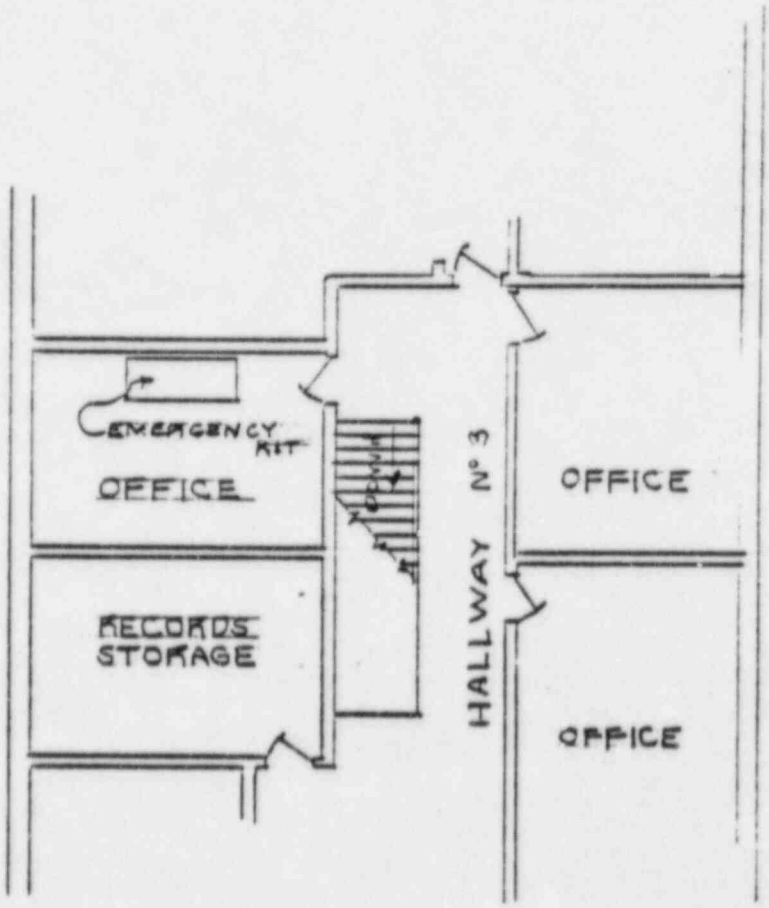
5.2 Evacuation Personnel Dose Record



FLOOR PLAN

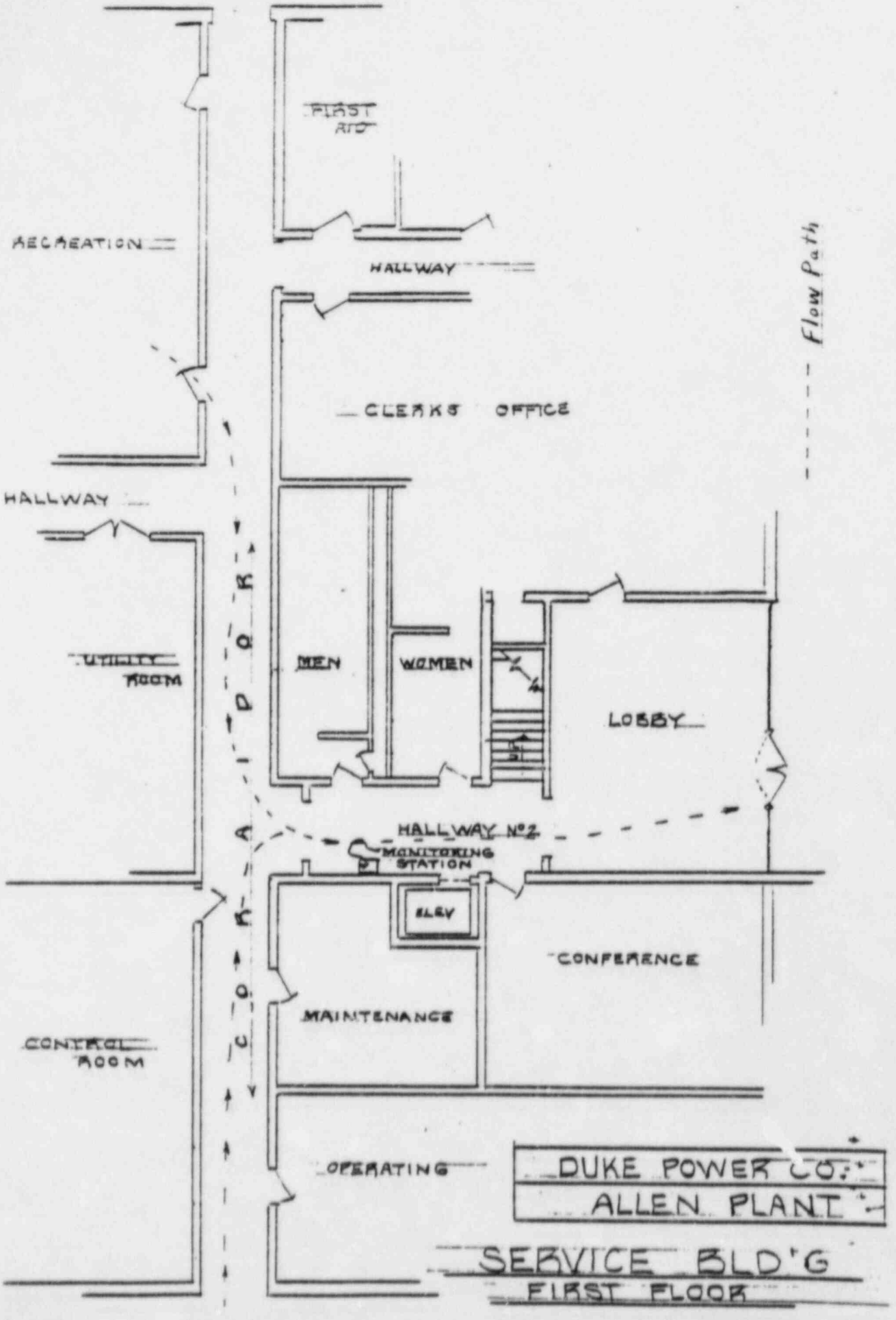
ROCK HILL MAINTENANCE BLDG.
DUKE POWER COMPANY.

------- Flow Path



SERVICE BLD'G
SECOND FLOOR

DUKE POWER COMPANY
ALLEN PLANT


FIRST AID
RECREATION
HALLWAY
CLERKS OFFICE
Flow Path
HALLWAY
UTILITY ROOM
MEN
WOMEN
LOBBY
CORRIDOR
HALLWAY No 2
MONITORING STATION
ELEV
CONFERENCE
MAINTENANCE
CONTROL ROOM
OPERATING
DUKE POWER CO.
ALLEN PLANT
SERVICE BLD'G
FIRST FLOOR

EVACUATION PERSONNEL DOSE RECORD

NAME	SOCIAL SECURITY NUMBER	H.P. BADGE NUMBER	DOSE (mrem)	COMMENTS

Form 34731 (10-81)
(Formerly SPD-1002-1)

DUKE POWER COMPANY
PROCEDURE PREPARATION
PROCESS RECORD

(1) ID No: HP/0/B/1009/04
Change(s) 0 to
0 Incorporated

(2) STATION: CATAWBA

(3) PROCEDURE TITLE: ENVIRONMENTAL MONITORING FOR EMERGENCY CONDITIONS WITHIN THE TEN MILE RADIUS OF CATAWBA NUCLEAR STATION

(4) PREPARED BY: Steve Jones DATE: 3-15-84

(5) REVIEWED BY: [signature] DATE: 3-19-84

Cross-Disciplinary Review By: _____ N/R: 87 Ltr

(6) TEMPORARY APPROVAL (IF NECESSARY):

By: _____ (SRO) Date: _____

By: _____ Date: _____

(7) APPROVED BY: [signature] Date: 4/3/84

(8) MISCELLANEOUS:

Reviewed/Approved By: _____ Date: _____

Reviewed/Approved By: _____ Date: _____

DUKE POWER COMPANY
CATAWBA NUCLEAR STATION
ENVIRONMENTAL MONITORING FOR
EMERGENCY CONDITIONS WITHIN THE
TEN MILE RADIUS OF CATAWBA NUCLEAR STATION

1.0 PURPOSE

To provide a method for identifying gaseous plumes or liquid effluent, and obtaining field data indicative of the radiation exposure to the general public following a suspected uncontrolled release of radioactivity. This procedure shall also be implemented by the Crisis Management Center once it is activated.

2.0 REFERENCES

2.1 HP/0/B/1000/06 Emergency Equipment Functional Check and Inventory

2.2 HP/0/B/1002/04 Collection of Operational Environmental Weekly Samples

2.3 HP/0/B/1002/05 Collection of Operational Environmental Monthly Samples

2.4 HP/0/B/1002/06 Collection of Operational Environmental Quarterly Samples

2.5 HP/0/B/1002/08 Collection of Operational Environmental Semimonthly Samples

2.6 HP/0/B/1002/10 Collection of Operational Environmental Semiannual Samples

2.7 HP/0/B/1003/05 Operating and Calibration Procedure: Eberline Model PIC-6A Portable Ion Chamber

2.8 HP/0/B/1003/12 Operating and Calibration Procedure: Eberline Model E-520 Portable Beta-Gamma Geiger Counter

2.9 HP/0/B/1003/17 Operation and Calibration Procedure: Canberra Series - 10 Portable MCA

2.10 HP/0/B/1003/31 Operation and Calibration: Eberline Model E140N Portable Count Rate Meter

2.11 HP/0/B/1009/16 Distribution of Potassium Iodide Tablets in the Event of a Radioiodine Release

2.12 HP/0/B/1009/19 Emergency Radio System Operations, Maintenance and Communications

3.0 LIMITS AND PRECAUTIONS

3.1 The Field Monitoring Teams (FMT) should park vehicles completely off the road when sampling.

3.2 Four (4) FMTs consisting of two (2) technicians per team and one (1) helicopter team (1 person) if necessary shall be formed as follows:

Team Call Signs	Transportation
Alpha	Land Vehicle
Bravo	Land Vehicle
Charlie	Land Vehicle
Delta	Land Vehicle
Echo	Helicopter

3.3 Each FMT shall use particulate masks and protective clothing whenever activity justifies it or when directed by the Field Monitoring Coordinator (FMC).

3.4 If the team members are expected to be exposed to I-131 in excess of 70 MPC (63×10^{-8} uCi/ml), and directed by the FMC, each team member should ingest a tablet of potassium iodide per Reference 2.11.

3.5 Environmental sampling during emergency conditions shall not replace, but rather supplement normal environmental monitoring.

3.6 Each FMT shall maintain open radio communications with the FMC per Reference 2.12. If radio becomes inoperable, call in sample results on a phone at [redacted] (Lake Wylie/Charlotte), [redacted] (Gaston County), [redacted] (Rock Hill and Fort Mill).

3.7 If any equipment becomes inoperable, notify the FMC and wait for further instructions.

3.8 Annual training in the use of this procedure and the associated equipment and instrumentation shall be conducted and documented on TSR-10.

3.9 Portable MCA's shall be picked up at the Health Physics instrument issue point when directed by the FMC. Ensure that the dewars are adequately filled per Reference 2.9.

3.10 When returning kits to the Emergency Kit Storage Room, perform an equipment inventory check using the Environmental Survey Kit Checklist (Reference 2.1). Note deviations and forward to the Respiratory/Instrument Calibration Supervisor.

4.0 PROCEDURE

4.1 Activation

4.1.1 Upon notificaton and assembly (FMC), the FMT members shall:

4.1.1.1 Report to the Health Physics area on the 609' elevation (on back shifts report to Administration Building) and wait for further instructions from the FMC.

4.1.1.2 Report to the Emergency Kit Storage Room in the Temporary Administration Building to get Environmental Survey Kits.

4.1.1.3 Ensure the Portable Power Generator is operational and the gas can is fully fueled (Reference 2.1).

4.1.1.4 Ensure the tamper seal on the Environmental Survey kits have not been broken and inventory any that have (Reference 2.1).

4.1.1.5 Don TLD and pocket dosimetry and fill out dose cards.

4.1.1.6 Battery and source check survey instruments and portable MCA for proper operation (References 2.7, 2.8, 2.9, 2.10).

4.1.1.7 Ensure the portable radios are functional before leaving (Reference 2.12).

4.1.1.8 Obtain emergency vehicles as directed in Enclosure 5.8.

4.1.1.9 Each FMT will proceed to the survey point assigned by the FMC (Enclosure 5.3).

4.2 Locating and Tracking the Plume

4.2.1 At the assigned survey point, the FMT shall perform a general area Beta vs. Beta-Gamma survey. This method should be used to locate center and width of plume.

4.2.1.1 Record date, time, location and dose rate (mr/hr) on the Field Monitoring Data Sheet (Enclosure 5.4).

4.2.2 If survey results are less than or equal to expected background, call in the results to the FMC and wait for further instructions.

4.2.3 If survey results are greater than background, take protective actions as necessary. Then, if directed, take an air sample (volume should be > 10^4 ml) equipped with a Silver Zeolite Cartridge and particulate filter.

4.2.3.1 Insert cartridge with arrow pointing in.

4.2.3.2 Insert filter paper with smooth side facing out.

4.2.3.3 Calculate required sample time per Enclosure 5.5.

4.2.3.4 When air sample is completed, place the Silver Zeolite Cartridge in a poly bag for analysis.

4.2.3.5 Place filter in a separate poly bag, label and retain for later analysis.

4.2.3.6 Follow instructions on the Field Monitoring Team Work Sheet and the attached Operator Guidelines (Enclosure 5.6) to record air sample information and analyze the cartridge on the Canberra-10.

4.3 Special Sampling, as directed:

4.3.1 All sampling outside of Auxiliary, Service and Turbine Buildings should be done in conjunction with Operations Support Center (OSC) personnel.

4.3.2 Take smears and place them in separate poly bags, label and retain for later analysis.

4.3.3 Count smears on E140N and record on Field Monitoring Data Sheet (Enclosure 5.4). Call in results to FMC.

4.3.4 Collect water samples in cubitainers using good Health Physics practices and label and retain for later analysis.

4.3.5 Place TLD's in the environment.

4.3.6 Retrieve and replace air sample and/or TLD's that are already located in the environment. Locations are listed in Enclosure 5.1. Place samples in separate poly bags, label and retain for later analysis.

4.3.7 Collect broad leaf vegetation sample (one square meter) label and retain for later analysis (Reference 2.12).

4.3.8 Collect shoreline sediment sample (one liter) label and retain for later analysis (Reference 2.6).

4.3.9 Collect milk sample (one full cubitainer) label and retain for later analysis (Reference 2.5). Locations are listed in Sample Enclosure 5.2.

4.4 Turnover

4.4.1 Each FMT shall be relieved as directed by the FMC.

4.4.2 Inform the relief FMT of the equipment inventory status.

4.4.3 Direct the relief FMT to don TLD's and pocket dosimetry and fill out dose cards.

4.4.4 Return all samples to the Emergency Kit Storage Room as directed by the FMC.

4.4.5 Turn in all data sheets to the FMC or his designee.

5.0 ENCLOSURES

5.1 Air Sampler, TLD, and Water Sample Locations

5.2 Milk Sample Locations

5.3 Predetermined Sampling Locations

5.4 Sample of Field Monitoring Data Sheet

5.5 Sample Time Required For Minimum Sample Volume

5.6 Sample of Field Monitoring Team Work Sheet For Determining Iodine Activity

5.7 TSC Field Monitoring Organization

5.8 Emergency Vehicles

DUKE POWER COMPANY
CATAWBA NUCLEAR STATION
HP/0/B/1009/04
ENCLOSURE 5.1
AIR SAMPLER, TLD, AND WATER SAMPLE LOCATIONS

Air Sample Locations (need key CPD-1)

Zone	& Radius (Mi)	No.	Description
A0	1	1	Hwy 274-N, right Liberty Hill Rd., right in fork to end (Air CNS #200, need key).
A0	1	5	Left at Steam Production entrance on Concord Rd., left on Old Concord Rd., right on Acacia Rd., left on Crepe Myrtle Rd., left on Blue Bird Ln., through gate to end (Air CNS #201, need key).
B1	3	1	Hwy 49-N, right Hwy 160, right at Tega Cay sign (98), right before Tega Cay entrance into Duke Power Company substation (Air CNS #212, need key).
C2	10	5	Hwy 274-S, left Hwy 161, right Mt. Gallant Rd. (195), right Hwy 21-121 By-Pass, right on Hwy 72 - 121 By-pass, left on dirt road (Trash Pile Rd.) across from Wayne's Auto Service, go to Duke Power Company substation (Air CNS #217, need key).
A0	1	26	Behind Catawba Nuclear Station overlook (Air CNS #205, need key).

TLD Locations

I. Site Boundary TLD's

Zone	& Radius (Mi)	No.	Description
A0	1	44	Hwy 274-N, right Liberty Hill Rd., right in fork, pass softball field to large rocks at fence on right. TLD is on fence (TLD CNS #222).
A0	1	1	Hwy 274-N, right Liberty Hill Rd., right in fork to end (TLD CNS #200, need key).
A0	1	5	Left at Steam Production entrance on Concord Rd., left on Old Concord Rd., right on Acacia Rd., left on Crepe Myrtle Rd., left on Blue Bird Ln., through gate to end (TLD CNS #201, need key).
A0	1	8	Left at Steam Production entrance on Concord Rd., left on Old Concord Rd., right on Acacia Rd., left on Crepe Myrtle Rd. Go to first drive on right past Paradise Pl., TLD across road (TLD CNS #202).

DUKE POWER COMPANY
CATAWBA NUCLEAR STATION
HP/0/B/1009/04
ENCLOSURE 3.1
AIR SAMPLER, TLD, AND WATER SAMPLE LOCATIONS

Zone	& Radius (Mi)	No.	Description
AO	1	11	Left at Steam Production entrance on Concord Rd., left on Old Concord Rd., right on Acacia Rd., left on Crape Myrtle Rd. TLD is .1 miles on left in curve (TLD CNS #223).
AO	1	14	Left at Steam Production entrance on Concord Rd., left on Old Concord Rd., right on Acacia Rd. TLD .2 miles on right (TLD CNS #224).
AO	1	43	Left at Steam Production entrance on Concord Rd., left on Old Concord Rd. to end. TLD on fence on left (TLD CNS #203).
AO	1	17	Left at Steam Production entrance on Concord Rd. to first transmission tower on left after bridge (TLD CNS #225).
AO	1	20	Left at Steam Production entrance on Concord Rd., TLD on left across bridge just past fence (TLD CNS #226).
AO	1	23	Left at Steam Production entrance on Concord Rd., TLD on left at beginning of guardrail posts (TLD CNS #204).
AO	1	26	Behind Catawba Nuclear Station overlook (TLD CNS #205).
AO	1	29	Left at Steam Production entrance on Concord Rd., TLD at Shady Shore Dr. on right corner at Bethel Community Clubhouse sign (TLD CNS #227).
AO	1	32	Right at Steam Production entrance on Concord Rd., TLD at first dirt left (Valelake Dr.) on right corner (TLD CNS #228).
AO	1	35	TLD on top of hill at Catawba Nuclear Station Construction entrance on North side of street (TLD CNS #206).
AO	1	38	Hwy 274-N, right at Liberty Hill Rd., right in fork to third power line on right, walk about 200 yds. South along boundary fence. TLD on fence (TLD CNS #229).
AO	1	41	Hwy 274-N, right at Liberty Hill Rd., go .3 miles (right in fork) TLD on fence on right (TLD CNS #207).

DUKE POWER COMPANY
CATAWBA NUCLEAR STATION
NP/O/B/1009/04
ENCLOSURE 5.1
AIR SAMPLER, TLD, AND WATER SAMPLE LOCATIONS

Zone	& Radius (Mi)	No.	Description
II.	4-5 Mile TLD's		
F1	4	4	Hwy 49-N to River Hills Plantation rear entrance at Robinwood Rd. TLD behind green building on right corner (TLD CNS #230).
F1	4	6	Hwy 49-N to River Hills Plantation front entrance guardhouse (TLD CNS #231).
A1	4	2	Hwy 49-N to intersection of Pleasant Hill Rd. (1109), TLD on power line (TLD CNS #232).
A1	4	4	Hwy 49-N, right Pleasant Hill Rd. (1109), right Youngblood Rd.(1102), left Zoar Rd. (1103), right Thomas Rd. (1104), TLD behind second house on right (TLD CNS #233).
B2	4	2	Hwy 49-N, right Hwy 160 to Home Federal Savings and Loan on left. TLD on left rear corner of building. (TLD CNS #234).
B1	4	3	Hwy 49-N, right Hwy 160, right on Dam Rd. (99), last gravel right in sharp curve before Lake Wylie Dam, left through fence to substation, TLD on right of inner substation fence (TLD CNS #235).
C1	4	1	Hwy 274-S, left Mt. Gallant Rd. (195), left India Hook Rd. (30) to S.C. Wildlife Resources Dept (TLD CNS #236).
C1	4	3	Hwy 274-S, left Mt. Gallant Rd. (195), right Homestead Rd. (657) to end, TLD straight across intersection of Twin Lakes Rd. (TLD CNS #237).
C1	4	5	Hwy 274-S, left Mt. Gallant Rd. (195), right W. Oak Dr. (962) to end at fork, TLD on left at fence (TLD CNS #238).
D1	5	1	Hwy 274-S to Carter Lumber Co., TLD on fence near gate (TLD CNS #239).
D1	4	2	Hwy 274-S, right Campbell Rd. (80), left on Paraham Rd. (34) to transmission tower on right, TLD on brown power pole (TLD CNS #240).
D1	5	4	Hwy 274-S, right Campbell Rd, (80) for about 3 miles, TLD on left at beginning of horse fence (TLD CNS #241).

DUKE POWER COMPANY
CATAWBA NUCLEAR STATION
HP/0/B/1009/04
ENCLOSURE 5.1
AIR SAMPLER, TLD, AND WATER SAMPLE LOCATIONS

Zone	& Radius (Mi)	No.	Description
E1	5	2	Hwy 49-S, right Faraham Rd. (34) to transmission tower on left after bridge (TLD CNS #242).
E1	5	3	Hwy 274-N, left Hwy 55, left Kingsberry Rd. (114) to transmission tower on left (TLD CNS #243).
F1	4	1	Hwy 274-N, left Hwy 55 to Bethel School, TLD on side of small building in back (TLD CNS #244).
F1	4	3	Hwy 274-N left on G envista Rd. to Crowder Creek Boat Landing, TLD to East of parking lot (TLD CNS #245).
B2	8	1	Hwy 49-N, right Carowinds Blvd. (1441), left Choate Cir., TLD on inside of fence left of the guardhouse (TLD CNS #246).
B1	3	1	Hwy 49-N, right Hwy 160, right Tega Cay sign (98), right before Tega Cay entrance into Duke Power Company substation (TLD CNS #212).
B2	7	6	Hwy 49-N, right Hwy 160 to Fort Mill, right Lee St., left Self St., TLD at Fort Mill Municipal Water Supply behind Springs Mill (TLD CNS #247).
C2	7	3	Hwy 274-S, right on Herlong Ave. to Piedmont Medical Center emergency entrance to back of hospital. TLD on fence at back right corner of Liquid Oxygen storage area (TLD CNS #248).
C2	10	5	Hwy 274-S to Newport, left at stop light, right on Rawlinson Rd., left Hwy 5, right on Heckle Blvd. (901) to end, left on Hwy 72, right on dirt road just across from Wayne's Auto Service, g. to Duke Power Company Substation (TLD CNS #217).
C2	8	6	Hwy 274-S, left Hwy 161, right Rawlinson Rd. (56), left Hwy 5 to Rock Hill Career Development Center, TLD on transmission tower (TLD CNS #249).

DUKE POWER COMPANY
CATAWBA NUCLEAR STATION
HP/0/B/1009/04
ENCLOSURE 5.1
AIR SAMPLER, TLD, AND WATER SAMPLE LOCATIONS

Zone	& Radius (Mi)	No.	Description
D2	10	4	Hwy 274-S, right Campbell Rd. (80), left Hwy 49-S, left Rd. 64, left Hwy 5. Go to Duke Power Company Appliance Center on left. TLD on fence in back (TLD CNS #250).
E2	10	2	Hwy 55 into Clover, TLD at Duke Power Company Appliance Center in rear lot on inner fence (TLD CNS #251).
			Water Sample Locations
F3	14	4	Hwy 274-N, right Pole Branch Rd. (279), right Hwy 273 into Belmont, right Catawba St., left at next light to Belmont Municipal Water Supply (Water CNS #218).
C2	7	2	Hwy 274-S, left Hwy 161, right Mt. Gallant Road (195) to end. Rock Hill Municipal Water Supply across intersection on left (Water CNS #214).
B2	7	6	Hwy 49-N, right Hwy 160 to Fort Mill, right Lee St., left Self St., go to Fort Mill Municipal Water Supply behind Springs Mill (Water CNS #213).
A0	1	46	Left exiting Steam Production entrance on Concord Rd., left just after canal bridge. Go to pier (water CNS #208, need key).
B1	4	5	Hwy 49-N, right Hwy 160, right Dam Rd. (99), left Gray Rock Rd. (251) to Lake Wylie Dam. Walk through plant to upstream side of the dam (water CNS #211).
B1	4	6	Hwy 49-N, right Hwy 160, right Dam Rd. (99), left Gray Rock Rd., (251) to Lake Wylie Dam. Ride or walk to river access on downstream side of dam.
C2	7	8	Hwy 274-S left Mt. Gallant Rd. (195), left Hwy 161, left Cherry Rd. (Hwy 21), left on dirt road at Fort-Rock Drive-In to end, go right to Rock Hill Municipal water intake.
A1	4	6	Hwy 49-N, left at Camp Steere sign after crossing Buster Boyd Bridge (Water CNS #215).

DUKE POWER COMPANY
CATAWBA NUCLEAR STATION
HP/0/B/1009/04
ENCLOSURE 5.2
MILK SAMPLE LOCATIONS

Zone	Radius (Mi)	Milk	
D1	6	M	Hwy 274-S, right Hwy 161, left Rd. 1080 to Pursley Dairy.
D2	8	M	Hwy 274-S, right Hwy 161, left Scism Dairy and Equipment Co. (CASE sign).
E2	6	M	Hwy 274-N, left Hwy 55, left Clinton Dairy Rd.
F1	3	M	Hwy 274-N, right Lake Wylie Rd. (1099) to first house on left, (Ingram Richmond residence).
F2	7	M	Hwy 274-N, Hwy 55, right Paraham Rd. (54), left Hwy 557. Barnett Dairy 1 mile on left.
D1	7	M	Hwy 274-S to Newport, left at stop light, right Adnah Church Rd. (81). Woods Dairy 1.5 miles on left.
F2	13	M	Hwy 274-N, left Hwy 55, go through Clover,SC. Right on Lloyd White Rd. (148), left on Crowders Creek Rd. (1103), next paved right (1125). Oates Dairy is half mile on left.

DUKE POWER COMPANY
CATAWBA NUCLEAR STATION
HP/0/B/1009/04
ENCLOSURE 5.3
PREDETERMINED SAMPLING LOCATIONS

Zone	Radius (Mi)	No.	Description
A0	1	1	Hwy 274-N, right Liberty Hill Rd., right in fork to end (TLD & Air CNS #200, need key).
A0	1	2	Hwy 274-N, right Lake Wylie Rd. (1099), right at Hudson Rd. fork, right at Commodore Pl. fork, left on Tioga Rd. to end.
A0	2	3	Hwy 274-N, right Lake Wylie Rd., (1099), left fork after pavement ends, on Hudson Rd. to end.
A0	2	4	Hwy 49-N, right Pleasant Hill Rd. (1109), right Youngblood Rd. (1102) to dead end at Catawba Yacht Club.
A0	1	5	Left exiting Steam Production entrance on Concord Rd., left on Old Concord Rd., right on Acacia Rd., left on Crepe Myrtle Rd., left on Blue Bird Ln. through gate to end (TLD & Air CNS #201, need key).
A0	1	6	Hwy 49-N, right Pleasant Hill Rd. (1109), right Youngblood Rd. (1102), left on Snug Harbor Rd. (1357), right Coze Cove Rd. (1434) to end.
A0	2	7	Hwy 49-N, right Pleasant Hill Rd. (1109), right Youngblood Rd. (1102), to intersection of Snug Harbor Rd. (1357).
A0	1	8	Left exiting Steam Production entrance on Concord Rd., left on Old Concord Rd., right on Acacia Rd., left on Crepe Myrtle Rd. Go to first drive on right past Paradise Pl., TLD across road (TLD CNS #202).
A0	1	9	Hwy 49-N, right Pleasant Hill Rd. (1109), right Youngblood Rd. (1102), left Snug Harbor Rd. (1357) to end.
A0	2	10	Hwy 49-N, right Pleasant Hill Rd. (1109), right Youngblood Rd. (1102), left Snug Harbor Rd. (1357), stay on Snug Harbor at Kalabash Rd. Fork, take first gravel left (Crosshavens Dr.) after fork to the end (Beware of dogs).

DUKE POWER COMPANY
CATAWBA NUCLEAR STATION
HP/0/B/1009/04
ENCLOSURE 5.3
PREDETERMINED SAMPLING LOCATIONS

Zone	Radius (Mi)	No.	Description
A0	1	11	Left exiting Steam Production entrance on Concord Rd., left on Old Concord Rd., right on Acacia Rd., left on Crepe Myrtle Road. TLD is .1 miles on left in curve (TLD CNS #223).
A0	1	12	Hwy 49-N, right Pleasant Hill Rd. (1109), right Youngblood Rd. (1102), left McKee Rd (1100), right Bankhead Rd. to end.
A0	2	13	Hwy 49-N, right Pleasant Hill Rd. (1109), right Youngblood Rd. (1102), left McKee Rd. (1100), right Bankhead Rd. to intersection of Bessbrook Rd.
A0	1	14	Left exiting Steam Production entrance on Concord Rd., left on Old Concord Rd., right on Acacia Rd. TLD .2 miles on right (TLD CNS #224).
A0	1	15	Left exiting Steam Production entrance on Concord Rd., take first dirt fork to left on Kingsberry Dr., Stop at Commodore Yacht Club.
A0	1	16	Left exiting Steam Production entrance on Concord Rd. to last big curve before pavement ends.
A0	1	17	Left exiting Steam Production entrance on Concord Rd. to first transmission tower on left after bridge (TLD CNS #225).
A0	1	18	Left exiting Steam Production entrance on Concord Rd., go to end and turn right on Sandlapper Rd. Stop at transmission tower.
A0	2	19	Hwy 274-S, left Allison Creek Rd. (1081) to end of pavement.
A0	2	20	Left exiting Steam Production entrance on Concord Rd. TLD on left across bridge, just past fence (TLD CNS #226).
A0	1	21	Left Hwy 274-S, left Allison Creek Rd. (1081), left Spratt Rd., to end (Beware of dogs).
A0	2	22	Hwy 274-S, left Allison Creek Rd. (1081) to intersection of Bardale Rd.

DUKE POWER COMPANY
CATAWBA NUCLEAR STATION
HP/0/B/1009/04
ENCLOSURE 5.3
PREDETERMINED SAMPLING LOCATIONS

Zone	Radius (Mi)	No.	Description
AO	1	23	Left exiting Steam Production entrance on Concord Rd. TLD on left at beginning of guardrail posts (TLD CNS #204).
AO	1	24	Hwy 274-S, left Allison Creek Rd. (1081), left at Spratt Rd., left Morrison Rd., then right in next 2 forks, left in next fork to end.
AO	2	25	Hwy 274-S, left Allison Creek Rd. (1081), to intersection of Spratt Rd.
AO	1	26	Behind Catawba Nuclear Station overlook (TLD and Air CNS #205, need key).
AO	1	27	Right exiting Steam Production entrance on Concord Rd., first dirt left on Valelake Rd., left in fork to end.
AO	2	28	Hwy 274-S, left Allison Creek Rd. (1081) to intersection of Colina Rd.
AO	1	29	Left exiting Steam Production entrance on Concord Rd. TLD at Shady Shore Dr. on right corner at Bethel Community Clubhouse sign (TLD CNS #227).
AO	1	30	Right exiting Steam Production entrance on Concord Rd., first dirt left on Valelake Rd., right in fork to end.
AO	2	31	Hwy 274-S to intersection of Campbell Rd. (80).
AO	1	32	Right exiting Steam Production entrance on Concord Rd. TLD at first dirt left (Valelake Dr.) on right corner (TLD CNS #228).
AO	1	33	Right exiting Steam Production entrance on Concord Rd., left on dirt road (Pine Pt. Dr.) just before Granny's Restaurant, stop .5 miles.
AO	2	34	Hwy 274-S to Big Allison Creek bridge.
AO	1	35	TLD on top of hill at intersection of Catawba Nuclear Station Construction entrance and Road 1132 (TLD CNS #206).
AO	1	36	Right exiting Steam Production entrance to transmission line just before Granny's Restaurant on Concord Rd. (1132).

DUKE POWER COMPANY
CATAWBA NUCLEAR STATION
HP/0/B/1009/04
ENCLOSURE 5.3
PREDETERMINED SAMPLING LOCATIONS

Zone	Radius (Mi)	No.	Description
A0	2	37	Hwy 274-N, left Liberty Hill Rd., take first left and go to end.
A0	1	38	Hwy 274-N, right at Liberty Hill Rd., right in fork to third transmission line on right, walk about 200 yds. South along boundary fence. TLD is on fence (TLD CNS #229).
A0	1	39	Hwy 274-N, right at Liberty Hill Rd., right in fork to third transmission line on right.
A0	2	40	Right exiting Steam Production entrance on Concord Rd. to end. Right on Hwy 274-N for 1 mile.
A0	1	41	Hwy 274-N, right at Liberty Hill Rd., go .8 miles (right in fork), TLD on fence on right (TLD CNS #207).
A0	1	42	Hwy 274-N, right at Liberty Hill Rd., right in fork, go to softball field entrance.
A0	2	43	Hwy 274-N, right Lake Wylie Rd. (1099), right Beaver Creek Trail to end.
A0	1	44	Hwy 274-N, right at Liberty Hill Rd., right in fork, pass softball field to large rock piling on fence. TLD is on fence (TLD CNS #222).
A0	1	45	Left exiting Steam Production entrance, left on Old Concord Rd. to end. TLD on fence on left (TLD CNS #203).
A0	1	46	Left exiting Steam Production entrance on Concord Rd. Turn left just after canal bridge. Go to pier (water CNS #208, need key).
A1	3	1	Hwy 49-N to NC side of Buster Boyd Bridge.
A1	4	2	Hwy 49-N to intersection of Pleasant Hill Rd. (1109), TLD on transmission tower (TLD CNS #232).
A1	5	3	Hwy 49-N to Steele Creek Vol. Fire Dept. on right.

DUKE POWER COMPANY
CATAWBA NUCLEAR STATION
HP/0/B/1009/04
ENCLOSURE 5.3
PREDETERMINED SAMPLING LOCATIONS

Zone	Radius (Mi)	No.	Description
A1	4	4	Hwy 49-N, right Pleasant Hill Rd (1109), right Youngblood Rd. (1102), left Zoar Rd. (1105), right Thomas Rd. (1104, TLD behind second house on right in pines (TLD CNS #233).
A1	5	5	Hwy 49-N, right Pleasant Hill Rd. (1109, right Youngblood Rd. (1102), left Hamilton Rd. (1106) to intersection of Hwy 160.
A1	4	6	Hwy 49-N, left at Camp Steere sign after crossing Buster Boyd Bridge (Water CNS #215).
A2	10	1	Hwy 49-N, stop one mile past Westinghouse Blvd. at Roberts Systems 8500 on left.
A3	10	1	Hwy 49-N, right Carowinds Blvd. (1441), left Hwy 51 to Pineville, stop near Sugar Creek bridge.
B1	3	1	Hwy 49-N, right Hwy 160, right on Gold Hill Rd. (98) at Tega Cay sign, right before Tega Cay entrance on gravel road into Duke Power Company substation (TLD & Air CNS #212, need key).
B1	2	2	Hwy 49-N, right Pleasant Hill Rd. (1109), right Youngblood Rd. (1102), left McKee Rd (1100)., left Bankhead Rd., left Bessbrook Rd. to end.
B1	4	3	Hwy 49-N, right Hwy 160, right on Dam Rd. (99), last gravel right in sharp curve before Lake Wylie Dam, left through fence to substation, TLD on right of inner substation fence (TLD CNS #235).
B1	2	4	Hwy 49-N, right Hwy 160, right on Gold Hill Rd. (98) at Tega Cay sign, enter Tega Cay following Tega Cay Dr., right Windjammer Dr., 6 miles, Right at circle, Left Kiwi Point to end.

DUKE POWER COMPANY
CATAWBA NUCLEAR STATION
HP/0/B/1009/04
ENCLOSURE 5.3
PREDETERMINED SAMPLING LOCATIONS

Zone	Radius (Mi)	No.	Description
B1	4	5	Hwy 49-N, right Hwy 160, right Dam Rd. (99), left Gray Rock Rd. (251) to Lake Wylie Dam. Walk through plant to upstream side of the dam (water CNS #211).
B1	4	6	Hwy 49-N, right Hwy 160, right Dam Rd. (99), left Gray Rock Rd. (251) to Lake Wylie Dam. Go to river access on downstream side of dam.
B2	8	1	Hwy 49-N, right Carowinds Blvd. (1441), left Choate Circle, TLD on inside of fence left of the guardhouse (TLD CNS #246).
B2	4	2	Hwy 49-N, right Hwy 160 to Home Federal Savings and Loan on left. TLD on left rear corner of building (TLD CNS #234).
B2	5	3	Hwy 49-N, right Hwy 160, left on Gold Hill Rd. (98) at Home Federal Savings and Loan, stop at intersection of Whitley Rd.
B2	10	4	Hwy 49-N, right Carowinds Blvd. (1441), left Hwy 51 to Pineville, right Hwy 521 (Polk St.) in Pineville, right on Dorman Rd., stop at state line.
B2	5	5	Hwy 49-N, right Hwy 160, right Sutton Rd. (49) to intersection of Gray Rock Rd. (251).
B2	7	6	Hwy 49-N, right Hwy 160 to Fort Mill, Right Lee St., left Self St. TLD at Fort Mill Municipal Water Supply on right behind Springs Mill (TLD CNS #247, also Water CNS #213).
B2	10	7	Hwy 49-N, right Hwy 160 through Fort Mill to the Sugar Creek bridge.
C1	4	1	Hwy 274-S, left Mt. Gallant (195), left India Hook Rd. (30) to SC Wildlife Resources Dept. (TLD CNS #236).
C1	5	2	Hwy 274-S, left Mt. Gallant Rd. (195), go beyond India Hook to Red Burketts Body Shop on right.

DUKE POWER COMPANY
CATAWBA NUCLEAR STATION
HP/0/B/1009/04
ENCLOSURE 5.3
PREDETERMINED SAMPLING LOCATIONS

Zone	Radius (Mi)	No.	Description
C1	4	3	Hwy 274-S, left Mt. Gallant Rd. (195), right Homestead Rd. (657) to end. TLD straight across intersection of Twin Lakes Rd. (TLD CNS #237).
C1	5	4	Hwy 274-S, left Mt. Gallant Rd. (195), right Homestead Rd. (657) to end.
C1	4	5	Hwy 274-S, left Mt. Gallant Rd. (195), right W. Oak Dr. (962) to end at fork. TLD on left at fence (TLD CNS #238).
C1	5	6	Hwy 274-S, left Mt. Gallant Rd. (195), right at York County Museum (658) to end at SC Nat nal Guard Armory.
C1	5	7	Hwy 274-S to Carter Lumber Co.
C2	10	1	Hwy 274-S, left Hwy 161, left in fork on Celanese Rd. (50) to intersection of Springdale Rd.
C2	7	2	Hwy 274-S, left Hwy 161, right Mt. Gallant Rd. (195) to end. Go to Rock Hill Municipal Water Supply across intersection on left (Water CNS #214).
C2	7	3	Hwy 274-S, right on Herlong Ave. to Piedmont Medical Center emergency entrance to back of hospital. TLD on fence at back right corner of Liquid Oxygen storage area (TLD CNS #248).
C2	10	4	Hwy 274-S, left Hwy 161, right Mt. Gallant Rd. (195), right Hwy 21-121 By-pass to Fast Fare on left at intersection of Springsteen Rd.
C2	10	5	Hwy 274-S to Newport, left at stop light, right on Rawlinson Rd., left Hwy 5, right on Heckle Blvd. (901) to end, left on Hwy 72, right on dirt road across from Wayne's Auto Service. Go to Duke Power Company substation (TLD & Air CNS #217, need key).
C2	8	6	Hwy 274-S, left Hwy 161, right Rawlinson Rd. (56), left Hwy 5 to Rock Hill Career Development Center, TLD on transmission tower (TLD CNS #249).

DUKE POWER COMPANY
CATAWBA NUCLEAR STATION
HP/0/B/1009/04
ENCLOSURE 5.C
PREDETERMINED SAMPLING LOCATIONS

Zone	Radius (Mi)	No.	Description
C2	10	7	Hwy 274-S, left Hwy 161, right Adnah Church Rd. (81), right on Hwy 5, left on Eastview Rd. (102) to intersection of Oak Park Rd. (103).
C2	7	8	Hwy 274-S, left Mt. Gallant Rd. (195), left Hwy 161, left Hwy 21, left on dirt road at Fort-Rock Drive-In to end, go right to Rock Hill Municipal Water Intake.
D1	5	1	Hwy 274-S to Carter Lumber Co. TLD on fence near gate (TLD CNS #239).
D1	4	2	Hwy 274-S, right Campbell Rd. (80), left Paraham Rd. (54) to transmission tower on right, TLD on power pole (TLD CNS #240).
D1	5	3	Hwy 274-S, right Campbell Rd. (80), left Paraham Rd. (54), next right on Rd. 815 to Allison Creek bridge.
D1	5	4	Hwy 274-S, right Campbell Rd. (80) for about 3 miles, TLD on left at beginning of horse fence (TLD CNS #241).
D2	10	1	Hwy 274-S, left Hwy 161, right Adnah Church Rd. (81), right Hwy 5, quick left on Eastview Rd. (102), right Holland Rd. (157), right Turkey Farm Rd. (1172), left Russell Rd. (536), go .2 miles.
D2	10	2	Hwy 274-S, left Hwy 161, right Adnah Chruch Rd. (81), right Hwy 5, left Billy Wilson Rd. (1451), right Turkey Farm Rd. (1172) to Fishing Creek bridge.
D2	10	3	Hwy 274-S, right Campbell Rd. (80), left Hwy 49-S, stop at Pantry before entering York.
D2	10	4	Hwy 274-S, right Campbell Rd. (80), left Hwy 49-S, left Rd. 64, left Hwy 5. Go to Duke Power Company Appliance Center on left. TLD on fence in back (TLD CNS #250).

DUKE POWER COMPANY
CATAWBA NUCLEAR STATION
HP/0/B/1009/04
ENCLOSURE 5.3
PREDETERMINED SAMPLING LOCATIONS

Zone	Radius (MI)	No.	Description
D2	10	5	Hwy 274-S, right Campbell Rd. (80), left 49-S, right Old Limestone Rd. (172) to end.
E1	5	1	Hwy 274-S, right Campbell Rd. (80) to intersection of Hwy 49.
E1	5	2	Hwy 49-S, right Paraham Rd. (54) to transmission tower on left after bridge (TLD CNS #242).
E1	5	3	Hwy 274-N, left Hwy 55, left Kingsberry Rd. (114) to transmission tower on left (TLD CNS #243).
E1	5	4	Hwy 274-N, left Hwy 55 to intersection of Kingsberry Rd. (114).
E2	5	1	Hwy 274-S, right Campbell Rd. (80), right Paraham Rd. (54) to intersection of Dr. Nichols Rd. (819).
E2	10	2	Hwy 274-N, left Hwy 55 into Clover, go to Duke Power Company Appliance Center on left. TLD on fence in back (TLD CNS #251).
E2	10	3	Hwy 274-N, left Hwy 55 to Pantry at intersection of Hwy 321 in Clover (behind Pantry).
F1	4	1	Hwy 274-N, left Hwy 55 to Bethel School. TLD on side of small building in back (TLD CNS #244).
F1	5	2	Hwy 274-N, left Hwy 55, right Bethel School Rd. (152) to intersection of Hollandale Dr.
F1	4	3	Hwy 274-N left on Glenvista Rd. to Crowder Creek boat landing, TLD to east of parking lot (TLD CNS #245).
F1	4	4	Hwy 49-N to River Hills Plantation rear entrance at Robinwood Rd. TLD behind green building on right corner (TLD CNS #230).

DUKE POWER COMPANY
CATAWBA NUCLEAR STATION
HP/0/B/1009/04
ENCLOSURE 5.3
PREDETERMINED SAMPLING LOCATIONS

Zone	Radius (Mi)	No.	Description
F1	5	5	Hwy 49-N, left Sherer Church Rd. to end.
F1	4	6	Hwy 49-N to River Hills Plantation entrance guardhouse (TLD CNS #231).
F1	5	7	Hwy 49-N, left Montgomery Rd. at the River Rat Restaurant. Stop in horseshoe curve near lake.
F2	10	1	Hwy 274-N, left Hwy 557, right Ridge Rd. (27) to Bowling Green Presbyterian Chruch.
F2	5	2	Hwy 274-N, left Hwy 557 to Pine Grove Baptist Chruch.
F3	10	1	Hwy 274-N, left Hwy 557, next paved right on Oakridge Rd. at Bethel Fire Dept. (Rd. 435) to intersection of Hwy 274 (in NC).
F3	10	2	Hwy 274-N, right Pole Branch Rd. (279) to Friendship Baptist Church on left.
F3	10	3	Hwy 274-N, right Pole Branch Rd. (279), right Hwy 273 to Allen Steam Plant Bridge.
F3	14	4	Hwy 274-N, right Pole Branch Rd. (279), right Hwy 273 into Belmont, right Catawba St., left at next light to Belmont Municipal Water Supply (Water CNS #218).

DUKE POWER COMPANY
CATAWBA NUCLEAR STATION
HP/0/B/1009/04
ENCLOSURE 5.4
FIELD MONITORING DATA SHEET

Date ________ Team Members/Call Sign ____/____ Inst. Type/No. ____/____

Sample Location	Time Survey Taken	Dose Rate (mR/hr)	Smear Activity (CCPM)

DUKE POWER COMPANY
CATAWBA NUCLEAR STATION
HP/0/B/1009/04
ENCLOSURE 5.5
SAMPLE TIME REQUIRED FOR MINIMUM SAMPLE VOLUME

FLOW RATE			MINIMUM REQUIRED SAMPLING TIME IN MINUTES
CFM		LPM	
.5	=	14	71
1.0	=	28	36
1.5	=	42	24
2.0	=	56	18
2.5	=	70	15
3.0	=	84	12
3.5	=	99	11
4.0	=	113	9
4.5	=	127	8

NOTE: When estimating time required to get a minimum volume of 1 x 10^6 ml if flow rate for the air sampler in use is not on table, go to next Lower flow rate. The LPM are rounded off to the conservative side.

Example: Air Sampler flow rate = 106 LPM. Minimum time 11 minutes

DUKE POWER COMPANY
CATAWBA NCULEAR STATION
HP/0/B/1009/04
ENCLOSURE 5.6
FIELD MONITORING TEAM WORK SHEET FOR DETERMINING IODINE ACTIVITY

Team Members ______________ Date ____________ Air Sampler No. ____________

Team Call Sign ____________ Canberra No. ______________

AIR SAMPLE INFORMATION — ANALYSIS RESULTS

A Sample ID. No./Time/Location	B Air Sampler Run Time (Min)	C Flow Rate (LPM)	D Iodine Activity Microcuries/ml	E Dose Rate mrem/hr	F Results Reported By:
___/___/___					
___/___/___					
___/___/___					
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___/___/___					

Column A) Number of Sample/Time it was Taken/Sampling Location (ex. AO-2-10).
Column B) Length of time the air sampler ran.
Column C) Air sampler meter flow rate.
Column D) Activity from Canberra.
Column E) Dose rate from Canberra.
Column F) Signature of person that calls in results to FMC.

5.6.1 MCA and Detector Set-Up

5.6.1.1 Disconnect DC power cord from unit.

5.6.1.2 Turn the contrast switch on the front of the unit clockwise to the ON mode.

5.6.1.3 Place sample holder with Na-22 check source onto the detector.

5.6.1.4 Press TEST SYSTEM.

5.6.1.5 Press ENTER to begin test.

5.6.1.6 If test failed, press CLEAR ENTRY and remove the instrument from service.

5.6.1.7 If test passed, press ENTER.

5.6.2 Collecting and Measuring Filter Cartridges

NOTE: Record data on Field Monitoring Team Work Sheet for Determining Iodine Activity (Sample Enclosure 5.6).

5.6.2.1 Press ANALYZE FILTER SAMPLE.

5.6.2.2 Press ENTER.

5.6.2.3 For each sample:

5.6.2.3.1 Place cartridge with the recognizable side toward the detector (in small poly bag) in sample holder.

5.6.2.3.2 Put detector and sample holder in shield.

5.6.2.3.3 Press ENTER to accept ID number.

5.6.2.3.4 Press ENTER to accept current Flow Rate (LPM). Otherwise, change number and press ENTER.

5.6.2.3.5 Press ENTER to accept current Flow Time (min). Otherwise, change number and press ENTER.

5.6.2.3.6 If the volume is determined to be too small, resample, press ENTER and return to Step 5.6.2.3.

5.6.2.3.7 Press ENTER to start Collect/Analyze.

5.6.2.3.8 Report/Record Iodine activity (µCi/ml) and dose rate (mrem/hr).

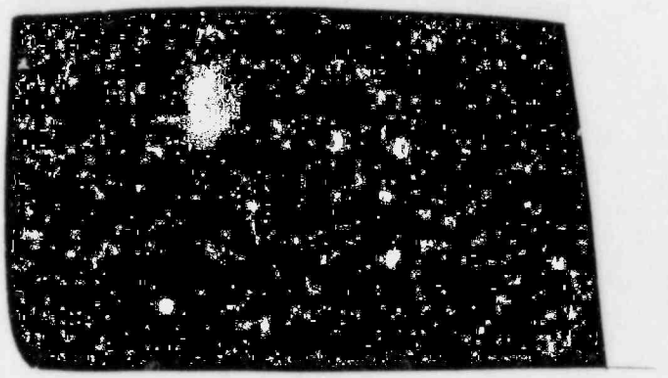
5.6.2.3.9 Press NEXT SAMPLE.

5.6.2.3.10 Label the cartridge and retain for later analysis.

5.6.3 After sampling completion, turn the contract switch counter-clockwise to the STAND-BY mode

DUKE POWER COMPANY
CATAWBA NUCLEAR STATION
HP/0/B/1009/04
ENCLOSURE 5.7
TSC FIELD MONITORING ORGANIZATION

POSITION	NAME	BUSINESS PHONE	HOME PHONE
Field Monitoring Coordinators:			
Primary:	C. V. Wray		
Alternates:	R. L. Rivard J. E. Threatt		
TSC Radio Operators:			
Primary:	D. E. Sexton		
Alternate:	T. W. O'Donohue		
Field Monitoring Teams:			



All Health Physics personnel with Field Monitoring Training.

DUKE POWER COMPANY
CATAWBA NUCLEAR STATION
HP/0/B/1009/04
ENCLOSURE 5.8
EMERGENCY VEHICLES

The two designated emergency vehicles are the Operations pick-up truck and the Technical Services vehicle used primarily by Chemistry. These two vehicles are to be obtained (as directed by the FMC) by getting the keys from the front desk Security Officer. A set of all keys to station vehicles shall be maintained by Security at the Personnel Access Portal (PAP).

Obtain any other Station vehicles (if available) as directed by the FMC. Voluntary use of personnal vehicles is another alternative that may be considered.

CATAWBA NUCLEAR STATION DIRECTIVE 3.8.4 (TS)

REV. NO. 7 DATE 5-1-84

APPROVAL [signature]

DUKE POWER COMPANY

CATAWBA NUCLEAR STATION

ONSITE EMERGENCY ORGANIZATION

1.0 PURPOSE

To define the role of the Emergency Coordinator and other members of the Onsite Emergency Organization in implementing the station Emergency Plan and to provide for augmentation of the normal operating shift during an emergency situation.

2.0 REFERENCES

2.1 Catawba Nuclear Station Emergency Plan

2.2 Catawba Nuclear Station Operations Management Procedure 1-8, "Authority and Responsibility of Licensed Reactor Operators and Licensed Senior Reactor Operators"

2.3 Station Directive 2.8.1 (TS) "Reporting Requirements"

2.4 Catawba Nuclear Station Operations Management Procedure 2-15 "Notification of Proper Authority".

2.5 Station Directive 3.0.7 (TS), Site Assembly/Evacuation.

3.0 SPECIFIC RESPONSIBILITIES

3.1 Shift Supervisor - All emergencies are initially handled by the Shift Supervisor. The Shift Supervisor on duty will ensure that all immediate actions required by station emergency or abnormal procedures, applicable to the situation, are performed and that all actions necessary for the protection and safety of personnel and property are being taken.

3.2 Emergency Coordinator - The Shift Supervisor shall assume the function of the Emergency Coordinator until the arrival of the Station Manager or his designee at which time the functions of the Emergency Coordinator are transferred to the Station Manager or his designee.

The Shift Supervisor shall then continue to take actions necessary to ensure that the emergency situation is brought under control.

3.3 Recovery Manager - The responsibilities of the Emergency Coordinator will be assumed by the Recovery Manager at the Crisis Management

Center (CMC) as this organization is staffed and ready to assume its function. This assumption of the Emergency Coordinator functions by the Recovery Manager, will take place for the Site Area Emergency and General Emergency classifications.

The Emergency Coordinator shall continue to take actions necessary to ensure that the emergency situation is brought under control and shall coordinate activities between the station and the CMC.

4.0 DUTIES

4.1 Shift Supervisor/Emergency Coordinator - immediate duties include the following:

4.1.1 Determine from the initiating conditions what Emergency Class the Station is in.

4.1.2 Declare the Emergency as necessary and assume control as the Emergency Coordinator.

4.1.3 Assign someone from the shift to begin the notifications as per applicable procedure.

4.1.4 Take necessary on site remedial actions.

4.1.5 Initiate activitation of the Technical Support Center and Operations Support Center.

4.1.6 Providing protective action recommendations to authorities responsible for implementing offsite emergency measures.

NOTE: This authority and responsibility shall not be delegated to other elements of the station emergency organization.

4.2 Station Manager/Emergency Coordinator - relieves the Shift Supervisor of the Emergency Coordinator's duties and assumes the responsibility for implementing the station Emergency Plan including:

4.2.1 Staffing the Technical Support Center and Operations Support Center with those personnel deemed necessary to effectively assess the emergency condition.

4.2.2 Instituting those procedures necessary to allow the Control Room to gain immediate control of the emergency situation.

4.2.3 Notification and activation of Crisis Management Team, county and state organizations and the Nuclear Regulatory Commission.

4.2.4 Providing protective action recommendations to authorities responsible for implementing off-site emergency measures.

NOTE: This authority and responsibility shall not be delegated to other elements of the station emergency organization.

4.2.5 Continued maintenance of an adequate state of emergency preparedness until the emergency situation has been effectively managed and the station is returned to a normal or safe operating condition.

4.3 Technical Support Center Staff - The Technical Support Center (TSC), location shown in Enclosure 4, will be activated and staffed to support the control room and coordinate emergency and/or recovery efforts with offsite groups, corporate headquarters, state and local government and the NRC. The station operating staff is used as the TSC staff in the emergency situation as deemed necessary by the Emergency Coordinator. Individuals with a TSC function will have a routine function that is similar to their role in an emergency.

4.3.1 Operations Group:

A. The Superintendent of Operations when designated, shall assume the duties of the Station Manager. He will provide expertise to the Station Manager and the Shift Supervisor regarding solutions to operational problems. He shall ensure that each operating shift is manned with competent personnel trained and prepared to manage all emergency situations, and he shall augment his personnel resorces as necessary to accomplish this goal. He shall provide technical expertise to other members of the TSC and shall work closely with the Superintendent of Maintenance in restoring station equipment to an operational status during and after the emergency condition. This individual shall be the first alternate to the Emergency Coordinator in the event the Station Manager is unavailable.

B. The Operating Engineer shall assume the duties of the Superintendent of Operations when so designated. He will provide technical expertise to the Superintendent of Operations and other members of the TSC as required and maintain contact with Operations personnel in the Control Room.

C. The Assistant Operating Engineer shall assume the duties of the Operating Engineer when so designated. He will provide technical expertise to the Superintendent of Operations, the Operating Engineer and other members of the TSC as required and maintain contact with the Operations Supervisor in the Operations Support Center (OSC).

4.3.2 Technical Services Group:

A. The Superintendent of Technical Services shall assume the duties of the Station Manager when so designated. He will provide expertise to the Station Manager and the Shift Supervisor (via the Operating Engineer)

regarding solutions to operational problems. He shall provide technical expertise to other members of the TSC in the areas of Health Physics, Chemistry, Performance and Reactor Engineering and in Licensing and Engineering support programs. He shall ensure that all areas of responsibility under his direction are staffed with competent personnel, properly trained and prepared to support any operational emergency condition. This individual shall be the second alternate to the Emergency Coordinator in the event the Station Manager is unavailable.

B. The Health Physics Section of the TSC

1. The Station Health Physicist shall assume the duties of the Superintendent of Technical Services when so designated. He will provide technical expertise to the Superintendent of Technical Services, the Station Manager and other members of the TSC as required. He will provide for the calculation and distributin of offsite dose determinations for releases of radioactive materials to the atmosphere and make recommendations to the Station Manager through the Superintendent of Technical Services on Protective Actions necessary for limiting exposure to station personnel and members of the public. He shall also be responsible for directing decontamination activities. The Station Health Physicist shall also work closely with the appropriate members of the Crisis Management Center to assure that radiological hazards during any emergency situations are minimized. The Station Health Physicist shall ensure that all areas under his direction are staffed and prepared to manage Health Physics support for any emergency condition.

2. Health Physics S&C Coordinator shall coordinate and direct the actions of in plant radiological monitoring teams and provide data on plant radiological status.

3. H. P. Support Coordinator shall direct the actions of the remainder of the Health Physics functions.

4. Data Analysis Coordinator shall provide for the calculation and distribution of Off-site Dose projections and field monitoring information assessable by Health Physics personnel and relay this to the Station Health Physicist.

The Data Analysis Coordinator shall also direct the Field Monitoring Coordinator as necessary to evaluate dose projections versus field data.

5. Field Monitoring Coordinator shall direct the actions of the field monitoring teams in gathering both on-site and off-site radiological data and make this information available to the Data Analysis Coordinator or Station Health Physicist. Constant communications will be maintained by a Radio Operator or by the use of plant or commercial telephone lines to the field teams.

C. The Station Chemist shall assume the duties of the Superintendent of Technical Services when so designated. He will provide technical expertise to the Superintendent of Technical Services and to other members of the TSC as required. e is responsible for coordinating chemical technical support and for initiating necessary action to ensure adequate chemical sampling and evaluation to support the emergency condition. The Station Chemist shall ensure that all areas under his direction are staffed and prepared to manage Chemistry support for any emergency condition.

D. The Performance Engineer shall assume the duties of the Superintendent of Technical Services when so designated. He will provide technical expertise to the Superintendent of Technical Services and to other members of the TSC as required. He will assure that adequate levels of technical and engineering manpower are available to: manage test procedure review, carryout special test procedures, insure control and accountability of special nuclear materials, and evaluate plant and reactor performance. A Test Engineer shall assist the Performance Engineer in the evaluation of plant systems and transmission of information to the CMC. A Performance Technician(s) will operate the TSC Operator Aid Computer Terminal to post and update plant status. This information will be transmitted through the VAX computer to other users. The Performance Engineer shall ensure that all areas under his supervision are staffed and prepared to manage Performance support for any emergency condition.

E. The Reactor Engineer shall assume the duties of the Performance Engineer when so designated. He will provide technical expertise to the Performance Engineer and to other members of the TSC as required. The Reactor Engineer shall ensure that all areas under his direction are staffed and prepared to manage technical support for any emergency condition.

F. The Licensing and Projects Engineer shall assume the duties of the Superintendent of Technical Services when so designated. He will provide technical expertise to the superintendent of Technical Services and to the members of the TSC as required. He is responsible for coordinating station activities with regulating agencies, coordinating the reporting and investigation of all incidents and for providing review of appropriate station technical matters. The License and Projects Engineer shall ensure that all areas under his direction are staffed and prepared to manage technical support for any emergency condition.

G. TSC Logkeeper shall record events that occur from the time of activation of the TSC and shall be directed by the Emergency Coordinator. This individual will be an engineer from the station's Projects group.

H. Offsite Communicator shall make followup notifications to State and/or County EOC's. This individual shall be an engineer from the Station's Licensing and Projects Group.

4.3.3 Administrative Group:

A. The Superintendent of Station Services when designated shall assume the duties of the Station Manager. He will provide techical expertise to the Station Manager and to the Shift Supervisor (via the Operating Engineer) regarding solutions to administrative problems associated with emergency conditions at the station. He shall provide technical expertise to other members of the TSC in the area of Contract Services, Security, Training and Safety, and Administrative Coordination. He shall ensure that all areas under his direction are staffed and prepared to manage administrative support for any emergency condition. This individual shall be the fourth alternate to the Emergency Coordinator in the event the Station Manager is unavailable.

B. The Security and Contract Coordinator shall assume the duties of the Superintendent of Station Services when so designated. He will provide technical expertise to the Superintendent of Station Services and to other members of the TSC as required. He is responsible for coordinating Security and Contract Services for the station. The Security Chief shall ensure that all areas under his direction are staffed and prepared to manage Security and Contract Services for any emergency condition.

C. The Administrative Coordinator shall assume the duties of the Superintendent of Station Services when so designated. She will provide technical expertise to

the Superintendent of Station Services and to other members of the TSC as required. She is responsible for coordinating and maintaining general adminstrative functions and for contacting the TSC clerk(s) as needed. The Administrative Coordinator shall ensure that all areas under her direction are staffed and prepared to manage administrative functions during any emergency condition.

D. The Training and Safety Coordinator shall assume the duties of the Superintendent of Station Services when so designated. She will provide technical expertise to the Superintendent of Station Services and to other members of the TSC as required. She is responsible for coordinating the station training and safety activities, Fire Protection and Medical Services in support of the emergency organization. The Training and Safety Coordinator shall ensure that all areas under her direction are staffed and prepared to provide needed training and safety evaluations during any emergency condition.

4.3.4 Maintenance Group:

A. The Superintendent of Maintenance when designated, shall assume the duties of the Station Manager. He will provide technical expertise to the Station Manager and the Superintendent of Operations regarding solutions to operational problems. He shall provide technical expertise to other members of the TSC in areas of Mechanical Maintenance, Planning, Instrument and Electrical Maintenance, and Materials Support. He will insure that all areas of responsibility under his direction are staffed with competent personnel properly trained and prepared to support any operational emergency condition. This individual shall be the third alternate to the Emergency Coordinator in the event the Station Manager is unavailable.

B. The Mechanical Maintenance Engineer shall assume the duties of the Superintendent of Maintenance when so designated. He will provide technical expertise to the Superintendent of Maintenance and to other members of the TSC as required. He is responsible for preventative and actual maintenance for all station mechanical equipment and facilities. The Mechanical Maintenance Engineer shall insure that all areas under his direction are staffed and prepared to manage maintenance support for any emergency condition.

C. The Planning Engineer shall assume the duties of the Superintendent of Maintenance when so designated. He will provide technical expertise to the Superintendent of Maintenance and to other members of the TSC as required. He is responsible for the implementation and evaluation of the maintenance management program and for the administration of the materials procurement program. The Planning Engineer shall insure that all areas under his direction are staffed and prepared to manage planning and materials support for any emergency condition.

D. The Instrument and Electrical Engineer shall assume the duties of the Superintendent of Maintenance when so designated. He will provide technical expertise to the Superintendent of Maintenance and to other members of the TSC as required. He is responsible for maintaining all station I&E equipment in an operational state. The Instrument and Electrical Engineer shall ensure that all areas under his direction are staffed and prepared to manage I&E support for any emergency condition.

4.4 Operations Support Center Staff

4.4.1 The Operations Support Center (OSC), location shown in Enclosure 5, shall be activated by the Emergency Coordinator in accordance with the applicable Emergency Procedure. The OSC will be staffed and organized as per Enclosure (3) or as deemed necessary by the Shift Supervisor or Station Manager. Those personnel assigned to the OSC shall be under the supervision of a Shift Supervisor or other Operations Group Supervisor designated by the Emergency Coordinator.

4.4.2 The Operations Support Center shall include as a minimum the following personnel:

A. Operations: Operators on shift who are not actually assigned to the control room and additional operations people on site or called out as required by the Shift Supervisor or Station Manager.

B. Health Physics: A Health Physics Supervisor and five technicians as deemed necessary by the Station Health Physicist. The Health Physics Supervisor shall work closely with the Shift Supervisor in charge and shall maintain contact with the HP S & C Coordinator in the TSC.

C. Other station groups as necessary.

4.4.3 In the event that the Operations Support Center becomes environmentally uninhabitable due to radiological or other conditions, the OSC shall move to the rear of the Control Room or to other facilities as applicable.

5.0 ACTIVATION OF EMERGENCY ORGANIZATION

5.1 Phased Activation of T.S.C. Organization

5.1.1 Selected station personnel are notified of situations classified as Unusual Events by Emergency Response Procedure, RP/0/A/5000/02. These individuals shall then respond as appropriate and shall notify any additional personnel in their organization to respond as needed. At the Alert class or greater, TSC activation is required, either full or partial as deemed necessary by the Station Manager.

5.1.2 To effectively respond to an emergency situation and to avoid unnecessary personnel from being activated, the TSC is divided into a Phase I and II organization, with other TSC personnel as needed. The Station Manager may activate Phase I separately or both Phase I and II jointly (Phase II is never activated without prior activation of Phase I).

5.1.3 See Enclosure 6 for Notification Mechanism.

5.2 Phase I of the Technical Support Center

5.2.1 Phase I of the Technical Support Center organization shall be staffed and organized as indicated below or as deemed necessary by the Station Manager.

NOTE: See Enclosure (1) for TSC organization.

5.2.2 Personnel assigned to Phase I of TSC shall be capable of supplementing the on-shift Emergency Response within 30 to 45 minutes of notification.

A. Station Manager/Emergency Coordinator
B. Group Superintendents
C. Station Health Physicist
D. Performance Engineer
E. Instrument and Electrical Engineer
F. Offsite Communicator
G. Fielding Monitoring Coordinator
H. Data Analysis Coordinator
I. S & C Coordinator
J. Support Coordinator
K. Test Engineer

5.2.3 In the event that the Technical Support Center becomes environmentally uninhabitable due to radiological or other conditions and the Control Room remains secure (habitable), Phase I of the TSC shall move inside the Control Room area. In the event the Control Room also becomes uninhabitable due to radiological or other conditions, Phase I of the TSC shall move to the Administration Building or to other facilities as applicable.

5.3 Phase II of the Technical Support Center

5.3.1 Phase II of the Technical Support Center organization shall be staffed and organized as indicated below or as deemed necessary by the Station Manager.

A. Operating Engineer
B. Assistant Operating Engineer
C. The Station Chemist
D. The Reactor Engineer
E. Performance Technician(s)
F. The Licensing & Projects Engineer
G. The Mechanical Maintenance Engineer
H. The Security & Contract Coordinator
I. The Training and Safety Coordinator

5.3.2 Personnel assigned to Phase II of TSC shall be capable of supplementing the on-shift Emergency Response within 45 to 75 minutes of notification

5.3.3 In the event that the Technical Support Center becomes environmentally uninhabitable due to radiological or other conditions, Phase II of the TSC shall move to the Administration Building or to other facilities as applicable, when directed by the Station Manager.

5.4 Other TSC Personnel

5.4.1 Full activation of the TSC is as shown in Enclosure (1). Other personnel not specified as part of the Phase I and II staff but still necessary for TSC are as indicated below:

A. The Administrative Coordinator
B. The Planning Engineer
C. Clerks as needed, determined by Group Superintendents
D. TSC Logkeeper
E. Radio Operator

5.4.2 This group shall be activated as soon as practicable.

5.5 OSC Notification

5.5.1 Operations personnel will be notified by the Operation's Duty Engineer or someone designated either by station phone or home phone as required.

5.5.2 Health Physics personnel will be notified by the Station Health Physicist or alternate either by station phone or home phone as required.

6.0 EMERGENCY ORGANIZATION SUPPORT

6.1 Clerical assistance for the Station Manager and the four station superintendents will be provided by one of their normally assigned

clerks. Notification of this individual will be made by the Administrative Coordinator.

6.2 Food and beverage will be supplied to the TSC and OSC as appropriate for the time of day. After initial staffing of the TSC and OSC, coffee and snack material will be provided by the Administrative group.

6.3 Station Fire Brigade

6.3.1 The fire brigade will have its normal functions of fire fighting in an emergency situation as needed.

6.3.2 In the event of an emergency requiring activitation of the Technical Support Center Phase I & II, the Station Fire Chief or his designee shall make frequent reports to the Training and Safety Coordinator regarding the status of any fires.

6.3.3 The Station Fire Chief or his designee shall also coordinate and direct the services of any outside fire departments called upon to assist in fire fighting on station property.

6.4 Station Security

6.4.1 The security force will have its normal function of station security in an emergency situation.

6.4.2 In the event of an emergency requiring activation of the Technical Support Center Phase I & II, the Security Shift Lieutenant or his designee shall make frequent reports to the Security and Contract Coordinator regarding the status of any security violations, threats or civil disturbances.

6.4.3 The Security Shift Lieutenant shall also coordinate and direct the services of any outside law enforcement agencies called upon to assist in an emergency situation.

6.4.4 The Security Shift Lieutenant shall inform the Security and Contract Coordinator in the TSC of the status of Site Assembly/Evacuation.

6.5 Evacuation Coordinator

6.5.1 In the event of a site evacuation, the Evacuation Coordinator shall be the overall person in charge at the evacuation site.

A. This position reports to the Emergency Coordinator or his designee for matters pertaining to personnel disposition, and status of the evacuation.

B. All evacuated supervisory personnel will in turn report to the Evacuation Coordinator.

6.5.2 The Emergency Coordinator shall notify the Evacuation Coordinator of the need for a Site Evacuation.

7.0 TRAINING & DRILLS

7.1 Training

7.1.1 Training will be provided for Onsite Emergency Organizations personnel listed in Enclosure 1 of this directive as per Station Directive 2.5.2 (TS).

7.1.2 Operations personnel, Security personnel and Fire Brigade members will receive training as a part of their regular shift training or as scheduled by the Training Coordinator.

7.2 Annual Training

7.2.1 All Emergency Organization personnel will receive annual overview retraining as per part O of the Emergency Plan.

7.3 Drills

7.3.1 Practice drill sessions will be held for each group within the organization to allow the individuals to perform their assigned functions.

7.3.2 The drill instructor will make corrections of performance as needed, during the drill.

7.3.3 The drill scenario, participants names and evaluation will be documented and any deficiencies will be corrected.

8.0 ENCLOSURES

Enclosure (1) Technical Support Center Staff - Phase I & II

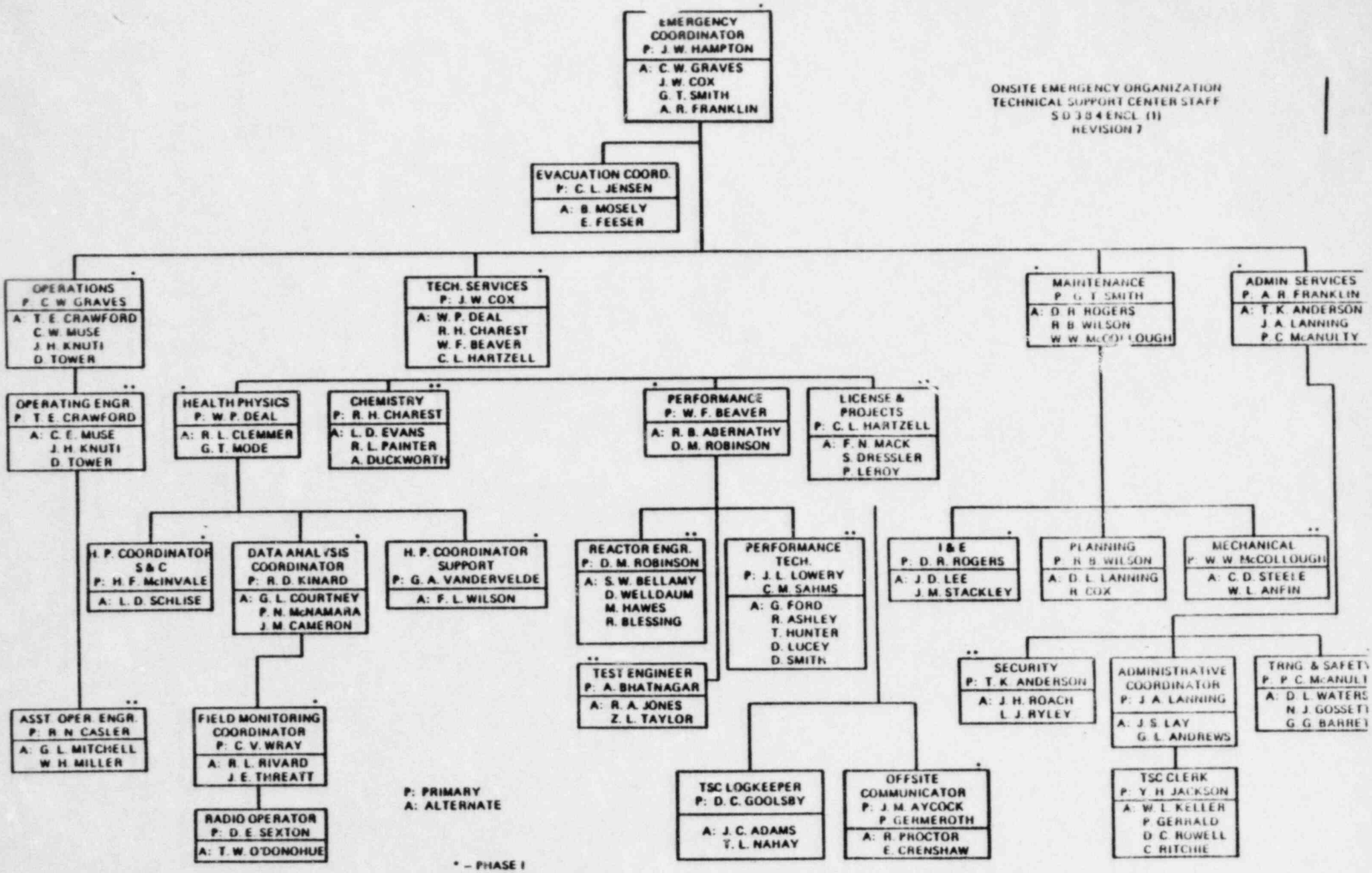
Enclosure (2) Technical Support Center Telephone Activation

Enclosure (3) Operations Support Center Personnel

Enclosure (4) TSC Location

Enclosure (5) OSC Location

Enclosure (6) Notification Mechanism


EMERGENCY COORDINATOR
P: J. W. HAMPTON
A: C. W. GRAVES
J. W. COX
G. T. SMITH
A. R. FRANKLIN
ONSITE EMERGENCY ORGANIZATION
TECHNICAL SUPPORT CENTER STAFF
S D 3 8 4 ENCL (1)
REVISION 7
EVACUATION COORD.
P: C. L. JENSEN
A: B. MOSELY
E. FEESER
OPERATIONS
P: C. W. GRAVES
A: T. E. CRAWFORD
C. W. MUSE
J. H. KNUTI
D. TOWER
TECH. SERVICES
P: J. W. COX
A: W. P. DEAL
R. H. CHAREST
W. F. BEAVER
C. L. HARTZELL
MAINTENANCE
P: G. T. SMITH
A: D. R. ROGERS
R. B. WILSON
W. W. McCOLLOUGH
ADMIN SERVICES
P: A. R. FRANKLIN
A: T. K. ANDERSON
J. A. LANNING
P. C. McANULTY
OPERATING ENGR.
P: T. E. CRAWFORD
A: C. E. MUSE
J. H. KNUTI
D. TOWER
HEALTH PHYSICS
P: W. P. DEAL
A: R. L. CLEMMER
G. T. MODE
CHEMISTRY
P: R. H. CHAREST
A: L. D. EVANS
R. L. PAINTER
A. DUCKWORTH
PERFORMANCE
P: W. F. BEAVER
A: R. B. ABERNATHY
D. M. ROBINSON
LICENSE & PROJECTS
P: C. L. HARTZELL
A: F. N. MACK
S. DRESSLER
P. LEROY
H. P. COORDINATOR S&C
P: H. F. McINVALE
A: L. D. SCHLISE
DATA ANALYSIS COORDINATOR
P: R. D. KINARD
A: G. L. COURTNEY
P. N. McNAMARA
J. M. CAMERON
H. P. COORDINATOR SUPPORT
P: G. A. VANDERVELDE
A: F. L. WILSON
REACTOR ENGR.
P: D. M. ROBINSON
A: S. W. BELLAMY
D. WELLDAUM
M. HAWES
R. BLESSING
PERFORMANCE TECH.
P: J. L. LOWERY
C. M. SAHMS
A: G. FORD
R. ASHLEY
T. HUNTER
D. LUCEY
D. SMITH
I & E
P: D. R. ROGERS
A: J. D. LEE
J. M. STACKLEY
PLANNING
P: R. B. WILSON
A: D. L. LANNING
R. COX
MECHANICAL
P: W. W. McCOLLOUGH
A: C. D. STEELE
W. L. ANFIN
TEST ENGINEER
P: A. BHATNAGAR
A: R. A. JONES
Z. L. TAYLOR
SECURITY
P: T. K. ANDERSON
A: J. H. ROACH
L. J. RYLEY
ADMINISTRATIVE COORDINATOR
P: J. A. LANNING
A: J. S. LAY
G. L. ANDREWS
TRNG. & SAFETY
P: P. C. McANULT
A: D. L. WATERS
N. J. GOSSETT
G. G. BARRET
ASST. OPER. ENGR.
P: R. N. CASLER
A: G. L. MITCHELL
W. H. MILLER
FIELD MONITORING COORDINATOR
P: C. V. WRAY
A: R. L. RIVARD
J. E. THREATT
RADIO OPERATOR
P: D. E. SEXTON
A: T. W. O'DONOHUE
TSC LOGKEEPER
P: D. C. GOOLSBY
A: J. C. ADAMS
T. L. NAHAY
OFFSITE COMMUNICATOR
P: J. M. AYCOCK
P. GERMEROTH
A: R. PROCTOR
E. CRENSHAW
TSC CLERK
P: Y. H. JACKSON
A: W. L. KELLER
P. GERRALD
D. C. ROWELL
C. RITCHIE
P: PRIMARY
A: ALTERNATE
* – PHASE I
** – PHASE II

All telephone number will be AREA CODE [redacted] unless otherwise noted.

Emergency Coordinator/Station Manager

P:	J. W. Hampton	O:	
		H:	
A:	C. W. Graves	O:	
		H:	
A:	J. W. Cox	O:	
		H:	
A:	G. T. Smith	O:	
		H:	
A:	A. R. Franklin	O:	
		H:	

Superintendent of Operations

P:	C. W. Graves	O:	
		H:	
A:	T. E. Crawford	O:	
		H:	
A:	C. E. Muse	O:	
		H:	
A:	J. H. Knuti	O:	
		H:	
A:	D. Tower	O:	
		H:	

Superintendent of Technical Service

P:	J. W. Cox	O:	
		H:	
A:	W. P. Deal	O:	
		H:	
A:	R. H. Charest	O:	
		H:	
A:	W. F. Beaver	O:	
		H:	
A:	C. L. Hartzell	O:	
		H:	

Superintendent of Station Services

P:	A. R. Franklin	O:	
		H:	
A:	T. K. Anderson	O:	
		H:	
A:	J. A. Lanning	O:	
		H:	
A:	P. McAnulty	O:	
		H:	

Superintendent of Maintenance

P:	G. T. Smith	O:	
		H:	
A:	D. R. Rogers	O:	
		H:	
A:	R. B. Wilson	O:	
		H:	
A:	W. W. McCollough	O:	
		H:	

NOTE P: Primary A: Alternate O: Office H: Home

All telephone number will be AREA CODE 803 unless otherwise noted.

Operating Engineer

P:	T. E. Crawford	O:	
		H:	
A:	C. E. Muse	O:	
		H:	
A:	J. H. Knuti	O:	
		H:	
A:	D. Tower	O:	
		H:	

Asst. Operating Engineer

P:	R. N. Casler	O:	
		H:	
A:	G. Mitchell	O:	
		H:	
A:	W. H. Miller	O:	
		H:	

Health Physics

P:	W. P. Deal	O:	
		H:	
A:	R. L. Clemmer	O:	
		H:	
A:	G. T. Mode	O:	
		H:	

Data Analysis Coordinator

P:	R. D. Kinard	O:	
		H:	
A:	G. L. Courtney	O:	
		H:	
A:	P. N. McNamara	O:	
		H:	
A:	J. M. Cameron	O:	
		H:	

Chemistry

P:	R. H. Charest	O:	
		H:	
A:	L. D. Evans	O:	
		H:	
A:	B. Painter	O:	
		H:	
A:	A. Duckworth	O:	
		H:	

Performance Engineer

P:	W. F. Beaver	O:	
		H:	
A:	R. Abernathy	O:	
		H:	
A:	D. M. Robinson	O:	
		H:	

Field Monitoring Coordinator

P:	C. V. Wray	O:	
		H:	
A:	R. L. Rivard	O:	
		H:	
A:	J. E. Threatt	O:	
		H:	

H. P. Support Coodinator

P:	G. A. Vandervelde	O:	
		H:	
A:	F. L. Wilson	O:	
		H:	

Licensing & Projects Engineer

P:	C. L. Hartzell	O:	
		H:	
A:	F. N. Mack	O:	
		H:	
A:	S. W. Dressler	O:	
		H	
A:	P. G. LeRoy	O:	
		H:	

Radio Operator

P:	D. E. Sexton	O:	
		H:	
A:	T. W. O'Donohue	O:	
		H:	

All telephone number will be AREA CODE 803 unless otherwise noted.

Reactor Engineer

P:	D. M. Robinson	O: H:
A:	S. M. Bellamy	O: H:
A:	M. Hawes	O: H:
A:	D. Wellbaum	O: H:
A:	R. Blessing	O: H:

Performance Technician

P:	M. Sahms	O: H:
P:	J. Lowery	O: H:
A:	G. Ford	O: H:
A:	R. Ashley	O: H:
A:	T. Hunter	O: H:
A:	D. Smith	O: H:
A:	D. Lucey	O: H:

Planning Engineer

P:	R. Wilson	O: H:
A:	D. Lanning	O: H:
A:	R. Cox	O: H:

I&E Engineer

P:	D. R. Rogers	O: H:
A:	J. Lee	O: H:
A:	J. Stackley	O: H:

Mechanical Engineer

P:	W. W. McCollough	O: H:
A:	C. D. Steele	O: H:
A:	W. L. Anfin	O: H:

Security & Contract Coordinator

P:	T. K. Anderson	O: H:
A:	J. Roach	O: H:
A:	L. Ryley	O: H:

Administrative Coordinato

P:	J. Lanning	O: H:
A:	J. Lay	O: H:
A:	G. Andrews	O: H:

Training & Safety

P:	P. McAnulty	O: H:
A:	D. Waters	O: H:
A:	J. Gossett	O: H:
A:	G. Barrett	O: H:

NOTE P: Primary A: Alternate O: Office H: Home

All telephone numbers will be AREA CODE 303 unless otherwise noted.

TSC Logkeeper

P: D. C. Goolsby O:
H:

A: J. Adams O:
H:

A: T. Nahay O:
H:

Offsite Communicator

P: J. M. Aycock O:
H:

P: P. W. Germeroth O:
H:

A: E. M. Crenshaw O:
H:

A: R. Proctor O:
H:

Test Engineer

P: A. S. Bhatnagar O:
H:

A: R. A. Jones O:
H:

A: Z. L. Taylor O:
H:

TSC Clerks

P: Y. Jackson O:
H:

A: W. Keller O:
H:

A: P. Gerrald O:
H:

A: D. Rowell O:
H:

A: C. Ritchie O:
H:

H.P. Coordinator S&C

P: H. F. McInvale O:
H:

A: L. D. Schlise O:
H:

Evacuation Coordinator

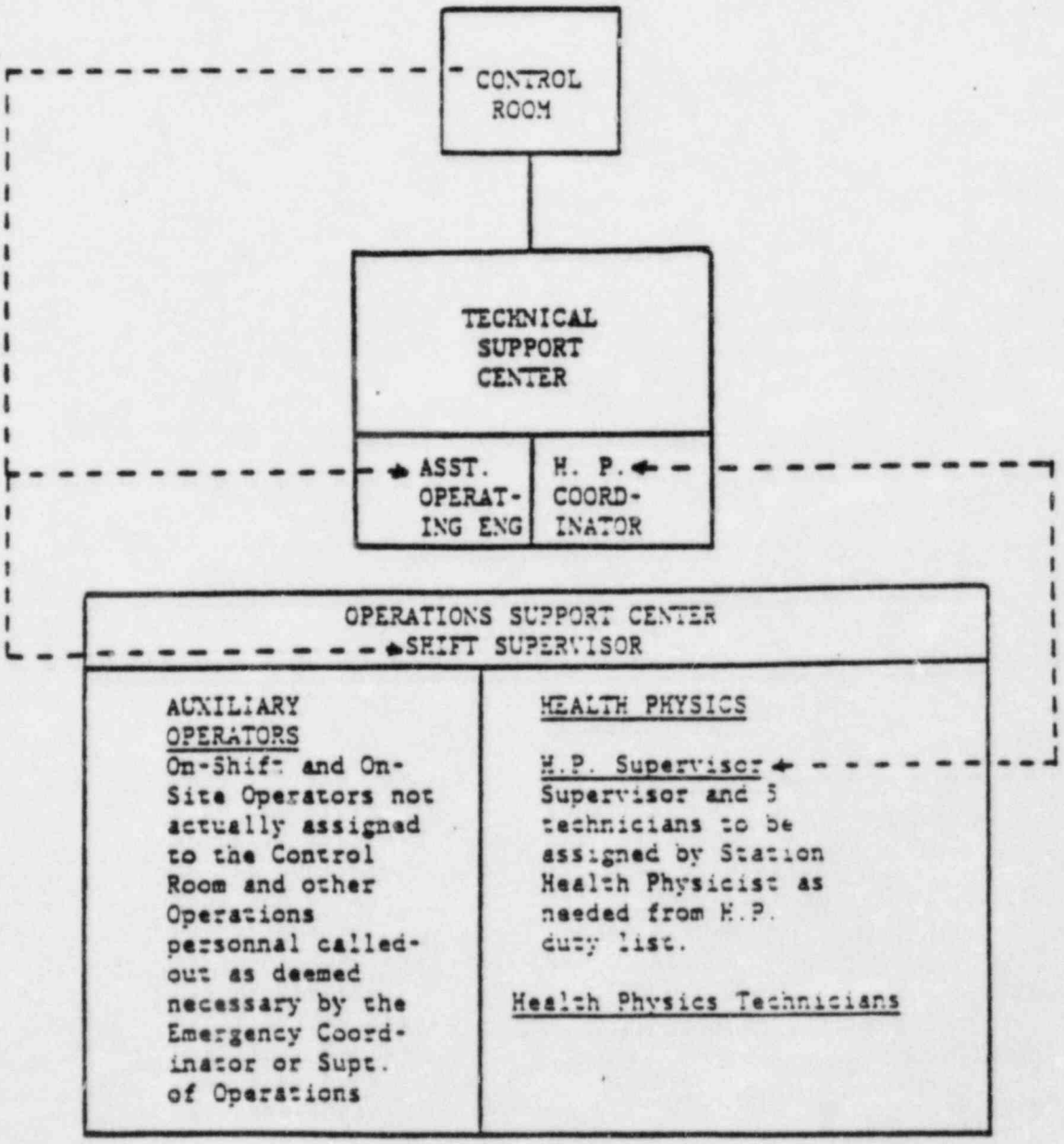
P: C. L. Jensen O:
Beeper:
H:

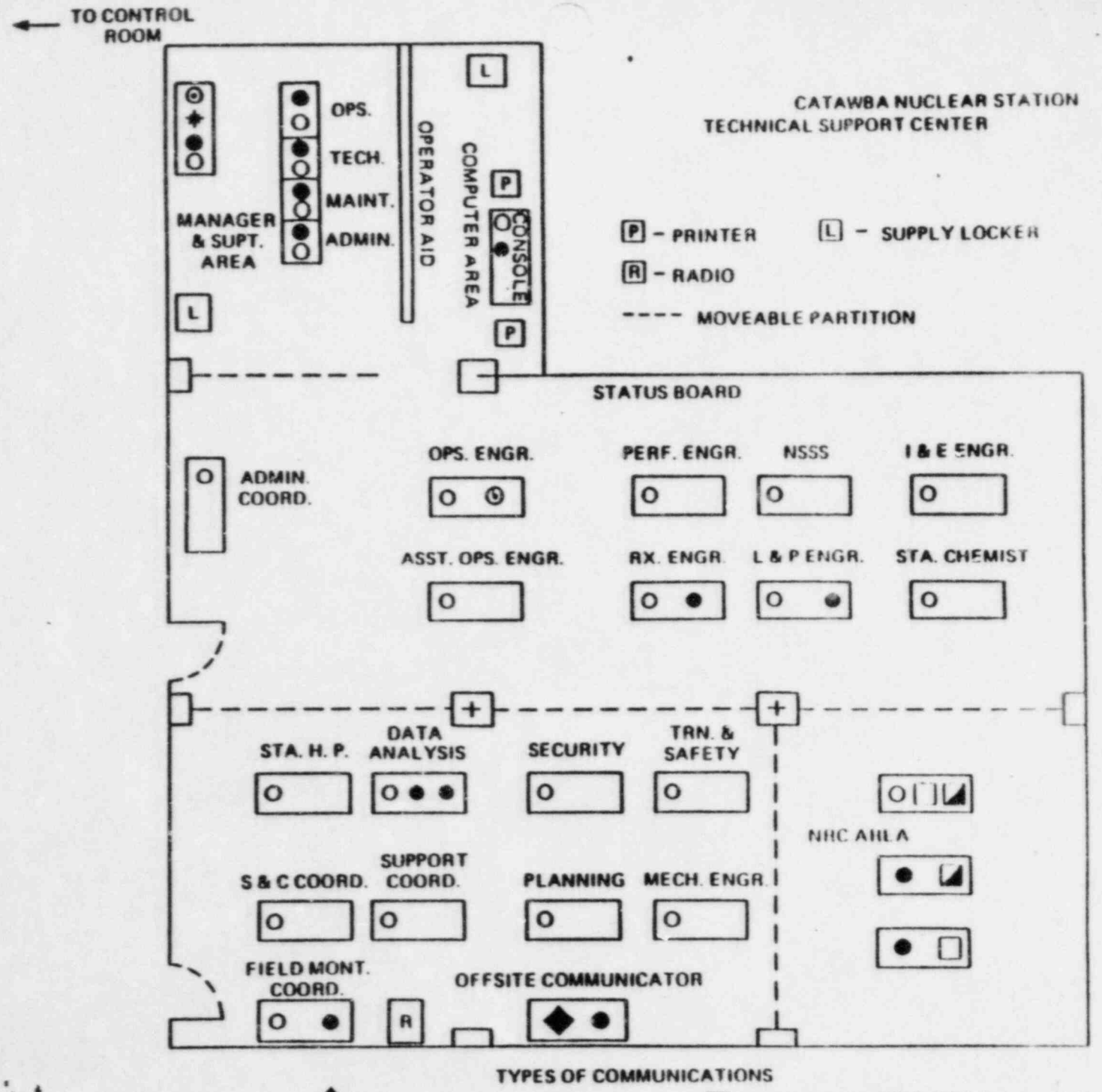
A: B. J. Moseley O:
Beeper:
H:

A: E. L. Feeser O:
Beeper:
H:

ONSITE EMERGENCY ORGANIZATION

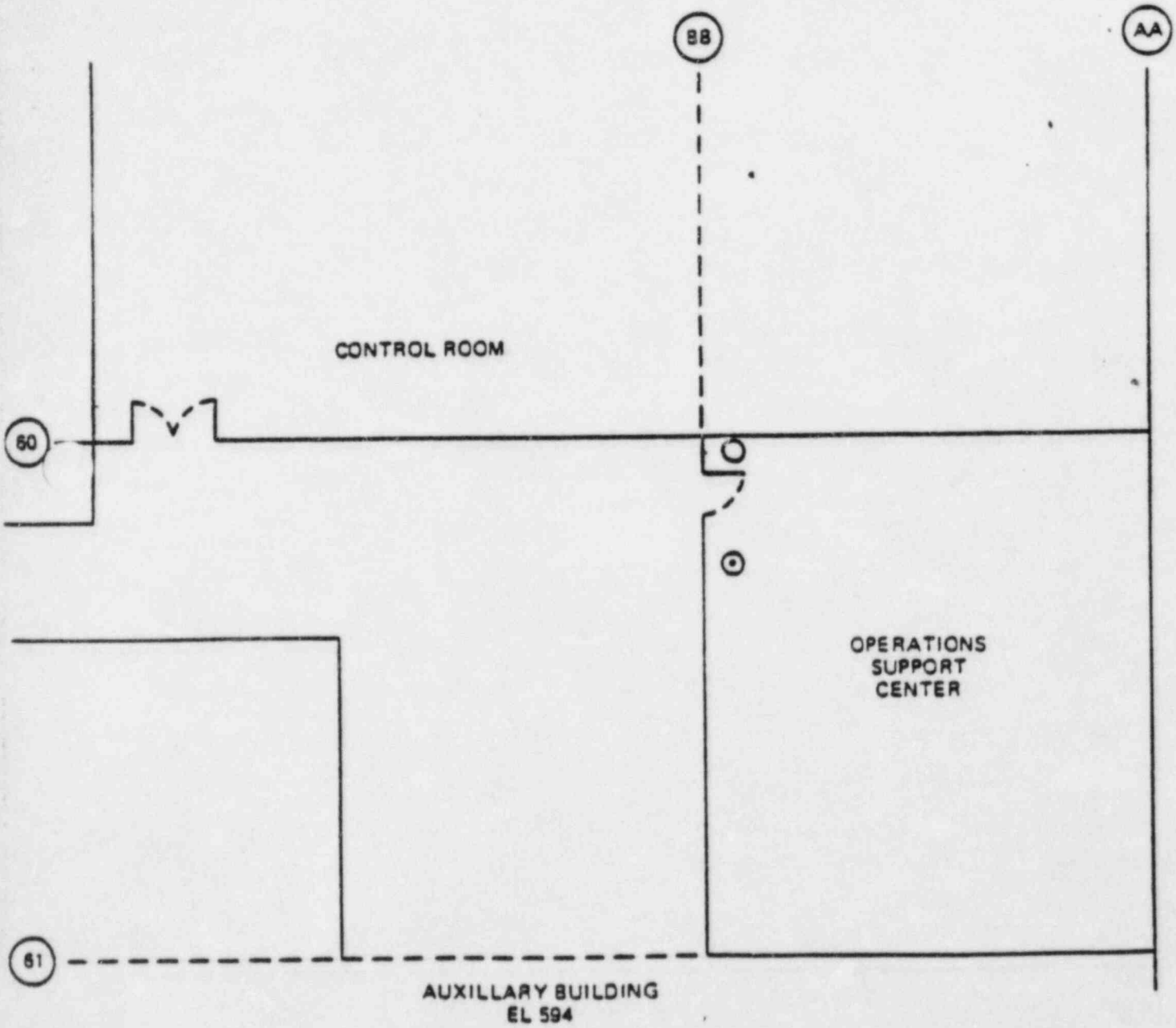
OPERATIONS SUPPORT CENTER




TO CONTROL ROOM
CATAWBA NUCLEAR STATION
TECHNICAL SUPPORT CENTER
OPS.
TECH.
MAINT.
ADMIN.
MANAGER & SUPT. AREA
OPERATOR AID
COMPUTER AREA
CONSOLE
P - PRINTER
L - SUPPLY LOCKER
R - RADIO
---- MOVEABLE PARTITION
STATUS BOARD
ADMIN. COORD.
OPS. ENGR.
PERF. ENGR.
NSSS
I & E ENGR.
ASST. OPS. ENGR.
RX. ENGR.
L & P ENGR.
STA. CHEMIST
STA. H. P.
DATA ANALYSIS
SECURITY
TRN. & SAFETY
NRC AHLA
S & C COORD.
SUPPORT COORD.
PLANNING
MECH. ENGR.
FIELD MONT. COORD.
OFFSITE COMMUNICATOR
TYPES OF COMMUNICATIONS
- PLANT PHONE
- OUTSIDE LINE
- RINGDOWN PHONE
- LINE TO RECOVERY MGR.
- EMERG. NOTIFICATION SYS. TO NRC
- HEALTH PHYSICS NETWORK
- OPERATIONS INTERCO

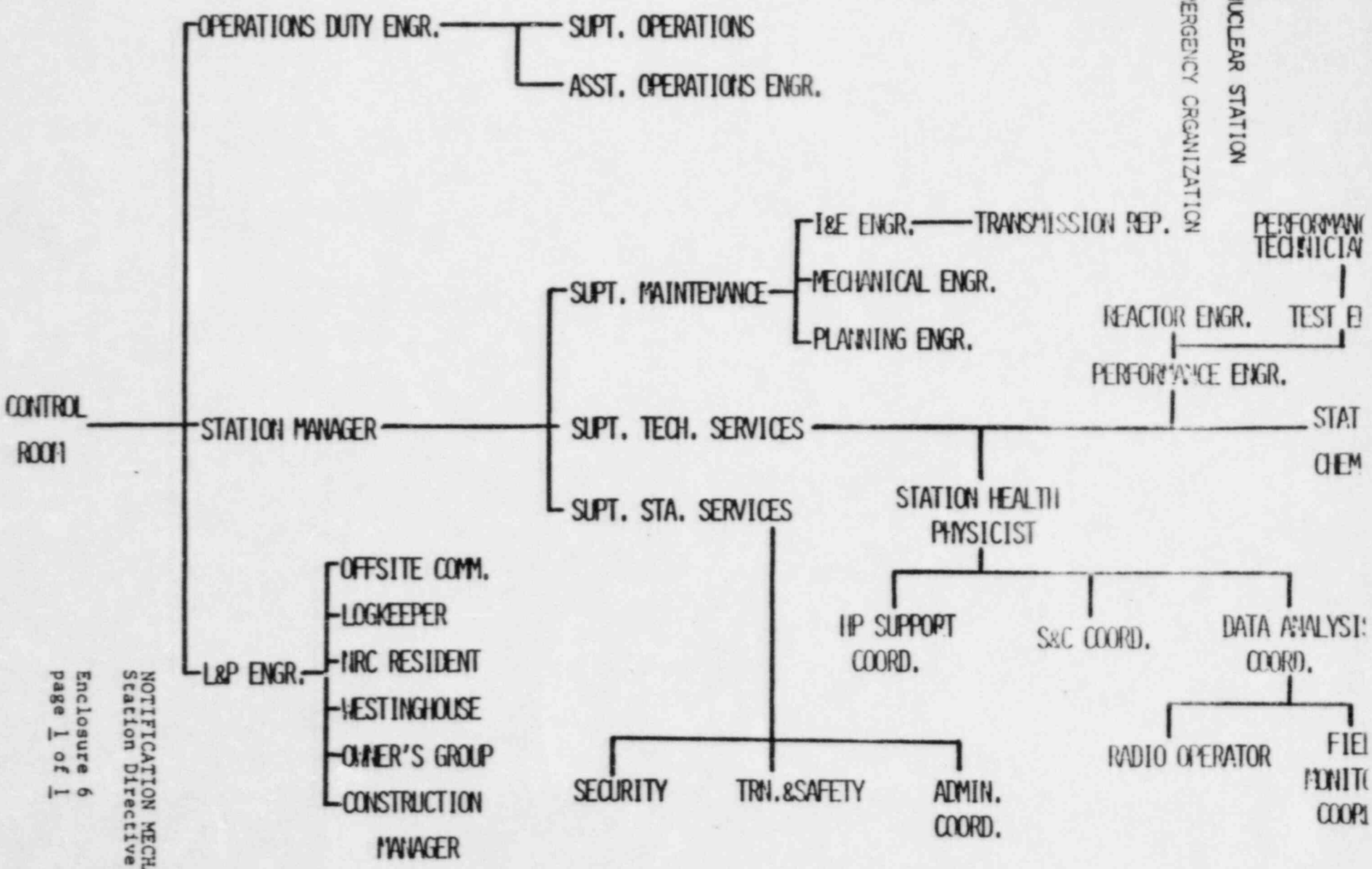
Enclosure (4)

CATAWBA NUCLEAR STATION
OPERATIONS SUPPORT CENTER



CATAWBA NUCLEAR STATION

SITE EMERGENCY ORGANIZATION



NOTIFICATION MECHANISM
Station Directive 3.8.4 Re

Enclosure 6
page 1 of 1