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

DUKE POWER COMPANY
PROCEDURE PREPARATION
PROCESS RECORD

(1) ID No: OP/0/A/6200/48
Change(s) 0 to
0 Incorporated

(2) STATION: McGuire Nuclear Station

(3) PROCEDURE TITLE: OPERATING PROCEDURE FOR THE OPERATION OF THE POST ACCIDENT LIQUID SAMPLE SYSTEM

(4) PREPARED BY: [signature] DATE: 12-28-82

(5) REVIEWED BY: Larry R. Kimray DATE: 12-30-82

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

(6) TEMPORARY APPROVAL (IF NECESSARY):

By: ______ (SRO) Date: ______

By: ______ Date: ______

(7) APPROVED BY: Tony L. McConnell Date: 1/5/83

(8) MISCELLANEOUS:

Reviewed/Approved By: ______ Date: ______

Reviewed/Approved By: ______ Date: ______

DUKE POWER COMPANY
McGUIRE NUCLEAR STATION
OPERATING PROCEDURE FOR THE OPERATION OF THE
POST ACCIDENT LIQUID SAMPLE SYSTEM

1.0 Purpose

The Post Accident Liquid Sampling System (PALS) provides the capacity to promptly obtain a reactor coolant sample under a nuclear reactor accident condition.

Sample acquisition during accident conditions (normal sampling area being inaccessible) will help evaluate information related to:

1) The extent of core damage which has occurred or is occurring.
2) Types and quantities of fission products released to containment liquid and gas phases.
3) Reactor Coolant chemistry and radiochemistry.

2.0 Limits

2.1 The PALS will be used to sample primary systems under the following conditions:

2.1.1 Post accident sampling

2.1.2 Inaccessibility of the Primary Sampling Lab due to radiation levels.

2.1.3 Request from the Station Chemist or designee.

2.2 The undiluted sample volume is 1.25 ml. and the final dilution volume shall be controlled between 250-3500 ml.

2.3 Health Physics personnel must perform continuous radiation monitoring during sampling at the liquid sample or control panel on the 716'el and 750'el Auxillary Building respectively.

2.4 Samples will be collected in 1 ml. and 5 ml. lockable glass syringes to be found in the Hot Lab.

3.0 Initial Conditions

3.1 In order to maintain the PALS in an operable condition at all times, the following requirements on Enclosure 9.1, PALS Monthly Checklist, must be done monthly and be current prior to sampling.

3.2 Verify with Operations that 1KC "A" Train is in operation when sampling is to be performed and list on Enclosure 9.2.

3.3 If the containment building has been isolated due to an SI or SIS signal, no sample is to be obtained until the On-Site Support Center can decide how to un-isolate one of the sample lines.

3.4 Verify with primary chemistry personnel that no sampling is in progress in the NM Lab.

4.0 Panel Preparation

4.1 Valve Alignment for Liquid Sampling

4.1.1 Contact Operations and request the following valves be opened to obtain the sample desired:

NC HOT LEG A

NC Hot Leg #1 Sample Line Inside Cont. Isol	1NM22A
NCHot Leg Sample Header Outside Cont. Isol	1NM26B

NC HOT LEG D

NC Hot Leg #4 Sample Line Inside Cont. Isol	1NM25A
NC Hot Leg Sample Header Outside Cont. Isol	1NM26B

ND PUMP DISCH 1A

*ND Pump 1A and HX Miniflow Stop	1ND68A

ND PUMP DISCH 1B

*ND Pump 1B and HX 1B Miniflow Stop	1ND67B

*Flow should be verified in this piping prior to sampling by verifying with operations that the respective A or B train is in service. Sign off Enclosure 9.2.

4.1.2 Notify Health Physics of sampling and ask for surveillance prior to going to the Control Panel. Sign off Enclosure 9.2.

4.1.3 Notify Radwaste Chemistry that panel will be operated.

4.1.4 Record specific conductivity of buffer solution on Enclosure 9.2 from Primary Chemical Data Log and take a stop watch and panel keys (located in Cold Lab Key Box) to Control Panel.

4.2 Control Panel (750'el. Aux. Bldg. Cable Room)

4.2.1 Turn the main selector knob (on control panel) to "Reset". Place key in System Power Switch and turn to the right. Press "Reset" button.

4.2.2 For ND Pump Discharge Sample, place the "Remote/Local" switch on the PALS Control Panel in the "Local" position and press "Open" switch for 1NM39 or 1NM40 to line up for an ND "1A" or "1B" Pump Discharge sample respectively. This is to be done after Operations has opened 1ND68A or 1ND67B.

4.2.3 Place the toggle switch for the dilution water meter and the nitrogen dilution meter on "ON".

4.2.4 Place the toggle switch for the radiation monitor to "ON" and turn the scale select to "rem/hr".

4.2.5 Place the temperature probe selector (Tc) to position 1.

4.2.6 Place the conductivity meter to "Measure".

4.2.7 Push in the pH probe "standardize" knob.

4.2.8 Select the system to be sampled with the system selector - Reactor Coolant System (refers to NC Hot Leg), Reactor Building Nor. Sump (refers to ND Pump Discharge).

5.0 <u>Panel Operation</u>

5.1 Panel Prep (position 1)

5.1.1 Turn the selector knob to "Panel Prep", position 1.

5.1.2 Press the "Selection Power - Activate" button.

5.1.3 Press the "Panel Prep. - Purge" button and hold for 1 min. and release.

5.1.4 Press the "Panel Prep. - Drain" button and hold for 30 sec. and release.

5.1.5 Press the "Panel Prep. - Calibration" button and hold until the conductivity and pH meters stabilize. (Approximately 1 minute)

5.1.6 Record the specific conductivity reading on Enclosure 9.2, the measured specific conductivity should correspond with the specific conductivity of the pH standard which was prepared in the lab. If not, repeat section 5.1.3 and 5.1.5. Contact the Station Chemist or Primary Supervisor if this measure does not work in the event of an accident. (If this is a routine test, replace the probe and then submit a work request as a final repair measure.

NOTE: Multiply conductivity meter reading by 1000 to obtain proper specific conductivity value.

5.1.7 Adjust the pH meter to the known pH of the standard.

5.1.8 Press the "Panel Prep - Purge" button and hold for 30 seconds then release.

5.1.9 Press the "Panel Prep - Flush" button and hold until the conductivity and pH meters stabilize (specific conductivity and pH of demineralized water) approximately 2-3 minutes, then release.

5.1.10 Press the "Panel Prep - Purge" button for 30 seconds and release.

5.1.11 Press the "Panel Prep - Drain" button for 60 seconds and release.

5.1.12 Repeat Steps 5.1.9, 5.1.10, 5.1.11 and then continue to Section 5.2.

5.2 Sample Collection (Position 2)

5.2.1 Turn the selector knob to "Sample Recirculation", position 2.

5.2.2 Set the temperature selector, located on the instrument panel, to Tc 1.

5.2.3 Record the radiation monitor reading on Enclosure 9.2 (Background).

5.2.4 Press the "Selection Power - Activate" button. Record the starting time on Enclosure 9.2. The radiation monitor should show an increased activity level and Tc 1 should show temperature increase as sample enters the liquid panel.

5.2.5 If Tc1 goes above 190°F, sample is not being cooled sufficiently. Turn selector to "Reset". Press" Reset" button and turn Power Key to vertical position. Call Station Chemist or his designee.

5.2.6 Turn the selector knob to "sample", position 3, when the sample temperature at Tc 1 stabilizes. Record the temperature on Enclosure 9.2. (Approximately 7-8 minutes)

NOTE: Tc 3 monitors KC Coolant outlet from the PALS HX and can be monitored during Tc 1 and Tc 2 stabilization.

5.3 Sample (Position 3)

5.3.1 Turn the temperature selector to Tc 2.

5.3.2 Press the "Selection Power - Activate" button.

5.3.3 Monitor the temperature gauge and when Tc 2 stabilizes record the temperature and radiation readings on Enclosure 9.2. (Approximately 7-8 minutes)

5.3.4 Subtract initial background activity from sample activity found during Tc 2 stabilization and record reading on Enclosure 9.2. This is the radiation due to the sample.

5.3.5 Press the "Sample - 1 Tc 2 Stabilize" button. When pressure stabilizes record the reading on Enclosure 9.2.

5.3.6 Press the "Sample - 2 Pressure Stabilize" button. Record the time sample flow stops on Enclosure 9.2.

5.3.7 Turn the selector knob to "Depressurization", position 4.

5.3.8 Request Operations to close the valves opened in section 4.1. If an ND Pump Discharge sample is being taken, press "close" switch for the ND Pump Discharge Isolation Valve, either 1ND39 or 1ND40 and place the "Remote/Local" switch in the "Remote" position.

5.4 Depressurization (Position 4)

5.4.1 Press the "Reset" button on the nitrogen flow totalizer to zero the readout. Preset the counter on the totalizer to 99999.

5.4.2 Press the "Selection Power - Activate" button. Verify the level gauge on the instrument panel indicates a vacuum of -25 inches of mercury (-25 level). Wait 60 seconds and insure 3000 psig pressure gauge indicates 0 psig pressure.

5.4.3 Press the "Start" button on the nitrogen flow totalizer and monitor the level gauge. Press the "Stop" button on the totalizer when the Level gauge needle first begins to move (approximately 5 minutes). Press "Start" button and "Stop" button to add small amounts of nitrogen and continue small adds until level meter reads 0-2 inches in level. If 5 inches is exceeded, a new stripped gas sample will need to be taken (ie) start from Section 4.1.

5.4.4 Turn the selector knob to "Liquid Sample", position 5.

5.5 Liquid Sample (Position 5)

5.5.1 Press the "Selection Power - Activate" button.

5.5.2 Press the "Liquid Sample - 1) Conductivity" button and hold until the conductivity meter stabilizes (approximately 5 seconds). Record the specific conductivity on Enclosure 9.2.

5.5.3 Press both the "Liquid Sample - 1) Conductivity" and Liquid Sample - 2)Log pH" bottons and hold until the pH meter stabilizes. If meter does not stabilize in 30 seconds, release both buttons and take a reading. Record the pH on Enclosure 9.2.

5.5.4 Press the "Gas Sample - 1) Activate" button. Note level gauge should decrease.

5.5.5 Press the "Gas Sample - 3) Diluted Gas Sample Grab" button.

5.5.6 Turn the selector knob to "Liquid Sample Prep.", position 6.

5.6 Liquid Sample Prep (Position 6)

5.6.1 Press the "Selection Power - Activate" button.

5.6.2 Press the "Liquid Sample Prep - B Activate to desired ml. volume" button and wait 5 seconds, after depressing. This deposits 1.25 ml of sample for dilution.

5.6.3 Press the "Reset" button on the dilution water flow totalizer and preset the meter for 250 mls of dilution water.

Press the "Start" button and let dilution continue to completion. Record the dilution volume on Enclosure 9.2.

5.6.4 Press the "Liquid Sample Prep - 3) Activate Mix" button and hold for 10 seconds.

5.6.5 Turn the selector knob to "Liquid Sample", position 7.

5.7 Liquid Sample (Position 7)

5.7.1 Press the "Selection Power - Activate" button.

5.7.2 Press the "Liquid Sample - Activate" button. Wait 15 seconds.

5.7.3 Immediately after 15 seconds press the "Liquid Sample - Diluted Sample Grab" button.

5.7.4 Turn the selector knob to "Flush", position 8.

5.8 Flush (Position 8)

5.8.1 Press the "Selection Power - Activate" button.

5.8.2 Press the "Flush - Activate" button and wait 4 - 5 minutes, 1st flush cycle.

5.8.3 Press the "Flush - Activate" button and monitor pH and conductivity meters until they reach equilibrium of demineralized water, 2nd flush cycle. (Approx. 10 minutes.)

5.8.4 Press the "Flush - Activate button and wait 3 minutes, 3rd flush cycle.

5.8.5 Press the "Flush - Activate" button. The "Complete": light must illuminate. If light doesn't illuminate continue and write a work request after sampling is completed.

5.8.6 Turn the selector knob to "Drain", position 9.

5.9 Drain (Position 9)

5.9.1 Press the "Selection Power - Activate" button.

5.9.2 Press the "Drain - Activate" button. Wait 120 seconds.

5.9.3 Press the "Drain - Activate" button. Wait 120 seconds.

5.9.4 Press the "Drain - Activate" button. Wait 13 minutes.

5.9.5 Press the "Drain - Activate" button and the "Complete" light should illuminate.

5.9.6 Turn the selector knob to "reset" and press the "reset" button.

5.9.7 Turn the System Power Key to the left to operate the sump pump: Allow pump to run for 15 minutes to insure sump is pumped dry.

5.9.8 Turn the System Power Key to the right to re-energize the PALS. Record the radiation level on Enclosure 9.2.

5.9.9 If the field at the panel is greater than 3 Rem/hr, continue to section 5.10, otherwise turn the System Power

Key to the vertical off position and proceed to section 6.0.

5.10 Decontamination

5.10.1 Turn the selector knob to "Panel Prep", position 1.

5.10.2 Press the "Selection Power - Activate" button.

5.10.3 Press and hold the "Flush" button for 2 minutes.

5.10.4 Repeat Panel Flush and Drain modes starting Section 5.8 through 5.9.8.

5.10.5 If radiation level is less than 3 Rem/hour, turn the System Power Key to the vertical position and continue to Section 6.0. If however, the radiation level remains greater than 3 Rem/hour, go back to step 4.1 and repeat the sequence using a larger dilution volume. See Enclosure 9.3 to determine the dilution volume. If with a 3500 ml dilution volume the radiation level is still greater than 3 Rem/hour, contact the Station Chemist or his designee.

6.0 <u>Sampling</u>

6.1 Verify the operability of 2-1 ml and 2-5 ml glass locking syringes located in the Hot Lab and label them.

6.2 Contact Health Physics Surveillance and Control Group and request surveillance while taking gas and liquid samples from the sample portion of the PALS located on 716'el. Aux. Bldg. FF-54.

6.3 Collect 2 - 1.0 ml stripped gas samples at the gas sample panel septum located on the north side of the sample panel and place syringes in plastic bag.

6.4 Collect 2 - 5 ml liquid samples from the liquid sample septum located on the south side of the sample panel and place syringes in plastic bag.

6.5 Replace the septa after collecting the syringe samples prior to returning to the Hot Lab, time permitting.

6.6 Take syringes to Hot Lab <u>in</u> <u>a</u> <u>sample</u> <u>carrier</u> and place in operating fume hood behind a lead brick shield to await analysis.

7.0 <u>Sample Analysis</u>

7.1 One syringe of stripped gas will be analyzed via Chemistry procedure CP/0/B/8100/31, Chemistry Procedure for the Analysis of Gases From the Reactor Coolant System Gas Mixtures. No averaging of gas samples will be done as in the procedure as only one syringe of sample will be pulled. Analyze the sample for % H_2 and O_2 and report results as follows:

$$\% H_2 \times \frac{1000\ cc}{0.170\ kg} \times \frac{1}{100} = cc/kg\ H_2 \quad (ie)\ \%H_2 \times 58.3 = cc/Kg\ H_2$$

$$\% O_2 \times \frac{1000\ cc}{0.170\ kg} \times \frac{1}{100} = cc/kg\ O_2 \quad (ie)\ \%O_2 \times 58.3 = cc/Kg\ O_2$$

Where: % gas is determined via CP/O/B/8100/31

1000 cc = stripped gas bomb volume

0.170 kg = reactor coolant sample size

1/100 = conversion of percent to decimal

Report cc/kg H_2 and O_2 on Enclosure 9.2.

7.2 Take the remaining 1 ml. syringe with stripped gas sample, withdraw 1 ml air from septum stoppered glass vial and load 1 ml stripped gas. Analyze by GeLi Spectral Analysis following CP/O/A/8200/05, Chemistry Procedure for Radioisotope Analysis.

Report the actual sample volume on the botton of the sample analysis form under remarks and submit to Health Physics so that they may adjust isotope acitivities from diluted samples to reflect reactor coolant activity. The calculation is as follows:

$$\text{Sample Volume} = \frac{170\ ml.}{1000} = 0.17\ ml.$$

Where: 1000 cc = stripped gas bomb volume

170 cc = reactor coolant sample size

7.3 Take 1 ml of liquid sample and dilute to 50 mls with Super Q Water in a 60 ml poly bottle. Analyze by GeLi Spectral Analysis following CP/O/A/8200/05. Report the actual sample volume being counted on the bottom of the sample analysis form under remarks and submit to Health Physics so that appropriate adjustment of isotope activities occurs. The calculation of sample volume is as follows:

$$\text{Sample Volume} = \frac{1.25\ ml}{\text{Total Dilution Volume}}$$

Where: 1.25 ml. = Reactor Coolant Volume

Total Dilution Volume = mls water added in Part II #11 of Enclosure 9.2 + 1.25 mls.

Example: 250 ml. dilution water added

$$\text{Sample Volume} = \frac{1.25 \text{ ml}}{251.25 \text{ ml}} = 4.98 \times 10^{-3} \text{ ml.}$$

7.4 Take 2 ml. of liquid sample and analyze for Boron using CP/0/B/8100/5E, Chemistry Procedure for the Determination of Boron in Water and Wastewater, Colormetric Method.

The value received must be corrected for dilution as follows:

$$\text{ppm Boron in reactor coolant} = \text{ppm measured} \times \frac{\text{Total Dilution Volume}}{1.25 \text{ ml.}}$$

Where: ppm Boron measured = value obtained via CP/0/B/8100/5E

Total Dilution Volume = mls water added Part II #11 of Enclosure 9.2 + 1.25 ml.

1.25 ml. = reactor coolant sample

7.5 If dilution proves inadequate for any of the above analyses, contact Station Chemist or his designee.

7.6 Report all results in the Primary Chemistry Data Log and Enclosure 9.2.

7.7 A minimum of 3 mls. of liquid will be needed for halide analysis (chloride). If insufficient sample remains after that needed for Boron and GeLi Spectral Analysis, the panel will be operated again within 10 hrs. after initial sampling and 2-5 ml. syringes of liquid sample taken for halide analysis. One technicon cup of liquid sample will be analyzed via CP/0/A/8100/06, Chemistry Procedure for the Determination of Chloride in High Purity Water. Results must be adjusted via the calculation in Section 7.4, substituting ppb Cl- for ppm B, so that dilution is taken into account. Record value in Primary Chemistry Data Log.

NOTE: Chloride sample to be taken only in an accident situation.

7.8 Clean 5 ml. syringes with Super Q Water after use.

8.0 References

8.1 Duke Power Company Nuclear Station Post Accident Liquid Sample Panel.

8.2 MC-1572-4.0 LL, Rev. 1

8.3 CP/0/B/8100/31, Chemistry Procedure for the Analysis of Gases from Reactor Coolant System Gas Mixtures.

8.4 CP/0/B/8100/05E, Chemistry Procedure for the Determination of Boron in Water and Wastewater.

8.5 CP/0/A/8200/05, Chemistry Procedure for Radioisotope Analysis.

8.6 CP/0/A/8100/06, Chemistry Procedure for the Determination of Chloride in High Purity Water.

9.0 Enclosures

9.1 PALS Monthly Checklist

9.2 PALS Data Sheet

9.3 Correction of Dilution Volume

9.4 PALS Control Panel Diagram

9.5 Directives for Personnel Conduct in the Hot Laboratory, the Atomic Absorption Laboratory, Unit 1 & 2 Primary Sampling Laboratories, And the Radwaste Operating Center.

10.0 General Information

10.1 PALS Breaker - Breaker Box 1KJ Breaker #34 located on 750' el. MM56

10.2 Phone at Control Panel - Ext.

10.3 Phone at Sample Panel - Ext.

ENCLOSURE 9.1

PALS MONTHLY CHECKLIST

1. pH 7.0 buffer solution must be replaced once a month. Prepare pH 7.0 buffer (4 liters) as per CP/0/B/8100/43. Measure specific conductivity and log in Primary Chemical Data Log.

   buffer expiration date:__________________

   specific conductivity:______________umhos/cm

   Technician/Date: ______________/________

2. Verify that the 1000 ppm Boron Standard Stock Solution used in CP/0/B/8100/05E, Chemistry Procedure for the Determination of Boron in Water and Wasterwater, will not expire prior to next monthy inspection. If so, replace as stated in the above procedure.

   1000 ppm Boron std. expiration date:_____________

   Technician/Date: ______________/__________

   Carminic Acid and 10 ppm Boron std are to be made prior to sampling.

3. The following valves should remain open:

The following valves should remain open:		Location	Date
Instrument Air Supply Isolation	1VI231	716 el' FF-54	
Nitrogen Supply Isolation	1GN124	716 el' above NB Panel	
KC Supply Isolation to PALS HX	1KC829	733 el' in front of "A" train pumps	
DI Water Supply Isolation	1NM376	716 el' FF-54	
Panel DI Water Inlet Isolation	LATER	716 el' south side of panel	
Panel Nitrogen Inlet Isolation	LATER	716 el' south side of panel	
Panel Instrument Air Inlet Isol.	LATER	716 el' south side of panel	
Panel Sample Return Isolation	1NM411	716 el' inside panel	
Panel KC Inlet to HX Isolation	1KC957	716 el' FF-54	
Panel KC Outlet from HX Isolation	LATER	716 el' inside panel	
KC Return to System	1KC873	733 el' by EMF-46	

4. pH and conductivity meters must be checked when buffer solution is renewed. Complete PALS operating procedure sections 4.2.1, 4.2.6, 4.2.7, 5.1.1, 5.1.2, 5.1.3, 5.1.4, 5.1.5, 5.1.6 5.1.7, 5.1.8, 5.1.9, 5.1.10, and 5.1.11. Turn System Power Key to vertical position to deenergize panel.

   calibration date:________________

   Technician: ____________________

5. Go to section 3.0 and take a reactor coolant sample using the PALS, analyzing the sample as stated in the procedure.

ENCLOSURE 9.2

OP/0/A/6200/48

PALS DATA SHEET

PART I (Complete prior to going to control panel) — Time

1 - Verify 1KC "A" Train is in operation. ________

2 - Sample valves opened as per 4.1.1 for the respective sample. ________

3 - Health Physics notified for monitoring support. ________

4 - Specific Conductivity of pH 7.0 buffer (reference Primary Chemistry Log). ________umhos/cm________

PART II (Complete at the control panel)

1 - Specific Conductivity of pH 7.0 buffer(measured). ________umhos/cm________

2 - pH meter standardized. ________

3 - Radiation field (presample background) ________rem/hr________

4 - Time sample purge started. ________hrs

5 - Temperature: Tc 1 ________°F ________

Temperature: Tc 2 ________°F ________

6 - Radiation field (at sampling) ________rem/hr________

- Radiation field (background) ________rem/hr________

Radiation due to sample ________rem/hr________

7 - Pressure at Isolation ________psig ________

8 - Time sample purge isolated ________hrs

9 - Specific Conductivity of sample ________umhos/cm________

10- pH of sample (measured) ________ ________

11- Dilution volume (mls. H_2O added) ________mls ________

12- Radiation field (postsample) ________rem/hr________

13- *pH of sample (boron corrected) ________ ________

*NOTE: If boron is present in sample, pH can be adjusted for boron by referring to boron curve in CP/0/B/8100/43. If this is a post accident sump sample, do not correct pH for boron.

PART III (Complete in Hot Lab)

1 - Gas Analysis ________cc/kg H_2________

________cc/kg O_2________

2 - GeLi Spectral Analysis (Gas) ________

3 - GeLi Spectral Analysis (Liquid) ________

4 - Boron Concentration ________ppm B________

5 - Chloride Concentration ________ppm Cl-________

TECHNICIAN ____________________

DATE ____________________

ENCLOSURE 9.3

OP/0/A/6400/48

CORRECTION OF DILUTION VOLUME

To correct the dilution volume, divide the final radiation reading (Section 5.10.5) by 3 rem/hr, then multiply this by 250 ml to obtain desired dilution volume in Section 5.6.3.

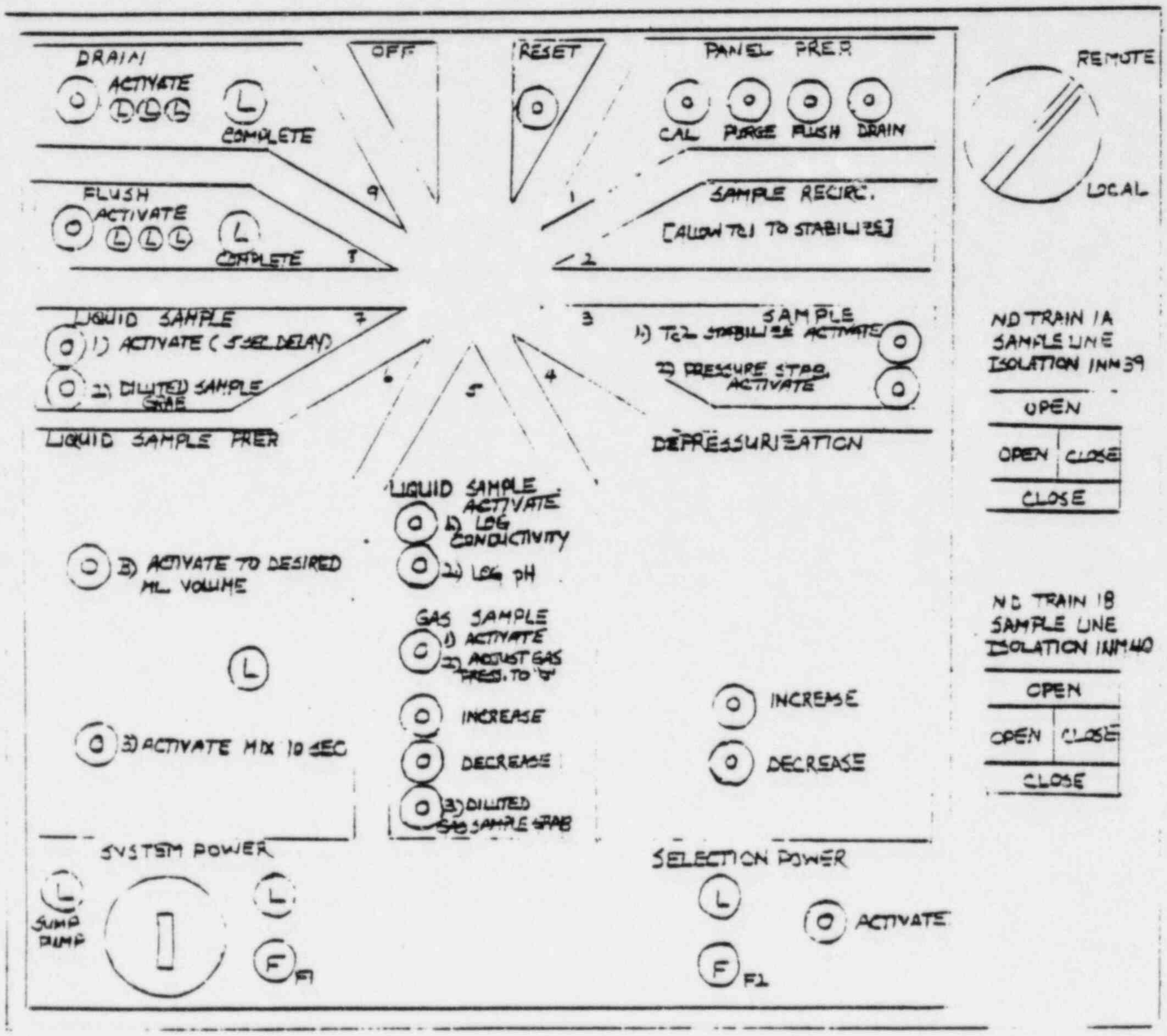
Example: Reading in Section 5.10.5 = 10 rem/hr

then $\frac{10 \text{ rem/hr}}{3} \times 250 = 833$ ml

Go back to Section 5.2 and repeat the sample sequence, using a dilution volume of 833 ml in Section 5.6.3 instead of 250 mls.

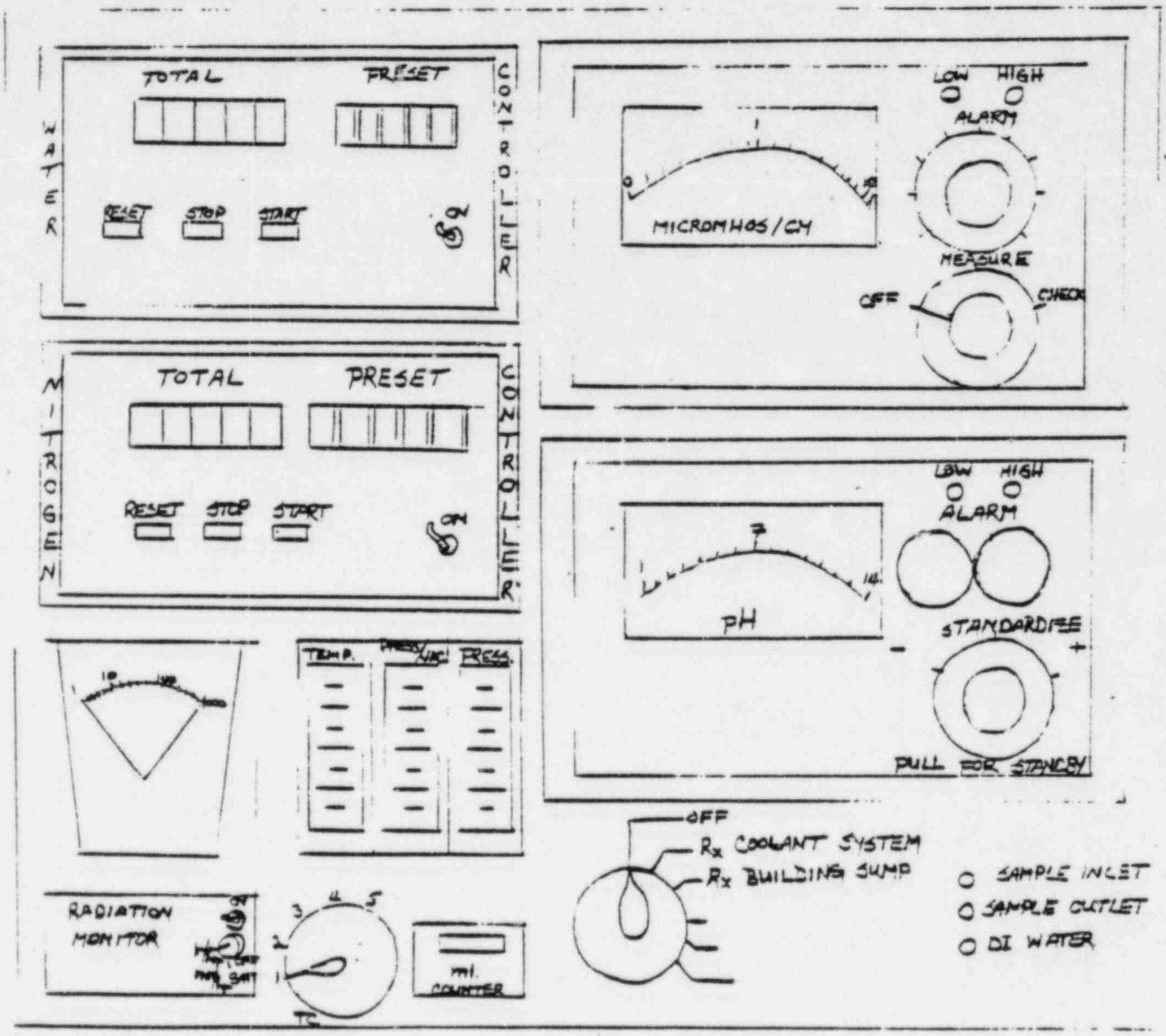
ENCLOSURE 9.4
OP/0/A/6200/48

PALS CONTROL PANEL DIAGRAM



ENCLOSURE 9.4
OP/0/A/6200/48

PALS CONTROL PANEL DIAGRAM



ENCLOSURE 9.5
OP/O/A/6200/48

DIRECTIVES FOR PERSONNEL CONDUCT IN THE HOT LABORATORY, THE ATOMIC ABSORPTION LABORATORY, UNIT 1 & 2 PRIMARY SAMPLING LABORATORIES, AND THE RADWASTE OPERATING CENTER

1. Eating, drinking, and the use of tobacco are prohibited.
2. Entry and exit from the Laboratories shall comply with current Health Physics Procedures.
3. No person shall work with or near radioactive materials without the proper safety attire which includes use of rubber gloves, lab coat, and eye protection.
4. Pipetting shall not be done by mouth suction. A safety pipet filler or pipet aide shall be used.
5. Radioactive liquid waste shall be disposed of in specific sinks only. Liquid radioactive sample volumes, treated water (YD, YM, Super Q) flows, and disposal of non-radioactive liquids are to be minimized as minimal as possible in order to limit wastes requiring radioactive waste processing.

   (A) <u>Hot Laboratory</u>

   1. East wall sink - this sink is for high activity (>1000 cpm 1/2" from 100 ml bottle) liquid wastes only. The drain is routed to the Chemical Drain Tank and the contents must undergo costly solidification and treatment as solid wastes. Low activity or non-radioactive materials are not to be disposed of in this sink.
   2. North wall sink and fume hood sinks - these sinks are for low activity (<1000 cpm 1/2" from 100 ml bottle) wastes. These drains are routed to the Floor Drain Tank.
   3. Mercuric thiocyanate chloride wastes are collected in buckets until filled, then they are transported to the Solid Waste System for disposal. No mercuric thiocyanate is to be introduced to any sink drain.

   (B) <u>Atomic Absorption Laboratory</u>

   1. Radioactive materials of any type shall not be introduced to these sinks since the drains are routed directly to the environment (drain to yard drain and into the Standby Nuclear Service Water Pond).
   2. Radioactive liquid wastes are collected in specified containers and emptied into the appropriate Hot Laboratory sink as necessary.

   (C) <u>Primary Sampling Laboratories I & II</u>

   1. Sink drains for all wastes are routed to the Waste Evaporator Feed Tank.
   2. Azide wastes from Winkler Dissolved Oxygen analysis are collected in specified containers, treated as per procedure CP/0/B/8100/91, and disposed of in a Primary Lab Sink.

6. Radioactive solid wastes and contaminated materials are to be collected in specified radioactive waste containers only. Non-radioactive or non-contaminated materials are not to be disposed of in the radioactive waste containers in order to minimize solid waste processing.
7. Radioactive materials and contaminated materials can be temporarily stored at designated locations in the Laboratories.
8. All apparatus used in the Laboratories shall remain in the Laboratories unless verified non-contaminated by Health Physics personnel for removal.
9. Good housekeeping practices shall be observed at all times, including routine precautionary activity surveys.
10. In the event of radioactive liquid spillage, the following steps are to be performed:

    (A) The liquid is to be blotted up; wear rubber gloves and shoe covers. Contain the spill to as small an area as possible.

    (B) All disposable materials contaminated by the spill and the cleanup process are to be deposited in a radioactive waste container.

    (C) The area of the spill is to be identified clearly and the type activity indicated if contamination remains.

    (D) Contact Health Physics for surveillance and de-contamination.

11. If, in the course of work, personnel contamination is suspected, a survey with an appropriate activity detector is to be made immediately. This should be followed by required de-contamination cleaning and activity determinations.
12. All wounds, spills or other emergencies are to be reported to Health Physics immediately.
13. If you have a cut, open wound, or skin lesion, notify a Chemistry Supervisor prior to handling any radioactive material.
14. Before exiting a Laboratory, ensure completeness or status of activities as to prevent contamination, sample or water flow unattended, or sample mix up. Complete all necessary paper work prior to exit.
15. Fume hoods shall be in operation at all times when the possibility of airborne radiation exists.
16. No radioactive materials are permitted in the Cold, Conventional Sampling, or Water Treatment Laboratories.

Form 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: McGuire Nuclear Station

(3) PROCEDURE TITLE: Evaluation of a Reactor Coolant Leak Inside Containment

(4) PREPARED BY: Wm B. McFee DATE: 7 Jan 83

(5) REVIEWED BY: J. R. Leonard DATE: 1/10/83

Cross-Disciplinary Review By: ____________ N/R: JRL

(6) TEMPORARY APPROVAL (IF NECESSARY):

By: ____________ (SRO) Date: ____________

By: ____________ Date: ____________

(7) APPROVED BY: Tony L. McConnell Date: 1/11/83

(8) MISCELLANEOUS:

Reviewed/Approved By: ____________ Date: ____________

Reviewed/Approved By: ____________ Date: ____________

DUKE POWER COMPANY
McGUIRE NUCLEAR STATION
EVALUATION OF A REACTOR COOLANT LEAK
INSIDE CONTAINMENT

1.0 Purpose

This procedure describes the method for evaluating the offsite dose rate and dose in the event of a reactor coolant leak inside containment. In addition, this procedure can provide warning message information to be given to State/Local agencies.

2.0 References

2.1 Station Health Physics Manual, Section 18.2; Environmental Monitoring for Emergency Conditions.

2.2 TID 14844.

2.3 HP/O/B/1009/02, Alternative Methods for Determining Dose Rate Within the Reactor Building.

2.4 Offsite Dose Calculation Manual (ODCM).

2.5 HP/O/B/1009/05, First Response Evaluation of a Reactor Coolant Leak Inside Containment.

2.6 Unit Data Book.

3.0 Limits and Precautions

3.1 This procedure is being used in an emergency situation which could result in evacuation of areas surrounding the plant. The procedure shall be fully understood and calculations shall be done carefully and accurately.

3.2 This procedure is written for use under abnormal conditions which could involve extremely high radiation levels. Only the Station Health Physicist or his designee should authorize the use of this procedure when needed and should provide appropriate surveillance and control of people taking the samples.

3.3 Check that the counting equipment to be used has been calibrated and daily response checks have been performed.

3.4 Individuals collecting the samples should be aware of the possibility of airborne contamination and high radiation levels in sampling areas. Use protective clothing, gloves, respiratory protective equipment, portable shielding, high range dosimeters, and survey instruments as determined by Health Physics supervisor.

3.5 If action is taken in the 4-10 mile radius area per reference 2.5, then wind direction should be rechecked every fifteen (15) minutes to ensure that additional sectors have not been affected. Once a sector has been added to the list, it cannot be removed from the list.

3.6 Projected doses should be compared to the Environmental Protection Agency Protective Action Guides to determine levels of protective action.

4.0 <u>Procedure</u>

4.1 Acquire the following information and record on Enclosure 5.4 and 5.5.

NOTE 1: Some of the following information can be obtained from the 'Tech Specs 04' program of the Operator Aid Computer (OAC). All information available in 'Tech Specs 04' will be denoted in the following procedure by a '(TS)' to the left of the section number. See Enclosure 5.9 for steps to access 'Tech Specs 04'.

NOTE 2: Standard warning message information to be given to state/local agencies will be denoted in the following procedure by a '(WM)' to the left of the section number.

NOTE 3: Meteorological data should be obtained in the order of preference listed in Enclosure 5.4.

NOTE 4: Use fifteen (15) minutes averages for all meteorological data.

4.1.1 Time of Reactor trip/shutdown (hours after midnight) and date.

4.1.2 Time of calculation (hours after midnight) and date.

(WM) 4.1.3 Wind direction recorded in degrees from North (upper tower). Lower tower wind direction should be used only if upper tower data is unavailable.

(WM) 4.1.4 Lower tower wind speed (MPH) (W). Upper tower wind speed should be used only if lower tower is unavailable.

4.1.5 Vertical temperature gradient or Δ T°C (Lower to Upper tower) from the -4 to +8 scale on the meteorological temperature strip chart recorder.

NOTE 1: The above information is used along with the Table on Enclosure 5.6 and map provided in TSC to determine areas affected by release.

NOTE 2: Plume direction is 180° opposite wind direction.

(WM) 4.1.6 Stability class (A, B, C, D, E, F, or G) from Table I (Enclosure 5.1).

(WM) 4.1.7 Ambient air temperature (°C) . Record in °F where: °F = 9/5 x °C + 32.

(WM) 4.1.8 Precipitation.

(WM) 4.1.9 Release height is 33 feet above yard elevation.

4.1.10 Leak rate, which is either known leak rate or design leak rate.

$$LR_{\text{design leak rate}} = \text{Containment Volume} \times \text{Design Leak Constar}$$
$$= 2.9 \times 10^{10}\text{ml} \times \frac{.0020}{\text{day}} \times \frac{\text{day}}{24\text{ hours}}$$
$$= 2.42 \times 10^{6}\text{ml/hr.}$$

NOTE: Enclosure 5.8 should be used in determining leak rate if other than design leak rate is used.

4.1.11 Reactor Building dose rate (EMF 51 A or B, whichever is higher or reference 2.3).

NOTE: Information in sections 4.1.12, 4.1.13, and 4.1.14 is not normally used. It is available if needed for working with outside agencies.

4.1.12 Release concentrations (C_{NG} and C_I) from Health Physics sampling of the Post Accident Containment Air Sampling System; or EMF data if sample results are not available, as follows:

If EMF39 (H) < 100 cpm,

C_{NG} = EMF39 (L) cpm x 3.8 E-8

or if EMF39 (H) > 100 cpm

C_{NG} = EMF39 (H) cpm x 2 E-4

C_I = EMF40 Δ cpm/Δ time x 2.34 E-10

Where:

C_{NG} = noble gas release concentration in μCi/ml

C_I = I-131 equiv. release concentration in μCi/ml

3.8 E-8 = EMF39 (L) correlation factor in μCi/ml/cpm from reference 2.6

2 E-4 = EMF39 (H) correlation factor in μCi/ml cpm from reference 2.6

2.34 E-10 = EMF40 correlation factor in μCi/ml/cpm/min from reference 2.6

(WM) 4.1.13 Calculate radiological release rate (Q) in Ci/sec using the following formula:

$\dot{Q}_{NG} = C_{NG} \times LR \times 7.86\ E{-6}$

$\dot{Q}_I = C_I \times LR \times 7.86\ E{-6}$

$\dot{Q} = (C_{NG} + C_I) \times LR \times 7.86\ E{-6}$

Where:

$\dot{Q}_{NG}$ = noble gas radiological release rate in Ci/sec

$\dot{Q}_I$ = I-131 equiv radiological release rate in Ci/sec

$\dot{Q}$ = radiological release rate in Ci/sec

LR = leak rate in ml/hr (section 4.1.10)

7.86 E-6 = 2.83 E4 cm³/ft³ x 2.78E-4 hr/sec x 1E-6 Ci/μCi

All other variables same as previously stated.

(WM) 4.1.14 Calculate dose conversion factors in R/hr/Ci/m³ for whole body and child thyroid using the following formulas:

$$DCF_{WB} = \frac{0.5 \times 3.7\ E10 \times 3600 \times \overline{E}}{1.3E3 \times 100 \times 6.25E5}$$

$DCF_{WB} = 820 \times \bar{E}$

Where:

DCF_{WB} = Whole body dose conversion factor in R/hr/Ci/m^3

0.5 = conversion from infinite cloud to semi-infinite cloud whole body dose

$\bar{E}$ = average Mev/dis from Count Room data

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

Hours from Trip	$\bar{E}$ in Mev/dis
$\leq$ 12	0.40
12 - 48	0.20
> 48	0.10

1.3 E3 = density of air in g/m^3

Conversion factors:

3.7 E10 dis/sec · Ci

3600 sec/hr

100 erg/g · rad

6.25E5 Mev/erg

DCF_{CT} = 4.39E-3 x 1E12 x 1E-3 x 0.422

DCF_{CT} = 1.85 E6

Where:

DCF_{CT} = child thyroid dose conversion factor in R/hr/Ci/m^3

4.39E-3 = inhalation dose factor for child thyroid in mrem/pCi, from reference 2.4

0.422 = child breathing rate in m^3/hr, from reference 2.4

Conversion factors:

1E12 pCi/Ci

1E-3 rad/mrad

4.1.15 Two (2) hour relative concentration (CH) in mph · sec/m^3 from Table I (Enclosure 5.1) at the site boundary (0.5), 2, 5, and 10 mile points. Record on Table I and Table II of Enclosure 5.5.

4.1.16 Calculate the dose rate and two (2) hour Dose Commitment (Rem) at the site boundary (0.5), 2, 5, and 10 mile points using computer program EPIP08 (Enclosure 5.10) and Enclosures 5.4 and 5.5, or the manual calculations shown in the following sections of this procedure.

(WM) 4.1.17 Determine the child thyroid dose rate at the site boundary (0.5), 2, 5, and 10 mile points using the following formula:

$$\dot{D}_{CT} = \dot{D}_{RB} \times LR \times TDCF_I \times \frac{1}{W} \times CH$$

Where:

$\dot{D}_{CT}$ = child thyroid dose rate in Rem/hour

$\dot{D}_{RB}$ = reactor building dose rate in Rem/hour (section 4.1.11)

LR = leak rate in ml/hr (section 4.1.10)

$TDCF_I$ = I-131 equiv. time determined conversion factor (from Table on Enclosure 5.2) and:

$$TDCF_I = \frac{A_I \times 1.17E-4 \times 1E3}{\dot{D}_I}$$

Where:

A_I = I-131 activity vs. time in $\frac{\mu Ci . mrem}{ml \cdot pCi}$

1.17 E-4 = child breathing rate in $\frac{m^3}{sec}$

1E3 = conversion factor in $\frac{pCi \cdot Rem}{\mu Ci \cdot mRem}$

$\dot{D}_I$ -I-131 dose rate vs time in $\frac{R}{hr}$

W = windspeed in mph (section 4.1.4)

CH = Two (2) hour relative concentration in mph · sec/m^3 (section 4.1.15)

NOTE: This can be rapidly accomplished by storing in calculator memory the result of all numbers, excepting CH, and then recalling this number to multiply by each CH value for the 0.5, 2, 5, and 10 mile points (as shown on Table I on Enclosure 5.5).

(WM) 4.1.18 Determine child thyroid dose at the site boundary (0.5), 2, 5, and 10 mile points by multiplying the dose rates at these points (as done in section 4.1.17 and shown on Table I on Enclosure 5.5) by the dose assessment period (in hours).

NOTE: CH values based on a two (2) hour dose assessment period.

(WM) 4.1.19 Determine the whole body gamma dose rate at the site boundary (0.5), 2, 5 and 10 mile points using the following formula:

$$\dot{D}_{WB} = \dot{D}_{RB} \times LR \times TDCF_{NG} \times \frac{1}{W} \times CH$$

Where:

$\dot{D}_{WB}$ = whole body gamma dose rate in Rem/hr.

$TDCF_{NG}$ = Noble gas time determined conversion factor (from Table on Enclosure 5.3) and:

$$TDCF_{NG} = \frac{A_{NG} \times 0.23E\text{-}6}{\dot{D}_{NG}}$$

Where:

A_{NG} = noble gas activity vs. time in $\frac{\mu Ci \cdot Mev}{ml \cdot dis}$

$$.23 \times 10^{-6} \frac{rad\ m^3\ dis}{\mu Ci\ sec\ MeV} = \frac{(\tfrac{1}{2})\ (3.7 \times 10^4\ d/s/\mu Ci)\ (1.6 \times 10^{-6}\ erg/MeV)}{(100 erg/g.\ rad)(0.00129 g/cm^3)(1 \times 10^{-6} cm^3/m^3)}$$

$\dot{D}_{NG}$ = noble gas dose rate vs time in $\frac{R}{hr}$

All other variables same as previously stated.

NOTE: This can be rapidly accomplished by storing in calculator memory the result of all numbers, excepting CH, and then recalling this number to multiply by each CH value for the 0.5, 2, 5, and 10 mile points (as shown on Table II on Enclosure 5.5).

(WM) 4.1.20 Determine whole body gamma dose at the site boundary (0.5), 2, 5, and 10 mile points by multiplying the dose rates at these points (as done in section 4.1.19 and shown on Table II on Enclosure 5.5) by the dose assessment period (in hours).

NOTE: CH values based on a two (2) hour dose assessment period.

4.2 Determine potentially affected zones based on wind direction using the table on Enclosure 5.6, and record on Enclosure 5.6.

4.3 Determine levels of protective action by comparing projected doses to EPA Protective Action Guides (page 2 of 3 on Enclosure 5.6) and record on Enclosure 5.6.

4.4 Determine if non-stagnating meteorological conditions exist by observing meteorological strip chart data. If:

(1) Instantaneous wind direction has not varied over 90° in the past two (2) hours, and

(2) Instantaneous wind speed has not fallen below 10 MPH in the past two (2) hours, then

non-stagnating conditions exist.

Record result on page 5 of 5 of Enclosure 5.1.

4.5 Check results and inform Emergency Coordinator of your recommendations.

4.6 Whenever possible, utilize environmental data in comparison with calculated results to better determine plume dispersions. Record environmental data on Enclosure 5.4 when available.

NOTE: Depending on meteorologic conditions, field monitoring teams may experience difficulty in finding the plume. Therefore, negative field results do not necessarily mean that radioactivity is not being released.

4.7 Calculated results should be compared with those from the Crisis Management Center (if accessible). Any discrepancies should be resolved through recalculations and calculation step comparisons.

4.8 Historical data shall be retained so that offsite dose trends can be analyzed.

4.9 Insure that Enclosures 5.4, 5.5, and 5.6 are properly completed and results presented to Station Health Physicist or his designee.

4.10 Actual field measurements of whole body doses will be compared to whole body dose projections by the Data Evaluations Coordinator.

5.0 <u>Enclosures</u>

5.1 Table I, Two Hour Relative Concentration

5.2 Table of I-131 Equivalent Time Determined Conversion Factors

5.3 Table of Noble Gas Time Determined Conversion Factors

5.4 Projected Exposure Data Sheet

5.5 Projected Exposure Work Sheet

5.6 Table of Affected Areas

5.7 Accident Assumptions Based on Potential

5.8 Estimating Containment Release Rates (P.F. 9. 4. 2)

5.9 OAC (Tech Specs 04) User Documentation

5.10 EPIP08, User Documentation

5.11 Offsite Dose Projections (Sample of Computer Printout)

TABLE 1

2 HOUR RELATIVE CONCENTRATION (CH)

Temp. Diff(°C)	Stability Class	Distance (in miles) 0.5	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0
1. ≤ -0.6	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. -0.5	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 +0.4	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. +0.5 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. ≥ +1.3	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

The temperature differential is the difference in temperature between the upper and lower temperature sensors and is in degrees centrigrade.

These values are site-specific for McGuire Nuclear Station.

Table of I-131 Equivalent Time Determined Conversion Factors
($TDCF_I$)

Time (hours after trip)	$TDCF_I$
0 - 1	1.93 E-7
1.1 - 3	2.68 E-7
3.1 - 5	3.30 E-7
5.1 - 7	3.84 E-7
7.1 - 10	4.68 E-7
10.1 - 15	5.59 E-7
15.1 - 20	6.55 E-7
20.1 - 30	8.14 E-7
30.1 - 40	9.20 E-7
40.1 - 50	9.75 E-7

Table of Noble Gas Time Determined Conversion Factors
($TDCF_{NG}$)

Time (hours after trip)	$TDCF_{NG}$
0 - 1	1.57 E-9
1.1 - 3	1.53 E-9
3.1 - 5	1.35 E-9
5.1 - 7	1.31 E-9
7.1 - 10	1.56 E-9
10.1 - 15	1.78 E-9
15.1 - 20	1.90 E-9
20.1 - 30	1.93 E-9
30.1 - 40	1.94 E-9
40.1 - 50	1.84 E-9

PROJECTED EXPOSURE DATA SHEET

Time of trip/shutdown__________ hours after midnight. Date____________.

Time of calculation__________ hours after midnight. Date____________.

(All meteorological data is 15 minute average)

Time (15 minute period ending time) _____ _____ _____ _____hours after midnight.

(WM) Wind Direction 1) Upper tower _____ _____ _____ _____degrees from North.

or 2) Lower tower _____ _____ _____ _____degrees from North.

(WM) Wind Speed 1) Lower tower _____MPH

or 2) Upper tower _____MPH

ΔT 1) Lower to Upper tower _____°C

or 2) For 1000 - 1600 -0.2 °C

or 3) For 1600 - 1000 +1.3 °C

(WM) Stability Class (ΔT and Enclosure 5.1) __________

(WM) Temperature _____°C

Convert °C to °F: _____°F = (9/5)(_____°C) +32

(WM) Precipitation__________

(WM) Release Height = 33 feet

Leak Rate __________________ml/hr

Rx. Bldg. Dose Rate ________R/hr

UNKNOWN RELEASE CONCENTRATIONS (C_{NG} and C_I)

(EMF DATA)

If EMF 39 (H) <100 cpm,

C_{NG}_____µCi/ml = EMF 39 (L) cpm _____ x 3.8 E-8 µCi/ml/cpm

Or if EMF 39 (H) > 100 cpm

C_{NG}_____µCi/ml = EMF 39 (H) cpm _____ x 2 E-4 µCi/ml/cpm

C_I _____µCi/ml = EMF 40 Δ cpm/Δ time _____ x 2.34 E-10 $\frac{\mu Ci/ml}{cpm/min}$

MANUAL CALCULATION WORKSHEET

Radiological release rate ($\dot{Q}$)

(WM) $\dot{Q}_{NG}$ __________ Ci/sec = C_{NG} __________ x LR ________ x 7.86 E-6

(WM) $\dot{Q}_{I}$ __________ Ci/sec = C_{I} __________ x LR ________ x 7.86 E-6

(WM) $\dot{Q}$ __________ Ci/sec = (C_{NG} _____ + C_{I} _____) x LR _____ x 7.86 E-6

Dose Conversion factors for whole body (DCF_{WB}) and child thyroid (DCF_{CT})

(WM) DCF_{WB} ______________ R/hr/Ci/m³ = 820 x $\bar{E}$ ______________

(WM) DCF_{CT} = 1.85E6 R/hr/Ci/m³

NOTE: The information on this page is not normally used. It is available if needed for working with outside agencies.

Dose Rate and Dose Calculations

Child Thyroid (Record all CH values for 0.5, 2, 5, and 10 miles in Table I)

$$\dot{D}_{CT} = \underbrace{\dot{D}_{RB}\_\_\_\_ \times LR\_\_\_\_ \times TDCF_{I}\_\_\_\_ \times \frac{1}{W\_\_\_\_}}_{\text{Store in calculator memory}} \times CH$$

Table I - Child Thyroid Dose Rate and Dose

(WM)

Distance	CH		Stored Calc. Value		Dose Rate (Rem/hour)		Time* Period		Dose (Rem)
S.B. 0.5 mi.	____	x	________	=	________	x	____	=	________
2 mi.	____	x	"	=	________	x	"	=	________
5 mi.	____	x	"	=	________	x	"	=	________
10 mi.	____	x	"	=	________	x	"	=	________

* CH values based on a two (2) hour dose assessment period.

Whole Body (Record all CH values for 0.5, 2, 5, and 10 miles in Table II).

$$\dot{D}_{WB} = \underbrace{\dot{D}_{RB}\_\_\_\_ \times LR\_\_\_\_ \times TDCF_{NG}\_\_\_\_ \times \frac{1}{W\_\_\_\_}}_{\text{Store in calculator memory}} \times CH$$

Table II - Whole Body Dose Rate and Dose

(WM)

Distance	CH		Stored Calc. Value		Dose Rate (Rem/hour)		Time* Period		Dose (Rem)
S.B. 0.5 mi.	____	x	________	=	________	x	____	=	________
2 mi.	____	x	"	=	________	x	"	=	________
5 mi.	____	x	"	=	________	x	"	=	________
10 mi.	____	x	"	=	________	x	"	=	________

* CH values based on a two (2) hour dose assessment period.

Determine affected areas based on wind direction from the table below:

Wind Direction (degrees from North)	0 - 4 Mile Recommendation	4 - 10 Mile Recommendation
0 - 22.5	See Note 1	R,T,S,E,F,U
22.6 - 45.0		R,T,S,E,U,P
45.1 - 67.5		R,T,S,E,U,P
67.5 - 90.0		R,T,S,U,P,N,O
90.1 - 112.5		R,T,S,P,N,O
112.6 - 135.0		R,P,N,O,L
135.1 - 157.5		I,P,N,O,L
157.6 - 180.0		I,N,O,L,T,J,H
180.1 - 202.5		I,N,L,J,H,G
202.6 - 225.0		I,N,L,J,H,G
225.1 - 247.5		I,J,H,G,F
247.6 - 270.0		J,H,G,F
270.1 - 292.5		H,G,F,E
292.6 - 315.0		G,F,E
315.1 - 337.5		G,F,E,U
337.6 - 359.9		F,E,U,S

NOTE 1: Areas A,B,C,D,Q,V,M will be the recommended areas if any action is taken in the 0 - 4 mile radius of the plant. This recommendation is independent of wind direction.

Table 5.1 Recommended protective actions to reduce whole body and thyroid dose from exposure to a gaseous plume

Projected Dose (Rem) to the Population	Recommended Actions[a]	Comments
Whole body <1 Thyroid <5	No planned protective actions.[b] State may issue an advisory to seek shelter and await further instructions. Monitor environmental radiation levels.	Previously recommended protective actions may be reconsidered or terminated.
Whole body 1 to <5 Thyroid 5 to <25	Seek shelter as a minimum. Consider evacuation. Evacuate unless constraints make it impractical. Monitor environmental radiation levels. Control access.	If constraints exist, special consideration should be given for evacuation of children and pregnant women.
Whole body 5 and above Thyroid 25 and above	Conduct mandatory evacuation. Monitor environmental radiation levels and adjust area for mandatory evacuation based on these levels. Control access.	Seeking shelter would be an alternative if evacuation were not immediately possible.
Projected Dose (Rem) to Emergency Team Workers		
Whole body 25 Thyroid 125	Control exposure of emergency team members to these levels except for lifesaving missions. (Appropriate controls for emergency workers, include time limitations, respirators, and stable iodine.)	Although respirators and stable iodine should be used where effective to control dose to emergency team workers, thyroid dose may not be a limiting factor for lifesaving missions.
Whole body 75	Control exposure of emergency team members performing lifesaving missions to this level. (Control of time of exposure will be most effective.)	

[a]These actions are recommended for planning purposes. Protective action decisions at the time of the incident must take existing conditions into consideration.

[b]At the time of the incident, officials may implement low-impact protective actions in keeping with the principle of maintaining radiation exposures as low as reasonably achievable.

0 - 4 miles

Recommended Areas ______________________________

Recommended Population ______________________________

4 - 10 miles

Recommended Areas ______________________________

Recommended Population ______________________________

Non-stagnating meteorological conditions do___/do not _____ exist.

____
Signature

NOTE TO EMERGENCY COORDINATOR:

If the release is projected to end within one-half (½) hour, and non-stagnating meteorological conditions exist, consider not recommending an evacuation if the plume will have left the Emergency Protection Zone (EPZ) before the population could evacuate.

ACCIDENT ASSUMPTIONS BASED ON POTENTIAL

Design Basis Accident assumes TID-14844 release of fission products to the containment atmosphere:

(1) 100% of all core noble gas activity
(2) 50% of all core Iodine activity with plate out of half of that released. Therefore, 25% of the Iodine activity will be in the containment atmosphere.

Loss of Reactor Coolant assumes the release of one reactor coolant volume with noble gas and Iodine activity associated with operation at 100% power with 1% fuel failure before the release.

Release of the Gap Activity assumes that there is cladding failure sufficient to release all fission products in the gas gap of the fuel pins to the containment atmosphere. Assumed is also loss of 10% of all core noble gas activity and 10% of all core Iodine activity to the containment atmosphere.

Containment leak rate is assumed to be:

(1) 0.2%/day for 0 - 24 hours
(2) 0.1%/day for 24 hours - 30 days

The 0.2%/day is the Tech. Spec. leak rate associated with the design pressure of 14.8 psig.

Assumptions used in determining the contribution to the total dose from Emergency Core Cooling System (ECCS) leakage are:

(a) 7320 ml/hr leakage from the pump seals and valves of the ECCS in the auxiliary building.
(b) An Iodine partition factor of 0.1 is used to determine the amount of Iodine released to the auxiliary building atmosphere.
(c) No credit is taken for the VA charcoal filters because the VA system is not safety related.

Bypass leakage is the fraction of the total containment leakage that bypasses the annulus and escapes to the atmosphere unfiltered.

Some examples of bypass leakage paths are:

(1) Leakage through containment isolation valves that do not seat properly.

(2) Leakage around the equipment hatch seals.

At McGuire the containment bypass leakage is 7% of the total containment leakage (Tech. Spec. 3.6.1.2, Revision 40)

ACCIDENT ASSUMPTIONS

Dose contributions are as follows:

Thyroid: 80% from bypass leakage
10% from ECCS leakage
10% from VE system leakage

Whole Body: 44% from bypass leakage
3% from ECCS leakage
53% from VE system leakage

At McGuire only 85% of the auxiliary building ventilation system is safety related. Therefore, when calculating releases following an accident, credit is not taken for the VA charcoal filters. However, the VA system is provided with emergency power and any bypass leakage or ECCS leakage to the auxiliary building will be released through the unit vent. The only source of radioactivity that does not go out the unit vent would be bypass leakage around the equipment hatch seals (see Fig. 1) which is only a small fraction of the total release.

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McGUIRE NUCLEAR STATION
EMERGENCY PLAN

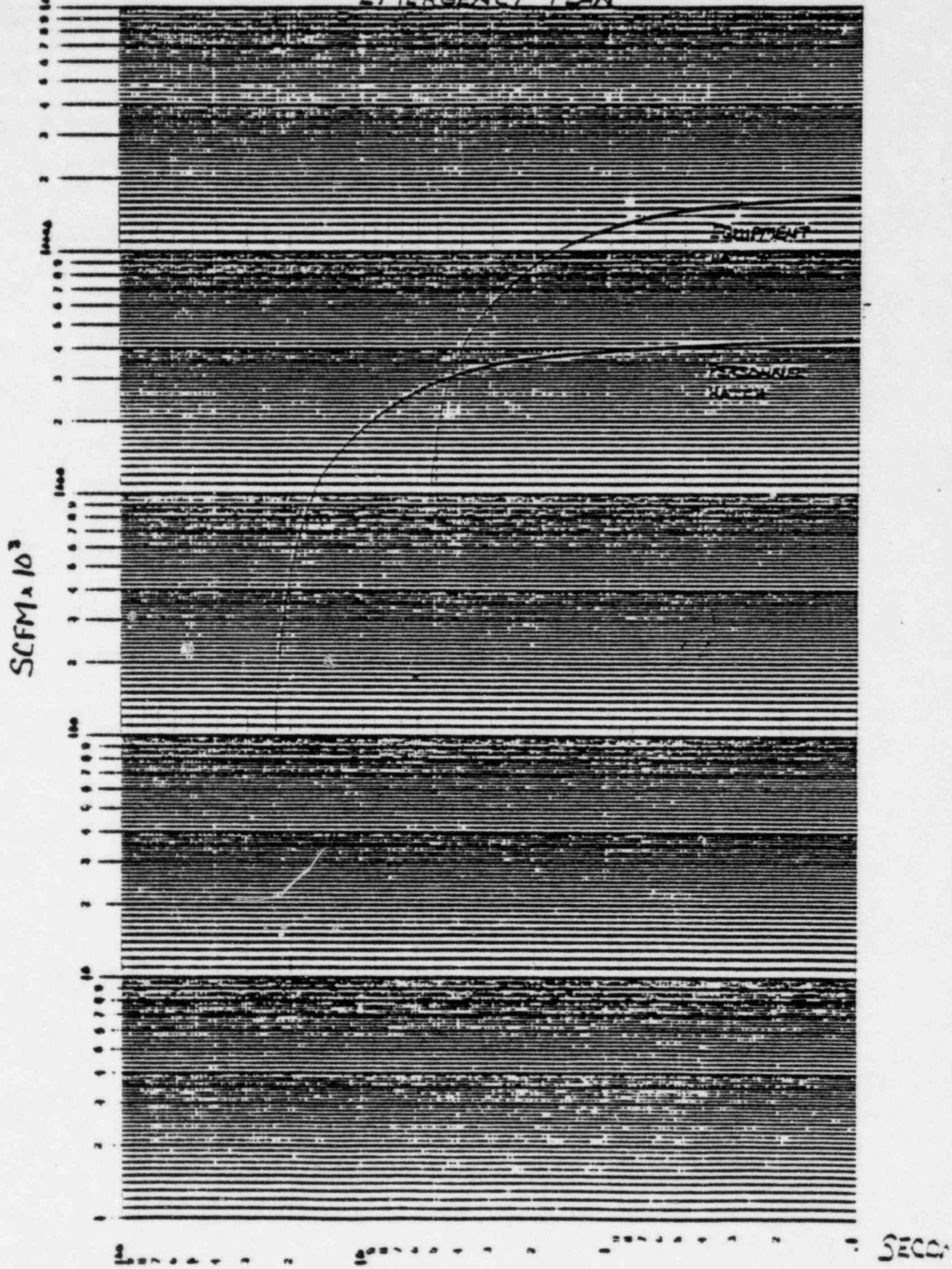
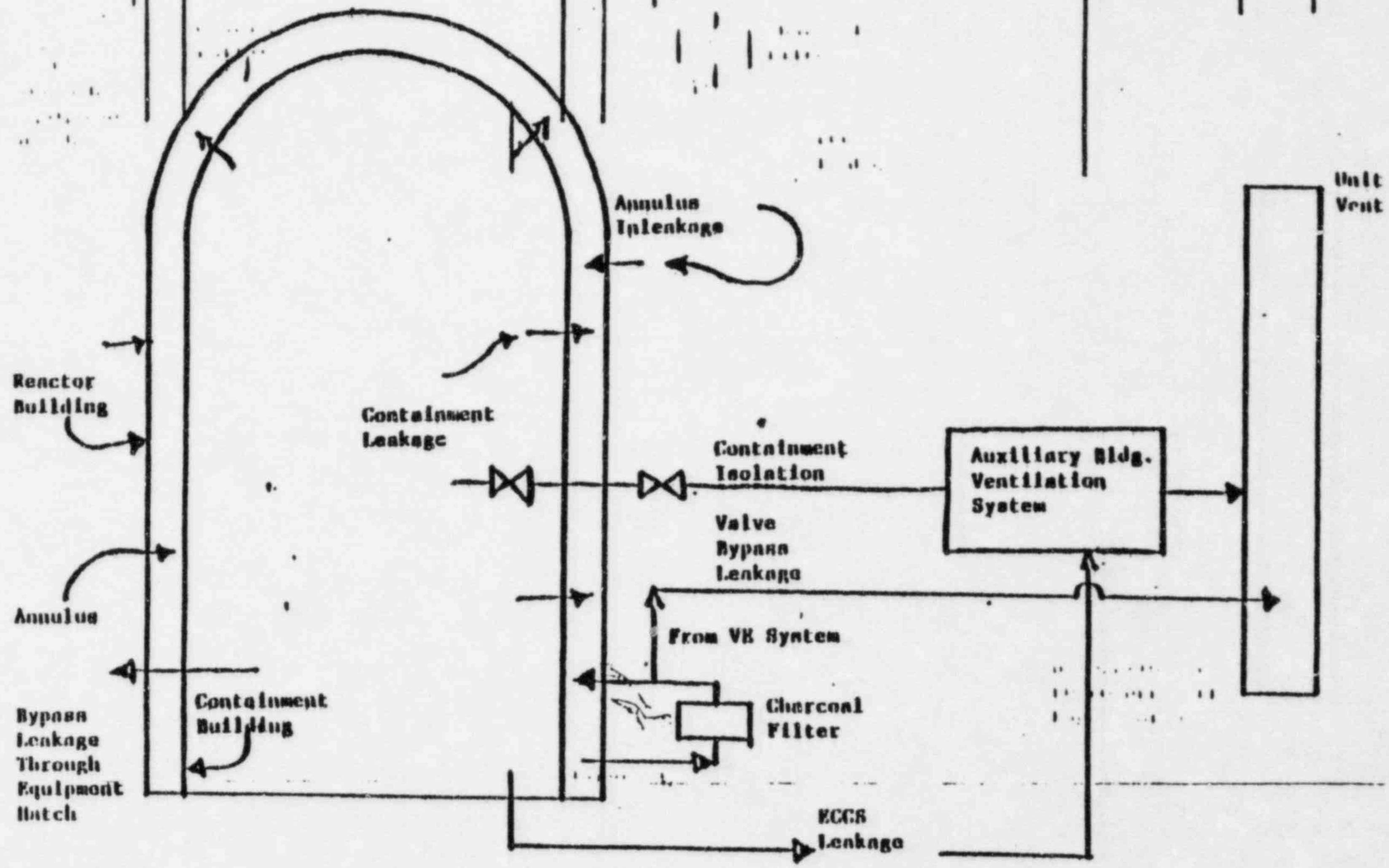


Figure 1


Annulus
Inleakage
Unit
Vent
Reactor
Building
Containment
Leakage
Containment
Isolation
Auxiliary Bldg.
Ventilation
System
Valve
Bypass
Leakage
Annulus
From VE System
Containment
Building
Charcoal
Filter
Bypass
Leakage
Through
Equipment
Hatch
ECCS
Leakage

ESTIMATED LEAKAGE RATES IN CASE OF CONTAINMENT FAILURE AT EITHER OCONEE NUCLEAR STATION OR McGUIRE NUCLEAR STATION

In any accident situation involving a release of fission product activity to the containment atmosphere, there are two major concerns:

1. Being able to predict potential offsite doses in the event containment does fail. The Recovery Manager may base a decision to evacuate or not on the potential effect to the public without any indication of offsite releases.

2. If containment does fail, it is necessary to estimate actual release rates in order to calculate actual offsite doses.

To do either of the above requires an estimate of CFM leakage rates versus size for a range of containment pressures. In order to calculate flow, either instantaneous or on a time basis, several basic assumptions must be made concerning the process. These assumptions will tend to give the most conservative answer.

To calculate instantaneous flow through a short pipe, as in Oconee's case, or through a ½" thick "orifice", as in McGuire's case, several assumptions are required. These assumptions, with an explanation, are:

1. Fully Turbulent Flow - In Oconee's case, since the pipe friction factor decreases with increasing velocity, the most restrictive case is fully turbulent flow. In McGuire's case, the flow coefficient is most restrictive in the fully turbulent region.

2. Maximum Expected Temperature - In both cases, since temperature is the sole factor affecting density of air, at a given pressure, a maximum temperature should be assumed. Since density decreases with increasing temperature, the higher the temperature the higher the flow.

3. 95% Relative Humidity - In both cases since the highest flow rate is obtained with the lowest specific gravity, the lowest specific gravity should be assumed. Since the specific gravity of an air-water vapor is most closely approximated by the ratio of the density of water vapor to that of air, the higher the relative humidity the lower the specific gravity.

In addition to the preceding assumptions, several other assumptions must be made before one can calculate time dependent flow. These assumptions, with an explanation are:

1. Uniform - State, Uniform - Flow Process - This type process applies in both cases and it is based on the following:

   A. The control volume remains constant relative to the coordinate frame.

   B. The state of the mass within the control volume may change with time, but at any instant of time the state is uniform throughout the entire control volume.

C. The state of the mass crossing each of the areas of flow on the control surface is constant with time although the mass flow rates may be time varying.

2. Rupture Occurs At End Of Accident - In both cases this is assumed in order to have a basis for initial conditions inside containment, i.e., maximum pressure and temperature and negligible heat input.

3. Process occurs Adiabatically - In both cases, since it was previously assumed that no heat would be added during the release, the adiabatic assumption is the most limiting case. This is shown by the Second Law of Thermodynamics for a control volume, which for this case is:

$$[m_2 s_2 - m_1 s_1]_{c.v.} + \Sigma m_e s_e = \int^t \frac{\dot{Q}_{c.v.}}{T} dt.$$

Considering the choices, either $\dot{Q}_{c.v.} = 0$ or $\dot{Q}_{c.v.} < 0$. If the latter is assumed, it would tend to decrease $\dot{m}_e$ which would not be as limiting as $\dot{Q}_{c.v.} = 0$.

4. Flow Occurs Isentropically - In both cases since frictional effects are negligible and it is being assumed no heat transfer occurs, it is intuitively obvious that flow can be assumed isentropic.

5. The Mixture Behaves As An Ideal Gas - In both cases this can be assumed because at low pressure, regardless of temperature, the Ideal Gas Law yields good accuracy.

Attached are graphs that illustrate the estimated leakage rates for Oconee and McGuire. In Oconee's case the flow versus time graph illustrates the time dependent flow that would occur if the containment was pressurized to 60 psig at the time of the failure. In McGuire's case the flow versus time graph illustrates the time dependent flow that would occur if the containment was pressurized to 15 psig at the time of the failure. In both cases the opening sizes are that of Schedule 40 Pipe.

EQUATIONS FOR McGUIRE

Instantaneous Flow
(Refer to Crane Tech. Paper #410)

$$q'_m = 678\ Yd^2 \sqrt{\frac{\Delta P P_1'}{K T_1 S_g}}$$

Where: q'_m = Standard cubic feet per minute

Y = Net expansion factor (from Table A-21)

d = Inside pipe diameter, inches

C = Flow coefficient (from Table A-20)

P_1' = Absolute pressure inside containment, psia

T_1 = Absolute temperature, °R

S_g = Specific gravity of the gas

$$S_g = 1 - \frac{.37803\ H_R\ P_{SV}}{P_1'}$$

H_R = Relative humidity

P_{SV} = Saturated vapor pressure of steam at T_1 conditions

Assumptions:

1. In determining C, it is assumed there exists fully turbulent flow:

Flow Versus Time

$PV = mRT$ $\quad R = 53.34$

Pv^k = Constant $\quad k = 1.4$

Tv^{k-1} = Constant

(Refer to Crane Tech Paper #410)

$$W = .525\ Yd^2 \sqrt{\frac{\Delta P}{Kv}}$$

Where: W = Mass flow rate lbm/sec

Y = Net expansion factor (from Table A-21)

d = Inside pipe diameter, inches

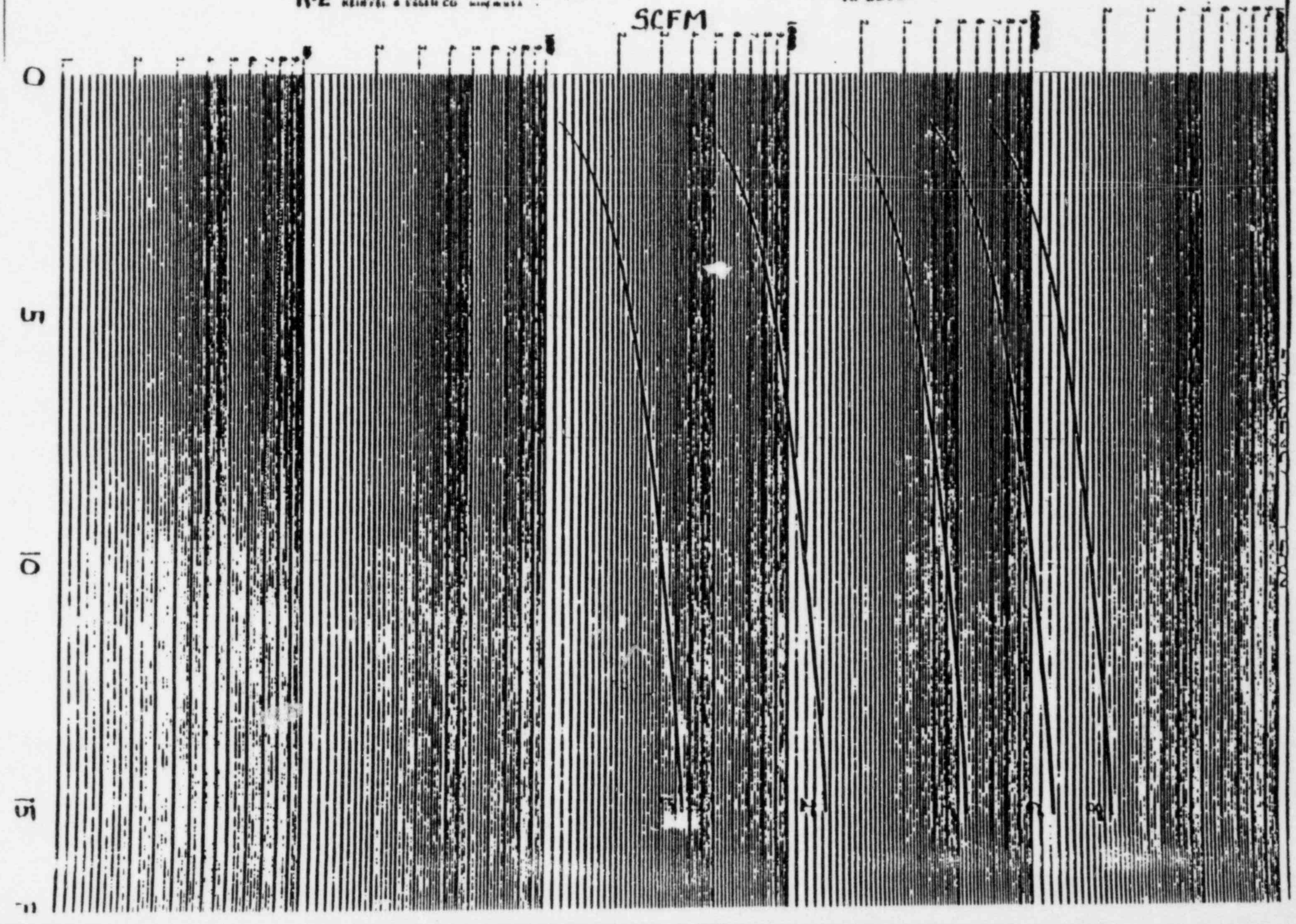
C = Flow coeffient (from Table A-44)

v = Specific volume

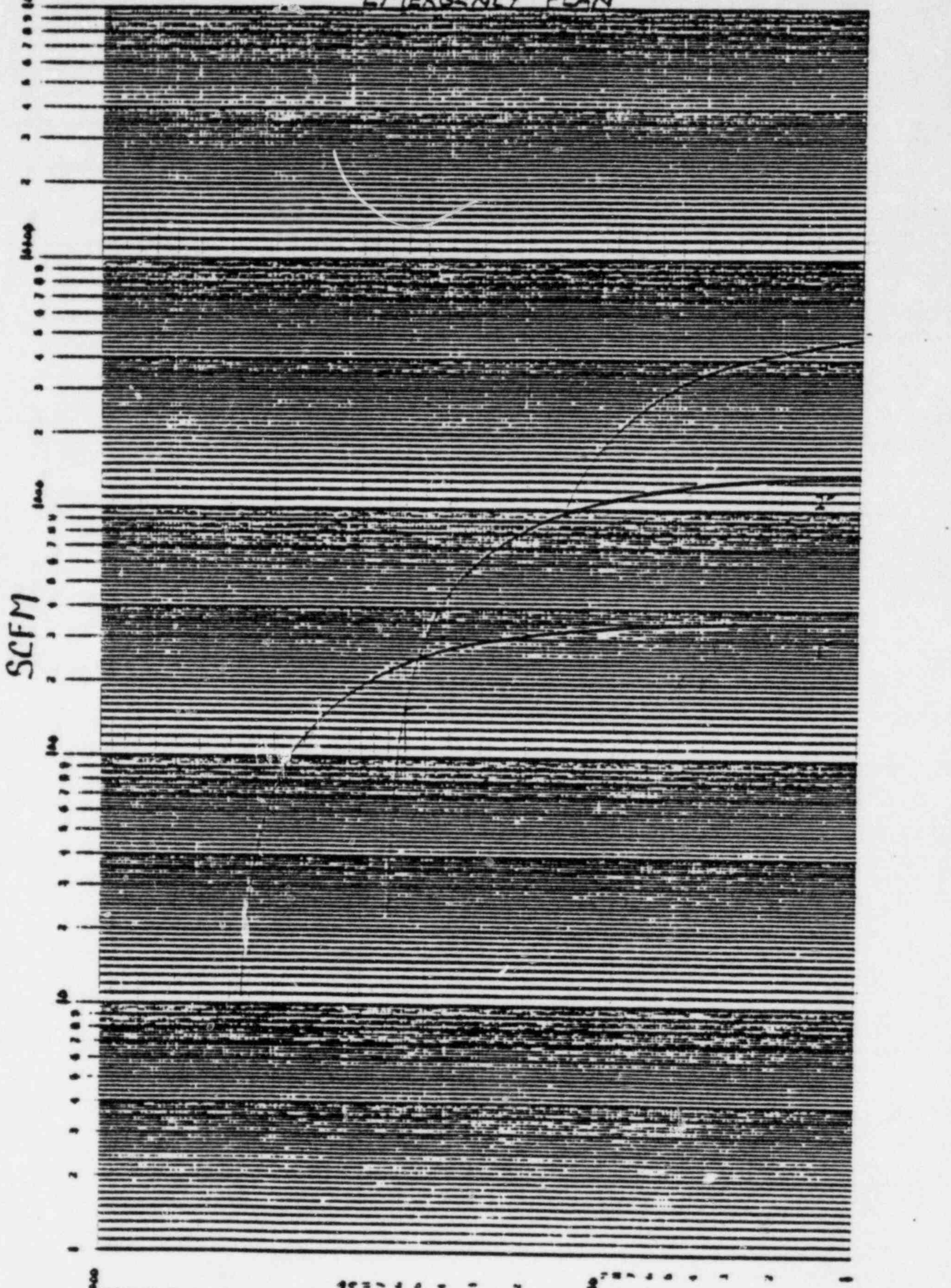
Assumption: The mass flow rate remains constant with a short interval of time.

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

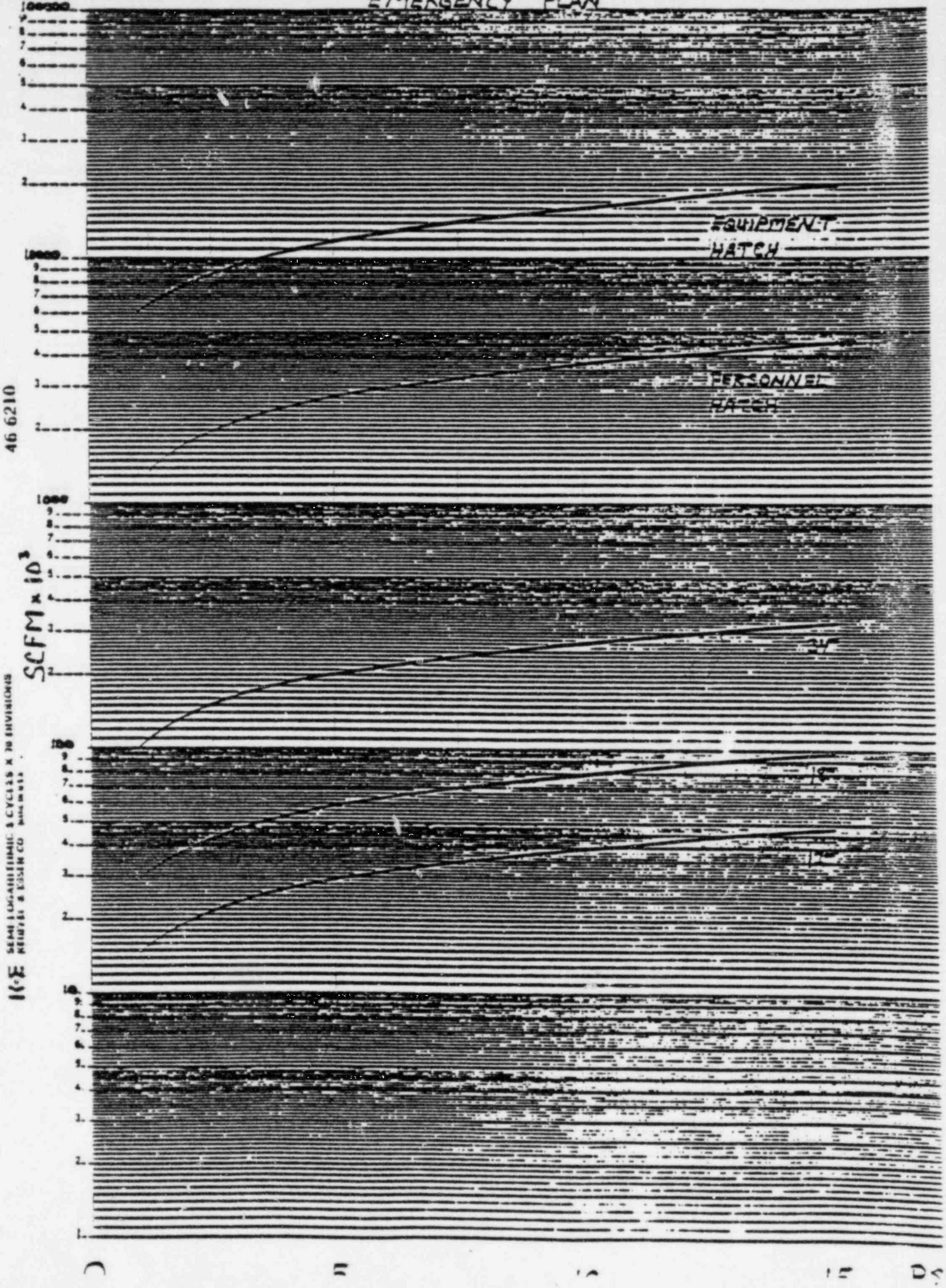
46 6210



McGUIRE NUCLEAR STATION
EMERGENCY PLAN



EMERGENCY PLAN



OPERATOR AID COMPUTER (TECH SPECS 04)
USER DOCUMENTATION

1) 'Tech Specs 04' can be accessed thru OAC terminals in either the 1) Technical Support Center (TSC) or the 2) Computer Room.

There are OAC terminals for both Units 1 and 2. Be certain to use the OAC terminal for the appropriate Unit.

All necessary data on the 'Tech Specs 04' computer printout will be under the 'Environmental Systems' heading.

2) Procedure

a) Check to see if the READY / ON/OFF LINE key on the printer is fully illuminated. If not fully illuminated, press the key one time and release.

b) Press the Tech Specs key of the OAC terminal. (Key will illuminate).

c) Type 0 4 using the blue numeric keys of the OAC terminal.

d) Press the Print key of the OAC terminal. (Key will illuminate).

e) Press the Enter key of the OAC terminal. (Key will illuminate).

Upon pressing Enter, printer will print data.

f) When printer stops, press the READY / ON/OFF LINE key on the printer to illuminate only the "READY" portion of the key.

g) Press the TOP OF FORM key on the printer three (3) times to advance paper. Tear off data sheet.

EP1P08 USER DOCUMENTATION

1.0 Purpose

This program is designed to calculate potential offsite dose in the event of a reactor coolant leak inside containment.

2.0 Procedure

2.1 All computer responses will be shown inside double bold lines. User responses will be shown underlined. The ↓ character signifies a carriage return (CTRL S pressed simultaneously on the Teletype terminal and the return key used on the Texas Instruments high speed terminal.)

2.2 VAX Logon procedure

2.2.1 Dial (Plant Ext) or (Microwave line) and make connection between terminal and computer.

2.2.2 Type ODC7320 ↓

2.2.3 Enter password DOSE ↓

2.3 When LOGON is complete, type : EPIPØ8 ↓

2.4 VAX will respond:

ENTER TIME OF TRIP (MM,DD,YY,HHSS)
?

Enter the date and time of reactor trip/shutdown in format shown.

EXAMPLE: Ø3,15,81,Ø8ØØ ↓

2.5 VAX will respond:

ENTER PRESENT DATE AND TIME
?

Enter the present date and time in the same format as 2.4.

2.6 VAX will respond:

ENTER RX. BLDG. DOSE RATE (R/HR)
?

Enter Reactor Building dose rate in R/hr as determined from Reactor Building monitor or alternative methods described in HP/O/B/1009/02.

EXAMPLE: 3.4E3 ↓

2.7 VAX will respond:

ENTER WIND SPEED (MPH), WIND DIRECTION (DEG. FROM NORTH)

?

Enter wind speed in miles per hour (use 15 min. average or standard National Weather Service observation) and wind direction (direction from which wind is coming) in degrees from North. (Use Ø.Ø as directly North).

EXAMPLE: 4.Ø,125.Ø ↵

2.8 VAX will respond:

IS THIS NWS DATA (NWS) OR PLANT DATA (MNS)

If National Weather Service temperature differential is used, enter NWS ↵ and proceed to 2.10. If plant temperature differential is used, enter MNS ↵ and proceed to 2.9.

2.9 VAX will respond:

ENTER TEMP DIFFERENTIAL (DEG.C.)

?

Enter the temperature differential in degrees Centigrade.

EXAMPLE: -Ø.4 ↵

2.10 VAX will respond:

USE DESIGN LEAK RATE (DLR) OR KNOWN LEAK RATE (KLR)

If design leak rate is used, enter DLR ↵ and proceed to 2.12. If leak rate other than design is used, enter KLR ↵ and proceed to 2.11.

2.11 VAX will respond:

ENTER KNOWN LEAK RATE (ML/HR)

?

Enter the leak rate in ML/HR.

EXAMPLE: 1.4E4 ↵

2.12 VAX will respond:

WHEN READY FOR PRINTOUT,
ADVANCE TO TOP OF PAGE
AND ENTER 'Go'

Advance to top of page and enter GO ↑

2.13 VAX will print, and the program will end, ready for next execution.

SAMPLE

```
EPIP08
ENTER TIME OF TRIP (MM,DD,YY,HHSS)
?
03,15,81,0800
ENTER PRESENT DATE AND TIME
?
03,16,81,1000
ENTER RX. BLDG. DOSE RATE (R/HR)
?
3.4E3
ENTER WIND SPEED (MPH), WIND DIRECTION (DEG. FROM NORTH)
?
4.0,125.0
IS THIS NWS DATA (NWS) OR PLANT DATA (MNS)
MNS
ENTER TEMP DIFFERENTIAL (DEG. C,)
?
-0.4
USE DESIGN LEAK RATE (DLR) OR KNOWN LEAK RATE (KLR)
DLR

          WHEN READY FOR PRINTOUT,
          ADVANCE TO TOP OF PAGE
          AND ENTER 'GO'
```

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MCGUIRE NUCLEAR STATION
OFFSITE DOSE PROJECTIONS
HP/0/B/1009/0]
ENCLOSURE 5.11

PLUME DIRECTION:	305.0 DEGREES		LEAK RATE:	2.45E+06 ML/HR
WINDSPEED:	4.0 MPH		RX BLDG DOSE RATE:	3.40E+03 R/HR
DELTA TEMP:	-0.4 DEG C.		NOBLE GAS DOSE RATE:	4.08E+04 R/HR
			IODINE DOSE RATE:	6.59E+05 R/HR
TIME OF T.IP:	3/15/81	800	AEB:	3.61E+02 UCI-MEV/ML-DIS
TIME OF CALC:	3/16/81	1000	ACDF:	5.01E+00 UCI-MREM/ML-PCI

DISTANCE DOWNWIND (MILES)	DOSE RATE AT PRESENT TIME (REM/HR)	DOSE RATE AT PRESENT TIME + 2 HOURS (REM/HR)	2 HR DOSE COMMITTMENT (REM)
		PROJECTED WHOLE BODY	
0.5	1.75E-03	1.71E-03	3.46E-03
1	6.45E-04	6.29E-04	1.27E-03
2	2.26E-04	2.20E-04	4.46E-04
3	1.24E-04	1.21E-04	2.46E-04
4	7.84E-05	7.64E-05	1.55E-04
5	5.53E-05	5.39E-05	1.09E-04
6	4.24E-05	4.13E-05	8.37E-05
7	3.37E-05	3.28E-05	6.65E-05
8	2.77E-05	2.70E-05	5.46E-05
9	2.31E-05	2.25E-05	4.55E-05
10	1.98E-05	1.93E-05	3.91E-05
		PROJECTED THYROID	
0.5	9.62E-01	9.44E-01	1.91E+00
1	3.54E-01	3.48E-01	7.02E-01
2	1.24E-01	1.22E-01	2.46E-0
3	[illegible]E-02	6.71E-02	1.35E-01
4	4.30E-02	4.22E-02	8.53E-02
5	3.04E-02	2.98E-02	6.02E-02
6	2.33E-02	2.29E-02	4.61E-02
7	1.85E-02	1.81E-02	3.66E-02
8	1.52E-02	1.49E-02	3.01E-02
9	1.27E-02	1.24E-02	2.51E-02
10	1.09E-02	1.07E-02	2.16E-02

READY

Form SPD-1002-1

DUKE POWER COMPANY
PROCEDURE PREPARATION
PROCESS RECORD

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

(2) STATION: McGuire Nuclear Station

(3) PROCEDURE TITLE: Release of Radioactive Materials Through Unit Vent Exceeding Technical Specifications

(4) PREPARED BY: Wm B. McRae DATE: 7 Jan 83

(5) REVIEWED BY: G. R. Leonard DATE: 1/10/83

Cross-Disciplinary Review By: ____________ N/R GRL

(6) TEMPORARY APPROVAL (IF NECESSARY):

By: ____________ (SRO) Date: ____________

By: ____________ Date: ____________

(7) APPROVED BY: Tony McConnell Date: 1/11/83

(8) MISCELLANEOUS:

Reviewed/Approved By: ____________ Date: ____________

Reviewed/Approved By: ____________ Date: ____________

DUKE POWER COMPANY
McGUIRE NUCLEAR STATION
RELEASE OF RADIOACTIVE MATERIALS THROUGH UNIT
VENT EXCEEDING TECHNICAL SPECIFICATIONS

1.0 Purpose

This procedure describes the method for calculating the potential offsite dose rate and dose following a release of radioactive materials through the unit vent. In addition, this procedure can provide warning message information to be given to state/local agencies.

2.0 References

2.1 Station Health Physics Manual, Section 18.2; Environmental Monitoring for Emergency Conditions.

2.2 HP/O/B/1009/07, Unit Vent/Waste Effluents Flow Data Collection.

2.3 10CFR20, Appendix B, Table II.

2.4 McGuire System Descriptions.

2.5 Unit Data Book

2.6 NRC Regulatory Guide 1.4

2.7 Offsite Dose Calculation Manual (ODCM)

2.8 HP/O/B/1009/05, First Response Evaluation of a Reactor Coolant Leak Inside Containment.

3.0 Limits and Precautions

3.1 This procedure is being used in an emergency situation which could result in evacuation of areas surrounding the plant. The procedure shall be fully understood and calculations shall be done carefully and accurately.

3.2 This procedure is written for use under abnormal conditions which could involve extremely high radiation levels. Only the Station Health Physicist or his designee should authorize the use of this procedure when needed and should provide appropriate surveillance and control of people taking samples.

3.3 Check that the counting equipment to be used has been calibrated and daily response checks have been performed.

3.4 Individuals collecting the samples should be aware of the possibility of airborne contamination and high radiation levels in sampling areas. Use protective clothing, gloves, respiratory protective equipment, portable shielding, high range dosimeters, and survey instruments as determined by Health Physics.

3.5 If action is taken in the 4 - 10 mile radius area per reference 2.8, then wind direction should be rechecked every 15 minutes to ensure that additional sectors have not been affected. Once a sector has been added to the list, it cannot be removed from the list.

3.6 Projected doses should be compared to the Environmental Protection Agency Protective Action Guides to determine levels of protective action.

4.0 <u>Procedure</u>

4.1 Acquire the following information and record on Enclosure 5.2 and/or 5.3.

NOTE 1: Some of the following information can be obtained from the 'Tech Specs 04' program of the Operator Aid Computer (OAC). All information available in 'Tech Specs 04' will be denoted in the following procedure by a '(TS)' to the left of the section number. See Enclosure 5.4 for steps to access 'Tech Specs 04'.

NOTE 2: Standard warning message information to be given to state/local agencies will be denoted in the following procedure by a '(WM)' to the left of the section number.

NOTE 3: Meteorological data should be obtained in the order of preference listed in Enclosure 5.2.

NOTE 4: Use 15 minute averages for <u>all</u> meteorological data.

(WM) 4.1.1 Wind direction recorded in degrees from North (upper tower). Lower tower wind direction should be used only if upper tower data is unavailable.

(WM) 4.1.2 Lower tower wind speed (MPH) (W). Upper tower wind direction should be used only if lower tower data is unavailable.

4.1.3 Vertical temperature gradient or $\Delta T°C$ (lower to upper tower) from the -4 to +8 scale on the meteorological temperature strip chart recorder.

NOTE 1: This information is used along with Table on Enclosure 5.4 and map provided in Technical Support Center (TSC) to determine areas affected by release.

NOTE 2: Plume direction is 180° opposite wind direction.

(WM) 4.1.4 Stability class (A,B,C,D,E,F, or G) from Table I (Enclosure 5.1).

(WM) 4.1.5 Ambient air temperature (°C). Record in °F where: °F = 9/5*°C + 32.

(WM) 4.1.6 Precipitation

(TS) 4.1.7 Discharge flow rate (F) from unit vent which is obtained by multiplying the fractional flow from totalizer by 170,500 to get flow in CFM. (i.e. 95% flow = 0.95 fractional flow).

NOTE 1: If the unit vent flow totalizer is inoperable, flow can be determined by reference 2.2.

(WM) NOTE 2: Release height of unit vent is 142 feet above yard elevation.

NOTE: Information in sections 4.1.8, 4.1.9, and 4.1.10 is not normally used. It is available if needed for working with outside agencies.

4.1.8 Discharge concentrations (C_{NG} and C_I) from Health Physics sampling of unit vent; or EMF data if sample results are not available, as follows:

If EMF36(H) <100 cpm,

C_{NG} = EMF36(L) cpm x 3.8 E-8

or if EMF36(H) >100 cpm,

C_{NG} = EMF36(H) cpm x 2 E-4

C_I = EMF37 Δ cpm/Δ time x 2.34 E-10

Where:

C_{NG} = noble gas discharge concentration in µCi/ml

3.8 E-8 = EMF36 (L) correlation factor in µCi/ml/cpm from reference 2.5

2 E-4 = EMF36 (H) correlation factor in µCi/ml/cpm from reference 2.5

2.34 E-10 = EMF37 correlation factor in µCi/ml/cpm/min from reference 2.5

(WM) 4.1.9 Calculate radiological release rate (Q) in Ci/sec using the following formula:

$\dot{Q}_{NG} = C_{NG} \times F \times 4.72\ E\text{-}4$

$\dot{Q}_{I} = C_{I} \times F \times 4.72\ E\text{-}4$

$\dot{Q} = (C_{NG} + C_{I}) \times F \times 4.72\ E\text{-}4$

Where:

$\dot{C}_{NG}$ = noble gas radiological release rate in Ci/sec

$\dot{Q}_{I}$ = I-131 equiv radiological release rate in Ci/sec

$\dot{Q}$ = radiological release rate in Ci/sec

4.72 E-4 = 2.83 E4 cm^3/ft^3 x 1.67 E-2 min/sec x 1E-6 Ci/µCi

All other variables same as previously stated.

(WM) 4.1.10 Calculate dose conversion factors in $R/hr/Ci/m^3$ for whole body and child thyroid using the following formulas:

$$DCF_{WB} = \frac{0.5 \times 3.7\ E10 \times 3600 \times \overline{E}}{1.3E3 \times 100 \times 6.25E5}$$

$$DCF_{WB} = 820 \times \overline{E}$$

Where:

DCF_{WB} = Whole body dose conversion factor in $R/hr/Ci/m^3$

0.5 = conversion from infinite cloud to semi-infinite cloud whole body dose

$\overline{E}$ = average Mev/dis from Count Room data

NOTE: If $\overline{E}$ cannot be obtained from sample results, the following values should be used.

Hours from Trip	$\overline{E}$ in Mev/dis
$\leq$ 12	0.40
12 - 48	0.20
> 48	0.10

1.3 E3 = density of air in g/m^3

Conversion factors:

3.7 E10 dis/sec · Ci

3600 sec/hr

100 erg/g · rad

6.25E5 Mev/erg

DCF_{CT} = 4.39E-3 x 1E12 x 1E-3 x 0.422

DCF_{CT} = 1.85 E6

Where:

DCF_{CT} = child thyroid dose conversion factor in $R/hr/Ci/m^3$ 4.39E-3 = inhalation dose factor for child thyroid in mrem/pCi, from reference 2.7

0.422 = child breathing rate in m^3/hr, from reference 2.7

Conversion factors:

1E12 pCi/Ci

1E-3 rad/mrad

4.1.11 Two (2) hour relative concentration (CH) in mph · sec/m^3 from Table I (Enclosure 5.1) at the site boundary (0.5), 2, 5, and 10 mile points. Record on Table I and Table II of Enclosure 5.3.

(WM) 4.1.12 Determine child thyroid dose rate using one of the following formulas:

$$\dot{D}_{CT} = 874 \times F \times C_I \times \frac{1}{W} \times CH$$

NOTE: Calculations are not required after discharge concentration is less than 10CFR20, Appendix B, Table II (I-131, 1E-10 µCi/ml; Xe-133, 3E-4 µCi/ml

Where:

$\dot{D}_{CT}$ = child thyroid dose rate in Rem/hr.

$$874 = 0.422 \frac{m^3}{hr} \times 4.39E\text{-}3 \frac{mrem}{pCi} \times 1E6 \frac{pCi}{\mu Ci} \times 1E\text{-}3 \frac{rem}{mrem} \times 472\ ml/sec/CFM$$

F = discharge flow rate in CFM (section 4.1.7)

C_I = I-131 equiv. discharge concentration in µCi/ml (section 4.1.8)

W = windspeed in mph (section 4.1.2)

CH = Two (2) hour relative concentration in mph · sec/m³ (section 4.1.11)

Or

NOTE: If EMF readings are being used, determine child thyroid dose rate using the following formula:

$$\dot{D}_{CT} = 2E\text{-}7 \times \frac{EMF37\Delta cpm}{\Delta time} \times F \times \frac{1}{W} \times CH$$

Where:

$$2E\text{-}7 = 874 \frac{rem \cdot ml \cdot m^3 \cdot min}{\mu Ci \cdot hr \cdot ft^3 \cdot sec} \times 2.34\ E\text{-}10 \frac{\mu CI \cdot min}{ml \cdot cpm}$$

$\frac{EMF37\Delta cpm}{\Delta time}$ = change in cpm per change in time (min)

NOTE: If 'Tech Specs 04' data is used, determine Δ cpm from two runs of the program 5 minutes apart (Δ Time = 5 minutes).

All other variables same as previously stated.

4.1.11.1 Using one of the above equations, determine the child thyroid dose rate at the site boundary (0.5), 2, 5, and 10 mile points.

NOTE: This can be rapidly accomplished by storing in calculator memory the result of all numbers, excepting CH, and then recalling this number to multiply by each CH value for the 0.5, 2, 5, and 10 mile points (as shown on Table I on Enclosure 5.3).

(WM) 4.1.13 Determine child thyroid dose at the site boundary (0.5), 2, 5, and 10 mile points by multiplying the dose rates at these points (as done in section 4.1.11.1 and shown on Table I on Enclosure 5.3) by the dose assessment period (in hours).

NOTE: CH values based on a two (2) hour dose assessment period.

(WM) 4.1.14 Determine whole body gamma dose rate using one of the following formulas:

$$\dot{D}_{WB} = 0.387 \times F \times C_{NG} \times \overline{E} \times \frac{1}{W} \times CH$$

Where:

$\dot{D}_{WB}$ = Whole body gamma dose rate in Rem/hr.

$$0.387 = 820 \ \frac{R \cdot ml \cdot dis}{hr \cdot \mu Ci \cdot Mev} \times 4.72E-4 \ \frac{m^3 \cdot min}{ft^3 \cdot sec}$$

$\overline{E}$ = average Mev/dis from Count Room data

NOTE: If $\overline{E}$ cannot be obtained from sample results, the following values should be used.

Hours from Trip	$\overline{E}$ in Mev/dis
≤ 12	0.40
12 - 48	0.20
> 48	0.10

All other variables same as previously stated.

Or

NOTE: If EMF readings are being used, determine whole body dose rate using one of the following formulas:

If EMF36(H) < 100cpm,

$$\dot{D}_{WB} = 1.43E-8 \times EMF36(L)cpm \times F \times \overline{E} \times \frac{1}{W} \times CH$$

Where:

$$1.47E-8 = 0.387 \ \frac{R \cdot m^3 \cdot ml \cdot dis \cdot min}{hr \cdot sec \cdot \mu Ci \cdot Mev \cdot ft^3} \times 3.8E-8 \ \mu Ci/ml/cpm$$

All other variables same as previously stated.

Or if EMF36(H) > 100 cpm,

$$\dot{D}_{WB} = 7.74E-5 \times EMF36(H)cpm \times F \times \overline{E} \times \frac{1}{W} \times CH$$

Where:

$$7.74E\text{-}5 = 0.387 \frac{R \cdot m^3 \cdot ml \cdot dis \cdot min}{hr \cdot sec \cdot \mu Ci \cdot Mev \cdot ft^3} \times 2E\text{-}4\ \mu Ci/ml/cpm$$

All other variables same as previously stated.

4.1.13.1 Using one of the above equations, determine the whole body dose rate at the site boundary (0.5), 2, 5, and 10 mile points.

NOTE: This can be rapidly accomplished by storing in calculator memory the result of all numbers, excepting CH, and then recalling this number to multiply by each CH value for the 0.5, 2, 5, and 10 mile points (as shown on Table II on Enclosure 5.3).

(WM) 4.1.15 Determine whole body gamma dose at the site boundary (0.5), 2, 5, and 10 mile points by multiplying the dose rates at these points (as done in section 4.1.13.1 and shown on Table II of Enclosure 5.3) by the dose assessment period (in hours).

NOTE: CH values based on a two (2) hour dose assessment period.

4.2 Determine potentially affected zones based on wind direction using the table on Enclosure 5.4 and record on Enclosure 5.4.

4.3 Determine levels of protective action by comparing projected doses to EPA Protective Action Guides (page 2 of 3 on Enclosure 5.4) and record on Enclosure 5.4.

4.4 Determine if non-stagnating meteorological conditions exist by observing meteorological strip chart data. If:

(1) Instantaneous wind direction has not varied over 90° in the past two (2) hours, and

(2) Instantaneous wind speed has not fallen below 10 MPH in the past two (2) hours, then

non-stagnating conditions exist.

Record result on page 2 of 2 of Enclosure 5.4.

4.5 Check results and inform Emergency Coordinator of your recommendations.

4.6 Whenever possible, utilize environmental data in comparison with calculated results to better determine plume dispersions. Record environmental data on enclosure 5.2 when available.

NOTE: Depending on meteorologic conditions, field monitoring teams may experience difficulty in finding the plume. Therefore, negative field results do not necessarily mean that radioactivity is not being released.

4.7 Calculated results should be compared with those from the Crisis Management Center if accessible. Any discrepancies should be resolved through recalculations and calculation step comparisons.

4.8 Historical data shall be retained so that offsite dose trends can be analyzed.

4.9 Insure that enclosure 5.2, 5.3, and 5.4 are properly completed and results presented to Station Health Physicist or his designee.

4.10 Actual field measurements of whole body doses will be compared to whole body dose projections by the Data Evaluation Coordinator.

5.0 <u>Enclosures</u>

5.1 Table 1, Two Hour Relative Concentration

5.2 Unit Vent Release Data Sheet

5.3 Manual Calculation Worksheet

5.4 Table of Potentially Affected Zones

5.5 OAC (Tech Specs 04) User Documentation

TABLE 1

2 HOUR RELATIVE CONCENTRATION (CH)

Temp. Diff(°C)	Stability Class	Distance (in miles) 0.5	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0
1. ≤ -0.6	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. -0.5	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 +0.4	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. +0.5 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. ≥ +1.3	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

The temperature differential is the difference in temperature between the upper and lower temperature sensors and is in degrees centrigrade.

These values are site-specific for McGuire Nuclear Station.

UNIT VENT RELEASE DATA SHEET

Time of trip/shutdown _____ hours after midnight. Date__________
Time of calculation _____ hours after midnight. Date__________
Sample Time ____________ hours after midnight. Date__________
(All meteorological data is 15 minute average.)
Time(15 min. period ending time)____ ____ ____ ____hours after midnight.
(WM) Wind direction 1) Upper tower ____ ____ ____ ____degrees from North.
or 2) Lower tower ____ ____ ____ ____degrees from North.
(WM) Wind Speed 1) Lower tower ________MPH
or 2) Upper tower ________MPH
ΔT 1) Lower to Upper tower ________°C
or 2) For 1000 - 1600 $\underline{-0.2}$ °C
or 3) For 1600 - 1000 $\underline{+1.3}$ °C
(WM) Stability Class (ΔT and Enc. 5.1) _____
(TS)(WM) Temperature _____°C
°F = (9/5) (°C_____) +32 = _____°F
(WM) Precipitation _____
(TS) Unit Vent Flow(F) _________CFM (Totalizer fraction x 170,500)
(WM) Release Height = 142 ft.

KNOWN RELEASE CONCENTRATIONS (C_{NG} and C_I)
(Vent Samples)

Gross Gas (C_{NG})__________________ µCi/ml

I-131 Equiv. (C_I)______________ µCi/ml

Gas $\overline{E}$ ____________________________Mev/dis

UNKNOWN RELEASE CONCENTRATIONS (C_{NG} and C_I)
(EMF Data)

IF EMF 36(H) < 100 cpm,

C_{NG}______________µCi/ml = EMF36 (L) cpm _________x 3.6 E-8 µCi/ml/cpm

Or if EMF 36(H) > 100 cpm

C_{NG}____________µCi/ml = EMF36(H) cpm__________x 2 E-4 µCi/ml/cpm

C_I____________µCi/ml = EMF37Δcpm/Δtime_________x 2.34E-10 $\frac{\mu Ci/ml}{cpm/min}$

Two (2) Hour Dose Commitment

Iodine (Child Thyroid)		Noble Gas (Whole Body)	
0.5 mi.	_____ Rem	0.5 mi.	_____ Rem
2 mi.	_____ Rem	2 mi.	_____ Rem
5 mi.	_____ Rem	5 mi.	_____ Rem
10 mi.	_____ Rem	10 mi.	_____ Rem

ENVIRONMENTAL DATA (If Available)

Point #	Dose Rate	Iodine Concentration
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

_______________________________ Dose Assessor

_______________ Date

MANUAL CALCULATION WORKSHEET

Radiological release rate ($\dot{Q}$)

(WM) $\dot{Q}_{NG}$ ______________ Ci/sec = C_{NG} __________ x F ________ x 4.72E-4

(WM) $\dot{Q}_{I}$ ___________ Ci/sec = C_{I} ___________ x F ________ x 4.72E-4

(WM) $\dot{Q}$ __________ Ci/sec = $(C_{NG} + C_{I})$ x F x 4.72 E-4

Dose Conversion factors for whole body (DCF_{WB}) and child thyroid (DCF_{CT})

(WM) DCF_{WB} ________________ R/hr/Ci/m³ = 820 x $\bar{E}$ ________________

(WM) DCF_{CT} = 1.85E6 R/hr/Ci/m³

NOTE: The information on this page is not normally used. It is available if needed for working with outside agencies.

Dose Rate and Dose Calculations

Child Thyroid (Record all CH values for 0.5, 2, 5, and 10 miles in Table I).

$$\dot{D}_{CT} = \underbrace{874 \times F\_\_\_\_ \times C_I\_\_\_\_ \times \frac{1}{W\_\_\_\_}}_{\text{Store in calculator memory}} \times CH$$

If using EMF37 reading, (use only if sample results are not available)

$$\dot{D}_{CT} = \underbrace{2E\text{-}7 \times \frac{EMF37\Delta cpm}{\Delta\ Time} \times F\_\_\_\_ \times \frac{1}{W\_\_\_\_}}_{\text{Store in calculator memory}} \times CH$$

Table I - Child Thyroid Dose Rate and Dose

(WM)

Distance	CH		Stored Calc. Value		Dose Rate (Rem/hour)		Time* Period		Dose (Rem)
S.B. 0.5 mi.	____	x	________	=	________	x	____	=	________
2 mi.	____	x	"	=	________	x	"	=	________
5 mi.	____	x	"	=	________	x	"	=	________
10 mi.	____	x	"	=	________	x	"	=	________

* CH values based on a two (2) hour dose assessment period.

Whole Body (Record all CH values for 0.5, 2, 5, and 10 miles in Table II).

$$\dot{D}_{WB} = \underbrace{0.387 \times F\_\_\_\_ \times C_{NG}\_\_\_\_ \times \bar{E}\_\_\_\_ \times \frac{1}{W\_\_\_\_}}_{\text{Store in calculator memory}} \times CH$$

NOTE: Use EMF36 only if sample results are not available. Use $\overline{E}$ listed below.

If using EMF36 reading and EMF36(H) < 100 cpm,

$\dot{D}_{WB}$ = 1.47E-8 x EMF36(Low)cpm________ x F________ x $\overline{E}$______ x $\frac{1}{W\_\_\_\_}$ x CH

Store in calculator memory

If using EMF36 reading and EMF36(H) > 100 cpm,

$\dot{D}_{WB}$ = 7.74E-5 x EMF36 (High) cpm_____ x F_____ x $\overline{E}$_____ x $\frac{1}{W\_\_\_\_}$ x CH

Store in calculator memory

Table II - Whole Body Dose Rate and Dose

(WM) Distance	CH		Stored Calc. Value		Dose Rate (Rem/hour)		Time Period*		Dose (Rem)
S.B. 0.5 mi.	____	x	__________	=	__________	x	______	=	__________
2 mi.	____	x	"	=	__________	x	"	=	__________
5 mi.	____	x	"	=	__________	x	"	=	__________
10 mi.	____	x	"	=	__________	x	"	=	__________

* CH values based on a two (2) hour dose assessment period.

NOTES:

1) If Hi-Range EMF reads greater than 100 cpm, use Hi-Range reading. If Hi-Range EMF reads less than 100 cpm, use Lo-Range reading.

2) Use $\overline{E}$ data from sample results. If sample results are not available, use the following approximations:

Time From Trip	$\overline{E}$
≤ 12 hours	0.40 MeV/dis.
12 - 48 hours	0.20 MeV/dis.
> 48 hours	0.10 MeV/dis.

Determine affected areas based on wind direction from the table below:

Wind Direction (degrees from North)	0 - 4 Mile Recommendation	4 - 10 Mile Recommendation
0 - 22.5	See Note 1	R,T,S,E,F,U
22.6 - 45.0		R,T,S,E,U,P
45.1 - 67.5		R,T,S,E,U,P
67.5 - 90.0		R,T,S,U,P,N,O
90.1 - 112.5		R,T,S,P,N,O
112.6 - 135.0		R,P,N,O,L
135.1 - 157.5		I,P,N,O,L
157.6 - 180.0		I,N,O,L,T,J,H
180.1 - 202.5		I,N,L,J,H,G
202.6 - 225.0		I,N,L,J,H,G
225.1 - 247.5		I,J,H,G,F
247.6 - 270.0		J,H,G,F
270.1 - 292.5		H,G,F,E
292.6 - 315.0		G,F,E
315.1 - 337.5		G,F,E,U
337.6 - 359.9		F,E,U,S

NOTE 1: Areas A,B,C,D,Q,V,M will be the recommended areas if any action is taken in the 0 - 4 mile radius of the plant. This recommendation is independent of wind direction.

Table 5.1 Recommended protective actions to reduce whole body and thyroid dose from exposure to a gaseous plume

Projected Dose (Rem) to the Population	Recommended Actions(a)	Comments
Whole body <1 Thyroid <5	No planned protective actions.(b) State may issue an advisory to seek shelter and await further instructions. Monitor environmental radiation levels.	Previously recommended protective actions may be reconsidered or terminated.
Whole body 1 to <5 Thyroid 5 to <25	Seek shelter as a minimum. Consider evacuation. Evacuate unless constraints make it impractical. Monitor environmental radiation levels. Control access.	If constraints exist, special consideration should be given for evacuation of children and pregnant women.
Whole body 5 and above Thyroid 25 and above	Conduct mandatory evacuation. Monitor environmental radiation levels and adjust area for mandatory evacuation based on these levels. Control access.	Seeking shelter would be an alternative if evacuation were not immediately possible.
Projected Dose (Rem) to Emergency Team Workers		
Whole body 25 Thyroid 125	Control exposure of emergency team members to these levels except for lifesaving missions. (Appropriate controls for emergency workers, include time limitations, respirators, and stable iodine.)	Although respirators and stable iodine should be used where effective to control dose to emergency team workers, thyroid dose may not be a limiting factor for lifesaving missions.
Whole body 75	Control exposure of emergency team members performing lifesaving missions to this level. (Control of time of exposure will be most effective.)	

(a)These actions are recommended for planning purposes. Protective action decisions at the time of the incident must take existing conditions into consideration.

(b)At the time of the incident, officials may implement low-impact protective actions in keeping with the principle of maintaining radiation exposures as low as reasonably achievable.

7) 0 - 4 miles
Recommended Areas ____
Recommended Population ____

4 - 10 miles
Recommended Areas ____
Recommended Population ____

Non-stagnating meteorological conditions do___/do not ___ exist.

____
Signature

NOTE TO EMERGENCY COORDINATOR:

If the release is projected to end within one-half (½) hour, and non-stagnating meteorological conditions exist, consider not recommending an evacuation if the plume will have left the Emergency Protection Zone (EPZ) before the population could evacuate.

OPERATOR AID COMPUTER (TECH SPECS 04)

USER DOCUMENTATION

1) 'Tech Specs 04' can be accessed thru OAC terminals in either the 1) Technical Support Center (TSC) or the 2) Computer Room.

There are OAC terminals for both Units 1 and 2. Be certain to use the OAC terminal for the appropriate Unit.

All necessary data on the 'Tech Specs 04' computer printout will be under the 'Environmental Systems' heading.

2) Procedure

a) Check to see if the READY / ON/OFF LINE key on the printer is fully illuminated. If not fully illuminated, press the key one time and release.

b) Press the Tech Specs key of the OAC terminal. (Key will illuminate).

c) Type 0 4 using the blue numeric keys of the OAC terminal.

d) Press the Print key of the OAC terminal. (Key will illuminate).

e) Press the Enter key of the OAC terminal. (Key will illuminate).

Upon pressing Enter, printer will print data.

f) When printer stops, press the READY / ON/OFF LINE key on the printer to illuminate only the "READY" portion of the key.

g) Press the TOP OF FORM key on the printer three (3) times to advance paper. Tear off data sheet.

Form SPD-1002-1

DUKE POWER COMPANY
PROCEDURE PREPARATION
PROCESS RECORD

(1) ID No: PT/0/A/4600/06
Change(s) 0 to
0 Incorporated

(2) STATION: McGuire Nuclear Station

(3) PROCEDURE TITLE: Exercises and Drills

(4) PREPARED BY: Mike Glover DATE: January 11, 1983

(5) REVIEWED BY: Morris Sample DATE: 1/17/83

Cross-Disciplinary Review By: ______ N/R: MS

(6) TEMPORARY APPROVAL (IF NECESSARY):

By: ______ (SRO) Date: ______

By: ______ Date: ______

(7) APPROVED BY: ______ Date: 1-17-83

(8) MISCELLANEOUS:

Reviewed/Approved By: ______ Date: ______

Reviewed/Approved By: ______ Date: ______

DUKE POWER COMPANY
McGUIRE NUCLEAR STATION
EXERCISES AND DRILLS

1.0 Purpose

This procedure provides for periodic exercises/drills to be conducted to evaluate major portions of the emergency response capability, and to develop and maintain key skills. Corrective actions and recommendations identified as a result of an exercise or drill will be corrected, and records maintained in accordance with this procedure.

2.0 References

2.1 McGuire Nuclear Station Emergency Plan

3.0 Time Required

2 hours

4.0 Prerequisite Tests

N/A

5.0 Test Equipment

N/A

6.0 Limits and Precautions

6.1 Exercise scenario's should be varied from year to year to test emergency team response to many of the initiating conditions listed in procedures RP/0/A/5700/01, RP/0/A/5700/02, RP/0/A/5700/03, and RP/0/A/5700/04.

6.2 Exercises should be scheduled to start between 6:00 PM and midnight and another between midnight and 6:00 AM once every six years.

6.3 Drills should be conducted more frequently than exercises and shall be supervised and evaluated by a drill instructor.

7.0 Required Station Status

N/A

8.0 Prerequisite System Conditions

N/A

9.0 Test Method

N/A

10.0 Data Required

Enclosure 13.1 Exercise/Drill Format and Critique Findings

Enclosure 13.2 Exercise/Drill, Controller/Evaluator Report

11.0 Acceptance Criteria

11.1 Completion of required exercise or drill and the subsequent critique.

12.0 Procedure

12.1 Exercises

12.1.1. A full-scale exercise is an event that tests the integrated capability and a major portion of the basic elements existing within emergency preparedness plans and organizations. A full-scale exercise shall include mobilization of state and local personnel and resources adequate to verify the capability to respond to an accident scenario requiring response. A full-scale exercise will be supervised and evaluated by a qualified exercise director. A full-scale exercise will be held no less than once every 5 years.

12.1.2. A small-scale exercise is an event which tests the adequacy of communication links, establishes that response agencies at the utility and local level understand the emergency action levels, and tests at least one other component (e.g. medical or offsite monitoring) of the emergency plan. A small-scale exercise will be conducted each year that a full-scale exercise is not held at the station. A small-scale exercise will be supervised and evaluated by a qualified exercise director.

12.1.3. An exercise will simulate an emergency that results in offsite protective actions and requires response by offsite agencies.

12.1.4. An exercise scenario shall provide for a critique of the exercise by all concerned personnel and organizations.

12.2 Drills

12.2.1 A drill is a supervised instruction period aimed at testing, developing and maintaining skills in a particular operation. A drill is often a component of an exercise. A drill will be supervised and evaluated by a qualified drill instructor.

12.2.2 Drills will be conducted at the frequencies indicated below:

(a) Communication drills with state and local government located within the 10 mile Emergency Planning Zone shall be conducted monthly. This communication check will include contact with the NRC headquarters via the ENS (Emergency Notification System) telephone from the Control Room, TSC and CMC. It will also include a communication check with the NRC Region II Operations Center from the Control Room, TSC and CMC.

(b) Communication drills with Federal emergency response organizations and states within the 50 mile Injestion Pathway shall be conducted quarterly.

(c) Communication drills with state and local emergency operations centers and field assessment teams shall be conducted annually.

NOTE Sample message information for the above communication drills shall test the ability to understand the content of messages.

(d) Fire drills shall be conducted in accordance with Station Directive 2.11.1 and documented by the Safety Department.

(e) Medical emergency drills involving a simulated contaminated individual shall be conducted annually. This drill will involve participation by the North Mecklenburg Ambulance Service and the North Mecklenburg Rescue Squad and Charlotte Memorial Hospital. A communication check to Oak Ridge REACTS as the provider of backup medical support shall be conducted during this drill.

(f) A radiological monitoring drill involving onsite and offsite radiological monitoring teams will be conducted annually. The monitoring teams will actually collect and analyze air samples, as appropriate. Soil, vegetation and water samples will not be taken as this is done on a weekly basis at the station. The exercise controllers will provide them simulated analysis results indicative of contamination or plume location.

(g) Health Physics drills shall be conducted semi-annually which involve response to, and analysis of, simulated elevated airborne and liquid samples and direct radiation measurements in the environment.

(h) Health Physics drills shall also be conducted annually which involve analysis of inplant liquid samples with actual radiation levels, including use of the post-accident sampling system.

(i) Site assembly drills shall be conducted semi-annually. These drills shall provide for the capability to account for all individuals onsite at the time of the emergency and to ascertain the names of missing individuals within 30 minutes of the start of an emergency condition. The capability to account for onsite individuals continuously after the initial accountability shall be included.

12.2.3 File Enclosure(s) 13.1 and 13.2 with completed procedure process record.

13.0 Enclosures

13.1 Exercise/Drill Format and Critique Findings.

13.2 Exercise/Drill, Controller/Evaluator Report

EXERCISE/DRILL FORMAT AND CRITIQUE FINDINGS

1.0 Classification of Exercise/Drill. (Check appropriate box) ☑

- ☐ - Emergency Exercise, 12.1
- ☐ - Communication Drill (state and local government within 10 mile EPZ and NRC Headquarters/Region II Operations Center from the Control Room, TSC, and CMC), 12.2.2, a.(monthly)
- ☐ - Communication Drill (Emergency response organizations and state within 50 mile I.P.Z.), 12.2.2, b. (quarterly)
- ☐ - Communication Drill (State and local Emergency Operations Centers and Field Assessment Teams), 12.2.2, c. (annually)
- ☐ - Medical Emergency Drill, 12.2.2, e. (annually)
- ☐ - Radiological Monitoring Drill, 12.2.2, f. (annually)
- ☐ - Health Physics Drill, 12.2.2, g. (semi-annually)
- ☐ - Health Physics Drill, 12.2.2.,h. (annually)
- ☐ - Site Assembly Drill, 12.2.2, i. (semi-annually)

2.0 Drill Instructor/Exercise Director ______________________
(Name)

Critique Director: ______________________
(Name)

3.0 Date/Time Exercise/Drill to be conducted: __________/__________
(Date) (Time)

4.0 Exercise/Drill Objectives: ______________________

____

____

____

____

____

____

5.0 Plant system/area(s) affected: ______________________

6.0 Work groups to be involved: ______________________

7.0 Time sequence of postulated events: ______________________

8.0 Assigned Observers (Controllers/evaluators) and their stations: ______________________

9.0 Critique to be conducted at: ________ / ________ ________
(Date) (Time) (Location)

10.0 Personnel to attend critique:

11.0 Critique Findings, Recommendations, Required Action(s), Etc.: ______________

12.0 Corrective Actions taken: (List actions taken to ensure all findings in 11.0 above are identified and corrected): ______________

NOTE: Include all Exercise/Drill data or other information provided as an attachment.

____
(Drill Instructor/Exercise Director)
(Signature)

____
(Critique Director)
(Signature)

EXERCISE/DRILL CONTROLLER/EVALUATOR REPORT

1.0 Drill Classification: ______________________________

____

____

2.0 Summary of Exercise/Drill: ______________________________

____

____

____

3.0 Exercise/Drill initiated: __________/__________
(Date) (Time)

4.0 Observation/Comments/Recommendations: ______________________________

____

____

____

____

____

____

5.0 Exercise/Drill completed at: __________/__________
(Date) (Time)

____
Controller/Evaluator
(Signature)

Form 34731 (
(Formerly SPD-1002-)

DUKE POWER COMPANY
PROCEDURE PREPARATION
PROCESS RECORD

(1) ID No: PT/0/A/4600/11
Change(s) 0 to
2 Incorporated

(2) STATION: McGuire Nuclear Station

(3) PROCEDURE TITLE: Function Check of Emergency Vehicle and Equipment

(4) PREPARED BY: Scott E. Freeman DATE: 31 Dec 82

(5) REVIEWED BY: J. R. Leonard DATE: 1/4/83

Cross-Disciplinary Review By: ______ N/R: JRL

(6) TEMPORARY APPROVAL (IF NECESSARY):

By: ______ (SRO) Date: ______

By: ______ Date: ______

(7) APPROVED BY: Tony L. McConnell Date: 1/5/83

(8) MISCELLANEOUS:

Reviewed/Approved By: ______ Date: ______

Reviewed/Approved By: ______ Date: ______

DUKE POWER COMPANY
McGUIRE NUCLEAR STATION
FUNCTION CHECK OF EMERGENCY VEHICLE AND EQUIPMENT

1.0 Purpose

1.1 To ensure that protective equipment and supplies are operational, and that communications capability exists with the various emergency personnel and emergency organizations at all times in the support of an emergency condition at the station.

2.0 References

2.1 NUREG--0654 (Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants).

3.0 Time Required

3.1 Sixteen (16) manhours.

4.0 Prerequisite Tests

N/A

5.0 Test Equipment

N/A

6.0 Precautions and Limitations

6.1 A minimum of two people shall be aboard the emergency boat when in use.

6.2 Emergency boat operators shall maintain radio communications with the McGuire Nuclear Station at all times and will verify this capability by performing a radio check every 30 minutes during the period the boat is being operated.

6.3 Personnel aboard the emergency boat shall wear floatation vests at all times and semi-dry suits when Condenser Circulating Water (RC) inlet temperature drops below 60°F., and outside air temperature is below 55° F.

6.4 Emergency boat fuel tank level shall be maintained at $\geq \frac{1}{4}$ full at all times.

6.5 Personnel using an emergency vehicle shall wear seat belts.

6.6 Personnel shall follow all FCC regulations during radio transmissions.

7.0 Required Station Status

N/A

8.0 Prerequisite System Conditions

N/A

9.0 Test Method

N/A

10.0 Data Required

10.1 Equipment Check-Off List - Emergency Vehicles (Enclosure 13.1)

10.2 Equipment Check-Off List - Emergency Boat (Enclosure 13.2)

10.3 Post Accident Containment Air Sampling Equipment (Enclosure 13.3)

10.4 Protective Equipment and Supplies Locations (Enclosure 13.4)

10.5 Protective Equipment and Supplies Check-Off List - Recovery Kits (Enclosure 13.5)

10.6 Protective Equipment and Supplies Check-Off List - Environmental Survey Kits (Enclosure 13.6, 13.7, 13.8, 13.9)

10.7 Protective Equipment and Supplies Check-Off List - Personnel Survey Kit - Construction Post #1 (Enclosure 13.10)

10.8 Protective Equipment and Supplies Check-Off List - Personnel Survey Kit - Brass Shack (Enclosure 13.11)

10.9 Protective Equipment and Supplies Check-Off List - Personnel Survey Kit - PAP Area (Enclosure 13.12)

10.10 Protective Equipment and Supplies Check-Off List - Personnel Survey Kit - Evacuation Facility (Enclosure 13.13)

10.11 Technical Support Center Kit Check List (Enclosure 13.14)

10.12 Medical Decontamination Kit Check-Off List (Enclosure 13.15)

10.13 Medical Decontamination Kit Check-Off List, Charlotte Memorial Hospital (Enclosure 13.16)

10.14 Operation Support Center Kit Check List (Enclosure 13.17)

10.15 Fuel Shipment Kit (Enclosure 13.18)

10.16 Verification of Emergency Communications (Enclosure 13.19)

10.17 National Weather Service and Onsite Weather (Enclosure 13.20)

11.0 Acceptance Criteria

N/A

12.0 Procedure

12.1 Emergency Vehicles

Date/Initials

_____/_____ 12.1.1 Once during each month and after emergency use, the emergency vehicles shall be inventoried per Enclosure 13.1 (Equipment Check-Off List - Emergency Vehicles).

_____/_____ 12.1.2 With each inventory a check-off list shall be completed and any discrepancies shall be noted on the list and reported to the emergency plan group immediately.

_____/_____ 12.1.3 Preventive maintenance shall be the responsibility of the Emergency Planning group of Health Physics and be performed by predesignated service areas.

12.2 Emergency Boat

_____/_____ 12.2.1 Once during each month and after use, the emergency boat shall be inventoried per enclosure 13.2 (Equipment Check-Off List - Emergency Boat).

NOTE: Run Time (Minimum 2 hours per month may be postponed up to, but not more than 3 months due to inclement weather.

_____/_____ 12.2.2 With each inventory the check-off list shall be completed and any discrepancies shall be noted on the list and reported to the emergency plan group immediately.

_____/_____ 12.2.3 Every 100 hours of operation, the emergency boat shall be delivered to an authorized service representative for routine preventative maintenance as per the owner's-operators' manual.

12.3 Protective Equipment Kits

_____/_____ 12.3.1 Once during each month and after use, each emergency kit listed in enclosure 13.4 (Protective Equipment Kit Locations) shall be inventoried per applicable enclosure 13.5 - 13.8 (Protective Equipment Kit Check-Off Lists).

_____/_____ 12.3.2 With each inventory the check-off list shall be completed and a copy placed in the applicable kit. (The original shall be filed with the completed procedure records). Any discrepancies shall be noted on the check-off list and reported to the emergency plan group immediately.

_____/_____ 12.3.3 Check all batteries in kits monthly for strength and condition.

_____/_____ 12.3.4 Verify calibration date and functional check each instrument during inventory.

_____/_____ 12.3.5 Verify that silver zeolite cartridges are sealed air tight, and must be changed out two (2) years from date on package.

12.4 Telephone Communications

_____/_____ 12.4.1 Once per calendar quarter, all telephone numbers and pages utilized in emergency procedures EP/0/A/5000/05-08, and Station Directives 3.8.1, 3.8.2 shall be verified correct and in working order. All jack-in telephones in the Technical Support Center will be verified in working order.

12.5 Radio Communications

_____/_____ 12.5.1 Once during each month, McGuire emergency radio transmitter/receivers shall be operationally checked as follows:

_____/_____ 12.5.1.1 McGuire Emergency Base Station -

verify capable communications with all county Emergency Operations Centers.

_____/_____ 12.5.1.2 Emergency Environmental Survey Team Radios - verify capable communications with McGuire Emergency Base Station at a minimum distance of 10 miles.

_____/_____ 12.5.1.3 Once a month, a call will be made to the National Weather Service located at the Charlotte Airport and McGuire Control Room to obtain the wind direction, speed and cloud cover.

_____/_____ 12.5.2 Verification of capable emergency communications shall be documented per enclosure 13.19 (Verification of Emergency Communications) and maintained on file by the Emergency Plan Group.

_____/_____ 12.5.3 A current verification letter of personnel authorized by Duke Power Company to report an emergency action level, to state and county agencies, will be used to authenticate the person or persons initiating the report. The verification letter will be updated every 6 months.

12.6 Emergency survey instruments and counting equipment shall be operationally checked quarterly per applicable Health Physics calibration procedures.

12.7 Emergency portable air samplers shall be operationally checked quarterly per Health Physics Manual, Section 15.2 Operation of Health Physics Air Samplers, utilizing their predesignated emergency vehicle and powerverter or gasoline powered generator as the power source.

12.8 Emergency pocket dosimeters shall be operationally checked quarterly per HP/0/B/1005/19 (Dosimeter Leak and Calibration Check).

12.9 Gasoline powered generators shall be operationally checked quarterly and preventative maintenance done as described in Section 4 of the owners' manual.

13.0 Enclosures

13.1 Equipment Check-Off List - Emergency Vehicles

13.2 Equipment Check-Off List - Emergency Boat

13.3 Post Accident Containment Air Sampling Equipment List.

13.4 Protective Equipment and Supplies Locations

13.5 Protective Equipment and Supplies Check-Off List - Recovery Kits

13.6 Protective Equipment and Supplies Check-Off List - Environmental Survey Kits Health Physics Vehicle

13.7 Protective Equipment and Supplies Check-Off List - Environmental Survey Kits Administrative Vehicle

13.8 Protective Equipment and Supplies Check-Off List - Environmental Survey Kits Chemistry Vehicle

13.9 Protective Equipment and Supplies Check-Off List - Environmental Survey Kits Maintenance Pickup (Spare) Boat

13.10 Protective Equipment and Supplies Check-Off List - Personnel Survey Kit - Construction Post #1

13.11 Protective Equipment and Supplies Check-Off List - Personnel Survey Kit - Brass Shack

13.12 Protective Equipment and Supplies Check-Off List - Personnel Survey Kit PAP Area

13.13 Protective Equipment and Supplies Check-Off LIst - Personnel Survey Kit - Evacuation Facility

13.14 Technical Support Center Kit Check List

13.15 Medical Decontamination Kit Check-Off List

13.16 Medical Decontamination Kit Check-Off List, Charlotte Memorial Hospital

13.17 Operational Support Center Kit Check-Off List

13.18 Fuel Shipment Kits Check-Off List

13.19 Verification of Emergency Communications

13.20 National and On-Site Weather Information

EQUIPMENT CHECK-OFF LIST
EMERGENCY VEHICLES

Vehicle #

7632 Health Physics Vehicle

4352 Chemistry Vehicle

8031 Maintenance Vehicle

7105 Administration Vehicle

ITEM	AMOUNT
Fire Extinguisher	1
First Aid Kit	1
Vehicle Accident Form	1
Keys (PAP)	1 set each

Discrepancies:

Signature/Date

EQUIPMENT CHECK-OFF LIST
EMERGENCY BOAT

INVENTORY

TIME	AMOUNT
Floatation Vest (one per person)	4
Semi-Dry Suits (one per person as required)	4
Buoyant Jacket (one per person as required)	4
Fire Extinguisher	1
Paddles	2
First Aid Kit	1
Anchor and Line	1
Snake Bite Kit	1
Loud Hailer	1

OPERATIONAL CHECKS

	Check ✓
Bilge Pump	____
Loud Hailer	____
Horn	____
Siren	____
Navigation Lights	____
Search Lights	____
Fuel Tank Level $\geq \frac{1}{2}$ full	____
Run Time (Minimum - 2 hours by log)	____

Discrepancies:

____
Signature/Date

POST ACCIDENT CONTAINMENT AIR SAMPLING EQUIPMENT

		Check ✓
Nalgene 500 ml Bottles of NAOH with Accompanying Vial of $NA_2\ S_2O_3 \cdot 5H_2O$	6	____
Nalgene 500 ml Thiosulfate Sample Bottles	6	____
Stainless Steel 100cc Gas Bombs	6	____
Poly Bags	6	____
Stop Watch	1	____

Location:

Health Physics Shift Lab in File Drawer Labeled "Post Accident Air Sampling Equipment."

PROTECTIVE EQUIPMENT AND SUPPLIES

KITS	LOCATION
Recovery Kits (4)	Control Room Station Manager's Office Training & Technology Cent. Cowans Ford Dam
Environmental Survey Kits (4)	Trailer #7
Personnel Survey Kits (5)	
Construction Post #1	Construction Post #1
Brass Shack	Construction Post #1
PAP Area	Security - PAP Area
Evacuation Facility (2)	Cowans Ford Dam, and Training & Technology Center
Medical Decontamination Kit	Auxiliary Building First Aid Room and Charlotte Memorial Hosp.
Operational Support Center Kit	Operational Support Center
Technical Support Center Kit	Technical Support Center
Fuel Shipment Kits (2)	Trailer #7

RECOVERY KITS CHECK LIST

ITEM	AMOUNT
Xetex Mod 305B	1
High Range Dosimeters	2
Dosimeter Charger	1
Boundary Ribbon or Rope (50 yd. roll)	1
Masking Tape (roll)	1
Rain Suits (set)	2
Protective Clothing (set)	2
Poly Bags (various)	12
Caution Signs w/inserts	2
Legal Pads	1
HP Form #2 (Smear Survey Form)	5
Pens	2
Grease Pencil	1
Norton 7600 Respirators w/7500-83 Chemical Cartridges	2
First Aid Kit	1
Potassium Iodide Tablets	475 Bottles-Cowans Ford, 150 Bottles-Control Room, Station Manager's Office, Training & Technology Cent.
Smears (box)	1
NuCon Smears	30
Soap (bar)	6
Flashlight	1
Batteries	4
Pocket Knife	1
Small Sample Bottles	200 Cowans Ford 60 Station Managers Office Training & Technology Cent. Control Room

Discrepancies:

Signature/Date

ENVIRONMENTAL SURVEY CHECK LIST
HEALTH PHYSICS VEHICLE

ITEM	AMOUNT
Xetex Mod 305B and Eberline E-520 or E-120 w/260 probe	1 each
Sam-2 w/RD-22 probe	1
Emergency Radio Transmitter/Receiver	1
Radeco H809V Air Sampler	1
Trippe PV1000FC Powerverter or Gasoline Powered Generator	1
High Range Dosimeter	2
Dosimeter Charger	1
TLD (in separate labeled container)	2
Norton 7600 Respirator w/7500-83 Chemical Cartridges	2
Potassium Iodide Tablets (bottle)	1
Protective Clothing (full set)	3
Poly Bags (various sizes)	6
Masking Tape (roll)	1
Limnological Sampler	1
Cubitainers	6
Hand Gardening Spade	1
Stopwatch	1
Flashlight	1
Batteries	4
Silver Zeolite (CP100G or GY130) Filter Cartridges and Particulate Filters	30
Labels for Filter Cartridges	30
Smears (box)	1
NuCon Smears	30
HP Form #2 (Smear Survey Form)	10
HP Form #6 (Air Survey Form)	10
Map of Ten Mile Zone Sectors	1
Legal Pad	1
Snake Bite Kit	1
Pen	2
Grease Pencil	1
Dime Roll	1
Pocket Knife	1
Health Physics Manual - Section 18.2	1

Discrepancies:

Signature/Date

ENVIRONMENTAL SURVEY CHECK LIST
ADMIN. VEHICLE

ITEM	AMOUNT
Xetex Mod 305B and Eberline E-520 or E-120 w/260 probe	1 each
Sam-2 w/RD-22 probe	1
Emergency Radio Transmitter/Receiver	1
Radeco H809V Air Sampler	1
Trippe PV1000FC Powerverter or Gasoline Powered Generator	1
High Range Dosimeter	2
Dosimeter Charger	1
TLD (in separate labeled container)	2
Norton 7600 Respirator w/7500-83 Chemical Cartridges	2
Potassium Iodide Tablets (bottle)	1
Protective Clothing (full set)	3
Poly Bags (various sizes)	6
Masking Tape (roll)	1
Cubitainers	6
Hand Gardening Spade	1
Stopwatch	1
Flashlight	1
Batteries	4
Silver Zeolite (CP100G or GY130) Filter Cartridges and	
Particulate Filters	30
Labels for Filter Cartridges	30
Smears (box)	1
NuCon Smears	30
HP Form #2 (Smear Survey Form)	10
HP Form #6 (Air Survey Form)	10
Map of Ten Mile Zone Sectors	1
Legal Pad	1
Snake Bite Kit	1
Pen	2
Grease Pencil	1
Dime Roll	1
Pocket Knife	1
Health Physics Manual - Section 18.2	1

Discrepancies:

Signature/Date

ENVIRONMENTAL SURVEY CHECK LIST
CHEMISTRY VEHICLE

ITEM	AMOUNT
Xetex Mod 305B and Eberline E-520 or E-120 w/260 probe	1 each
Sam-2 w/RD-22 probe	1
Emergency Radio Transmitter/Receiver	1
Radeco H809V Air Sampler	1
Trippe PV1000FC Powerverter or Gasoline Powered Generator	1
High Range Dosimeter	2
Dosimeter Charger	1
TLD (in separate labeled container)	2
Norton 7600 Respirator w/7500-83 Chemical Cartridges	2
Potassium Iodide Tablets (bottle)	1
Protective Clothing (full set)	3
Poly Bags (various sizes)	6
Masking Tape (roll)	1
Cubitainers	6
Hand Gardening Spade	1
Stopwatch	1
Flashlight	1
Batteries	4
Silver Zeolite (CP100G or GY130) Filter Cartridges and Particulate Filters	30
Labels for Filter Cartridges	30
Smears (box)	1
NuCon Smears	30
HP Form #2 (Smear Survey Form)	10
HP Form #6 (Air Survey Form)	10
Map of Ten Mile Zone Sectors	1
Legal Pad	1
Snake Bite Kit	1
Pen	2
Grease Pencil	1
Dime Roll	1
Pocket Knife	1
Health Physics Manual - Section 18.2	1

Discrepancies:

Signature/Date

ENVIRONMENTAL SURVEY CHECK LIST
MAINT. PICKUP (SPARE) VEHICLE

ITEM	AMOUNT
Xetex Mod 305B and Eberline E-520 or E-120 w/260 probe	1 each
Sam-2 w/RD-22 probe	1
Emergency Radio Transmitter/Receiver	1
Radeco H809V Air Sampler	1
Trippe PV1000FC Powerverter or Gasoline Powered Generator	1
High Range Dosimeter	2
Dosimeter Charger	1
TLD (in separate labeled container)	2
Norton 7600 Respirator w/7500-83 Chemical Cartridges	2
Potassium Iodide Tablets (bottle)	1
Protective Clothing (full set)	3
Poly Bags (various sizes)	6
Masking Tape (roll)	1
Limnological Sampler	1
Cubitainers	6
Hand Gardening Spade	1
Stopwatch	1
Flashlight	1
Batteries	4
Silver Zeolite (CP100G or GY130) Filter Cartridges and Particulate Filters	30
Labels for Filter Cartridges	30
Smears (box)	1
NuCon Smears	30
HP Form #2 (Smear Survey Form)	10
HP Form #6 (Air Survey Form)	10
Map of Ten Mile Zone Sectors	1
Legal Pad	1
Snake Bite Kit	1
Pen	2
Grease Pencil	1
Dime Roll	1
Pocket Knife	1
Health Physics Manual - Section 18.2	1

Discrepancies:

Signature/Date

PERSONNEL SURVEY KIT
CONSTRUCTION POST #1

CHECK LIST

ITEM	AMOUNT
Eberline E-520 or E-120 w/HP-260 probe	1
Emergency Radio Transmitter/Receiver, provided by Security	1
High Range Dosimeters	1
Dosimeter Charger	1
Norton 7600 Respirator w/7500-83 Chemical Cartridges	1
Potassium Iodine Tablets (bottle)	1
Protective Clothing (full set)	6
Boundary Ribbon or Rope (50 yd. roll)	1
Caution Signs w/inserts	4
Masking Tape (roll)	1
Poly Bags (various)	6
Smears (box)	1
NuCon Smears	25
HP Form #2 (Smear Survey Form)	10
Pens	2
Grease Pencil	1
Health Physics Manual, Section 18.1	1
Legal Pad	1
Pocket Knife	1

Discrepancies:

Signature/Date

PERSONNEL SURVEY KIT
BRASS SHACK
CHECK LIST

ITEM	AMOUNT
Eberline E-520 or E-120 w/HP-260 probe	1
Emergency Radio Transmitter/Receiver, provided by Security	1
High Range Dosimeters	1
Dosimeter Charger	1
Norton 7600 Respirator w/7500-83 Chemical Cartridges	1
Potassium Iodide Tablets (bottle)	1
Protective Clothing (full set)	6
Boundary Ribbon or Rope (50 yd. roll)	1
Caution Signs w/inserts	4
Masking Tape (roll)	1
Poly Bags (various)	6
Smears (box)	1
NuCon Smears	25
HP Form #2 (Smear Survey Form)	10
Pens	2
Grease Pencil	1
Health Physics Manual, Section 18.1	1
Legal Pad	1
Pocket Knife	1

Discrepancies:

Signature/Date

PERSONNEL SURVEY KIT
PAP AREA
CHECK LIST

ITEM	AMOUNT
Eberline E-520 or E-120 w/HP260 probe	2
Emergency Radio Transmitter/Receiver, provided by Security	1
High Range Dosimeters	2
Dosimeter Charger	1
Norton 7600 Respirator w/7500-83 Chemical Cartridges	2
Potassium Iodide Tablets (bottle)	1
Protective Clothing (full set)	6
Boundary Ribbon or Rope (50 yd. roll)	1
Caution Signs w/inserts	4
Masking Tape (roll)	1
Poly Bags (various)	6
Smears (box)	1
NuCon Smears	25
HP Form #2 (Smear Survey Form)	10
Pens	2
Grease Pencil	2
Health Physics Manual, Section 18.1 and Section 11.3	1 each
Legal Pad	1
Pocket Knife	1
Hand Soap	10
Hand Brushes	2
Atomic Swipes	12
Citric Acid (1 lb.)	1
Disposable Towels	1 pk.
Fingernail Clippers	1
Disposable Coveralls	40
Phisohex	1 quart

Discrepancies:

Signature/Date

PERSONNEL SURVEY KIT
EVACUATION FACILITY
CHECK LIST

ITEM	AMOUNT
Eberline E-520 or E-120 w/HP260 probe	2
Emergency Radio Transmitter/Receiver, provided by Security	1
High Range Dosimeters	4
Dosimeter Charger	1
Norton 7600 Respirator w/7500-83 Chemical Cartridges	4
Potassium Iodide Tablets (bottle)	2
Small Sample Bottles	4
Protective Clothing (full set)	6
Boundary Ribbon or Rope (50 yd. roll)	2
Caution Signs w/inserts	6
Masking Tape (roll)	1
Poly Bags (various)	6
Smears (box)	1
NuCon Smears	25
HP Form #2 (Smear Survey Form)	10
Pens	2
Grease Pencil	2
Health Physics Manual, Section 18.1 and Section 11.3	1 each
Legal Pad	1
Pocket Knife	1
Hand Soap	10
Hand Brushes	2
Atomic Swipes	12
Citric Acid (1 lb.)	1
Disposable Towels	1 pk.
Fingernail Clippers	1
Disposable Coveralls	40
Phisohex	1 quart

Discrepancies:

Signature/Date

TECHNICAL SUPPORT CENTER KIT
CHECK LIST

ITEM	AMOUNT
Protective Clothing (set)	6
Norton 7600 Respirators w/7500-83 Chem. Ctgs.	6
Xetex Mod 305B or PIC 6A	1
Radeco H809V Air Sampler	1
Silver Zeolite (CP-100G or GY-130) Filter Cartridges & Particulate Filters	25
Labels for Filter Cartridges	25
SAM-2 w/RD-22 Probe	1
Potassium Iodide Tablets (bottle)	25
Small Sample Bottles	10
Caution Signs w/inserts	3
Rad Tape	2
Smears	30
Plastic Bags	6
Masking Tape (roll)	1
Pen	2
Grease Pencil	1

Discrepancies:

____
Signature/Date

MEDICAL DECONTAMINATION KIT CHECK-OFF LIST

ITEM	AMOUNT
Eberline RM-14 w/HP-210 Probe (H.P. Lab)	1
Decon Cleaner	3
Disposable Towels	10
Poly Bags 20" x 40"	2
Poly Bags 12" x 18"	4
Fingernail Clippers	1
Smears	25
NuCon Smears	25
Hand Brushes	2
Hand Soap	10
Protective Clothing (full set)	4
Disposable Rain Suits	2
Tape, Radioactive Material	1
Tape, Masking 2"	1
Tape, Duct 2"	1
HP Form #2	4
AP/0/A/5500/27	1
Swipes, Atomic (Kotex)	12
Citric Acid (1 lb.)	1
Phisohex	1 gallon

Discrepancies:

____
Signature/Date

MEDICAL DECONTAMINATION KIT CHECK-OFF LIST
CHARLOTTE MEMORIAL HOSPITAL

ITEM	AMOUNT
Eberline E-120 w/HP210 and HP270 Probes	2
Decon Cleaner	3
Disposable Towels	10
Poly Bags 20" x 40"	2
Poly Bags 12" x 18"	4
Fingernail Clippers	1
Smears	25
NuCon Smears	25
Hand Brushes	2
Hand Soap	10
Protective Clothing, provided by Hospital	4
Disposable Rain Suits	2
Tape, Radioactive Material	1
Tape, Masking 2"	6
Tape, Duct 2"	6
HP Form #2	4
AP/0/A/5500/27	1
Swipes, Atomic (Kotex)	36
Citric Acid (1 lb.)	1
Hair Clippers, Electric	1
Absorbent Paper	150
Caution Signs w/inserts	5
Rad Rope	1
Pocket Dosimeters 0-200 mR	25
Dosimeter Charger	1

Discrepancies:

Signature/Date

OPERATION SUPPORT CENTER KIT
CHECK-OFF LIST

ITEM	AMOUNT
Protective Clothing (set)	4
Norton 7600 Respirators w/7500-83 Chemical Cartridges	4
Flashlight	4
Batteries	8
Portable Radiac Instrument (PIC 6-A)	2
Camera	1
Film Pacs	2
Masking Tape (roll)	2
Dosimeters (0-5R) (0-50R)	4 each
Dosimeter Charger	1
Rain Suits	4
Poly Bags	12
Batteries (Camera)	1
Flashbulbs (Camera)	8

Discrepancies:

Signature/Date

FUEL SHIPMENT KIT

ITEM	AMOUNT
Air Purifying Respirator	2
Coveralls	4
Rubber Shoe Covers, pairs	6
Rubber Gloves, pairs	6
Poly Bags 20" x 40"	12
Step Off Pads	3
50 yd. Roll of Barricade Tape (Magenta & Yellow)	4
Roll of Duct Tape	2
Box of Small Kimwipes	2
TLD Badges in Separate Labeled Container	5
Personnel Dosimeters	5
Dosimeter Charger	1
Steno Pad with 2 Ink Pens	1
NuCon Smears	100
Cotton Gloves, Bundle	1
Shoe Covers, disposable, pair	20
All Purpose Marker	2
Scotch Tape Roll and Dispenser	1
Masking Tape, 1 roll 1" and 1 roll 2"	2
Eberline E-520 w/HP-270 probe	1
Rain Suit, disposable	2
Hood, disposable	4
Weather-Proof Caution Signs with Inserts	4
Radioactive Waste Signs (4" x 6")	25
Caution: Radiation/Radioactive Material Tags	12
Binoculars	1
Coins for Telephone (roll of dimes)	1
Plastic Sample Bottles	12
Safety Glasses	5
Hard Hats	3
Contact Pyrometer	2
Flashlight and extra batteries	2
Portable Air Sampler	1
Silver Zeolite Cartridges and labels	10 each
Eberline E-520 or E-120 w/HP260 Probe	1
Trippe PV100FC Powerverter or Gasoline Powered Generator	1

Discrepancies:

Signature/Date

VERIFICATON OF EMERGENCY COMMUNICATIONS

This document shall serve as written verification that on the date below all telephone numbers and pages enclosed in emergency procedures EP/0/A/5000/05 thru EP/0/A/5000/08, Station Directive 3.8.1 and Station Directive 3.8.2 are correct and in working order, and that all jack-in telephones in the Technical Support Center are in working order. (To be done quarterly).

____
Signature/Date

Furthermore, this document shall serve as written verification that McGuire Nuclear Station's emergency radio transmitter/receivers have been successfully checked for operation at the distances prescribed by this procedure. (To be done monthly).

____
Signature/Date

Discrepancies Note: ____

____

Corrective Actions Taken: ____________________________________

____

____

WEATHER INFORMATION

	NATIONAL WEATHER SERVICE	ONSITE DATA
Wind Direction	________	________
Wind Speed	________	________
Cloud Cover	________	________
Time	________	________

Discrepancies:

____
Signature/Date

STATION DIRECTIVE 3.7.3
APPROVAL
DATE Original Issued 5/18/77
REVISION 11 DATE 1/17/83

DUKE POWER COMPANY

McGUIRE NUCLEAR STATION

BOMB THREAT/BOMB SEARCH PLAN

OBJECTIVE

The objective of this directive is to outline a plan that will provide for the safety and protection of Station personnel and equipment in the event of a bomb threat and to ensure continuity of service, if possible.

GENERAL

In the event of a bomb threat, an organized plan must be utilized. The following is an outline of the procedure to be used at McGuire Nuclear Station in the event that a bomb threat is received or a suspected device is detected.

HANDLING OF TELEPHONE CALL

In the event a bomb threat telephone call is received, a Telephone Procedure Bomb Threat Check List (Attachment #1) has been placed at the Switchboard, the Control Room, Central and Secondary Alarm Station, Station Manager Clerk's Office, and in the Station Manager's Office; this list should be used to record all the information possible during the telephone conversation.

IMPLEMENTATION AND NOTIFICATION

In the event a bomb threat is received, the following action should be taken:

1) The person receiving the call should immediately notify the Operations Shift Supervisor, extension
2) The Operations Shift Supervisor shall take the following action:
   a) Implement RP/0/A/5700/01, Notification of Unusual Event
   b) Notify the CAS/SAS Operator at extension 4482, 4461.

3) The Emergency Coordinator shall proceed to assemble personnel and evacuate any affected station areas based on information available. (See Station Directive 3.8.1, Site Assembly/Evacuation).

4) In the event the bomb threat involves discovery of a suspected device or information provided leads the Emergency Coordinator/Shift Supervisor to believe a bomb actually exists that may affect Reactor Safety Systems or potential release of radioactive materials the Shift Supervisor should consider taking the following steps:
   1) Place the reactor(s) in a safe operating mode.
   2) Take necessary precautions to prevent the release of radioactive materials (i.e. stop all releases of radioactive materials, secure high radiation areas).

SEARCH AND REPORT

The Station will be searched by available Health Physics, Operations Fire Brigade, Security Force Personnel (to be provided by Security Shift Lieutenant) Construction Supervision for Construction spaces outside the protected area in accordance with guidance provided in Bomb Threat Search Plan (Attachment #2) and Construction procedures. If a Bomb Threat should occur during the backshifts or on weekends, the Emergency Coordinator shall call-out additional Fire Brigade, Health Physics, Security Force and Construction personnel thru appropriate supervision to assist in the Bomb Threat search. Each individual involved in the search will report results of the search to the Emergency Coordinator, he will issue any
additional instructions.

DETECTION OF A DEVICE

It is possible that a bomb threat could develop by mere detection of a suspicious device. The person discovering a suspected explosive device should immediately advise their supervisor of the location, time discovered, and any pertinent information. This situation would then be handled similar to the case of finding the device during the response to a bomb threat phone call as outlined in this Directive.

CAUTION: Personnel should not move, tamper with, or handle any suspected explosive device. Do not use radio systems for communications.

FURTHER ACTION REQUIRED

The Emergency Coordinator shall take appropriate action based on the existence of a suspected explosive device. If a suspected explosive device is found, the Emergency Coordinator shall ensure the following action is taken:

1) Contact the Charlotte/Mecklenburg Bomb Disposal Team after a suspected explosive device has been found. The contacts for McGuire are:
   Responding Team: Charlotte/Mecklenburg Bomb Disposal Team
   Telephone Number
2) Evacuate the affected area and ensure that all personnel stay clear of the danger zone (300 feet).

ALL CLEAR REPORT

When a bomb threat no longer exists, the Emergency Coordinator will ensure that an "All Clear Report" is made and Station Personnel shall be allowed to return to their normal work locations.

STATION DIRECTIVE 3.7.3

ATTACHMENT NO. 1

REVISION 2 DATE 6/23/82

APPROVAL [illegible]

TELEPHONE PROCEDURES/BOMB THREAT CHECK LIST

INSTRUCTIONS: Be calm, courteous, and listen; do not interrupt the caller.
CALLERS IDENTITY: ____ Sex __________ Approxmiate Age
ORIGIN OF CALL: ____ Local __________ Long Distance __________ Internal

VOICE CHARACTERISTICS:		SPEECH:		LANGUAGE:	
____ Loud	____ Soft	____ Fast	____ Slow	____ Excellent	____ Poor
____ High Pitch	____ Deep	____ Distant	____ Lisp	____ Fair	____ Other
____ Pleasant	____ Raspy	____ Stutters	____ Nasal	____ Foul	
____ Intoxicated	____ Other	____ Slurred	____ Other	____ Good	

ACCENT:	MANNER:		BACKGROUND NOISES	
____ Local	____ Calm	____ Angry	____ Factory Machines	____ Trains
____ Foreign	____ Rational	____ Irrational	____ Music	____ Voices
____ Familiar	____ Coherent	____ Incoherent	____ Street Traffic	____ Quiet
If familiar	____ Deliberate	____ Emotional	____ Animals	____ Office
who did it	____ Crying	____ Laughing	____ Airplanes	____ Other
sound like? ____________				

BOMB FACTS

Pretend difficulty in hearing.
Keep caller talking.
If the caller seems agreeable to further conversation, ASK THESE QUESTIONS:

1. When will the bomb explode? ______________________
2. Where is the bomb located? ______________________
3. What kind of bomb is it? ______________________
4. Where are you now? ______________________
5. What is your name and address? ______________________
____
____

If the building is occupied, inform the caller that detonation could cause death or injury.
Did the caller appear familiar with the premises by his description of the bomb location? ______
Notify the Operations Shift Supervisor. Talk to no one other than instructed by your supervisor.

SIGNED ______________________ TIME ____________ DATE ______________

STATION DIRECTIVE 3.7.3
ATTACHMENT NO. 2
REVISION 8 DATE 1/12/83
APPROVAL [illegible]

BOMB THREAT SEARCH PLAN AND CHECK SHEET

In the event a bomb threat received included information about the location of the bomb, this area should be searched first. If the bomb threat contained no information about the bomb location, the following search plan will be utilized:

NOTE:
(1) Health Physics coverage of some areas and search personnel may be required. Contact Health Physics for support in these areas.
(2) The Emergency Coordinator shall designate search plan priorities based on available information. Areas that are known to be inaccessible for long periods of time i.e.: Containment, filter and demineralizer rooms, should not be given priority for search.
(3) For locked areas where keys are not available from the Shift Supervisor or Health Physics, the appropriate personnel in charge of the area shall be contacted for access.

AREA	RESPONSIBILITY	SEARCH COMPLETED INITIALS	SEARCH COMPLETED TIME
Vital Electrical/Cable Rooms	Fire Brigade		
All Other Station "Vital" Areas	Security		
Unit 1, Fuel Building	Fire Brigade		
Unit 2, Fuel Building	Fire Brigade		
Unit 1 Containment Bldg. (all elevations)	Fire Brigade		
Unit 2 Containment Bldg. (all elevations)	Fire Brigade		
Auxiliary Bldg. Elv. 695	Fire Brigade		
Auxiliary Bldg. Elv. 716	Fire Brigade		

BOMB THREAT SEARCH PLAN AND CHECK SHEET CONTINUED

AREA	RESPONSIBILITY	SEARCH COMPLETED INITIALS	TIME
Auxiliary Bldg. & Service Bldg. Elv. 733 and Elv. 739	Fire Brigade		
Auxiliary Bldg. & Service Bldg. Elv. 750	Fire Brigade		
Auxiliary Bldg. & Service Bldg. Elv. 760, 767, 777 (Q.A. Darkroom, Planning, Ventilation Room)	Fire Brigade		
Auxiliary Bldg. Elv. 786	Fire Brigade		
Unit 1 Inboard/Outboard Doghouse	Fire Brigade		
Unit 2 Inboard/Outboard Doghouse	Fire Brigade		
Unit 1, 2, Turbine Bldg. Elv. 739	Fire Brigade		
Unit 1, 2, Turbine Bldg. Elv. 760	Fire Brigade		
Unit 1, 2, Turbine Bldg. Elv. 790	Fire Brigade		
All Extremely High Radiation Areas	Health Physics		
Station Grounds "Inside" Protected Area	Security		
Turbine Building, Service Building, Auxiliary Building, and Containment Building Roof's and Structures	Security		
Intake Structure	Security		
RadWaste Solidification	Health Physics		

BOMB THREAT SEARCH PLAN AND CHECK SHEET CONTINUED

AREA	RESPONSIBILITY	SEARCH COMPLETED INITIALS	SEARCH COMPLETED TIME
Contaminated Parts Whse.	Health Physics		
Safe Shutdown Facility	Security		
All Trailers - Inside Protected Area	Security		
Warehouse #5	Security		
Interim Waste Building	Health Physics		
Oil Storage House	Security		
Bulk H_2 Storage House	Security		
Bulk N_2 Storage House	Security		
Bulk O_2 Storage House	Security		
All Construction Buildings (Inside Protected Area)	Security		
All Construction Buildings (Outside Protected Area)	Construction Supervision		
Inside FWST Missile Shield (Unit 1 and 2)	Security		
Administrative Building	Security		
Trailers and Grounds near Admin. Bldg. (Outside Protected Area)	Security		