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EMERGENCY PLAN PROCEDURES

PROCEDURE NO. IP- 1028 REV. 3

TITLE " CORE DAMAGE ASSESSMENT
"

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CORE DAMAGE ASSESSMENT

1.0 PURPOSE

To provide a methodology to determine the extent of core damage following an accident. The assessment is based on radionuclide concentrations and other parameters.

2.0 DISCUSSION

2.1 The core damage procedure is based on quantitative and qualitative assessments of various plant parameters, some of which are interrelated.

2.1.1 Radiation monitors in the VC: This is a gross but immediately available measurement of noble gases released.

2.1.2 Radioactivity released from the core:

- Measured in RCS, VC atmosphere, sumps in VC.
- Correct by power history, decay, etc.
- Evaluate versus expected radioactivity released for clad damage, fuel overheat, fuel melt.

2.1.3 Hydrogen in containment: A measure of the amount of the zirconium water reaction from the fuel cladding.

2.1.4 Core exit thermocouples and reactor vessel level instrumentation: When available, used to determine whether the core has been uncovered and what type of fuel damage may have occurred.

2.2 Qualitative Assessment of Core Damage

Attachment 1, Qualitative Assessment of Core Damage, should be used in conjunction with the quantitative assessment of core damage which follows in Section 3.0.

2.3 Limitations of this Procedure

- This procedure is an approximate method and may give some conflicting results. Engineering judgement must be used throughout.
- Some areas for potential errors are:
  - Plateout of samples in containment or in sample lines;
  - Gamma spectroscopy of highly radioactive samples;
  - Estimates of ECCS water volumes or sump volumes;
  - Calculations of core inventories;
  - Effect of multiple precursors in the parent-daughter decay chains and unequal release fractions.

- The uncertainties are such that core damage estimates using this methodology are sufficient only to establish major categories of fuel damage. This categorization, with confirmation, will require extensive additional analysis for some several days past the accident date.

3.0 PROCEDURE: QUANTITATIVE CALUCLATIONS OF CORE DAMAGE

The calculations can be performed by following the attachments as worksheets or by running the computer programs. Instructions for the program are listed in Attachment 4B.

3.1 Data Collection

- Using Attachment 2, record all appropriate data concerning RCS, sumps in VC, and VC atmosphere sampling.

- Power History - Note if computer is being used, the power history data has already been entered; follow the prompts in the program.

  - Record EFPD and calendar days of operation on Attachment 4, Part 1.

  - If reactor has been at steady state power (± 10% of average power level) for 4 days or more, record power level on Attachment 4, Part 2.

  - If reactor has not been at steady state power for at least 30 days, use Attachment 4A to record power history over the last 30 days.

- Record sample results from RCS, Recirc. Sump, VC atmosphere on Attachments 5 and 6.

3.2 Power History Correction Factor (PCF)

The inventories of fission products shown in Attachment 3 are for end of core life 100% power steady state operating conditions. This must be corrected for actual power history.

3.2.1 Steady state power (± 10%) prior to shutdown:

- Long-lived nuclide correction is calculated in Attachment 4, Part 3.

- Short-lived and medium-lived nuclide corrections are calculated in Attachment 4, Part 4.

3.2.2 Transient Power History:

- Long-lived nuclides: transient power history not applicable, use Attachment 4 to calculate power correction factor.

- Short and medium-lived nuclides: correct each nuclide separately using Attachment 4A as a calculation sheet. Computer-calculated power correction factors are also available. They may be accessed by using Attachment 4B.

3.3 Chemistry Sample Corrections

Samples of RCS, Recirc. Sump, and VC atmosphere must be corrected using Attachment 5 (Water Samples) and Attachment 6 (VC Atmosphere).

3.3.1 Back-Decay Correction CF (bd)

- This factor is used to correct the sample result back to the time of reactor shutdown.
- Nuclides that are daughters in a chain must be accounted for by following the calculations in Attachment 5A.
- The Chemistry computer has the capability to back-decay nuclides. Ensure that this correction is not applied twice. The daughters as discussed above should not be back-decayed by the Chemistry computer.

3.3.2 Temperature-Pressure Correction CF (tp)

- This factor is used to account for the differences in temperature and pressure between the sample and the sampled system (e.g., RCS, VC air).
- Water samples are corrected for temperature only.
- Air samples are corrected for both temperature and pressure.

3.4 Calculation of Percent Core Damage

The calculation of percent core damage involves 3 basic steps:

- Determination of activity released from the core;
- Determination of the power corrected activity inventory;
- Comparison of the actual activity released to the expected inventory.

This calculation is performed for clad damage, fuel overheat, and fuel melt using Attachments 7, 7A, 7B, 7C, and 7D.

3.4.1 Calculate total activity released by radionuclide:

- Using Attachment 7 as a calculation sheet, add the activity from RCS, containment sumps, and VC atmosphere to determine total activity released from the core.

- Values for activity concentrations are obtained from Attachments 5 and 6, and should have been previously corrected for decay, dilution, temperature, pressure, etc. in accordance with Attachments 5 and 6.

3.4.2 Calculate activity normally present in the RCS during operations:

- Using Attachment 7A as a calculation sheet, determine the amount of each nuclide present during normal operations.
- This activity is subtracted from the total amount released from the core.
- This calculation is only used in assessing clad damage. For other types of fuel damage, it is an insignificant fraction of the activity.

3.4.3 Calculate Percent Fuel Damage:

- Use Attachments 7B (Clad Damage), 7C (Fuel Overheat), and 7D (Fuel Melt) as calculation sheets.
- Correct the nuclide inventories from Attachment 3 using the previously developed power correction factors.
- Compare the activity released (Attachments 7, 7A) to the corrected inventories to obtain percent fuel damage.

3.5 Assessment of Core Damage using Activity Released

Assessment of core damage involves determining:

- The type of core damage: clad damage, fuel overheat, fuel melt.
- The amount of core damage: 0 to 100% in each of the above categories.

3.5.1 Comparison with expected inventories released:

Attachment 3 lists the nuclides associated with the 3 types of fuel damage and the amount of activity expected to be released for 100% clad damage, 100% fuel overheat, and 100% fuel melt.

3.5.2 The nuclides released are characteristic of the type of damage as are the ratios of nuclides.

3.5.3 Clad Damage:

- Nuclides associated with cladding damage are primarily the medium-lived and long-lived noble gases and iodines.
- Attachment 7B contains the calculated percent clad damage.
- The ratios of the noble gases to Xe-133 (and Iodines to I-131) in the gap differ from the ratios in the fuel itself. The ratios are shown in Attachment 3 and can help to ascertain whether the release was from the fuel (fuel overheat or melt) or from the gap (clad damage).
- RCS pressure, temperature, and power transients may result in Iodine spiking where the Iodine concentrations in the RCS increase sharply. This is not indicative of cladding failure but should be considered so that it is not confused with clad damage. Attachment 8 provides an estimate of the total I-131 release that might be expected during an iodine spike.
- Clad rupture is dependent on fuel temperature and RCS pressure where higher RCS pressures will delay clad rupture.

3.5.4 Fuel Overheat:

- Moderately volatile fission products are released during fuel overheat conditions, including cesium, ruthenium, and tellurium in addition to the more volatile noble gases and iodines. Lesser amounts of barium and strontium are also released.
- Attachment 7C provides the calculated percent fuel overheat.
- The use of the isotopic ratios listed in Attachment 3 can be used to determine the source of the noble gases and iodines.

3.5.5 Fuel Melt:

- Fuel pellet melting leads to rapid release of noble gases, iodines, bromines, and cesiums remaining after fuel overheat.
- Significant release of the strontium, barium-lanthanum chemical groups is the most distinguishing feature of fuel melt conditions.
- Attachment 7D provides the calculated percent fuel melt.

- The use of isotopic ratios listed in Attachment 3 can be used to determine the source of the noble gases and iodines.

3.5.6 Non-Uniform Core Damage:

- The above evaluations address an assumed uniform distribution of core damage. The degree of damage may vary within the core, and this should be considered in explaining any conflicting data.

4.0 AUXILIARY INDICATORS

There are plant indicators monitored during an accident which can provide verification of the initial estimate of core damage based on the radionuclide analysis. The plant indicators include containment hydrogen concentration, core exit thermocouple temperatures, reactor vessel water level, and containment radiation level.

4.1 Containment Hydrogen Concentration

- An accident in which the core is uncovered and the fuel rods are exposed to steam may result in the reaction of the zirconium of the cladding with the steam which produces hydrogen. It is assumed that all of the hydrogen that is produced is released to the containment atmosphere.

- The hydrogen dissolved in the primary system during normal operation contributes an insignificant amount of the total hydrogen released to the containment. The hydrogen recombiners will not have a significant effect on a zirconium - steam reaction in the case of severe core degradation.

- The percentage of zirconium water reaction does not equal the percentage of clad damaged but it does provide a qualitative verification of the extent of clad damage estimated from the radionuclide analysis.

- Attachment 9 shows the relationship between the hydrogen concentration and the percentage of zirconium water reaction.

4.2 Core Exit Temperatures and Reactor Vessel Water Levels

Core Exit Thermocouples (CETC) and the Reactor Vessel Level Indication System (when available) (RVLIS) readings can be used for verification of core damage estimates in the following ways.

- Due to the heat transfer mechanisms between the fuel rods, steam, and thermocouples, the highest clad temperature will be higher than the CETC readings. Therefore, if thermocouples read greater than 1300°F, clad failure may have occurred. 1300°F is the lower limit for cladding failures.

- If any RCPs are running, the CETCs will be good indicators of clad temperatures and no core damage should occur since the forced flow of the steam-water mixture will adequately cool the core.

- No generalized core damage can occur if the core has not uncovered. So if RVLIS full range indicates that the collapsed liquid level has never been below the top of the core and no CETC has indicated temperatures corresponding to superheated steam at the corresponding RCS pressure, then no generalized core damage has occurred.

- Attachment 10 provides information on types of damage to fuel at increasing temperatures.

4.3 Containment Radiation Levels

- R-25 and R-26 are located just above the 95' VC and can be used as a gross indication of activity (primarily noble gases) in the containment atmosphere.

- R-25 and R-26 would be expected to read approximately the same value if there were noble gases dispersed in containment.

- Attachment 11 provides data on expected radiation levels for clad damage, fuel overheat, and fuel melt conditions.

5.0 REFERENCES

References are listed in Attachment 12.

LIST OF ATTACHMENTS

QUALITATIVE ASSESSMENT OF CORE DAMAGE

	NO DAMAGE	CLAD DAMAGE	FUEL OVERHEAT	FUEL MELT
Radiation Levels in VC * (R-25 & R-26)	1 R/hr. (Minimum Reading)	Up to 32 R/hr.	Up to 8.3E4 R/hr.	Up to 1.4E5 R/hr.
% Hydrogen in VC **	0%	←	Up to 12.6%	→
Core Exit Thermocouples	600°F	1300°F and check temperature vs. pressure for super heated core uncovery.		
RVLIS (if available) ***	Full	Used in conjunction with CETCs to determine core uncovery.		
Expected Nuclides	Kr, Xe, I	Kr, Xe, I	Cs, Te	Sr, Ba, La, Pr

* Time dependent R-25/R-26 readings can be found in Attachment 11.

** Presence of hydrogen is indicative of reaction of the cladding but does not indicate whether fuel overheat or melt has occurred.

*** No generalized core damage can occur if the core remains covered.

SAMPLING DATA FOR CORE DAMAGE CALCULATIONS

Calculation No.: _____

Current Date: _____ Reactor Shutdown: Date: _____

Current Time: _____ Time: _____

SAMPLE AND MEDIA DATA

	RCS	VC ATMOSPHERE	RECIRC SUMP	OTHER
Sample No.	_____	_____	_____	_____
Date of Sample	_____	_____	_____	_____
Time of Sample	_____	_____	_____	_____
Sample Temperature (°F)	_____ °F	_____ °F	_____ °F	_____
Sample Pressure (psia)	_____ psia	_____ psia	_____ psia	_____
System Temperature (°F)	_____ °F	_____ °F	_____ °F	_____
System Pressure (psia) or Level	_____ psia	_____ psia	_____ ft (see a. below)	_____

Volume of ECCS Dilution Water: _____ gallons

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a. Level in Recirc. Sump: _____ ft _____ gallons

b. Level in VC Sump: _____ ft _____ gallons

c. Level in Reactor Sump: _____ inches _____ gallons

(Note: This can only be estimated based on the 2½" level alarm, the 6" level alarm, and the reactor sump pump light; Technical Support Center should estimate this volume if necessary.)

d. Level in Containment: _____ inches above 46 ft. elevation _____ gallons

e. Total estimated gallons of water in VC sumps and floor: _____ gallons

CORE RELEASE INVENTORIES OF CHARACTERISTIC FISSION PRODUCTS

NUCLIDE	HALF-LIFE	DECAY CONSTANT (DAY^{-1})	GAP RELEASE (Ci)	FUEL OVERHEAT RELEASE (Ci)	FUEL MELT RELEASE (Ci)	FUEL PELLET** ACTIVITY RATIO	GAP** ACTIVITY RATIO
Clad Failure Nuclides							
Kr-85*	10.72 yr	1.77E-4	1.6E4	9.0E5	1.5E6	.01	.11
Kr-87	76.3 m	1.31E+1	3.1E3	1.8E7	3.0E7	.22	.022
Kr-88	2.84 h	5.86E0	6.7E3	2.5E7	4.2E7	.29	.045
Xe-131m	11.84 d	5.85E-2	7.5E2	2.8E5	4.7E5	.004	.004
Xe-133	5.245d	1.32E-1	1.5E5	8.8E7	1.5E8	1.0	1.0
I-131	8.04 d	8.62E-2	2.4E5	4.3E7	7.2E7	1.0	1.0
I-133	20.8 h	8.00E-1	1.6E5	8.8E7	1.5E8	2.1	.71
I-135	6.61 h	2.52E0	8.3E4	7.9E7	1.3E8	1.9	.39
Fuel Overheat Nuclides							
Cs-137*	30.17 y	6.3E-5	N/A	4.9E6	8.1E6	--	--
Te-129	69.6 m	1.4E+1	N/A	1.5E7	2.4E7	--	--
Te-132	78.2 h	2.1E-1	N/A	6.2E7	1.0E8	--	--
Fuel Melt Nuclides							
Ba-140	12.79 d	5.4E-2	N/A	2.2E5	3.5E7	--	--
La-140	40.22 h	4.1E-1	N/A	2.5E5	3.7E7	--	--
La-142	95.4 m	1.1E+1	N/A	1.9E5	3.1E7	--	--
Pr-144	17.28 m	5.8E+1	N/A	1.5E5	1.4E6	--	--

* Long-lived nuclides.

** Ratio for Noble Gases is to Xe-133 = NG Isotope/Xe-133.
Ratio for Iodines is to I-131 = I Isotope/I-131.

POWER HISTORY CORRECTION FOR STEADY STATE POWER HISTORY

1. Data for Long-Lived Nuclides Power Correction Factor.

	EFPD		Calendar Days	
Current Cycle	_____	Start Date of the Oldest Fuel Cycle	_____	(A)
Previous Cycle	_____	Current Date	_____	(B)
2 Cycles Previous	_____	Days Between (A)&(B)	_____	
=	_____			

2. Data if Plant has been at Steady-State Power (within 10% of average power level).

Steady State Power Level (last 4 days) = _____ %
Steady State Power Level (last 30 days) = _____ %

3. Calculation of Long-Lived Power Correction Factor.

	Nuclide	Half-Life	EFPD/Calendar Days
Long-Lived Nuclides	Kr-85	10.72y	_____
	Cs-137	30.17y	_____

4. Calculation of Short and Medium-Lived Power Correction Factor - (Steady State Operation).

	Nuclide	Half-Life	Steady State Power Level (%) (last 4 days): P(4)	P(4)/100%
Short-Lived Nuclides	Kr-87	76.3 m	_____	_____
	Kr-88	2.84 h	_____	_____
	I-133	20.8 h	_____	_____
	I-135	6.61 h	_____	_____
	Te-129	69.6 m	_____	_____
	La-142	95.4 m	_____	_____
	Pr-144	17.28 m	_____	_____

	Nuclide	Half-Life	Steady State Power Level (%) (last 30 days): P(30)	P(30)/100%
Medium-Lived Nuclides	Xe-131m	11.84 d	_____	_____
	Xe-133	5.245d	_____	_____
	I-131	8.04 d	_____	_____
	Te-132	78.2 h	_____	_____
	Ba-140	12.79 d	_____	_____
	La-140	40.22 h	_____	_____

NOTE: Short-Lived Power Correction Factor (PCF) = P(4)/100%
Medium-Lived Power Correction Factor (PCF) = P(30)/100%
Long-Lived Power Correction Factor (PCF) = EFPD/Calendar Days

POWER HISTORY CORRECTION FOR NUCLIDE i
(Transient Power History)

Nuclide: _____ Half-Life: _____

λ = _____ day^{-1} (from Attachment 3)

Period	P_j Power Level (%)	T_j Duration (Days)	t_j (Days) Decay Time	$(1-e^{-\lambda_i T_j})$	$(e^{-\lambda t_j})$	$P_j(1-e^{-\lambda_i T_j})(e^{-\lambda t_j})$
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						

$$\Sigma P_j(1-e^{-\lambda_i T_j})(e^{-\lambda_i t_j}) = \_\_\_\_\_$$

$$PCF_i = \frac{\Sigma P_j(1-e^{-\lambda_i T_j})(e^{-\lambda t_j})}{100\%} = \_\_\_\_\_$$

p_j = steady reactor power level (percent)

λ_i = decay constant for isotope i (day^{-1})

T_j = time at power level P_j (days)

t_j = time since end of T_j to reactor shutdown (days)

NOTE: Power history should cover the last 30 days or more.

INSTRUCTIONS FOR USE OF COMPUTER PROGRAM FOR CALCULATIONS

1. Use a half-duplex, 300 or 1200 baud terminal. Parity setting is irrelevant. Dial one of the following numbers: ( )
( ) 3

   1.1 Place telephone into acoustic coupler or turn on modem (as appropriate) when tone is heard.

   1.2 The computer will send some characters to the terminal. Hit the return key.

   1.3 When the terminal requests "SERVICE", type 65 and hit the return key.

   1.4 When the terminal requests "USER NUMBER", type P489PFM, (password)* and hit the return key.

2. Type -PCF and hit the return key. (Allow about 30 seconds for the program to run.) A complete Power Correction Factor report will be sent to the screen. Date and time given should be the time of trip or commencement of reactor shutdown. If this is not the case, inform the Site Reactor Engineer or the Performance and Reliability Supervisor to update the shutdown file. 3

3. First you must run a test case of the core damage assessment computer program. Type -CORTEST and hit the return key. The program will automatically execute using the input data specified in ENG-208, Rev. 1, "Acceptance Test for Core Damage Assessment Computer Program". To ensure the program is functioning correctly, compare the output of the program to the test results listed in Attachment 4C.

4. Type -CORDAM and input the data requested. Note that the printout obtained in Step 2 will be used as part of the input section to this program. CORDAM will complete all calculations and output Attachments 5 through 7D. 3

5. Type "BYE" and hit the return key.

6. Hang up the telephone and disconnect the equipment.

* Password available from Site Reactor Engineer, Performance and Reliability Supervisor, or Control Room.

TEST CASE OF ATTACHMENT 7D

CALCULATION OF PERCENT FUEL MELT

(A)	(B)	(C)	(D) = (B)x(C)	(E)	(F)	(G)
Nuclide	Uncorrected Fuel Melt Release Inventory (Ci)	Power Correction Factor (Attachment 4 or 4A)	PCF Corrected Fuel Melt Inventory (Ci)	Activity Released From Core (Ci)*	(E/D x 100%) Percent Fuel Melt	NG or Iodine Ratios **
Kr-85	1.5E6	2.430E-01	3.645E+05	1.479E+08	4.058E+04	6.464E-01
Kr-87	3.0E7	9.915E-01	2.975E+07	8.450E+11	2.841E+06	3.692E+03
Kr-88	4.2E7	9.923E-01	4.168E+07	6.360E+09	1.526E+04	2.779E+01
Xe-131m	4.7E5	9.810E-01	4.611E+05	1.178E+08	2.555E+04	5.149E-01
Xe-133	1.5E8	9.998E-01	1.500E+08	2.288E+08	1.526E+02	1.000E+00
I-131	7.2E7	9.948E-01	7.163E+07	1.051E+08	1.467E+02	1.000E+00
I-133	1.5E8	9.993E-01	1.499E+08	1.522E+08	1.016E+02	1.449E+00
I-135	1.3E8	9.949E-01	1.293E+08	4.261E+08	3.294E+02	4.056E+00
Cs-137	8.1E6	2.430E-01	1.968E+06	6.997E+07	3.555E+03	N/A
Te-129	2.4E7	1.000E+00	2.400E+07	1.094E+09	4.560E+03	N/A
Te-132	1.0E8	1.000E+00	1.000E+08	5.812E+07	5.812E+01	N/A
Ba-140	3.5E7	1.000E+00	3.500E+07	4.223E+07	1.206E+02	N/A
La-140	3.7E7	1.000E+00	3.700E+07	3.153E+07	8.522E+01	N/A
La-142	3.1E7	1.000E+00	3.100E+07	1.878E+10	6.058E+04	N/A
Pr-144	1.4E6	1.000E+00	1.400E+06	1.785E+06	1.275E+02	N/A

WATER SAMPLE DATA AND CALCULATIONS

Water Sample Type: Sample No.: _____

☐ RCS ☐ Recirc Sump ☐ Other: _____

(A) Nuclide	(B) Half-Life	(C) Decay Constant $\lambda(hr^{-1})$	(D) Reported uCi/cc	(E) Back-Decay Correction Factor	(F) Temperature Correction Factor	(G) Corrected uCi/gram
Kr-85	10.72 y	7.38 E-6				
Kr-87	76.3 m	5.45 E-1				
Kr-88	2.84 h	2.44 E-1				
Xe-131m*	11.84 d	2.44 E-3				
Xe-133*	5.245d	5.51 E-3				
I-131	8.40 d	3.59 E-3				
I-133	20.8 h	3.33 E-2				
I-135	6.61 h	1.05 E-1				
Cs-137	30.17 y	2.62 E-6				
Te-129*	69.6 m	5.98 E-1				
Te-132	78.2 h	8.86 E-3				
Ba-140	12.79 d	2.26 E-3				
La-140*	40.22 h	1.72 E-2				
La-142*	95.4 m	4.36 E-1				
Pr-144*	17.28 m	2.41 E0				

Column E: Back-Decay Correction Factor = $CF(bd) = \frac{1}{e^{-\lambda t}} = e^{\lambda t}$

* NOTE: Nuclides marked with * are daughters in a decay chain. This must be taken into account in order to back-decay correct. Attachment 5A should be followed for those nuclides.

Column F: Temperature Correction Factor CF(t).
This factor converts uCi/cc to uCi/g.
If temperature of the water is $<200°F$, CF(t) = 1, and uCi/cc = uCi/g.
If temperature of the water is $\geq 200°F$, use the Table below to determine CF(t).

Column G: Corrected uCi/g = reported uCi/cc x CF(bd) x CF(t)

(G) = (D) x (E) x (F)

RCS Water Temperature	Temperature Correction Factor CF(t)
$\leq 150°F$	1.0
200°F	.97
300°F	.92
400°F	.86
500°F	.79
600°F	.68
700°F	.44

PARENT-DAUGHTER DECAY CORRECTION

The Table on Page 2 of this Attachment lists the significant parent-daughter relationships. The decay scheme of the parent-daughter is described as follows:

$$Q_B(t) = K \frac{\lambda_B}{\lambda_B - \lambda_A} Q_A^\circ \left(e^{-\lambda_A t} - e^{-\lambda_B t}\right) + Q_B^\circ e^{-\lambda_B t}$$

Where:

Q_A° = 100% fuel melt inventory (Ci) of parent*

Q_B° = 100% fuel melt inventory (Ci) of daughter*

$Q_B(t)$ = hypothetical daughter activity (Ci) at sample time

K = branching factor*

λ_A = parent decay constant, (hr^{-1})*

λ_B = daughter decay constant (hr^{-1})*

t = time period from shutdown to time of sample (hr)

1. Calculate the hypothetical daughter concentration, $Q_B(t)$ at the time of sampling assuming 100% fuel melt release of both parent and daughter activity.

2. Determine the fraction (Fr) of the decay of the initial inventory of the daughter to the hypothetical daughter activity at sample time.

$$Fr = \frac{Q_B^\circ \left(e^{-\lambda_B t}\right)}{Q_B(t)}$$

3. Calculate the amount of the measured sample specific activity associated with the decay of the daughter that was released.

M_B = Fr x measure specific activity (uCi/gm or uCi/cc)

Where: M_B = measured activity of B

4. Use this value of M_B as the reported uCi/cc in Column D of Attachment 5 or 6 and continue with further corrections as necessary on Attachment 5 or 6.

* See Page 2 of this Attachment for data on affected nuclides.

Parent Nuclide	$\lambda_A(hr^{-1})$	Q°_A	K	Daughter Nuclide	$\lambda_B(hr^{-1})$	Q°_B	$Q_B(t)$	Fr	M_B*
I-131	3.59E-3	7.2E7	.008	Xe-131m	2.44E-3	4.7E5	____	____	____
I-133	3.33E-2	1.5E8	.976	Xe-133	5.51E-3	1.5E8	____	____	____
Xe-133m	1.28E-2	2.1E7	1.0	Xe-133	5.51E-3	1.5E8	____	____	____
Sb-129	.161	2.3E7	.827	Te-129	.598	2.4E7	____	____	____
Te-129m	8.47E-4	5.8E6	.68	Te-129	.598	2.4E7	____	____	____
Ba-140	2.26E-3	3.5E7	1.0	La-140	1.72E-2	3.7E7	____	____	____
Ba-142	3.78	3.3E7	1.0	La-142	.436	3.1E7	____	____	____
Ce-144	1.02E-4	1.3E6	1.0	Pr-144	2.41	1.4E6	____	____	____

* M_B should be transferred to Attachment 5 or 6 into Column D, reported uCi/cc.

VC ATMOSPHERE SAMPLE DATA AND CALCULATIONS

Sample No.: _____

(A) Nuclide	(B) Half-Life	(C) Decay Constant λ (hr^{-1})	(D) Reported uCi/cc	(E) Back-Decay Correction Factor	(F) Temp/Press Correction Factor	(G) Corrected uCi/gram
Kr-85	10.72 y	7.38 E-6				
Kr-87	76.3 m	5.45 E-1				
Kr-88	2.84 h	2.44 E-1				
Xe-131m*	11.84 d	2.44 E-3				
Xe-133*	5.245d	5.51 E-3				
I-131	8.04 d	3.59 E-3				
I-133	20.8 h	3.33 E-2				
I-135	6.61 h	1.05 E-1				
Cs-137	30.17 y	2.62 E-6				
Te-129*	69.6 m	5.98 E-1				
Te-132	78.2 h	8.86 E-3				
Ba-140	12.79 d	2.26 E-3				
La-140*	40.22 h	1.72 E-2				
La-142*	95.4 m	4.36 E-1				
Pr-144*	17.28 m	2.41 E0				

Column E: Back-Decay Correction Factor = $CF(bd) = \frac{1}{e^{-\lambda t}} = e^{\lambda t}$

* NOTE: Nuclides marked with * are daughters in a decay chain. This must be taken into account in order to back-decay correct. Attachment 5A should be followed for those nuclides.

Column F: Temperature/Pressure Correction Factor = $CF(tp) = \frac{P(a)}{P(s)} \times \frac{(T(s) + 460)}{(T(a) + 460)}$

T(a), P(a) = VC atmosphere temperature °F and pressure (psia)
T(s), P(s) = VC sample temperature °F and pressure (psia)

Column G: Corrected uCi/cc = reported uCi/cc x CF(bd) x CF(tp)

(G) = (D) x (E) x (F)

CALCULATION OF ACTIVITY RELEASED FROM CORE

Nuclide	RCS Corrected (uCi/gram)	x	RCS (grams)*	x 10^{-6} =	RCS (Ci)	Sump Corrected (uCi/gram)	x	VC Sumps (grams)**	x 10^{-6} =	Sump (Ci)	VC Atmos. Corrected (uCi/cc)	x 7.39E4 *** =	VC Atmos. (Ci)	Total Activity E RCS & Sump & VC Atmosphere (Ci)
Kr-85														
Kr-87														
Kr-88														
Xe-131m														
Xe-133														
I-131														
I-133														
I-135														
Cs-137														
Te-129														
Te-132														
Ba-140														
La-140														
La-142														
Pr-144														

* Normally 90,000 gal. x 3785 cc/gal. x 1 gram/cc = 3.41 E8 grams

** Water in VC (gallons) x 3785 cc/gal. x 1 gram/cc = VC sumps (grams)

This value should be based on data from all available level instrumentation (see Attachment 2) and should be approximately equal to ECCS volume added. VC sump and Recirc. sump volumes can be determined using Control Room graph book.

NOTE: The activity is determined from the Recirc sump. This is assumed to be the activity in all water in the VC sumps. Consider this as a possible source of error.

*** uCi/cc x 2.61 E6 cu. ft. x 2.83 E4 cc/cu. ft. x 10^{-6} Ci/uCi = 7.39 E4

CALCULATION OF ACTIVITY PRESENT DURING NORMAL OPERATIONS

(A)	(B)	(C)	(D)	(E)	(F)	(G)=(F)-(C)-(E)
Nuclide	Normal Operations RCS Conc (uCi/cc)* x 320**	RCS (Ci) Normal Ops	Normal Operations VC Conc (uCi/cc)* x 7.4E4***	VC (Ci) Normal Ops	Activity Released From Core (Attachment 7)	Corrected Ci Released From Core
Kr-85						
Kr-87						
Kr-88						
Xe-131m						
Xe-133						
I-131						
I-133						
I-135						

* Obtain from recent pre-shutdown RCS sample:

- Available from Chemistry or Site Reactor Engineer
- If unavailable, use the following approximate values as a sum of the operation activity:

	Ci
Kr-85	12
Kr-87	12
Kr-88	20
Xe-131m	40
Xe-133	200
I-131	8
I-133	10
I-135	10

** 320 = 3.2E8 cc RCS x 1E-6 Ci/uCi

*** 7.4E4 = 7.4E10 cc in VC x 1E-6 Ci/uCi

The results in Column G to be used in Attachment 7B.

NOTE: Account for Iodine spiking in accordance with Section 3.5.3 and Attachment 8, if necessary.

CALCULATION OF PERCENT CLAD DAMAGE

(A) Nuclide	(B) Uncorrected Clad Damage Inventory	(C) Power Correction Factor (Attachment 4 or 4A)	(D) = (B) x (C) PCF Corrected Clad Damage Inventory	(E) Activity Released From Core (Ci)*	(F) (E/D) x 100% Perc. Clad Damage	(G) NG or Iodine Ratios**
Kr-85	1.6E4					
Kr-87	3.1E3					
Kr-88	6.7E3					
Xe-131m	7.5E2					
Xe-133	1.5E5					
I-131	2.4E5					
I-133	1.6E5					
I-135	8.3E4					

* From Attachment 7A.

** $\frac{\text{Noble Gas Isotope}}{\text{Xe-133}}$ or $\frac{\text{Iodine Isotope}}{\text{I-131}}$ (Compare to ratios in Attachment 3.)

NOTE: The percent fuel damage values can only be considered as approximations. If the actual age of the fuel assembly(s) damaged and the power region in the core is different from the core average, (core average was used to develop the inventories in Column B) then the actual inventories in the fuel damaged could differ by a factor of 2-3. The calculated percent damage must be considered along with the isotopic ratios (Column G), presence of other nuclides, and other parameters as discussed elsewhere in this procedure.

CALCULATION OF PERCENT FUEL OVERHEAT

(A) Nuclide	(B) Uncorrected Fuel Overheat Release Inventory (Ci)	(C) Power Correction Factor (Attachment 4 or 4A)	(D) = (B)x(C) PCF Corrected Fuel Overheat Inventory (Ci)	(E) Activity Released From Core (Ci)*	(F) (E/D x 100%) Percent Fuel Overheat	(G) NG or Iodine Ratios **
Kr-85	9.0E5					
Kr-87	1.8E7					
Kr-88	2.5E7					
Xe-131m	2.8E5					
Xe-133	8.8E7					
I-131	4.3E7					
I-133	8.8E7					
I-135	7.9E7					
Cs-137	4.9E6					N/A
Te-129	1.5E7					N/A
Te-132	6.2E7					N/A
Ba-140	2.2E5					N/A
La-140	2.5E5					N/A
La-142	1.9E5					N/A
Pr-144	1.5E5					N/A

* From Attachment 7.

** $\frac{\text{Noble Gas Isotope}}{\text{Xe-133}}$ or $\frac{\text{Iodine Isotope}}{\text{I-131}}$ (Compare to ratio in Attachment 3.)

NOTE: The percent fuel damage values can only be considered as approximations. If the actual age of the fuel assembly(s) damaged and the power region in the core is different from the core average (core average was used to develop the inventories in Column B), then the actual inventories in the fuel damaged could differ by 20-30%. The calculated percent damage must be considered along with the isotopic ratios (Column G), presence of other nuclides, and other parameters as discussed elsewhere in this procedure.

CALCULATION OF PERCENT FUEL MELT

(A)	(B)	(C)	(D) = (B)x(C)	(E)	(F)	(G)
Nuclide	Uncorrected Fuel Melt Release Inventory (Ci)	Power Correction Factor (Attachment 4 or 4A)	PCF Corrected Fuel Melt Inventory (Ci)	Activity Released From Core (Ci)*	(E/D x 100%) Percent Fuel Melt	NG or Iodine Ratios **
Kr-85	1.5E6					
Kr-87	3.0E7					
Kr-88	4.2E7					
Xe-131m	4.7E5					
Xe-133	1.5E8					
I-131	7.2E7					
I-133	1.5E8					
I-135	1.3E8					
Cs-137	8.1E6					N/A
Te-129	2.4E7					N/A
Te-132	1.0E8					N/A
Ba-140	3.5E7					N/A
La-140	3.7E7					N/A
La-142	3.1E7					N/A
Pr-144	1.4E6					N/A

* From Attachment 7.

** $\frac{\text{Noble Gas Isotope}}{\text{Xe-133}}$ or $\frac{\text{Iodine Isotope}}{\text{I-131}}$ (Compare to ratio in Attachment 3.)

NOTE: The percent fuel damage values can only be considered as approximations. If the actual age of the fuel assembly(s) damaged and the power region in the core is different from the core average (core average was used to develop the inventories in Column B), then the actual inventories in the fuel damaged could differ by 30-40%. The calculated percent damage must be considered along with the isotopic ratios (Column G), presence of other nuclides, and other parameters as discussed elsewhere in this procedure.

EXPECTED IODINE SPIKE VS. NORMAL IODINE ACTIVITY

I-131 uCi/gram*	Average I-131 Release (Curies)	Maximum I-131 Release (Curies)
0.5 - 1.0	3400	6500
0.1 - 0.5	380	950
.01 - 0.1	200	650
.001 - .01	100	300
<.001	2	10

* Normal operating I-131 specific activity in RCS.

VC HYDROGEN CONCENTRATION VS. ZIRCONIUM-WATER REACTION

Percent Zirconium Water Reaction	Hydrogen Concentration in VC (Volume %)
10	1.3%
20	2.5%
30	3.8%
40	5.0%
50	6.3%
60	7.5%
70	8.8%
80	10.0%
90	11.3%
100	12.6%

EXPECTED FUEL DAMAGE CORRELATION WITH CORE EXIT THERMOCOUPLE READINGS

Fuel Damage	Temperature °F*
No Damage	< 1300
Clad Damage	1300 - 2000
Ballooning of zircaloy cladding	> 1300
Burst of zircaloy cladding	1300 - 2000
Oxidation of cladding and hydrogen generation	> 1600
Fuel Overtemperature	2000 - 3450**
Fission product fuel lattice mobility	2000 - 2550
Grain boundary diffusion release of fission products	2450-3450**
Fuel Melt	> 3450**
Dissolution and liquefaction of UO_2 in the the zircaloy - ZrO_2 eutectic	> 3450**
Melting of remaining UO_2	5100**

---

* These temperatures are material property characteristics and are non-specific with respect to locations within the fuel and/or fuel cladding.

** Core Exit Thermocouple are not valid over 3000°F.

NOTE: When narrow range thermocouple readings go offscale (as indicated by an asterisk on the thermocouple map), use the wide range readings.

EXPECTED CONTAINMENT RADIATION LEVELS POST-ACCIDENT (R-25/R-26)

Time After Shutdown	R/hr for 100% Clad Damage	R/hr for 100% Fuel Overheat	R/hr for 100% Fuel Melt
0	32	8.3 E4	1.4 E5
1 hr.	31	7.4 E4	1.3 E5
2 hrs.	27	5.9 E4	9.8 E4
4 hrs.	21	3.8 E4	6.4 E4
8 hrs.	16	1.9 E4	3.2 E4
12 hrs.	13	1.2 E4	1.9 E4
24 hrs.	11	7.2 E3	1.1 E4
48 hrs.	9.6	5.7 E3	9.0 E3
4 days	7.5	4.3 E3	6.7 E3
7 days	5.4	2.8 E3	4.5 E3
14 days	2.8	1.1 E3	1.8 E3
30 days	1.3	1.4 E2	2.2 E2

3

Radiation levels are taken from Reference 15.

REFERENCES

1. "Clarification of TMI Action Plan Requirements", NUREG-0737, USNRC, November 1980.

2. "A Report to the Commission and to Public, NRC Special Inquiry Group", M. Rogovin, 1980.

3. "ORIGEN Isotope Generation and Depletion Code", Oak Ridge National Laboratory, CCC-217.

4. Method of Calculating the Fractional Release of Fission Products from Oxide Fuel, ANSI/ANS 5.4 - 1982.

5. WCAP-9964, Westinghouse Electric Corporation.

6. "Source Term Specification", ANS 18.1 Standard 1976.

7. "Radionuclide Release Under Specific LWR Accident Conditions", Draft NUREG-0956, USNRC, January 1983.

8. "Release of Fission Products from Fuel in Postulated Degraded Accidents", IDCOR Draft Report, July 1982.

9. "TMI-2 Accident: Core Heat-up Analysis", NSAC/24, January 1981.

10. "Light Water Reactor Hydrogen Manual", NUREG/CR-2726, August 1983.

11. Westinghouse Emergency Response Guidelines.

12. Analysis of the Three Mile Island Accident and Alternative Sequences, Prepared for NRC by Battelle, Columbus Laboratories, NUREG/CR-1219.

13. Westinghouse Owners Group Core Damage Assessment Methodology, February 1984.

14. Core Damage Procedure based upon Post-Accident Chemistry and Radiation Sample Analysis, R. W. Bradshaw, R. D. Ivany, Combustion Engineering, Inc., November 1983.

15. "High Range Containment Monitor Response to Post Accident Fission Product Releases", prepared by Sargent and Lundy for the New York Power Authority, SL-7009, May 1986.

Indian Point 3
Nuclear Power Plant
P.O. Box 215
Buchanan, New York 10511
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RE-AD-1.0
ATTACHMENT 6.7

New York Power Authority

EMERGENCY PLAN PROCEDURES

PROCEDURE NO. IP- 1041 REV. 6

TITLE: PERSONNEL MONITORING FOR EOF, TSC, OSC, AND CONTROL ROOM PERSONNEL

"THIS PROCEDURE HAS BEEN EXTENSIVELY REVISED"

WRITTEN BY: Maryann Chaubard 2/20/87
SIGNATURE/DATE

REVIEWED BY: Michael Pull 2/20/87
SIGNATURE/DATE

PORC REVIEW: [signature] Jan 3/3/87
DATE

APPROVED BY: [signature] 3/3/87
SIGNATURE/DATE

EFFECTIVE DATE: 03/13/87

RES LOG #: EP-5

IP-1041

PERSONNEL MONITORING FOR EOF, TSC, OSC, AND CONTROL ROOM PERSONNEL

1.0 INTENT

To describe the procedure to be used for personnel monitoring of the support forces located in the Emergency Operations Facility, Technical Support Center, Operations Support Center, and the Control Room.

2.0 DISCUSSION

Emergency Operations Facility, Technical Support Center, Operations Support Center, and the Control Room personnel shall be monitored as follows.

3.0 PROCEDURE

3.1 Non-Radiological Condition

3.1.1 A control point will be established by the H.P. Technician. Radiological monitoring equipment should be set up and operationally tested.

3.1.2 Facility general radiation levels will be monitored by means of a dosimeter and TLD at each location. The dosimeters and TLDs should be taped to an inside wall at each facility at average chest level.

3.1.3 Personnel should report to their accountability officer prior to leaving the facility.

3.2 Radiological Condition Exists or Is Anticipated

3.2.1 A frisker station will be set up at all entry/exit points in each facility. Any person entering into the facility must frisk prior to entry.

At the OSC/TSC locations, the interlocking door system will be energized and all entry/exit will be made through the OSC Control Point only.

3.2.2 Periodic β and γ field measurements shall be made (RO-2, E-530, or equivalent). (See IP-1040, Habitability of the Emergency Facility" for habitability criteria.)

In the EOF, EP-Form #42 will be used to record the data. In the OSC/TSC, and Control Room, surveys will be documented on facility maps.

3.2.3 To exit a facility:

a. EOF - sign in/out using EP-Form #45 wearing dosimetry and/or protective clothing as per H.P. monitor.

b. Control Room - sign in/out using H.P. log book wearing dosimetry and/or protective clothing as per H.P. Technician.

c. OSC/TSC - sign in/out using H.P. log book or OSC Briefing Form (EP-Form #18) wearing dosimetry and/or protective clothing as per H.P. Team Leader.

3.3 Dosimetry will establish exposure tracking system in accordance with approved plant procedures.

3.4 Environmental monitoring teams shall obtain their own dosimeter and TLD from the stock in the emergency vehicles.

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RE-AD-1.0
ATTACHMENT 6.7

New York Power Authority

EMERGENCY PLAN PROCEDURES

PROCEDURE NO. IP- 1050 REV. 12

TITLE: ACCOUNTABILITY

"THIS PROCEDURE HAS BEEN EXTENSIVELY REVISED."

WRITTEN BY: David A. Bell 2/26/87
SIGNATURE/DATE

REVIEWED BY: Michael K. Hall 2-26-87
SIGNATURE/DATE

PORC REVIEW: [signature] 3/3/87
DATE

APPROVED BY: [signature] 3/3/87
SIGNATURE/DATE

EFFECTIVE DATE: 03/13/87

RES LOG #: EP-4

IP-1050

ACCOUNTABILITY

1.0 INTENT

This procedure is used during an emergency to assure that all IP-3 personnel are accounted for.

2.0 DISCUSSION

Accountability will be initiated at the Site Area Emergency classification (or earlier if directed by the Emergency Director). When directed by the ED, Control Room personnel will sound the Site Assembly Alarm at which time all site personnel will report to their assigned assembly areas. Initial accountability, resulting in a "missing persons" list, must be completed in about 30 minutes.

3.0 LOCATION OF ASSEMBLY AREAS

3.1 Control Room

All Watch, off-watch Operations personnel, contingency, and "spares" will report to the Control Room until requested to report to the OSC.

3.2 All non-watch personnel will report to their assigned assembly areas (or to the nearest assembly area) when the Site Assembly Alarm sounds. Assembly area locations are denoted by large orange signs with blue letters reading "ASSEMBLY AREA". The larger assembly areas have been further subdivided into department sections. All personnel shall report to their respective assembly areas as indicated below:

(See Attachment 8.1 for the site map with NYPA assembly area locations.)

3.2.1 (L) Training (Office Area): Training personnel or persons in the immediate vicinity. Personnel in formal training classes will be accounted for by the assigned instructor who will report their status to the office area.

3.2.2 (K) Administration Building (2nd Floor Lunch Room): Administration Building personnel, Floors 2, 3, and 4 (except H.P., Chemistry, and other designated personnel who will report to the OSC or TSC).

3.2.3 (C) Machine Shop (15' Elevation): All non-watch maintenance and construction personnel within the security fence. First Floor (Maintenance) personnel should use this as their assembly area.

3.2.4 (G) Construction Conference Trailer: NYPA Construction personnel and all other personnel in the immediate area.

3.2.5 (J) Warehouse (Office Area): Warehouse personnel and personnel in immediate vicinity.

3.2.6 (H) Con Edison Service Center, West Store Room Area: Personnel may eventually assemble here if evacuation of the site is necessary.

3.2.7 (TSC) Technical Support Center personnel should report to the TSC as their assembly area. If a TSC designated individual is at another assembly area, they should report in at that area and then go directly to the TSC.

3.2.8 (OSC) Designated Operations Support Center personnel shall report to the Operations Support Center as their assembly area. If an OSC designated individual is at another assembly area, they should report in at that area and then go directly to the OSC.

3.2.9 (EOF) Designated Emergency Operations Facility personnel shall report to the EOF as their assembly area.

3.2.10 SECURITY Security shall account for their own personnel.

3.2.11 CONTRACTORS Contractor personnel (non-supervisory) not assigned to the protected area do not routinely receive accountability training. These personnel will be accounted for by their supervisors who will report their status to the nearest accountability area.

4.0 LOCATION AND OPERATION OF ACCOUNTABILITY CARD READERS

4.1 Accountability card readers are installed in the following assembly areas within the protected area:

4.1.1 Control Room
4.1.2 OSC
4.1.3 TSC
4.1.4 2nd Floor Lunch Room - Administration Building
4.1.5 15' Elevation Machine Shop

4.2 When arriving at your assembly area, card into the accountability card reader insuring that the red light is lit. Leave card in the reader until the light turns green, then remove your card. Report to the Accountability Officer in the area.

4.3 If the red light is not lit, go directly to the Accountability Officer and check in.

4.4 If you are requested to change assembly areas (e.g., from the Lunch Room to the OSC), report to the Accountability Officer in the new area. Do not card out when leaving the assembly area.

5.0 RESPONSIBILITIES

5.1 LEAD ACCOUNTABILITY OFFICER (LAO) - The LAOs during normal work hours are those designated on Attachment 8.2. During off hours, the Security Shift Coordinator is the LAO.

5.2 The Lead Accountability Officer should call Ext. 8067 (Security C.A.S. Operator) to insure that the accountability card readers have been activated. In addition, call all assembly areas to insure that the phones are functional. If they are not, notify the OSC Manager.

5.2.1 Determine accountability in assembly areas outside the protected area.

5.2.2 Receive list of unaccounted for personnel within the protected area from Security (if the card readers are operable).

5.2.3 Develop missing persons list.

5.2.4 Inform Emergency Director as soon as protected area accountability is complete.

5.2.5 Inform Emergency Director and Area Accountability Officers when site accountability is complete. As necessary:

a. Discuss Search and Rescue with Emergency Director. Only the ED can authorize a Search and Rescue effort.

b. Discuss evacuation routes with Emergency Director and transmit that information to Area Accountability Officers.

5.2.6 If evacuation is to the Con Edison Service Center Building, an H.P. will be dispatched (if radiological conditions warrant) to escort evacuees. Re-accounting of personnel should be performed upon arrival at the Service Center.

5.2.7 Keep assembly areas informed of plant conditions.

5.2.8 If radiation levels in an assembly area are greater than 10 mR/hr., contact H.P. Team Leader in the OSC for direction. If available, an H.P. will be dispatched to assembly area to verify radiation levels.

5.3 AREA ACCOUNTABILITY OFFICERS

5.3.1 Report to assigned assembly area. Identify yourself as the Area Accountability Officer to all personnel.

5.3.2 Ensure the telephone and the P.A. speaker in assembly areas are functional.

5.3.3 If release is in progress or as directed, ensure all personnel frisk prior to entry.

5.3.4 Perform accountability as follows:

a. Assembly areas with card readers:

1. Insure that the card readers are activated by observing red light indication. If it is not activated, call the LAO.

2. Insure all personnel in your assembly area have punched into the card reader.

b. All Accountability Officers complete the following:

1. The Area Accountability Officer has a master list of personnel by department who should be reporting to each designated assembly area.

2. Cross off all accounted for personnel and add any "others" reporting to the assembly area.

3. Where possible, utilize first line supervisors to account for their personnel.

4. A person should only be accounted for if they are visibly present or known to be off site. This information should be given to the Accountability Officer by employees' supervisors. If the person is "thought" to be off site, it should be so noted.

5. Upon completion, call the LAO informing him/her of the status of accountability.

c. Account for "late reporters" as necessary to LAO.

5.3.5 Control area access by sign-in/sign-out sheets at single access point.

5.3.6 Update assembly area personnel as to general plant conditions and developments as informed by the LAO.

5.3.7 Continuously monitor Ludlum 300/E-530 for changing radiological conditions. If greater than 10 mR/hr., immediately contact the LAO for possible evacuation.

5.3.8 Contact LAO as necessary to resolve problems requiring immediate attention.

5.4 SECURITY

5.4.1 Activate the assembly area accountability card readers when the ALERT emergency is announced or when notified to do so by the Control Room or Lead Accountability officer.

5.4.2 Perform accountability in the protected area in accordance with the following:

a. Account for all Security personnel.

b. Generate an unaccounted for personnel list as soon as possible. Cross off all Security personnel.

c. Utilize Security personnel (radio communications), the page system, and call assembly areas within the protected area to identify/locate missing personnel.

d. Notify the Lead Accountability Officer in less than 30 minutes of any missing personnel.

5.4.3 If the accountability card readers are inoperable:

a. Send the Visitor's List to the LAO.

b. Account for all Security personnel.

c. Call the LAO informing him/her of the status of accountability.

6.0 OFF HOURS

6.1 All non-watch personnel should assemble at the Machine Shop, 15' Elevation.

6.2 TSC and OSC personnel should report to the TSC and OSC respectively.

6.3 All Watch, contingency, and "spares" should report to the Control Room.

6.4 Responsibility for assembly area habitability surveys shall be assumed by the Shift Supervisor and the Watch Health Physics Technician or other individuals designated by the Shift Supervisor.

7.0 PERSONNEL CONTAMINATION CHECK (IP-1060)

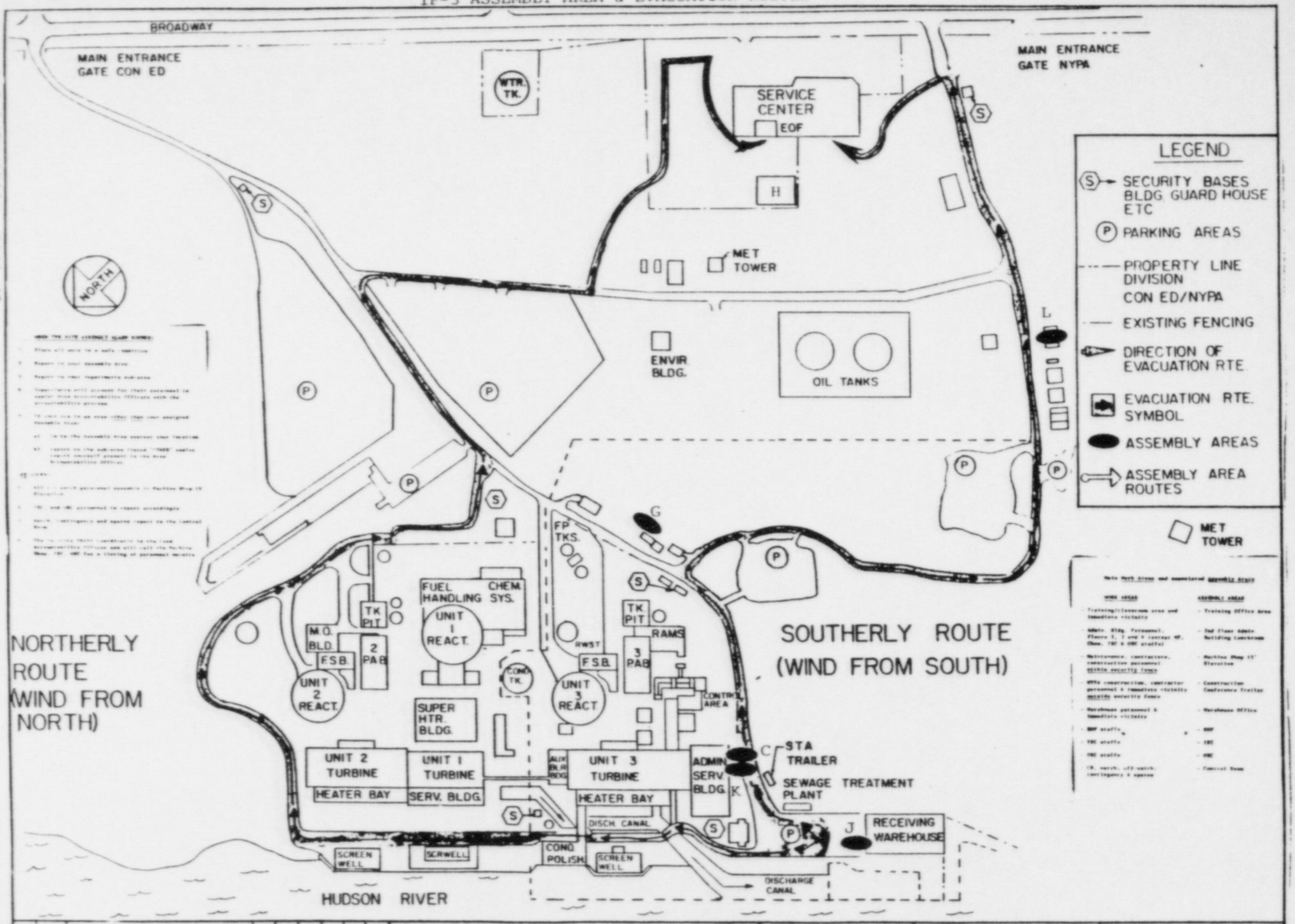
7.1 If personnel are relocated from an assembly area to the Con Edison Service Center due to radiation levels, they should be checked for contamination.

7.2 Prior to leaving the Con Edison Service Center, personnel and vehicles should be re-checked for contamination.

8.0 ATTACHMENTS

8.1 Assembly Area and Evacuation Route Map
8.2 Accountability Telephone Listing
8.3 Lead Accountability Checklist
8.4 Accountability Officer Checklist
8.5 Security Accountability Checklist

IP-3 ASSEMBLY AREA & EVACUATION ROUTES



IP-1030 Attachment 8.1

REV	DATE	DESCRIPTION	DWN	CHK	DS	DAE	DE	DD

POWER AUTHORITY OF THE STATE OF NEW YORK

ISSUE

DATE

DWG NO

ENGINEER

STATE REG NO

REV

SHT OF

ACCOUNTABILITY

ACCOUNTABILITY AREA		ACCOUNTABILITY OFFICER	OFFICE EXTENSION	ASSEMBLY AREA EXTENSION
L	Training	Bobby Martin Steve Smith Doug Ames Bill Swindell		
J	Warehouse	David DiCioccio Lou Tiberi		
K	Administration	Jill Choma Jim Reagan George Nikolatos Marianne Tansky		
C	Machine Shop	Chuck Alphin Mike Devlin Bruce Witherall		
G	Construction Conference Trailer	William Eichert Ronald Mackowiak Marie Campanaro		
	Control Room	Gail Ruh		
	TSC	Jean Moretti Ed Noel Al Froebrich		
	OSC	Anthony Vitale Cliff Marks Mary Ellen Mastrogiacomo		
	EOF	Laura Eagens Pam Walsh Lori Gierloff Nancy Boyle		
H	Con Edison Service Center (West Store Room Area)			

MAR 13 1987

TELEPHONE EXTENSIONS

Unit 3 Control Room and Page
Unit 2 Control Room (Con Edison)
Shift Supervisor's Office
Operations Superintendent Office
Security Shift Coordinator
Security Building Extensions
Con Edison LAO
Westinghouse (Ray Heisey)
OSC
TSC
EOF (Emergency Director)

LEAD ACCOUNTABILITY OFFICERS (Normal Working Hours)	OFFICE EXTENSIONS
Ruthanne Bowman	
Sal Golemi	
Christine Metzger	
Mary Ann Petrillo	

SECURITY ACCOUNTABILITY (Protected Area during Normal Working Hours)	OFFICE EXTENSIONS
Security Shift Coordinator	
L. J. Malaspina	
Harry Bain	

LEAD ACCOUNTABILITY OFFICER
(Off Hours)

Security

MAR 13 1987

LEAD ACCOUNTABILITY OFFICER CHECKLIST

1. Upon hearing the Site Assembly Alarm, call NYPA Construction Office ( ) and Training (X) to notify them of the Site Assembly Alarm in the event the alarm cannot be heard.

2. Verify activation of the assembly area accountability card readers by calling the Security C.A.S. Operator (X).

3. Verify operability of phones in all assembly areas. If they are not functional, call the OSC Manager.

4. Await calls from the Area Accountability Officers located outside the protected area for the status of accountability in those areas. If an assembly area outside the protected area has not reported their status within approximately 15 minutes, call that area for accountability status. Phone numbers for those areas are as follows:

   a. NYPA Construction
   b. EOF
   c. Warehouse
   d. Training

5. If a page is required to locate missing personnel, call the OSC at _____ and ask for the Accountability Officer.

6. In order to run a badge check, call Security at _____ asking for the C.A.S. Supervisor or _____ asking for the C.A.S. Operator.

7. When "protected area" accountability is complete, Security will notify the LAO of any unaccounted for personnel.

8. When protected area accountability is complete, notify the Emergency Director and name all unaccounted for personnel.

9. When "site" accountability is complete, discuss Search and Rescue operations with the Emergency Director, if necessary.

10. Discuss evacuation routes with the Emergency Director and coordinate evacuation with Area Accountability Officers and H.P. Team Leader in the OSC as necessary.

11. Keep all assembly areas informed on plant conditions.

12. If Area Accountability Officers report radiation levels of greater than 10 mR/hr., contact the H.P. Team Leader in the OSC for direction. If available, an H.P. will be dispatched to the assembly area to verify radiation levels.

AREA ACCOUNTABILITY OFFICER CHECKLIST

1. Report to assigned assembly area. Identify yourself as the Area Accountability Officer to all personnel.

2. Ensure the telephone and the P.A. speaker in assembly areas are functional.

3. If release is in progress or as directed, ensure all personnel frisk prior to entry.

4. Perform accountability as follows:

   a. Assembly areas with card readers:

      - Insure that the card readers are activated by observing red light indication. If it is not activated, call the LAO.

      - Insure all personnel in your assembly area have punched into the card reader.

   b. All Accountability Officers complete the following:

      - On the master list of personnel by department, which shows who should be reporting to each designated assembly area, cross off all accounted for personnel and add any "others" reporting to the assembly area

      - Where possible, utilize first line supervisors to account for their personnel.

      - A person should only be accounted for if they are visibly present or known to be off site. This information should be given to the Accountability Officer by employees' supervisors. If the person is "thought" to be off site, it should be so noted.

      - Upon completion, call the LAO informing him/her of the status of accountability.

   c. Account for "late reporters" as necessary to LAO.

5. Control area access by sign-in/sign-out sheets at single access point.

6. Update assembly area personnel as to general plant conditions and developments as informed by the LAO.

7. Continuously monitor Ludlum 300/E-530 for changing radiological conditions. If greater than 10 mR/hr., immediately contact the LAO for possible evacuation.

8. Contact LAO as necessary to resolve problems requiring immediate attention.

SECURITY ACCOUNTABILITY CHECKLIST

1. Activate the assembly area accountability card readers when the ALERT Emergency is announced or when notified to do so by the Control Room or Lead Accountability Officer.

2. When the Site Assembly Alarm is sounded, insure card readers are activated and account for all personnel in the protected area.

3. Perform accountability in the protected area in accordance with the following:

   a. Account for all Security personnel.

   b. Generate an unaccounted for personnel list as soon as possible. Cross off all Security personnel.

   c. Perform a badge check to determine if they are in the protected area and, if so, what their last location was.

   d. Utilize Security personnel (radio communications), the page system, and by calling assembly areas within the protected area to identify/locate missing personnel.

4. Provide the Lead Accountability Officer with the names of any unaccounted for personnel as soon as possible.

5. As requested by Lead Accountability Officer, perform badge checks of unaccounted for personnel to determine if they are within the protected area. Advise Lead Accountability Officer.

6. During off hours, the Security Shift Coordinator is the Lead Accountability Officer and must keep the Emergency Director advised of the status of accountability for the entire site.

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RE-AD-1.0
ATTACHMENT 6.7

NewYork Power Authority

EMERGENCY PLAN PROCEDURES

PROCEDURE NO. IP- 1055 REV. 4

TITLE: FIRE EMERGENCY

WRITTEN BY: MaryLynn Chaubard 3/2/87
SIGNATURE/DATE

REVIEWED BY: [signature] 03/02/87
SIGNATURE/DATE

PORC REVIEW: [signature] 3/12/87
DATE

APPROVED BY: [signature] 3/12/87
SIGNATURE/DATE

EFFECTIVE DATE: 03/13/87

RES LOG #: EP-7

IP-1055

FIRE EMERGENCY

1.0 DISCUSSION

The following are fire hazards which may occur which would require activation of the Emergency Plan and subsequent notifications.

Notification of Unusual Event

An uncontrolled fire in the protected area not affecting safety systems.

Alert

Fire of a magnitude that may significantly affect safety systems.

Site

Fire of a magnitude that causes safety systems to become inoperable such that the ability to reach a safe condition could not be guaranteed.

2.0 REFERENCES

2.1 AP-27.3 - IP-3 Site Fire Protection Procedures

2.2 FP-7 - Fire Notification Guidelines

2.3 IP-1056 - Directing Fire Fighting Personnel in Controlled Area

3.0 PROCEDURE

3.1 Person(s) should call the Control Room (or page party phone) immediately to report a fire. The location, size, and type of the fire, and callers' name should be given. | 4

3.2 Control Room shall sound the fire siren.

3.3 Control Room shall announce over the P.A. System for the fire brigade to respond. Message shall be repeated twice and the siren resounded.

3.4 All unnecessary personnel shall be evacuated from the fire area.

3.5 When requested by the Fire Brigade Leader, the SRO, under the direction of the Shift Supervisor, shall call Verplanck Fire Department for assistance.

3.6 See IP-1056, Directing Fire Fighting Personnel in Controlled Area, if applicable.

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New York Power Authority

EMERGENCY PLAN PROCEDURES

PROCEDURE NO. IP- 1060 REV. 5

TITLE: Personnel Radiological Check and Decontamination

WRITTEN BY: Maryann Chaubard 3/2/87
SIGNATURE/DATE

REVIEWED BY: Michael K Rull 03/02/87
SIGNATURE/DATE

PORC REVIEW: M P Cass 3/12/87
DATE

APPROVED BY: [signature] 3/12/87
SIGNATURE/DATE

EFFECTIVE DATE: 03/13/87

RES LOG #: EP-8

IP-1060

PERSONNEL RADIOLOGICAL CHECK AND DECONTAMINATION

1.0 INTENT

To describe the emergency condition methods of checking personnel for contamination and their subsequent decontamination when required.

2.0 DISCUSSION

Determination of personnel contamination levels, supervision of personnel decontamination and subsequent checkout will be performed by members of the Health Physics staff. Resolution of problem cases will be handled by the Radiological Assessment Team Leader (RATL).

3.0 DECONTAMINATION FACILITIES

3.1 Decontamination facilities available include:

a. Decon facility on the 4th floor of the Administration Building located at the HP Control Point;
b. Con Edison Service Center Building.

3.2 Decontamination supplies are available at each location.

4.0 PRECAUTIONS

4.1 Decontamination will be performed in accordance with RE-HPI-6.41.

4.2 Chemical decontamination should only be performed with medical supervision or under direction of a knowledgeable individual.

4.3 Clean is considered less than 100 cpm above background.

5.0 PROCEDURE

5.1 Personnel will be monitored for contamination:

a. when leaving restricted areas;
b. when leaving areas in the plant suspected to be contaminated;
c. assembly areas if suspected to be contaminated;
d. re-assembly areas.

5.2 Records of personnel monitoring will be maintained on the Personnel Contamination Check Form, EP-Form #14 (Attachment 6.1).

5.3 Records of personnel decontamination will be maintained on the Skin Decontamination Record Form, EP-Form #15 (Attachment 6.2).

NOTE: EP-Forms #14 and #15 are to be returned to the Watch H.P. or H.P. Team Leader in the OSC as applicable.

5.4 Documentation of all monitoring and decontamination activities will be directed to the Health Physics Team Leader in the OSC for evaluation and retention.

5.5 H.P. Control Point and Decon Facility decontamination will be performed in accordance with RE-HPI-6.41.

5.6 Decontamination at the Con Edison Service Center:

5.6.1 Determine the contamination level category by using a frisker with an HP-210 G.M. tube to check the individual. The categories are as follows:

a. Clean - less than 100 cpm above background;
b. Low level - less than 10,000 cpm above background;
c. High level - 10,000 cpm above background or greater.

5.6.2 For individuals contaminated in the Low Level category, use the Service Center locker room shower. This amount will not exceed the limits specified in 10CFR 20.303 for discharge into a sanitary sewage system.

a. Shower using non-alkaline soap such as Phisoderm, if available, and lukewarm water. Keep contamination away from non-contaminated parts of the body. If practical, wash off higher levels of contamination first.

b. Recheck individual after shower. Levels less than 100 cpm above background are considered uncontaminated.

c. If the levels are still greater than 100 cpm above background, have the individual re-shower and then re-check.

d. If the individual remains contaminated after three (3) showers (over 100 cpm above background), consult the Radiological Assessment Team Leader.

5.6.3 For individuals contaminated in the High Level category, use the portable sample kit, decon kit, and transportation kit located in the Medical Bureau Office at the Service Center. The instructions for their use are included with the kits. The key is located with the Service Center Guard.

5.6.4 When an individual is decontaminated to a level less than 10,000 cpm above background using a "frisker" with an HP-210 G.M. tube or equivalent, he may be referred to the shower room where further decontamination may be continued.

6.0 ATTACHMENTS

6.1 EP-Form #14 - Personnel Contamination Check Form

6.2 EP-Form #15 - Skin Decontamination Record Form

EP-FORM #14

PERSONNEL CONTAMINATION CHECK

DATE: _____ INSTRUMENT MODEL: _____

H.P.: _____ INSTRUMENT SERIAL NO.: _____

INDIVIDUAL'S NAME	MAXIMUM FRISKER (CPM)	DESCRIPTION OF AREA WITH READING > 100 CPM	DISPOSITION OF INDIVIDUAL

NOTE: All personnel leaving restricted areas or other areas suspected to be contaminated should be surveyed. Record on this form whether contaminated or not.

Return this form to the Watch H.P. or H.P. Team Leader in the OSC as applicable.

FEB 03 1987

EP-FORM #15

SKIN DECONTAMINATION RECORD

NAME: _____ SOCIAL SECURITY NO.: _____
(LAST) (FIRST) (INITIAL)

DATE: _____ TIME OF CONTAMINATION: _____

H.P. TECHNICIAN: _____

How and where it occurred: _____

Max. initial contamination levels: With Anti-C: _____ W/O Anti-C: _____

Body Orifices/Swabs or Smears/Counting Instrument Used (S/N): _____

	1		2		3		4		5	
	TIME	CPM	TIME	CPM	TIME	CPM	TIME	CPM	TIME	CPM
EYE										
EAR										
NOSE										
MOUTH										
OTHER										

TIME DECON STEP BEGINS	SKIN AREA CONCERNED	DECON AGENTS USED	CONTAMINATION LEVEL AFTER DECONTAMINATION	SKIN CONDITION

TIME DECONTAMINATION COMPLETED:	DECONTAMINATION DONE BY:

Return this form to the Watch H.P. or H.P. Team Leader in the OSC as applicable.

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EP-FORM #15
(continued)

NAME OF INDIVIDUAL: _____

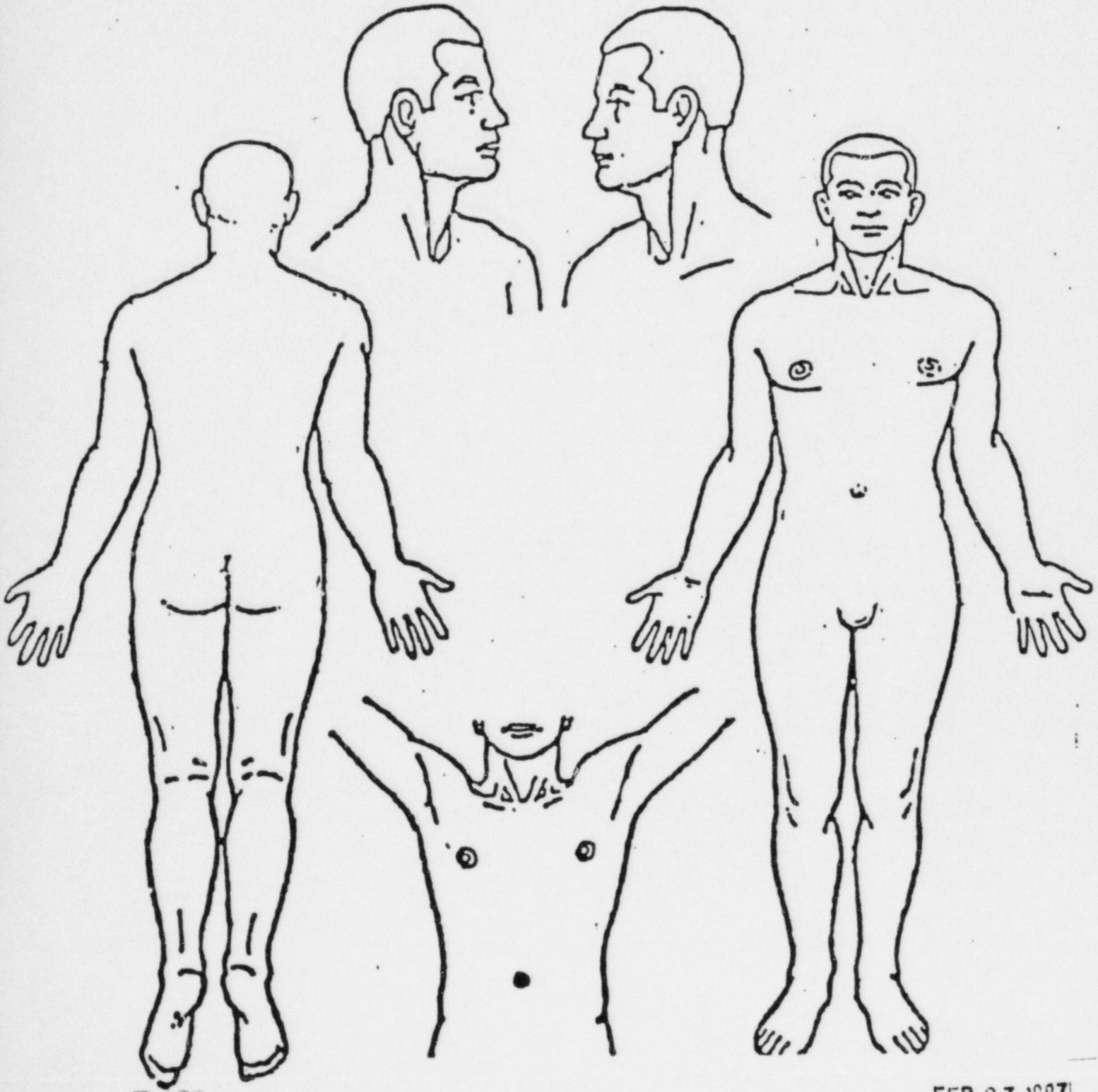
SURVEYED BY: _____

DIRECTIONS: INDICATE LEVELS OF CONTAMINATION ON THE CORRESPONDING BODY PART.

SURVEY TIME: _____ DATE: _____

METER TYPE: _____

SERIAL NO: _____ CALIBR. DUE: _____



FEB 03 1987

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New York Power Authority

EMERGENCY PLAN PROCEDURES

PROCEDURE NO. IP- 1063 REV. 5

TITLE: VEHICLE/EQUIPMENT RADIOLOGICAL CHECK AND DECONTAMINATION

WRITTEN BY: MaryAnn Chaubard 3/2/87
SIGNATURE/DATE

REVIEWED BY: Michael Ruel 03/03/87
SIGNATURE/DATE

PORC REVIEW: M Carr 3/12/87
DATE

APPROVED BY: [signature] 3/12/87
SIGNATURE/DATE

EFFECTIVE DATE: 03/13/87

RES LOG #: EP-9

IP-1063

VEHICLE/EQUIPMENT RADIOLOGICAL CHECK AND DECONTAMINATION

1.0 INTENT

To describe the methods of checking vehicles and equipment for contamination and their subsequent decontamination at the Con Edison Service Center when required.

2.0 DISCUSSION

During a Site Area or General Emergency, vehicle access to or departure from the Indian Point Site is stopped with the exception of emergency vehicles. Permission for vehicles or equipment to leave the site is obtained from the Emergency Director after evaluation of contamination (potential or actual). The criteria presented in this procedure shall be used to determine the status of site personnel private vehicles in the event of a site evacuation that requires contamination checks (see IP-1053). The responsibility for performing contamination checks and supervision of any decontamination is that of the Onsite Monitoring Team which is made up of Health Physics personnel.

Vehicle and equipment decontamination will be performed at the Service Center parking area (or other designated area) which will be accessed through the south gate located near the gasoline pumps. This gate will be opened by a member of the Security Force. No vehicles will be allowed to leave the Broadway entrance unless authorized by the Emergency Director.

3.0 PROCEDURE

3.1 Check for removable (loose) contamination by making smear checks (gauze pads or paper disks).

a. A gauze pad smear is made up of the major surface area of the outside of the car and tires. The pad is then placed against an RM-14/HP-210 probe or equivalent. No rise above background is considered uncontaminated. Any indication above background will require paper disk smears to quantify activity.

b. A paper disk smear is made of a number of representative areas (100 cm^2 in size) and counted with a GM or proportional counter or the RM-14/HP-210 or equivalent. To be considered uncontaminated, the removable contamination must be less than 1000 dpm/100 cm^2 or less than 100 cpm above background using the RM-14/HP-210 or equivalent.

3.2 Check for fixed contamination by slowly passing the E-530/166 probe or equivalent as close as possible to the surface. To be considered uncontaminated, the fixed contamination, as seen by the instrument, must be less than 0.1 mR/hr. above background.

3.3 If the vehicle or equipment is contaminated, have it moved to the decontamination location in the northeast corner of the Service Center North parking lot.

3.4 Position the vehicle or large equipment close to the corner water run-off opening. This will allow contamination to run off into a small depression where it will be contained and concentrated by the land contour. Isolate and post the run off area, as necessary.

3.5 Using hoses hooked up to the nearest fire hydrant or utilizing a Fire Deparment pumper, wash the vehicle or equipment with the detergent and water.

3.6 If the vehicle or equipment is still contaminated, rewash and recheck until it checks out uncontaminated.

3.7 Record all contamination checks and washes along with the vehicle license plate number on EP-Form #16 and equipment information on EP-Form #17 (Attachments 4.1 and 4.2). Return these forms to the Watch H.P. or H.P. Team Leader in the OSC as applicable.

3.8 Vehicles (not including environmental monitoring vehicles) that are contaminated will not be permitted to leave the site.

NOTE: Release of vehicles and equipment at contamination levels greater than the 1000 dpm limit may be required under certain conditions (high offsite contamination levels, emergency medical treatment). Permission to release vehicles and equipment in such circumstances must be obtained from the Emergency Director.

4.0 ATTACHMENTS

4.1 EP-Form #16 - Vehicle Contamination Check

4.2 EP-Form #17 - Equipment Contamination Check

EP-FORM #16

VEHICLE CONTAMINATION CHECK

DATE: _____ H.P.: _____

COUNTER SERIAL NO.: _____ COUNTER CALIBR. DUE DATE: _____

FRISKER SERIAL NO.: _____ FRISKER CALIBR. DUE DATE: _____

VEHICLE LICENSE NUMBER	LOOSE CONTAMINATION DPM/100 CM^2 OR CPM > BKGD	FIXED CONTAMINATION CPM > BKGD	DESCRIPTION OF AREA CONTAMINATED	DISPOSITION OF VEHICLE

RETURN THIS FORM TO THE WATCH H.P. OR H.P. TEAM LEADER IN THE OSC AS APPLICABLE.

FEB 03 1987

EP-FORM #17

EQUIPMENT CONTAMINATION CHECK

DATE:_____ H.P.:_____

COUNTER SERIAL NO.:_____ COUNTER CALIBR. DUE DATE:_____

FRISKER SERIAL NO.:_____ FRISKER CALIBR. DUE DATE:_____

EQUIPMENT DESCRIPTION	LOOSE CONTAMINATION DPM/100 CM^2 OR CPM > BKGD	FIXED CONTAMINATION CPM > BKGD	LOCATION OF CONTAMINATION	DISPOSITION OF EQUIPMENT

RETURN THIS FORM TO THE WATCH H.P. OR H.P. TEAM LEADER IN THE OSC AS APPLICABLE.

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RE-AD-1.0
ATTACHMENT 6.7

New York Power Authority

EMERGENCY PLAN PROCEDURES

PROCEDURE NO. IP- 1076 REV. 7

TITLE: BEEPERS

WRITTEN BY: Maggie McCough 03/02/87
SIGNATURE/DATE

REVIEWED BY: [signature] 03/02/87
SIGNATURE/DATE

PORC REVIEW: [signature] 3/12/87
DATE

APPROVED BY: [signature] 3/12/87
SIGNATURE/DATE

EFFECTIVE DATE: 03/13/87

RES LOG #: EP-66

IP-1076

BEEPERS

1.0 INTENT

To outline the procedure for beeper page units used to contact NYPA personnel for emergency notification.

2.0 DISCUSSION

The paging service used at IP-3 is Metromedia TeleCommunications Paging Services. A VHF band is used to transmit signals to the paging units via towers located throughout the service area. The IP-3 pagers have digital readout as well as tone. This allows the person being paged to know where to call back (i.e., directly to the paging party). Use of a touch-tone telephone is required for the digital message. Should rotary telephones be used, the pager will beep but no digital display will be available. Therefore, the paged person will not know who to call. It is best to use Security ( ) as an intermediary if dialing from a rotary phone and they will be able to page personnel from the plant touch-tone phones; or if the "air" is busy, to dial ( ) and ask Metromedia to page manually. Again only a beep will be heard and a message must be left with Security on who to call back.

NOTE: Site telephones are both the touch-tone dial and rotary dial types. The multi-extension console model is rotary dial and the single user desk model is touch-tone. See Section 4.0 for instructions on paging from these different types of telephones.

3.0 PRECAUTIONS

3.1 Beepers are fragile and should be handled carefully.

3.2 Beepers should be worn and in the "on" position when you are away from your home telephone, office telephone, or plant paging system.

3.3 Missing or defective beepers should be reported immediately to the R.E.S. Department, ( ) .

4.0 PROCEDURE

4.1 Establish the necessity to use beeper paging (i.e., no answer at home or office phones or by plant paging).

4.2 There are four (4) different ways to page individuals with these digital display pagers. In order of preference:

a. Using a touch-tone phone, enter the telephone number for call back as per the following instructions:

DATA PAGE SERVICE - How to send a message to:
NOTE: You must use a touch-tone phone or adapter. 1. Dial the Beeper No.: _____ 2. Wait until you hear 3 beep tones: beep/beep/beep. 3. Enter the phone number where you wish to be called. (You can enter up to 24 digits.) 4. Press the number sign button (#). 5. Hang up.

b. If you are using a rotary phone, you can call Security ( ) and have them use the plant touch-tone phones so they can enter the number for callback (see Section 4.2.a. for instructions).

c. If you are paging someone using a rotary phone, the paged individual will only hear a beep. In this instance, Security must be called ( ) leaving a message with them so that when the person being paged calls in, Security can relay the message.

d. If a busy signal is obtained, you can call Security (and request them to call Metromedia at ( ) to have them do the paging manually. No digital display will appear, only a beep. In this instance, Security must be called leaving a message with them so that when the person being paged calls in, Security can relay the message.

4.3 Instructions when you are paged:

a. Call back telephone number which appears on your pager printout.

b. If only a beep is heard and/or a _ _ _1_ _ _ appears in the center of the screen, this means you were: 1) paged with a rotary phone; or 2) paged manually by Metromedia; or 3) the telephone code entered was not signaled to you properly. Should you receive only a beep, call Security ( ) to ask for your message, if one has been left for you.

5.0 TESTING

5.1 Beepers will be tested every other month to insure their operability and use in accordance with 3PT-TM03.

5.2 A letter will be distributed to all beeper holders notifying them of the test and the date of the testing period. Attachment 6.4 will be used to record the results of the beeper test.

5.5 Follow instructions in Section 4.2 to test each beeper.

6.0 ATTACHMENTS

6.1 Beeper Use Instructions

6.2 Metromedia Paging Network

6.3 Beeper Holders

6.4 Beeper Test Record

INTRODUCTION

Your "BPR 2000" series display pager is a compact tone alert silent alert pager with four call capability and unique visual display of a numeric message and source identifier.

FEATURES

Four-Call Feature: The pager displays pages from two different sources and identifies the source with a display digit (1 or 2), with and without data. (See Figures 4a, 4b, 4c, and 4d.)

12-Digit LCD Display with 24-Digit Message Capacity: For a single page, the pager can display 24 digits, 12 digits at a time.

Back-Lighted Display: Depress the LIGHT button to illuminate the display at night or during low light conditions.

Memory Capacity: The pager saves the two most recent messages in memory for a total of up to 48 digits.

"Vibra-Page" Model: This model alerts the user by vibrating when in the Silent mode.

Automatic Alert Reset: The tone or "Vibra-Page" alert automatically stops after eight seconds or can be halted by pressing the Read button anytime during the eight second alert.

OPERATION (See Figure 1.)

Tone Alert Mode: Set the OFF ON switch to ON. The tone symbol ( ) is displayed when in Tone Alert mode.

Power-Up Alert: A short power-up alert indicates that the pager is operating normally. No alert indicates a dead battery or bad battery contact.

Display Check: Along with the power-up alert a display consisting of the tone symbol ( ), the call source identifiers ( ), and a field of eights (8) will appear (see Fig. 2a).

Standby: Following the display check, the pager will display a field of all dashes and the source identifiers.

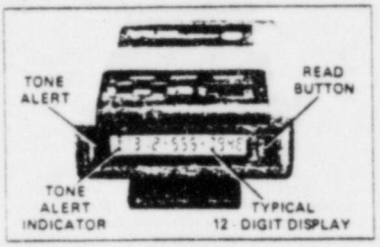

Figure 1. Controls

will vanish (see Fig. 2b). This display shows that the pager is in Standby, ready to receive a page.

Paging Alert: When a page is received, the pager emits an audible beeping tone and the display changes to a checkerboard pattern (see Fig. 2c). Depress the Read button to halt the alert and interrogate the pager memory. The pager will display the call source identifier and numerical information as described in Memory and Message Display paragraphs. If the Read button is not depressed, the audible alert will halt automatically after eight seconds. Depress the Read button to interrogate the pager memory.

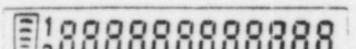

Figure 2a. Display Check (at power up)

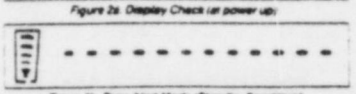

Figure 2b. Tone Alert Mode (Standby Condition)

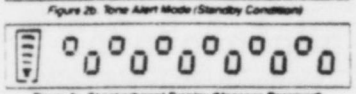

Figure 2c. Checkerboard Display (Message Received)

Silent Mode (See Figure 3.)

Tone Alert Model: Depress the SILENT button. The tone symbol will vanish from the display. The pager operates the same as described for Tone Alert mode except that no tone alert will be given.

"Vibra-Page" Model: This model pager operates the same as the Tone Alert model pager except that the unit vibrates when the SILENT button is depressed and when receiving a page.

NOTE: To return to Tone Alert mode from Silent mode, depress the SILENT button again.

NOTE: If the OFF ON switch is moved to OFF and back to ON the pager memory will be totally erased and the pager will be placed in Tone Alert mode.

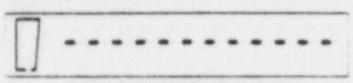

Figure 3. Silent Mode (Standby Condition)

MEMORY AND MESSAGE DISPLAYS

Memory: The pager memory can store up to two pages (message displays) containing up to 24 digits of numerical information for each page. This stored information can be interrogated at any time. If a third page is received, it is placed into memory, causing the earliest page to be lost (memory "overwrite"); hence, only the two most recent pages are stored. Figures 4a, 4b, 4c, and 4d illustrate and briefly explain the four types of message displays (standard four call pager).

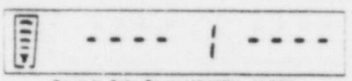

Figure 4a. Call 1 (Source 1 identifier – no data)

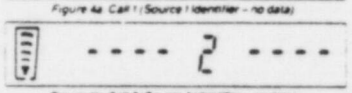

Figure 4b. Call 2 (Source 2 identifier – no data)

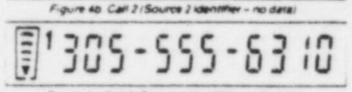

Figure 4c. Call 3 (Source 1 identifier – with data)

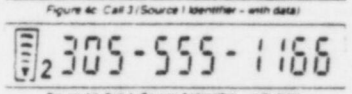

Figure 4d. Call 4 (Source 2 identifier – with data)

Message Examples:

Example 1: Assume that a page is received and a checkerboard display pattern is indicated for the first time since the pager was set to ON. Depress the Read button to interrogate the memory. A pattern exactly like Figure 4a or 4b, or similar to Figure 4c or 4d, is displayed (no audible alert symbol if in Silent mode). Unless the Read button is depressed, the message display remains for 12 seconds, then the pager returns to the Standby condition (Fig. 2b). If 12 digits of information are displayed and the rightmost digit is flashing, depress the Read button to interrogate the memory for a display of up to 12 additional digits of information. If the rightmost digit is flashing and the Read button is not depressed within 12 seconds, the display automatically advances to the additional 12 digits of information. Unless the Read button is depressed again, the display remains for 12 seconds, then the pager returns to Standby condition (Fig. 2b). To recall the numerical display again, depress the Read button.

Example 2: Assume that another page has been received (continuing on from Example 1). Depress the Read button to interrogate the memory. A second message is displayed as in Figures 4a, 4b, 4c, or 4d. Unless the Read button is depressed, the pager returns to the Standby condition after 12 seconds (or after 24 seconds if more than 12 digits of data are stored in memory).

Both the first and second pages remain in memory but will not be displayed unless interrogated. To interrogate the memory for the first (earliest) page (Example 1), depress the Read button *before* the second page display vanishes and the pager returns to Standby.

Example 3: If two pages have been received as described in Examples 1 and 2, then the memory is full since it contains information from the two most recent pages. If another page is received, the new (latest) page message is placed into memory, causing the page message from the earliest page to be lost. This "overwrite" feature means that you never have to clear the memory manually.

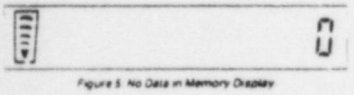

Figure 5. No Data in Memory Display

Figure 5 illustrates a "no data in memory" display which occurs when the Read button is depressed and no messages are in memory. This pattern is also displayed when interrogating for a second page when only one message has been received.

BATTERY INFORMATION

Battery Types: The pager is designed to operate with a single AA-size alkaline battery (Motorola type NLN8278A) or a single AA-size nickel-cadmium battery (Motorola type NLN7057A). Either of these batteries provide for optimum pager performance. AA-size alkaline or nickel-cadmium batteries from other manufacturers may give comparable performance, but have not been tested by Motorola. Substitution of a battery other than those recommended by Motorola could reduce operating life and may impair proper operation.

Battery Charging: The Motorola type NLN5678A Single-Unit Battery Charger is available for charging nickel-cadmium batteries. The charger provides for charging the battery either in or out of the pager.

a. If the battery is out of the pager, insert it in the battery charging pocket on the top of the charger. Observe that the charging lamp glows, indicating that the battery is being charged.

b. If the battery is in the pager, insert the pager in the charger pocket. The clip on the pager must fit into the notch on the charger pocket. Observe that the charging lamp glows, indicating that the pager is inserted properly and the battery is being charged.

c. Charge the battery at least 12 hours to reach full battery capacity.

Low Battery Display: The pager will display a Lo Lo Lo Lo Lo Lo when the battery has less than eight hours of life remaining. This display may occur after Power-up or anytime the pager is in Standby condition.

Battery Installation: (*See Figure 6.*)

a. Locate the black locking switch on the bottom of the pager.

b. Slide the black locking switch to the UNLOCK position. This reveals a red indicator and shows that the battery compartment cover is in the unlocked condition.

c. Locate the triangular shaped arrows on the battery compartment cover.

d. Press on the square textured area and slide the battery cover in the direction of the arrows.

e. Slide the battery compartment cover completely free from the pager housing.

f. Align the positive end of the battery with the positive marking in the battery compartment and insert the new battery. Be sure the battery is inserted properly or the pager will not work.

g. Reinstall the battery compartment cover in reverse order of disassembly by sliding the cover onto the bottom of the pager in the opposite direction of the arrows.

h. Make sure to slide the black locking switch to the locked position.

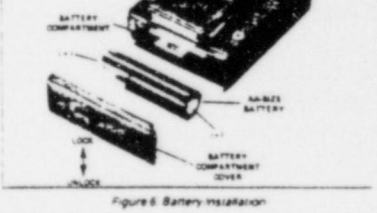

Figure 6. Battery Installation

OPTIONS

Single-Source, Single-Call Operation: The pager responds to source 1 identifier only, with an alert plus data message.

Single-Source, Dual-Call Operation: The pager responds to source 1 identifier only, with an alert, no data or with an alert plus data.

Manual Reset: The pager must be reset to halt an alert

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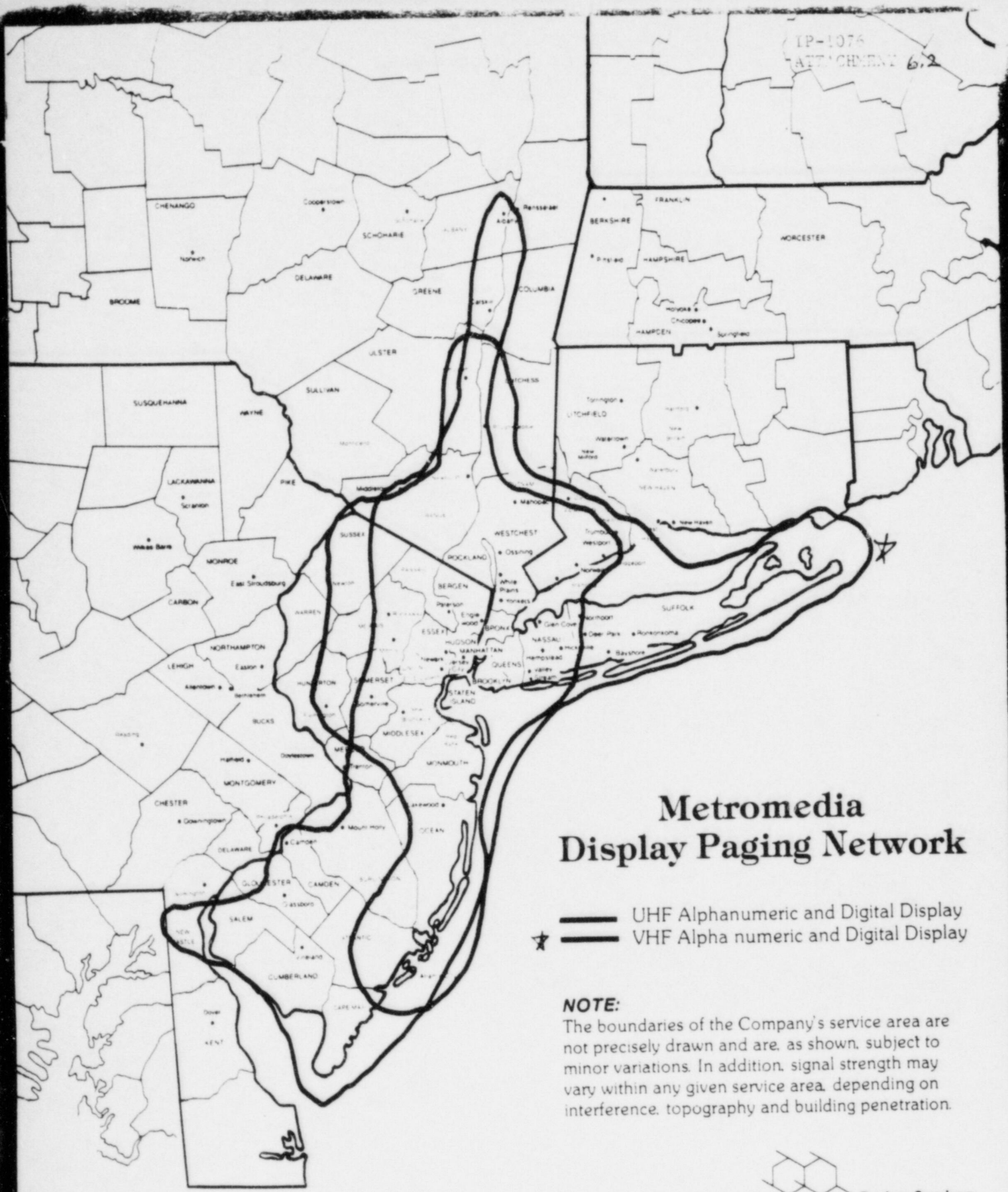
ATTACHMENT 6.2



Metromedia Display Paging Network

UHF Alphanumeric and Digital Display

VHF Alpha numeric and Digital Display

NOTE:
The boundaries of the Company's service area are not precisely drawn and are, as shown, subject to minor variations. In addition, signal strength may vary within any given service area, depending on interference, topography and building penetration.

Metromedia TeleCommunications **Paging Services**

429 Sylvan Avenue
Englewood Cliffs, NJ 07632

BEEPER HOLDERS

Beeper Holders	Pager No.
Albright, Marty	( )
Brons, Jack	
Carano, Bill	
Deschamps, Bob	
DiChiara, Joe	
Dube, Joe	
Forte, Todd	
Gillen, Jim	
Gullick, Jerry	
Hahn, John	
Hamlin, Bill	
Heady, Bill	
Josiger, Bill	
Kelly, Larry	
Munoz, Steve	
Perrotta, Joe	
Russell, Joe	
Russell, Pat	
Quinn, Dennis	
Smith, Steve	
Tagliamonte, Ed	
Vignola, Joe	
Chemistry Supervisors	
Nuclear Generation Duty Officer	( )

DATA PAGE SERVICE How to send a message to:
NOTE: You must use a touch-tone phone or adapter.
1. Dial the Beeper No.:_____
2. Wait until you hear 3 beep tones: beep - beep - beep.
3. Enter the phone number where you wish to be called. (You can enter up to 24 digits.)
4. Press the number sign button (#).
5. Hang up.

NOTE: With this type of paging, the individual will see the number you entered on his pager and will know where to call back.

If using a rotary phone, follow the instructions in Section 4.0 of this procedure.

DATE: _____

BEEPER TEST RECORD

Individual	Pager No.	Result of Test	Comment
Albright, Marty			
Brons, Jack			
Carano, Bill			
Deschamps, Bob			
DiChiara, Joe			
Dube, Joe			
Forte, Todd			
Gillen, Jim			
Gullick, Jerry			
Hahn, John			
Hamlin, Bill			
Heady, Bill			
Josiger, Bill			
Kelly, Larry			
Munoz, Steve			
Perrotta, Joe			
Russell, Joe			
Russell, Pat			
Quinn, Dennis			
Smith, Steve			
Tagliamonte, Ed			
Vignola, Joe			
Chemistry Supvs.			
Nuclear Generation Duty Officer			

For Service or Manual Paging: Metromedia TeleCommunications

_____
Signature of Test Coordinator/Date

_____
Signature of A.R.E.S.S.

_____
Signature of Performance and Reliability Supervisor/Date