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115 - 115 - CHEMISTRY SAMPLING TEAM: EMERGENCY PLAN-POSITION SPECIFIC PROCEDURE

REMOVE MANUAL TABLE OF CONTENTS DATE: 03/11/2003

ADD MANUAL TABLE OF CONTENTS DATE: 04/16/2003

CATEGORY: PROCEDURES TYPE: EP
ID: EP-PS-115
REMOVE: REV:13

REMOVE: PCAF 2003-1010 REV: N/A

ADD: REV: 14

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A045

`PROCEDURE COVER SHEET

PPL SUSQUEHANNA, LLC	NUCLEAR DEPARTMENT PROCEDURE	
CHEMISTRY SAMPLING TEAM EMERGENCY PLAN POSITION SPECIFIC INSTRUCTION		EP-PS-115 Revision 14 Page 1 of 4

QUALITY CLASSIFICATION:
( ) QA Program (X) Non-QA Program

APPROVAL CLASSIFICATION:
( ) Plant ( ) Non-Plant
(X) Instruction

EFFECTIVE DATE: 4-16-2003
PERIODIC REVIEW FREQUENCY: 2 Years
PERIODIC REVIEW DUE DATE: 4-16-2005

RECOMMENDED REVIEWS:
ALL

Procedure Owner: Nuclear Emergency Planning

Responsible Supervisor: Chemistry Supervisor-SSES

Responsible FUM: Supv.-Nuclear Emergency Planning

Responsible Approver: Vice President-Nuclear Operations

CHEMISTRY SAMPLING TEAM Emergency Plan-Position Specific Procedure

WHEN: All Phases, Alert or higher

HOW NOTIFIED: Plant Page System

REPORT TO: Chemistry Coordinator

WHERE TO REPORT: Control Room and then TSC

OVERALL DUTY:

Collect and analyze samples to obtain data required to manage the emergency.

MAJOR TASKS:	TAB:	REVISION:
BRIEFING, ASSIGNMENTS, AND PREPARATION OF RADIOCHEMISTRY LAB(S)		
Report for briefing and assignment(s)	TAB A	8
Prepare In-Plant Chemistry Lab to accept samples	TAB B	4
Prepare West Building Chemistry Lab to accept samples	TAB C	6
PASS SAMPLING AND ANALYSIS PROCEDURES		
Prepare Post Accident Sample Station (PASS) for sample collection. Secure PASS after sample(s) have been taken	TAB D	9
Collect Small Volume Liquid Sample(s) from PASS	TAB E	7
Collect Dissolved Gas Sample(s) and/or Large Volume Liquid Sample(s) from PASS	TAB F	8
Collect 14.7cc Gas Sample(s) from PASS	TAB G	7
Collect Iodine/Particulate Sample(s) from PASS	TAB H	5
Prepare and Analyze PASS Small Volume Liquid Sample(s)	TAB I	6

MAJOR TASKS:	TAB:	REVISION:
PASS SAMPLING AND ANALYSIS PROCEDURES (continued)		
Prepare and Analyze PASS Dissolved Gas Sample(s)	TAB J	7
Prepare and Analyze PASS 14.7 cc Gas Sample(s)	TAB K	7
Prepare and Analyze PASS Particulate and Iodine Sample(s)	TAB L	4
VENT MONITORING AND ANALYSIS PROCEDURES		
Collect SPING Sample(s) from Vent Monitoring System on Reactor Building 818' El.	TAB M	6
Collect Sample(s) from Post Accident Vent Sampling System (PAVSS) on Turbine 729' EL.	TAB N	9
Prepare and Analyze Vent Monitor Sample(s)	TAB O	7
ADDITIONAL TASKS		
Collect and Analyze Sample from Reactor Building Sampling Station. Sample has potential to be highly radioactive.	TAB P	5
In the event of an Unmonitored Liquid Release, collect and analyze Liquid Samples	TAB Q	6
RHR Service Water samples when RHR Service Water is in service but RHR-SW rad monitor is inoperable and normal sample point is unavailable	TAB R	5

SUPPORTING INFORMATION:	**TAB:**
Emergency Telephone Instructions	TAB 1
Emergency Organizations	TAB 2
Logkeeping	TAB 3
Sampling Requirements Based on Key Indicators	TAB 4
Intentionally Blank	TAB 5
Area Radiation Monitors	TAB 6
PAVSS Instructions	TAB 7

REFERENCES:

Post Accident Sample Station User's Manual, GE, NEDC-24889

General Electric Post Accident Sample Station Manual, GEK-83344

CH-CC-010, Chloride – Silver Nitrate Turbidimetric Method

CH-CC-030, Laboratory pH Determination

CH-CC-040, Hydrogen By GC

Ch-CC-043, Analytical Procedures for HACH or BETZ Portable Spectrophotometer Labs

CH-GI-051, Instrument Checks at the Offsite Chemistry Lab

CH-RC-010, Iodine Counting and Data Analysis

CH-RC-016, Particulate Filter Analysis

CH-RC-071, Radiochemical Analysis of High Activity Iodine Cartridge Samples

CH-RC-076, Gamma Spectral Analysis Using the ND 9900

TS 5.5.3

MAJOR TASK:

Report for briefing and assignment(s).

SPECIFIC TASKS:	HOW:	INITIALS
1. Immediately report to the Control Room unless otherwise directed.		
2. If directed by the Shift Manager to obtain a Reactor Coolant Sample, obtain the following information from the Control Room:	2a. Obtain the following information from the control room: • Ask if RWCU and/or Reactor Recirculation Systems are isolated. • If RWCU or Recirc are isolated, proceed with the following steps to obtain a PASS Sample. • If RWCU or Recirc are NOT isolated, proceed to Step 5(b)4 and TAB P to obtain a sample from the RB Sample Station. **NOTE:** **If the reactor is pressurized obtain a routine coolant sample from PASS. If the Reactor is depressurized obtain a PASS sample from RHR.** (1) Reactor Pressure: ________psig (2) RHR Mode: ______________________ RHR Pump A & C In Service / Out of Service (circle) RHR Pump B & D In Service / Out of Service (circle) (3) If a RHR sample is requested, record date and time RHR was placed in mode to be sampled.	________

SPECIFIC TASKS:	HOW:	INITIALS
3. Upon activation of the TSC report to the Chemistry Coordinator.		
4. Obtain briefing and assignments from the Chemistry Coordinator.	4a. The following information: (1) Team # ____________ (2) Required samples and analyses: ____________________ ____________________ ____________________ ____________________ ____________________ ____________________ ____________________ ____________________	______
	4b. If PASS samples are requested, obtain the following information: (1) Reactor Pressure: ________ psig (2) RHR Mode: ____________ RHR Pump A&C In Service/ Out of Service. (Circle) RHR Pump B&D In Service/ Out of Service. (Circle) (3) If a RHR sample is requested, record date and time RHR was placed in mode to be sampled.	______
	4c. If PAVSS samples are requested, perform the following: (1) Contact I&C to reset flow totalizers on PAVSS prior to sampling.	

SPECIFIC TASKS:		HOW:	INITIALS
		(2) Initialize appropriate PAVSS and place corresponding SPING in STANDBY.	
		HELP **PAVSS Instructions** **See TAB 7**	
		(3) Record time of reactor shutdown. Shutdown Time: ___________	________
	4d.	Record laboratory to be used for sample analyses and begin lab preparations:	________
		HELP **In-Plant Chemistry Lab Prep.** **See TAB B**	
		HELP **Offsite Chemistry Lab Prep.** **See TAB C**	
	4e.	Record extension number where Chemistry Coordinator may be contacted: Ext. # ____________________	________
5. Obtain briefing from Radiation Protection Coordinator or designee.	5a.	Sign in on RWP # YYYY-8000 series unless directed otherwise; in that case, Obtain Emergency RWP and record the following: RWP # ____________________	

Team Members	Allowable Exposure

____

SPECIFIC TĀSKS:	HOW:	INITIALS
	5b. Perform the following special actions, if applicable: (1) **If collecting a SPING sample,** obtain and record ARM readings on Reactor Building 818' El. __________ __________ __________ __________ __________ __________ __________ __________ (2) **If collecting a PAVSS sample,** obtain radiation readings from Turbine Building 729' El. And record. __________ __________ __________ __________ __________ __________ __________ __________ (3) **If collecting a PASS sample,** obtain radiation readings from Turbine Building 729' El. and record. __________ __________ __________ __________ __________ __________ __________ __________	

SPECIFIC TASKS:	HOW:	INITIALS
	(4) **If collecting an RBSS sample**, obtain and record radiation readings in sampling room, or from ARM's nearby, if available. ________________________ ________________________ ________________________ ________________________ ________________________ ________________________ ________________________ ________________________	________
	5c. Determine best route to and from sample point by performing the following:	
	(1) If cart is required to transport sampling equipment, confirm elevator or appropriate building may be used.	
	(2) Record recommended route to and from sample point: ________________________ ________________________ ________________________ ________________________ ________________________ ________________________ ________________________ ________________________	________
	(3) Record any pertinent technical conditions which could affect sample collection: ________________________ ________________________ ________________________ ________________________ ________________________ ________________________ ________________________ ________________________	________

SPECIFIC TASKS:	HOW:	INITIALS
	HELP **PASS Sample(s)** **See TAB D**	
	HELP **SPING Sample(s)** **See TAB M**	
	HELP **PAVSS Sample(s)** **See TAB N**	
	HELP **RBSS Sample(s)** **See TAB P**	
	HELP **Unmonitored Liquid Release Sample(s)** **See TAB Q**	

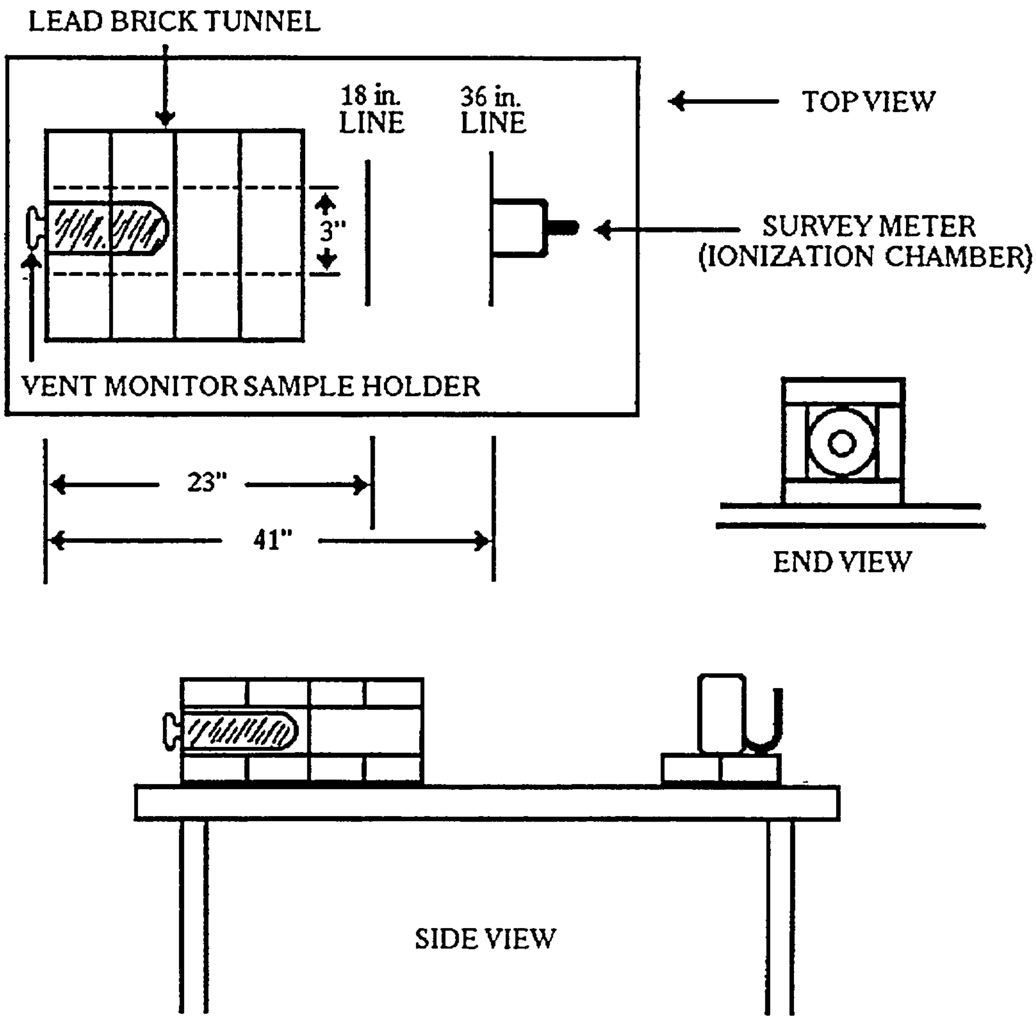
MAJOR TASK:

Prepare In-Plant Chemistry Lab to accept samples.

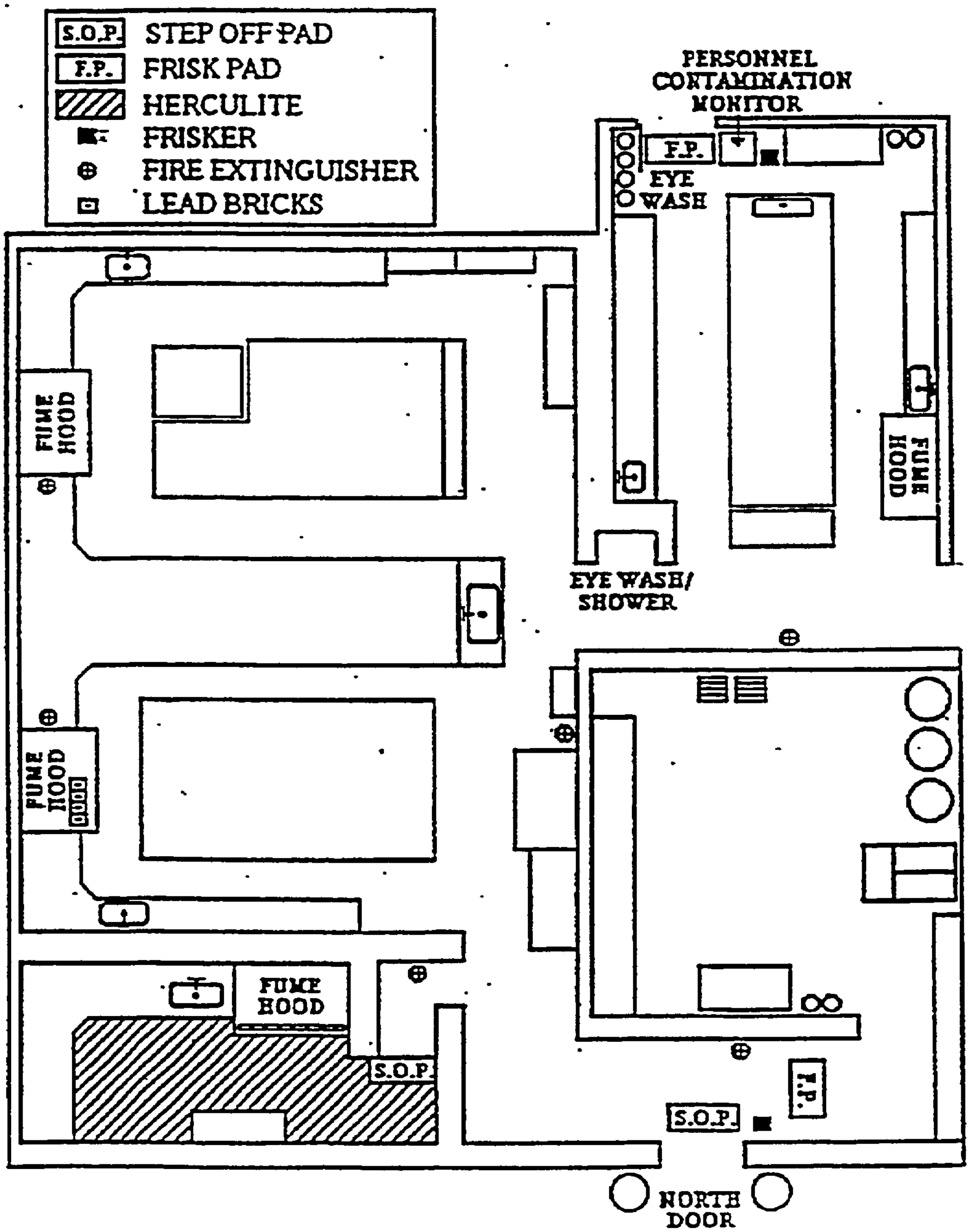
SPECIFIC TASKS:	HOW:	INITIALS
NOTE: **All contaminated or potentially contaminated personnel and samples should enter In-Plant Chemistry Lab <u>through North Door only</u>.**		
1. After briefing and assignment, construct necessary lead brick shielding for sample storage and preparation.	1a. Construct lead brick shield in Sample Preparation Room fume hood to store radioactive samples and sample dilutions.	______
	1b. Construct lead brick tunnel as shown on Attachment A, Suggested Cave/Tunnel Designs, in In-Plant Chemistry Lab fume hood closest to Sample Preparation Room.	______
2. Obtain necessary supplies.	2a. Obtain the following supplies: ___ pH meter and electrode ___ Dilution vials ___ Liquid syringe or Eppendorf pipettes, 1.0 ml, 0.1 ml ___ Gas tight syringes ___ Vials, gas and liquid ___ Septums ___ Capper and decapper ___ 0.01N Nitric Acid (HNO_3) ___ Labels and markers ___ Bench coat ___ Paper towels ___ Tongs ___ Plastic wrap ___ Bags ___ Survey Meter ___ Vacuum grease ___ Remote handling tool(s) ___ Cotton gloves ___ Plastic gloves ___ Radiation tape ___ Yellow trash bags	______

SPECIFIC TASKS:		HOW:		INITIALS
		2b.	Store supplies within access of Sample Preparation Room fume hood.	______
3.	Initiate Emergency Sample Log and Event Log.			______
4.	Obtain equipment from In-Plant Chemistry Lab for contamination control:	4a.	Obtain the following supplies: ___ Herculite ___ Step-off Pads ___ Duct tape ___ Plastic booties ___ Plastic gloves ___ Frisker ___ Survey Meter ___ 2 Containers for used protective clothing	______
			NOTE: **If unable to locate equipment, notify Chemistry Coordinator of needed supplies.**	
5.	Prepare Sample Preparation Room to receive radioactive samples.	5a.	Place step-off pad as shown on Attachment B, In-Plant Chemistry Lab.	______
		5b.	Cover floor with herculite as shown on Attachment B.	______
6.	Complete In-Plant Chemistry Lab preparations.	6a.	Place containers for used protective clothing at each step-off pad.	______
		6b.	Place clean plastic gloves, booties, and lab coats at North Door for donning prior to entrance to Sample Preparation Room.	______

ATTACHMENT A
SUGGESTED CAVE/TUNNEL DESIGNS



ATTACHMENT B
IN-PLANT CHEMISTRY LAB



MAJOR TASK:

Prepare West Building Chemistry Lab to accept samples.

SPECIFIC TASKS:		HOW:	INITIALS
NOTE: If the security at the West Building is tripped while accessing the building, contact Corporate Security at the General Office ETN 220-5296.			
1. Obtain access to the West Building	1a.	Obtain the key for the West Building from the cabinet in the Technician's office area. <u>or</u> Contact Security and arrange for them to unlock the West Building.	________
	1b.	Obtain the security access code from Chemistry Management.	________
	1c.	Contact Health Physics: (1) to determine if a Health Physics technician will accompany Chemistry to Offsite Chemistry Lab in order to perform surveys. (2) to determine if there is a preferred route to the Offsite Chemistry Lab. (3) to obtain frisker and other equipment that may be needed at the Offsite Chemistry Lab.	________
		NOTE: **If gates need to be unlocked, contact Security to arrange for access.**	
	1d.	Proceed to the West Building.	________

SPECIFIC TASKS:		HOW:		INITIALS
			NOTE: **If the next three steps are not performed within 30 seconds, Corporate Security will receive an alarm.**	
		1e.	Unlock the front door to the West Building.	______
		1f.	Proceed through two (2) doors.	
		1g.	Enter access code using the keypad inside the second door within 30 seconds.	______
			NOTE: **If there is an entry error during the code, re-enter the correct code and contact Corporate Security at ETN 220-5296.**	
2.	Obtain the key to the Chem Lab Credenza.	2a.	Located in Key Box outside receptionist's office.	______
3.	After briefing and assignment, perform the following steps to prepare Offsite Chemistry Lab.	3a.	Ensure compressor for gamma spectroscopy detector is on and detector is cooled to operating temperature.	______
		3b.	Ensure current Analysis Library is available for reference.	______
		3c.	Initiate Emergency Sample Log and Event Log.	______

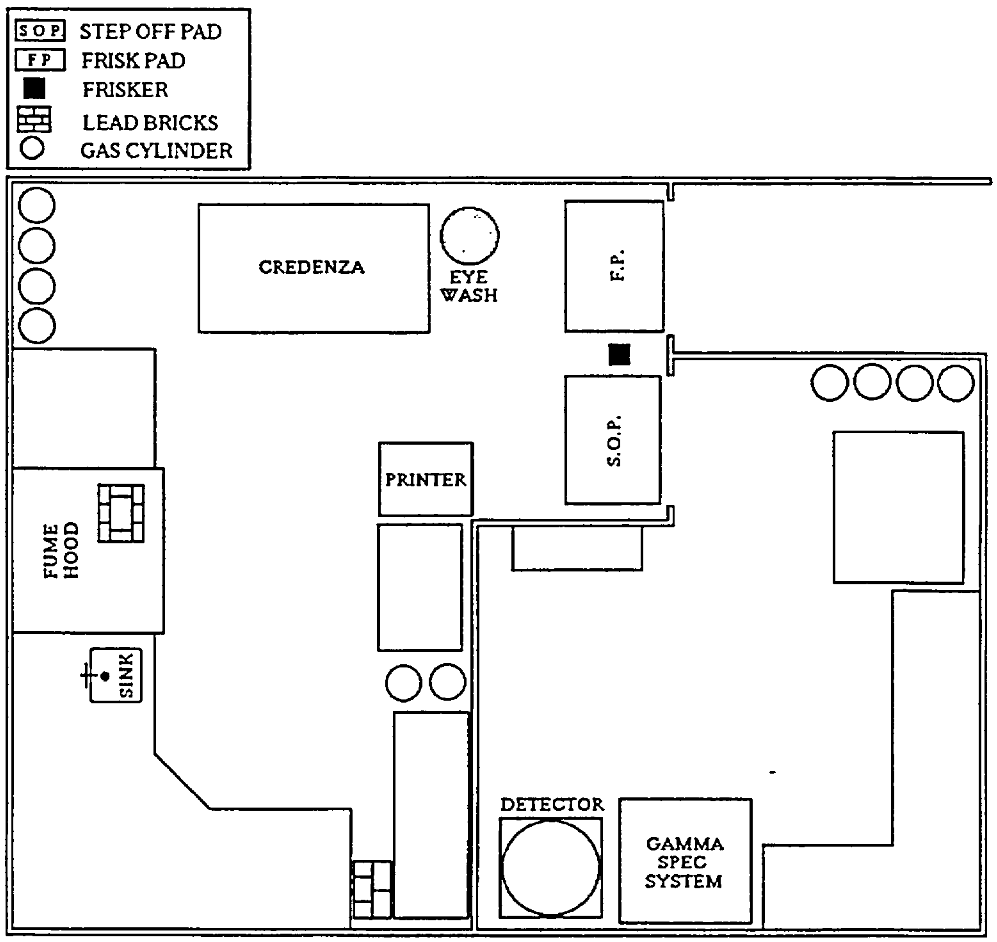
SPECIFIC TASKS:	HOW:		INITIALS
	3d.	Label all samples NOT assigned an in-plant sample number using the following format: EOFYY-XXX WHERE: YY = Last 2 digits of current year XXX = Sequential number	_______
	3e.	Connect tygon from exhaust of G.C. to hood.	_______
4. Set up detector cave purge, if operable.	4a.	Begin purge a minimum of 30 minutes prior to receiving samples.	_______
	4b.	Set up compressed air purge line (tygon tubing) for gamma spectroscopy detector.	_______
	4c.	Open regulator valve(s) on compressed air tank to obtain slow flow of gas.	_______
	4d.	Ensure slow flow rate is obtained by placing back of hand at end of tubing. If flow rate is too high, gas bottle will be quickly exhausted.	_______
	4e.	Place end of tubing into high purity germanium detector cave to prevent any airborne radioactivity from entering cave and raising background levels.	_______

SPECIFIC TASKS:		HOW:		INITIALS
5.	Perform instrument checks of all operable equipment and log results.	5a.	Perform instrument checks on the following equipment, if operable, in accordance with CH-GI-051, Instrument Checks at the Offsite Chemistry Lab. _____Gamma spectroscopy system _____Laboratory balance _____Turbidimeter _____pH meter _____Gas chromatograph _____Portable frisker____________	_______
6.	Obtain necessary supplies and store within access of fume hood.	6a.	Obtain the following supplies: _____pH meter and electrode _____Dilution vials _____Liquid syringe or Eppendorf pipettes, 1.0 ml, 0.1 ml _____Gas tight syringes _____Gas vials _____Septums _____Capper and decapper _____0.01N Nitric Acid (HNO_3) _____Labels and markers _____Paper towels _____Lab coats _____Carboys _____Tongs _____Plastic wrap _____Bags _____Survey Meter _____Vacuum grease _____Remote handling tool(s) _____Cotton gloves _____Plastic gloves _____Radiation tape _____Yellow trash bags _____2 adjustable wrenches _____Large screwdriver _____Syringes and needles for liquid transfers _____Bench coat	_______

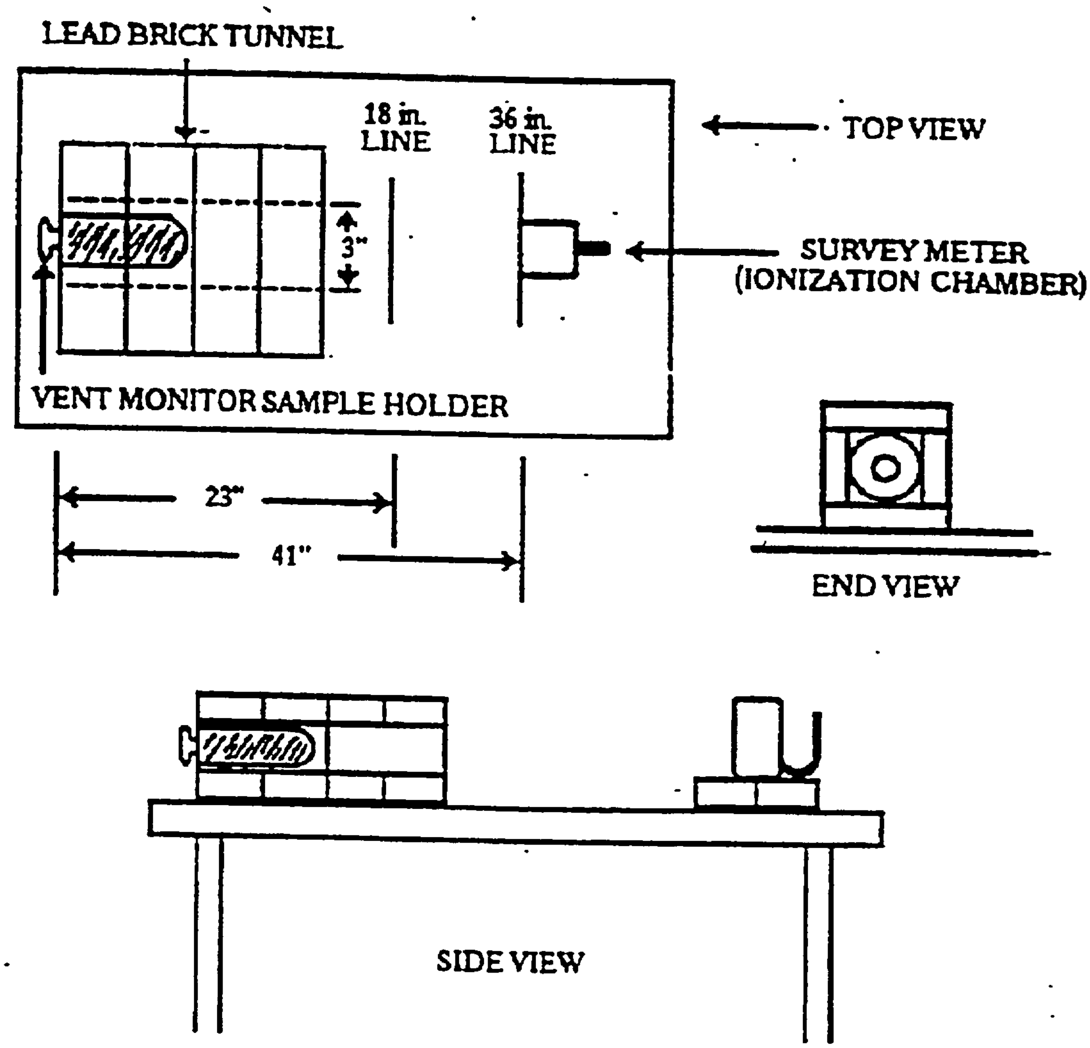
SPECIFIC TASKS:		HOW:		INITIALS
7.	If required, obtain additional supplies for contamination control.	7a.	Obtain the following supplies from the D-Con room: ______Step-off pads ______Herculite ______Duct tape ______Plastic booties ______Plastic gloves ______Protective Clothing ______Containers for used PC's	________
8.	Complete Offsite Chemistry Lab preparations.	8a.	Place step-off pads as shown on Attachment A, Offsite Chemistry Lab.	________
		8b.	Place the following at each step-off pad. (1) Containers for used protective clothing (2) Plastic gloves (3) Plastic booties	________
		8c.	Install bench coat on lab benchtops, taping edges and seams.	________
		8d.	Install double layer of herculite in Sample Handling hood.	________
9.	Construct necessary lead brick shielding for sample storage and preparation.	9a.	Construct lead brick shield in Sample Handling hood to store samples and sample dilutions.	________
		9b.	Construct lead brick tunnel as shown on Attachment B, Suggested Cave/Tunnel Designs, on floor or other suitable location.	________

SPECIFIC TASKS:	HOW:	INITIALS
10. Ensure adequate source of flush water.	10a. Check water supply demineralizer cartridges to determine if cartridges require changeout.	_______
	10b. Confirm isolation valve under sink is open.	_______
11. Ensure fume hood exhaust is operable.	11a. Turn fume hood exhaust on.	_______
	11b. Tape kimwipe strips near fume hood exhaust as visual indication hood is operating.	_______
	11c. Leave fume hood exhaust running to purge EOF lab of any airborne radioactivity.	_______
12. Designate sink for disposal of **nonradioactive solutions only.**	12a. Disconnect sink drain connection between steel and PVC piping.	_______
	12b. Place 5 gallon carboy under drain and tape connection between pipe and carboy to prevent spillage.	_______
	12c. Replace carboy when 2/3 full. Handle carboy with extreme care due to highly acidic nature of disposed liquid.	_______
13. Place two large beakers in fume hood for disposal of solid and liquid radioactive waste.		_______
14. Set up holding area for nonradioactive used glassware.	14a. Dispose of glassware used for radioactive samples as solid radioactive waste immediately after use to minimize personnel exposure.	_______
	14b. Store glassware used for nonradioactive blanks and standards in holding area for used glassware until cleaning is available.	_______

ATTACHMENT A
OFFSITE CHEMISTRY LAB



ATTACHMENT B
SUGGESTED CAVE/TUNNEL DESIGNS



MAJOR TASK:

Prepare and Analyze PASS Small Volume Liquid Sample(s).

SPECIFIC TASKS:	HOW:	INITIALS
1. Upon return from PASS Sample Station, place sample cask in Sample Prep Room.		______
2. Transfer required TAB E data to Attachment A, Small Volume Liquid Analysis.		______
3. Perform pre-analysis sample preparation in fume hood.	3a. Using remote handling device, remove sample vial from cask. Place sample vial behind shielding in fume hood.	______
	3b. Obtain contact dose rate (closed window) on sample vial. Record sample number, dose rate, dilution performed, and dilution factor on Attachment A. (1) If 0.1 ml sample was obtained for pH analysis, record original dilution as N/A and dilution factor of 1. (2) If demineralized water was added to sample at time of collection, record original dilution as 0.1:10 and dilution factor of 100.	______
	3c. If 0.1 ml sample was obtained for pH analysis, analyze pH using flat surface membrane pH probe in accordance with CH-CC-030, Laboratory pH Determination. Record results on Attachment A (under analysis results).	______

SPECIFIC TASKS:	HOW:	INITIALS
4. Prepare sample for isotopic analysis	4a. If demineralized water was added to sample at time of collection, determine dilution(s) required to obtain 10ml sample at <5.0mR/hr using the table below.	

Original vial Contact mR/hr.	Dilution ratio	Dilution Factor	Vials Required
0.0 – 5.0	None	1 E2	None
5.0 – 50	1:10	1 E3	1
50 – 500	0.1:10	1 E4	1
500 - 5000	0.1:10 & 1:10	1 E5	2

4b. For a 0.0-0.5mR/hr sample, no dilution is required. GO TO Step 4i of this tab.

4c. If applicable, label additional vial(s), adding consecutive letters to the original sample number.

4d. For a 5.0-50mR/hr sample, place 9.0ml 0.01N HNO_3 diluent into the vial, cap vial, and inject 1.0ml of original sample through septum.

4e. For a 50-500mR/hr sample, place 9.9ml 0.01N HNO_3 diluent into the vial, cap vial, and inject 0.1ml of original sample through the septum.

4f. For a 500-5000mR/hr sample:

(1) Place 9.9ml 0.1N HNO_3 diluent into one vial, and 9.0ml into the second vial: cap vials.

(2) Inject 0.1ml of original sample into the first vial.

(3) Gently invert vial five (5) times to mix.

SPECIFIC TASKS:	HOW:		INITIALS
	(4)	Withdraw 1.0ml from the first vial and inject into the second vial.	
	4g.	While directing the open end of the needle toward the back of the hood, vent vial by inserting a hypodermic needle (without syringe) through the septum into the air space above the liquid, and then removing the needle.	
	4h.	Gently invert final vial five (5) times to mix.	
	4i.	Record sample number, dilution(s) performed, and dilution factor on Attachment A for each dilution prepared.	________
	4j.	Record contact dose rate (closed window) on Attachment A for each sample dilution.	________
	4k.	Store original sample bottle and all dilution(s) except one to be analyzed in lead brick storage cave in fume hood of Sample Prep Room.	________
	4l.	When sample is < 5.0 mR/hr, wrap vial in clean plastic film and transfer to Counting Room for analysis.	________

SPECIFIC TASKS:		HOW:		INITIALS
5.	Perform isotopic analysis on sample < 5.0 mR/hr.	5a.	Using the table below, determine Actual Coolant Volume for isotopic analysis, based on the dilutions that were performed.	______
		5b.	Decay correct sample to time of collection.	
		5c.	Determine DEI-131 (µCi/ml) in accordance with CH-RC-010, Iodine Counting and Data Analysis.	______
		5d.	Record Analysis Date/Time, CTE Number, and DEI-131 on Attachment A.	______
		5e.	Attach printout of isotopic analysis to Attachment A.	______
		5f.	Notify Chemistry Coordinator of analysis results.	______
6.	Perform additional analyses, as requested by Chemistry Coordinator.	6a.	Perform boron analysis in accordance with CH-CC-043, Analytical Procedures for HACH or BETZ Portable Spectrophotometer Labs, if required. Record results on Attachment A.	______
		6b.	Perform chloride analysis, in accordance with CH-CC-010, Chloride - Silver Nitrate Turbidimetric Method, if required. Record results on Attachment A.	______
		6c.	Notify Chemistry Coordinator of analysis results.	______

Table for step 5a:

Dilutions Performed	Actual Coolant Volume - ml
None	1 E –1
1:10	1 E –2
0.1:10	1 E –3
0.1:10 & 1:10	1 E - 4

SPECIFIC TASKS:	HOW:	INITIALS
7. At completion of analyses, place sample in lead brick storage cave in fume hood of Sample Prep Room.		______

ATTACHMENT A

SMALL VOLUME LIQUID ANALYSIS

I. SMALL VOLUME LIQUID ANALYSIS

Sample Source	Sample Date/Time
Liquid Sample Temperature TI-660 °F	Vial Dose Rate mR/hr
Conductivity CI-663 μmho/cm @ °F	

II. SAMPLE DILUTION/RESULTS

Sample	Original	Dilution 1	Dilution 2	Dilution 3
Sample #				
Dilution Ratio				
Dilution Factor				
Dose Rate				
Actual Coolant Volume for Isotopic Analysis ml				
Analysis Date/Time	CTE #		DEI-131 μCi/ml	

Additional Analyses	Performed	Not Performed	Analysis Results	x	Dilution Factor	=	Sample Conc.
Boron				x		=	ppm
Chloride				x		=	ppm
pH							

Performed By	Date
Reviewed By	Date

MAJOR TASK:

Prepare and Analyze PASS Dissolved Gas Sample(s).

SPECIFIC TASKS:		HOW:	INITIALS
1.	Upon return from PASS Sample Station, place gas syringe behind shielding in fume hood.		_______
2.	Transfer required TAB F data to Attachment A, Dissolved Gas Analysis.		_______
3.	Determine contact dose rate of gas syringe.	3a. Obtain contact dose rate (closed window) on gas syringe. Record on Attachment A.	_______
4.	Determine gas concentrations of undiluted sample by gas chromatograph, if requested by Chemistry Coordinator. Perform all sample preparations in fume hood.	4a. Inject applicable volume of sample into gas chromatograph and analyze in accordance with CH-CC-040, Hydrogen By GC. (1) Install clean needle on locked dissolved gas syringe, if not performed previously. (2) Insert needle into appropriate septum of gas chromatograph. (3) Push green button in to unlock syringe. (4) Push plunger into syringe 0.5 cc or other appropriate volume, and start analysis on gas chromatograph. (5) Push red button in to lock syringe and remove from gas chromatograph.	_______
		4b. Record analysis results, analysis date and time, and CTE Number on Attachment A.	_______
5.	Determine Total Dissolved Gas Concentration, Hydrogen Dissolved Gas Concentration, and Oxygen Dissolved Gas Concentration.	5a. Perform calculations in accordance with Attachment A using Initial and Final Gas Sample Pressures from PI-662.	_______

SPECIFIC TASKS:	HOW:	INITIALS
	5b. Record results on Attachment A.	______
6. Prepare sample for isotopic analysis.	6a. Determine dilution(s) required to obtain 14.7 cc gas vial < 5.0 mR/hr. Perform all sample preparations in fume hood.	

Syringe Dose Rate – mR/hr	Dilution(s)	Dilution Factor	Vial(s)
0-70	1:14.7	14.7	1
70-1000	1:14.7 & 1:15.7	231	2
1000-15000	1:14.7, 1:15.7 & 1:15.7	3623	3

6b. Prepare and label dilution vials by adding consecutive letters to the sample number. ______

6c. Using a clean gas tight syringe, remove 1 cc of air from each new gas vial. ______

6d. For a 0-70mR/hr dose rate, transfer 1 cc of dissolved gas sample into a partially evacuated gas vial as follows:

(1) Ensure red button is pushed in to lock dissolved gas syringe. Install clean needle on locked syringe, if not installed previously.

(2) Insert dissolved gas syringe needle into septum of partially evacuated gas vial.

(3) Push green button in to unlock syringe.

(4) Push plunger 1.0 cc into syringe.

(5) Push red button in to lock syringe. Remove syringe from gas vial septum. ______

SPECIFIC TASKS:	HOW:	INITIALS
	6e. For a 70-100mR/hr dose rate, using a clean gas tight syringe, remove 1 cc from the first (A) dilution vial and inject into the second (B) dilution vial.	______
	6f. For a 1000-15000 mR/hr dose rate, using a clean gas tight syringe, remove 1 cc from second (B) dilution vial and inject it into the third (C) dilution vial.	______
	6g. Record sample number, dilution(s) performed, and dilution factor on Attachment A for each vial prepared.	______
	6h. Record contact dose rate (closed window) on Attachment A for each vial prepared.	______
	6i. Store original sample and all dilution(s) except one to be analyzed in lead brick storage cave in fume hood of Sample Prep Room.	______
	6j. Wrap final dilution in clean plastic film and transfer to Counting Room for analysis.	______
7. Perform isotopic analysis on sample < 5.0 mR/hr in accordance with CH-RC-076, Gamma Spectral Analysis Using the ND 9900.	7a. Determine corrected vial volume (after dilution) for isotopic analysis. (1) Record on Attachment A. (2) Enter corrected vial volume as actual sample volume for gamma spectroscopy analysis.	______
	7b. Decay correct sample to time of collection.	______
	7c. Record Analysis Date/Time and CTE Number on Attachment A.	______
	7d. Attach printout of isotopic analysis to Attachment A.	______

SPECIFIC TASKS:	HOW:	INITIALS
	7e. Notify Chemistry Coordinator of analysis results.	______
8. At completion of analysis, place sample in lead brick storage cave in fume hood of Sample Prep Room.		______

ATTACHMENT A

DISSOLVED GAS SAMPLE ANALYSIS

I. DISSOLVED GAS SAMPLE ANALYSIS

Sample Source	Sample Date/Time
Initial Sample Gas Pressure (P_o) PI-662 psia	Temperature TI-660 °F
Final Sample Gas Pressure (P_f) PI-662 psia	Contact Dose Rate mR/hr

II. GAS CHROMATOGRAPH ANALYSIS

Analysis Date/Time	CTE #	Tech
Hydrogen (C_H) %	Oxygen (C_O) %	Nitrogen %

III. DISSOLVED GAS CONCENTRATIONS

Total Dissolved Gas Concentration:

$$C_T = MF_T \times [P_f - (1.05 \times P_o) - P_v]$$

$$= \_\_\_\_ \times [\_\_\_\_ - (1.05 \times \_\_\_\_) - \_\_\_\_]$$

$$= \_\_\_\_\_\_\_ \text{ scc/kg}$$

WHERE:

C_T = Total Dissolved Gas Concentration (scc/kg)
MF_T = Multiplication Factor for gas and liquid loop volumes
Unit 1: 6.33 Unit 2: 8.33
P_f = Final Sample Gas Pressure PI-662 (psia)
P_o = Initial Sample Gas Pressure PI-662 (psia)
P_v = Liquid vapor pressure of sample @ temperature TI-660 from Attachment B

Dissolved Hydrogen Concentration:

$$C_H = \frac{(MF_H) \times (\% H_2) \times (P_f)}{(\text{TI-660 °F} + 460)} = \frac{(\quad) \times (\quad) \times (\quad)}{(\_\_\_\_ + 460)}$$

$$= \_\_\_\_\_\_\_ \text{ scc/kg}$$

WHERE:

C_H = Dissolved Hydrogen Concentration (scc/kg)
MF_H = Multiplication Factor
Unit 1: 48.6 Unit 2: 63.31
$\%H_2$ = Percent hydrogen from gas chromatograph analysis
P_f = Final Sample Gas Pressure PI-662 (psia)
TI-660 = Temperature (°F) at TI-660

Attachment A

DISSOLVED GAS CONCENTRATIONS (continued)

III. DISSOLVED GAS CONCENTRATIONS, cont.

Dissolved Oxygen Concentration:

$$C_O = \frac{(MF_1) \times (\% O_2) \times (P_f)}{(T_f + 460)} - (MF_2 \times P_o)$$

$$= \frac{(\_\_\_) \times (\_\_\_) \times (\_\_\_)}{(\_\_\_ + 460)} - (\_\_\_ \times \_\_\_)$$

$$= \_\_\_\_\_\_ \text{ scc/kg}$$

WHERE:

C_O = Dissolved Oxygen Concentration (scc/kg)
MF_1 = Multiplication Factor
Unit 1: 53.5 Unit 2: 68.21
$\%O_2$ = Percent oxygen from gas chromatograph analysis
P_f = Final Sample Gas Pressure PI-662 (psia) from Tab F, step 12l
MF_2 = Multiplication Factor
Unit 1: 1.15 Unit 2: 1.59
P_o = Initial Sample Gas Pressure PI-662 (psia) from Tab F, step 12g
T_f = Temperature (°F) at TI-660 from Tab F, step 12l

IV. SAMPLE DILUTION FOR ISOTOPIC ANALYSIS

Sample	Dilution 1	Dilution 2	Dilution 3
Sample #			
Dil Factor	14.7	231	3623
Volume (cc)	1	6.37 E-2	4.06 E-3
Dose Rate			
Analysis Date/Time			CTE #

Performed By	Date
Reviewed By	Date

Attachment B

WATER VAPOR PRESSURE

Temperature (°F)	P_v (psia)	Temperature (°F)	P_v (psia)
60	0.2561	106	1.135
62	0.2749	108	1.203
64	0.2950	110	1.275
66	0.3163	112	1.351
68	0.3389	114	1.430
70	0.3629	116	1.513
72	0.3884	118	1.601
74	0.4155	120	1.693
76	0.4442	122	1.789
78	0.4746	124	1.890
80	0.5068	126	1.996
82	0.5409	128	2.107
84	0.5770	130	2.223
86	0.6152	132	2.345
88	0.6555	134	2.472
90	0.6981	136	2.605
92	0.7431	138	2.744
94	0.7906	140	2.889
96	0.8407	142	3.041
98	0.8936	144	3.200
100	0.9492	146	3.365
102	1.008	148	3.538
104	1.070	150	3.718

MAJOR TASK:

Prepare and Analyze PASS 14.7 cc Gas Sample(s).

SPECIFIC TASKS:		HOW:	INITIALS
1. Upon return from PASS Sample Station, place gas sample behind shielding in fume hood.			______
2. Transfer required TAB G data to Attachment A, 14.7 cc Gas Sample Analysis.			______
3. Determine and record (closed window) contact dose rate of gas vial on Attachment A.			______
4. Determine gas concentrations of undiluted sample by gas chromatograph, if requested by Chemistry Coordinator. Perform all sample preparations in fume hood.	4a.	Using gas tight syringe, inject 0.25 cc gas or other appropriate volume into gas chromatograph and analyze in accordance with CH-CC-040, Hydrogen By GC.	______
	4b.	Record analysis results, analysis date and time, and CTE Number on Attachment A.	______
5. Determine calculated volume of sample vial at standard temperature and pressure (STP) on Attachment A.	5a.	If gas chromatograph analysis was performed, determine calculated drywell concentrations of hydrogen, oxygen, and nitrogen on Attachment A.	______
	5b.	Notify Chemistry Coordinator of analysis results.	______
6. Prepare sample for isotopic analysis.	6a.	Determine dilution(s) required to obtain 14.7 cc gas vial < 5.0 mR/hr. Perform all sample preparations in fume hood.	

Vial Dose Rate – mR/hr	Dilution(s)	Dilution Factor	Vial(s)
0-5	Count as is	1	None
5-80	1:15.7	15.7	1
80-1200	1:15.7 & 1:15.7	246	2
1200-19000	1:15.7, 1:15.7 & 1:15.7	3870	3

SPECIFIC TASKS:	HOW:		INITIALS
	6b.	Prepare and label dilution vial(s), adding consecutive letters to the sample numbers.	_______
	6c.	Using clean gas tight syringe, remove 1 cc of air from each new gas vial.	_______
	6d.	Transfer 1 cc of gas sample into partially evacuated gas vial.	_______
	6e.	Perform successive dilutions from one vial to the next until gas vial dose rate of < 5.0 mR/hr is achieved.	_______
	6f.	Record sample number, dilution(s) performed, and dilution factor on Attachment A for each vial prepared.	_______
	6g.	Record contact dose rate (closed window) on Attachment A for each vial prepared.	_______
	6h.	Store original sample and all dilution(s) except one to be analyzed in lead brick storage cave in fume hood of Sample Prep Room.	_______
	6i.	Wrap final dilution in clean plastic film and transfer to Counting Room for analysis.	_______
7. Perform isotopic analysis on sample < 5.0 mR/hr in accordance with CH-RC-076, Gamma Spectral Analysis Using the ND 9900.	7a.	Determine corrected vial volume (after dilution) for isotopic analysis using calculated sample volume at STP.	
		(1) Record on Attachment A.	
		(2) Enter corrected vial volume as actual sample volume for gamma spectroscopy analysis.	_______
	7b.	Decay correct sample to time of collection.	_______
	7c.	Record Analysis Date/Time and CTE Number on Attachment A.	_______

SPECIFIC TASKS:	HOW:	INITIALS
	7d. Attach printout of isotopic analysis to Attachment A.	______
	7e. Notify Chemistry Coordinator of analysis results.	______
8. At completion of analysis, place sample in lead brick storage cave in fume hood of Sample Prep Room.		______

Attachment A
14.7 cc GAS SAMPLE ANALYSIS

I. 14.7 cc GAS SAMPLE ANALYSIS

Sample Source: ______________________	
Sample Date/Time: __________/__________	
Initial Sample Gas Pressure (P_o) PI-708:	________ psia
Temperature TI-724 (T):	________ °F
Final Sample Gas Pressure (P_f) PI-708:	________ psia

GAS CHROMATOGRAPH ANALYSIS

Analysis Date/Time	CTE #	Tech
Hydrogen (C_H) %	Oxygen (C_O) %	Nitrogen (C_N) %

Calculated Sample Volume @ STP:

$$\text{Sample Vol @ STP} = \frac{[(P_f - P_o) \times (14.7\ cc) \times (492^\circ R)]}{(T + 460^\circ R) \times (14.7\ psia)}$$

$$\text{Sample Vol @ STP} = \frac{[(\_\_\_ - \_\_\_) \times (492)]}{(\_\_\_ + 460)}$$

$$= \_\_\_\_\_\_\ cc\ @\ STP$$

CALCULATED GAS CONCENTRATIONS
(Corrected for air remaining in evacuated vial)

Calculated Drywell Hydrogen Concentration:

$$\text{Drywell } H_2 \text{ Conc (\%)} = C_H \times \frac{14.7\ cc}{\text{Sample Vol @ STP}}$$

$$\text{Drywell } H_2 \text{ Conc (\%)} = \_\_\_\_\_\_ \times \frac{14.7}{(\_\_\_\_\_\_)}$$

$$= \_\_\_\_\_\_\_\_\ \%\ H_2$$

Attachment A
14.7 CC GAS SAMPLE ANALYSIS (continued)

Calculated Oxygen Concentration:

$$\text{Drywell } O_2 \text{ Conc (\%)} = \left[C_O - \frac{(14.7\text{ cc} - \text{Sample Vol @ STP}) \times 21\%}{14.7\text{ cc}} \right] \times \frac{14.7\text{ cc}}{\text{Sample Vol @ STP}}$$

$$\text{Drywell } O_2 \text{ Conc (\%)} = \left[\_\_\_\_ - \frac{(14.7 - \quad) \times 21}{14.7} \right] \times \frac{14.7}{(\_\_\_\_)}$$

$$= \_\_\_\_\_\_\_\_ \% \ O_2$$

Calculated Nitrogen Concentration:

$$\text{Drywell } N_2 \text{ Conc (\%)} = \left[C_N - \frac{(14.7\text{ cc} - \text{Sample Vol @ STP}) \times 78.1\%}{14.7\text{ cc}} \right] \times \frac{14.7\text{ cc}}{\text{Sample Vol @ STP}}$$

$$\text{Drywell } N_2 \text{ Conc (\%)} = \left[\_\_\_\_ - \frac{(14.7 - \quad) \times 78.1}{14.7} \right] \times \frac{14.7}{(\_\_\_\_)}$$

$$= \_\_\_\_\_\_\_\_ \% \ N_2$$

II. SAMPLE DILUTION FOR ISOTOPIC ANALYSIS

Sample	Original	Dilution 1	Dilution 2	Dilution 3
Sample #				
Dil Factor	1	15.7	246	3870
Dose Rate				
Analysis Date/Time			CTE #	

Corrected Sample Vial Volume Following Dilution: (for isotopic analysis only)

$$\text{Volume}_{isotopic} = \frac{\text{Sample Vol @ STP}}{\text{Dil Factor}} = \frac{\_\_\_\_\_\_}{(\_\_\_\_\_\_)}$$

$$\text{Volume}_{isotopic} = \_\_\_\_\_\_ \text{ cc}$$

Performed By	Date
Reviewed By	Date

MAJOR TASK:

Prepare and Analyze PASS Particulate and Iodine Sample(s).

SPECIFIC TASKS:		HOW:		INITIALS
1.	Upon return from PASS Sample Station, place cartridge retainer behind shielding in fume hood.			______
2.	Transfer required TAB H data to Attachment A, Particulate/Iodine Sample Analysis.			______
3.	Perform pre-analysis sample preparation in fume hood.	3a.	Disassemble cartridge retainer.	______
		3b.	Obtain contact dose rate (closed window) on particulate filter and iodine cartridge(s). Record sample number and dose rate of each on Attachment A.	______
		3c.	Place particulate filter in Petri dish and wrap in clean plastic film.	______
		3d.	Wrap cartridge(s) in clean plastic film.	______
		3e.	Transfer samples to Counting Room for analysis.	______
4.	Perform isotopic analysis on particulate filter and each cartridge.	4a.	Determine sample volume for isotopic analysis. (1) Record on Attachment A. (2) Enter sample volume for gamma spectroscopy analysis.	______
		4b.	Analyze iodine cartridges in accordance with CH-RC-071, Radiochemical Analysis of High Activity Iodine Cartridge Samples.	______
		4c.	Analyze particulate filter in accordance with CH-RC-016, Particulate Filter Analysis.	______
		4d.	Record Analysis Date/Time and Standardization Number of each sample on Attachment A.	______

SPECIFIC TASKS:	HOW:		INITIALS
	4e.	Record activities of iodine isotopes from gamma spectroscopy analysis of each cartridge.	______
	4f.	Determine total activity of each iodine isotope from all cartridges and record on Attachment A.	______
	4g.	Attach printouts of all isotopic analyses to Attachment A.	______
	4h.	Notify Chemistry Coordinator of analysis results.	______
5. At completion of analysis, place samples in lead brick storage cave in fume hood of Sample Prep Room.			______

Attachment A

PARTICULATE/IODINE SAMPLE ANALYSIS

I. PARTICULATE/IODINE SAMPLE ANALYSIS

Sample Source	Sample Date/Time
Total Sample Time sec	

II. SAMPLE DILUTION/RESULTS

Particulate/Iodine Sample Volume:

$$\text{Volume} = \frac{(3\text{ L/min orifice flow}) \times (\text{Total Sample Time in sec}) \times (1000\text{ cc/L})}{60\text{ sec/min}}$$

= (50 cc/sec) x ______ sec = _______ cc

Sample	Particulate	Cartridge #1	Cartridge #2	Cartridge #3
Sample #				
Analysis Date/Time				
Dose Rate (mR/hr)				
CTE #				
Tech				

Cartridge	I-131	I-132	I-133	I-134	I-135
#1					
#2					
#3					
Total μ Ci/cc					

Performed By	Date
Reviewed By	Date

MAJOR TASK:

Collect Samples(s) from Post-Accident Vent Sampling System (PAVSS) on Turbine 729' El.

SPECIFIC TASKS:		HOW:	INITIALS
NOTE: **If at any time while monitoring dose rates especially when opening sample inlet, dose rates exceed 1000 mR/hr general area GO TO step 15a in order to secure sample flow.**			
1. Ensure flow totalizers on appropriate PAVSS have been reset prior to sampling.	1a.	Contact I&C to reset the totalizer(s) by pulling and reinstalling the fuse(s).	______
2. After briefing and assignment, obtain necessary equipment.	2a.	Obtain the following supplies: ____ Respiratory protection devices ____ Hi-range and extremity dosimetry ____ Survey meter ____ Gas sample container (Nominal 75 cc) ____ Particulate filters ____ Silver zeolite cartridges ____ Plastic bags ____ Tygon tubing as necessary for proper connections ____ Remote handling tongs ____ Large blade screwdriver with long handle ____ Adjustable wrench ____ 2 pairs of 16-inch channel locks ____ 11/16" deep socket ____ Rachet wrench ____ Noble gas quick disconnects ____ Stopwatch ____ Calculator ____ 5' x 5' plastic sheet ____ Sample cask for gas container ____ Tweezers	______
3. Perform instrument checks on survey meter.	3a.	Check the following on survey meter: ____ Calibration has not expired. ____ Battery indication is good. ____ Source check is satisfactory.	______

SPECIFIC TASKS:		HOW:	INITIALS
4. Don protective clothing and respiratory protection as directed by Radiation Protection Coordinator.			______
5. Ensure each team member present has required dosimetry.			
6. Ensure survey meter is on highest range.			
7. Notify Chemistry Coordinator before leaving Chemistry Lab.	7a.	Ensure appropriate PAVSS has been initialized.	______
	7b.	Ensure corresponding SPING has been placed in STANDBY.	______
8. Proceed to PAVSS on Turbine Building 729' Elevation via best route while continuously monitoring radiation levels and status of CAMs and ARMs.		**NOTE:** **Attachment A may be reviewed for location and configuration of PAVSS.**	
	8a.	Retreat to low background area and notify Chemistry Coordinator if any of the following conditions are encountered: (1) General area radiation levels exceed 1,000-mrem/hr at any time. (2) Total annual whole body (TEDE) exposure approaches 2000 mrem.	______
9. At PAVSS, check area radiation levels and notify Chemistry Coordinator.	9a.	PAVSS general area radiation level: ______________ mR/hr	______
		NOTE: **X in panel and switch designations denotes specific PAVSS system. X = 0 for Standby Gas Treatment System (SGTS), 1 for Unit 1 Turbine Building (TB1), and 2 for Unit 2 Turbine Building (TB2). Attachments B and C may be reviewed for illustrations of PAVSS panels, as required.**	

SPECIFIC TASKS:	HOW:	INITIALS
	9b. Survey front of PAVSS control panels, noble gas monitors, and shielded sample carts. Panel 0C259 - Standby Gas Treatment Panel 1C259 - Unit 1 Turbine Building Vent Panel 2C259 - Unit 2 Turbine Building Vent	______
	9c. Ensure the following supplies are at PAVSS location: ____1 pair of 3' long steel lifting bars ____2 pairs of S-hooks	______
	9d. Notify Chemistry Coordinator of radiation levels.	______
10. Perform valve lineups to establish isokinetic flow through PAVSS.	**NOTE:** **Attachment D may be reviewed for diagrams of particulate/iodine filter assembly and sample cart, as required.**	
	10a. Remove installed sample cart, if necessary, by disconnecting inlet and outlet disconnects between sample cart and control panel.	______
	10b. Ensure particulate filter and silver zeolite cartridge are installed in sample cart to be used.	______
	10c. Position sample cart under appropriate PAVSS control panel.	______
	NOTE: **Sample lines will be crossed in front of cart after completing next two steps.**	
	(1) Connect inlet sample line on left side of skid to inlet connection on right side of sample cart.	

SPECIFIC TASKS:	HOW:	INITIALS
	(2) Connect outlet sample line on right side of skid to outlet connection on left side of sample cart.	
	(3) Lightly pull disconnects to ensure fittings are properly mated.	______
	10d. Ensure Sample System Power Switch HS-X6560 on appropriate PAVSS control panel is ON. White light should illuminate.	______
	10e. Secure sample cart and confirm the following valve positions for the appropriate PAVSS sampling station:	
	(1) Sample Cart Isolation Valves are OPEN (parallel to tubing): SGTS: 0-65-032 OPEN 0-65-033 OPEN TB1: 1-65-038 OPEN 1-65-039 OPEN TB2: 2-65-004 OPEN 2-65-005 OPEN	______
	(2) Valves between control panel and sample cart are OPEN: SGTS: 0-65-022 OPEN 0-65-029 OPEN 0-65-031 OPEN TB1: 1-65-029 OPEN 1-65-035 OPEN 1-65-037 OPEN TB2: 2-65-010 OPEN 2-65-022 OPEN 2-65-024 OPEN	______

SPECIFIC TASKS:	HOW:	INITIALS
	(3) Sample Cart Bypass Valve is CLOSED: SGTS: 0-65-030 CLOSED TB1: 1-65-036 CLOSED TB2: 2-65-023 CLOSED	______
	(4) Sample Inlet Valve is OPEN: SGTS: 0-65-021 OPEN TB1: 1-65-027 OPEN TB2: 2-65-009 OPEN	______
	(5) Atmospheric Test Valve is CLOSED: SGTS: 0-65-017 CLOSED TB1: 1-65-019 CLOSED TB2: 2-65-016 CLOSED	______
	(6) Sample Return Valve is OPEN: SGTS: 0-65-018 OPEN TB1: 1-65-022 OPEN TB2: 2-65-008 OPEN	______
	(7) Noble Gas Mon Out Valve between grab sample ports on noble gas monitor skid is OPEN: SGTS: 0-65-026 OPEN TB1: 1-65-032 OPEN TB2: 2-65-017 OPEN	______

SPECIFIC TASKS:	HOW:	INITIALS
	(8) Noble Gas Grab Sample Inlet and Outlet Valves are CLOSED: SGTS: 0-65-027 CLOSED 0-65-028 CLOSED TB1: 1-65-033 CLOSED 1-65-034 CLOSED TB2: 2-65-018 CLOSED 2-65-019 CLOSED	_______
	10f. Ensure filter monitor plugs are in place on sample cart.	_______
11. Isolate sample flow to affected SPING by shutting off sample pump on Reactor Building 818' El. and closing sample line. Start sample flow to appropriate PAVSS panel.	11a. Turn Man. Isolation Switch HS-X6562 on appropriate PAVSS control panel to CLOSE. Red light above hand switch should go OFF and amber light should illuminate.	_______
	11b. Turn Man. System Init. HS-X6561 on appropriate PAVSS control panel to RUN to open sample line to PAVSS and start PAVSS pump. (1) Sample Pump Iso Vlv SV-X6561 amber light should go OFF and red light should illuminate. (2) Sample Pump XP261 (TB1/2) or Sample Pump 0P561 (SGTS) amber light should go OFF and red light should illuminate.	_______

SPECIFIC TASKS:	HOW:	INITIALS
12. Flush sample lines for a minimum of three sample line volumes.	**NOTE:** **Sample cart must be in place during all valve adjustments and sample line flushes. At completion of valve adjustments and sample line flushes, sample cart will be removed and particulate/iodine filter assembly replaced or new sample cart installed before collecting grab sample.**	
	12a. **If taking an SGTS vent sample,** perform the following:	
	(1) Adjust Rad Smpl Control Valve 0-65-023 until Radiation Sample Velocity FI-06560A is within ± 20% of Stack Velocity FI-06562A.	
	(2) Observe Radiation Sample Flow (CFM) FI-06560B to estimate average flow.	
	(3) Record start date and time of sample flush.	
	SGTS Flush Start Date/Time: ________/________	
	(4) Flush system for approximately 5 minutes at 1 cfm or equivalent volume.	

SPECIFIC TASKS: **HOW:** **INITIALS**

(5) GO TO appropriate step. ________

Sample to be Taken	Action
Collect Particulate/Iodine Sample and Noble Gas Sample.	GO TO Step 13. Step 13 may be performed during sample line flush.
Collect Noble Gas Sample only.	GO TO Step 14.
Place PAVSS on line. No Sample Collection.	Return to In-plant Chemistry Lab.

12b. **If taking TB1 or TB2 vent sample,** perform the following:

(1) Adjust Total Smpl Control Valve for the appropriate sampling station until Total Sample Velocity FI-X6561A is within ± 20% of Stack Velocity FI-X6562A.

Vent	Total Smpl Control Valve
TB1	1-65-030
TB2	2-65-011

(2) Observe Total Sample Flow (CFM) FI-X6561B to estimate average flow.

(3) Adjust Radiation Smpl Control Valve for the appropriate sampling station until Radiation Sample Velocity FI-X6560A is within ± 20% of Total Sample Velocity FI-X6561A.

Vent	Radiation Smpl Control Valve
TB1	1-65-031
TB2	2-65-012

SPECIFIC TASKS:	HOW:	INITIALS
	(4) Record start date and time of sample flush. TB1/2 Flush Start Date/Time: ________/________	
	(5) Flush system for approximately 5 minutes at 1 cfm or equivalent volume.	
	(6) GO TO appropriate step.	_______

Sample to be Taken	Action
Collect Particulate/Iodine Sample and Noble Gas Sample.	GO TO Step 13. Step 13 may be performed during sample line flush.
Collect Noble Gas Sample only.	GO TO Step 14.
Place PAVSS on line. No Sample Collection.	Return to In-plant Chemistry Lab.

SPECIFIC TASKS:	HOW:	INITIALS
13. Determine optimum sample time for particulate/iodine grab sample.	13a. Determine time, in hours, since reactor shutdown. Time since shutdown: ______ hours	_______
	13b. Refer to Attachment E to estimate noble gas to iodine ratio for specified time since shutdown. NG/I Ratio: ________________	_______
	13c. Turn Channel Selector thumbwheel on appropriate Eberline Display Panel across from noble gas monitor skid to 01 to obtain current Mid-Range noble gas concentration. Mid-Range (01): __________ µCi/cc	_______

SPECIFIC TASKS:	HOW:	INITIALS
	13d. If current Mid-Range noble gas concentration is > 7.80 E +01 µCi/cc, turn Channel Selector thumbwheel to 02 to obtain current High-Range noble gas concentration. High-Range (02): ________ µCi/cc	________
	13e. Obtain the following readings from appropriate PAVSS control panel and record. (1) Radiation Sample Flow FI-X6560B (CFM): ____________ cfm (2) **SGTS** Stack Flow FI-X06562B (CFM): _______ x 10 = _______ cfm (3) **TB1** or **TB2** Stack Flow FI-X6562B (CFM): _______ x 100 = _______ cfm	________
	13f. Determine minimum sample time (minutes) of particulate/iodine grab sample by:	

$$ST = \frac{(2.45\ E\ \text{-}2) \times (NG{:}I\ Ratio)}{(NG\ Conc) \times (Sample\ Flow)}$$

$$= \frac{(2.45\ E\ \text{-}2) \times (\_\_\_\_\_\_\_\_)}{(\_\_\_\_\_\_\ \mu Ci/cc) \times (\_\_\_\_\_\_\ cfm)}$$

= ______ minutes

SPECIFIC TASKS:	HOW:	INITIALS
	WHERE:	
	ST = Sample time in seconds	
	NG:I Ratio = Noble gas to iodine ratio from Attachment E based on specified time since shutdown	
	NG Conc = Noble gas concentration (µCi/cc) from Step 13c or 13d	
	Sample Flow = Radiation Sample Flow FI-X6560B (CFM) from Step 13e.(1).	_______
	In Step 15e(4), record the Sample Length to be used as the greater of the time calculated above or 2 minutes.	
14. Obtain noble gas grab sample from vent. If NOT obtaining noble gas grab sample from vent, GO TO Step 15.	14a. Attach gas sample container to local connections for appropriate system on noble gas monitor skid. Ensure stopcocks on gas container are OPEN.	_______
	14b. Position the following valves for the appropriate system in the order shown to collect noble gas grab sample:	
	SGTS V-2 (0-65-027) OPEN	_______
	V-3 (0-65-028) OPEN	_______
	V-1 (0-65-026) CLOSED	_______
	TB1 V-2 (1-65-033) OPEN	_______
	V-3 (1-65-034) OPEN	_______
	V-1 (1-65-032) CLOSED	_______
	TB2 V-2 (2-65-018) OPEN	_______
	V-3 (2-65-019) OPEN	_______
	V-1 (2-65-017) CLOSED	_______

SPECIFIC TASKS:	HOW:	INITIALS
	14c. Allow sample to flow through gas sample container for 2 minutes to ensure representative sample.	_______
	14d. Position the following valves for the appropriate system <u>in the order shown</u> to secure noble gas grab sample:	
	SGTS V-1 (0-65-026) OPEN	_______
	V-2 (0-65-027) CLOSED	_______
	V-3 (0-65-028) CLOSED	_______
	TB1 V-1 (1-65-032) OPEN	_______
	V-2 (1-65-033) CLOSED	_______
	V-3 (1-65-034) CLOSED	_______
	TB2 V-1 (2-65-017) OPEN	_______
	V-2 (2-65-018) CLOSED	_______
	V-3 (2-65-019) CLOSED	_______
	14e. Close gas outlet stopcock connected to V-2 followed by gas inlet stopcock connected to V-3 to secure sample.	_______
	14f. Record noble gas grab sample date and time. Noble Gas Sample Date/Time: _______/_______	_______
	14g. Obtain contact dose rate (closed window) on noble gas grab sample. Noble Gas Grab Sample Dose Rate: ____________ mR/hr	_______
	14h. Place noble gas grab sample in plastic bag and seal.	_______
	14i. Transfer to sample cask for transport to In-Plant Chemistry Lab.	_______

SPECIFIC TASKS:	HOW:				INITIALS
15. Obtain particulate/iodine grab sample from vent. If NOT obtaining particulate/iodine grab sample from vent, GO TO Step 17.	15a. Perform the following valve lineups on appropriate sampling station to secure sample cart used during flush of particulate/iodine sample lines:				
	(1) Open Atmospheric Test Valve:				
		SGTS:	0-65-017	OPEN	_______
		TB1:	1-65-019	OPEN	_______
		TB2:	2-65-016	OPEN	_______
	(2) Close Sample Inlet Valve:				
		SGTS:	0-65-021	CLOSED	_______
		TB1:	1-65-027	CLOSED	_______
		TB2:	2-65-009	CLOSED	_______
	(3) Open Sample Cart Bypass Valve:				
		SGTS:	0-65-030	OPEN	_______
		TB1:	1-65-036	OPEN	_______
		TB2:	2-65-023	OPEN	_______
	(4) Close valves between control panel and sample cart:				
		SGTS:	0-65-032	CLOSED	_______
			0-65-031	CLOSED	_______
		TB1:	1-65-035	CLOSED	_______
			1-65-037	CLOSED	_______
		TB2:	2-65-022	CLOSED	_______
			2-65-024	CLOSED	_______
	(5) Close Sample Cart Isolation Valves (perpendicular to tubing):				
		SGTS:	0-65-032	CLOSED	_______
			0-65-033	CLOSED	_______

SPECIFIC TASKS:	HOW:			INITIALS
	TB1:	1-65-038	CLOSED	_______
		1-65-039	CLOSED	_______
	TB2:	2-65-004	CLOSED	_______
		2-65-005	CLOSED	_______

15b. Disconnect inlet and outlet disconnects between control panel and sample cart. Remove sample cart from PAVSS control panel and mark with tape to indicate cart has been used for sample flush. _______

15c. Install new sample cart by performing the following:

(1) Ensure particulate filter and silver zeolite cartridge are installed in new sample cart to be used. _______

(2) Position new sample cart under appropriate PAVSS control panel. _______

NOTE:
Sample lines will be crossed in front of cart after completing next two steps.

(3) Connect inlet sample line on left side of skid to inlet connection on right side of sample cart. _______

(4) Connect outlet sample line on right side of skid to outlet connection on left side of sample cart. _______

(5) Lightly pull disconnects to ensure fittings are properly mated. _______

SPECIFIC TASKS:	HOW:	INITIALS

15d. Secure sample cart and perform the following valve lineups for the appropriate PAVSS sampling station to establish sample flow:

(1) Open Sample Cart Isolation Valves (parallel to tubing):

SGTS:	0-65-032	OPEN	_______
	0-65-033	OPEN	_______
TB1:	1-65-038	OPEN	_______
	1-65-039	OPEN	_______
TB2:	2-65-004	OPEN	_______
	2-65-005	OPEN	_______

(2) Open valves between control panel and sample cart:

SGTS:	0-65-029	OPEN	_______
	0-65-031	OPEN	_______
TB1:	1-65-035	OPEN	_______
	1-65-037	OPEN	_______
TB2:	2-65-022	OPEN	_______
	2-65-024	OPEN	_______

(3) Close Sample Cart Bypass Valve:

SGTS:	0-65-030	CLOSED	_______
TB1:	1-65-036	CLOSED	_______
TB2:	2-65-023	CLOSED	_______

15e. The following steps require timing. Read and understand steps 15e through 15h before proceeding. Steps 15e(1) through 15e(4) need to be performed simultaneously.

(1) Open Sample Inlet Valve for appropriate sampling station:

SGTS:	0-65-021	OPEN	_______

SPECIFIC TASKS:	HOW:	INITIALS
	TB1: 1-65-027 OPEN	______
	TB2: 2-65-009 OPEN	______
	(2) Close Atmospheric Test Valve for appropriate sampling station:	
	SGTS: 0-65-017 CLOSED	______
	TB1: 1-65-019 CLOSED	______
	TB2: 2-65-016 CLOSED	______
	(3) Press Radiation Sample Flow printer switch HS-X6560-1 on appropriate PAVSS control panel.	______
	(4) Using stopwatch, begin timing sequence. Collect sample for length of time as determined in Step 13f.	
	Sample Length _____ minutes	______
	(5) Confirm sample flow is <u>approximately</u> 20% of Stack Flow to maintain isokinetic flow. Adjust sample valve for appropriate sampling station, as required.	______

Vent	Radiation Smpl Control Valve
SGTS	0-65-023
TB1	1-65-031
TB2	2-65-012

15f. Record particulate/iodine grab sample start date and time.

Particulate/Iodine Sample Start Date/Time: ________/________ ______

SPECIFIC TASKS:	HOW:	INITIALS
	15g. The following 3 steps should be performed simultaneously to secure particulate/iodine grab sample. Read and understand before proceeding:	
	(1) Open Atmospheric Test Valve for appropriate sampling station:	
	SGTS: 0-65-017 OPEN	______
	TB1: 1-65-019 OPEN	______
	TB2: 2-65-016 OPEN	______
	(2) Close Sample Inlet Valve for appropriate sampling station:	
	SGTS: 0-65-021 CLOSED	______
	TB1: 1-65-027 CLOSED	______
	TB2: 2-65-009 CLOSED	______
	(3) Press Radiation Sample Flow printer switch HS-X6560-1 on appropriate PAVSS control panel.	______
	15h. Record particulate/iodine grab sample stop date and time.	
	Particulate/Iodine Sample Stop Date/Time: ________/________	______
	15i. Remove printer tape from Radiation Sample Totalized Flow FR-X6560 and record the following:	
	Final Totalized Sample Flow:____ft^3	
	Initial Totalized Sample Flow:____ft^3	______

SPECIFIC TASKS:	HOW:	INITIALS

15j. Secure sample cart with particulate/iodine grab sample by performing the following valve lineups for the appropriate PAVSS sampling station:

(1) Open Sample Cart Bypass Valve:

SGTS:	0-65-030	OPEN	_______
TB1:	1-65-036	OPEN	_______
TB2:	2-65-023	OPEN	_______

(2) Close valves between control panel and sample cart:

SGTS:	0-65-029	CLOSED	_______
	0-65-031	CLOSED	_______
TB1:	1-65-035	CLOSED	_______
	1-65-037	CLOSED	_______
TB2:	2-65-022	CLOSED	_______
	2-65-024	CLOSED	_______

(3) Close Sample Cart Isolation Valves (perpendicular to tubing) to isolate filter assembly during transport:

SGTS:	0-65-032	CLOSED	_______
	0-65-033	CLOSED	_______
TB1:	1-65-038	CLOSED	_______
	1-65-039	CLOSED	_______
TB2:	2-65-004	CLOSED	_______
	2-65-005	CLOSED	_______

(4) Disconnect inlet and outlet disconnects between control panel and sample cart. Remove cart from PAVSS control panel. _______

SPECIFIC TASKS:	HOW:	INITIALS
16. Install original sample cart under appropriate PAVSS control panel.	16a. Position original sample cart under appropriate PAVSS control panel unless dose rates on sample cart are excessive.	
	NOTE: **Sample lines will be crossed in front of cart after completing next two steps.**	
	(1) Connect inlet sample line on left side of skid to inlet connection on right side of sample cart.	
	(2) Connect outlet sample line on right side of skid to outlet connection on left side of sample cart.	
	(3) Lightly pull disconnects to ensure fittings are properly mated.	______
	16b. Secure sample cart and perform the following valve lineups for the appropriate PAVSS sampling station:	
	(1) Open Sample Cart Isolation Valves (parallel to tubing):	
	SGTS: 0-65-032 OPEN	______
	0-65-033 OPEN	______
	TB1: 1-65-038 OPEN	______
	1-65-039 OPEN	______
	TB2: 2-65-004 OPEN	______
	2-65-005 OPEN	______
	(2) Open valves between control panel and sample cart:	
	SGTS: 0-65-029 OPEN	______
	0-65-031 OPEN	______
	TB1: 1-65-035 OPEN	______
	1-65-037 OPEN	______

SPECIFIC TASKS:	HOW:	INITIALS
	TB2: 2-65-022 OPEN	______
	2-65-024 OPEN	______
	(3) Close sample cart bypass valve:	
	SGTS: 0-65-030 CLOSED	______
	TB1: 1-65-036 CLOSED	______
	TB2: 2-65-023 CLOSED	______
	(4) Open Sample Inlet Valve for appropriate sampling station:	
	SGTS: 0-65-021 OPEN	______
	TB1: 1-65-027 OPEN	______
	TB2: 2-65-009 OPEN	______
	(5) Close Atmospheric Test Valve for appropriate sampling station:	
	SGTS: 0-65-017 CLOSED	______
	TB1: 1-65-019 CLOSED	______
	TB2: 2-65-016 CLOSED	______
17. Obtain contact dose rate on sample casks.	17a. Obtain contact dose rate on each sample cask.	
	(1) If contact dose rate exceeds 2.5 R/hr above background, exit area immediately.	
	(2) Record contact dose rate of each sample cask.	
	Noble Gas Sample Cask:____ mR/hr	
	Particulate/Iodine Cask:____ mR/hr	______
	17b. Remove sample cart to low traffic, low dose area.	______

SPECIFIC TASKS:		HOW:	INITIALS
18. Remove particulate/ iodine grab sample from sample cart, if applicable.	18a.	Lay sheet of approximately 5' x 5' plastic on floor near where sample cart lid will be disassembled.	______
	18b.	Place cart lid stand on plastic sheet.	______
		NOTE: **The following step requires two or more individuals to perform.**	

CAUTION

IF CONTACT DOSE RATE EXCEEDS 2.5 R/hr ABOVE BACKGROUND, EXIT AREA IMMEDIATELY.

	18c.	Remove nuts in sample cart lid. Using lift bars and S-hook lid attachments, carefully raise lid off sample cart. Maximize distance from filter assembly to reduce personnel exposure.	______
	18d.	Place cart lid on lid stand.	______
		NOTE: **Attachment D may be reviewed for diagram of sample cart interior and quick release assembly.**	
	18e.	Obtain contact dose rate (closed window) on filter assembly.	
		(1) Record contact dose rate on filter assembly. Filter Assembly: ______ mR/hr	______
	18f.	Release quick disconnect with large blade screwdriver and grab filter assembly with tongs to remove assembly from sample cart.	______

SPECIFIC TASKS:	HOW:	INITIALS
	18g. Using two pairs of 12 inch channel locks, separate filter assembly into halves. Remove iodine cartridge with tongs. (1) Place iodine cartridge in plastic bag and seal. (2) Obtain contact dose rate (closed window) on iodine cartridge and record. Iodine Cartridge: _____ mR/hr (3) Transfer cartridge to sample cask for transport to In-Plant Chemistry Lab. (4) Obtain contact dose rate on iodine sample cask and record. Iodine Cask: ________ mR/hr	_______
	18h. Remove particulate filter from separated filter assembly with tongs. (1) Place filter in plastic bag and seal. (2) Obtain contact dose rate (closed window) on particulate filter and record. Particulate Filter: _____ mR/hr (3) Transfer filter to sample cask for transport to Chemistry Lab. (4) Obtain contact dose rate on particulate filter sample cask and record. Filter Cask: ________ mR/hr	_______
19. Notify Chemistry Coordinator of sample and cask dose rates.		_______

SPECIFIC TASKS:	HOW:	INITIALS
20. If obtaining additional vent samples, perform the following:	20a. <u>GO TO</u> applicable TAB. **HELP** **SPING Sample(s)** **See TAB M** **HELP** **PAVSS Sample(s)** **See TAB N**	______
	20b. Notify Chemistry Coordinator to arrange transport of vent samples to lab by additional technician, if available.	______
21. If all vent sampling is complete, <u>GO TO</u> TAB P.		______

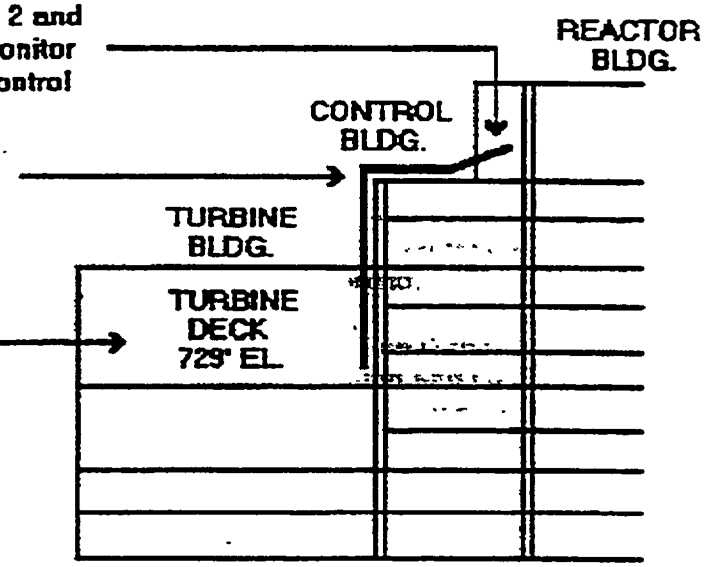
Attachment A

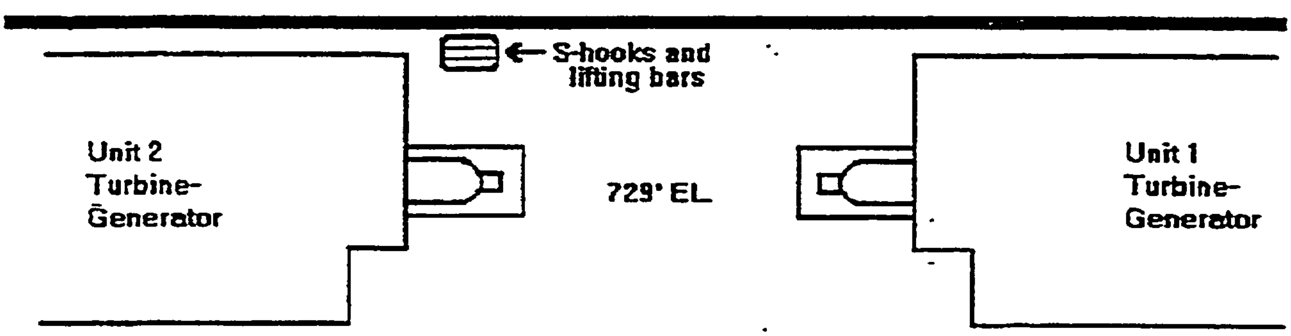
LOCATION OF PAVSS CONTROL PANELS AND NOBLE GAS MONITORS

1. Tie-in with existing Turbine Building 1 & 2 and Standby Gas Treatment System Vent Monitor sample lines in dead space between Control Structure and Reactor Building.

2. Sample lines are routed across roof of Control structure, down west side of Control structure through roof of Turbine Building.

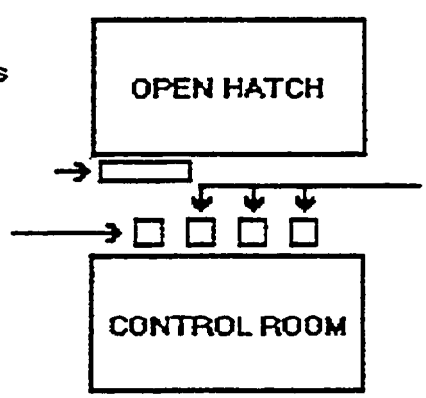
3. Down to Turbine Deck. 729' Elevation. where sampling and monitoring equipment is located as shown below.





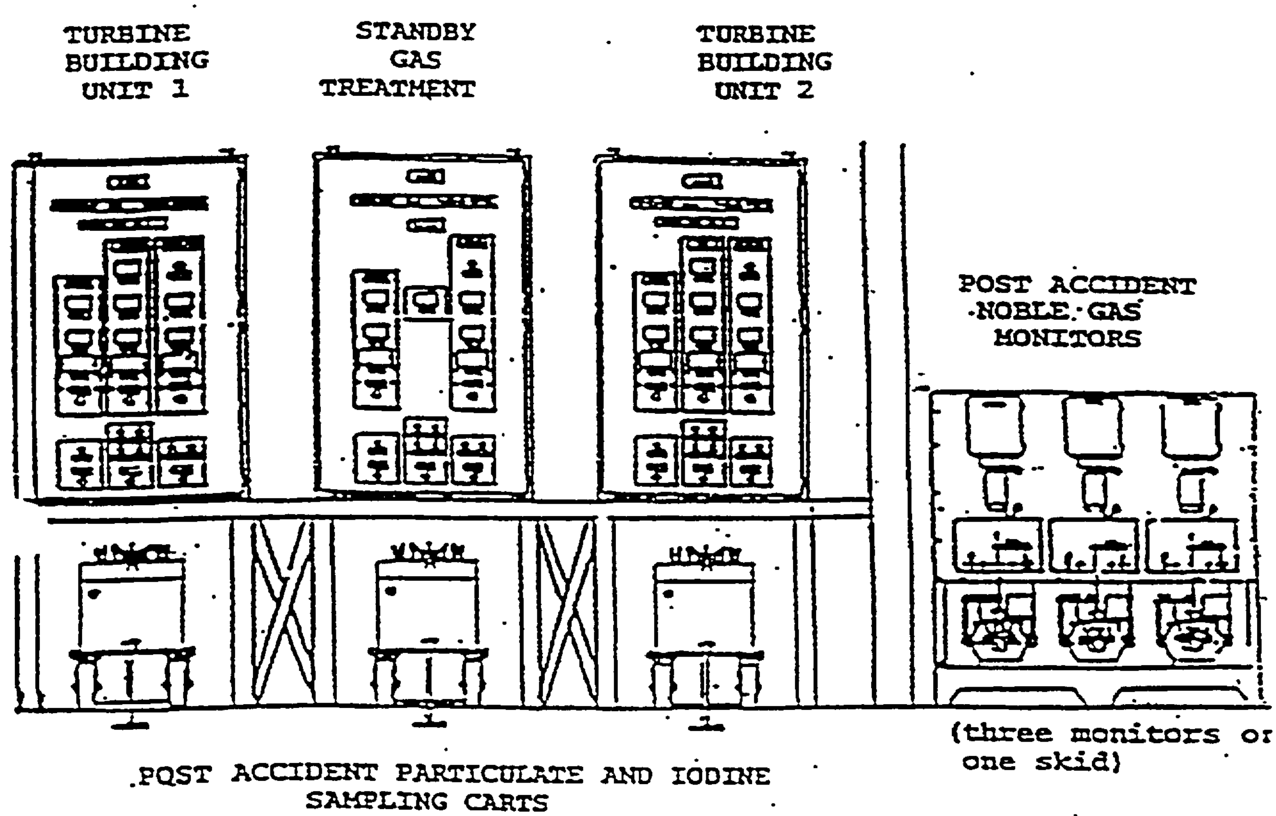
5. Eberline Display Panels relay noble gas data to SPING Terminals in Control Room and TSC.

6. Noble Gas Monitor with mid and high range detectors for each of three vents.



4. Air monitoring and control panels above shielded particulate/iodine sample carts.

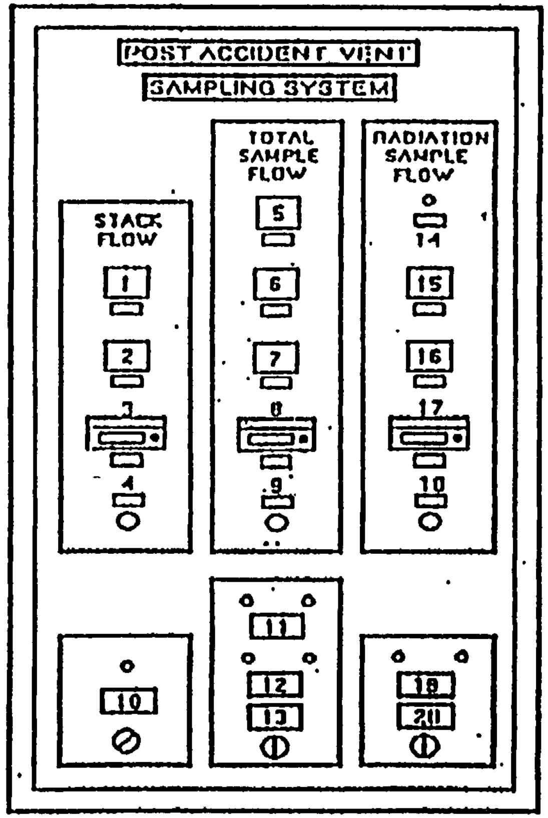
Attachment B
POST ACCIDENT VENT SAMPLING SYSTEM



Attachment C

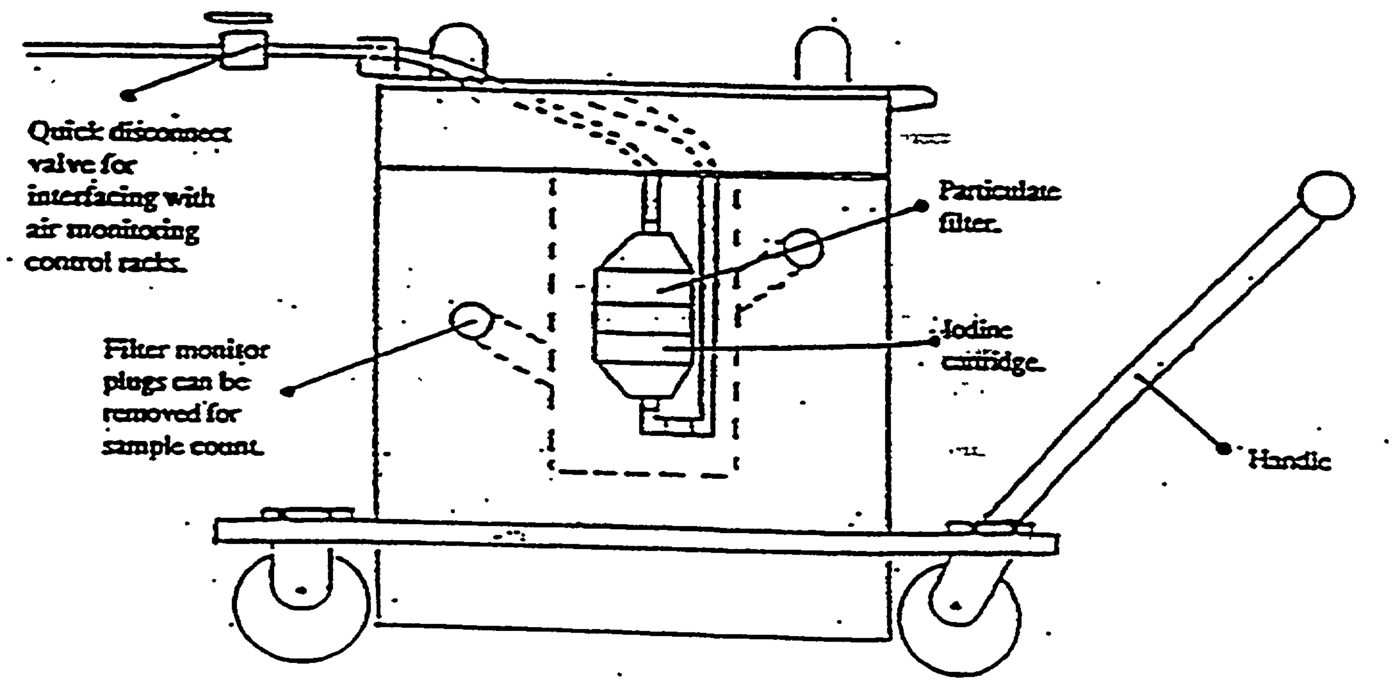
Panel 0C250 - Standby Gas Treatment System
Panel 1C250 - Unit 1 Turbine Building
Panel 2C269 - Unit 2 Turbine Building

1. Stack Flow - Velocity - FPM
   FI-X6562A
2. Stack Flow - CFM
   FI-X6562B - TB1/2 (CFM x 100)
   FI-065628 - SGTS (CFM x 10)
3. Stack Flow - Totalized Flow
   FR-X6562
4. Stack Flow - Printer Switch
   HS-X6562-1
5. Total Sample Flow - Temperature - F
   TI-X6561
6. Total Sample Flow - Velocity - FPM
   FI-X6561A
7. Total Sample Flow - CFM
   FI-X6561B
8. Total Sample Flow - Totalized Flow
   FR-X6561
9. Total Sample Flow - Printer Switch
   HS-X6561-1
10. Sample System Power
    HS-X6560
11. Sample Pump Iso Vlv
    SV-X6561
12. Sample Pump XP261 (TB1/2)
    Sample Pump 0P561 (SGTS)
13. Post Accident VSSS Man, System Init.
    HS-X6561



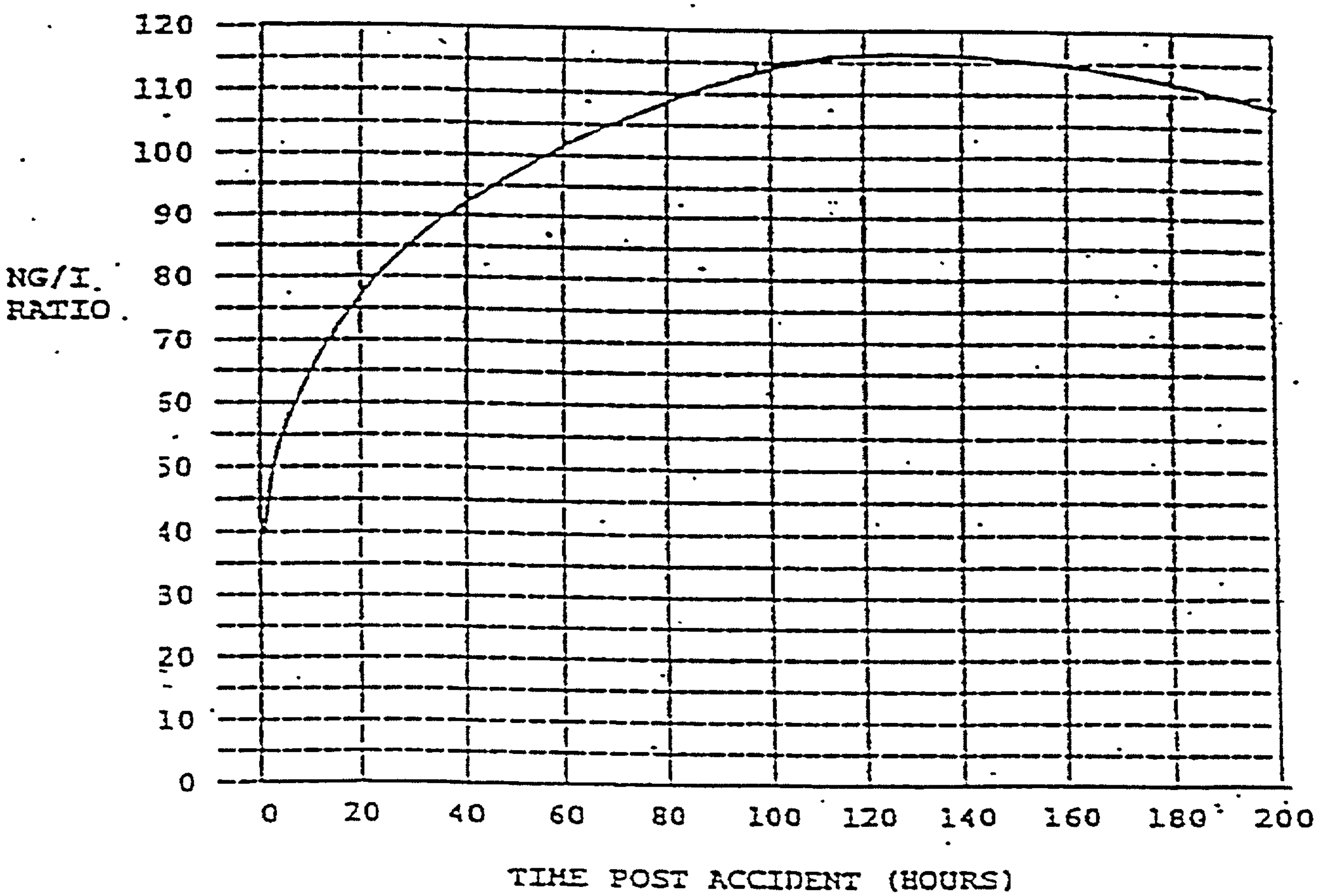
14. Radiation Sample Flow - Low Flow Alarm
15. Radiation Sample Flow - Velocity - FPM
    FI-X6560A
16. Radiation Sample Flow - CFM
    FI-X6560B
17. Radiation Sample Flow - Totalized Flow
    FR-X6560
18. Radiation Sample Flow - Printer Switch
    HS-X6560-1
19. Sample Pump Iso Vlv
    SV-X6562
20. Refuel Floor (TB or SGTS) Man. Isolation
    HS-X6562

Attachment D
PAVSS PARTICULATE/IODINE FILTER ASSEMBLY AND SAMPLE CART



Attachment E

NOBLE GAS/IODINE RATIO VS. TIME POST ACCIDENT (HOURS)



MAJOR TASK:

Prepare and Analyze Vent Monitor Sample(s).

SPECIFIC TASKS:		HOW:		INITIALS
1.	Place vent sample casks and/or noble gas grab sample from SPINGs or PAVSS behind shielding in fume hood.			_______
2.	If noble gas grab sample was NOT taken, GO TO Step 7.			_______
3.	Determine contact dose rate of noble gas grab sample.	3a.	Transfer TAB M noble gas data from SPINGS or TAB N noble gas data from PAVSS to Attachment A, Vent Noble Gas Analysis.	_______
		3b.	Obtain contact dose rate (closed window) on noble gas grab sample. Record sample number and dose rate of original sample on Attachment A.	_______
		3c.	If contact dose rate on noble gas grab sample is < 0.5 mR/hr, GO TO Step 5. If contact dose rate on noble gas grab sample is ≥ 0.5 mR/hr, perform the following:	
			(1) Prepare new labeled gas vial for dilution. Add consecutive letters to sample number to distinguish dilution from original sample.	
			(2) Using clean gas tight syringe, remove 1 cc of air from new gas vial.	
			(3) Transfer 1 cc of gas sample into partially evacuated gas vial.	
			(4) Obtain contact dose rate (closed window) of sample vial. Record sample number and dose rate on Attachment A.	_______

SPECIFIC TASKS:	HOW:	INITIALS
4. Determine dilution(s) needed to obtain 14.7 cc gas vial < 5 mR/hr.		

Vial Dose Rate – mR/hr	Dilution	Dilution Factor
0-5	1:14.7	14.7
5-80	1:14.7 & 1:15.7	231
80-1200	1:14.7, 1:15.7 & 1:15.7	3623
1200-19000	1:14.7, 1:15.7, 1:15.7, & 1:15.7	5.69 E4

4a. Prepare new labeled gas vials for required number of dilution(s). Add consecutive letters to sample number to distinguish dilutions from original vial. ______

4b. Using clean gas tight syringe, remove 1 cc of air from each new gas vial. ______

4c. Transfer 1 cc of gas sample into partially evacuated gas vial. ______

4d. Perform successive dilutions, as required, until final gas vial < 5 mR/hr. ______

4e. Record sample number and contact dose rate (closed window) on Attachment A for each dilution prepared. ______

4f. Store original sample and all dilution(s) except one to be analyzed in lead brick storage cave in fume hood of Sample Prep Room. ______

4g. Wrap final dilution in clean plastic film and transfer to Counting Room for analysis. ______

5. Perform isotopic analysis on sample in accordance with CH-RC-076, Gamma Spectral Analysis Using the ND 9900.

5a. If original sample was <u>NOT</u> diluted, record original sample volume and N/A Corrected Sample Volume Section of Attachment A. ______

5b. If original sample required dilution, determine corrected vial volume (after dilution) for isotopic analysis.

(1) Record on Attachment A.

SPECIFIC TASKS:	HOW:	INITIALS
	(2) Enter corrected vial volume as actual sample volume for gamma spectroscopy analysis.	_______
	5c. Decay correct sample to time of CTE collection.	_______
	5d. Record Analysis Date/Time and CTE Standardization Number on Attachment A.	_______
	5e. Record the concentration of each detected noble gas from gamma spectroscopy analysis on Attachment A.	_______
	5f. Multiply each detected concentration by Stack Flow to determine release rate. Record on Attachment A.	_______
	5g. Add release rates of all noble gases to determine Total Noble Gas Vent Release Rate. Record on Attachment A.	_______
	5h. Attach printout of isotopic analysis to Attachment A.	_______
	5i. Notify Chemistry Coordinator of analysis results.	_______
6. At completion of analysis, place sample in lead brick storage cave in fume hood of Sample Prep Room.		_______
7. Perform pre-analysis sample preparation of particulate/iodine grab sample in fume hood. If particulate/iodine grab sample was not taken, <u>GO TO</u> Step 10.	7a. Transfer TAB M particulate/iodine data from SPINGS or TAB N particulate/iodine data from PAVSS to Attachment B, Vent Particulate/Iodine Analysis.	_______

SPECIFIC TASKS:	HOW:	INITIALS
	7b. Disassemble iodine cartridge holder, if appropriate.	
	(1) Transfer iodine cartridge to clam shell holder and blow instrument air through cartridge in same direction of flow as sample flow for a minimum of 1 minute, as required.	
	(2) Wrap iodine cartridge in clean plastic film.	
	(3) Obtain contact dose rate (closed window) on cartridge. Record sample number and dose rate on Attachment B.	_______
	7c. Disassemble particulate filter holder, if appropriate.	
	(1) Place particulate filter in clean Petri dish and wrap in clean plastic film.	
	(2) Obtain contact dose rate (closed window) on Petri dish. Record sample number and dose rate on Attachment B.	_______
	7d. Transfer samples to Counting Room for analysis.	_______
8. Perform isotopic analysis on particulate filter and iodine cartridge.	8a. Determine sample volume for isotopic analysis.	
	(1) Record on Attachment B.	
	(2) Enter sample volume for gamma spectroscopy analysis.	_______

SPECIFIC TASKS:	HOW:	INITIALS
	8b. Analyze iodine cartridge in accordance with CH-RC-071, Radiochemical Analysis of High Activity Iodine Cartridge Samples.	______
	(1) Record the concentration of each detected iodine from gamma spectroscopy analysis on Attachment B.	
	(2) Add concentrations of all iodines to determine Total Iodine Concentration. Record on Attachment B.	
	(3) Using the formula on Attachment B, multiply Total Iodine Concentration by a correction factor (for line loss and collection efficiency) and by Stack Flow in order to determine Total Iodine Vent Release Rate.	
	8c. Analyze particulate filter in accordance with CH-RC-076, Gamma Spectral Analysis Using the ND9900.	______
	(1) Record the concentration of each detected particulate from gamma spectroscopy analysis on Attachment B.	
	(2) Add concentrations of all particulates to determine Total Particulate Concentration. Record on Attachment B.	
	(3) Using the formula on Attachment B, multiply Total Particulate Concentration by a correction factor for line loss and by Stack Flow in order to determine Total Particulate Vent Release Rate.	

SPECIFIC TASKS:	HOW:	INITIALS
	8d. Record Analysis Date/Time and CTE Standardization Number of each sample on Attachment B.	______
	8e. Attach printouts of all isotopic analyses to Attachment B.	______
	8f. Notify Chemistry Coordinator of analysis results.	______
9. At completion of analysis, place samples in lead brick storage cave in fume hood of Sample Prep Room.		______
10. Perform pre-analysis sample preparation of previous particulate/iodine sample removed from SPINGs. Perform all sample preparations in fume hood.	10a. Obtain contact dose rate on center bottom of sample cask. Record on Attachment C, SPING Particulate/Iodine Samples.	______
	10b. If contact dose rate is > 2.5 R/hr on center bottom of sample cask, sample contains > 5 Curies. Perform the following:	______
	(1) Determine sample activity in Curies from Attachment D. Record on Attachment C.	
	(2) Determine Vent Release rate in accordance with Attachment C, page 2.	
	(3) <u>GO TO</u> Step 12.	
	10c. If contact dose rate is < 2.5 R/hr on center bottom of sample cask, remove sample holder from sample cask.	
	(1) Do not remove sample holder from two plastic bags.	
	(2) Stand ionization chamber at 36 inch line of lead brick tunnel. Align center of detector with expected center of sample holder.	

SPECIFIC TASKS:	HOW:		INITIALS
		(3) Place back of sample holder flush with back of lead brick tunnel.	
		(4) Obtain dose rate 36 inches from sample.	______
	10d.	If dose rate is > 300 mR/hr at 36 inches, sample contains > 800 mCuries.	
		(1) Replace sample holder in cask.	
		(2) Determine sample activity in Curies from Attachment E. Record on Attachment C.	
		(3) Determine Vent Release Rate in accordance with Attachment C, page 2.	
		(4) GO TO Step 12.	______
	10e.	If dose rate is < 300 mR/hr at 36 inches, obtain dose rate 18 inches from sample.	
		(1) If dose rate is > 50 mR/hr at 18 inches, replace sample holder in cask.	
		(2) Determine sample activity in mCuries from Attachment F. Record on Attachment C.	
		(3) Determine Vent Release Rate in accordance with Attachment C, page 2.	
		(4) GO TO Step 12.	______
	10f.	If dose rate is < 50 mR/hr at 18 inches, obtain contact dose rate (closed window) on sample.	
		(1) If contact dose rate is > 50 mR/hr, replace sample holder in cask.	

SPECIFIC TASKS:	HOW:	INITIALS
	(2) Determine number of mCuries on sample by: # mCi = Contact Reading on Sample Record on Attachment C.	
	(3) Determine Vent Release Rate in accordance with Attachment C, page 2.	
	(4) GO TO Step 12.	_______
	10g. If contact dose rate is < 50 mR/hr, remove sample holder from two plastic bags.	
	(1) Remove sample(s) from sample holder(s).	
	(2) Transfer iodine cartridge to clam shell holder and blow instrument air through iodine cartridge in same direction of flow as sample flow for approximately 1 minute, as required.	
	(3) Wrap iodine cartridge in clean plastic film.	
	(4) Place particulate filter in Petri dish and wrap in clean plastic film.	
	(5) Transfer samples to Counting Room for analysis.	_______
11. Perform isotopic analysis on particulate filter and iodine cartridge.	11a. Determine sample volume for isotopic analysis.	
	(1) Record on Attachment B.	
	(2) Enter sample volume for gamma spectroscopy analysis.	_______

SPECIFIC TASKS:	HOW:	INITIALS
	11b. Analyze iodine cartridges in accordance with CH-RC-071, Radiochemical Analysis of High Activity Iodine Cartridge Samples.	
	(1) Record the concentration of each detected iodine from gamma spectroscopy analysis on Attachment B.	
	(2) Add concentrations of all iodines to determine Total Iodine Concentration. Record on Attachment B.	
	(3) Using the formula on Attachment B, multiply Total Iodine Concentration by a correction factor (for line loss and collection efficiency) and by Stack Flow in order to determine Total Iodine Vent Release Rate.	______
	11c. Analyze particulate filter in accordance with CH-RC-076, Gamma Spectral Analysis Using the ND9900.	
	(1) Record the concentration of each detected particulate from gamma spectroscopy analysis on Attachment B.	
	(2) Add concentrations of all particulates to determine Total Particulate Concentration. Record on Attachment B.	
	(3) Using the formula on Attachment B, multiply Total Particulate Concentration by a correction factor for line loss and by Stack Flow in order to determine Total Particulate Vent Release Rate.	______

SPECIFIC TASKS:	HOW:	INITIALS
	11d. Record Analysis Date/Time and CTE Standardization Number of each sample on Attachment B.	______
	11e. Attach printouts of all isotopic analyses to Attachment B.	______
	11f. Notify Chemistry Coordinator of analysis results.	______
12. At completion of analysis, place samples in lead brick storage cave in fume hood of Sample Prep Room.		______

Attachment A

VENT NOBLE GAS ANALYSIS

I. VENT NOBLE GAS ANALYSIS

Sample Source		Sample Date/Time	
SPING Sample Flow	cc/min	Stack Flow	cc/min
PAVSS Sample Flow	cfm x 2.83 E 4 =		cc/min
PAVSS Stack Flow	cfm x 2.83 E 4 =		cc/min

II. SAMPLE DILUTION/ISOTOPIC ANALYSIS

Sample	Original	Dilution 1	Dilution 2	Dilution 3	Dilution 4
Sample #					
Dil Factor	1	14.7	231	3623	5.69 E +4
Dose Rate					

Corrected Sample Volume Following Dilution: (for isotopic analysis only)

$$\text{Volume}_{isotopic} = \frac{14.7 \text{ cc Sample Vol}}{\text{Dil Factor}} = \frac{14.7}{(\_\_\_\_\_)}$$

$$\text{Volume}_{isotopic} = \_\_\_\_\_\_ \text{ cc}$$

Analysis Date/Time			CTE STANDARDIZATION #		
Noble Gas	Concentration (μCi/cc)	x	Stack Flow (cc/min)	=	Release Rate (μCi/min)
Kr-85		x		=	
Kr-85m		x	(Given Above)	=	
Kr-87		x	(Given Above)	=	
Kr-88		x	(Given Above)	=	
Xe-133		x	(Given Above)	=	
Xe-135		x	(Given Above)	=	
		x	(Given Above)	=	
		x	(Given Above)	=	
Total Noble Gas Vent Release Rate					μCi/min

Performed By	Date
Reviewed By	Date

Attachment B

VENT PARTICULATE/IODINE ANALYSIS

NOTE: Computer Program "Vent" may be used instead of this form (Surveillance).

I. VENT PARTICULATE/IODINE ANALYSIS

Sample Source	Sample Date/Time
SPING Sample Flow cc/min	SPING Stack Flow cc/min
Sample Start Date/Time	Sample Stop Date/Time
Sample Flow: cc/min x Sample Duration: min = Sample Vol: cc	
Iodine Cask Dose Rate mR/hr	Filter Cask Dose Rate mR/hr
PAVSS Sample Flow cfm x 2.83 E 4 cc/ft³ = cc/min	
PAVSS Stack Flow cfm x 2.83 E 4 cc/ft³ = cc/min	
Sample Volume = (Final Totalizer Flow - Initial Totalizer Flow) x 2.83 E 4 cc/ft³ Sample Volume = (_______ ft³ - ________ ft³) x 2.83 E 4 cc/ft³ = _______ cc	

II. SAMPLE DATA

Sample	Particulate	Iodine
Sample #		
Analysis Date/Time		
CTE Standardization #		
Dose Rate		
Tech		

III. IODINE RESULTS

Iodines	Concentration μCi/cc
I-131	
I-132	
I-133	
I-134	
I-135	
Total Iodine Concentration	

Total Iodine Release Rate (μCi/min) = Total Iodine Conc. (μCi/cc) x Corr. Factor x Stack Flow (cc/min)

= ____________ μCi/cc x A* x ___________ cc/min

= ____________ μCi/min

*** A=1.7 for SPING; A=1.8 for PAVSS**

Attachment B

VENT PARTICULATE/IODINE ANALYSIS (continued)

IV. PARTICULATE RESULTS

Particulates	Concentration μ Ci/cc
Sr-91	
Sr-92	
Y-92	
Zr-95	
Zr-97	
Mo-99	
Ru-103	
Te-132	
Cs-134	
Cs-137	
Cs-138	
Ba-140	
La-140	
Ce-141	
Ce-144	
Total Particulate Concentration	

Total Particulate Release Rate (μ Ci/min) = Total Part. Conc. (μ Ci/cc) x Corr. Factor x Stack Flow (cc/min)
= ______________μ Ci/cc x *B x ____________cc/min

= ______________μ Ci/min

*** B=3.6 for SPING; B=4.3 for PAVSS**

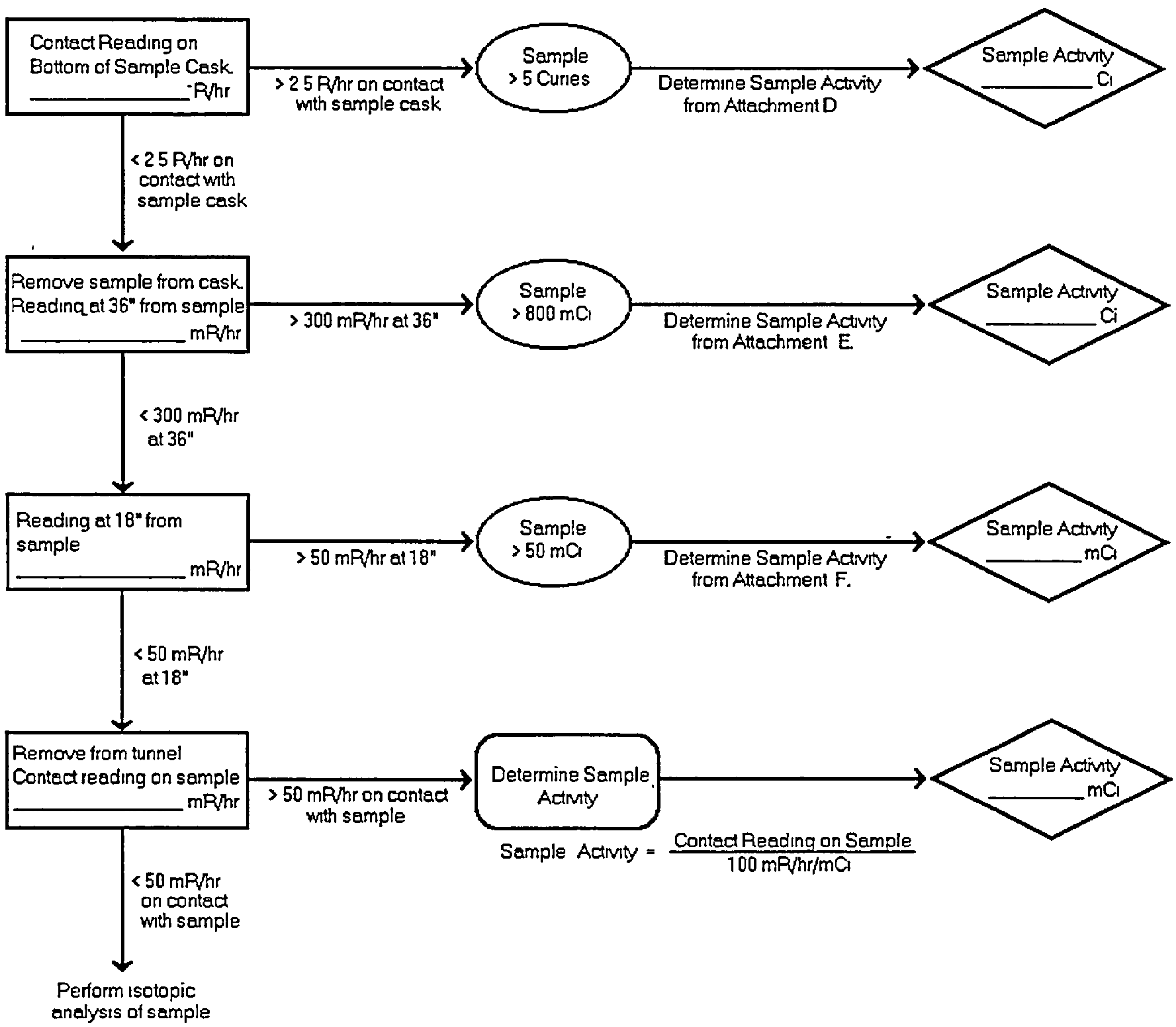
Performed By	Date
Reviewed By	Date

Attachment C

I. SPING PARTICULATE/IODINE SAMPLES

Sample Source	Sample #		Survey Meter #
Sample Start Date/Time		Sample Stop Date/Time	
Sample Duration minutes		Stack Flow cc/min	

SPING PARTICUALTE - IODINE SAMPLE



Attachment C
SPING PARTICULATE/IODINE SAMPLES (continued)

FOR SAMPLES > 50 mR/HR ON CONTACT:

1. Convert sample activity (Ci or mCi) to μCi:

μCi = _______ Curies x (1 E 6 μCi/Ci) OR _______ mCuries x (1 E 3 μCi/mCi)

= _______ μCi

2. Determine sample volume:

cc = (Sample Flow) x (Sample Duration)

= (____ cc/min) x (____ minutes)

= _____ cc

3. Divide sample activity by sample volume to determine sample concentration:

μCi/cc = Sample Activity / Sample Volume = _________ μCi / cc

= ______ μCi/cc

4. Multiply sample concentration by Stack Flow to determine Vent Release Rate:

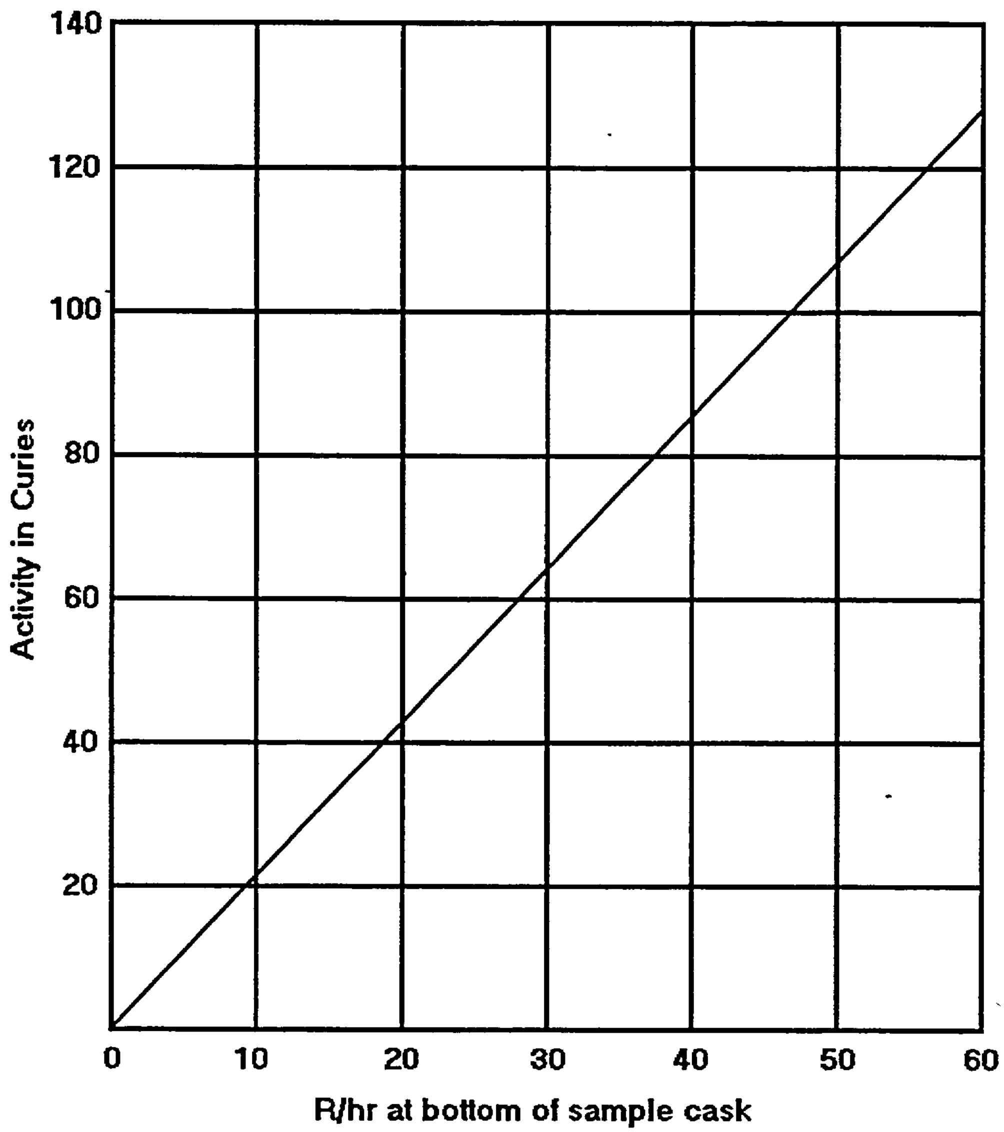
μCi/min = (Sample Concentration) x (Stack Flow)

= (_____ μCi/cc) x (____ cc/min)

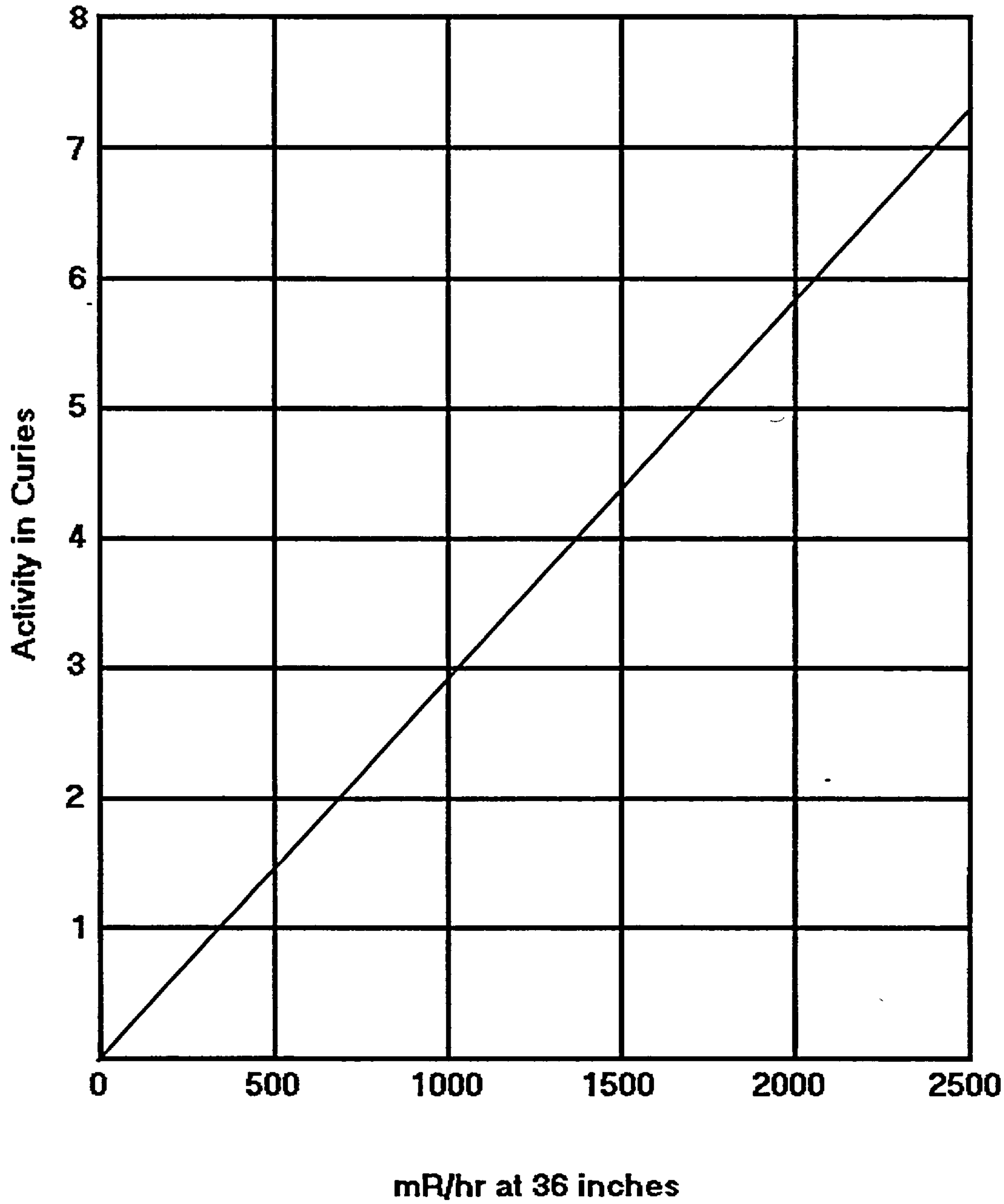
= ______ μCi/min

Performed By	Date
Reviewed By	Date

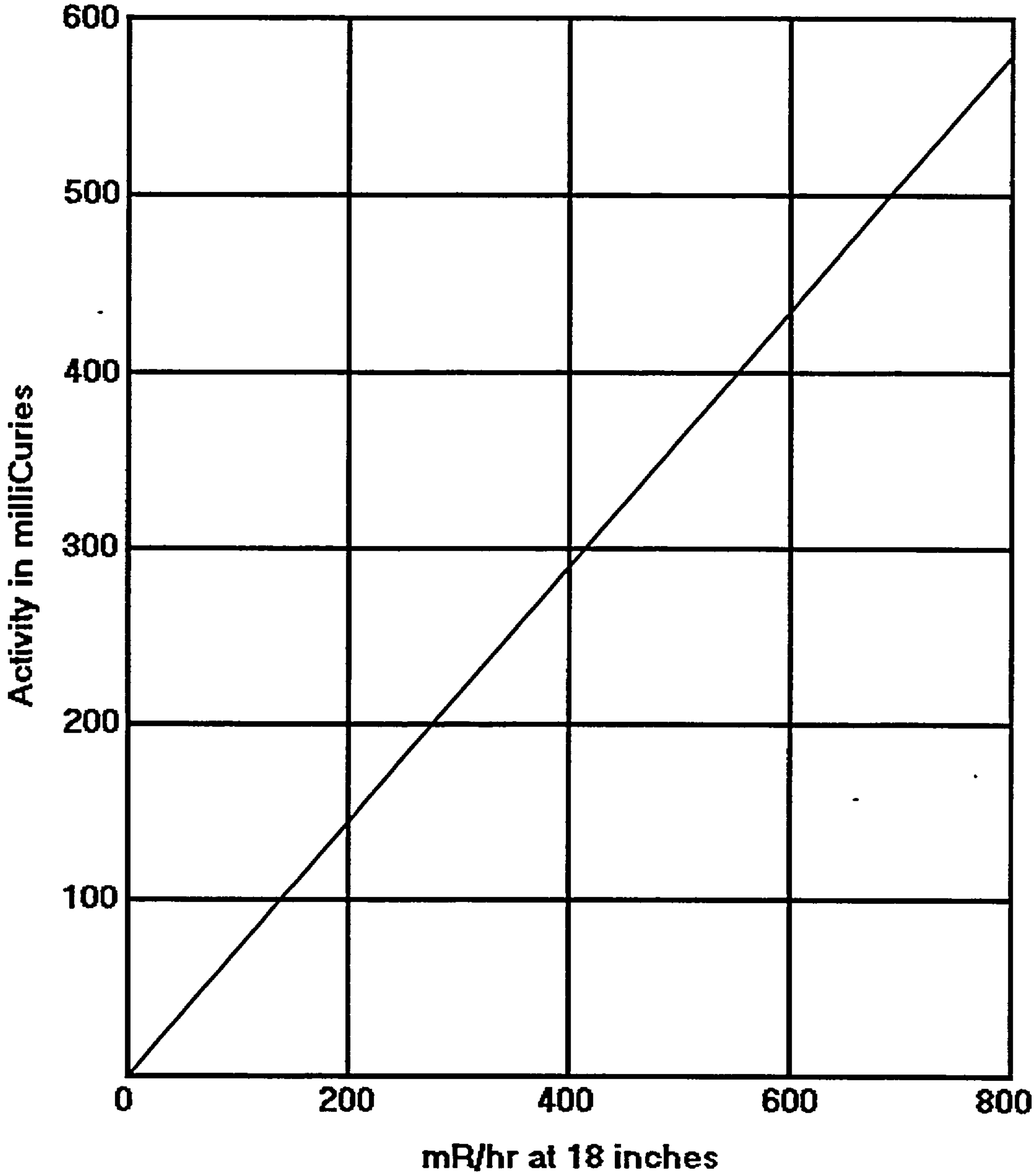
Attachment D
SAMPLE ACTIVITY BASED ON CONTACT DOSE RATE AT BOTTOM OF PARTICULATE/IODINE SAMPLE CASK



Attachment E
SAMPLE ACTIVITY BASED ON DOSE RATE AT 36 INCHES
FROM PARTICULATE/IODINE SAMPLE



Attachment F
SAMPLE ACTIVITY BASED ON DOSE RATE AT 18 INCHES
FROM PARTICULATE/IODINE SAMPLE



MAJOR TASK:

Collect and analyze sample from Reactor Building Sample Station. Sample has potential to be highly radioactive.

SPECIFIC TASKS:	HOW:	INITIALS
1. After briefing and assignment and following setup of appropriate Chemistry Lab.	1a. Obtain the following supplies: ____Respiratory protection devices ____Hi-range and extremity dosimetry ____Survey meter calibrated at highest range ____Sample bottles (250 mL polyethylene preferred) ____Remote handling device ____Plastic Bags ____Key to Reactor Building Sample Station, if required	________
	1b. Check the following on survey meter: ____Calibration has not expired. ____Battery indication is good. ____Source check is satisfactory.	________
	1c. Place survey meter in plastic bag and seal.	________
2. If Reactor Water Recirc sample is required, request Operations ensure the following valves are OPEN:	2a. Sample trip valve HV-1F019 (HV-2F019).	________
	2b. Sample trip valve HV-1F020 (HV-2F020).	________
3. Don protective clothing and respiratory protection as directed by Radiation Protection Coordinator.		________
4. Ensure each team member present has required dosimetry (TLD, SRD, and required special dosimetry).		________
5. Ensure survey meter is on highest range.		________
6. Notify Chemistry Coordinator before leaving Chemistry Lab.		________

SPECIFIC TASKS:	HOW:	INITIALS
7. Proceed to Reactor Building Sample Station via best route while continuously monitoring radiation levels and status of CAMs and ARMs.	7a. Retreat to low background area and notify Chemistry Coordinator if any of the following conditions are encountered: (1) General area radiation levels exceed 1,000 mrem/hr at any time. (2) Total annual whole body exposure (TEDE) approaches 2000 mrem.	______
8. Monitor general area dose rates at the Sample Station.	**NOTE:** **If general area radiation levels exceed 1,000 mrem/hr at any time, immediately retreat to low background area and notify Chemistry Coordinator.**	
	8a. Continuously monitor radiation levels while entering Sample Station.	______
	8b. Record Reactor Building Sample Station area radiation monitor reading and report to the Chemistry Coordinator. RBSS ARM = __________mR/hr. Chemistry Coordinator notified.	______
	8c. Ensure hood ventilation is functioning prior to collecting sample.	______
	8d. Ensure sample cask is available at Sample Station.	______

SPECIFIC TASKS:	HOW:	INITIALS

CAUTION

IF CONTACT RADIATION LEVELS ON SAMPLE CONTAINER EXCEED 5000 MR/HR ABOVE BACKGROUND AT ANY TIME DURING SAMPLE COLLECTION, IMMEDIATELY SHUT OFF SAMPLE FLOW AND NOTIFY CHEMISTRY COORDINATOR.

9. Obtain required sample.

9a. Check applicable sample at Grab Sample and Bypass (GSB) Module to confirm flow through module has been established. ______

NOTE:
If flow was NOT previously established, allow sufficient flush time through module at approximate flow of 1200 ml/min before collecting sample.

Sample	Flush Time
Rx H_2O Influent	2 minutes
Rx H_2O Recirc	4 minutes

9b. Open appropriate sample valve and flush approximately 30 mL. ______

9c. Collect approximately 100 ml of sample using remote handling device if necessary.

(1) Continuously monitor sample container for quick detection of high dose rates.

(2) Highest general area dose rates may occur at center of sample station due to location of cooler. ______

9d. Shut sample valve and cap bottle. Rinse bottle with demin water and wipe dry. ______

9e. Place sample bottle in plastic bag. ______

SPECIFIC TASKS:	HOW:	INITIALS
10. Obtain contact dose rate on sample bottle and determine approximate sample volume.	10a. Obtain contact dose rate (closed window) on sample bottle. Sample Bottle dose rate: ___ mR/hr	_______
	10b. If contact dose rate on sample bottle is < 100 mrem/hr (closed window) above background place sample in plastic bucket for transport to lab.	_______
	10c. If contact dose rate on sample bottle is > 100 mrem/hr (closed window) above background, place sample in lead cask for transport to lab. (1) Obtain contact dose rate on sample cask. Cask dose rate: ______ mR/hr (2) If contact dose rate on sample cask is greater than 100 mrem/hr above background, notify Chemistry Coordinator for instructions.	_______
	10d. Record sample source and sample date and time. (1) Sample Source: __________ (2) Sample Date/Time: _______/_______ (3) Sample Volume: ________ ml	_______
11. Notify Chemistry Coordinator of sample dose rates.		_______
12. Upon leaving Sample Station, notify Chemistry Coordinator sampling is complete.		_______
13. Notify Chemistry Coordinator upon arrival at Chemistry Lab.		_______
14. Prepare and analyze sample obtained from Reactor Building Sample Station.	14a. Place sample cask in Sample Prep Room.	_______

SPECIFIC TASKS:	HOW:	INITIALS
	14b. Transfer TAB Q data to Attachment A, Reactor Building Sample Analysis.	_______
15. Perform pre-analysis sample preparation in fume hood.	15a. Label clean liquid PASS sample vial.	_______
	15b. Pipette 10 ml of sample into clean liquid PASS sample vial.	_______
	15c. Place original sample bottle in lead brick storage cave in fume hood of Sample Prep Room.	_______
	15d. Obtain contact dose rate (closed window) on 10 ml sample vial. Record dose rate on Attachment A.	_______
16. Determine dilution(s) required to obtain 10 ml sample < 5 mR/hr.		

Vial Dose Rate – mR/hr	Dilution	Dilution Factor
0-5	Count as is	1
5-50	1:10	10
50-500	0.1:10	1.0E +2
500-5000	0.1:10 & 1:10	1.0E +3

16a. Label required number of clean liquid PASS sample vials. Add consecutive letters to sample number to distinguish dilutions from original vial. _______

16b. Prefill each clean labeled vial with required amounts of diluent and 0.01N HNO_3. Perform dilutions as follows:

(1) Use hypodermic syringe to transfer sample aliquot to prefilled liquid vial.

(2) 1:10 dilution: Add 1 ml sample to 9 ml diluent (0.01N HNO_3).

(3) 0.1:10 dilution: Add 0.1 ml sample to 9.9 ml diluent (0.01N HNO_3).

(4) Cap all vials, as required. _______

SPECIFIC TASKS:	HOW:		INITIALS
	16c.	Record sample number, dilution(s) performed, and dilution factor on Attachment A for each dilution prepared.	_______
	16d.	Record contact dose rate (closed window) on Attachment A for each sample dilution.	_______
	16e.	Store original sample bottle and all dilution(s) except one to be analyzed in lead brick storage cave in fume hood of Sample Prep Room.	_______
	16f.	When diluted sample is < 5 mR/hr, wrap vial in clean plastic film and transfer to Counting Room for analysis.	_______
17. Perform isotopic analysis on sample < 5 mR/hr.	17a.	Enter the applicable actual coolant volume for isotopic analysis to account for all sample dilutions. Record on Attachment A.	

Dilutions Performed	Actual Coolant Volume - ml
As is	10
1:10	1
0.1:10	1E-1
0.1:10 & 1:10	1E-2

____

17b.	Decay correct sample to time of collection.	_______
17c.	Determine DEI-131 (μCi/ml) in accordance with CH-RC-010, Iodine Counting and Data Analysis.	_______
17d.	Record Analysis Date/Time, CTE Number, and DEI-131 on Attachment A.	_______
17e.	Attach printout of isotopic analysis to Attachment A.	_______
17f.	Notify Chemistry Coordinator of analysis results.	_______

SPECIFIC TASKS:	HOW:	INITIALS
18. Perform additional analyses, as requested by Chemistry Coordinator.	18a. Perform boron analysis in accordance with CH-CC-043, Analytical Procedures for HACH or BETZ Portable Spectrophotometer Labs, if required. Record results on Attachment A.	______
	18b. Perform chloride analysis in accordance with CH-CC-010, Chloride - Silver Nitrate Turbidimetric Method, if required. Record results on Attachment A.	______
	18c. Perform pH analysis in accordance with CH-CC-030, Laboratory pH Determination, if required. (1) Use 0.1 ml of undiluted sample and flat surface pH probe to perform analysis. (2) Record results on Attachment A.	______
	18d. Notify Chemistry Coordinator of analysis results.	______
19. At completion of analyses, place sample in lead brick storage cave in fume hood of Sample Prep Room.		______

Attachment A

REACTOR BUILDING SAMPLE ANALYSIS

I. REACTOR BUILDING SAMPLE ANALYSIS

Sample Source	Sample Date/Time
Sample Dose Rate mR/hr	

II. SAMPLE DILUTION/RESULTS

Sample	Original	Dilution 1	Dilution 2	Dilution 3
Sample #				
Dilutions	NA	1:10	0.1:10	0.1:10 & 1:10
Dilution Factor	NA	10	1.0 E +2	1.0 E +3
Dose Rate				

Actual Coolant Volume for Isotopic Analysis ml			
Analysis Date/Time	CTE #		DEI-131 µCi/ml
Additional Analyses	Performed	Not Performed	Analysis Results x Dilution Factor = Sample Results
Boron			x = ppm
Chloride			x = ppm
pH			

Performed By	Date
Reviewed By	Date

MAJOR TASK:

In the event of an Unmonitored Liquid Release, Collect and Analyze Liquid Samples.

SPECIFIC TASKS:	HOW:	INITIALS
1. After receiving sampling instructions from Chemistry Coordinator or OSC, proceed to Cooling Tower Blowdown Sampler.	1a. Collect grab sample from blowdown line composite sampler.	______
	1b. Collect grab samples from other locations as determined by Chemistry Coordinator.	______
2. Transport sample(s) to Chemistry Lab for analysis.		______
3. Perform isotopic analysis on undiluted sample.	3a. Label sample(s) with sample location, sample number, and sample date and time.	______
	3b. Record the following on Attachment A, Sample Analyses for Unmonitored Liquid Release. (1) Sample Location (2) Sample Date/Time (3) Sample Volume	______
	3c. Analyze sample in accordance with CH-RC-076, Gamma Spectral Analysis Using the ND 9900. (1) Decay correct sample to time of collection. (2) Record Analysis Date/Time, Standardization Number, and total activity (μCi/ml) on Attachment A. (3) Attach printout of isotopic analysis to Attachment A.	______
	3d. Notify Chemistry Coordinator/Shift Manager of analysis results.	______

Attachment A
SAMPLE ANALYSES FOR UNMONITORED LIQUID RELEASE

I. SAMPLE ANALYSES FOR UNMONITORED LIQUID RELEASE

Sample Location	Sample Date/Time
Sample Volume ml	Analysis Date/Time
CTE #	Total Activity μCi/ml

Sample Location	Sample Date/Time
Sample Volume ml	Analysis Date/Time
CTE #	Total Activity μCi/ml

Sample Location	Sample Date/Time
Sample Volume ml	Analysis Date/Time
CTE #	Total Activity μCi/ml

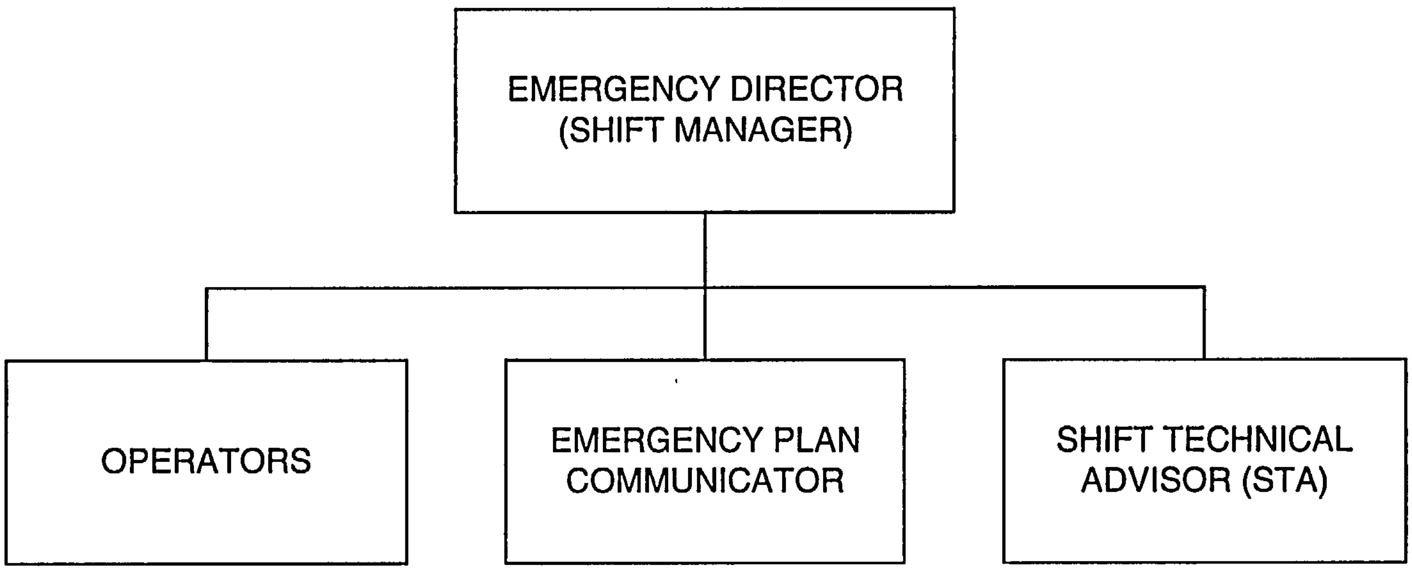
Sample Location	Sample Date/Time
Sample Volume ml	Analysis Date/Time
CTE #	Total Activity μCi/ml

Sample Location	Sample Date/Time
Sample Volume ml	Analysis Date/Time
CTE #	Total Activity μCi/ml

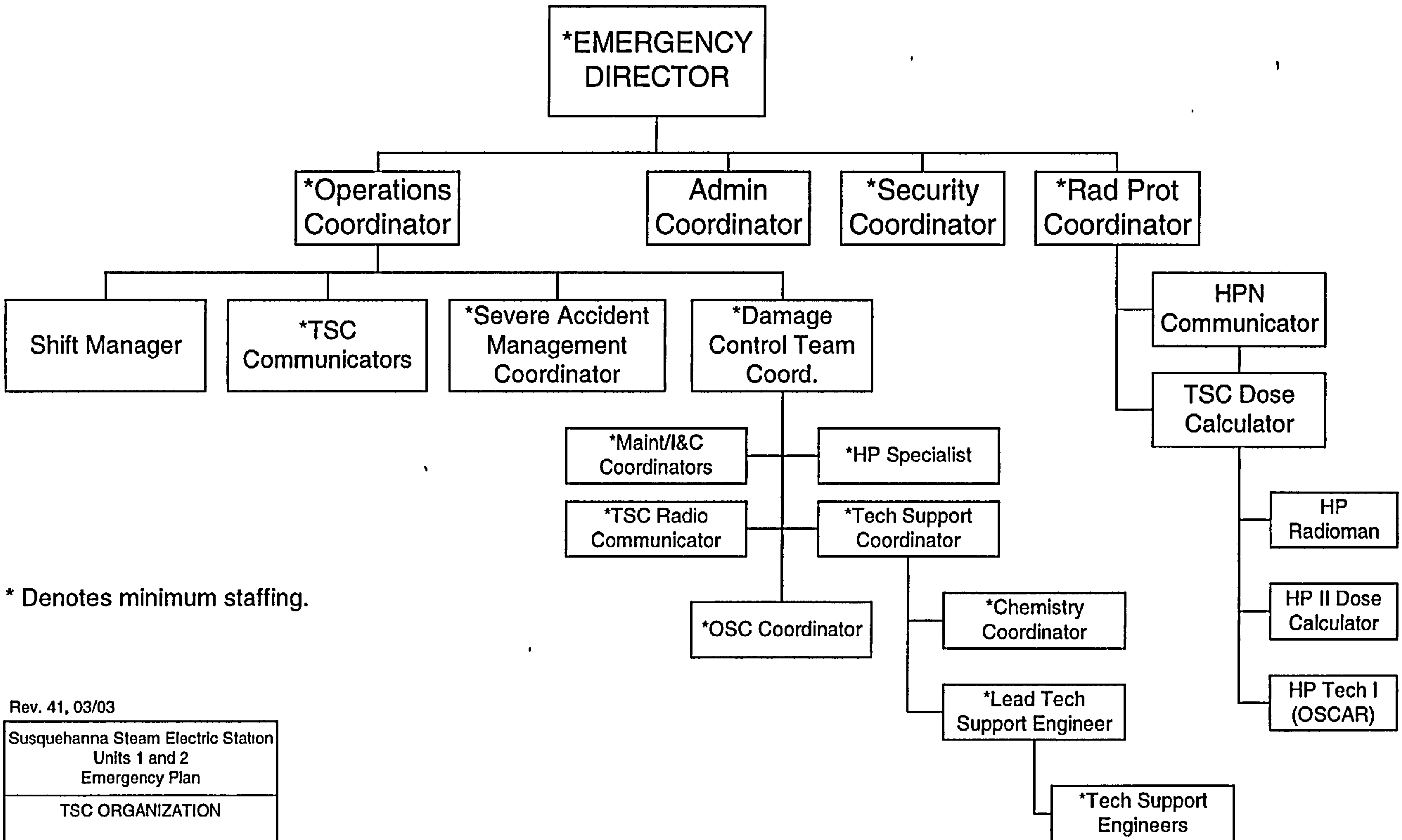
Sample Location	Sample Date/Time
Sample Volume ml	Analysis Date/Time
CTE #	Total Activity μCi/ml

Performed By	Date
Reviewed By	Date

EMERGENCY ORGANIZATION
CONTROL ROOM



TSC ORGANIZATION

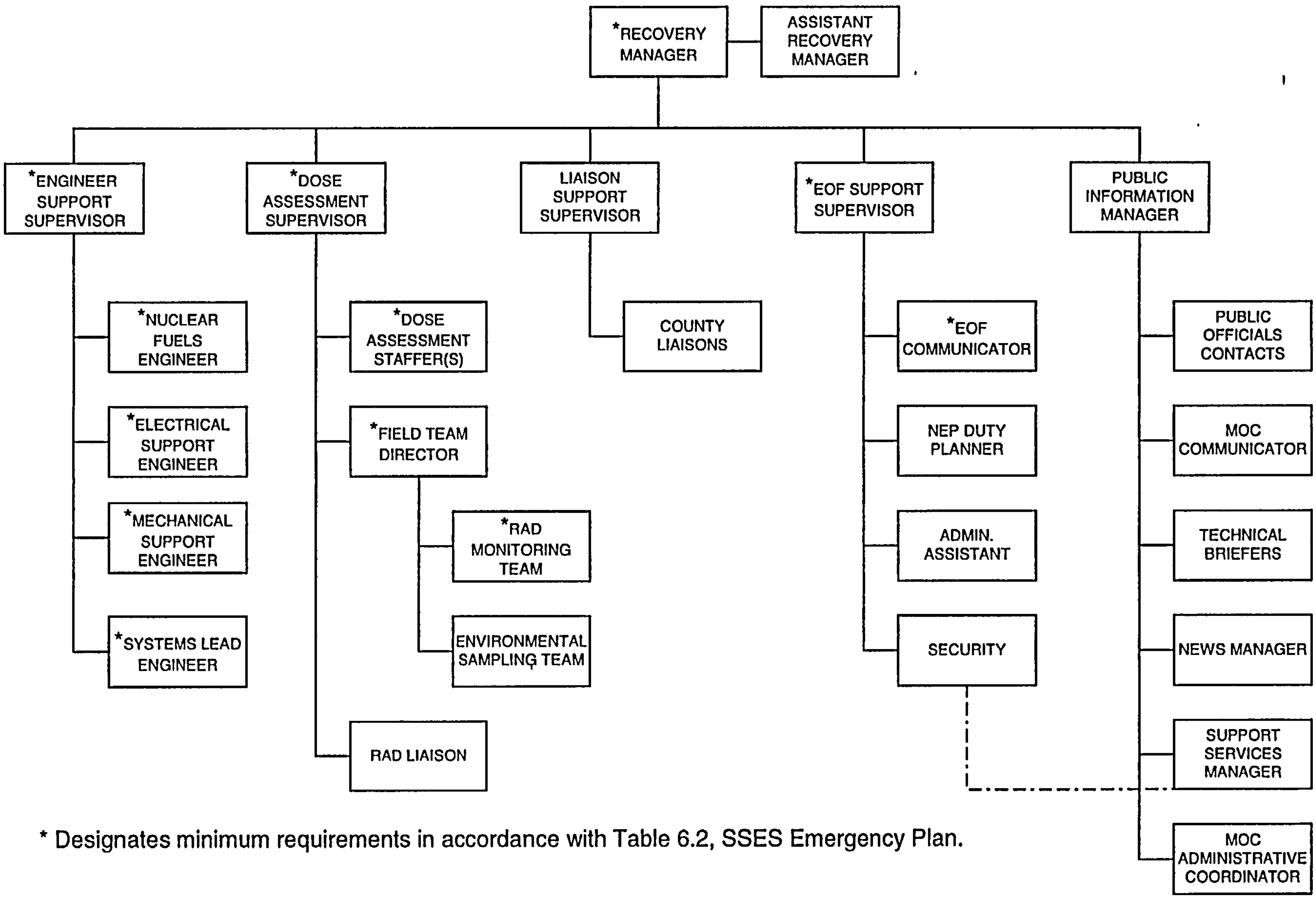


* Denotes minimum staffing.

Rev. 41, 03/03

Susquehanna Steam Electric Station Units 1 and 2 Emergency Plan
TSC ORGANIZATION FIGURE 6.2

EOF ORGANIZATION



* Designates minimum requirements in accordance with Table 6.2, SSES Emergency Plan.