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

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CATEGORY: PROCEDURES TYPE: EP
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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 13 Page 1 of 4

QUALITY CLASSIFICATION:	APPROVAL CLASSIFICATION:
( ) QA Program (X) Non-QA Program	( ) Plant ( ) Non-Plant (X) Instruction

EFFECTIVE DATE: 10-25-2002

PERIODIC REVIEW FREQUENCY: 2 Years

PERIODIC REVIEW DUE DATE: 10-25-2004

RECOMMENDED REVIEWS:
ALL

Procedure Owner: Nuclear Emergency Planning

Responsible Supervisor: Chemistry Supervisor-SSES

Responsible FUM: Supv.-Nuclear Emergency Planning

Responsible Approver: General Manager-SSES

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: Operations Shift Center (OSC)

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	7
Prepare In-Plant Chemistry Lab to accept samples	TAB B	3
Prepare West Building Chemistry Lab to accept samples	TAB C	5
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	5

MAJOR TASKS:	TAB:	REVISION:
PASS SAMPLING AND ANALYSIS PROCEDURES (continued)		
Prepare and Analyze PASS Dissolved Gas Sample(s)	TAB J	6
Prepare and Analyze PASS 14.7 cc Gas Sample(s)	TAB K	6
Prepare and Analyze PASS Particulate and Iodine Sample(s)	TAB L	3
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	8
Prepare and Analyze Vent Monitor Sample(s)	TAB O	5
ADDITIONAL TASKS		
Collect and Analyze Sample from Reactor Building Sampling Station. Sample has potential to be highly radioactive.	TAB P	4
In the event of an Unmonitored Liquid Release, collect and analyze Liquid Samples	TAB Q	5
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 Operations Support (OSC), unless otherwise directed.		_____
2. Obtain briefing and assignments from appropriate Coordinator.	2a. Obtain the following information during briefing: (1) Team # _____ (2) Required samples and analyses: _____ _____ _____ _____ _____ _____ _____ _____	_____
	2b. 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.	_____

SPECIFIC TASKS:	HOW:	INITIALS

2c. If PAVSS samples are requested, perform the following:

(1) Contact I&C to reset flow totalizers on PAVSS prior to sampling.

(2) Initialize appropriate PAVSS and place corresponding SPING in STANDBY.

HELP
PAVSS Instructions
See TAB 7

(3) Record time of reactor shutdown.
Shutdown Time: _____ _____

2d. 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

2e. Record extension number where Chemistry Coordinator may be contacted:

Ext. # _____ _____

SPECIFIC TASKS:	HOW:	INITIALS
3. Obtain briefing from Radiation Protection Coordinator or designee.	3a. Obtain Emergency RWP and record the following: RWP # _____ Team Members / Allowable Exposure _____ _____ _____ _____ _____ _____	_____
	3b. 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. _____ _____ _____ _____ _____ _____ _____ _____	

SPECIFIC TASKS:	HOW:	INITIALS

(3) **If collecting a PASS sample,** obtain radiation readings from Turbine Building 729' El. and record.

(4) **If collecting an RBSS sample**, obtain and record radiation readings in sampling room, or from ARM's nearby, if available.

3c. 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.

SPECIFIC TASKS:	HOW:	INITIALS
	(2) Record recommended route to and from sample point: _____ _____ _____ _____ _____ _____ _____ _____	_____
	(3) Record any pertinent technical conditions which could affect sample collection: _____ _____ _____ _____ _____ _____ _____ _____	_____
	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**	

SPECIFIC TASKS:	HOW:	INITIALS
	HELP **Unmonitored Liquid Release Sample(s)** **See TAB Q**	

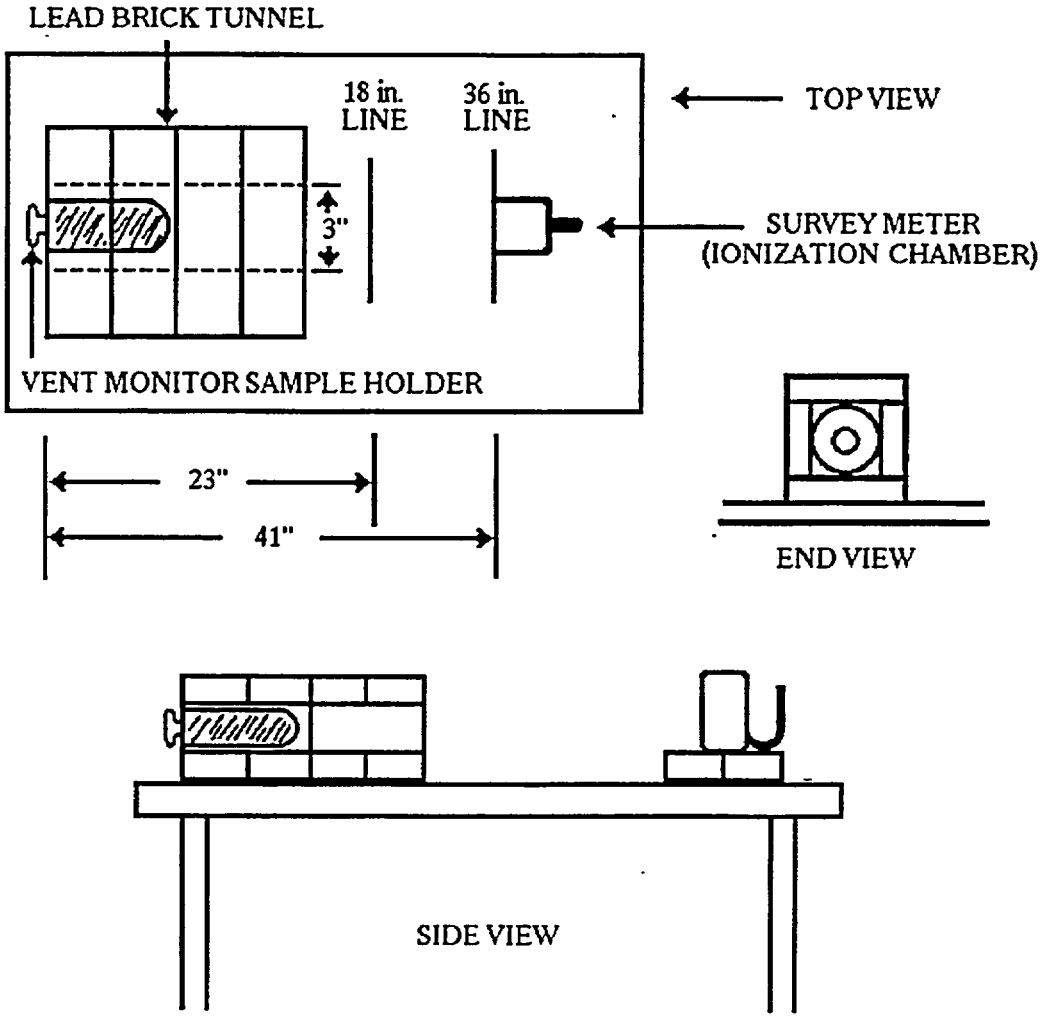
MAJOR TASK:

Prepare In-Plant Chemistry Lab to accept samples.

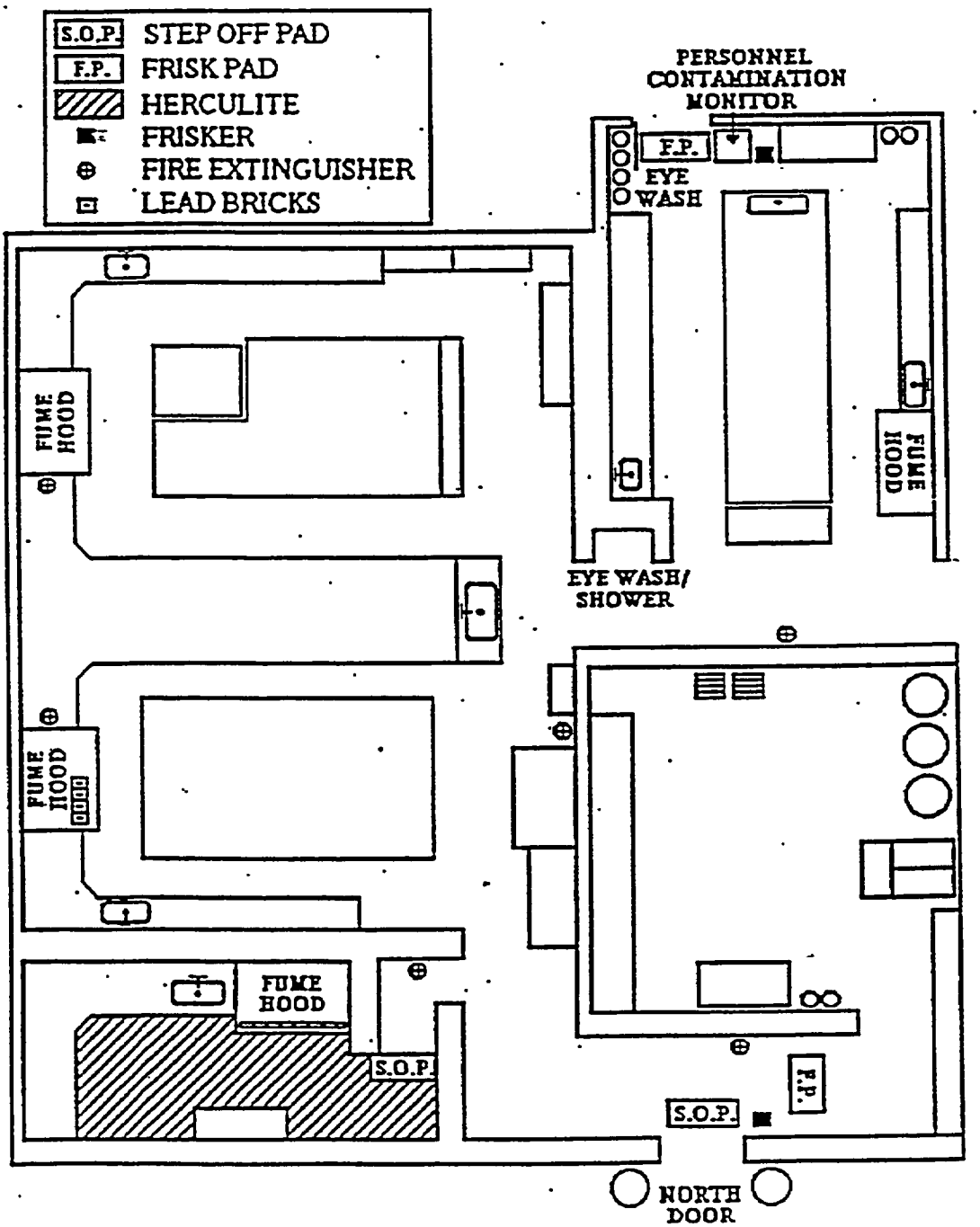
SPECIFIC TASKS:	HOW:	INITIALS
NOTE: **All contaminated or potentially contaminated personnel and samples should enter In-Plant Chemistry Lab <u>through North Door only</u>.**		
1. After briefing and assignment, construct necessary lead brick shielding for sample storage and preparation.	1a. Construct 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 Foreman's office. or 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.	_____

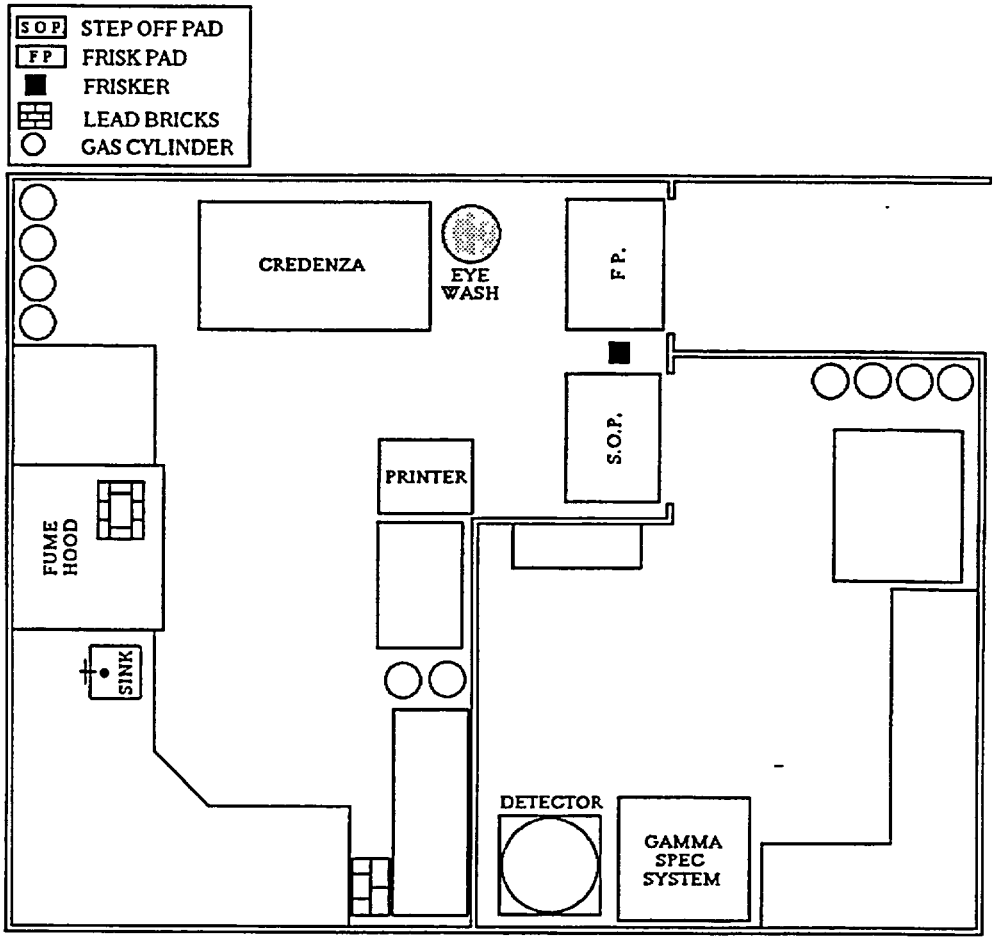
SPECIFIC TASKS:	HOW:		INITIALS
	3d.	Label all samples NOT assigned an in-plant sample number using the following format: EOFYY-XXX WHERE: YY = Last 2 digits of current year XXX = Sequential number	_____
	3e.	Connect tygon from exhaust of G.C. to hood.	_____
4. Set up detector cave purge, if operable.	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	_____

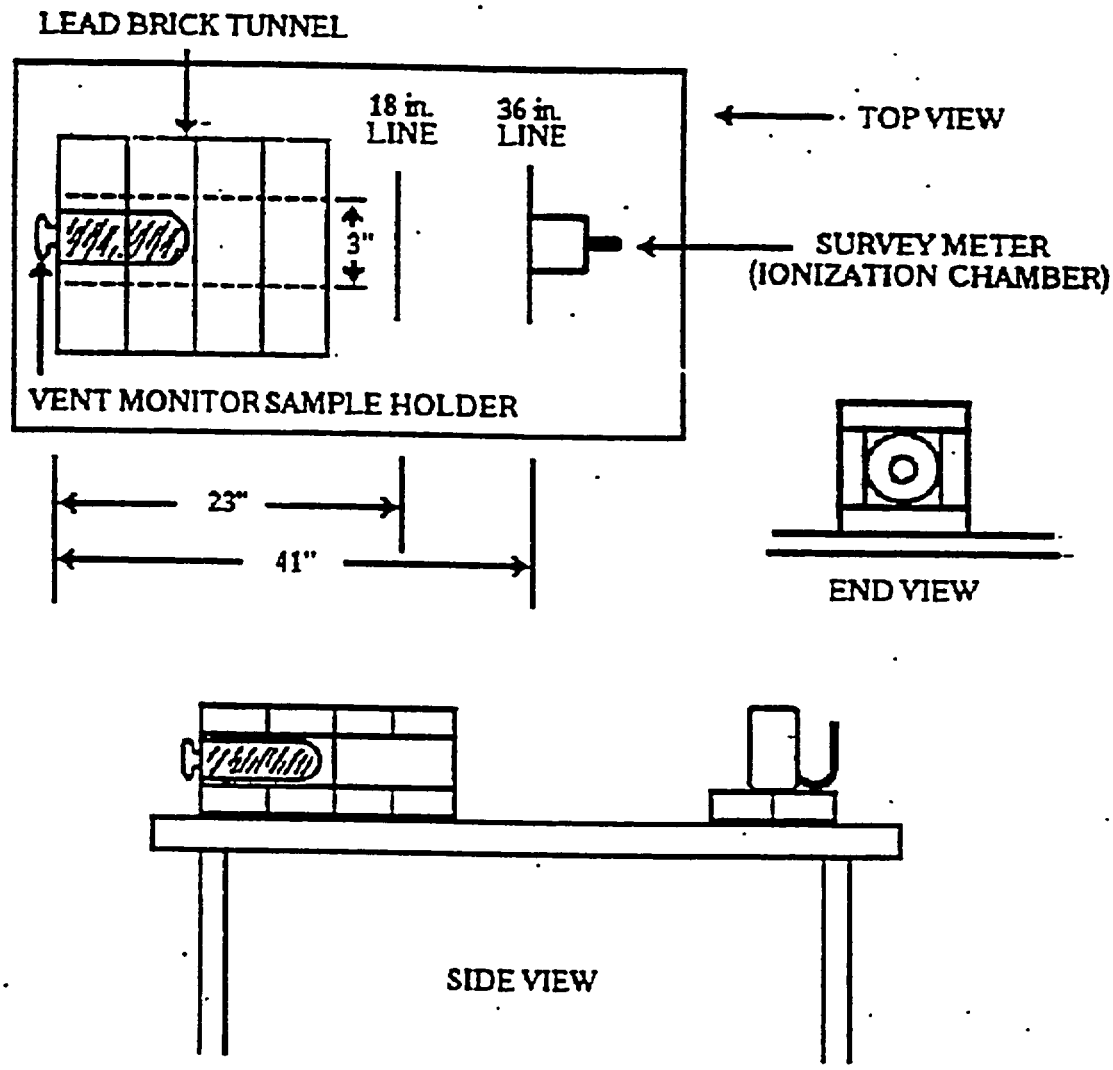
SPECIFIC TASKS:	HOW:	INITIALS
7. If required, obtain additional supplies for contamination control.	7a. Obtain the following supplies from the D-Con room: _____Step-off pads _____Herculite _____Duct tape _____Plastic booties _____Plastic gloves _____Protective Clothing _____Containers for used PC's	_____
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 Post Accident Sample Station (PASS) for sample collection. Secure PASS after sample(s) have been taken.

SPECIFIC TASKS:	HOW:	INITIALS
1. After briefing and assignment and following setup of appropriate Chemistry Lab, obtain necessary equipment.	1a. Obtain the following supplies: ____ Respiratory protection devices ____ Hi-range and extremity dosimetry ____ Survey meter (calibrated at highest range) ____ 18 gauge syringe needles for liquid samples ____ 25 gauge syringe needles for gas samples ____ Needle changing tool ____ Flashlight ____ Mirror ____ Stopwatch ____ Calculator ____ Numbered liquid sample vials ____ Numbered gas vials ____ Keys to PASS power switch and supply cabinet ____ Adjustable wrenches for changing gas bottles ____ 10 cc syringe ____ Luer-lok valves ____ Demineralized water ____ Watch ____ Pen and marker ____ Locking gas syringe with extended needle ____ Sample cask (If required for requested samples)	_____

SPECIFIC TASKS:	HOW:		INITIALS
2. If Iodine/Particulate sample requested, assemble cartridge retainer.		**NOTE:** **Direction of flow in retainer is through opening to particulate filter and cartridges and exiting through critical orifice.**	
	2a.	Align all iodine cartridges with arrow pointing in direction of flow (toward critical orifice).	_____
	2b.	Check critical orifice at closed end of retainer. 3 L/min orifice should be used unless otherwise directed by Chemistry Coordinator.	_____
	2c.	Assemble particulate/iodine cartridge retainer in the following order: O-ring, iodine cartridge, O-ring, iodine cartridge, O-ring, iodine cartridge, O-ring, aluminum ring spacer, O-ring, filter retainer assembly with 47 mm filter paper, screen, and retainer cap with O-ring cartridge retainer cap with two lightly greased O-rings	_____
	2d.	Record rated flow of installed orifice: Critical Orifice Flow _____ L/min	_____
	2e.	Ensure lightly greased O-rings are installed at both ends of cartridge retainer.	_____
3. Perform instrument checks on survey meter calibrated at highest range.	3a.	Check the following on survey meter: ____Calibration has not expired. ____Battery indication is good. ____Source check is satisfactory.	_____

SPECIFIC TASKS:	HOW:		INITIALS
4. Request Operations perform the following to activate PASS Sample Station:	4a.	Activate PASS Isolation Valve Panel Permissive Switch HS-12370 (HS-22370).	_____
	4b.	Open Outboard A RHR Heat Exchanger Vent Valve to Suppression Pool HV-151F103A (HV-251F103A).	_____
5. Record reactor pressure and RHR mode from TAB A.		**NOTE:** **To obtain representative liquid sample from Jet Pumps at low power conditions (<1%) for small pipe break or non-break events, reactor level must be raised to level of moisture separators. This will fully flood moisture separators and induce thermal recirculation for good mixing.**	
	5a.	Reactor Pressure _____ psig	_____
	5b.	RHR Mode:_____	
		(1) RHR Pump A&C In Service/ Out of Service. (Circle)	
		(2) RHR Pump B&D In Service/ Out of Service. (Circle)	_____
		NOTE: **RHR must be in the same mode of operation for thirty minutes prior to sampling.**	_____
	5c.	If reactor vessel is depressurized (<109 psig), sample reactor water from RHR in shutdown cooling or LPCI mode.	

SPECIFIC TASKS:	HOW:		INITIALS
	5d.	If sampling suppression pool, ensure RHR system is running in suppression pool cooling mode for a minimum of 30 minutes before collecting sample.	_____
6. Don protective clothing and respiratory protection as directed by Radiation Protection Coordinator.			_____
7. Ensure each team member present has required dosimetry.			_____
8. Ensure survey meter is on highest range.			_____
9. Notify Chemistry Coordinator before leaving Chemistry lab.			_____
10. Proceed to PASS via best route while continuously monitoring radiation levels and status of CAMs and ARMs.	10a.	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 mR/hr at any time. (2) Total annual whole body exposure (TEDE) approaches 2000 mrem.	_____
11. At PASS station, check area radiation levels and notify Chemistry Coordinator.	11a.	PASS general area radiation level. _____ mR/hr	_____
	11b.	Report radiation levels to the Chemistry Coordinator.	_____
12. Check alignment of switches on Control Panel 1C104A (2C104A).	12a.	Ensure Gas Sample Selector Switch HC-723 is set to position 4, SPARE.	_____
	12b.	Ensure all other switches are set to UP and OFF.	_____

SPECIFIC TASKS:	HOW:		INITIALS
13. Check switches on PASS Isolation Valve Control Panel 1C104D (2C104D).	13a.	Ensure PASS Isolation Valve Panel Permissive Switch HS-12371 (HS-22371) is set to OFF.	_____
	13b.	Ensure all other switches are set to OFF.	_____
14. Establish sample station ventilation.	14a.	Record Gas Sample Panel pressure: PI-123728(223728) _____ in. H_2O.	_____
	14b.	At top side of sample station 1C104C (2C104C), loosen wing nut and rotate handle 90° clockwise.	_____
	14c.	Tighten wing nut.	_____
	14d.	Record Gas Sample Panel pressure: PI-123728(223728) _____ in. H_2O.	_____
	14e.	If step 14a is NOT greater than step 14d, notify Chemistry Coordinator.	
15. If Demineralized Water Tank 1T-171 (2T-171) indicates less than 1/3 full on tank level sight glass LI-12368 (LI-22368), add water to above the 2/3 level.	15a.	Check closed Nitrogen Supply Valve 123242 (223242).	_____
	15b.	Open Makeup Water Supply Valves 123258 (223258) and 123239 (223261).	_____
	15c.	If excess pressure in tank prevents filling, perform the following:	
		(1) Remove vent line cap.	
		(2) Open Demin Tank Vent Valve 123251 (223251).	
		(3) After tank indicates greater than 2/3 full, close Demin Tank Vent Valve 123251 (223251).	
		(4) Replace vent line cap.	

SPECIFIC TASKS:	HOW:		INITIALS
		(5) Close Makeup Water Supply Valve 123239 (223261).	_____
16. Establish nitrogen supply as follows:	16a.	Open nitrogen tank valve 123330(223330) and check tank pressure.	_____
	16b.	If tank pressure is less than 500 psig, close tank valve, bleed pressure from regulator, and change nitrogen tank.	_____
17. Pressurize demineralized water tank.	17a.	Set regulator on nitrogen cylinder to approximately 100 psig on PI-12361 (PI-22361).	_____
	17b.	Check open two regulator discharge valves, 123331 (223331) and 123335 (223335)	_____
	17c.	Open nitrogen supply valves 123242 (223242) and 123249 (223249).	_____
	17d.	Check demineralized water tank pressure is between 95 and 105 psig on Demineralized Water Tank PI 12368 (22368).	_____
	17e.	Open valve 123244 (223244) from demineralized water tank to sample system.	_____
18. Line up PASS Isolation Valve Control Panel 1C104D (2C104D), perform applicable lineups.	18a.	Turn PASS Isolation Valve Panel Permissive Switch HS-12371 (HS-22371) to ON.	_____
	18b.	Turn Wetwell Return Valve Switch SV-12364 (SV-22364) to ON to open liquid return line to wetwell.	_____
	18c.	Turn Suppression Pool Isolation Valve Switch SV-12361 (SV-22361) to ON to open gas return line to suppression pool.	_____

SPECIFIC TASKS:	HOW:	INITIALS
19. Line up Control Panel 1C104A (2C104A).	19a. Slowly adjust Flow Control Valve PCV-627 until reading of approximately 15 psig is attained on adjacent pressure gauge.	_____
	NOTE: **Area Monitor RI-507, Liquid Monitor RI-665, and Cartridge Monitor RI-704 on Monitor Panel 1C104B (2C104B) may alarm upon startup.**	
	19b. Turn Control Panel Power Selector Switch HC-600 to position A or B, as required, for power.	_____
	19c. Press green light button of each monitor to reset alarm, as required.	_____

CAUTION

LIQUID PRESSURE PI-661 SHOULD BE LESS THAN 100 PSIG. PRESSURE GREATER THAN 100 PSIG INDICATES SUSPECTED LEAKAGE THROUGH ISOLATION VALVE. DO NOT PROCEED WITH PROCEDURE. NOTIFY CHEMISTRY COORDINATOR.

20. Ensure liquid return line to wetwell is open.	20a. Turn Liquid/Gas Selector Switch HC-700 to LIQD.	_____
	20b. Turn Flush System Switch HC-628-1 counterclockwise to position 6, FLUSH PIPING STATION.	_____
	20c. Turn Liquid Sample Source Selector Switch HC-626 to position 5, RHR ON BYPASS.	_____
	20d. Slowly adjust Flow Control Valve PCV-627 to obtain between 0.8 to 1.2 gpm on Sample Return Flow FI-664.	_____

SPECIFIC TASKS:	HOW:		INITIALS
	20e.	If unable to obtain flow on Sample Return Flow FI-664, notify Chemistry Coordinator.	_____
	20f.	Maintain flow for a minimum of 10 seconds to confirm liquid return line is open.	_____
	20g.	Turn Liquid Sample Source Selector Switch HC-626 to UP and OFF.	_____
	20h.	Turn Flush System Switch HC-628-1 to UP and OFF.	_____
	20i.	Turn Flow Control Valve PCV-627 counterclockwise to obtain approximately 0 psi on adjacent pressure gauge.	_____
21. Initiate collector drain/blowdown sequence to drain collector tank, trap, and sump.	21a.	Rotate Drain System Switch HC-715-1 clockwise through all positions, pausing for a minimum of 5 seconds in each position.	_____
	21b.	Ensure Drain System Switch HC-715-1 is placed in UP and OFF position to end sequence.	_____

NOTE (1):
Removable components that are common to both units may be used on either unit of the PASS. This includes (but is not limited to) items such as casks, vials, positioners, iodine cartridge retainers, and needle changing tools.

NOTE (2):
If unable to complete any step in the following sampling procedures, contact Chemistry Coordinator for further instructions.

SPECIFIC TASKS:	HOW:	INITIALS
22. Take required samples.	**HELP** **Small Volume Liquid Sample** **See TAB E**	
	HELP **Dissolved Gas Sample** **See TAB F**	
	HELP **Large Volume Liquid Sample** **See TAB F**	
	HELP **14.7 cc Gas Sample** **See TAB G**	
	HELP **Iodine/Particulate Sample** **See TAB H**	
23. At completion of sampling, secure sample station.	23a. Rotate Drain System Switch HC-715-1 clockwise through all positions, pausing for a minimum of 5 seconds in each position.	_____
	23b. Ensure Drain System Switch HC-715-1 is placed in UP and OFF position to end sequence.	_____
24. Secure Control Panel 1C104A (2C104A).	24a. Ensure Gas Sample Selector Switch HC-723 is set to position 4, SPARE.	_____
	24b. Ensure Liquid/Gas Selector Switch HC-700 is set to OFF.	_____
	24c. Ensure Control Panel Power Selector Switch HC-600 is set to OFF.	_____

SPECIFIC TASKS:		HOW:		INITIALS
		24d.	Ensure all other switches are set to UP and OFF.	_____
25	Secure PASS Isolation Valve Control Panel 1C104D (2C104D).	25a.	Ensure all switches other than HS-12371 (HS-22371) on panel 1C104D are set to OFF, and indicate closed.	_____
		25b.	Notify Chemistry Coordinator if any switch other than HS-12371 (HS-22371) indicates open or has dual indication.	_____
		25c.	Ensure PASS Isolation Valve Panel Permissive Switch HS-12371 (HS-22371) is set to OFF.	_____
26.	Secure nitrogen supply system.	26a.	Close nitrogen tank valve 123330 (223330).	_____
		26b.	Close nitrogen supply valve 123242 (223242).	_____
27.	Secure chiller.	27a.	Turn off gas chiller circulation pump, if applicable.	_____
		27b.	ENSURE OPEN petcock located on top of sight glass at rear of chiller.	_____
28.	Secure demineralized water tank.	28a.	Close Valve 123244 (223244) from demineralized water tank to sample system.	_____
		28b.	Perform step 15 of this tab to ensure proper demineralized water tank level.	_____
29.	Secure sample station vent damper on top right side of Sampler Panel 1C104C (2C104C).	29a.	Loosen wing nut and rotate handle 90° counterclockwise.	_____
		29b.	Tighten wing nut.	_____

SPECIFIC TASKS:	HOW:	INITIALS
30. Request Operations perform the following lineups to deactivate PASS Sample Station.	30a. Close Outboard A RHR Heat Exchanger Vent Valve to Suppression Pool HV-151F103A (HV-251F103A).	_____
	30b. Deactivate PASS Isolation Valve Panel Permissive Switch HS-12370 (HS-22370).	_____
31. Notify Chemistry Coordinator sampling is complete and sample station is secured.		_____
32. Return to In-plant Chemistry Lab.	32a. Transfer samples to In-plant Chemistry Lab using precautions to minimize personnel exposure. (1) If large volume liquid sample was taken, allow sample to remain in cask at PASS Sample Station unless otherwise directed. (2) If assistance required to transport small volume liquid cask, use lifting bar with S-hooks (located at PAVSS work area) and second person. Suspend cask from S-hook. (3) Notify Chemistry Coordinator upon arrival at In-plant Chemistry Lab.	_____
33. Analyze samples in accordance with appropriate procedures.	**HELP** **PASS Small Volume Liquid Sample(s)** **See TAB I**	
	HELP **PASS Dissolved Gas Sample(s)** **See TAB J**	

SPECIFIC TASKS:	HOW:	INITIALS
	HELP PASS 14.7 cc Gas Sample(s) See TAB K	
	HELP PASS Iodine/Particulate Sample(s) See TAB L	

MAJOR TASK:

Collect Small Volume Liquid Sample(s) from PASS.

SPECIFIC TASKS:	HOW:	INITIALS
1. Ensure Liquid/Gas Selector Switch HC-700 on Control Panel 1C104A (2C104A) is in LIQD position.		_____
2. If obtaining RHR sample, GO TO Step 5.		

CAUTION

INFORM CONTROL ROOM SAMPLING MAY INCREASE TOTAL CORE FLOW READING BY ≈ 5 x 10^6 LBM/HR. POWERPLEX SHOULD BE BLOCKED.

3. Notify Control Room PASS isolation valves to Jet Pump will be opened and instrument line excess flow check valves may trip.	3a. Maintain constant communication with Control Room until flow is established through sample station.	_____
	3b. Tripping of excess flow check valve is evidenced by dramatic drop in pressure on Liquid Pressure PI-661. PI-661 should show steady increase in pressure and level off at reactor pressure (approximately 1000 psig at 100% power). If tripping occurs during Jet Pump sampling, turn Flow Control Valve PCV-627 counterclockwise until adjacent pressure gauge reads 0 psi and request Operations reset flow check valve by depressing reset push button until red (open) indication returns.	_____
4. If sampling Jet Pump, perform applicable lineups.	4a. At PASS Isolation Valve Control Panel 1C104D (2C104D), place Jet Pump Isolation Valve Switch SV-12374 (SV-22374) to ON to open Jet Pump instrument line.	_____

SPECIFIC TASKS:	HOW:		INITIALS
	4b.	At Control Panel 1C104A (2C104A), turn Liquid Sample Source Selector Switch HC-626 to position 1, JET PUMP-ON BYPASS.	_____
	4c.	GO TO Step 6.	_____
5. If sampling RHR, perform applicable lineups.	5a.	At PASS Isolation Valve Control Panel 1C104D (2C104D), turn ONE of the following isolation valves to ON: (1) RHR Pump A&C Isolation Valve SV-12360 (SV-22360); OR (2) RHR Pump B&D Isolation Valve SV-12362 (SV-22362)	_____
	5b.	At Control Panel 1C104A (2C104A), turn Liquid Sample Source Selector Switch HC-626 to position 5, RHR-ON BYPASS.	_____
6. Flush bypass line.	6a.	Ensure RHR system is running in the same mode for a minimum of 30 minutes before collecting sample.	_____
	6b.	To avoid tripping excess flow check valve, **slowly** turn Flow Control Valve PCV-627 clockwise to obtain between 0.8 to 1.2 gpm on Sample Return Flow FI-664.	_____
	6c.	Record start time of bypass flush. Bypass flush start time:_____	_____
		NOTE: **Perform Step 7 while flushing bypass line.**	

SPECIFIC TASKS:	HOW:	INITIALS

6d. Flush bypass line for appropriate time:

Sample	Minutes to Flush Unit 1	Unit 2
Jet Pump	14 min.	16 min.
A&C RHR	10 min.	9 min.
B&D RHR	14 min.	12 min.

6e. Record Sample Return Flow FI-664 and bypass flush duration.

(1) FI-664: _____ gpm

(2) Bypass flush duration: _____ minutes. _____

CAUTION

DO NOT SLIDE SHIELD DRAWER OUT BEYOND RED LINE AS INJURY MAY OCCUR.

7. While flushing bypass line, prepare Sampler Panel 1C104C (2C104C) for small volume liquid sample.

7a. Slide lead shielding drawer out on right side of Sampler Panel 1C104C (2C104C) to tape mark to expose sampling needles. _____

7b. Check condition of needles on right underside of Sampler Panel 1C104C (2C104C) using a mirror and flashlight. If needles are bent or missing:

(1) Install new needles using the needle changing tool.

(2) Tighten needles approximately 1/3 turn. Do not overtighten. _____

7c. Unscrew threaded handle under Sampler Panel 1C104C (2C104C) until handle is at upper right corner where leg meets base. This position will angle handle sleeve upwards and minimize interference with cask positioner. _____

SPECIFIC TASKS:	HOW:		INITIALS
	7d.	Place both guides of small volume cask positioner to inside of pivot slot.	_____
	7e.	Place small volume cask into cask positioner.	_____
	7f.	Remove stopper and carrying handle from cask.	_____
		NOTE: **Aluminum tab in top of bottle cap should be removed prior to insertion.**	
	7g.	Raise locking handle in slide and insert numbered sample bottle into cask.	_____
	7h.	Lower locking handle to lower bottle into cask.	_____
	7i.	Swing cask into position under Sampler Panel 1C104C (2C104C) until flush with lower plate.	_____
		NOTE: **While supporting cask in place, latch safety chain and lower handle to horizontal position. Threaded bolt should fit into groove in positioner bracket with welded washer on outside.**	
8. After bypass line flush (Step 6) is complete, flush sample line.	8a.	Adjust Flow Control Valve PCV-627 to obtain between 0.2 to 0.4 gpm on Sample Return Flow FI-664.	_____
	8b.	Turn Liquid Sample Source Selector Switch HC-626 to position 2, JET PUMP, <u>OR</u> position 4, RHR, for desired sample.	_____

SPECIFIC TASKS:	HOW:		INITIALS
	8c.	Record start time of sample flush. Sample flush start time: _____	_____
		NOTE: **Step 9 may be performed while flushing sample line.**	
	8d.	Flush sample line for approximately 10 minutes.	_____
9. Align small volume liquid sample bottle.	9a.	Loosen and raise locking handle on cask to position sample bottle onto needles.	
	9b.	While holding bottle in position on needles, tighten locking handle to secure sample bottle.	_____
	9c.	Ensure HC-616-1 Bottle In light indicates green.	_____
	9d.	As necessary, reposition bottle to get green light by loosening and tightening locking handle.	_____
	9e.	Record Sample Return Flow FI-664 and Liquid Monitor RI-665 radiation levels. (1) FI-664: _____ gpm (2) RI-665: _____ gpm	_____
	9f.	Near end of sample line flush, record Liquid Pressure PI-661, Liquid Sample Temperature TI-660, and Conductivity CI-663. (1) TI-660: _____ °F (2) PI-661: _____ psig	

SPECIFIC TASKS:	HOW:		INITIALS
		(3) CI-663: (_____) x 10 x (_____) scale = _____µmho/cm @ _____ °F	_____
10. After 10 minute flush of sample line (Step 8) is complete, collect small volume liquid sample.	10a.	If sample is to be taken only for pH, fill syringe with 10 cc of air.	_____
	10b.	If pH is not required, fill syringe with 9.9 ml of demineralized water.	_____
	10c.	Connect syringe and two Luer-Lok valves to flush line for Sample Valve 123247 (223247) on front of Sampler Panel 1C104C (2C104C).	_____
	10d.	Turn Small Volume Sample Switch HC-616-1 to position 1, TAKE SAMPLE. Ensure CV-616 indicates open.	_____
	10e.	Record sample date and time. Sample Date/Time: _____/_____	_____
	10f.	Open 2 Luer-Lok valves on front of Sampler Panel 1C104C (2C104C) and inject water (air for pH sample) into line.	_____
	10g.	Close Luer-Lok valves and remove syringe.	_____
	10h.	If demineralized water was injected into sample line, inject air to flush line.	_____
		(1) Fill syringe with air and reconnect syringe to Luer-Lok valves on front of Sampler Panel 1C104C (2C104C).	
		(2) Open two Luer-Lok valves and inject air into line.	

SPECIFIC TASKS:	HOW:		INITIALS
		(3) Close Luer-Lok valves and remove syringe.	_____
	10i.	Turn Small Volume Sample Switch HC-616-1 to UP and OFF.	_____
11. Flush sample line with demineralized water.	11a.	Adjust Flow Control Valve PCV-627 counterclockwise to obtain approximately 0 psi on adjacent pressure gauge.	_____
	11b.	Turn Small Volume Sample Switch HC-616-1 to position 3, FLUSH LOOP.	_____
	11c.	Turn Flow Control Valve PCV-627 clockwise to obtain a minimum of 0.5 gpm on Sample Return Flow FI-664. Flush sample line for at least 2 minutes or until Liquid Monitor RI-665 reaches a minimum value.	_____
	11d.	Turn Flow Control Valve PCV-627 counterclockwise to obtain approximately 0 psi on adjacent pressure gauge.	_____
	11e.	Turn Small Volume Sample Switch HC-616-1 to UP and OFF.	_____
	11f.	Turn Liquid Sample Source Selector Switch HC-626 to UP and OFF.	_____

CAUTION

REDUCE PERSONNEL EXPOSURE BY AVOIDING BEAM OF RADIATION STREAMING THROUGH CASK OPENING.

12. Secure small volume liquid sample.	12a.	Loosen locking handle on cask and lower sample vial.	_____
	12b.	Lower cask by loosening the cask handle positioner, removing safety chain and lowering cask positioner.	_____

SPECIFIC TASKS:	HOW:		INITIALS
	12c.	Close lead shield drawer on right side of Sampler Panel 1C104C (2C104C).	_____
13. Obtain dose rates on sample vial and cask.	13a.	Obtain dose rate (closed window) on sample vial at opening of shield plug.	
		Vial dose rate: _____ mR/hr	_____
	13b.	Install shield plug in cask.	_____
	13c.	Remove cask from cask positioner.	_____
	13d.	Remove cask positioner.	_____
	13e.	Obtain contact dose rate and dose rate at 12 inches from sample cask.	
		Cask dose rate: _____ mR/hr	
		Cask at 12 in.: _____ mR/hr	_____
14. Notify Chemistry Coordinator of sample vial and cask dose rates.			_____
15. If obtaining additional dissolved gas or liquid sample(s) **FROM SAME SAMPLE POINT**, GO TO Step 4 of applicable TAB.		**HELP** **Small Volume Liquid Sample** **See TAB E**	
		HELP **Dissolved Gas Sample** **See TAB F**	
		HELP **Large Volume Liquid Sample** **See TAB F**	_____
16. Turn sample isolation valve on PASS Isolation Valve Control Panel 1C104D (2C104D) to previous position.	16a.	If Jet Pump sample was taken, turn Jet Pump Isolation Valve SV-12374 (SV-22374) to OFF.	_____

SPECIFIC TASKS:	HOW:	INITIALS
	16b. If RHR sample was taken, turn the applicable isolation valve to OFF: (1) RHR Pump A&C Isolation Valve SV-12360 (SV-22360); OR (2) RHR Pump B&D Isolation Valve SV-12362 (SV-22362)	_____
17. Turn Liquid/Gas Selector Switch HC-700 on Control Panel 1C104A (2C104A) to OFF.		_____
18. If obtaining additional sample(s) from different sample point, GO TO applicable TAB.	**HELP** **Small Volume Liquid Sample** **See TAB E**	
	HELP **Dissolved Gas Sample** **See TAB F**	
	HELP **Large Volume Liquid Sample** **See TAB F**	
	HELP **14.7 cc Gas Sample** **See TAB G**	
	HELP **Iodine/Particulate Sample** **See TAB H**	
19. If all sampling is complete, GO TO TAB D, Step 24 to secure sample station.		_____

MAJOR TASK:

Collect Dissolved Gas Sample(s) and/or Large Volume Liquid Sample(s) from PASS.

SPECIFIC TASKS:	HOW:	INITIALS
1. Ensure Liquid/Gas Selector Switch HC-700 on Control Panel 1C104A (2C104A) is in LIQD position.		
2. If obtaining RHR sample, GO TO Step 5.		

CAUTION

INFORM CONTROL ROOM SAMPLING MAY INCREASE TOTAL CORE FLOW READING BY ≈ 5 x 10^6 LBM/HR. POWERPLEX SHOULD BE BLOCKED.

3. Notify Control Room PASS isolation valves to Jet Pump will be opened and instrument line excess flow check valves may trip.	3a. Maintain constant communication with Control Room until flow is established through sample station.	
	3b. Tripping of excess flow check valve is evidenced by dramatic drop in pressure on Liquid Pressure PI-661. PI-661 should show steady increase in pressure and level off at reactor pressure (approximately 1000 psig at 100% power). If tripping occurs during Jet Pump sampling, turn Flow Control Valve PCV-627 counterclockwise until adjacent pressure gauge reads 0 psi and request Operations reset flow check valve by depressing reset push button until red (open) indication returns.	
4. If sampling Jet Pump, perform applicable lineups.	4a. At PASS Isolation Valve Control Panel 1C104D (2C104D), check/place Jet Pump Isolation Valve SV-12374 (SV-22374) to ON to open Jet Pump instrument line.	

SPECIFIC TASKS:	HOW:		INITIALS
	4b.	At Control Panel 1C104A (2C104A), turn Liquid Sample Source Selector Switch HC-626 to position 1, JET PUMP-ON BYPASS.	_____
	4c.	GO TO Step 6.	_____
5. If sampling RHR, perform applicable lineups.	5a.	At PASS Isolation Valve Control Panel 1C104D (2C104D), turn ONE of the following isolation valves to ON: (1) RHR Pump A&C Isolation Valve SV-12360 (SV-22360); OR (2) RHR Pump B&D Isolation Valve SV-12362 (SV-22362)	_____
	5b.	At Control Panel 1C104A (2C104A), turn Liquid Sample Source Selector Switch HC-626 to position 5, RHR-ON BYPASS.	_____
6. Flush bypass line.	6a.	Ensure RHR system is running in the same mode for a minimum of 30 minutes before collecting sample.	_____
	6b.	To avoid tripping excess flow check valve, **slowly** turn Flow Control Valve PCV-627 clockwise to obtain between 0.8 to 1.2 gpm on Sample Return Flow FI-664.	_____
		NOTE: **Step 7 may be performed while flushing bypass line.**	
	6c.	Record start time of bypass flush. Bypass flush start time: _____	_____

SPECIFIC TASKS:	HOW:			INITIALS
	6d.	Flush bypass line for appropriate time:		
			Minutes to Flush	
		Sample	Unit 1	Unit 2
		Jet Pump	14 min.	16 min.
		A&C RHR	10 min.	9 min.
		B&D RHR	14 min.	12 min. _____
	6e.	Record Sample Return Flow FI-664 and bypass flush duration.		
		(1) FI-664: _____ gpm		
		(2) Bypass flush duration: _____ minutes.		_____

CAUTION

DO NOT SLIDE SHIELD DRAWER OUT BEYOND RED LINE AS INJURY MAY OCCUR.

7. While flushing bypass line, prepare Sampler Panel 1C104C (2C104C) for large volume liquid sample. Large volume liquid sample vial must be in place to collect dissolved gas sample.	7a.	Slide lead shielding drawer out on right side of Sampler Panel 1C104C (2C104C) to red line to expose sampling needles.	_____
	7b.	Check condition of needles on left underside of Sampler Panel 1C104C (2C104C) using a mirror and flashlight. If needles are bent or missing:	
		(1) Install new needles using the needle changing tool.	
		(2) Tighten needles approximately 1/3 turn. Do not overtighten.	_____
	7c.	Remove shield plug from large volume cask.	_____

SPECIFIC TASKS:	HOW:		INITIALS
	7d.	Push cask plunger down to raise sample holder. Insert a numbered sample bottle into cask holder.	_____
	7e.	Pull cask plunger up to lower sample bottle into cask.	_____
	7f.	Open valve on hydraulic cylinder to lower cask on cart. Roll cask into position under Sampler Panel 1C104C (2C104C), placing front edges of cart between alignment marks.	_____
	7g.	Place metal wedges under rear wheels of cart. Ensure cart cask plate remains flush against back wall.	_____
	7h.	Close valve on hydraulic cylinder.	
		(1) Using hydraulic pump, raise cask until top cask ring is inside and large volume cask is between 1/4 and 1/2 inch from bottom of Sampler Panel 1C104C (2C104C).	_____
8. After bypass line flush (Step 6) is complete, flush sample line.	8a.	Adjust Flow Control Valve PCV-627 to obtain between 0.2 and 0.4 gpm on Sample Return Flow FI-664.	_____
	8b.	Turn Liquid Sample Source Selector Switch HC-626 to position 2, JET PUMP, **OR** position 4, RHR, for desired sample.	_____
	8c.	Record start time of sample flush.	
		Sample flush start time: _____	_____
	8d.	Flush sample line for approximately 10 minutes.	_____

SPECIFIC TASKS:	HOW:		INITIALS
	8e.	Perform Steps 9 through 11 while completing sample line flush.	_____
9. While flushing sample line, insert large volume liquid sample bottle onto needles.	9a.	Push cask plunger down (without rotating) to mechanical stop to raise sample bottle out of cask, through bottle guide, and onto needles.	_____
		NOTE: **It may be necessary to withdraw the plunger, inspect, reposition lineup, and reinsert plunger to get green light.**	
	9b.	Ensure HC-601 Liq'd Bot'l In light indicates green.	_____
	9c.	Using hydraulic pump, raise cask until cask just touches bottom of Sampler Panel 1C104C (2C104C).	_____
10. While flushing sample line, ensure Dissolved Gas Collection Chamber is leak tight.	10a.	Confirm Dissolved Gas Pressure PI-662 is between 13.5 to 15.5 psia.	_____
	10b.	If Dissolved Gas Pressure PI-662 is NOT between 13.5 to 15.5 psia, unscrew gas extension arm and inspect septum.	
		(1) Use needle or sharp object to remove septum and metal compression washer from gas extension arm.	
		(2) Reinstall metal washer, replace septum, as required. Septum should be inserted after the metal compression washer into end of gas extension arm.	
		(3) Install gas extension arm.	_____

SPECIFIC TASKS:	HOW:	INITIALS
	10c. Turn Dissolved Gas and Liquid Sample Switch HC-601 to position 1, START P-701 AND INSERT NEEDLE. (START P-701 & FLOW.) (Do not insert needle into gas collection chamber.)	_____
	10d. After Dissolved Gas Pressure PI-662 stabilizes, turn Dissolved Gas and Liquid Sample Switch HC-601 to UP and OFF.	_____
	10e. If Dissolved Gas Pressure PI-662 increases more than 0.1 psia/min, air leak into gas collection chamber is indicated. Perform the following: (1) Tighten or replace septum in accordance with Step 10b and repeat Steps 10c through 10e. (2) If septum is replaced and pressure increases are still observed, air leak in a valve or fitting is indicated. Notify Chemistry Coordinator.	_____
	NOTE: **If Dissolved Gas Collection Chamber can <u>NOT</u> be evacuated to < 6.4 psia, vacuum pump P-701 may require rebuilding or replacement. Notify Chemistry Coordinator.**	
	10f. Confirm Dissolved Gas Pressure PI-662 indicates < 6.4 psia.	_____
11. While flushing sample line, record readings for large volume liquid sample.	11a. Record Sample Return Flow FI-664 and Liquid Monitor RI-665 radiation levels. (1) FI-664: _____ gpm	

SPECIFIC TASKS:	HOW:		INITIALS
		(2) RI-665: _____ gpm	_____
	11b.	Near end of sample line flush, record Liquid Sample Temperature TI-660, Liquid Pressure PI-661, and Conductivity CI-663.	
		(1) TI-660: _____ °F	
		(2) PI-661: _____ psig	
		(4) CI-663: (_____) x 10 x (_____) scale = _____µmho/cm @ _____ °F	_____
12. After sample line flush (Step 8) is complete, air purge gas collection chamber for dissolved gas readings.	12a.	Turn Dissolved Gas and Liquid Sample Switch HC-601 to position 1, START P-701 & INSERT NEEDLE. (START P-701 & FLOW.)	_____
	12b.	Insert extended needle (open ended without syringe) through septum in gas extension arm on left side of Sampler Panel 1C104C (2C104C) into gas collection chamber to purge air through chamber. Dissolved Gas Pressure PI-662 may increase while purging.	_____
	12c.	Turn Dissolved Gas and Liquid Sample Switch HC-601 to position 2, START P-601, and operate for 20 minutes.	_____
	12d.	Turn Dissolved Gas and Liquid Sample Switch HC-601 to position 3, CIRC & SEPARATE GAS, for approximately 30 seconds.	_____
	12e.	Record Sample Date/Time.	
		Sample Date/Time: _____/_____	_____

SPECIFIC TASKS:	HOW:	INITIALS
	12f. Turn Dissolved Gas and Liquid Sample Switch HC-601 to position 4, REMOVE NEEDLE (CIRC & SEPARATE GAS). (1) Remove extended needle from gas collection chamber. (2) Allow Dissolved Gas Pressure PI-662 to stabilize to a value < 6.45 psia.	_____
	12g. Turn Dissolved Gas and Liquid Sample Switch HC-601 to position 5, CIRC & SEPARATE. When Dissolved Gas Pressure PI-662 stabilizes at < 6.45 psia, record as Initial Dissolved Gas Pressure (P_o). PI-662 (P_o): _____ psia	_____
	NOTE: **Timed step.**	
	12h. Turn Dissolved Gas and Liquid Sample Switch HC-601 to position 6, COLLECT DISSOLVED GAS, for approximately 5 seconds.	_____
	12i. Turn Dissolved Gas and Liquid Sample Switch HC-601 to position 7, CIRCULATE AGAIN, for approximately 10 seconds.	_____
	12j. Turn Dissolved Gas and Liquid Sample Switch HC-601 to position 8, COL'CT DIS'LVD GAS AGAIN, for approximately 5 seconds. Record Dissolved Gas Pressure PI-662 after reading stabilizes. PI-662: _____ psia	_____

SPECIFIC TASKS:	HOW:		INITIALS
	12k.	Repeat Steps 12i and 12j until the difference between consecutive pressure readings taken from Dissolved Gas Pressure PI-662 at position 8 is less than 0.2 psia.	_____
	12l.	Turn Dissolved Gas and Liquid Sample Switch HC-601 to position 9, RELIEVE PRESS/TAKE GAS SAMPLE. Record Final Dissolved Gas Pressure PI-662 (P_f) and final liquid temperature TI-660 (T_f). PI-662 (P_f): _____ psia TI-660 (T_f): _____ °F	_____

CAUTION

HAND CONTACT WITH SYRINGE WHILE PULLING GAS SAMPLE SHOULD NOT EXCEED 30 SECONDS DUE TO POTENTIALLY HIGH DOSE RATE.

13.	If NOT collecting a dissolved gas sample, GO TO Step 15. To collect dissolved gas sample, perform the following:		
	13a.	Ensure extended needle is installed on gas tight syringe.	_____
		NOTE: **Radiation monitoring of syringe while pulling sample is required for quick detection of high dose rates.**	
	13b.	Press green button in to unlock syringe and depress plunger until fully inserted.	_____
	13c.	Insert extended needle of syringe through septum via needle guide into gas collection chamber on left side of Sampler Panel 1C104C (2C104C).	_____

SPECIFIC TASKS:	HOW:	INITIALS
	CAUTION **HIGH RADIATION POTENTIAL. READ STEPS 13.d AND 13.e BEFORE CONTINUING.**	
	13d. Pull plunger out to collect 5 cc gas sample.	_____
	13e. If radiation level exceeds 1500 mR/hr at syringe, perform the following: (1) Depress plunger to inject sample back into gas collection chamber. (2) Turn HC-652 left to LOWER PRES. (3) Discard needle and syringe. High dose rate in syringe indicates water in syringe. Repeat Steps 12 and 13 to collect dissolved gas sample, if required.	_____
	13f. Press red button in to lock syringe. Do not withdraw needle.	_____
	13g. If Dissolved Gas Pressure PI-662 is > 14.7 psia, turn HC-652 left to LOWER PRES and hold to relieve pressure in gas collection chamber.	_____
	13h. Remove syringe and extended needle from Sampler Panel 1C104C (2C104C).	_____
	13i. Remove extended needle from syringe.	_____
14. Obtain dose rate on syringe.	14a. Obtain contact dose rate (closed window) on syringe. Syringe dose rate: _____ mR/hr	_____

SPECIFIC TASKS:	HOW:		INITIALS
15. Complete sampling sequence.	15a.	Turn Dissolved Gas and Liquid Sample Switch HC-601 to position 10, TAKE LIQUID SAMPLE. Ensure Gas Pump P-701 is running.	_____
	15b.	If large volume liquid sample is required, press and hold sample button HC-629-1 (PRESS FOR LIQ'D SAMPLE) for a minimum of 10 seconds. Ensure CV-629 indicates open.	_____
	15c.	Turn Dissolved Gas and Liquid Sample Switch HC-601 to UP and OFF.	_____
	15d.	Turn Liquid Sample Source Selector Switch HC-626 to UP and OFF.	_____
16. Flush sample line with demineralized water.	16a.	Adjust Flow Control Valve PCV-627 counterclockwise to obtain approximately 0 psi on adjacent pressure gauge.	_____
	16b.	Turn Liquid Sample Source Selector Switch HC-626 to position 4, RHR.	_____
	16c.	Turn Flush System Switch HC-628-1 to position 2, START FLUSH.	_____
	16d.	Adjust Flow Control Valve PCV-627 to obtain a minimum of 0.5 gpm on Sample Return Flow FI-664.	_____
	16e.	Flush sample line until Liquid Monitor RI-665 reaches a minimum value (approx. 5 min.).	_____
	16f.	Turn Flush System Switch HC-628-1 to position 3, FLUSH V-610 LOOP. Flush sample line until Liquid Monitor RI-665 reaches a minimum value (approx. 3 min.).	_____

SPECIFIC TASKS:	HOW:		INITIALS
	16g.	Turn Flush System Switch HC-628-1 to position 4, FLUSH P-601 LOOP. Flush sample line until Liquid Monitor RI-665 reaches a minimum value (approx. 3 min.).	_____
	16h.	Turn Flush System Switch HC-628-1 to position 6, FLUSH PIPING STATION. Flush piping station for 5 minutes.	_____
	16i.	Turn Flush System Switch HC-628-1 to position 7, FLUSH CV-622 LOOP. Flush sample line until Liquid Monitor RI-665 reaches a minimum value (approx. 3 min.).	_____
	16j.	If Liquid Monitor RI-665 dose rate is > 2 R/hr, turn Flush System Switch HC-628-1 to position 2, START FLUSH. Repeat Steps 16e through 16i twice to flush system OR until two consecutive flush cycles achieve no significant reduction in dose rate.	_____
	16k.	Turn Liquid Sample Source Selector Switch HC-626 to UP and OFF.	_____
	16l.	Turn Flush System Switch HC-628-1 to UP and OFF.	_____
	16m.	Turn Flow Control Valve PCV-627 counterclockwise to obtain approximately 0 psi on adjacent pressure gauge.	_____
17. Secure large volume liquid sample cask.	17a.	Pull plunger handle up to lower liquid sample bottle into large cask. Do not turn plunger handle to avoid bending needles.	_____

SPECIFIC TASKS:	HOW:		INITIALS
	17b.	If plunger fails to withdraw and clear bottle guide, loosen and retighten valve on hydraulic cylinder to lower cask 1/4 to 1/2 inch.	_____
	17c.	Open valve on hydraulic cylinder to lower cask on cart.	_____
	17d.	Slide lead shield drawer into enclosure to cover needle opening.	_____

CAUTION

REDUCE PERSONNEL EXPOSURE BY AVOIDING BEAM OF RADIATION STREAMING THROUGH CASK OPENING.

	17e.	Remove wedges from cart wheels. Roll cask away from Sampler Panel 1C104C (2C104C).	_____
18. If large volume liquid sample was collected, obtain dose rates on sample bottle and cask.	18a.	Obtain dose rate (closed window) at opening of shield plug. Bottle dose rate: _____ mR/hr	_____
	18b.	Install shield plug in cask.	_____
	18c.	Obtain contact dose rate and dose rate at 12 inches from sample cask. Cask dose rate: _____ mR/hr Cask at 12 in: _____ mR/hr	_____
19. Notify Chemistry Coordinator of sample and cask dose rates.			_____
20. If obtaining additional dissolved gas or liquid sample(s) **FROM SAME SAMPLE POINT**, GO TO Step 4 of applicable TAB.		**HELP** **Small Volume Liquid Sample** **See TAB E**	

SPECIFIC TASKS:	HOW:	INITIALS
	HELP **Dissolved Gas Sample** **See TAB F**	
	HELP **Large Volume Liquid Sample** **See TAB F**	
21. Turn sample isolation valve on PASS Isolation Valve Control Panel 1C104D (2C104D) to previous position.	21a. If Jet Pump sample was taken, turn Jet Pump Isolation Valve SV-12374 (SV-22374) to OFF.	_____
	21b. If Jet Pump sample was taken, notify Control Room that Total Core Flow reading is no longer being affected. Powerplex monitors should be restored.	_____
	21c. If RHR sample was taken, turn the applicable isolation valve to OFF: (1) RHR Pump A&C Isolation Valve SV-12360 (SV-22360); OR (2) RHR Pump B&D Isolation Valve SV-12362 (SV-22362)	_____
22. Turn Liquid/Gas Selector Switch HC-700 on Control Panel 1C104A (2C104A) to OFF.		_____
23. If obtaining additional sample(s) **FROM DIFFERENT SAMPLE POINT,** GO TO applicable TAB.	**HELP** **Small Volume Liquid Sample** **See TAB E**	
	HELP **Dissolved Gas Sample** **See TAB F**	

SPECIFIC TASKS:	HOW:	INITIALS
	HELP **Large Volume Liquid Sample** **See TAB F**	
	HELP **14.7 cc Gas Sample** **See TAB G**	
	HELP **Iodine/Particulate Sample** **See TAB H**	

24. If all sampling is complete, GO TO TAB D, Step 24 to secure sample station. _____

MAJOR TASK:

Collect 14.7 cc Gas Sample(s) from PASS.

SPECIFIC TASKS:	HOW:		INITIALS
1. Line up Containment gas analyzer isolation valves.	1a.	For a Secondary Containment samples, no line up is required, GO TO step 3a.	
	1b.	For all other samples, request Operations to open/check open the following hand switches on Panel 1C601 (2C601):	
		(1) For Drywell High and Wetwell #1 CONTN GAS ANLZR IB ISO LOOP A HS-15740A (HS-25740A) and CONTN GAS ANLZR OB ISO LOOP A HS-15742A (HS-25742A)	_____
		(2) For Drywell Mid and Wetwell #2 CONTN GAS ANLZR IB ISO LOOP B HS-15740B (HS-25740B) and CONTN GAS ANLZR OB ISO LOOP B HS-15742B (HS-25742B)	_____
2. Line up PASS Isolation Valve Control Panel.	2a.	Turn Suppression Pool Isolation Valve Switch SV-12361 (SV-22361) to ON to open gas return line to suppression pool.	_____

SPECIFIC TASKS:	HOW:		INITIALS
	2b.	At PASS Isolation Valve Control Panel 1C104D (2C104D), place the desired sample switch to ON.	
		(1) Drywell High Level Isolation Valve SV-12369 (SV-22369)	_____
		(2) Drywell Mid Level Isolation Valve SV-12368 (SV-22368)	_____
		(3) Wetwell Gas Sample #1 Isolation Valve SV-12366 (SV-22366)	_____
		(4) Wetwell Gas Sample #2 Isolation Valve SV-12365 (SV-22365)	_____
3. Prepare Control Panel 1C104A (2C104A) for gas sample.	3a.	Turn Liquid/Gas Selector Switch HC-700 to GAS.	_____
	3b.	Place gas chiller in service as follows:	
		(1) CHECK sight glass located at rear of chiller for water level	_____
		(2) If the sight glass is full, CLOSE the petcock on top of the sight glass, and go to step 8	_____
		(3) If the water level is low, OPEN PASS Gas Cooler Chilled Water Bypass Vlv. 123329 (223329) located inside chiller housing.	_____
		(4) SLOWLY OPEN 1/4 turn, PASS Chilled Water Makeup Iso. Vlv. 123252 (223252).	_____
		(5) When sight glass filled, CLOSE Vlv. 123252 (223252).	_____

SPECIFIC TASKS:	HOW:		INITIALS
		(6) CLOSE petcock on top of sight glass.	_____
		(7) SET PASS Gas Cooler Chilled Water Bypass Vlv 123329 (223329) by first closing the valve and then opening it 1/2 turn.	_____
		(8) Energize gas chiller circulation pump by turning toggle switch on back of chiller housing to ON.	_____
		(9) Check tubing becomes cool in approximately 5 minutes.	_____
4. If iodine/particulate sample NOT requested, GO TO Step 4e. If iodine/particulate sample requested, GO TO Step 4a.	4a.	Pull out particulate/iodine drawer and remove cartridge retainer, if applicable.	_____
	4b.	Place filter paper end of recently assembled retainer at back of drawer.	_____
		NOTE: **If good seal is not obtained between retainer and drawer, air inleakage will occur and invalidate sample.**	
	4c.	Turn round knob on front of drawer clockwise to compress O-rings and obtain good seal between retainer and drawer.	_____
	4d.	Insert drawer into Sampler Panel 1C104C (2C104C) and hand tighten T-handle clockwise on front of drawer until HC-712 Cart'g In status light indicates green.	_____

SPECIFIC TASKS:	HOW:	INITIALS

4e. Turn Iodine Cartridge Sample Switch HC-712 counterclockwise to position 4, EVACUATE CARTRIDGE. _____

NOTE:
Complete Steps 4f, 4g, and 4h even if criteria not met.

4f. Confirm Gas Circulation Pressure PI-726 stabilizes between 15 to 25 inches Hg Vac after a short time. _____

4g. After cartridge is evacuated, rapidly turn Iodine Cartridge Sample Switch HC-712 clockwise to UP and OFF. _____

NOTE:
It may be necessary to adjust retainer knob and drawer T-handle and repeat Steps 4e-4h to get steady vacuum.

4h. Confirm steady vacuum is obtained on Gas Circulation Pressure PI-726 by observing that pressure does not increase more than 5 inches Hg in one minute. _____

NOTE:
If criteria of Steps 4f, 4g, or 4h NOT met, inspect cartridge retainer sealing surfaces.

(1) Pull drawer out of panel and remove cartridge.

(2) Replace and/or lightly grease O-rings located on both ends of retainer and on inside edge of retainer cap.

(3) Repeat Steps 4b-4h.

SPECIFIC TASKS:	HOW:		INITIALS
5. Install gas sample vial.	5a.	Apply light coat of vacuum grease to gas vial rubber septum.	
	5b.	Place gas vial into gas vial positioner. Install positioner into gas port, rotating positioner as necessary to obtain green light.	
	5c.	Ensure HC-705 Bottle In status light indicates green.	_____
	5d.	If unable to obtain green HC-705 Bottle In light, inspect gas vial needle. If needle is missing or bent, install new needle.	
6. At Control Panel 1C104A (2C104A), turn Gas Sample Selector Switch HC-723 to desired sample location.	6a.	Position 1, Drywell ATMOS	_____
	6b.	Position 2, SUP'N POOL ATMOS	_____
	6c.	Position 3, 2nd Cont'mt ATM	_____

CAUTION

SAMPLE STATION RADIATION LEVELS MAY INCREASE DURING SAMPLE COLLECTION. MAINTAIN DISTANCE FROM SAMPLE STATION TO REDUCE PERSONNEL EXPOSURE.

7. Flush sample lines.	7a.	Turn Gas Sample Switch HC-705 to position 2, CIRCULATE GAS.	_____
	7b.	Record start time of sample flush.	
		Sample flush start time: _____	_____

SPECIFIC TASKS:	HOW:	INITIALS

7c. Determine sample flush time by dividing the flush factor in the table below by the FI-725 flow rates, and flush sample line accordingly. _____

NOTE:
FI-725 does not have a "zero" graduation. If the ball is at rest at the bottom of the indicator, then there is no flow. If there is flow, it can be quantified by reading from the "10" graduation at 2 SCFH per graduation. Read flow at center of ball.

	Flush Factors	
Sample	Unit 1	Unit 2
Wetwell #1	172	134
Wetwell #2	293	287
Drywell - High	159	185
Drywell - Mid	262	306
Sec. Containment	13	16

7d. Record Gas Circulation Flow FI-725 and sample flush duration.

(1) FI-725: _____ SCFH

(2) Sample flush duration:

$$\frac{\text{Flush Factor}}{\text{FI-725}} = \frac{(\quad)}{(\quad)} =$$

_____ minutes. _____

7e. Near end of sample line flush, record Gas Discharge Pressure PI-727 and Gas Sample Temperature TI-724.

(1) PI-727: _____ psig

(2) TI-724: _____ °F _____

SPECIFIC TASKS:	HOW:	INITIALS
8. After sample line flush (Step 7) is complete, obtain gas sample.	8a. Turn Gas Sample Switch HC-705 to position 3, EVACUATE BOTTLE.	_____
	(1) Ensure Gas Circulation Flow FI-725 decreases to indicate no flow.	_____
	(2) Record Initial Sample Gas Pressure PI-708 (P_o). PI-708 (P_o): _____ psia	_____
	8b. Turn Gas Sample Switch HC-705 to position 4, TAKE SAMPLE.	
	(1) Ensure Sample Gas Pressure PI-708 has NOT increased more than 1 psia from Step 8a.	
	(2) If significant pressure increase occurs, system leak is indicated. Replace gas sample bottle and repeat Steps 5 through 8b.	_____
	8c. Press and hold gas sample pushbutton HC-720 (PRESS FOR SAMPLE) until steady reading on Sample Gas Pressure PI-708 is seen (about 30 seconds).	_____
	8d. Record Sample Date/Time, Final Sample Gas Pressure PI-708 (P_f), and Cartridge Monitor RI-704.	
	(1) Sample Date/Time:____/____	
	(2) PI-708 (P_f): _____ psia	
	(3) RI-704: _____ mR/hr	_____

SPECIFIC TASKS:	HOW:		INITIALS
	8e.	Turn Gas Sample Switch HC-705 to position 5, FLUSH SYSTEM. Flush sample line for approximately 1 minute or until Cartridge Monitor RI-704 reaches a minimum value.	_____
	8f.	Turn Gas Sample Switch HC-705 to UP and OFF.	_____
	8g.	Turn Gas Sample Selector Switch HC-723 to position 4, SPARE.	_____

CAUTION

MAINTAIN GAS VIAL A SUFFICIENT DISTANCE FROM ALL INDIVIDUALS TO REDUCE PERSONNEL EXPOSURE.

9. Withdraw gas vial positioner.	9a.	Unlock gas vial positioner and remove from gas port.	_____
	9b.	Quickly insert gas vial into gas vial cask.	_____

CAUTION

REDUCE PERSONNEL EXPOSURE BY AVOIDING BEAM OF RADIATION STREAMING THROUGH CASK OPENING.

10. Obtain dose rates on gas vial and cask.	10a.	Obtain dose rate (closed window) on gas vial (through notched side opening), and report to Chemistry Coordinator. Vial dose rate: _____ mR/hr	_____
	10b.	Obtain contact dose rate and dose rate at 12 inches from sample cask. Cask dose rate: _____ mR/hr Cask at 12 in: _____ mR/hr	_____
11. Notify Chemistry Coordinator of bottle and cask dose rates.			_____

SPECIFIC TASKS:	HOW:	INITIALS
12. If obtaining additional 14.7 cc gas sample or particulate/iodine sample(s) **FROM SAME SAMPLE POINT**, GO TO Step 4 of this TAB.	**HELP** **14.7 cc Gas Sample** **See TAB G** **HELP** **Particulate/Iodine Sample** **See TAB H**	
13. If additional gas samples are required from a different source, GO TO Step 1.		_____
14. If no additional samples are required, notify Operations appropriate Containment Gas Analyzer Isolation Valves opened in Step 1 may be closed.	**NOTE:** **No valve manipulation was required to obtain Secondary Containment Atmosphere Sample.**	_____
15. At PASS Isolation Valve Control Panel 1C104D (2C104D), turn isolation valve selected in Step 2 to OFF.		_____
16. Turn Liquid/Gas Selector Switch HC-700 on Control Panel 1C104A (2C104A) to OFF.		_____
17. If obtaining additional sample(s) from different sample point, GO TO applicable TAB.	**HELP** **Small Volume Liquid Sample** **See TAB E** **HELP** **Dissolved Gas Sample** **See TAB F** **HELP** **Large Volume Liquid Sample** **See TAB F**	

SPECIFIC TASKS:	HOW:	INITIALS
	HELP **14.7 cc Gas Sample** **See TAB G**	
	HELP **Iodine/Particulate Sample** **See TAB H**	

18. If all sampling is complete, GO TO TAB D, Step 24 to secure sample station.

MAJOR TASK:

Collect Iodine/Particulate Sample(s) from PASS.

SPECIFIC TASKS:	HOW:	INITIALS
1. If not previously performed, line up Containment gas analyzer isolation valves.	1a. For a Secondary Containment samples, no line up is required. GO TO step 3a.	
	1b. For all other samples, request Operations to open/check open the following hand switches on Panel 1C601 (2C601):	
	(1) For Drywell High and Wetwell #1 CONTN GAS ANLZR IB ISO LOOP A HS-15740A (HS-25740A) and CONTN GAS ANLZR OB ISO LOOP A HS-15742A (HS-25742A)	_____
	(2) For Drywell Mid and Wetwell #2 CONTN GAS ANLZR IB ISO LOOP B HS-15740B (HS-25740B) and CONTN GAS ANLZR OB ISO LOOP B HS-15742B (HS-25742B)	_____
2. Line up PASS Isolation Valve Control Panel.	2a. Turn Suppression Pool Isolation Valve Switch SV-12361 (SV-22361) to ON to open gas return line to suppression pool.	_____

SPECIFIC TASKS:	HOW:		INITIALS
	2b.	At PASS Isolation Valve Control Panel 1C104D (2C104D), place the desired sample switch to ON.	
		(1) Drywell High Level Isolation Valve SV-12369 (SV-22369)	_____
		(2) Drywell Mid Level Isolation Valve SV-12368 (SV-22368)	_____
		(3) Wetwell Gas Sample #1 Isolation Valve SV-12366 (SV-22366)	_____
		(4) Wetwell Gas Sample #2 Isolation Valve SV-12365 (SV-22365)	_____
3. Prepare Control Panel 1C104A (2C104A) for gas sample.	3a.	Turn Liquid/Gas Selector Switch HC-700 to GAS.	
	3b.	Turn on gas chiller circulation pump.	
		(1) Turn ON/OFF toggle switch on back panel of chiller unit to ON.	
		(2) Check tubing becomes cool to touch within approximately 5 minutes.	_____
4. Load recently assembled retainer in particulate/iodine drawer of Sampler Panel 1C104C (2C104C).	4a.	Pull out particulate/iodine drawer and remove cartridge retainer, if applicable.	_____
	4b.	Place filter paper end of recently assembled retainer at back of drawer.	_____
		NOTE: **If good seal is not obtained between retainer and drawer, air inleakage will occur and invalidate sample.**	

SPECIFIC TASKS:	HOW:	INITIALS
	4c. Turn round knob on front of drawer clockwise to compress O-rings and obtain good seal between retainer and drawer.	_____
	NOTE: **It may be necessary to reposition drawer while loosening and tightening T-handle to obtain green light.**	
	4d. Insert drawer into Sampler Panel 1C104C (2C104C) and hand tighten T-handle clockwise on front of drawer until HC-712 Cart'g In status light indicates green.	_____
	4e. Turn Iodine Cartridge Sample Switch HC-712 counterclockwise to position 4, EVACUATE CARTRIDGE.	_____
	NOTE: **Complete Steps 4f, 4g, and 4h even if criteria not met.**	
	4f. Confirm Gas Circulation Pressure PI-726 stabilizes between 15 to 25 inches Hg Vac after a short time.	_____
	4g. After cartridge is evacuated, turn Iodine Cartridge Sample Switch HC-712 clockwise rapidly to UP and OFF.	_____
	NOTE: **It may be necessary to adjust retainer knob and drawer T handle, and repeat Steps 4e-4h to get steady vacuum.**	

SPECIFIC TASKS:	HOW:		INITIALS
	4h.	Confirm steady vacuum is obtained on Gas Circulation Pressure PI-726 by observing that pressure does not increase more than 5 inches Hg in one minute.	_____
	4i.	If criteria of Step 4f, 4g, or 4h NOT met, inspect retainer sealing surfaces.	
		(1) Pull out drawer and remove retainer.	
		(2) Replace and/or lightly grease O-rings located on both ends of retainer and on inside edge of retainer cap.	
		(3) Repeat Steps 4b through 4h.	
5. At Control Panel 1C104A (2C104A), turn Gas Sample Selector Switch HC-723 to desired sample location.	5a.	Position 1, Drywell ATMOS	_____
	5b.	Position 2, SUP'N POOL ATMOS	_____
	5c.	Position 3, 2nd Cont'mt ATM	_____

CAUTION

SAMPLE STATION RADIATION LEVELS MAY INCREASE DURING SAMPLE COLLECTION. MAINTAIN DISTANCE FROM SAMPLE STATION TO REDUCE PERSONNEL EXPOSURE.

6. Flush sample lines.	6a.	Turn Iodine Cartridge Sample Switch HC-712 to position 2, CIRCULATE GAS.	_____
	6b.	Record start time of sample flush.	
		Sample flush start time: _____	_____

SPECIFIC TASKS:	HOW:	INITIALS

6c. Determine sample line flush time by dividing the sample flush factor from the table below by the FI-725 flow, and flush sample line accordingly.

NOTE:
FI-725 does not have a "zero" graduation. If the ball is at rest at the bottom of the indicator, then there is no flow. If there is flow, it can be quantified by reading from the "10" graduation at 2 SCFH per graduation. Read flow at center of ball.

Sample	Flush Factors Unit 1	Unit 2
Wetwell #1	172	134
Wetwell #2	293	287
Drywell - High	159	185
Drywell - Mid	262	306
Sec. Containment	13	16

(1) FI-725: _____ SCFH

(2) Sample flush duration:

$$\frac{\text{Flush Factor}}{\text{FI-725}} = \frac{(\quad)}{(\quad)} =$$

_____ minutes. _____

6d. At end of sample line flush, record Gas Circulation Pressure PI-726, Gas Discharge Pressure PI-727, Gas Sample Temperature TI-724, and Cartridge Monitor RI-704.

(1) PI-726: _____ psig

(2) PI-727: _____ psig

(3) TI-724: _____ °F

SPECIFIC TASKS:	HOW:		INITIALS
		(4) RI-704: _____ mR/hr	_____
	6e.	If Gas Circulation Pressure PI-726 and Gas Discharge Pressure PI-727 are NOT approximately the same, NOTIFY Chemistry Coordinator.	
7. After sample line flush is complete, obtain particulate/iodine sample.	7a.	Set Timed Sample Switch to YES.	_____
	7b.	Set Cartridge Sampler Timer KC-712 to 5 seconds.	_____
	7c.	Perform the following within 5 second time period set on timer:	
		(1) Turn Iodine Cartridge Sample Switch HC-712 to position 3, GAS THRU CARTRIDGE.	
		(2) Obtain Gas Circulation Pressure PI-726 and Gas Discharge Pressure PI-727 during timed sequence.	
		PI-726: _____ inches Hg Vac	
		PI-727: _____ inches Hg Vac	_____
	7d.	Record Sample Date/Time.	
		Sample Date/Time: _____/_____	_____
8. When timer has timed out, record Cartridge Monitor RI-704.	8a.	RI-704: _____ mR/hr	_____
9. If RI-704 does NOT exceed 25 mR/hr above background, obtain additional timed samples if requested by Chemistry Coordinator by:	9a.	To obtain additional timed samples using a stopwatch GO TO 9c.	
	9b.	To obtain additional timed samples using installed timer, perform the following:	
		(1) Turn Iodine Cartridge Sample Switch HC-712 to position 2, CIRCULATE GAS.	

SPECIFIC TASKS:	HOW:	INITIALS

(2) Reset Cartridge Sample Timer KC-712 for desired time (not to exceed 30 seconds).

(3) Turn Iodine Cartridge Sample Switch HC-712 to position 3, GAS THRU CARTRIDGE.

(4) After time interval has ended, observe Cartridge Monitor RI-704.

(5) Repeat Steps 9b.(1) through 9b.(4) until Cartridge Monitor RI-704 approaches 25 mR/hr above background or until total sampling time is 10 minutes.

(6) Turn Iodine Cartridge Sample Switch HC-712 to position 4, EVACUATE CARTRIDGE. _____

(7) GO TO 9d.

9c. To obtain additional timed samples using a stopwatch, perform the following:

(1) Turn Iodine Cartridge Sample Switch HC-712 to position 2, CIRCULATE GAS.

(2) Reset Cartridge Sample Timer KC-712 to 0.

(3) Set Timed Sample switch to NO.

(4) Simultaneously, start stopwatch AND turn Iodine Cartridge Sample Switch HC-712 to position 3, GAS THRU CARTRIDGE.

SPECIFIC TASKS:	HOW:	INITIALS
	(5) When Cartridge Monitor RI-704 approaches 25 mR/hr above background or when total sampling time is 10 minutes, simultaneously, stop stopwatch AND turn Timed Sample Switch to YES.	
	(6) After time interval has ended, observe Cartridge Monitor RI-704.	
	(7) Turn Iodine Cartridge Switch HC-712 to position 4, EVACUATE CARTRIDGE.	
	9d. Record total sampling time: Total Sample Time: _____ sec	_____
	9e. Turn Iodine Cartridge Sample Switch HC-712 to position 5, FLUSH CARTRIDGE. Purge cartridge for approximately 1 minute or until Cartridge Monitor RI-704 stabilizes.	_____
	9f. Record Cartridge Monitor RI-704 reading: RI-704: _____ mR/hr	_____
	9g. Turn Iodine Cartridge Sample Switch HC-712 to UP and OFF.	_____
	9h. Turn Gas Sample Selector Switch HC-723 to position 4, SPARE.	_____

SPECIFIC TASKS:	HOW:	INITIALS

CAUTION

KEEP CARTRIDGE RETAINER A MAXIMUM DISTANCE FROM ANY INDIVIDUAL TO REDUCE PERSONNEL EXPOSURE.

10. Withdraw cartridge retainer.

10a. Withdraw filter drawer and place cartridge retainer into plastic bag or suitable carrying device for transport to Chemistry Lab. _____

10b. Obtain contact dose rate (closed window) on cartridge retainer.

Retainer dose rate: _____ mR/hr _____

10c. Reload a cartridge retainer in accordance with TAB D, Step 2b-2e, if applicable. _____

10d. Place loaded retainer in drawer. Do not tighten retainer knob. _____

10e. Place drawer into sample panel, hand tightening T handle. _____

11. Notify Chemistry Coordinator of cartridge retainer dose rate. _____

12. If obtaining additional particulate/ iodine sample(s) **FROM SAME SAMPLE POINT**, GO TO Step 4 of this TAB.

HELP
14.7 cc Gas Sample
See TAB G

HELP
Particulate/Iodine Sample
See TAB H

_____

13. If iodine/particulate samples are required from a different source, GO TO Step 1 of this TAB. _____

SPECIFIC TASKS:	HOW:	INITIALS
14. If no additional samples are required, notify Operations appropriate Containment Gas Analyzer Isolation Valves opened in Step 1 may be closed.	**NOTE:** **No valve manipulation was required to obtain Secondary Containment Atmosphere Sample.**	
15. At Isolation Valve Control Panel 1C104D (2C104D), turn isolation valve selected in Step 2 to OFF.		_____
16. Turn Liquid/Gas Selector Switch HC-700 on Control Panel 1C104A (2C104A) to OFF.		_____
17. If obtaining additional sample(s) from different sample point, GO TO applicable TAB.	**HELP** **Small Volume Liquid Sample** **See TAB E**	
	HELP **Dissolved Gas Sample** **See TAB F**	
	HELP **Large Volume Liquid Sample** **See TAB F**	
	HELP **14.7 cc Gas Sample** **See TAB G**	
	HELP **Iodine/Particulate Sample** **See TAB H**	
		_____

SPECIFIC TASKS:	HOW:	INITIALS
18. If all sampling is complete, GO TO TAB D, Step 24 to secure sample station.		_____

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 0.1N 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 0.1N 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.	_____
		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	
	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.	_____

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 CONCENTRATIONS (continued)

III. DISSOLVED GAS CONCENTRATIONS, cont.

Dissolved Oxygen Concentration:

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

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

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

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 concentratiens 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:

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

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

$$= \_\_\_\_\_ \text{ cc @ STP}$$

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

Calculated Drywell Hydrogen Concentration:

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

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

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

Attachment A

14.7 CC GAS SAMPLE ANALYSIS (continued)

Calculated Oxygen Concentration:

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

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

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

Calculated Nitrogen Concentration:

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

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

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

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)

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

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

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:

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

= (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 µCi/cc					

Performed By	Date
Reviewed By	Date

MAJOR TASK:

Collect SPING Sample(s) from Vent Monitoring System on Reactor Building 818' E1.

SPECIFIC TASKS:	HOW:	INITIALS
1. After briefing and assignment and following setup of appropriate Chemistry Lab, obtain necessary equipment.	1a. Obtain the following supplies: ____Respiratory protection devices ____Hi-range and extremity dosimetry ____Survey meter ____Grab sample apparatus assembled with particulate filter and silver zeolite cartridge ____Stopwatch ____Tweezers ____Particulate filters ____Silver zeolite cartridges ____Plastic bags ____Plastic petri dishes ____Vent particulate/iodine sample holders assembled with particulate filter and silver zeolite cartridge ____2 lead vent sample holder pigs, each lined with a plastic bag ____Radiation tape ____Pen and marker ____Cart to transport listed equipment	_____
2. Perform instrument checks on survey meter.	2a. Check the following on survey meter: ____Calibration has not expired. ____Battery indication is good. ____Source check is satisfactory.	_____
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.		_____

SPECIFIC TASKS:	HOW:	INITIALS
6. Notify Chemistry Coordinator before leaving Chemistry lab.		_____
7. Proceed to SPINGs on Reactor Building 818' Elevation 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. At SPINGs, check area radiation levels and notify Chemistry Coordinator.	8a. SPINGs general area radiation level: _____ mR/hr	_____
	8b. Notify Chemistry Coordinator.	_____
9. Remove present iodine cartridge from applicable SPING.	9a. Turn Channel Selector thumbwheel of applicable monitor to 10. Record SPING designation, date/time, and stack flow from monitor LED. (1) SPING: _____ (2) Date/Time: _____/_____ (3) Stack Flow: _____ cc/min	_____
	9b. At applicable SPING, press FLUSH to start monitor flush. (1) Ensure V-2 indicates open. (2) Ensure V-5 indicates closed.	_____
	9c. Close V-1 and record sample time. Cartridge/Particulate Sample Time: _____/_____	_____
	9d. After 2 minutes, press vacuum pump STOP on monitor panel and press FLUSH on SPING.	_____

SPECIFIC TASKS:	HOW:	INITIALS
	9e. Check radiation level at front of sample ports and record. Radiation Level at sample ports: _____ mR/hr	_____
	9f. Loosen thumb screws and swing retaining bar aside.	
	(1) Place sample cask on floor below iodine port at center front of SPING.	_____

CAUTION

IF RADIATION LEVELS EXCEED 500 MR/HR ABOVE BACKGROUND DURING CARTRIDGE WITHDRAWAL, RETURN IODINE CARTRIDGE HOLDER TO ORIGINAL POSITION AND CONTACT CHEMISTRY COORDINATOR.

	(2) Start withdrawing iodine cartridge holder while monitoring area for quick detection of high dose rates.	
	(3) Grab end knob of iodine cartridge holder. Quickly withdraw holder and place sample end down inside plastic bags in sample cask.	
	(4) Seal bag in sample cask.	
	(5) Move sample cask away from sampling area.	
	(6) Record radiation level of iodine cartridge holder. Iodine Radiation Level: _____ mR/hr	_____
	9g. Install new iodine cartridge holder with silver zeolite cartridge in SPING iodine port.	_____

SPECIFIC TASKS:	HOW:	INITIALS
10. Remove present particulate filter from applicable SPING.	10a. Place sample cask on floor below particulate filter port on left front of SPING.	_____
	(1) Disconnect the alpha particulate detector cable on left front of SPING.	

CAUTION

IF RADIATION LEVELS EXCEED 500 MR/HR ABOVE BACKGROUND DURING FILTER WITHDRAWAL, RETURN PARTICULATE FILTER HOLDER TO ORIGINAL POSITION AND CONTACT CHEMISTRY COORDINATOR.

(2) Start withdrawing particulate filter holder while monitoring area for quick detection of high dose rates.

(3) Grab end knob of particulate filter holder. Quickly withdraw holder and place sample end down inside plastic bags in sample cask.

(4) Seal inner and outer bags in sample cask. Place cask in plastic bag and seal.

(5) Move sample cask away from sampling area.

(6) Record radiation level of particulate filter holder.

Particulate Radiation Level: _____ mR/hr _____

10b. Install new particulate filter holder in SPING filter port. _____

10c. Reinstall retaining bar on SPING monitor. _____

10d. Reconnect the alpha detector to the interface box. _____

SPECIFIC TASKS:	HOW:	INITIALS
11. Obtain grab sample from vent. If NOT obtaining grab sample from vent, GO TO Step 12.	11a. Install grab sample apparatus on applicable vent monitor. (1) Attach particulate inlet of grab sample apparatus to V-4. (2) Attach gas outlet of grab sample apparatus to V-3. (3) Ensure all stopcocks and valves on grab sample apparatus are open.	_____
	11b. Open V-3 and V-4.	_____
	11c. Press vacuum pump START on monitor panel and monitor area radiation levels. Record sample start time. Grab Sample Start Date/Time: _____/_____	_____
	11d. Turn Channel Selector thumbwheel of applicable monitor to 11. Record sample flow from monitor LED. Grab Sample Flow: _____ cc/min	_____
	11e. Secure grab sample apparatus after: (1) Contact readings with particulate/iodine clam shell of grab sample apparatus approaches 50 mR/hr above background; OR (2) total sample time approaches 5 minutes.	
	11f. Secure grab sample apparatus by: (1) Open V1 (2) Close gas outlet stopcock. (3) Close gas inlet stopcock.	

SPECIFIC TASKS:	HOW:		INITIALS
	(4)	Close remaining valves on grab sample apparatus.	_____
	11g.	Record Grab Sample Stop Date/Time Grab Sample Stop Date/Time: _____/_____	_____
	11h.	Close V-3 and V-4.	_____
	11i.	Disconnect grab sample apparatus from vent monitor. Place in plastic bag and seal.	_____
	11j.	Obtain contact dose rate (closed window) on grab sample. Grab Sample Dose Rate _____ mR/hr	_____
	11k.	GO TO 12c.	_____
12. Return SPING to service.	12a.	Open V-1.	_____
	12b.	Press vacuum pump START on monitor panel.	_____
	12c.	Record new SPING filter sample start date and time. Sample Start Date/Time: ____/____	_____
	12d.	Confirm the following lineups.	
	(1)	OPEN: Valve 1 Valve 5	
	(2)	CLOSED: Valve 2 Valve 3 Valve 4	
	(3)	OFF (DOWN): Calibration Switch All Maintenance Switches	

SPECIFIC TASKS:	HOW:			INITIALS
		(4)	ON: Sample Pump with indication of sample flow	
		(5)	NO FLOW: Through air purge flow meter	_____
13. Obtain contact dose rate on both vent sample casks.	13a. Obtain contact dose rate at center bottom of each sample cask.			
		(1)	If contact dose rate exceeds 2.5 R/hr above background, exit area immediately. Filter or cartridge contains more than 5 Curies activity.	
		(2)	If contact dose rate is < 2.5 R/hr above background, place sample cask(s) on cart and transport to Chemistry Lab.	
		(3)	Record contact dose rate of each sample cask.	
			Iodine Cask: _____ mR/hr	
			Particulate Cask: _____ mR/hr	_____
14. Notify Chemistry Coordinator of cask dose rates and return of vent monitor to operation.				_____
15. If obtaining additional Vent samples, perform the following:	15a. GO TO applicable TAB.			_____

HELP

SPING Sample(s)
See TAB M

HELP

PAVSS Sample(s)
See TAB N

SPECIFIC TASKS:	HOW:	INITIALS
	15b. Notify Chemistry Coordinator to arrange transport of vent samples to lab by additional technician, if available.	_____
16. If all vent sampling is complete, GO TO TAB O.		_____

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.

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:

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

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

= _____ 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 in the order shown 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 approximately 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.

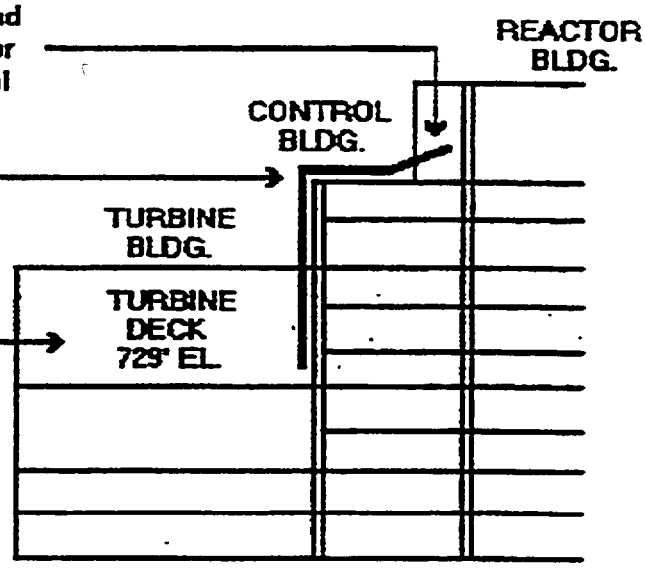
	18c.	Remove nuts in sample cart lid. Using lift bars and S-hook lid attachments, carefully raise lid off sample cart. Maximize distance from filter assembly to reduce personnel exposure.	_____
	18d.	Place cart lid on lid stand.	_____
		NOTE: **Attachment D may be reviewed for diagram of sample cart interior 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.	_____

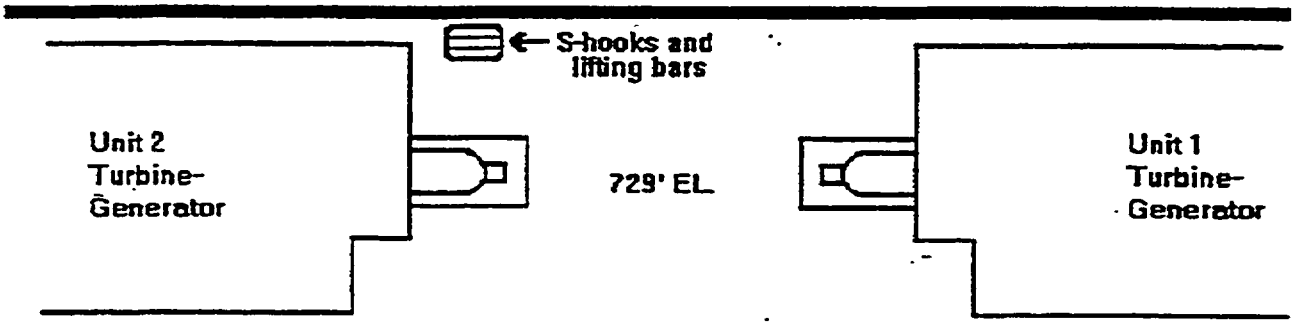
SPECIFIC TASKS:	HOW:	INITIALS
	18g. Using two pairs of 12 inch channel locks, separate filter assembly into halves. Remove iodine cartridge with tongs. (1) Place iodine cartridge in plastic bag and seal. (2) Obtain contact dose rate (closed window) on iodine cartridge and record. Iodine Cartridge: _____ 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. GO TO 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, GO TO TAB P.		

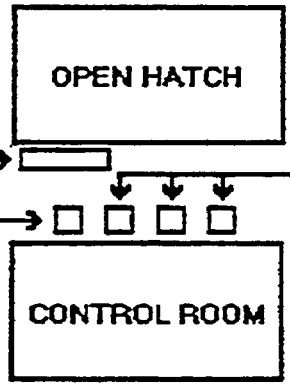
Attachment A
LOCATION OF PAVSS CONTROL PANELS AND NOBLE GAS MONITORS

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.



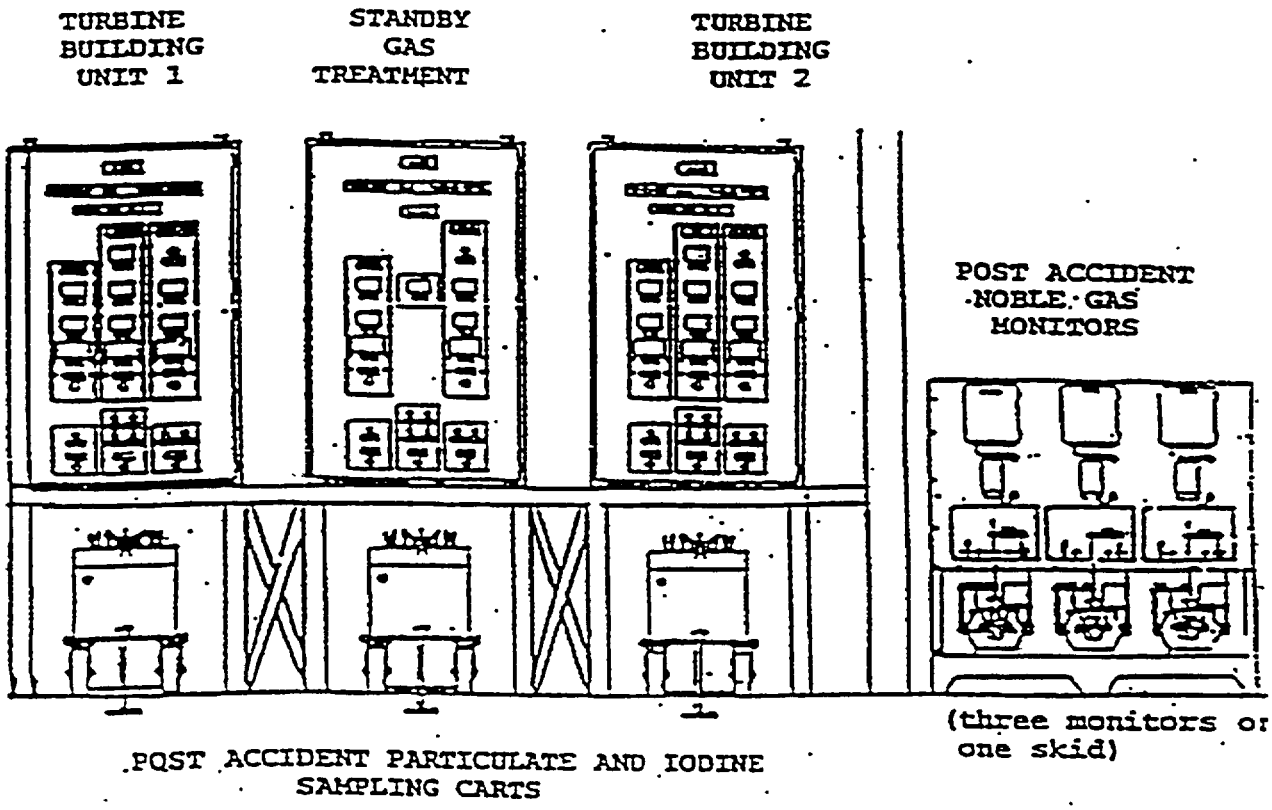


5. Eberline Display Panels relay noble gas data to SPING Terminals in Control Room and TSC.
6. Noble Gas Monitor with mid and high range detectors for each of three vents.



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

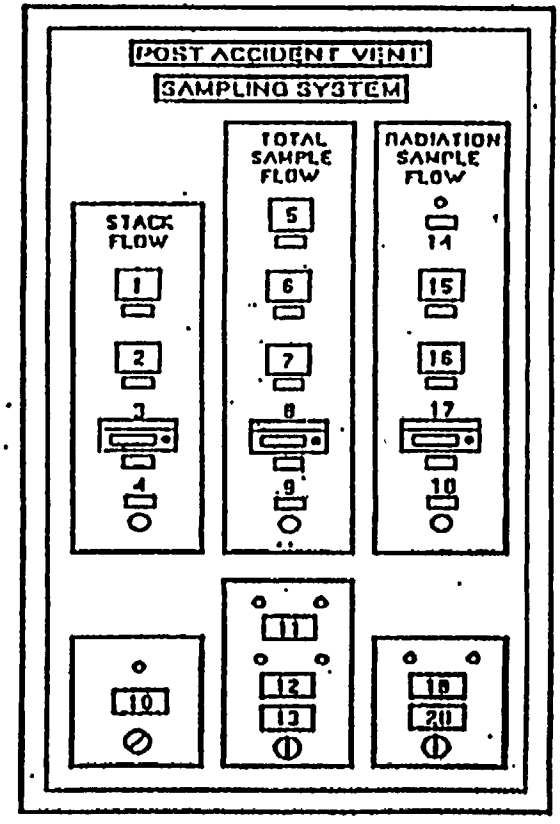
Attachment B
POST ACCIDENT VENT SAMPLING SYSTEM



Attachment C

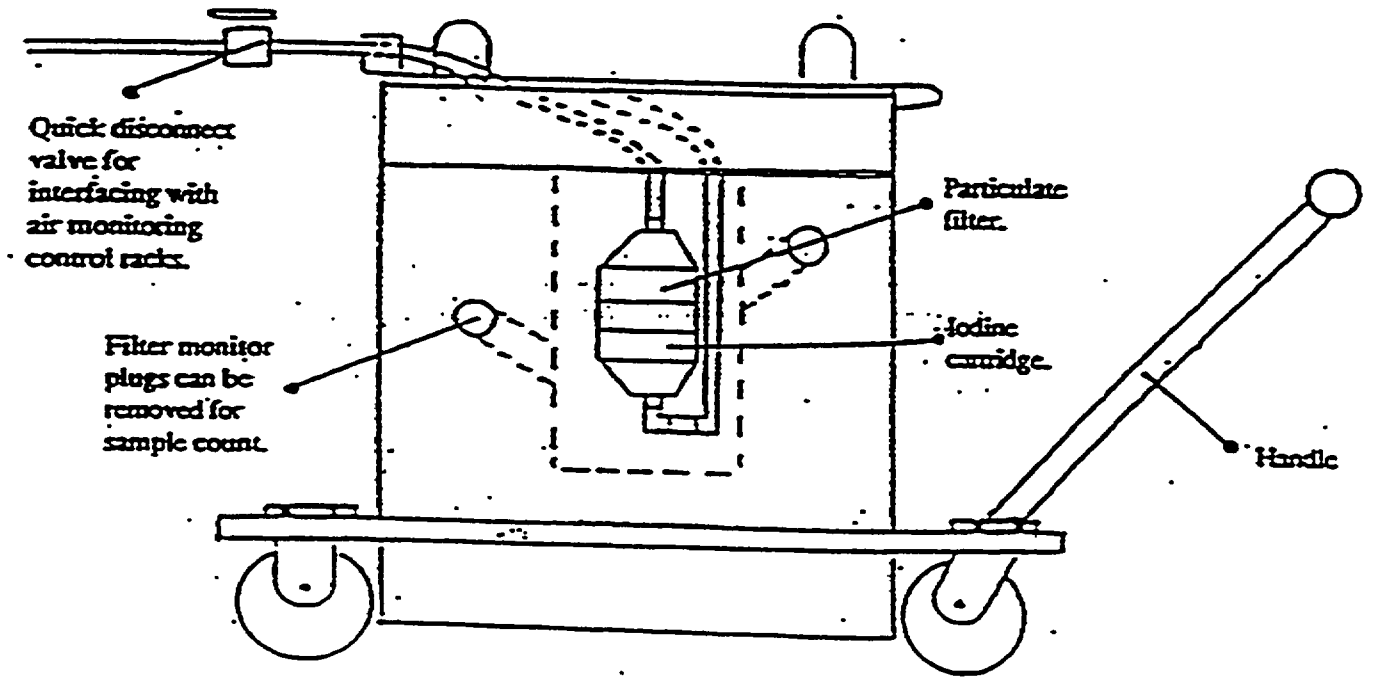
Panel 0C250 - Standby Gas Treatment System
Panel 1C250 - Unit 1 Turbine Building
Panel 2C269 - Unit 2 Turbine Building

1. Stack Flow - Velocity - FPM FI-X6562A
2. Stack Flow - CFM FI-X6562B - TB1/2 (CFM x 100) FI-06562B - 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



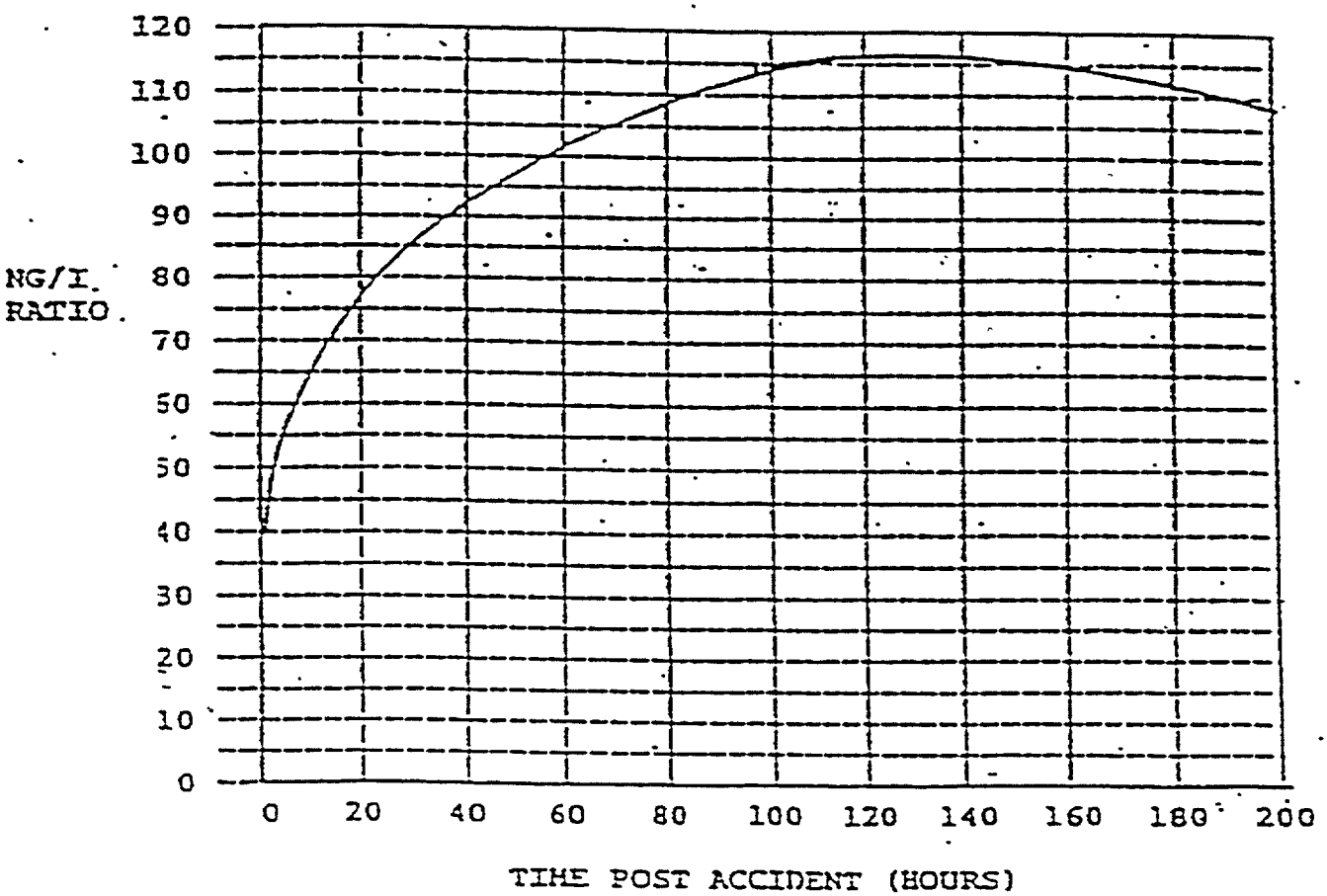
14. Radiation Sample Flow - Low Flow Alarm
15. Radiation Sample Flow - Velocity - FPM FI-X6560A
16. Radiation Sample Flow - CFM FI-X6560B
17. Radiation Sample Flow - Totalized Flow FR-X6560
18. Radiation Sample Flow - Printer Switch HS-X6560-1
19. Sample Pump Iso Vlv SV-X6562
20. Reluel Floor (TB or 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 NOT 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, GO TO 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) GO TO 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)

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

$Volume_{isotopic}$ = _____ 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 µCi/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 (µCi/min) = Total Part Conc. (µCi/cc) x Corr. Factor x Stack Flow (cc/min)
= _____µCi/cc x *B x _____cc/min

= _____µCi/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	

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 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

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Performed By	Date
Reviewed By	Date

MAJOR TASK:

If RHR Service Water is in service but RHR Service Water rad monitor is inoperable or suspect and normal sample point is unavailable, COLLECT sample from valve pit at the Spray Pond.

SPECIFIC TASKS:	HOW:	INITIALS
1. Obtain sample location from Chem. Coor. or OSC: - Manhole 2515 (Security Manhole-44) for 1A or 2A RHR service water - Manhole 2514 (Security Manhole-43) for 1B or 2B RHR service water	1a.	_____
2. Assemble apparatus	2a. Sample bottle Confined Space Entry Kit/Rescue Retrieval Kit Bucket (to allow volume estimate) Apparatus for hatch removal (Check with Ops for location) Utility Knife/Screw Driver	_____
3. Request Security help at the vault.	3a. Complete Manhole Access Authorization (Form SI-SO-013-1), if required by Security.	_____
4. Proceed to valve pit.	4a. Located on the top of the hill between the pump house and #1 cooling tower.	_____
5. Make Confined Space Entry into the top Compartment.	5a. Open outside hatch and enter.	_____
6. Clear any obstruction through the hole next to the ladder.		_____
7. Disconnect sample valve and sample tubing from hose at quick disconnect.		_____
8. Push hose outside the vault through the hole next to the ladder.		_____
9. Reconnect the valve and tubing.		_____

SPECIFIC TASKS:	HOW:		INITIALS
10. Remove cover and make Confined Space Entry into lower compartment.			_____
11. Open valve to establish sample path.	11a.	Open 012812A(B), located in Lower vault near the ceiling.	_____
12. Confirm sample flow before closing vault.			_____
13. Close vault.			_____
14. Obtain sample.	14a.	Open valve at end of sample line.	_____
	14b.	Flush approximately 5 gallons of water.	_____
	14c.	Collect sample	_____
	14d.	Close valve or allow to run into the Spray Pond.	_____
15. Transport sample(s) to Chemistry lab for Analysis			_____
16. Perform isotopic analysis on undiluted sample.	16a.	Label sample(s) with sample location, sample number, and sample date and time.	_____
	16b.	Analyze sample IAW CH-RC-076, Gamma Spectral Analysis Using the ND 9900 decay correcting to time of collection.	_____
	16c.	Notify Chemistry Coordinator of analysis results.	_____
17. For subsequent samples, repeat steps 14, 15, and 16.			_____