07-29-83

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POST-ACCIDENT SAMPLING AND ANALYSIS OF POTENTIALLY HIGH LEVEL REACTOR COOLANT

1.0 INTRODUCTION

1.1 This procedure outlines the steps necessary to collect, handle and analyze a high level reactor coolant sample which could result from gross fuel failure.

1.2 Equipment List

Set up the following in the primary sample hood prior to collecting your sample:

1.2.1 The equipment detailed in Figures 2A and 2B, with the exception of the sample bomb.

1.2.2 One magnetic stirrer and one 50 ml poly beaker and a 50 ml beaker.

1.2.3 A pH/mv meter and pH probe.

1.2.4 A piston burette.

1.2.5 A lead brick wall of sufficient size to store residue from analysis.

1.2.6 Automatic pipets, continuously adjustable through 5 ml, or equivalent.

1.2.7 Remote handling tools located in the cabinet below the hood.

1.2.8 Prepare a 1.0 liter sidearm flask with a correctly sized solid stopper and rubber septum over the sidearm.

1.2.9 Gas syringe

The following equipment is also necessary for this procedure and need to be made ready.

1.2.10 The gas partitioner for H_2 analysis.

1.2.11 The special cart used for transport of the sample bomb.

1.2.12 Tools for connecting and disconnecting sample bomb; i.e., 11/16" open end wrench or equivalent.

1.2.13 Remote valve turning tool. This tool as well as those mentioned in Step 1.2.12 are necessary for sampling and should be taken along and placed on the sample bomb transport cart.

1.3 Reagents

The following reagents are also necessary and need to be prepared.

1.3.1 0.1N NaOH for boron. Obtain a supply from normal boron analysis.

1.3.2 Manitol for boron analysis.

1.4 Preliminary Steps	Initials
1.4.1 Standardize the pH meter.	______
1.4.2 Organize as much of the equipment as possible behind lead brick walls in an arrangement that allows for unobstructed view of all operations with the aid of the convex mirror. (See Figure 2.)	______
1.4.3 Put new rubber septum on gas bomb.	______
1.4.4 Check out and prime the piston burette with fresh 0.1N NaOH solution.	______

2.0 PRELIMINARY EVALUATION

NOTE: THIS EVALUATION SHALL BE COMPLETED PRIOR TO ANY ATTEMPT TO ENTER THE AUXILIARY BUILDING OR SAMPLE ROOM TO OBTAIN A REACTOR COOLANT SAMPLE UNDER EMERGENCY CONDITIONS.

2.1 Possible Indication of Fuel Damage

Some or all of the following would be present if fuel damage had occurred:

2.1.1 The letdown radiation monitor (R9) would be unusually high or offscale. ______

Initials

2.1.2 The Unit 2 failed fuel monitor (2RE-109) will be unusually high or offscale. ________

2.1.3 The Unit 1 containment radiation monitors (R11 and R12) or the Unit 2 containment radiation monitors (RE-211 and RE-212) would be unusually high or offscale. ________

2.1.4 The Unit 1 containment area monitors (R2 and R7) or the Unit 2 containment area monitors (RE-102 and RE-107) would be reading unusually high or offscale. ________

2.1.5 The auxiliary building stack monitor (R14) would show a significant increase due to auxiliary building airborne activity from the letdown and charging pump areas. ________

2.1.6 Evaluation of Sample Room Conditions

a. The sample room area monitor (R6 or RE-106) and charging pump area monitor (R4 or RE-104) would give an indication of conditions in the auxiliary building and sample room. ________

b. After evaluation of the radiation monitoring system readouts, Health Physics will determine what airborne and radiation surveys would be appropriate before auxiliary building entry. ________

c. Verify the requirements for auxiliary building sample room entry, i.e., (1) RWP requirements, (2) clothing requirements, (3) respiratory requirements, and (4) dosimetry requirements including extremity dose monitoring requirements, and (5) health physics coverage requirements including timekeeping. ________

2.2 Possible Loss of Component Cooling

2.2.1 Verify that component cooling is still in service to the affected unit. Sample cannot be obtained without component cooling to sample room heat exchangers. ________

3.0 REACTOR COOLANT SAMPLING PROCEDURE

NOTE: THIS PROCEDURE SHALL NOT BE INITIATED UNTIL THE EVALUATIONS DISCUSSED IN SECTION 2.0 HAVE BEEN COMPLETED AND REVIEWED BY DUTY & CALL SUPERINTENDENT (COORDINATOR), DUTY HEALTH PHYSICS SUPERVISION AND THE DUTY SHIFT SUPERINTENDENT, AND THEIR APPROVAL HAS BEEN GRANTED.

3.1 Collecting a Pressurized Sample (Refer to Figure 1) — Initials

NOTE: THE FOLLOWING STEPS WILL BE ACCOMPLISHED UNDER THE DIRECTION OF HEALTH PHYSICS SUPERVISION AND ONLY AFTER COMPLETING SECTION 1.0 OF THIS PROCEDURE.

3.1.1 The following steps (a through f) must be accomplished before opening the incontainment sample isolation valve 955 (Step 3.1.2) and the hot leg sample isolation valve 966C (Step 3.1.3). __________

a. Verify that the demineralized water header pressure is approximately 100 to 120 psi. __________

NOTE: THIS STEP MAY BE DELETED IF REACTOR MAKEUP WATER IS USED FOR THE FLUSH.

b. Proceed to the sample room and install the shielded sample bomb on the outside wall of the sample room using the fittings provided. __________

CAUTION: BEFORE REMOVING THE SWAGE LOCK CAPS TO INSTALL THE BOMB, OPEN VALVES 939, 940 AND 941 TO RELIEVE SYSTEM PRESSURE. CLOSE VALVES 939, 940 AND 941. PLACE A WASTE BUCKET DIRECTLY UNDER THE BOMB. USE A PAPER TOWEL SHIELD AND RUBBER GLOVES WHEN REMOVING CAPS.

c. Verify that the dimineralized water line is connected from valve 945 to the demineralized water manifold. Open demineralized H_2O valves 945, 947, and 948 and check for leaks on the bomb fittings. Shut valves 945, 947, and 948. __________

d. Enter the sample room and close the following valves on the sample panel.

1. 961C - Normal hot leg sample bomb inlet. __________

2. 964C - normal hot leg sample bomb outlet. __________

Initials

3. 965C - normal hot leg sample bypass. ________

4. 968 - normal hot leg return valve. ________

5. 971 - normal hot leg sink sample valve. ________

e. Notify the control room that the failed fuel monitor (RE-109) will be taken out-of-service for sampling; then close:

938B - detector RE-109 inlet valve ________
938A - detector RE-109 outlet valve ________

f. Further verify that there is component cooling flow to the sample room heat exchangers by viewing the local flow indicator (FI-603) on the sample panel. ________

g. Open the following valves on the sample panel.

1. 969A - sample system purge to volume control tank. ________

2. 956C - normal hot leg sample supply valve. ________

3. 990 - residual heat removal sample supply valve. ________

h. Leave the sample room and position the following valves wide open. These valves are located on the sample room wall.

1. 939 - sample bomb inlet. ________

2. 940 - sample bomb bypass. ________

3. 941 - sample bomb outlet. ________

NOTE: FOR DRILLS AND TRAINING EXERCISES OPEN VALVE 941 ONLY ONE-QUARTER TURN TO ELIMINATE N-16 GAMMAS.

3.1.2 Open the incontainment hot leg sample isolation valve (valve 955) and the residual heat removal sample isolation valve (valve 959) by means of the switches located outside the No. 1 pipeway for Unit 1 or No. 4 pipeway for Unit 2. ______

CAUTION: IF THE AFFECTED UNIT IS ALREADY ON RHR, LEAVE THE AREA IMMEDIATELY AFTER OPENING VALVE 959 AS BACKGROUND RADIATION LEVELS WILL RISE SHARPLY.

If the valve No. 955 will not open because of containment isolation, perform the following steps (1 through 3). ______

1. Request that the Control Room reset the containment isolation signal. ______

2. Turn the local control switch positions for valves 951, 953, and 955 to the "close" position. ______

3. Turn the local control switch for valve 955 to the "open" position. ______

NOTE: SECTION 3.1.2 MUST BE ACCOMPLISHED BEFORE SAFETY INJECTION RECIRCULATION HAS BEGUN.

3.1.3 Leave the area and request control room to open the hot leg sample isolation valve (966C). ______

3.1.4 Verify sample flow by an increase in the radiation level. ______

3.1.5 After a minimum recirc time of 15 minutes, return to the sample station and <u>using the remote valve operating tool</u>, fully open valves 9B and 9A and 8A and 8B. ______

a. Slowly and completely close valve 940. ______

b. Leave the primary auxiliary building. ______

NOTE: THE VALVE OPERATING TOOL SHOULD BE USED TO OPERATE ALL VALVES EXCEPT 945, 946, 947 AND 948 (FLUSH VALVES).

3.1.6 After 5 additional minutes, return to collect the sample. Close valves 9B and 9A and then valves 8B and 8A using the remote valve operating tool. Make note of the sample collection time. ______

NOTE: DO NOT DISCONNECT THE SAMPLE BOMB UNTIL SAMPLE FLOW IS SECURED AND THE DI FLUSH IS COMPLETE AS EVIDENCED BY REDUCTION IN RADIATION LEVELS.

3.1.7 Request control room to immediately close the hot leg sample isolation valve 966C. ______

NOTE: IT IS VERY IMPORTANT THAT THE HOT LEG SAMPLE ISOLATION VALVE 966C IS CLOSED PRIOR TO STARTING THE DI FLUSH. WAIT FOR CONFIRMATION FROM THE CONTROL ROOM.

4.0 <u>SAMPLE LINE FLUSHING</u>

4.1 Leave valve 939 open, and fully open valves 940 and 941. Open valves 945 and 946. Allow the lines to flush for at least 15 minutes. ______

NOTE: DO NOT REMAIN IN THE AREA OF THE SAMPLE STATION DURING THIS FLUSH.

4.2 After about 15 minutes return and measure radiation levels. If a Chemistry & Health Physics Supervisor determines that the levels are satisfactory, close whitey valve 946 and using the remote valve tool, close valve 939. Then open valve 947 and valve 948 and allow about a 15-minute DI flush. ______

4.3 After about 15 minutes, close valves 940 and 941 with the remote valve tool and then close valves 945, 947, and 948. Disconnect valve 945 from the demineralized water manifold and cap both ends. Disconnect the sample bomb from the fittings using a paper towel to prevent spraying. Remove the shielded sample bomb from its support. Remove excess liquid from the top and bottom bomb fittings with a syringe and dispose behind lead shielding. Replace the Swagelok caps on the wall fittings and on the bomb. Transport the bomb, remote valve tool and wrenches to the chemistry lab on a cart. ______

NOTE: AFTER DRILLS AND TRAINING EXERCISES, RETURN ALL EQUIPMENT AND VALVE LINEUPS TO NORMAL.

4.4 Enter the sample room and notify control room that the failed fuel monitor (RE-109) is to be returned to service and that the sample room valving is to be returned to normal.

4.4.1 Close Valves:

1. 961C - Normal hot leg sample bomb inlet ________
2. 964C - Normal hot leg sample bypass ________
3. 965C - Normal hot leg sample bypass ________
4. 971 - Normal hot leg sink sample valve ________
5. 939 - High level sample bomb inlet ________
6. 940 - High level sample bomb bypass ________
7. 941 - High level sample bomb outlet ________
8. 945, 946, 947, 948 - Demineralized water flush valves ________

NOTE: DISCONNECT VALVE 945 FROM THE DEMINERALIZED WATER MANIFOLD. ADVISE CONTROL TO REDUCE DEMINERALIZED WATER HEADER PRESSURE TO NORMAL.

4.4.2 Open Valves:

1. 938B - Failed fuel monitor RE-109 inlet ________
2. 938A - Failed fuel monitor RE-109 outlet ________
3. 956C - Normal hot leg sample supply valve ________
4. 968 - Normal hot leg return valve ________
5. 969A - Sample system purge to volume control tank ________
6. 966C - Hot leg sample isolation valve. ________

5.0 <u>SEPARATION OF THE PRESSURIZED SAMPLE AND ANALYSIS OF THE GASEOUS AND LIQUID COMPONENT</u> (Refer to Figures 2A and 2B)

5.1 <u>Collecting the Gaseous Sample From the Pressurized Sample</u>

5.1.1 Place the shielded sample bomb in the sample holder in the primary sample hood. ________

5.1.2 Connect the sample bomb to the shielded gas collection bomb by means of the fittings provided. Place lead bricks in the area of this connection for shielding. ______

5.1.3 Connect the valve manifold to the opposite end of the sample bomb and verify that valve 11 on the manifold is open. ______

5.1.4 Make sure that the vacuum line is attached to the gas collection bomb at the valve 1 location. Open valves 1 and 2. Secure valve 3. Evacuate the gas bomb and connecting lines. With vacuum still on, secure valve 1. Secure vacuum. ______

5.1.5 Before proceeding, make sure no inleakage has occurred into the gas bomb by observing the vacuum gauge reading. Using the remote valve tool, fully open valves 9A and 9B. Open valve 8A one-quarter turn. Crack open valve 8B and control degassing by throttling valve 8B. Allow the system to degas for 5 minutes. Check that valves 9A and 9B, 8A and 8B are fully open. Close valve 2. ______

NOTE: OBSERVE THE VACUUM GAUGE. THE VACUUM SHOULD DROP VERY SLOWLY. IF THE DROP IS TOO RAPID, CLOSE VALVE 8B SLIGHTLY. DROP SHOULD BE 5-10" HG/MIN.

5.2 <u>Analysis of Gaseous Sample</u>

5.2.1 Hydrogen

Use a syringe to draw a 1 cc sample. Use the injection port on the gas partitioner for this analysis. ______

5.2.2 Radioactive Noble Gas

Use a syringe to draw a 1/2 cc sample and inject this into the flask prepared in Section 1.2.8.* Allow 30 minutes for thermal mixing. Draw a 1 cc sample of this dilution and proceed as normal ______

*Additional dilution should be performed if the contact reading is >1 mr/hour.

NOTE: SEE SECTIONS 7.0 AND 8.0.

5.3 Collecting the Liquid Sample From the Pressurized Sample

NOTE: IT IS EXTREMELY IMPORTANT TO VERIFY THAT VALVE 2 HAS BEEN CLOSED BEFORE PROCEEDING.

5.3.1 Open valve 3 slowly. Allow the liquid sample to drain into the 50 ml beaker. Direct a slow stream of air through the vent line on valve 3 if necessary to recover the total liquid sample. ________

5.3.2 Close valves 8A and 8B, 9A and 9B, and valve 3. ________

5.4 Analysis of Liquid Samples

5.4.1 Boron/pH Analysis

a. Transfer a 5 ml sample using an automatic pipetter into a 50 ml poly beaker containing a stir bar. ________

b. After transfer is complete, record the pH. ________

c. Plug in the magnetic stirrer, add mannitol, and proceed with the boron analysis. ________

NOTE: IF THE PRIMARY SYSTEM HAS BEEN BORATED, 5 ML OR MORE OF TITRANT MAY BE NEEDED TO REACH AN ENDPOINT.

NOTE: AFTER DRILLS AND PRACTICE RUNS, THE BORON TITRATOR MUST BE FLUSHED WITH DEIONIZED WATER AND PUT IN DRY LAY-UP. ALL ELECTRODES SHOULD BE PLACED IN LAYUP SO THEY ARE CONDITIONED FOR IMMEDIATE USE.

5.4.2 Chloride Analysis

NOTE: THE CHLORIDE ANALYSIS WILL BE PERFORMED BY WE LAB SERVICES USING THEIR ION CHROMATOGRAPHY ANALYZER.

Initials

5.4.3 Iodine Analysis and Gamma Scan

Using the specially prepared 2 cc syringe or adjustable automatic pipet, withdraw 0.3 cc (or less) of the sample from the poly beaker and inject this sample into a 1000 ml poly bottle containing demineralized water. Make additional dilutions in the same manner.* Count as normal. __________

*Additional dilution should be performed until the contact reading is <1 mr/hour.

NOTE: SEE SECTIONS 7.0 AND 8.0.

5.5 Reporting of Results

Complete and forward Reactor Coolant Post-Accident Sampling Analysis Report (EPIP-30).

6.0 SAMPLE RESIDUE

Place all sample residue in the specially prepared lead pig for disposal. __________

7.0 SAMPLES TAKEN TO KEWAUNEE NUCLEAR PLANT FOR COUNTING

Reference: Post-accident counting agreement with Wisconsin Public Service, Kewaunee Nuclear Plant.

Kewaunee Nuclear Plant does not utilize the 5 cc glass vial and 1 cc test tube geometries. Therefore, "normal" samples will have to be diluted and placed in one liter poly bottles if they are sent to the Kewaunee Nuclear Plant for analysis.

8.0 LABELING OF SAMPLES

Label all chloride, noble gas, iodine and gamma scan samples with all pertinent information such as: sample number, name of sample, date and time of sampling, sample volume and dilution(s).

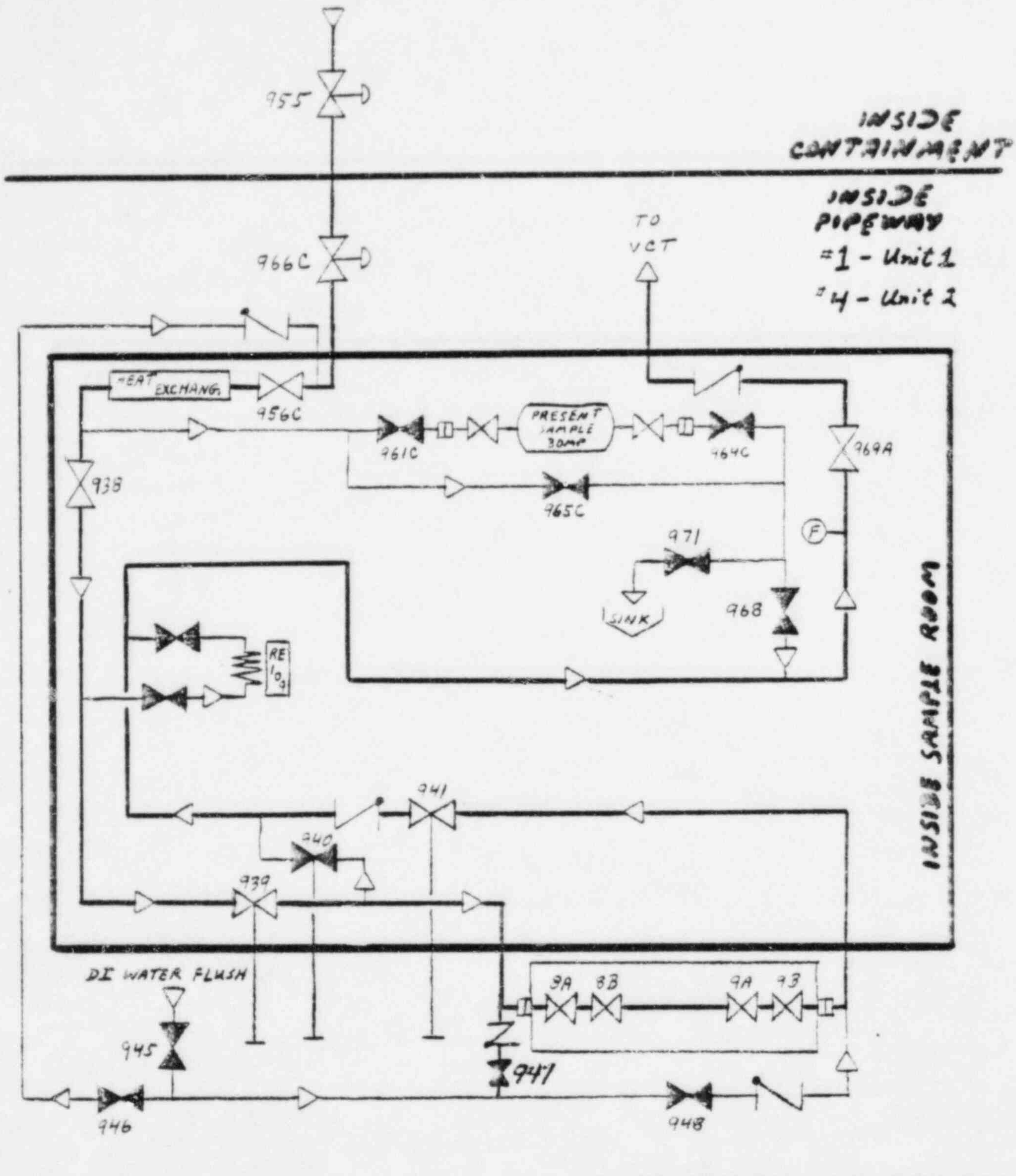


FIGURE 1
PRIMARY COOLANT HIGH LEVEL SAMPLING FLOW DIAGRAM

WISCONSIN ELECTRIC POWER COMPANY
Point Beach Nuclear Plant

SYSTEM		FILE
DWG. NO.	REV.	DATE
MOD. REQ. NO.		DATE
ORIGINATOR		
CHANGE INCORPORATED BY		
DWG. NO.	REV.	DATE

K & E 10-5646

CALCULATION SHEET

SHEET ______ OF ______

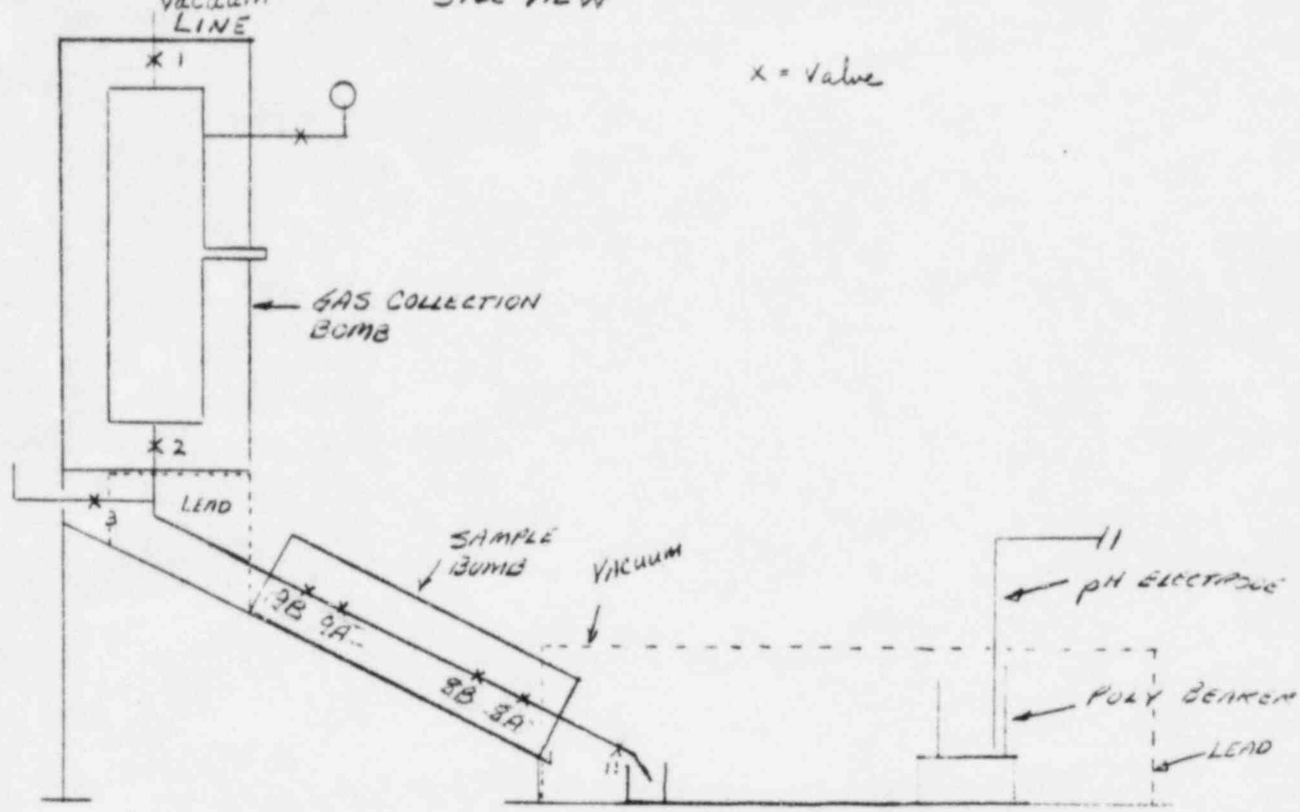
FILE No. ______

FIGURE 2 A

MADE BY ______ DATE ______

CHKD. BY ______ DATE ______

SIDE VIEW



TOP VIEW

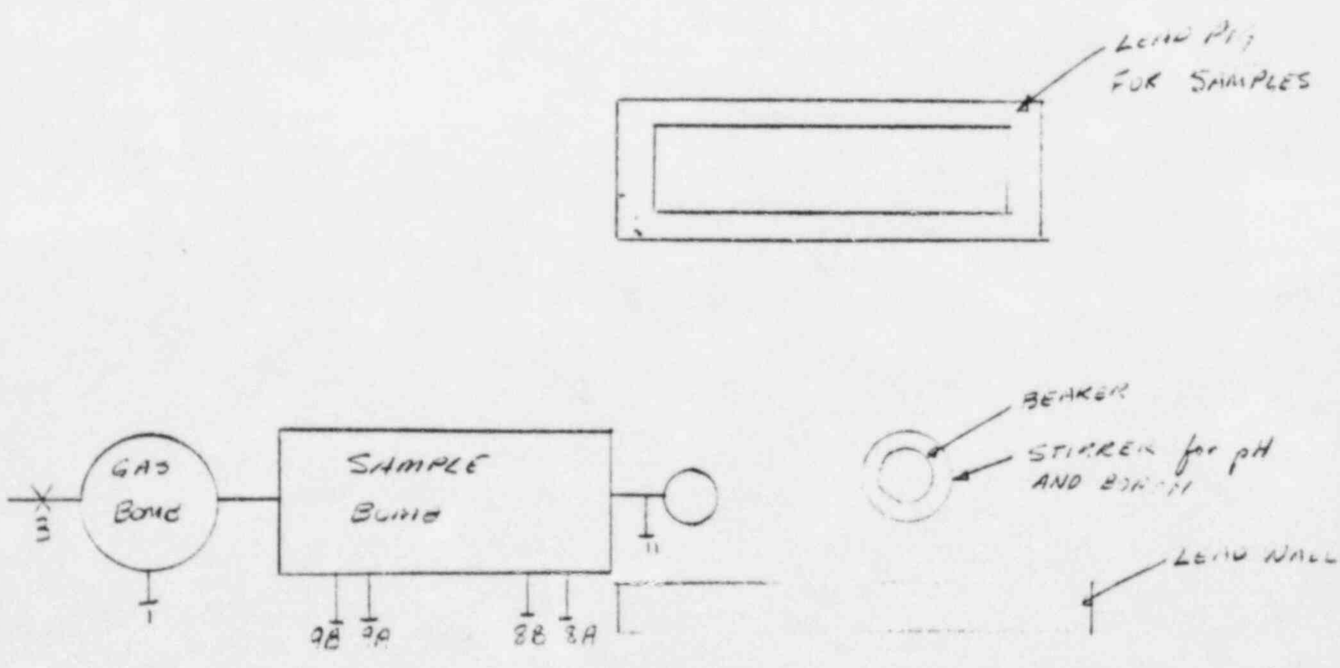


Figure 2 B

CALCULATION SHEET

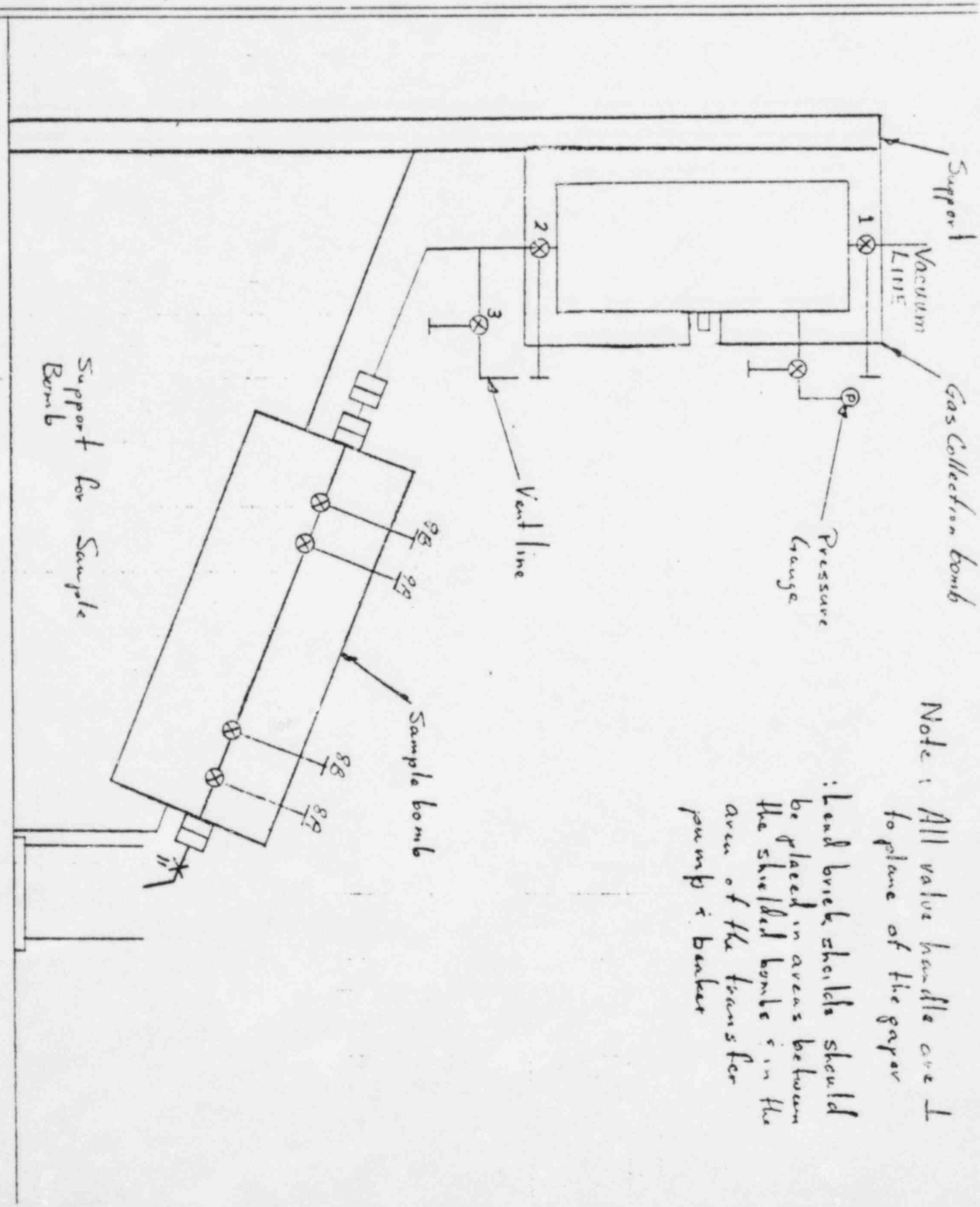
SHEET ______ OF ______

FILE No. ______

SUBJECT: Sample Bomb Laboratory Set up

MADE BY: RJS DATE: 1/3/90

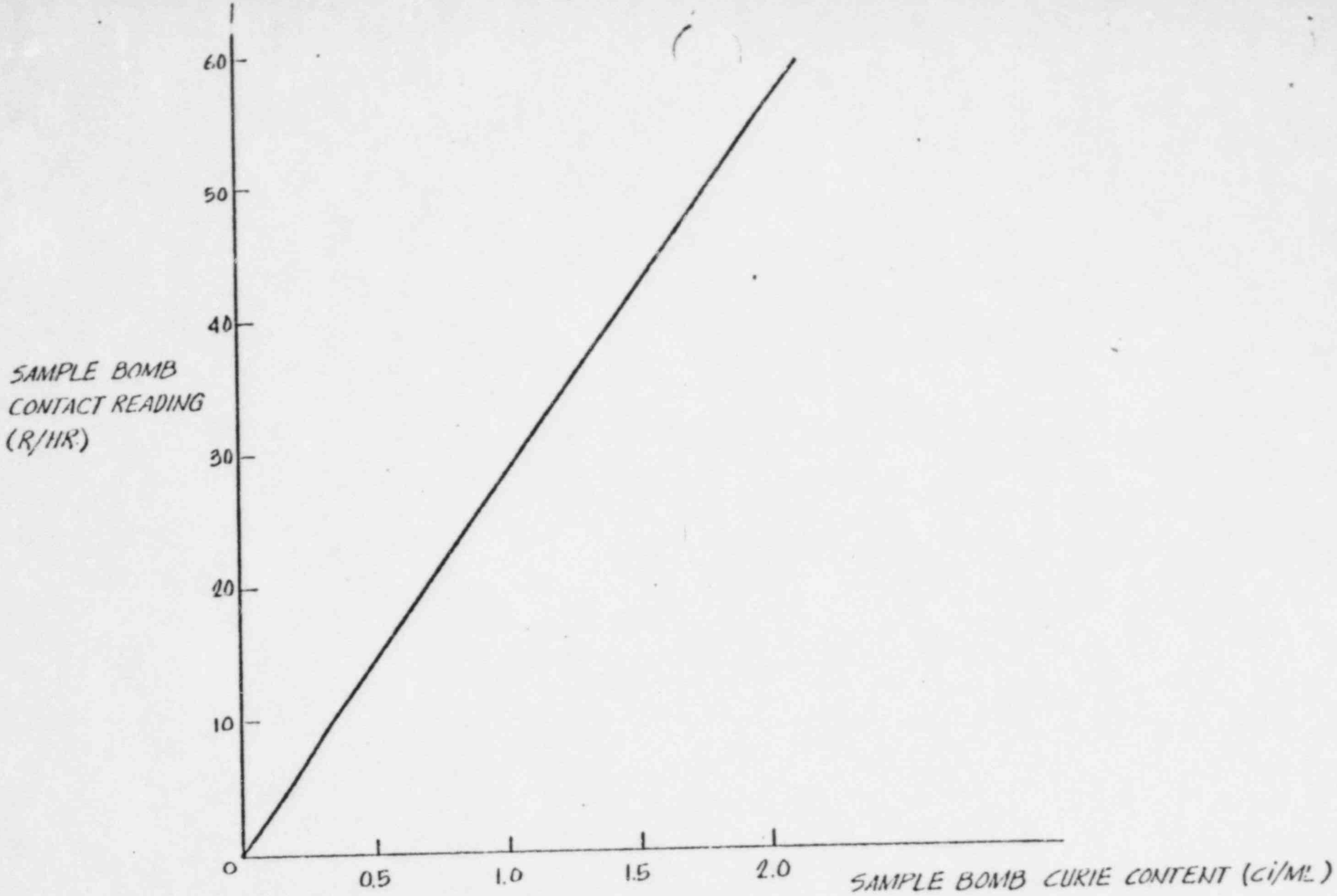
CHKD. BY: CHH DATE: 1/3/90



Note: All valve handle are ⊥ to plane of the paper

: Lead brick shields should be placed in areas between the shielded bombs & in the area of the transfer pump & beaker

Appendix A



REV.	DATE	REVISIONS	BY	REV'D	APPR'D			
A	12-21-79	INITIAL ISSUE PRELIMINARY	HR	NPM	[illegible]	eds nuclear	SAMPLE BOMB CURIE CONTENT VS. CONTACT READING - ONE RCS DILUTION, NO RECIRCULATION POINT BEACH NUCLEAR PLANT UNIT 1 & 2 WISCONSIN ELECTRIC POWER CO. MILWAUKEE, WISCONSIN	SCALE N.T.S. JOB NO. 0870-001 DRAWING NO FIGURE 1 2.1.8.a REV. A SHEET 1 OF 1

POINT BEACH NUCLEAR PLANT

REACTOR COOLANT POST-ACCIDENT SAMPLING ANALYSIS REPORT

1.0 ANALYSIS OF GASEOUS SAMPLE

1.1 Hydrogen Analysis

1.1.1	Scale used on gas partitioner	________
1.1.2	Millivolt reading on chart recorder	________
1.1.3	% hydrogen from calibration curve	________
1.1.4	Volume of sample bomb in ml	________
1.1.5	Atmospheric pressure (mm/Hg)	________
1.1.6	cc/Kg hydrogen in coolant* (STP)	________

$$\text{*cc/Kg } H_2 \text{ (STP)} = \frac{(1.1.3)}{100} \times \frac{280}{(1.1.4)} \times \frac{(1.1.5)}{760} \times 1000$$

$$= 3.68 \quad \frac{(1.1.3) \times (1.1.5)}{(1.1.4)}$$

1.2 Radioactive Noble Gases

1.2.1	Decay time in minutes	________
1.2.2	Sample count time in seconds	________
1.2.3	Detector	________
1.2.4	Geometry	________
1.2.5	Common multiplier*	________
1.2.6	Volume of sidearm flask	________

$$\text{*CM} = \frac{280}{(1.1.4)} \times \frac{(1.2.6)}{0.5}$$

$$= 5.6 \times 10^2 \quad \frac{(1.2.6)}{(1.1.4)}$$

(1) See Section 5.2.2 of EPIP 7.3.2.

1.2.7 MCA Results

Isotope	Concentration (μCi/cc)
Xe-133	________
Kr-85m	________
Kr-88	________
Xe-133m	________
Xe-135	________
Xe-138	________
Kr-87	________
Xe-135m	________
Ar-41	________
Kr-85	________
Xe-131m	________

2.0 ANALYSIS OF LIQUID SAMPLE

2.1 Boron and pH

2.1.1 Volume of sample ________ ml

2.1.2 pH of sample ________

2.1.3 Normality of NaOH ________

2.1.4 Volume of NaOH used ________ ml

2.1.5 Concentration of boron* ________ ppm

$$*\text{ppm Boron} = \frac{(2.1.5)}{(2.1.1)} \times (2.1.4) \times 10810$$

2.2 Chloride

2.2.1 Chloride concentration ________ pp

2.3 Iodine Analysis

2.3.1 Decay time ________ min

2.3.2 Sample count time ________ sec

2.3.3 Detector ________

2.3.4 Geometry ________

2.3.5 Common multiplier* ______________

$$*CM = \frac{1075}{V_S} \times F$$

V_s = Volume of sample (first dilution)

F = Any additional dilution factors (2 or more dilutions)

(1) See Section 5.4.3 of EPIP 7.3.2.

2.3.6 MCA Results

Isotope	Concentration (μCi/cc)
I-130	______________
I-131	______________
I-132	______________
I-133	______________
I-134	______________
I-135	______________
Total	______________

3.0 ROUTING AND APPROVAL

		Date	Initials
3.1	Calculations completed by	________	________
3.2	Analysis completed by	________	________
3.3	Chemistry & Health Physics Supervisor	________	________
3.4	Chemistry/Health Physics Supervisor (TSC)	________	________
3.5	Director (TSC)	________	________

POST-ACCIDENT SAMPLING OF CONTAINMENT ATMOSPHERE

1.0 INTRODUCTION

This procedure outlines the steps necessary to collect, handle and analyze a potentially high radioactive containment atmosphere sample resulting from gross fuel failure and loss of reactor coolant system integrity to determine hydrogen and radioactive gas concentrations.

2.0 PRELIMINARY EVALUATION

NOTE: THE FOLLOWING EVALUATION SHALL BE COMPLETED PRIOR TO ANY ATTEMPT TO ENTER THE FACADE OR R11/R12 CUBICLE TO PERFORM A VALVE LINEUP OR COLLECT A CONTAINMENT ATMOSPHERE SAMPLE.

2.1 Indications of Possible Fuel Damage

Some or all of the following would be present if fuel damage or loss of reactor coolant system integrity had occurred:

2.1.1 The letdown radiation monitor (R9) and failed fuel monitor (RE-109) would be unusually high or offscale.

2.1.2 The containment radiation monitors 1R11 and 1R12, or 2RE-211 and 2RE-212 would be unusually high or offscale.

2.1.3 The containment area monitors 1R2 and 1R7 or 2RE-102 and 2RE-107 would be unusually high or offscale.

2.1.4 The automatic actions of EOP-1A have caused containment isolation.

2.2 Evaluation of Radiological Hazards in Access Areas Required for Sampling

	Initials
2.2.1 After evaluation of the radiation monitoring system readouts, verify with Health Physics that the appropriate airborne and radiation surveys have been made before entering the facade.	______

Initials

2.2.2 Verify the requirements for facade and 1R11/1R12 or 2RE-211/2RE-212 cubicle entry.

a. Radiation work permit requirements

b. Clothing requirements

c. Respiratory requirements

d. Dosimetry requirements including extremity dose monitoring

e. Health physics coverage requirements including timekeeping ____________

3.0 <u>CONTAINMENT ATMOSPHERE SAMPLING PROCEDURE</u>

NOTE: THE FOLLOWING PROCEDURE SHALL NOT BE INITIATED UNTIL THE EVALUATION DISCUSSED IN SECTION 2.0 HAS BEEN COMPLETED. THE DUTY & CALL SUPERINTENDENT (COORDINATOR), THE DUTY AND CALL HEALTH PHYSICS SUPERVISOR AND THE DUTY SHIFT SUPERINTENDENT SHALL APPROVE THE IMPLEMENTATION OF THIS PROCEDURE. THE FOLLOWING STEPS WILL BE ACCOMPLISHED UNDER THE DIRECTION OF HEALTH PHYSICS SUPERVISION.

3.1 <u>Unit 1 Containment Atmosphere Sampling Using the 1R11/1R12 Sampling System</u>

3.1.1 Valve Lineup

a. Entry into the facade shall be from the potable water room.

b. Verify with the control room that the 1R11/1R12 sampling system is lined up in accordance with the following:

(1) The containment isolation valves 3200C and 3200G are closed. ____________

(2) The 3200A&B AOV's in the R11/R12 cubicle are closed. ____________

(3) The 1P707 forced purge pump is secured. ____________

Initials

c. Proceed to the R11/R12 cubicle, and place the 1R11/1R12 sampling system in the following lineup:

(1) Open valves 1-3200J and 1-3200L. ________

(2) Close valve 1-3200M. ________

(3) Verify that the continuous vent valves 1-3200S and 1-3200W are closed. ________

(4) Close valve 1-3200K. ________

d. Connect the 100' service air hose to the Chicago fitting located on the elevator side of the cubicle established for sample line purging. ________

NOTE: THE AIR HOSE AND PRESSURE REGULATOR ARE STORED INSIDE THE POTABLE WATER ROOM.

e. Verify that valve 1-3200Y is closed. ________

f. Proceed to the potable water room with the air hose and pressure regulator.

NOTE: FOR RCT TRAINING EXERCISES, DO NOT USE THE POTABLE WATER ROOM SERVICE AIR HOOKUPS, SINCE THEIR USE UNNECESSARILY BURDENS SECURITY. THE SERVICE AIR HOOKUPS LOCATED ON THE EL. 66' CONTROLLED SIDE FACADE WALL ARE TO BE USED.

(1) Attach the service air hose to an available turbine hall service air outlet using the pressure regulator designated for this procedure. ________

(2) Lock the Chicago fitting in place using the appropriate pins. ________

g. Verify with the control room that the 1R11/1R12 monitor is lined up to monitor, and discharge to, containment atmosphere. ________

h. Request the control room to open the 1-3200A&B AOV sample system valves and the containment isolation valves 1-3200C&G. ________

Initials

i. Verify sample flow by an increase in radiation levels in the cubicle, and return to the potable water room. ________

j. Allow five minutes for sample recircing. Request control room to stop the pump and close 1-3200A, B, C & G AOV isolation valves. ________

3.1.2 Sample Collection

a. Enter the facade and proceed to the sample point. Take along two 2 cc gas syringes in a hollowed-out lead break. One syringe should have 1 cc of AgZ inside the syringe barrel. ________

CAUTION: CONTAINMENT PRESSURE COULD THEORETICALLY BE AS HIGH AS 60 PSIG. HOLD THE SYRINGE PLUNGER SECURELY. ALSO, LOCK THE GAS SYRINGES BEFORE WITHDRAWING FROM THE SAMPLING SEPTUM, USING THE BUILT-IN LOCKING DEVICE ON THE SYRINGE.

b. Remove the set screw and take two 1 cc gas samples. Place the syringes in the lead brick. ________

c. Replace the set screw and open valve 3200Y. ________

d. Leave the facade and return to the potable water room. ________

3.1.3 Sample Line Purging

a. Open service air valve and adjust the pressure to a setting of 10 psig greater than measured containment pressure. ________

b. Request control room to open the pump discharge isolation valve 1-3200A. ________

c. Request control room to start the 1R11/1R12 pump. ________

d. Verify purge effectiveness by measuring the reduction in radiation levels after approximately 15 minutes of purging. ________

Initials

e. Request control room to close the 1-3200A pump discharge isolation valve, secure the pump, and open the 1-3200B&C pump suction isolation valves. ________

f. Continue the purge for 10 more minutes. ________

g. Request control room to close all pump discharge and suction isolation valves and secure the pump. ________

h. Secure the service air valve. ________

NOTE: AFTER DRILLS AND PRACTICE RUNS, RETURN ALL EQUIPMENT AND VALVE LINEUPS TO THE AS-FOUND CONDITION.

3.2 <u>Unit 2 Containment Atmosphere Sampling Using the RE-211/RE-212 Sampling System, After Containment Isolation</u>

3.2.1 Valve Line-Up

a. Verify with the control room that the following containment isolation conditions exist:

(1) Valves 3200A, B & C have closed. ________

(2) Pumps P707A&B have been secured. ________

(3) Valve 3200G is lined up to return flow to the containment (Position 1). ________

(4) Valves 3200D, E, F & H are closed. ________

b. Obtain the designated 100' service air line and pressure regulator from the potable water room. ________

c. Proceed to the nonnuclear room with the air hose and pressure regulator. ________

NOTE: FOR RCT TRAINING EXERCISES, DO NOT USE THE NONNUCLEAR ROOM SERVICE AIR HOOKUPS, SINCE THEIR USE UNNECESSARILY BURDENS SECURITY. THE SERVICE AIR HOOKUPS LOCATED ON EL. 66' CONTROLLED SIDE FACADE WALL ARE TO BE USED.

Initials

(1) Attach the service air hose to an available turbine hall service air outlet using the pressure regulator designated for this procedure. ________

(2) Lock the Chicago fitting in place, using the appropriate pins. ________

d. Proceed to the RE-211/RE-212 cubicle and perform the following:

(1) Connect the service air hose to the Chicago fitting attached to valve 3200Y, and verify that the valve is closed. ________

NOTE: THE VALVE IS LOCATED ON THE ELEVATOR SIDE OF THE R211/R212 CUBICLE.

(2) Lock the Chicago fitting in place, using the appropriate pins. ________

(3) Enter the cubicle and perform the following:

(1) Verify AOV-3200A&B are closed by visual observation. ________

(2) Manually close valves 3200K, N, P, Q, W, EE & FF. ________

(3) Manually open valves 3200J & L. ________

e. Request the control room perform the following:

NOTE: THE SAMPLE PUMP P707A SEALS ARE RATED FOR 5 PSI. TO PREVENT AN INADVERTENT AIRBORNE RELEASE, THE CONTAINMENT PRESSURE MUST BE LESS THAN 5 PSI BEFORE PROCEEDING.

(1) Verify containment pressure is less than 5 psi. ________

(2) Place the sample mode switch located in the cable spreading room in the SEPTUM position. ________

Initials

(3) Open AOV's 3200A&B and the containment isolation valve 3200C. ________

(4) Start sample pump P707A. ________

f. Verify sample flow by observing a flow increase on FIT-3288 and return to the nonnuclear room. ________

g. Allow 15 minutes for sample recirculation and return to the cubicle with two (2) 2 cc gas-tight syringes in a hollowed-out lead brick. One syringe should have 1 cc of AgZ inside the syringe barrel. ________

3.2.2 Sample Collection

a. Obtain two 1 cc gas samples from the sample septum by means of the gas-tight syringes. ________

NOTE: LOCK THE SYRING PLUNGERS PRIOR TO WITHDRAWING FROM THE SEPTUM.

b. Place the syringes in the leak bricks for transport. ________

c. Establish a service air pressure of 5 psi on the regulator and open valve 3200Y. ________

3.2.3 Sample Line Purge

a. Return to the nonnuclear room and request the control room close valves 3200B&C. ________

b. Allow the system to purge forward for 25 minutes, then request the control room perform the following:

(1) Secure the sample pump P707A. ________

(2) Close AOV-3200A and place valve 3200M in its normal position (Position 1). ________

(3) Open AOV-3200B&C. ________

c. Allow the system to purge backwards 25 minutes and request the control room close valves 3200B&C. ________

Initials

d. Return to the cubicle and perform the following:

(1) Verify the effectiveness of the purge by measuring the reduction of the radiation levels. ________

(2) Close the service air hose regulator, close valve 3200Y and remove the service air hose. ________

(3) Enter the cubicle and open valves 3200K, N, P & Q. ________

(4) Close valves 3200J & L. ________

e. Notify the control room that sampling has been completed, and that valves 3200W, EE & FF are closed. ________

NOTE: AFTER ALL DRILLS AND PRACTICE EXERCISES, ALL EQUIPMENT AND VALVE LINEUPS ARE TO BE RETURNED TO THE AS-FOUND CONDITION.

4.0 CONTAINMENT ATMOSPHERE ANALYSIS

4.1 Volume Adjustments

4.1.1 Before proceeding with the hydrogen, radioactive noble gas and radioactive iodine analyses, the sample contents of both syringes must be brought to atmospheric pressure. Use the shielded sacrificial glass bomb for this purpose.

4.1.2 Insert the syringe through the rubber septum of the glass bomb. Unlock the syringe locking device and let the syringe and bomb equilibrate for approximately 30 seconds. Relock the syringe and withdraw from the septum. Store the syringe in the lead brick.

4.1.3 Repeat Step 4.1.2 for the other syringe.

4.2 Hydrogen

Assuming normal equipment setup and preparations are complete, use the sample injection port on the gas partitioner, inject a 1 cc gas sample and proceed using normal hydrogen analysis procedures. ________

Initials

4.3 Radioactive Noble Gases and Iodines

Noble Gases

4.3.1 Use the 2 cc syringe with the 1 cc of AgZ for the noble gas and iodine separation/analysis.

4.3.2 Inject the 1 cc containment atmosphere sample into a one liter poly bottle. Remove the syringe and store in the lead brick. Tape over the syringe hole in the poly bottle. Let the gas come to equilibrium for a minimum of 15 minutes while proceeding with the iodine analysis section.

4.3.3 Withdraw a 1 cc gas sample from the poly bottle in Step 4.3.2. If the contact reading on the syringe is less than 1 mR/hr, inject the sample into a 5 cc vial and count as normal. If the contact reading is greater than 1 mR/hr, further dilutions are necessary.

Dilution procedure: Inject the 1 cc sample into a one liter poly bottle and allow to equilibriate. Withdraw 1 cc from the poly bottle. If the contact reading is less than one mR/hr, inject into a 5 cc vial and count as normal. If the contact reading is greater than 1 mR/hr, dilute further.

NOTE: FOR EACH DILUTION, USE A NEW SYRINGE OR MAKE CERTAIN THE OLD SYRINGE IS COMPLETELY PURGED. LABEL NOBLE GAS SAMPLES AND IODINE SAMPLES WITH ALL PERTINENT INFORMATION SUCH AS: SAMPLE NUMBER, NAME OF SAMPLE, DATE AND TIME OF SAMPLE, SAMPLE VOLUME AND DILUTION(S).

Iodines

4.3.4 Unscrew the syringe tip and internal plunger stop and pour the silver zeolite into a counting test tube and cap.

4.3.5 If the silver zeolite/iodine sample is less than one mR/hr contact, count the sample directly on the MCA using the test tube geometry.

4.3.6 If the iodine activity is too high to count directly, determine the radiation level in mR/hr at one foot. Also, determine the percent isotopic composition using the MCA and attenuating the sample if necessary.

Determine the total iodine activity using the following equation:

$$C_{(Ci)} = \frac{R/hr\ @\ 1'}{6E_T}$$

The following table can be used as an aid in determining the "Total Average Energy/γ" (E_T) for the above equation.

Isotope	(1) Average γ Energy	(2) % Composition (Fraction)	(1) x (2) Weighted γ Energy
I^{131}	0.380	________	________
I^{132}	0.731	________	________
I^{133}	0.530	________	________
I^{134}	0.857	________	________
I^{135}	1.238	________	________

Total Weighted γ Energy : (E_T) ________

Each individual iodine isotopic concentration (μCi/cc) is calculated as follows:

$$\mu Ci/cc\ I_{(i)} = C_{(Ci)} \times 2 \times 10^{+6} \times \text{(Fractional \% Composition)}$$

5.0 CALCULATIONS

5.1 Pressure and Temperature Correction

Ask control room supervision for the temperature and pressure in containment (psig and °F). Determine atmospheric pressure (mm Hg) and temperature (°F) from the barometer in the laboratory. Convert this to psia. Apply the following correction factor to all results:

Initials

$$\text{Concentration } (\mu Ci/cc) \times \frac{(P \quad + 14.7)}{P_{lab}} \frac{T \quad + 459}{T_{lab} + 459}$$ ________

$$P_{lab\ (psia)} = 14.7 \text{ psi} \times \frac{P \quad (mm\ Hg)}{760\ mm\ Hg}$$

5.2 Complete and forward Containment Atmospheric Post-Accident Sampling Analysis Report (EPIP-31).

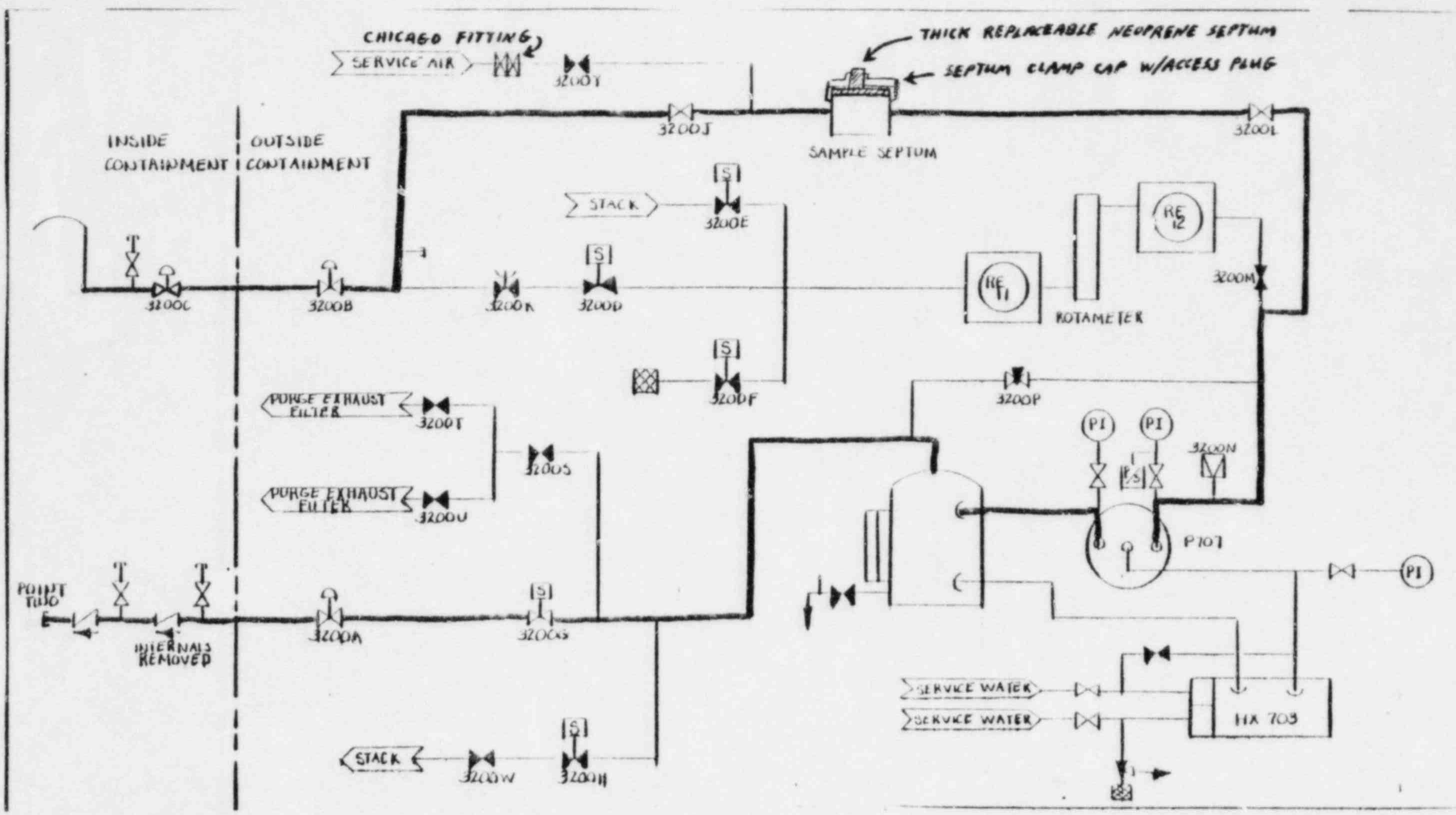


FIGURE 1

UNIT 1 CONTAINMENT ATMOSPHERE SAMPLING R11/R12 VALVE LINE-UP

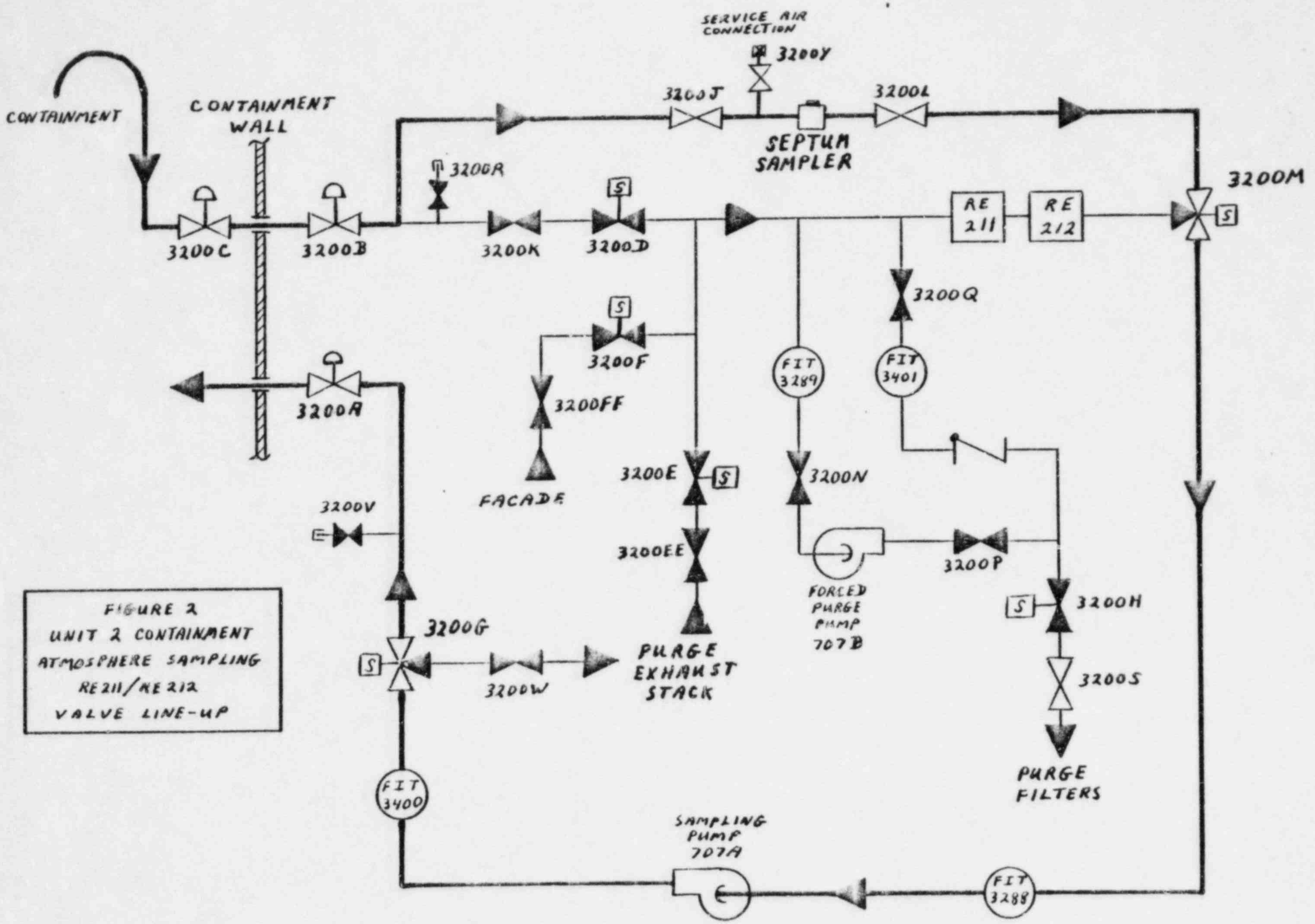


FIGURE 2
UNIT 2 CONTAINMENT
ATMOSPHERE SAMPLING
RE211/RE212
VALVE LINE-UP

POINT BEACH NUCLEAR PLANT

CONTAINMENT ATMOSPHERE POST-ACCIDENT SAMPLING ANALYSIS REPORT

1.0 HYDROGEN ANALYSIS

1.1 Scale used on gas partitioner ____________

1.2 Millivolt reading on chart recorder ____________

1.3 % hydrogen from calibration curve ____________

2.0 RADIOACTIVE NOBLE GAS ANALYSIS

2.1 Decay time in minutes ____________

2.2 Sample count time in seconds ____________

2.3 Detector ____________

2.4 Geometry ____________

2.5 Number of dilutions : (D) ____________

2.6 Common multiplier* ____________

$$*CM = (D)^{1} \times \frac{1075}{1.0} \times \text{(Pressure-Temperature Correction)}$$

$$\text{Pressure-Temperature Correction} = \frac{(P_C + 14.7)(T_C + 459)}{P_L\ (T_L + 459)}$$

Where P_C = Pressure in Containment (psig) ____________

T_C = Temperature in Containment (°F) ____________

P_L = Pressure in Lab (psi) where ____________

$$P_L = 14.7 \times \frac{P\ \text{(mm Hg)}}{760\ \text{(mm Hg)}}$$

T_L = Temperature in Laboratory (°F) ____________

(1) See Section 4.3.3 of EPIP 7.3.3. One or more dilutions may be necessary.

2.7 Results of MCA

Isotope	Concentration (μCi/cc)
Xe-133	______
Kr-85m	______
Kr-88	______
Xe-133m	______
Xe-135	______
Xe-138	______
Kr-87	______
Xe-135m	______
Ar-41	______
Kr-85	______
Xe-131m	______

3.0 RADIOACTIVE IODINE ANALYSIS

3.1 Decay time in minutes ______

3.2 Sample count time in seconds ______

3.3 Detector ______

3.4 Geometry ______

3.5 Results of MCA

Isotope	Concentration (μCi/cc)
I-131	______
I-132	______
I-133	______
I-134	______
I-135	______

4.0 ROUTINE & APPROVAL	Date	Initials
4.1 Calculations completed by	______	______
4.2 Analysis completed by	______	______
4.3 Chemistry & Health Physics Supervisor	______	______
4.4 Chemistry/Health Physics Supervisor (TSC)	______	______
4.5 Director (TSC)	______	______