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DETERMINATION OF REACTOR COOLANT CHLORIDE
CONCENTRATION AT THE HIGH RADIATION SAMPLING SYSTEM

A. PURPOSE

The purpose of this procedure is to delineate a method of determining the reactor coolant chloride concentration at the High Radiation Sampling System (HRSS) during normal and post-accident conditions. This procedure includes chloride standardization, sample analysis, system flushing and column regeneration sections.

B. REFERENCES

1. Sentry Equipment Corporation, Post Accident Sample System, Volume 1.
2. LZP 1330-29, "Sampling at the High Radiation Sampling System (Valve Operations at the HRSS Valve Control Panel)."
3. LZP 1330-22, "Calibration of the Model 10 Dionex Ion Chromatograph."

C. PREREQUISITES

1. The operator should be familiar with the operation of the ion chromatograph.
2. Verify that instrument air, approximately 100 psig, and nitrogen, approximately 60 psig, are available at the Chemical Analysis Panel (CAP), OPLE1J.
3. Fill a four liter collapsable container with demineralized water. Remove excess air from the bottle and label the bottle. Connect the bottle to the waterline in the reagent storage facility in the CAP, OPLE1J, open the container valve and then vent the feed lines.
4. Check that the containers of eluent, regenerant, and chloride standard are approximately half full, fill if necessary.
5. Check and vent pumps if air bubbles are visible in the sight glass. Venting is normally required when the eluent and regenerant containers are filled.

6. Ensure that the ion-exchange columns in use have been calibrated.
7. Reagents:
 - a. 0.005 M Sodium tetraborate ($\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}$).
 - b. 0.006 M Sodium carbonate ($\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$).
 - c. 1 N Sulfuric acid (H_2SO_4).
 - d. 1 ppm Chloride standard.
8. The sample must have been obtained in accordance with Reference 2 prior to performing this procedure.
9. Notify Rad/Chem Supervision if any problems are encountered at the HRSS panels.

D. PRECAUTIONS

1. A Regulatory Guide 1.3 or 1.4 release of fission products implies extremely high levels of radioactivity. Dose rates may be high enough to prevent entry into many areas of the plant that are normally habitable. Rad/Chem Supervision should be contacted prior to entry into any area when such a release of fission products is suspected.
2. Wear radiation dosimetry as recommended by Rad/Chem Supervision.
3. Wear protective clothing and respiratory protection as recommended by Rad/Chem Supervision.
4. Appropriate survey instruments should be available for monitoring during this procedure.
5. New calibration curves are required when columns are changed, since each set of columns will show slightly different results with respect to peak height and possibly retention time.
6. Calibration should be checked after making up new eluent. Results will differ if the concentration of the new eluent differs from the old.

E. LIMITATIONS AND ACTIONS

1. This analysis must be completed within 3 hours following an accident condition.
2. Under post-accident conditions, column regeneration should be performed as soon as practicable after completing the chloride analysis. Regeneration will significantly reduce or virtually eliminate the resin columns as a radiation source.
3. The calibration curve should be checked every four samples by analyzing a chloride standard.
4. The resin columns should be replaced every year, and new calibration curves developed.
5. This procedure is to be used for measuring chloride concentration for the range of 0.1 to 20 ppm in primary coolant water samples. The estimated precision is about ± 15 percent for the range of 0.1 to 1 ppm and ± 20 percent for the range of 1 to 20 ppm. Accuracy of analysis for the higher range can be improved to about ± 10 percent by calibration in that range. A chloride determination can be obtained within 15 minutes after primary coolant is charged to the ion chromatograph.
6. Retention time for any ionic species will vary with pump stroke setting. Pump stroke should remain constant for routine analytical use.
7. Regeneration is required about once every four hours during continuous operation of the system.
8. During continuous operation of the system, the columns must be cleaned on a daily basis or every other regeneration by pumping 0.006 M sodium carbonate through the columns for a 15-20 minute period. This is done prior to regeneration of the suppressor column.
9. This procedure, though intended for use under post-accident conditions, can be used for sampling at the HRSS panels during normal operations, during which the precautions may have limited applications. However, normal routine sampling precautions should be observed.

F. PROCEDURE

NOTE

For noun names associated with the valves operated in this procedure, refer to Attachment B.

1. Verify the following valve lineup at the LSP, OPLD8J:
 - a. RC-V-1.1 (closed).
 - b. RC-V-1.2 (closed).
 - c. RC-V-1.3 (closed).
 - d. RC-V-1.4 (closed).
 - e. RC-V-1.5 (closed).
 - f. Verify RC-V-4 is closed. Connect the flush water hose to RC-D-1 and open the flush water line valve.
 - g. RC-V-5.1 (closed).
 - h. RC-V-5.2 (closed).
 - i. RC-V-2 (closed).
 - j. RC-VREL-1 (closed).
 - k. RC-VREL-2 (closed).
 - l. RC-V-9 (CLOSED).
 - m. RC-V-11 (CLOSED).
 - n. RC-V-20 (closed).
 - o. RC-V-21 (closed).
 - p. RC-V-16 (closed).
 - q. RC-V-8.1 (closed).
 - r. RC-V-8.2 (closed).

- s. RC-DV-1 (BYPASS).
 - t. RC-V-18 (6 o'clock).
 - u. RC-V-19 (BYPASS).
 - v. RC-V-22 (TO CHEM PANEL).
 - w. RC-V-17 (closed).
 - x. RC-V-7 (open).
 - y. RC-V-3 (open).
2. Verify the following valve lineup at the CAP, OPLE1J:
- a. Connect the flush water hose to D-3 and open the flush water line valve.
 - b. V-10 (open).
 - c. V-11 (open).
 - d. V-12 (open).
 - e. V-2 (open).
 - f. V-8 (open).
 - g. V-15 (closed).
 - h. V-9 (closed).
 - i. V-29 (TO NITROGEN SUPPLY).
 - j. V-5 (CLOSED).
 - k. V-6 (OXYGEN CALIB SOLUTION).
 - l. V-9 (closed).
 - m. V-7 (YSI OXYGEN ANALYZER).
3. Startup the Ion Chromatograph at the CMP, OPLE4J, in accordance with the following:

- a. Place the POWER and AIR switches to ON position.
 - b. Place LOAD/INJECT switch in LOAD position.
 - c. Place the E-2 switch in the UP position.
 - d. Place the SEPARATOR switch in the SEP-1 position.
 - e. Place the SUPPRESSOR switch in the SUP-1/RGN-2 position.
4. Startup the conductivity meter at the CAP OPLE1J, in accordance with the following:
- a. Set MODE switch to ZERO and adjust the meter to zero with the screw below the meter face.
 - b. Set MODE switch to CAL to set the meter at full scale. CAL is adjusted with the screw at the top of the meter circuit board. The adjustment screw is labeled METER.
 - c. Set the MODE switch to LIN.
 - d. Set the umho full scale switch to 30. After operation of the system for approximately 30 minutes, set the switch to 1.
 - e. Set the OFFSET range switch to X 10.
5. Perform the system baseline stabilization in accordance with the following:
- a. At the CAP, OPLE1J, check that the eluent pump setting is 40%, and the local pump switch is ON.

NOTE

Retention time for any ionic species will vary with pump stroke setting. Pump stroke should remain constant for routine analytical use.

- b. Turn the pump switch on the CMP, OPLE4J, to the ON position.
- c. Turn the gauge switch on the CMP, OPLE4J, to the ON position. Normal operating pressure is

200 psig, however, pressure will fluctuate due to the pump reciprocating.

- d. Operate the system for approximately 30 minutes or until the baseline stabilizes with the umho setting in the 1 position.
6. Perform the chloride calibration check in accordance with the following at the CAP, OPLE1J, or as otherwise directed:
- a. Align valve V-5 to CHLORIDE CALIB SOLUTION.
 - b. Adjust valve V-15 until sufficient flow is indicated by the red flow indicator light. Allow the line to flush for a minimum of two (2) minutes.
 - c. At the CMP, OPLE4J, place the LOAD/INJECT switch in the INJECT position. Turn on the chart recorder (the switch is located inside on the lower right as the recorder is pulled out).
 - d. Press the PIP event recorder button on the CAP, OPLE1J, conductivity meter or mark the inject position on the chart paper of the recorder. Record the standard identification and date and time of analysis on the chart paper.
 - e. Turn valve V-5 to the CLOSED position.
 - f. After approximately one minute, place the LOAD/INJECT switch at the CMP, OPLE4J, in the LOAD position. The chloride peak will occur at approximately five minutes after injection. This peak height may be used as the reference point to determine the chloride concentration in subsequent unknown samples.
 - g. The chloride standard will be automatically flushed from the analyzer. Allow approximately ten (10) minutes to complete this operation. Turn off the chart recorder on the CMP, OPLE4J.
 - h. Align valve V-5 to LIQUID SAMPLE.

- i. Align valve V-29 to the vent position.
7. Purge the system for the reactor coolant sample in accordance with the following at the LSP, OPLD8J.
- a. At the CAP, OPLE1J, verify V-5 is aligned to LIQUID SAMPLE.
 - b. Open RC-V-1.1 (-1.2, -1.3, -1.4, or -1.5), depending on sample source.
 - c. Open RC-VREL-1 until RC-FI-1 indicates 35-40 inches of water. Purge for a minimum of five (5) minutes. Slowly close RC-VREL-1 until RC-FI-1 indicates 12-15 inches of water. Continue the purge for a minimum of one (1) minute.
 - d. Close RC-V-3.
 - e. Open RC-V-2.
 - f. Adjust RC-VREL-2 until RC-FI-2 indicates 18-22 inches of water.
 - g. Verify that the flow rate at the CAP Ion Chromatograph line is 15 ml/min by observing the red indicator on the CAP, OPLE1J, is lit. Flush for a minimum of five (5) minutes.
8. Analyze the sample in accordance with the following at the CAP, OPLE1J, or as otherwise directed:
- a. At the CMP, OPLE4J, place the LOAD/INJECT switch in the INJECT position and turn on the chart recorder.
 - b. Press the PIP event recorder button on the CAP conductivity meter or mark the inject position on the chart paper at the CMP OPLE4J. Record the sample source, date and time of analysis, on LRC Form 1089, Attachment A.
 - c. After approximately one minute, place LOAD/INJECT switch on the CMP, OPLE4J, in the LOAD position. The chloride peak will occur at approximately five (5) minutes after injection.

- d. Turn valve V-5 to the DEMIN WATER position. Flush with demineralized water for a minimum of two (2) minutes.
 - e. If the chloride peak goes off-scale, a reanalysis must be completed using a larger micromho setting (3 umho). Align V-5 to LIQUID SAMPLE, flush for a minimum of one (1) minute, and repeat Steps F.8.a. through F.8.d.
9. Flush the system in accordance with the following at the LSP, OPLD8J, or as otherwise directed:
- a. At the CAP, OPLE1J, align V-5 to LIQUID SAMPLE.
 - b. At the Valve Control Panel, OPLC9J, secure the sampling lineup in accordance with Reference 2, Steps F.1.c.9) through F.1.c.10).
 - c. At the LSP, OPLD8J, close RC-V-1.1 (-1.2, -1.3, -1.4, or -1.5).
 - d. Open RC-V-4.
 - e. Adjust RC-VREL-2 until RC-FI-2 indicates 18-22 inches of water. Flush with demineralized water for a minimum of three (3) minutes.
 - f. Close RC-V-7.
 - g. Open RC-V-3.
 - h. Adjust RC-VREL-1 until RC-FI-1 indicates 35-40 inches of water. Flush with demineralized water for a minimum of one (1) minute.
 - i. Close RC-V-3.
 - j. Open RC-V-1.1 (-1.2, -1.3, -1.4, or -1.5) and flush with demineralized water for a minimum of five (5) minutes.
 - j. Close RC-V-1.1 (-1.2, -1.3, -1.4, or -1.5).
 - l. Open RC-V-8.1 and RC-V-8.2.
 - m. Adjust RC-VREL-2 until RC-FI-2 indicates 18-22 inches of water. Flush with demineralized water for a minimum of three (3) minutes.

- n. At the CMP, OPLE4J, cycle the LOAD/INJECT switch at least three times. Return it to the LOAD position.
 - o. At the CAP, OPLE1J, align V-5 to CLOSED.
 - p. Turn V-6 on the CAP, OPLE1J, to LIQUID SAMPLE and flush with demineralized water for a minimum of two (2) minutes.
 - q. Turn V-6 to OXYGEN CALIB SOLUTION.
 - r. At the CAP, OPLE1J, close the flush water valve and disconnect the flush water hose from D-3.
 - s. Secure flushing by closing the following valves on the LSP, OPLD8J:
 - 1) RC-V-8.2.
 - 2) RC-V-8.1.
 - 3) RC-V-2.
 - 4) RC-V-4.
 - 5) RC-VREL-1.
 - 6) RC-VREL-2.
 - t. At the LSP, OPLD8J, close the flush water valve and disconnect the flush water hose from RC-D-1.
 - u. At the LSP, OPLD8J, secure the system lineup in accordance with Reference 2, Steps F.2.c.11) through F.2.e.
10. Regenerate the columns in accordance with the following:
- a. Under post-accident conditions, column regeneration is performed as soon as practicable after completing the chloride analyses. Regeneration will significantly reduce or virtually eliminate the resin columns as a radiation source.

- b. Column regeneration is performed every 4 hours if the ion chromatograph is in continuous use. The need for column regeneration under other conditions is indicated by a high baseline conductivity, or a significant change in the time for the chloride peak to occur, or change in peak height when running the chloride standard. A sodium carbonate flush is performed prior to every other regeneration. Go to step F.10.e. if only regeneration is required.
- c. Perform the following lineup for flushing of the resin columns:
 - 1) Place the MODE switch on the CAP, OPLE1J, conductivity meter at ZERO.
 - 2) Place the E1 switch on the CMP, OPLE4J, in the ON (up) position.
 - 3) Place the E2 switch on the CMP, OPLE4J, in the OFF (down) position.
 - 4) Place the SEPARATOR switch on the CMP, OPLE4J, in the SEP-1 (up) position.
 - 5) Place the SUPPRESSOR switch on the CMP, OPLE4J, in the SUP-1/RGN-2 (up) position.
 - 6) Place the PUMP switch on the CMP, OPLE4J, in the ON (up) position.
- d. The valve lineup in Step F.10.c will provide for sodium carbonate flushing of both columns. Operate for 15-20 minutes, then turn the E1 switch on the CMP, OPLE4J, to the OFF position (down) and flush for 10 minutes.
- e. On the CMP, OPLE4J, turn the SUPPRESSOR switch to the SUP-2/RGN-1 (down) position.
- f. Depress the REGENERATION START button on the CMP, OPLE4J. The system timer is set to provide for a 15 minute acid regeneration followed by a 45 minute water rinse, do not change the setting. After one hour the system will shut off automatically and the red ready light will be activated.

11. Secure the system after completion of column regeneration in accordance with the following:
 - a. Turn the ion chromatograph POWER switch on the CMP, OPLE4J, to OFF.
 - b. Turn the AIR switch to OFF on the CMP, OPLE4J.
 - c. Turn the GAUGE switch to OFF, on the CMP, OPLE4J.
 - d. Turn the PUMP switch on the CMP, OPLE4J to OFF.
 - e. Turn the conductivity meter MODE switch to ZERO on the CAP, OPLE1J.
12. Calculate the chloride concentration in accordance with the following:
 - a. Measure the height of the chloride standard peak (PH_S), units, and record on LRC FORM 1097C (Attachment A).
 - b. Measure the height of the sample peak (PH_U), units, and record on LRC Form 1097C (Attachment A).
 - c. Calculate and record the chloride concentration in accordance with LRC FORM 1097C (Attachment A).
13. Attach the strip chart from the ion chromatograph to LRC FORM 1097C (Attachment A) and forward to Rad/Chem Supervision.

G. CHECKLISTS

1. None.

H. TECHNICAL SPECIFICATION REFERENCES

1. None.

ATTACHMENT B
VALVE LISTING

RC-V-1.1	Reactor Recirc Loop B Sample Cutout Valve
RC-V-1.2	RT Demin Inlet Sample Cutout Valve
RC-V-1.3	RHR Loop A Sample Cutout Valve
RC-V-1.4	RHR Loop B Sample Cutout Valve
RC-V-1.5	RT Demin Outlet Sample Cutout Valve
RC-V-2	Sample Source Isolation Valve
RC-V-3	Sample Purge Cutout Valve
RC-V-4	Flushing Water Isolation Valve
RC-V-5.1	Pressurized Sample Inlet Isolation Valve
RC-V-5.2	Pressurized Sample Outlet Isolation Valve
RC-V-7	Diluted Sample Bypass Valve
RC-V-8.1	RC-SF-1.2 Inlet Isolation Valve
RC-V-8.2	RC-SF-1.2 Outlet Isolation Valve
RC-V-9	RC-EV-1 Isolation Valve
RC-V-10	RC-EV-1 Evacuation Cutout Valve
RC-V-11	Off-gas 4-way Valve
RC-V-12	Argon to Air Ejector Cutout Valve
RC-V-13	Off-gas Vial Evacuation Cutout Valve
RC-V-14	Argon Supply to Off-gas Vial Cutout Valve
RC-V-15	Off-gas Sample to Gas Chromatograph Isolation Valve
RC-V-16	RC-SF-1.2 Argon Purge Cutout Valve
RC-V-17	Reactor Coolant Grab Sample Cutout Valve
RC-V-18	Reactor Coolant Undiluted Sample Backflush Cutout Valve
RC-V-19	Reactor Coolant Undiluted Sample Injection Valve
RC-V-20	RC-C-1 Fill Valve
RC-V-21	RC-C-1 Isolation Valve
RC-V-22	Liquid Sample to CAP Isolation Valve
RC-DV-1	Reactor Coolant Diluted Sample Injection Valve
RC-DV-2	Off-gas Sample Injection Valve
RC-VREL-1	Reactor Coolant Purge Throttle Valve
RC-VREL-1	Reactor Coolant Sample Throttle Valve
V-1	Off-gas Sample to Gas Chromatograph
V-2	Ion Chromatograph to Waste
V-5	Ion Chromatograph Sample Source Selection
V-6	O ₂ Analyzer Sample Source Selection
V-7	O ₂ Analyzer Selection
V-8	Ion Chromatograph Discharge Valve
V-9	O ₂ Calibration Solution Cutout

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V-10	Instrument Air Cutout
V-11	Demineralized Water Cutout Valve
V-12	Nitrogen Supply Cutout Valve
V-14	Argon Supply Cutout Valve
V-15	Cal-3 Isolation Valve
V-16	Cal-2 Isolation Valve
V-17	O ₂ Calibration Solution Tank Recirc Valve
V-18	O ₂ Calibration Solution Tank Drain Valve
V-19	Cal-3 Drain Valve
V-20	Cal-2 Drain Valve
V-24	Demin Water Fill to O ₂ Cal. Soln. Tk.
V-25	Cal-1 Drain Valve
V-26	Cal-1 Isolation Valve
V-27	Nitrogen Supply to Cal-1
V-28	Nitrogen Supply to Cal-2
V-29	Nitrogen Supply to Cal-3
V-30	Cal-1 Cal-2 Selection Valve

ATTACHMENT A

LA SALLE COUNTY STATION
Post-Accident Analysis of Chloride Worksheet

SAMPLE SOURCE:	
Date	Time
C_s Chloride Standard Concentration, ppm	
PH_s Chloride Standard Peak Height, units	
PH_u Sample Peak Height, units	
C_u Sample Chloride Concentration, ppm	

$$C_u = \frac{(C_s) \times (PH_u)}{(PH_s)}$$

APPENDIX A

LSCS PROCEDURE DEFICIENCY SHEET

PROCEDURE 1: LZP-1330-22

REVISION:

[illegible]

COMMENTS:

SOURCE CODE: C.E.
SAL
C.E.
By tracing
Origin

Note: Indicate by title and/or number the specific document needed in each of the following possibilities.

CALIBRATION OF THE MODEL 10 DIONEX ION CHROMATOGRAPH

A. PURPOSE

The purpose of this procedure is to delineate a method for calibration of the Model 10 Dionex Ion Chromatograph at the High Radiation Sampling System (HRSS).

B. REFERENCES

1. try Equipment Corporation, Post Accident Sample Sem, Volume 1.
2. LZP 1330-21, "Determination of Reactor Coolant Chloride Concentration at the High Radiation Sampling System."

C. PREREQUISITES

1. The operator should be familiar with the operation of the ion chromatograph.
2. Verify that instrument air, approximately 100 psig, and nitrogen, approximately 60 psig, are available at the Chemical Analysis Panel (CAP), OPLE1J.
3. The ion exchange columns have been recently regenerated or replaced.
4. Reagents:
 - a. 0.005 M Sodium tetraborate ($\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}$).
 - b. 0.006 M Sodium carbonate ($\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$).
 - c. 1 N Sulfuric acid (H_2SO_4).
 - d. Chloride standard; 1 ppm, 0.5 ppm, 0.2 ppm, and 0.1 ppm chloride.
5. Fill a four liter collapsable container with demineralized water. Remove excess air from the bottle, and label. Connect it to the waterline in the reagent storage facility. Open the container valve and vent feed lines.
6. Check that the eluent and regenerant containers are approximately half full.

7. Ensure that the chloride calibration solution tank is over half full of 1 ppm chloride standard.

D. PRECAUTIONS

1. During normal operation, there are expected to be no radiation hazards associated with the performance of this procedure, however, the following precautions should be observed:
 - a. A Regulatory Guide 1.3 or 1.4 release of fission products implies extremely high levels of radioactivity. Dose rates may be high enough to prevent entry into many areas of the plant that are normally habitable. Rad/Chem Supervision should be contacted prior to entry into any area when such a release of fission products is suspected.
 - b. Wear radiation dosimetry as recommended by Rad/Chem Supervision.
 - c. Wear protective clothing and respiratory protection as recommended by Rad/Chem Supervision.
 - d. Appropriate survey instruments should be available for monitoring during this procedure if it is performed under post-accident conditions.

E. LIMITATIONS AND ACTIONS

1. Notify Rad/Chem Supervision if any problems are encountered at the HRSS panels.
2. Retention time for any ionic species will vary with pump stroke setting. Pump stroke should remain constant for routine analytical use.
3. This procedure is intended for use in calibrating the ion chromatograph in the 0.1 to 1 ppm chloride range. However, calibration can be performed in the 1 to 20 ppm range with the use of the appropriate calibration solutions and this procedure.

F. PROCEDURE

NOTE

For noun names associated with the valves operated in this procedure, refer to Attachment B.

1. Verify the following valve lineup at the Liquid Sampling Panel (LSP), OPLD8J.
 - a. RC-V-1.1 (closed).
 - b. RC-V-1.2 (closed).
 - c. RC-V-1.3 (closed).
 - d. RC-V-1.4 (closed).
 - e. RC-V-1.5 (closed).
 - f. RC-V-22 (TO WASTE).
2. Verify the following valve lineup at the CAP, OPLE1J:
 - a. V-10 (open).
 - b. V-11 (open).
 - c. V-12 (open).
 - d. V-2 (open).
 - e. V-8 (open).
 - f. V-29 (to vent).
 - g. V-5 (CLOSED).
 - h. V-6 (OXYGEN CALIB. SOLUTION).
 - i. V-7 (YSI OXYGEN ANALYZER).
 - j. V-15 (closed).
 - k. V-9 (closed).
3. Start up the Ion Chromatograph at the Chemical Monitoring Panel (CMP), OPLE4J, in accordance with the following:

- a. Place the POWER and AIR switches to ON position.
 - b. Place LOAD/INJECT switch in LOAD position.
 - c. Place the E-2 switch in the UP position.
 - d. Place the SEPARATOR switch in the SEP-1 position.
 - e. Place the SUPPRESSOR switch in the SUP-1/RGN-2 position.
4. Start up the Conductivity Meter at the CAP, OPLE1J, in accordance with the following:
- a. Set MODE switch to ZERO and adjust the meter to zero with the screw below the meter face.
 - b. Set the MODE switch to CAL to set the meter at full scale. CAL is adjusted with the screw at the top of the meter circuit board. The adjustment screw is labeled METER.
 - c. Set the MODE switch to LIN.
 - d. Set the umho full scale switch to 30. After operation of the system for approximately 30 minutes, set the switch to 1.
 - e. Set the OFFSET range switch to X 10.
5. Perform the system baseline stabilization in accordance with the following:
- a. At the CAP, OPLE1J, check the eluent pump setting is 40 percent and the local pump switch is ON.
 - b. Turn the pump switch on the CMP, OPLE4J, to the ON position.
 - c. Turn the gauge switch on the CMP, OPLE4J, to the ON position. Normal operating pressure is 200 psig, however, pressure will fluctuate due to the pump reciprocating.
 - d. Operate the system for approximately 30 minutes or until the baseline stabilizes with the umho setting in the 1 position.

6. Analyze the chloride standard in accordance with the following:
 - a. At the CAP, OPLE1J, align V-5 to CLOSED and V-29 to the vent position.
 - b. Open V-13 in the rear of the CAP, OPLE1J.
 - c. Inject 15 ml of the 0.1 ppm chloride standard through the septum, in the rear of the CAP, OPLE1J, using caution not to inject any air bubbles with the solution.
 - d. Close V-13.
 - e. At the CMP, OPLE4J, place the LOAD/INJECT switch in the INJECT position. Turn on the chart recorder.
 - f. Press the PIP event recorder on the CAP, OPLE1J, conductivity meter. Record the standard concentration, date and time of analysis on the chart paper.
 - g. After approximately one minute, place the LOAD/INJECT switch at the CMP, OPLE4J, in the LOAD position. The chloride peak will occur at approximately five minutes after injection.

NOTE

If the chloride peak is off scale, repeat Steps F.6.b through F.6.g using a larger umho setting.

- h. The chloride standard will be automatically flushed from the analyzer. Allow approximately ten (10) minutes to complete this operation. Turn off the chart recorder on the CMP, OPLE4J.
 - i. Repeat Steps F.6.b through F.6.h for each chloride standard, 0.2 ppm and 0.5 ppm chloride.
7. Analyze the 1 ppm chloride standard in accordance with the following:
 - a. Align valve V-29 on the CAP, OPLE1J, to NITROGEN SUPPLY.

- b. At the CAP, OPLE1J, align valve V-5 to CHLORIDE CALIB SOLUTION.
- c. At the CAP, OPLE1J, adjust valve V-15 until sufficient flow is indicated by the red flow indicator light. Flush for a minimum of two (2) minutes.
- d. At the CMP, OPLE4J, place the LOAD/INJECT switch in the INJECT position. Turn on the chart recorder.
- e. Press the PIP event recorder on the conductivity meter on the CAP, OPLE1J. Record the standard concentration, date and time of analysis on the chart paper.
- f. On the CAP, OPLE1J, turn valve V-5 to the CLOSED position.
- g. After approximately one minute, place the LOAD/INJECT switch at the CMP, OPLE4J, in the LOAD position. The chloride peak will occur at approximately five minutes after injection.

NOTE

If the chloride peak is off scale, repeat Steps F.7.b through F.7.g using a larger umho setting.

- h. The chloride standard will be automatically flushed from the analyzer. Allow approximately ten (10) minutes to complete this operation. Turn off the chart recorder on the CMP, OPLE4J.
8. Regenerate and flush the columns in accordance with the following at the CMP, OPLE4J:
- a. Perform the following lineup for flushing of the resin columns:
 - 1) Place the MODE switch on the CAP, OPLE1J, conductivity meter to ZERO.
 - 2) Place the E-1 switch on the CMP, OPLE4J, in the ON (up) position.

- 3) Place the E-2 switch on the CMP, OPLE4J, in the OFF (down) position.
 - 4) Place the SEPARATOR switch on the CMP, OPLE4J, in the SEP-1 (up) position.
 - 5) Place the SUPPRESSOR switch on the CMP, OPLE4J, in the SUP-1/RGN-2 (up) position.
 - 6) Place the PUMP switch on the CMP, OPLE4J, in the ON (up) position.
- b. This lineup will provide for sodium carbonate flushing of the separator column. Operate for 15-20 minutes, then turn the E-1 switch to the water position (down) and flush for 10 minutes.
 - c. Check the SUPPRESSOR switch is in the SUP-2/RGN-1 position.
 - d. Depress the regeneration start button. The system timer must be set to provide for a 15 minute acid regeneration followed by a 45 minute water rinse. After one hour the system will shut off automatically and the red ready light will be activated.
9. Secure the system after completion of column regeneration in accordance with the following:
- a. Turn the ion chromatograph POWER switch on the CMP, OPLE4J, to OFF.
 - b. Turn the AIR switch on the CMP, OPLE4J, to OFF.
 - c. Turn the GUAGE switch on the CMP, OPLE4J, to OFF.
 - d. Turn the PUMP switch on the CMP, OPLE4J, to OFF.
 - e. Turn the conductivity meter MODE switch on the CAP, OPLE1J, to ZERO.
10. Plot the chloride calibration curve in accordance with the following:

- a. Measure the height of each peak for its respective standard; 0.1 ppm, 0.2 ppm, 0.5 ppm and 1.0 ppm chloride.
 - b. On a sheet of linear graph paper, plot the peak height, in units, on the vertical axis and the chloride concentrations, in ppm, on the horizontal axis. Refer to Attachment A.
 - c. Draw the best fit straight line through the data points.
11. Attach the strip chart from the ion chromatograph to the chloride calibration curve and forward to Rad/Chem Supervision for review.

G. CHECKLISTS

1. None.

H. TECHNICAL SPECIFICATION REFERENCES

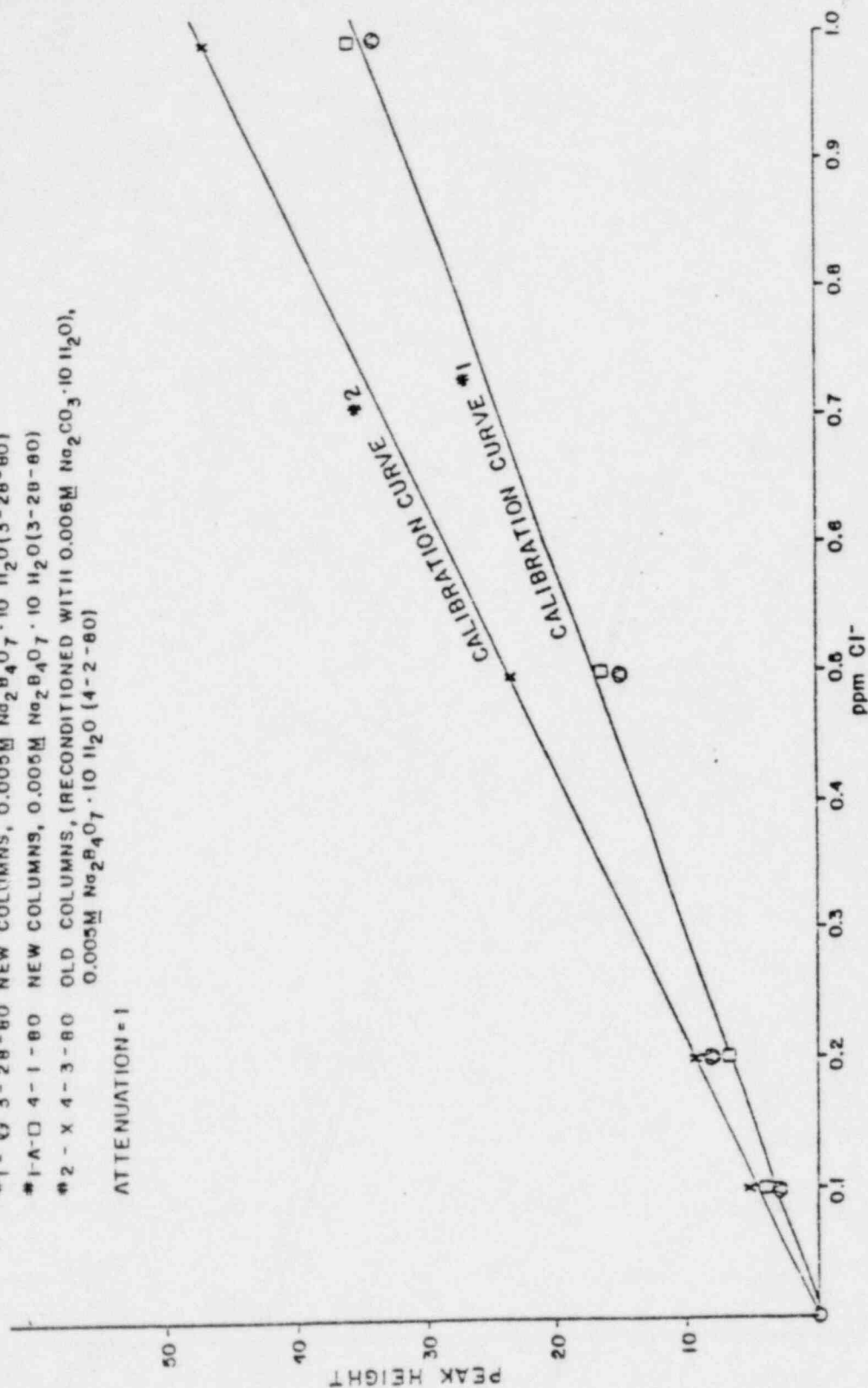
1. None.

ATTACHMENT A

CHLORIDE CALIBRATION CURVES

- #1 - \bigcirc 3-28-80 NEW COLUMNS, 0.005M $\text{Na}_2\text{B}_4\text{O}_7 \cdot 10 \text{H}_2\text{O}$ (3-28-80)
#1-A- \square 4-1-80 NEW COLUMNS, 0.005M $\text{Na}_2\text{B}_4\text{O}_7 \cdot 10 \text{H}_2\text{O}$ (3-28-80)
#2 - X 4-3-80 OLD COLUMNS, (RECONDITIONED WITH 0.005M $\text{Na}_2\text{CO}_3 \cdot 10 \text{H}_2\text{O}$,
0.005M $\text{Na}_2\text{B}_4\text{O}_7 \cdot 10 \text{H}_2\text{O}$ (4-2-80)

ATTENUATION = 1



ATTACHMENT B

VALVE LISTING

RC-V-1.1	Reactor Recirc Loop B Cutout Valve
RC-V-1.2	RT Demin Inlet Cutout Valve
RC-V-1.3	RHR Heat Exchanger A Cutout Valve
RC-V-1.4	RHR Heat Exchanger B Cutout Valve
RC-V-1.5	RT Demin Outlet Cutout Valve
V-2	Ion Chromatograph to Waste
V-5	Ion Chromatograph Sample Source Selection Valve
V-6	O ₂ Analyzer Sample Source Selection Valve
V-7	O ₂ Analyzer Selection Valve
V-8	Ion Chromatograph Discharge Valve
V-9	O ₂ Calibration Solution Cutout Valve
V-10	Instrument Air Cutout Valve
V-11	Demineralized Water Cutout Valve
V-12	Nitrogen Supply Cutout Valve
V-13	Ion Chromatograph Manual Injection Valve
V-15	Cal-3 Isolation Valve
V-19	Cal-3 Drain Valve
V-29	Nitrogen Supply to Cal-3

DETERMINATION OF REACTOR COOLANT HYDROGEN
CONCENTRATION AT THE HIGH RADIATION SAMPLING SYSTEM

A. PURPOSE

1. The purpose of this procedure is to delineate a method of determining the reactor coolant hydrogen concentration at the High Radiation Sampling System (HRSS) during normal and post-accident conditions. This procedure includes chromatograph verification, system calibration, sample analysis and system flushing sections, utilizing the Chemical Analysis Panel (CAP), OPLE1J, the Chemical Monitoring Panel (CMP), OPLE4J, and the Liquid Sampling Panel (LSP), OPLD8J.

B. REFERENCES

1. Sentry Equipment Corporation, Post Accident Sample System, Volume 1.
2. LZP 1330-27, "Sampling of Reactor Coolant Off-Gas."

C. PREREQUISITES

1. This procedure is intended to be performed in conjunction with Reference 2 for sample analysis.
2. Verify the following or equivalent program is in the chromatograph microprocessor memory:

<u>Step</u>	<u>Time</u>		<u>Code</u>
01	00	01	03
02	00	02	25
03	00	20	04
04	00	30	01
05	01	15	00

3. Carrier and calibration gases available as follows:
 - a. Chromatography grade argon carrier gas, approximately 40 PSIG.
 - b. Calibration gas #1, 10 percent hydrogen (by volume) in argon carrier, approximately 20 PSIG.

- c. Calibration gas #2, 2000 ppm (0.2 percent) hydrogen (by volume) in argon carrier, approximately 20 PSIG.
- d. Hydrogen, minimum 99.9 percent pure.
- 4. Equipment:
 - a. Gas tight syringe sized as necessary.
 - b. Hydrogen concentration vs. peak height charts.
- 5. The operator should be familiar with the operation of the HRSS panels.
- 6. Establish communications with the Unit Nuclear Station Operator (NSO).
- 7. The instrument should be in the ON or STANDBY condition for a minimum of 30 minutes before sample analysis.

D. PRECAUTIONS

- 1. A Regulatory Guide 1.3 or 1.4 release of fission products implies extremely high levels of radioactivity. Dose rates may be high enough to prevent entry into many areas of the plant that are normally habitable. Rad/Chem Supervision should be contacted prior to entry into any area when such a release is suspected.
- 2. Wear radiation dosimetry as recommended by Rad/Chem Supervision.
- 3. Wear protective clothing and respiratory protection as recommended by Rad/Chem Supervision.
- 4. Appropriate survey instruments should be available for monitoring during this procedure.
- 5. The chromatograph calibration should be checked daily or when in use by analyzing a calibration gas standard.
- 6. Calibration should be performed upon installation and quarterly thereafter. The system should be recalibrated whenever columns are changed, or system volume changed, since such changes, by affecting

peak heights and retention times, can lead to erroneous estimates of reactor coolant hydrogen concentrations.

7. Retention time for hydrogen and other gases will vary with argon carrier gas pressure. The gas pressure should remain constant at 40 PSIG for routine analytical use.
8. The system is intended to be operated using only four (4) attenuation settings on the chromatograph. The settings are 5 X 1, 25 X 1, 100 X 1, 5 X 100. Under no circumstances should the system be operated with attenuations different from these, except during system warmup and stabilization.
9. Chromatograph verification shows that the chromatograph performance has not degraded. This is critically dependent on the setting of the chromatograph's back pressure regulating valve. Under no circumstances should this valve be adjusted without prior approval of Rad/Chem Supervision.

E. LIMITATIONS AND ACTIONS

1. Notify Rad/Chem Supervision if any problems are encountered at the HRSS panels.
2. This procedure, though intended for use under post-accident conditions, can be used for sampling at the HRSS panels during normal operations, during which the precautions listed may have limited applications. However, normal routine sampling precautions should be observed.

F. PROCEDURE

NOTE

For noun names associated with the valves operated in this procedure, refer to Attachment F.

1. Perform the following valve lineup:
 - a. Verify valve V-1 is open.
 - b. Open valve V-14 and verify the argon pressure gauge reads 40 PSIG. Adjust pressure regulating valve if necessary.

- c. Open valve V-10 and verify the air pressure gauge reads 40 PSIG. Adjust pressure regulating valve if necessary.
2. Startup the gas chromatograph in accordance with the following:
- a. Select an attenuation factor of 250 (25 X 10). Place all function switches in the OFF (out) position.
 - b. Depress MAN and CLEAR pushbuttons.
 - c. Enter code "00" on keyboard.
 - d. Allow the chromatograph to stabilize for 30 minutes if power was just restored.
 - e. Display platen setpoint temperature by entering "01", then "35" and record for a minimum of 30 seconds. Then display actual platen temperature by entering "45" and record for a minimum of 30 seconds. Setpoint and actual temperatures should be within 1/2 grid marking of one another.
 - f. As necessary, repeat Step F.2.e at a minimum of 5 minute intervals until stabilization is achieved.
3. Perform the chromatograph verification in accordance with the following:

NOTE

This procedure serves to verify that chromatograph performance has not changed from previous use and calibration. The procedure should be run (1) whenever the instrument has been shutdown for extended periods and twice (2) daily during normal use.

- a. Release AUTO and ENTER pushbuttons.
- b. Depress MAN and CLEAR pushbuttons.
- c. Enter code "00" on keyboard.
- d. Verify that SAMP pushbutton is released and sample loop #1 is selected.

- e. Enter "23" to initiate evacuation of chromatograph.
- f. Verify that the red high vacuum light is on after a few minutes.
- g. Enter "24" to terminate evacuation.
- h. Select 500 (5 X 100) attenuation if CAL 1 (10 percent hydrogen) will be used. Select 5 (5 X 100) attenuation if CAL 2 (2000 ppm hydrogen) will be used.
- i. Depending on the attenuation selected, depress the CAL 1 or CAL 2 pushbutton. Wait 5 seconds and verify that the amber low vacuum light is on.
- j. Release CAL 1 and CAL 2 pushbutton and wait 10 seconds.
- k. Start the L&N recorder and depress AUTO pushbutton.
- l. Depress CLEAR.
- m. Wait until the display clock has timed to three (3) minutes, then release AUTO, depress CLEAR, and enter "00". Stop the L&N recorder.
- n. Label the L&N recorder trace with date, time, calibration gas used, loop number, and attenuation used.
- o. Calculate the hydrogen peak height "X" using:
$$X = (P \times A) / (100)$$
Where: P = Trace peak height
(with baseline subtracted),
L&N recorder scale units.
A = Attenuation.
- p. Verify that X is within $\pm 5\%$ of the value shown on the concentration versus peak height chart for the selected attenuation and calibration gas. If X is greater than $\pm 5\%$ of the value shown, contact Chemistry Supervision.

4. Perform the sample analysis in accordance with the following:
 - a. Open or check open valve V-1.
 - b. Release the AUTO and ENTER pushbuttons.
 - c. Depress MAN and CLEAR pushbuttons.
 - d. Enter code "00" on the keyboard.
 - e. Depress the SAMP pushbutton and verify the red sample light is on.
 - f. Select Loop #1.
 - g. Enter "23" to initiate evacuation of the chromatograph.
 - h. Verify the red high vacuum light is on after a few minutes.
 - i. Cycle through loops 1, 2, 3, and 4, pausing at each loop for 5 seconds. Repeat for a total of three cycles.
 - j. Select Loop #1.
 - k. Upon notification from the Liquid Sampling Panel (LSP), OPLD8J, operator that the LSP is ready to transfer a sample, enter "24" to terminate evacuation. Then notify him that the CAP, OPLE1J, is ready. Refer to Reference 2 to obtain a sample at the LSP.
 - l. Select 5 (5 X 1) attenuation for normal operation. Select 500 (5 X 100) attenuation for post-accident situations.
 - m. When the LSP, OPLD8J, operator gives notification that the CAP, OPLE1J, analysis may begin, proceed in accordance with the following:
 - 1) Cycle through loops 1, 2, 3, and 4; pausing at each loop for 5 seconds. Repeat for a total of three cycles.

- 2) Select loop #1.
- 3) Notify the LSP operator to close RC-V-15.
- n. Start the L&N recorder and depress the AUTO pushbutton.
- o. Depress CLEAR.
- p. Wait until the display clock has timed to 3 minutes, then release AUTO, depress CLEAR, and enter "00".
- q. Label the L&N recorder trace with the date, time, loop number, and attenuation setting.
- r. Depending on the trace just recorded, select a different attenuation to obtain a better trace. If the trace is acceptable, proceed to step F.4.u.
- s. Select the next available loop and depress the AUTO pushbutton.
- t. Repeat steps F.4.o through F.4.r.
- u. Stop the L&N recorder.
- v. To purge the system of residual gas, proceed in accordance with the following:
 - 1) Enter code "23" to evacuate the chromatograph until the red HI VACUUM light is on, then code "13" to purge the lines from RC-V-15.
 - 2) Cycle through loops 1, 2, 3, and 4, pausing at each loop for 5 seconds. Repeat for a total of three cycles.
 - 3) Enter code "14" to terminate the purge, enter "24" to terminate evacuation.
 - 4) Enter code "00".
 - 5) Release the SAMP pushbutton.
- w. If no further analyses are required, close valves V-1, V-14, and V-10.

- x. Determine the reactor coolant hydrogen concentration by calculating the hydrogen peak height "X" in accordance with the following formula, and record the work on LRC FORM 1097B (Attachment E):

$$X = (P) \times (A) / (100)$$

where: P = Trace peak height (with baseline subtracted),
L&N recorder scale units.

A = Attenuation setting.

- y. From the plot of hydrogen concentration versus peak height for the attenuation setting used, read the measured hydrogen concentration at the intersection of the curve for the appropriate loop and the value of X determined in Step F.4.x. Record the results on LRC Form 1097B (Attachment E).

- 5. Perform the calibration of the gas chromatograph in accordance with the following:

NOTE

This procedure serves to calibrate the entire Liquid Sampling Panel (LSP), OPLD8J, Chemical Analysis Panel (CAP), OPLE1J, and chromatograph system. The procedure should be run whenever system volume has changed or chromatograph hardware is replaced or modified. This procedure produces four charts of hydrogen concentration versus chromatograph peak height, which are used to estimate hydrogen concentrations of the reactor coolant samples.

- a. Perform the chromatograph verification procedure, Steps F.3.a through F.3.o for CAL 2 gas.
- b. Perform the chromatograph verification procedure, Steps F.3.a through F.3.o for CAL 1 gas.
- c. Depress the SAMP pushbutton.
- d. At the LSP, OPLD8J, remove the plug from the tee at the bottom of RC-EV-1 and replace it with the septum cap.

- e. At the LSP, OPLD8J, proceed in accordance with the following:
 - 1) Verify RC-EV-1 is free of water.
 - 2) Verify RC-V-9 is closed.
 - 3) Verify RC-SF-1.2 is filled with demineralized (DI) water.
 - 4) Verify RC-V-8.1 is closed.
 - 5) Verify RC-V-8.2 is closed.
 - 6) Verify RC-V-16 is closed.
 - 7) Verify RC-V-13 is closed.
 - 8) Verify RC-V-10 is closed.
 - 9) Verify RC-V-11 is in the 9 o'clock position.
 - 10) Verify RC-DV-2 is in the 9 o'clock position.
 - 11) Verify RC-V-15 is open.
- f. Evacuate RC-EV-1 and the transfer line to the CAP in accordance with the following:
 - 1) Open RC-V-12 and RC-V-10.
 - 2) Evacuate until RC-G-2.1 reads a minimum of 22 inches Hg.
 - 3) Close RC-V-10 and RC-V-12.
- g. At the CMP, OPLE4J, proceed in accordance with the following:
 - 1) Enter "23" to initiate evacuation of the chromatograph.
 - 2) Verify that the red HI VACUUM light is on after a few minutes.
 - 3) Cycle through loops 1, 2, 3, and 4, pausing at each loop for 5 seconds or until the HI VACUUM light is on. Repeat for a total of three cycles.

- 4) Select loop #1.
- 5) Enter "24" to terminate evacuation.
- 6) Select attenuation of 5 (5 X 1).

n. At the LSP, OPLD8J, proceed in accordance with the following:

- 1) Verify the vacuum is a minimum of 22 inches Hg on gauge RC-G-2.1.
- 2) Turn RC-V-11 clockwise to the 12 o'clock position (CLOSED).
- 3) Inject 0.25 cc of hydrogen gas into RC-EV-1 via the septum.
- 4) Open RC-V-9 then wait approximately five (5) seconds.
- 5) Close RC-V-9.
- 6) Open RC-V-16.
- 7) Snap open RC-V-9 and wait one minute.
- 8) Close RC-V-16 then close RC-V-9.
- 9) Turn RC-V-11 counterclockwise to the 9 o'clock position.
- 10) Record the ambient temperature on LRC FORM 1097B (Attachment E).

i. At the CMP, OPLE4J, proceed in accordance with the following:

- 1) Cycle through loops 1, 2, 3, and 4, pausing at each loop for 5 seconds. Repeat for a total of three cycles.
- 2) Start the L&N recorder.
- 3) Select loop #1 and depress AUTO pushbutton.

- 4) Depress CLEAR.
 - 5) Wait until the display clock has timed to 3 minutes, release AUTO, depress CLEAR, and enter "00".
 - 6) Repeat Steps F.5.i.1 through F.5.i.5 for loops 2, 3, and 4.
 - 7) Stop the L&N recorder.
 - 8) Record the date, time, cc of hydrogen used, attenuation setting and loop numbers on the L&N recorder trace.
- j. Repeat Steps F.5.e through F.5.i using different attenuation settings and hydrogen injection volumes, in accordance with the following table:

ATTENUATION SETTING Step F.5.g.6)	HYDROGEN INJECTION VOLUME (cc) Step F.5.h.3)
5 (5 X 1)	1.0
25 (25 X 1)	1.0
25 (25 X 1)	5.0
100 (100 X 1)	5.0
100 (100 X 1)	30.
500 (5 X 100)	30.
500 (5 X 100)	60.

- k. Release the SAMP pushbutton.
- l. Perform the chromatograph verification procedure, steps F.3.a through F.3.o for CAL 2 gas. Verify the results are equivalent to those obtained in step F.5.a.
- m. Perform the chromatograph verification procedure, steps F.3.a through F.3.o for CAL 1 gas. Verify the results are equivalent to those obtained in Step F.5.b.
- n. For each of the four attenuations (5, 25, 100, 500) develop a chart of hydrogen concentration (Y) versus hydrogen peak height (X) in accordance with the following:

- 1) Calculate X and Y in accordance with the following and record the work on LRC Form 10978 (Attachment E):

$$Y = (H) \times (273 / (273 + T)) / (0.030)$$

$$X = (P) \times (A) / (100)$$

where: H = Hydrogen volume injected, cc.

I = Measured ambient temperature,
°C.

P = Trace peak height (with
baseline subtracted),
L&N recorder scale units.

A = Attenuation setting.

- 2) On each chart, plot the high and low concentration data points and connect each pair with a straight line, refer to Attachments A, B, C, and D.

G. CHECKLISTS

1. None.

H. TECHNICAL SPECIFICATION REFERENCES

1. None.

ATTACHMENT A

LZP 1330-24

Revision 0

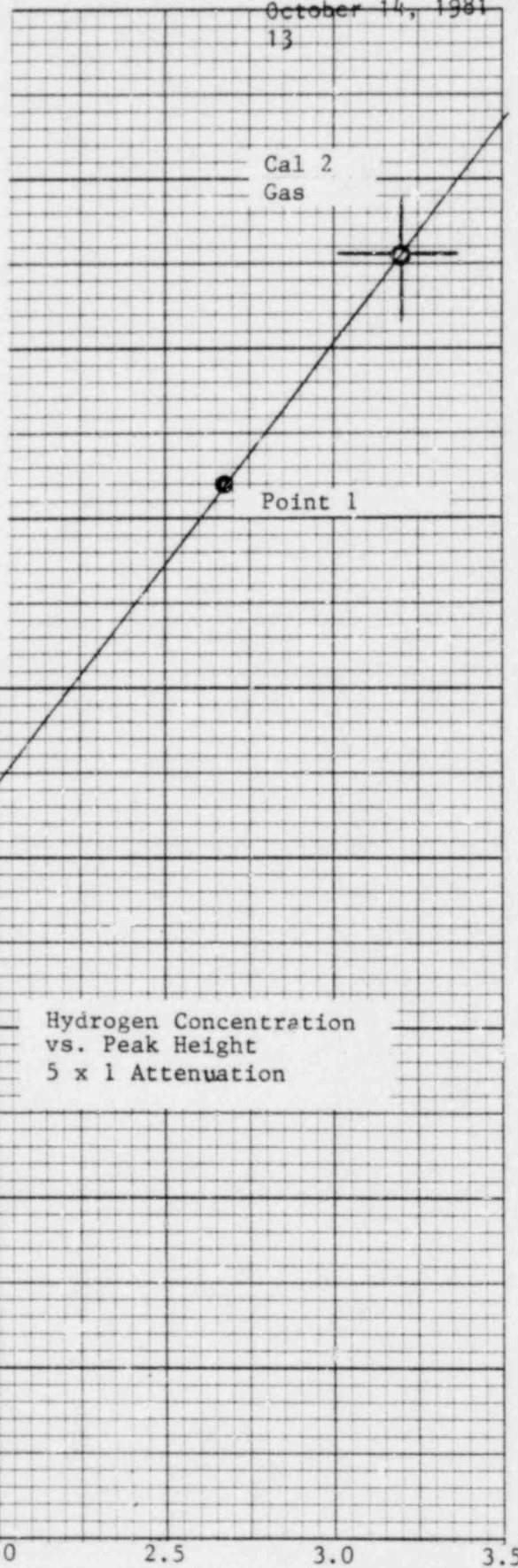
October 14, 1981

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Calculations Per Step F.5.a.

LOOP #1

	POINT 1	POINT 2
H	1cc	0.25 cc
T	20°C	20°C
P	53.3 scale units	17.7 scale units
A	5	5
Y	$(1) \frac{(273)}{(273+20)} = 31.0$	$(0.25) \frac{(273)}{(273+20)} = 7.76$
X	$\frac{(53.3)}{(100)} (5) = 2.67$	$\frac{(17.7)}{(100)} (5) = 0.89$



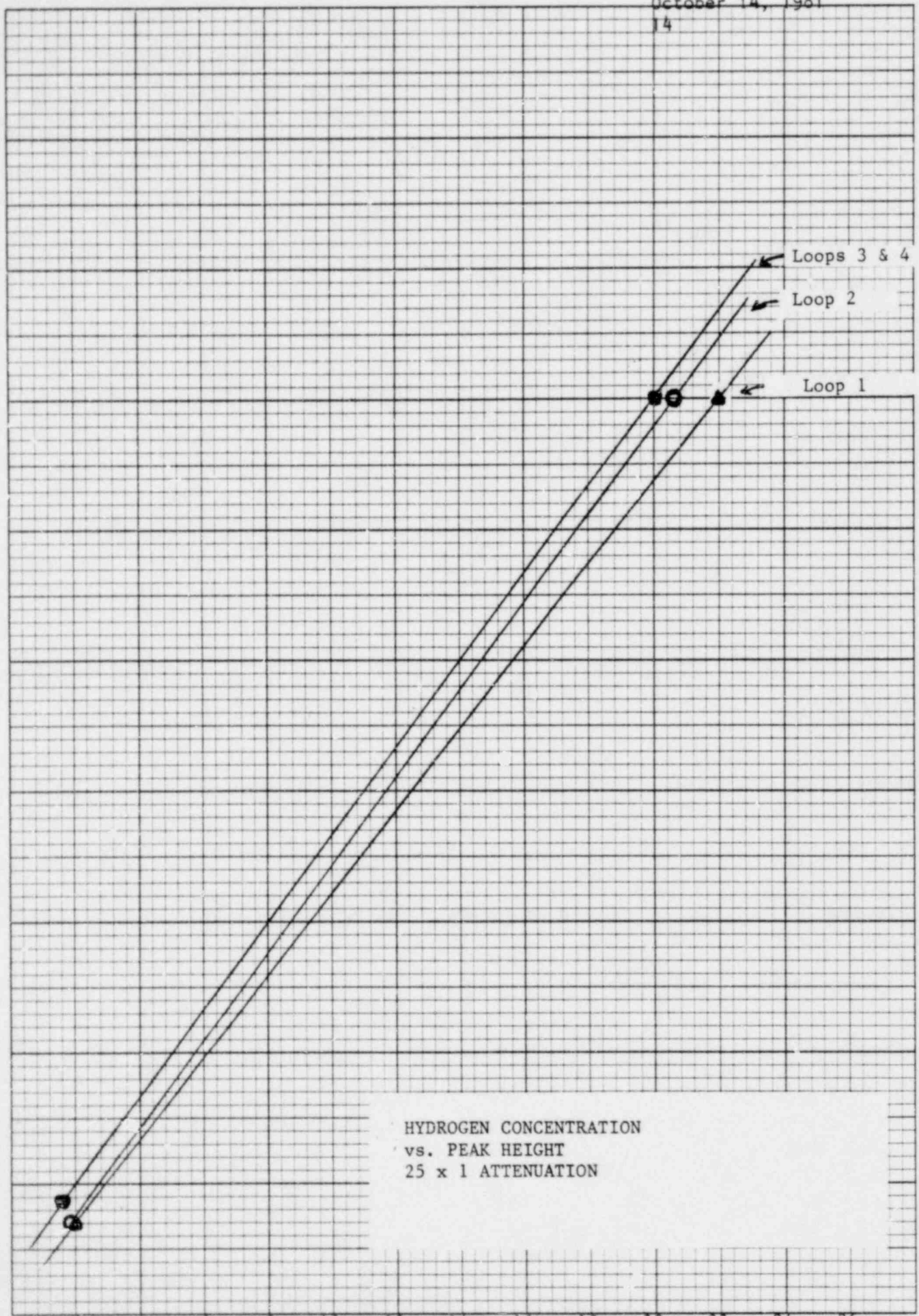
(CC @ STP/KG)

HYDROGEN CONCENTRATION (Y)

HYDROGEN PEAK HEIGHT (X)
 $\left(\frac{\text{SCALE}}{100} \times \text{ATTENUATION} \right)$

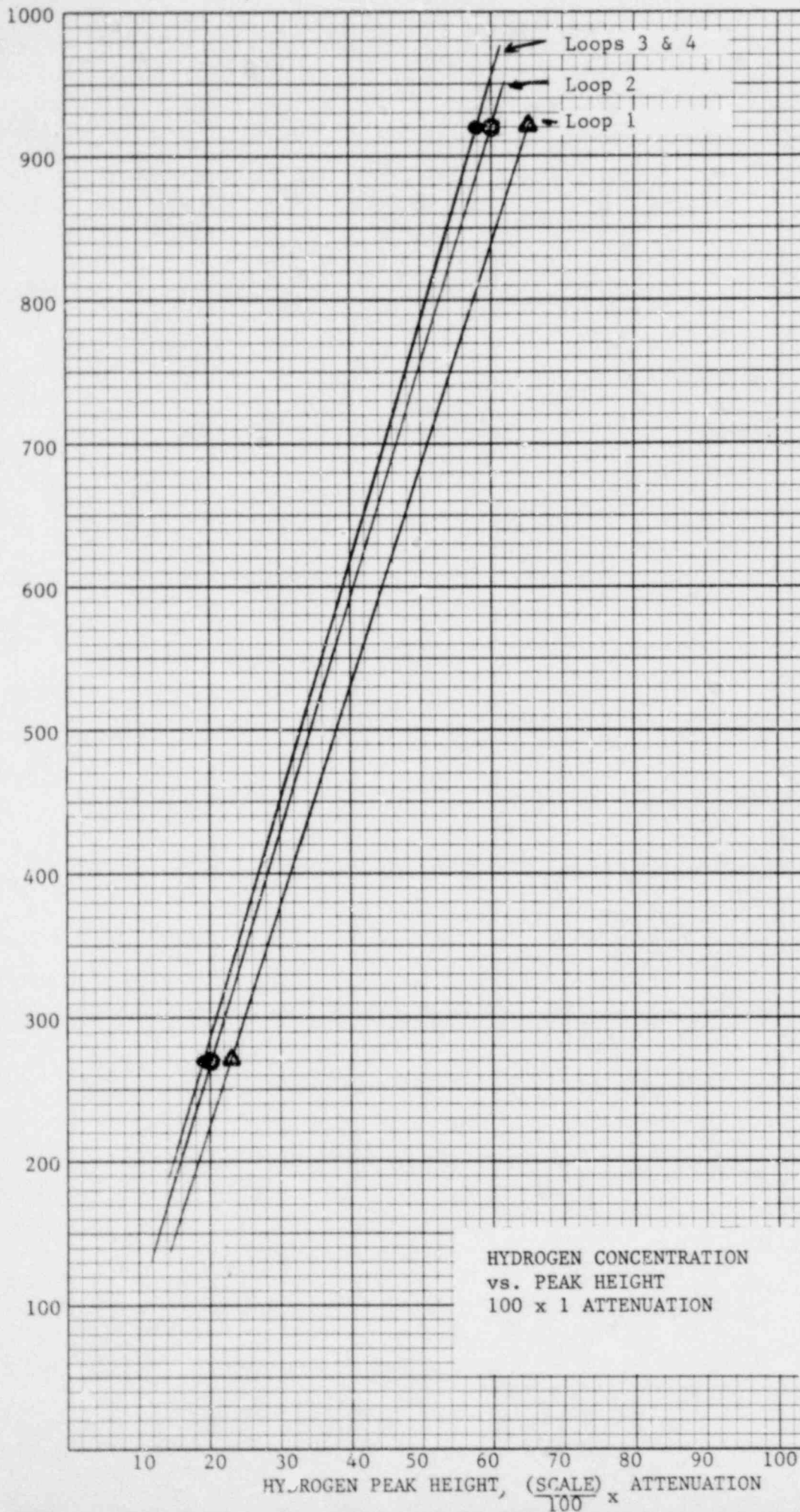
(CC @ STP/KG)

HYDROGEN CONCENTRATION

400
380
360
340
320
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20

(CC @ STP/KG)

HYDROGEN CONCENTRATION



HYDROGEN CONCENTRATION

(CC @ STP/KG)

2000

1800

1600

1400

1200

1000

800

600

400

200

Loops 3 & 4

Loop 2

Loop 1

HYDROGEN CONCENTRATION
vs. PEAK HEIGHT
5 x 100 ATTENUATION

20 40 60 80 100 120 140 160 180 200 220 240 260
HYDROGEN PEAK HEIGHT, (SCALE) x ATTENUATION
100

ATTACHMENT E
LASALLE COUNTY STATION
HYDROGEN ANALYSIS AT THE HRSS

Ambient Temperature:
CALIBRATION Loop #

H	Hydrogen Volume Injected, cc	
T	Measured Ambient Temperature, °C	
P	Trace Peak Height, units	
A	Attenuation Setpoint	
Y	$H \times 273 / (273 + T) / 0.030$	
X	$P \times A / 100$	
	Calibration Gas # _____ Verification Concentration, cc:	

ANALYSIS Loop #

P	Trace Peak Height, units	
A	Attenuation Setpoint	
X	$P \times A / 100$	
	Sample Hydrogen Concentration, cc	

ATTACHMENT F
VALVE LISTING

V-1	Off-gas Sample to Gas Chromatograph Cutout Valve
V-10	Instrument Air Cutout Valve
V-14	Argon Supply Cutout Valve
RC-V-8.1	RC-SF-1.2 Inlet Isolation Valve
RC-V-8.2	RC-SF-1.2 Outlet Isolation Valve
RC-V-9	RC-EV-1 Isolation Valve
RC-V-10	RC-EV-1 Evacuation Cutout Valve
RC-V-11	Off-gas 4-way Valve
RC-V-12	Argon to Air Ejector Cutout Valve
RC-V-13	Off-gas Vial Evacuation Cutout Valve
RC-V-15	Off-gas Sample to Gas Chromatograph Isolation Valve
RC-V-16	RC-SF-1.2 Argon Purge Cutout Valve
RC-DV-2	Off-gas Sample Injection Valve

ATTACHEMENT A

LSCS PROCEDURE DEFICIENCY SHEET

PROCEDURE 1: LEP 1330-25

REVISION: 0

[illegible]

COMMENTS: _____

SOURCE CODE: C.E.
S&L
G.E.
By teaching
O'Brien

Note: Indicate by title and/or number the specified document needed to resolve deficiency if possible.

SAMPLING OF REACTOR COOLANT
AT THE HIGH RADIATION SAMPLE SYSTEM

A. PURPOSE

The purpose of this procedure is to delineate a method of obtaining liquid samples at the High Radiation Sample System (HRSS) during normal and post-accident operations, including grab, diluted (1000:1), and undiluted (15 ml) samples.

B. REFERENCES

1. Sentry Equipment Corporation, Post-Accident Sample System, Volume 1.
2. LZP 1330-29, "Sampling at the High Radiation Sampling System (Valve Operation at the HRSS Valve Control Panel)."
3. LZP 1330-31, "HRSS Sample Movement."
4. AAIS-CCP-0031, "BWR Coolant Radionuclide Analysis."

C. PREREQUISITES

1. The Operator should be familiar with the operation of the HRSS panels.
2. Verify that instrument air, approximately 100 psig, is available at the Liquid Sampling Panel (LSP), OPL08J.
3. Establish communications with the Unit Nuclear Station Operator (NSO).
4. Equipment:
 - a. Clean one liter polyethylene bottles with caps.
 - b. Paper towels.
 - c. Plastic or rubber gloves.
 - d. Sample tote tray.

- e. Survey instruments, as appropriate.
- 5. The sample must have been obtained in accordance with Reference 2 prior to performing this procedure.

D. PRECAUTIONS

- 1. A Regulatory Guide 1.3 or 1.4 release of fission products implies extremely high levels of radioactivity. Dose rates may be high enough to prevent entry into many areas of the plant that are normally habitable. Rad/Chem Supervision should be contacted prior to entry into any area when such a release of fission products is suspected.
- 2. Wear radiation dosimetry as recommended by Rad/Chem Supervision.
- 3. Wear protective clothing and respiratory protection as recommended by Rad/Chem Supervision.
- 4. Appropriate survey instruments should be available for monitoring during this procedure.
- 5. Use protective gloves whenever sampling process sample lines containing radionuclides.
- 6. Wipe up any spills immediately to prevent contamination outside the sample hood.
- 7. Be certain the sample bottle is dry before removing it from the sample hood.
- 8. The samples should be transferred to the chemical laboratory in a tote tray.

E. LIMITATIONS AND ACTIONS

- 1. Notify Chemistry Supervision if any problems are encountered at the HRSS panels.
- 2. This procedure, though intended for use under post-accident conditions, can be used for sampling at the HRSS panels during normal operations, during which the precautions may have limited applications. However, normal routine sampling precautions should be observed.

F. PROCEDURE

NOTE

For noun names associated with the valves operated in this procedure, refer to Attachment A.

1. Verify the following valve lineup at the LSP, OPLD8J:
 - a. RC-V-1.1 (closed).
 - b. RC-V-1.2 (closed).
 - c. RC-V-1.3 (closed).
 - d. RC-V-1.4 (closed).
 - e. RC-V-1.5 (closed).
 - f. RC-DV-1 (BYPASS).
 - g. RC-V-19 (BYPASS).
2. Connect the flush water hose to RC-D-1 at the LSP, OPLD8J, and open the flush water valve.
3. To obtain a diluted (1000:1) reactor coolant sample, proceed to step F.5. To obtain an undiluted reactor coolant sample (15 ml), proceed to step F.4. To obtain a reactor coolant grab sample, proceed in accordance with the following at the LSP, OPLD3J or as otherwise directed:
 - a. Verify the following valve lineup:
 - 1) RC-V-5.1 (closed).
 - 2) RC-V-5.2 (closed).
 - 3) RC-V-17 (closed).
 - 4) RC-V-17 (closed).
 - 5) RC-V-4 (closed).
 - 6) RC-VREL-1 (closed).

- 7) RC-VREL-2 (closed).
- 8) RC-V-11 (closed).
- 9) RC-V-9 (closed).
- 10) RC-V-8.2 (closed).
- 11) RC-V-8.1 (closed).
- 12) RC-V-16 (closed).
- 13) RC-V-18 (6 o'clock).
- 14) RC-V-22 (TO WASTE).

b. Obtain the sample in accordance with the following:

- 1) Open RC-V-3.
- 2) Open RC-V-2.
- 3) Select one of the sample sources and open its corresponding valve, RC-V-1.1 (-1.2, -1.3, -1.4, -1.5).
- 4) Slowly open RC-VREL-1 until RC-FI-1 reads 35-40 inches of water. Allow to purge for a minimum of five (5) minutes.
- 5) Slowly open RC-VREL-1 until RC-FI-1 read 12-15 inches of water. Continue the purge for a minimum of one (1) minute.
- 6) Close RC-V-3.
- 7) Open RC-V-7.
- 8) Slowly open RC-VREL-2 until RC-FI-2 reads 18-22 inches of water. Allow to purge for three (3) minutes.
- 9) Align RC-V-18 to the 3 o'clock position.
- 10) Open RC-V-17, adjust RC-VREL-2 until RC-FI-2 reads 18-22 inches of water or RC-G-3 reads 20 PSIG. DO NOT exceed 20 PSIG

on RC-G-3. Allow to purge for two (2) minutes.

- 11) Close RC-V-17 and place a sample bottle under the sample tap.
- 12) Open RC-V-17. Obtain sufficient sample to rinse the sample bottle.
- 13) Close RC-V-17 and empty the sample bottle into the tray.
- 14) Replace the sample bottle under the sample tap and open RC-V-17.
- 15) Fill the sample bottle to overflow and screw the cap on loosely.
- 16) Gently squeeze the bottle to effect overflow, then immediately tighten the cap.

NOTE

The physical shape of the polyethylene bottle should be somewhat distorted after step F.3.b.16).

- 17) Close RC-V-17.
- 18) Wipe the bottle dry with paper towels.
- 19) Label the bottle with the following information:
 - a. Sample point.
 - b. Date sampled.
 - c. Time sampled.
 - d. Initials of person sampling.

NOTE

This labeling may be done prior to taking the sample.

- 20) Tag the sample bottle with the appropriate sticker if the sample contains radionuclides.

NOTE

This tagging may be done prior to taking the sample.

- 21) Place the bottle in the tote tray for transport to the chemical laboratory.
- c. Flush and secure the system in accordance with the following:
- 1) At the Valve Control Panel, OPLC9J, secure the sampling lineup in accordance with Reference 2, steps F.1.c.9) through F.1.c.10).
 - 2) Close the sample valve, RC-V-1.1 (-1.2, -1.3, -1.4, -1.5).
 - 3) Open RC-V-4.
 - 4) Open RC-V-17, adjust RC-VREL-2 until RC-FI-2 reads 18-22 inches of water. Flush with demineralized water for a minimum of three (3) minutes.
 - 5) Close RC-V-17.
 - 6) Align RC-V-18 to the 6 o'clock position, adjust RC-VREL-2 until RC-FI-2 reads 18-22 inches of water. Flush with demineralized water for a minimum of three (3) minutes.
 - 7) Close RC-V-7.
 - 8) Open RC-V-3.
 - 9) Adjust RC-VREL-1 until RC-FI-1 reads 35-40 inches of water. Flush with demineralized water for a minimum of one (1) minute.
 - 10) Close RC-V-3.
 - 11) Open the sample valve, RC-V-1.1 (-1.2, -1.3, -1.4, -1.5), flush with demineralized water for five (5) minutes.
 - 12) Close the sample valve, RC-V-1.1 (-1.2, -1.3, -1.4, -1.5).

- 13) Close RC-V-4.
- 14) Close RC-VREL-1 and RC-VREL-2.
- 15) Close the flush water valve and disconnect the flush water hose from RC-DV-1.
- 16) Secure the system in accordance with Reference 2, steps F.1.c.11) through F.1.e.

4. To obtain an undiluted (15 ml) reactor coolant sample, proceed in accordance with the following at the LSP, OPLD8J or as otherwise directed:

a. Verify the following valve lineup:

- 1) RC-V-5.1 (closed).
- 2) RC-V-5.2 (closed).
- 3) RC-V-17 (closed).
- 4) RC-V-4 (closed).
- 5) RC-V-7 (closed).
- 6) RC-VREL-1 (closed).
- 7) RC-VREL-2 (closed).
- 8) RC-V-11 (closed).
- 9) RC-V-9 (closed).
- 10) RC-V-8.2 (closed).
- 11) RC-V-8.1 (closed).
- 12) RC-V-16 (closed).
- 13) RC-V-18 (6 o'clock).
- 14) RC-V-22 (TO WASTE).

b. Prepare the sample bottle in accordance with the following:

- 1) Place the bottle on the cart/cask assembly cavity piston.

- 2) Turn the direction valve for the hydraulic piston in the DOWN position and lower the bottle into the cask cavity.
 - 3) Close and open the cask to verify that the cover is working properly.
 - 4) Turn on the LSP undiluted reactor coolant sample fill station lights.
 - 5) Position the cask/cart under the LSP undiluted reactor coolant sample fill station needles and set the brake.
 - 6) Turn the direction valve for the hydraulic piston in the UP position and raise the bottle onto the needles.
- c. Obtain the sample in accordance with the following:
- 1) Open RC-V-3.
 - 2) Open RC-V-2.
 - 3) Select one of the sample sources and open its' corresponding valve. RC-V-1.1 (-1.2, -1.3, -1.4, -1.5).
 - 4) Slowly open RC-VREL-1 until RC-FI-1 reads 35-40 inches of water. Allow to purge for a minimum of five (5) minutes.
 - 5) Slowly close RC-VREL-1 until RC-FI-1 reads 12-15 inches of water. Continue the purge for a minimum of one (1) minute.
 - 6) Close RC-V-3.
 - 7) Open RC-V-7.
 - 8) Slowly open RC-VREL-2 until RC-FI-2 reads 18-22 inches of water. Allow to purge for three (3) minutes.
 - 9) Turn RC-V-19 to SAMPLE.
 - 10) Adjust RC-VREL-2 until RC-FI-2 reads 18-22 inches of water or RC-G-3 reads 20

PSIG. DO NOT exceed 20 PSIG on RC-G-3.
Allow to purge for two (2) minutes.

- 11) Close RC-V-7. Let RC-G-3 return to 0 PSIG then wait 30 seconds to allow the sample bottle to depressurize.
 - 12) Turn RC-V-19 to BYPASS.
 - 13) Turn the direction valve for the cart/cask hydraulic plunger to the DOWN position. Lower the sample bottle into the cask and close the cask.
 - 14) At the Valve Control Panel, OPLC9J, secure the sampling lineup in accordance with Reference 2, steps F.1.c.9) through F.1.c.10).
- d. Flush and secure the system in accordance with the following:
- 1) Close the sample valve, RC-V-1.1 (-1.2, -1.3, -1.4, -1.5).
 - 2) Open RC-V-7.
 - 3) Open RC-V-4.
 - 4) Adjust RC-VREL-2 until RC-FI-2 reads 18-22 inches of water. Flush with demineralized water for a minimum of three (3) minutes.
 - 5) Close RC-V-7.
 - 6) Open RC-V-3.
 - 7) Adjust RC-VREL-1 until RC-FI-1 reads 35-40 inches of water. Flush with demineralized water for a minimum of one (1) minute.
 - 8) Close RC-V-3.
 - 9) Open the sample valve, RC-V-1.1 (-1.2, -1.3, -1.4, -1.5), and flush for a minimum of five (5) minutes.

- 10) Close the sample valve, RC-V-1.1 (-1.2, -1.3, -1.4, -1.5).
- 11) Release the brake and remove the cart/cask from the sample station.
- 12) Install and secure the auxiliary shield.
- 13) Install and secure the needle flush tool.
- 14) Open RC-V-8.1.
- 15) Open RC-V-8.2.
- 16) Adjust RC-VREL-2 until RC-FI-2 reads 18-22 inches of water. Flush with demineralized water for one (1) minute.
- 17) Turn RC-V-19 to SAMPLE.
- 18) Adjust RC-VREL-2 until RC-FI-2 reads 18-22 inches of water or RC-G-3 reads 20 PSIG. DO NOT exceed 20 PSIG on RC-G-3. Allow to flush with demineralized water for two (2) minutes.
- 19) Close RC-V-2.
- 20) Allow RC-G-3 return to 0 PSIG then wait 30 seconds to allow the bottle to depressurize.
- 21) Turn RC-V-19 to BYPASS.
- 22) Close RC-V-8.2.
- 23) Close RC-V-8.1.
- 24) Close RC-V-4.
- 25) Close RC-VREL-2.
- 26) Close RC-VREL-1.
- 27) Remove the needle flush tool.
- 28) Turn off the LSP undiluted reactor coolant sample fill station lights.

- 29) Close the flush water valve and disconnect the flush water hose from RC-DV-1.
 - 30) Secure the system in accordance with Reference 2, steps F.1.c.11) through F.1.e.
5. To obtain a diluted (1000:1) reactor coolant sample, proceed in accordance with the following at the LSP, OPLD8J or as otherwise directed:
- a. Fill reservoir RC-R-1 with demineralized water.
 - b. Open RC-V-20 then open RC-V-21. Adjust reservoir RC-R-1 until the water level in graduated cylinder RC-C-1 is 125 ml.
 - c. Close RC-V-21.
 - d. Close RC-V-20.
 - e. Verify the following valve lineup:
 - 1) RC-V-5.1 (closed).
 - 2) RC-V-5.2 (closed).
 - 3) RC-V-17 (closed).
 - 4) RC-V-4 (closed).
 - 5) RC-V-2 (closed).
 - 6) RC-V-7 (closed).
 - 7) RC-VREL-1 (closed).
 - 8) RC-VREL-2 (closed).
 - 9) RC-V-11 (closed).
 - 10) RC-V-9 (closed).
 - 11) RC-V-16 (closed).
 - 12) RC-V-18 (6 o'clock).

13) RC-V-19 (BYPASS).

14) RC-V-22 (TO WASTE).

f. Prepare the sample bottle in accordance with the following:

- 1) Insert the needle of the hand operated vacuum pump into the septum of the diluted reactor coolant sample bottle. Evacuate to the maximum vacuum achievable with the hand operated pump. The vacuum MUST be at LEAST 15 inches of Hg.
- 2) Keep the hand operated vacuum pump connected to the evacuated bottle for three (3) minutes to assure that the bottle retains the vacuum.
- 3) Remove the bottle from the hand operated vacuum pump and place the bottle on the cart/cask assembly cavity piston.
- 4) Turn the direction valve for the hydraulic piston to the DOWN position and lower the bottle into the cask cavity.
- 5) Close and open the cask to verify that the cover is working properly.
- 6) Turn on the LSP diluted reactor coolant sample fill station lights.
- 7) Position the cask/cart under the LSP diluted reactor coolant sample fill station needle and set the brake.
- 8) Turn the direction valve for the hydraulic piston to the UP position and raise the bottle onto the needle.

g. Sample in accordance with the following:

- 1) Open RC-V-8.1.
- 2) Open RC-V-8.2.

- 3) Open RC-V-3.
 - 4) Select one of the sample sources and open its' corresponding valve, RC-V-1.1 (-1.2, -1.3, -1.4, -1.5).
 - 5) Slowly open RC-VREL-1 until RC-FI-1 reads 35-40 inches of water. Purge for a minimum of five (5) minutes.
 - 6) Slowly close RC-VREL-1 until RC-FI-1 reads 12-15 inches of water. Continue the purge for a minimum of one (1) minute.
 - 7) Close RC-V-3.
 - 8) Open RC-V-2.
 - 9) Slowly open RC-VREL-2 until RC-FI-2 reads 18-22 inches of water. Purge for three (3) minutes.
 - 10) Close RC-V-8.1.
 - 11) Turn RC-DV-1 to SAMPLE.
 - 12) Close the sample source isolation valve.
 - 13) At the Valve Control Panel, OPLC9J, secure the sampling lineup in accordance with Reference 2, steps F.1.c.9) through F.1.c.10).
 - 14) Close the sample valve, RC-V-1.1 (-1.2, -1.3, -1.4, -1.5).
- h. Flush and secure the system in accordance with the following:
- 1) Open RC-V-7.
 - 2) Open RC-V-4.
 - 3) Adjust RC-VREL-2 until RC-FI-2 reads 18-22 inches of water. Flush with demineralized water for a minimum of three (3) minutes.

- 4) Close RC-V-7.
 - 5) Open RC-V-3.
 - 6) Adjust RC-VREL-1 until RC-FI-1 reads 35-40 inches of water. Flush with demineralized water for a minimum of one (1) minute.
 - 7) Close RC-V-3.
 - 8) Open RC-V-21.
 - 9) When the water level in the graduated cylinder RC-C-1 reaches 37 ml, close RC-V-21. If RC-V-21 is closed before the 37 ml mark it may be reopened to obtain the desired level.
 - 10) Turn RC-DV-1 to BYPASS.
 - 11) Open RC-V-8.1.
 - 12) Adjust RC-VREL-2 until RC-FI-2 reads 18-22 inches of water. Flush with demineralized water for one (1) minute.
 - 13) Close RC-V-2.
 - 14) Open the sample valve, RC-V-1.1 (-1.2, -1.3, -1.4, -1.5) and flush with demineralized water for a minimum of five (5) minutes.
 - 15) Close the sample valve, RC-V-1.1 (-1.2, -1.3, -1.4, -1.5).
 - 16) Close RC-V-8.2.
 - 17) Close RC-V-8.1.
 - 18) Close RC-VREL-2.
 - 19) Close RC-VREL-1.
 - 20) Close RC-V-4.
- i. Remove the sample and cask/cart assembly and secure the system in accordance with the following:

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- 1) Place the direction valve for the hydraulic plunger in the DOWN position.
 - 2) Lower the bottle into the cask.
 - 3) Close the cask.
 - 4) Release the brake and remove the cart/cask from the sample station.
 - 5) Install and secure the auxiliary shield.
 - 6) Turn off the LSP diluted reactor coolant sample fill station lights.
 - 7) Close the flush water valve and disconnect the flush water hose from RC-DV-1.
 - 8) Secure the system in accordance with Reference 2, steps F.1.c.11) through F.1.e.
6. Transport the samples to the laboratory in accordance with Reference 3.
 7. Analyze the samples in accordance with Reference 4.

G. CHECKLISTS

1. None.

H. TECHNICAL SPECIFICATION REFERENCES

1. None.

ATTACHMENT A
VALVE LISTING

RC-V-1.1	Reactor Recirc. Loop B Sample Cutout Valve
RC-V-1.2	RT Demin. Inlet Sample Cutout Valve
RC-V-1.3	RHR Loop A Sample Cutout Valve
RC-V-1.4	RHR Loop B Sample Cutout Valve
RC-V-1.5	RT Demin. Outlet Sample Cutout Valve
RC-V-2	Sample Source Isolation Valve
RC-V-3	Sample Purge Cutout Valve
RC-V-4	Flasking Water Isolation Valve
RC-V-5.1	Pressurized Sample Inlet Isolation Valve
RC-V-5.2	Pressurized Sample Outlet Isolation Valve
RC-V-7	Diluted Sample Bypass Valve
RC-V-8.1	RC-SF-1.2 Inlet Isolation Valve
RC-V-8.2	RC-SF-1.2 Outlet Isolation Valve
RC-V-9	RC-EV-1 Isolation Valve
RC-V-10	RC-EV-1 Evacuation Cutout Valve
RC-V-11	Off-gas 4-way Valve
RC-V-12	Argon to Air Ejector Cutout Valve
RC-V-13	Off-gas Vial Evacuation Cutout Valve
RC-V-14	Argon Supply to Off-gas Vial Cutout Valve
RC-V-15	Off-gas Sample to Gas Chromatograph Isolation Valve
RC-V-16	RC-SF-1.2 Argon Purge Cutout Valve
RC-V-17	Reactor Coolant Grab Sample Cutout Valve

ATTACHMENT A
(Continued)

RC-V-18	Reactor Coolant Undiluted Sample Backflush Cutout Valve
RC-V-19	Reactor Coolant Undiluted Sample Injection Valve
RC-V-20	RC-C-1 Fill Valve
RC-V-21	RC-C-1 Isolation Valve
RC-V-22	Liquid Sample to CAP Isolation Valve
RC-DV-1	Reactor Coolant Diluted Sample Injection Valve
RC-DV-2	Off-gas Sample Injection Valve
RC-VREL-1	Reactor Coolant Purge Throttle Valve
RC-VREL-2	Reactor Coolant Sample Throttle Valve

ATTACHMENT A
LSCS PROCEDURE DEFICIENCY SHEET

PROCEDURE #: LAP 1330-26

REVISION: 0

PROCEDURE PARAGRAPH #	INFO SOURCE (SEE CODE)	DEFICIENCY	IDENTIFICATION INITIAL/DATE	RESOLUTION INITIAL/DATE
		None		
F. 4.2.	OTHER	Reference for sample movement	RHK 9/26/81	9-14-81 RHK
F. 7.	CECO	" " " analysis	RHK 8/2/81	9-14-81 RHK
NA	CEC	PROCEDURE REQUIRES PCWT	QVS 9/17/81	

COMMENTS: _____

SOURCE CODE: C.E.
S&L
G.E.
By testing
Other

Note: Indicate by title and/or number the specified document needed to resolve deficiency if possible.

SAMPLING OF CONTAINMENT AIR AT THE HIGH RADIATION SAMPLING SYSTEM

A. PURPOSE

The purpose of this procedure is to delineate a method of obtaining a containment air sample at the High Radiation Sampling System (HRSS) supplementing the containment monitors during normal and post-accident conditions. This procedure includes disposal of samples following analyses.

B. REFERENCES

1. Sentry Equipment Corporation, Post-Accident Sample System, Volume 1.
2. LZP 1330-29, "Sampling at the High Radiation Sampling System (Valve Operation at the HRSS Valve Control Panel)."
3. LZP 1330-31, "HRSS Sample Movement."
4. AAIS-CCP-0002, "General Radionuclide Analysis of a Gas Sample."
5. Action Item Record (AIR), 1-81-494.

C. PREREQUISITES

1. Verify that nitrogen pressure, approximately 100 psig, is available at the Containment Air Control Panel (CCP), OPLE2J.
2. Verify that the CCP printer power is ON and the printer is set to the proper date and time.
3. Set the CCP FUNCTION SELECT to the SF1-SF3/GGD position and observe the following at the CCP, OPLE2J:
 - a. The POWER ON light turns on.
 - b. Annunciator windows glow steady in:

ROW	COL
1	1
1	2
1	3
2	2

- c. The flow monitor 20% and 100% flow lights turn on for approximately 25 seconds after power is first applied.

NOTE

There is no flow at this time.

- d. The 20 minute Gross Gamma Detector (GGD) timer is energized.
- 4. Press the annunciator RESET pushbutton to turn off all lighted annunciator windows.
 - 5. Verify the timers on the CCP, OPLE2J, are set as follows:
 - a. Pre-sample back flush - two minutes.
 - b. Sample capture/residual gas removal - three minutes.
 - c. Sample flask line flush - three minutes.
 - d. Equilibrate flask pressure and post sample back flush - fifteen seconds.
 - e. Time between SF1 and SF2 - twenty minutes.
 - f. Time between GGD exercises - twenty minutes.
 - g. Time between SF2 and SF3 - 120 minutes.
 - 6. Verify all air and solenoid valve selector switches on the CCP, OPLE2J, are positioned to AUTO.
 - 7. Press the PILOT LIGHT TEST pushbutton on the CCP, OPLE2J, and observe all pilot lights are functional.
 - 8. Press the annunciator TEST button on the CCP, OPLE2J, and verify the following:

- a. Horn sounds.
 - b. Annunciator windows flash on and off in:

ROW	COL
1	1
1	2
1	3
2	2
 - c. Annunciator window in ROW 2, COL 1 lights up and remains lighted.
 - d. Annunciator window in ROW 2, COL 3 is off. This position has no operator function.
9. Release the annunciator TEST pushbutton. Verify that the annunciator window in ROW 2, COL 1 turns off and remains off.
10. Press the annunciator ACKNOWLEDGE pushbutton on the CCP, OPLE2J. Verify the following:
- a. Horn turns off.
 - b. All flashing windows change to a steady glow.

NOTE

If desired, push the TEST pushbutton to retest ROW 2, COL 1 lamps. ROW 2, COL 1 lamps remain lighted as long as the TEST pushbutton is pressed. The other windows will maintain a steady glow.

11. Press the annunciator RESET pushbutton on the CCP, OPLE2J. Verify that all annunciator windows return to the normal (off) condition.
12. At the Containment Air Sampling Panel (CASP), OPLD9J, verify the following:
- a. The green INACTIVE pilot light is on.
 - b. All four green SAMPLE FLASK INACTIVE pilot lights are on.
 - c. Sample flasks are properly coupled and locked to the CASP, OPLD9J.

- d. All sample flask inlet and outlet valves are opened.
 - e. All sample flask bypass valves are closed.
- 13. At the CCP, OPLE2J, turn the TEMP SELECT to the desired temperature (150 or 300); 150 during normal operations, 300 during post-accident conditions.
 - 14. Equipment:
 - a. Reach rods.
 - b. Sample flask assemblies.
 - 15. The operator should be familiar with the operation of the HRSS panels.
 - 16. Establish communications with the Unit Nuclear Station Operator (NSO).
 - 17. The sample must have been obtained in accordance with Reference 2 prior to performing this procedure.

D. PRECAUTIONS

- 1. A Regulatory Guide 1.3 or 1.4 release of fission products implies extremely high levels of radioactivity. Dose rates may be high enough to prevent entry into many areas of the plant that are normally habitable. Rad/Chem Supervision should be contacted prior to entry into any area when such a release of fission products is suspected.
- 2. Wear radiation dosimetry as recommended by Rad/Chem Supervision.
- 3. Wear protective clothing and respiratory protection as recommended by Rad/Chem Supervision.
- 4. Appropriate survey instruments should be available for monitoring during this procedure.
- 5. Under no circumstances should the sample flask assemblies be uncoupled from the CASP, OPLD9J, without verifying that either the "sample flask flushing exercise complete" indicating lights are on or performing a manual flushing operation.

6. Reach rods should be used to open and close the valves on the sample flask assemblies for high radiation level samples.
7. A LOW NEGATIVE CABINET PRESSURE ALARM, at the Containment Air Control Panel, OPLE2J, implies a potential for airborne activity leaking into the HRSS room. Investigate and correct the problem immediately to preclude contamination of the area.

E. LIMITATIONS AND ACTIONS

1. After the "SF-3 exercise complete" indicator lights, the START pushbutton becomes inoperative until the CCP SYSTEM RESET button is pushed. This resets the automatic sample sequence program.
2. After the "SF-4 exercise complete" indicator lights, the START pushbutton becomes inoperative until the CASP SF-4 RESET button is pushed. This signifies that the operator has removed the filled sample flask and replaced it with an empty one.
3. The exercise stop pushbutton, when pushed, will stop automatic sequencing and disable the start pushbutton.
4. If any problems are encountered at the HRSS panels, contact Rad/Chem Supervision.

F. PROCEDURE

NOTE

For noun names associated with the valves operated in this procedure, refer to Attachment A.

1. To obtain a containment air sample in sample flask (SF) #1, 2, or 3, proceed in accordance with the following at the CCP, OPLE2J, or as otherwise directed:
 - a. Adjust the nitrogen pressure regulator PC-1 until the pressure gauge reads 80 psi.
 - b. Press the SYSTEM RESET button to initialize the automatic sample flask filling program.

- c. Press the exercise RESET button and then exercise START button to initiate the automatic sample acquisition sequence.
- d. The CCP, OPLE2J, will control the collection of a sample automatically through the following sequential operations:
 - 1) Two-minute pre-sample backflush.
 - 2) Three-minute sample capture.
 - 3) Fifteen-second equilibrate flask pressure.
 - 4) Three-minute residual gas removal.
 - 5) Fifteen-second post-sample backflush.
 - 6) Fifteen-second post-sample backflush.
- e. When the ISOLATE SAMPLE FLASK annunciator window flashes, press the exercise STOP button. This freezes the program in the PAUSE mode.
- f. At the CASP, OPLD9J, close the inlet and outlet valves for the sample flask, SF-1, and open the bypass valve.

CAUTION

Reach rods should be used to open and close the valves on the sample flask assemblies for high radiation level samples.

- g. At the CCP, OPLE2J, release the exercise STOP pushbutton and press the exercise START pushbutton. Pressing the START button initiates a three-minute sample flask line flush. When the flush is complete the programmer returns to the home position and turns on the TIME BETWEEN SF1-SF2 timer.

NOTE

If the SF lines are not flushed during automatic sample acquisition, a manual line flush must be performed later before the SF can be removed from the CASP, OPLD9J.

- h. When the TIME BETWEEN SF1-SF2 timer times out, (20 min.) the programmer will repeat the sample procedure of Step F.1.d. When the SF2 exercise has ended, the programmer returns to the home position and turns on the following:
 - 1) TIME BETWEEN GGD EXERCISES timer (20 min.).
 - 2) TIME BETWEEN SF2-SF3 timer (120 min.).
 - i. Four GGD exercises will be accomplished before the TIME BETWEEN SF2-SF3 timer times out. At the completion of the four GGD exercises, the CCP, OPLE2J, will collect the SF-3 sample. If the TIME BETWEEN SF-2 and SF-3 timer times out before completion of a GGD exercise the GGD exercise will continue to completion and then the SF-3 exercise will begin.
 - j. Observe that all SF EXERCISE COMPLETE indicators, for sample flasks SF1, SF2, and SF3 on the CCP, OPLE2J, are lighted. If all indicators are lighted, proceed to Step F.4. for system shutdown and cart/cask removal. If all exercise complete indicators are not lighted, proceed immediately to Step F.3 for manual sample flask line flushing. DO NOT uncouple the sampling flasks at this time.
2. To obtain a containment air sample in sample flask #4, SF4, proceed in accordance with the following at the CCP, OPLE2J, or as otherwise directed:
- a. Adjust the nitrogen pressure regulator, PC-1, until the pressure gauge reads 80 psi.
 - b. Place the CCP Function Select Switch to the SF4 position.
 - c. Press the exercise RESET button and then exercise START button to initiate sampling.
 - d. The CCP, OPLE2J, will control the collection of a sample automatically through the following sequential operations:

- 1) Two-minute pre-sample backflush.
 - 2) Three-minute sample capture.
 - 3) Fifteen-second equilibrate flask pressure.
 - 4) Three-minute residual gas removal.
 - 5) Fifteen-second post-sample backflush.
 - 6) Fifteen-second post-sample backflush.
- e. When the ISOLATE SAMPLE FLASK annunciator window flashes, press the exercise STOP button. This freezes the program in the PAUSE mode.
 - f. At the CASP, OPLD9J, close the inlet and outlet valves for the sample flask, SF-4, and open the bypass valves.
 - g. At the CCP, OPLE2J, release the exercise STOP pushbutton and press the exercise START pushbutton. The CCP, OPLE2J, will initiate a three-minute sample flask line flush to complete the sampling sequence.

NOTE

If the SF lines are not flushed during automatic sample acquisition, a manual line flush must be performed later before the sample flask can be removed from CASP, OPLD9J.

- h. Observe that the SF4 exercise complete indicator is lighted. If the indicator is lighted, proceed to Step F.4 for system shutdown and cart/cask removal. If the indicator is not lighted, proceed to Step F.3 to perform a manual flushing operation prior to further action. DO NOT uncouple the sampling flasks at this time.
3. To perform a manual sample flask line flush, proceed in accordance with the following at the CCP, OPLE2J:
 - a. Turn all air operated and solenoid valves to the CLOSED position.

- b. Turn the following valves to the OPEN position.
 - 1) SV-10.
 - 2) SV-1.2 and AV-1 for SF-1 flushing.
 - 3) SV-2.1 and SV-2.2 for SF-2 flushing.
 - 4) SV-3.1 and SV-3.2 for SF-3 flushing.
 - 5) SV-4.1 and SV-4.2 for SF-4 flushing.
 - c. Flush the sample flask lines for a period of three-minutes and close SV-10 and the inlet and outlet sampling line valves previously opened in Step F.3.b.
 - d. Proceed to Step F.4. for system shutdown and cart/cask removal.
4. To remove the cart/cask and shut the system down, proceed in accordance with the following at the CASP, OPLD9J, or as otherwise directed:
- a. Unlock the quick disconnects from the flushed cask or casks. Remove the cart/cask assembly to the laboratory area in accordance with Reference 3.

CAUTION

Reach rods should be used to unlock the quick disconnects on the sample cask assemblies for high radiation level samples.

- b. Install the backup cart/cask assembly.
- c. Push the RESET button at the CASP, OPLD9J, to clear sampling flush indicator lights from ACTIVE to INACTIVE status.
- d. Push the SYSTEM RESET button at the CCP, OPLE2J, to return electro-programmer to initial startup mode.
- e. At the CCP, OPLE2J, turn FUNCTION SELECT to OFF, remove the tape output from the printer, and push printer to OFF. The tape output should accompany the samples to the chemical laboratory.

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- f. Upon completion of the sampling operations, secure the sampling lineup in accordance with Reference 2, Steps F.4.b.6) through F.4.c.
- 5. Analyze the sample in accordance with Reference 4.
- 6. Dispose of the air samples following analysis, in accordance with the following:
 - a. At the Valve Control Panel, OPLC9J, proceed in accordance with the following:
 - 1) Place the UNIT 1(2) POWER switch in the ON position.
 - 2) Open the following valves and verify the indication shows OPEN:
 - a) HRSS SYSTEM AIR RETURN TO SUPPRESSION POOL, 1(2)CM-088 and 1(2)CM-089.
 - b) HRSS SYSTEM AIR RETURN TO SUPPRESSION POOL, 1(2)CM-090.
 - b. Connect the cask/cart assembly to an available sampling station at the CASP, OPLD9J, and note the sampling station number.
 - c. Close the sample flask bypass valve at the CASP, OPLD9J.
 - d. Open the sample flask inlet and outlet valves at the CASP, OPLD9J.
 - e. At the CCP, OPLE2J, place the FUNCTION SELECT switch in the SF4 position.
 - f. Press the EXERCISE STOP pushbutton on the CCP, OPLE2J, if not already depressed.
 - g. Turn all air and solenoid operated valves on the CCP, OPLE2J, to the CLOSED position.
 - h. Turn the following valves on the CCP, OPLE2J, to the OPEN position:

- 1) SV-10 to open the nitrogen supply.
 - 2) SV-1.2 and AV-1 for SF-1 flushing.
 - 3) SV-2.1 and SV-2.2 for SF-2 flushing.
 - 4) SV-3.1 and SV-3.2 for SF-3 flushing.
 - 5) SV-4.1 and SV-4.2 for SF-4 flushing.
- i. Allow the sample flask to flush for a minimum of three (3) minutes.
 - j. At the CCP, OPLE2J, turn SV-10 to the CLOSED position.
 - k. Turn the solenoid operated valves opened in Step F.6.g to the CLOSED position.
 - l. Press the SYSTEM RESET button on the CCP, OPLE2J, to return the electroprogrammer to the initial startup mode.
 - m. Turn the FUNCTION SELECT switch on the CCP, OPLE2J, to the OFF position.
 - n. Release the EXERCISE STOP pushbutton on the CCP, OPLE2J.
 - o. Close the sample flask inlet and outlet valves on the CASP, OPLD9J.
 - p. Unlock the quick disconnects from the cask/cart assembly and remove the cask/cart.

NOTE

The cask/cart may be left coupled to the CASP, OPLD9J, for future analyses.

- q. At the Valve Control Panel, OPLC9J, proceed in accordance with the following:
 - 1) Close the following valves and verify the indication shows CLOSED:
 - a) HRSS SYSTEM AIR RETURN TO SUPPRESSION POOL, 1(2)CM-088 and 1(2)CM-089.

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d) HRSS SYSTEM AIR RETURN TO SUPPRESSION
POOL, 1(2)CM-090.

2) Place the UNIT 1(2) POWER switch in the
OFF position.

G. CHECKLISTS

1. None.

H. TECHNICAL SPECIFICATION REFERENCES

1. None.

ATTACHMENT A
VALVE LISTING

AV-1	Sample Flask #1 Inlet
SV-1.2	Sample Flask #1 Outlet
SV-2.1	Sample Flask #2 Inlet
SV-2.2	Sample Flask #2 Outlet
SV-3.1	Sample Flask #3 Inlet
SV-3.2	Sample Flask #3 Outlet
SV-4.1	Sample Flask #4 Inlet
SV-4.2	Sample Flask #4 Outlet
SV-5	Sample Purge
AV-2	CASP Outlet
SV-10	Nitrogen Inlet

SAMPLING OF REACTOR COOLANT OFF-GAS
AT THE HIGH RADIATION SAMPLING SYSTEM

A. PURPOSE

The purpose of this procedure is to delineate a method of obtaining a reactor coolant off-gas sample at the High Radiation Sampling System (HRSS) during normal and post-accident conditions. This procedure includes the steps to route gas to the Chemical Analysis Panel (CAP) for hydrogen analysis.

B. REFERENCES

1. Sentry Equipment Corporation, Post Accident Sample System, Volume 1.
2. LZP 1330-29, "Sampling at the High Radiation Sampling System (Valve Operation at the HRSS Valve Control Panel)."
3. LZP 1330-31, "HRSS Sample Movement."
4. AAIS-CCP-0031, "BWR Coolant Radionuclide Analysis."

C. PREREQUISITES

1. The operator should be familiar with the operation of the HRSS panels.
2. Establish communications with the Unit Nuclear Station Operator (NSO).
3. Verify that argon, approximately 100 psig, is available at the Liquid Sampling Panel (LSP), OPLD8J.
4. Equipment:
 - a. Reach rods.
 - b. Griptong.
 - c. Reactor coolant off-gas sample bottle with septum.

d. Sample cart/cask assembly.

5. The sample must have been obtained in accordance with Reference 2 prior to performing this procedure.

D. PRECAUTIONS

1. A Regulatory Guide 1.3 or 1.4 release of fission products implies extremely high levels of radioactivity. Dose rates may be high enough to prevent entry into many areas of the plant that are normally habitable. Rad/Chem Supervision should be contacted prior to entry into any area when such a release of fission products is suspected.
2. Wear radiation dosimetry as recommended by Rad/Chem Supervision.
3. Wear protective clothing and respiratory protection as recommended by Rad/Chem Supervision.
4. Appropriate survey instruments should be available for monitoring during this procedure.

E. LIMITATIONS AND ACTIONS

1. Notify Rad/Chem Supervision if any problems are encountered at the HRSS panels.
2. This procedure, though intended for use under post-accident conditions, can be used for sampling at the HRSS panels during normal operations, during which the precautions may have limited applications. However, normal routine sampling precautions should be observed.

F. PROCEDURE

NOTE

For noun names associated with the valves operated in this procedure, refer to Attachment B.

1. Prepare the system for sampling in accordance with the following:

- a. Install the needle flush tool.
- b. Verify the following valve lineup:
 - 1) RC-V-1.1 (closed).
 - 2) RC-V-1.2 (closed).
 - 3) RC-V-1.3 (closed).
 - 4) RC-V-1.4 (closed).
 - 5) RC-V-1.5 (closed).
 - 6) Verify RC-V-4 is closed. Connect the flush water hose to RC-D-1 and open the flush water line valve.
 - 7) RC-V-5.1 (closed).
 - 8) RC-V-5.2 (closed).
 - 9) RC-V-4 (closed).
 - 10) RC-V-2 (closed).
 - 11) RC-V-7 (closed).
 - 12) RC-V-17 (closed).
 - 13) RC-V-16 (closed).
 - 14) RC-DV-1 (BYPASS).
 - 15) RC-V-19 (BYPASS).
 - 16) RC-DV-2 (9 o'clock).
 - 17) RC-VREL-1 (closed).
 - 18) RC-VREL-2 (closed).
 - 19) RC-V-15 (closed).
 - 20) RC-V-13 (closed).

- 21) RC-V-12 (closed).
- 22) RC-V-14 (closed).
- 23) RC-V-8.1 (closed).
- 24) RC-V-11 (CLOSED).
- 25) RC-V-18 (6 o'clock).
- 26) RC-V-22 (TO WASTE).
- 27) RC-V-9 (open).
- 28) RC-V-8.2 (open).
- 29) RC-V-10 (open).
- 30) RC-V-3 (open).

c. Dry the expansion vessel RC-EV-1 in accordance with the following:

- 1) Turn RC-V-11 clockwise to the 3 o'clock position.
- 2) Pull open RC-VREL-2. When there is a sharp increase in pressure indicated on RC-G-3, release RC-VREL-2.
- 3) Adjust RC-VREL-2 until RC-G-3 indicates approximately 20 psig. Dry RC-EV-1 with argon for a minimum of one (1) minute.
- 4) Turn RC-V-11 counterclockwise to the 9 o'clock position to permit RC-EV-1 to vent, then close RC-V-9.

d. Evacuate the expansion vessel and sample lines in accordance with the following:

- 1) Install the diluted gas sample bottle on the front panel needle.
- 2) Open RC-V-13 and then open RC-V-12 and evacuate until RC-G-2.1 and RC-G-2.2 indicate a minimum of 22 inches of mercury.

- 3) Turn RC-DV-2 to the 6 o'clock position and continue the evacuation until RC-G-2.2 indicates the same reading as RC-G-2.1 or a minimum of 22 inches of mercury.
 - 4) Close in order RC-V-13, RC-V-10, and RC-V-12. Record the vacuum on RC-G-2.1. on LRC Form 1097A (Attachment A). wait for a minimum of two (2) minutes and verify that the vacuum is holding.
 - 5) Turn RC-V-11 clockwise to the CLOSED position.
 - 6) Turn RC-DV-2 to the 9 o'clock position.
 - 7) Open RC-V-14 and verify the pressure on RC-G-2.2 is approximately 1 psig.
- e. Purge the sample lines in accordance with the following:
- 1) Open RC-V-8.1.
 - 2) Open the sample source valve RC-V-1.1 (-1.2, -1.3, -1.4, -1.5) for the sample to be obtained.
 - 3) Slowly open RC-VREL-1 until RC-FI-1 indicates 35-40 inches water. Purge for a minimum of five (5) minutes.
 - 4) Slowly close RC-VREL-1 until RC-FI-1 indicates 12-15 inches water. Continue the purge for a minimum of one (1) minute.
 - 5) Close RC-V-3.
2. Sample in accordance with the following:
- a. Open RC-V-2.
 - b. Adjust RC-VREL-2 until RC-FI-2 indicates 18-22 inches of water. Purge for a minimum of three (3) minutes.

- c. Close RC-V-8.2.
- d. Close RC-V-8.1.
- e. Close RC-V-1.1 (-1.2, -1.3, -1.4, -1.5).
- f. Open RC-V-7 and then open RC-V-4.
- g. Adjust RC-VREL-2 until RC-FI-2 indicates 18-22 inches of water. Flush with demineralized water for a minimum of three (3) minutes.
- h. Close RC-V-7.
- i. Open RC-V-3.
- j. Adjust RC-VREL-1 until RC-FI-1 indicates 35-40 inches of water. Flush with demineralized water for a minimum of one (1) minute. Close RC-V-3.
- k. Open RC-V-1.1 (-1.2, -1.3, -1.4, -1.5). Flush with demin water for a minimum of five (5) minutes.
- l. Close RC-V-1.1 (-1.2, -1.3, -1.4, -1.5).
- m. Open RC-V-9, wait approximately five (5) seconds, and close RC-V-9.
- n. Open RC-V-16.
- o. Snap open RC-V-9 and wait for one (1) minute.
- p. Close RC-V-16 and then close RC-V-9.
- q. Turn RC-V-11 counterclockwise to the 9 o'clock position. The pressure reading on RC-G-2.1 is normally between 8 and 10 psig. Record the reading on LRC Form 1097A (Attachment A).
- r. Verify with the CMP, OPLE4J, operator that the gas chromatograph is ready to receive the sample.
- s. Open RC-V-15.
- t. Instruct the CMP, OPLE4J, operator to begin loading the gas chromatograph sample loops.

- u. Upon notification from the CMP, OPLE4J, operator that all loops are filled, close RC-V-15.
 - v. Verify the pressure indicated on RC-G-2.1 is normally 5 and 7 psig, record the reading on LRC Form 1097 A (Attachment A).
3. Obtain the diluted gas sample in accordance with the following:
- a. Turn RC-DV-2 to the 6 o'clock position. Wait until the pressure on RC-G-2.2 returns to 1 psig.
 - b. Turn RC-DV-2 to the 9 o'clock position. Close RC-V-14.
 - c. Remove the griptong containing the diluted gas sample and place behind shielding.
4. Flush the system in accordance with the following:
- a. Verify RC-V-15 is closed. Turn RC-V-11 counterclockwise to the 6 o'clock position.
 - b. Open RC-V-9, RC-V-7 and RC-V-8.1.
 - c. Adjust RC-VREL-2 until RC-FI-2 indicates 18-22 inches of water. Flush with demineralized water for a minimum of one (1) minute.
 - d. Open RC-V-8.2.
 - e. Close RC-V-9 and RC-V-7.
 - f. Adjust RC-VREL-2 until RC-FI-2 indicates 18-22 inches of water. Flush with demineralized water for a minimum of three (3) minutes.
 - g. Close RC-V-8.1.
 - h. Turn RC-V-11 counterclockwise to the 3 o'clock position.
 - i. Open RC-V-9.
 - j. Pull open RC-VREL-2. When there is a sharp increase in pressure indicated on RC-G-3, release RC-VREL-2. Adjust RC-VREL-2 until RC-

G-3 indicates 20 psig. Flush with argon for a minimum of three (3) minutes.

- k. Close RC-V-9.
 - l. Open RC-V-10.
 - m. Turn RC-V-11 counterclockwise to the 9 o'clock position and allow RC-EV-1 to vent.
 - n. Close RC-V-10.
 - o. Turn RC-V-11 clockwise to CLOSED.
 - p. Open RC-V-8.1.
 - q. Adjust RC-VREL-2 until RC-FI-2 indicates 18-22 inches of water. Flush with water for a minimum of one (1) minute.
 - r. Terminate flushing by closing the following:
 - 1) RC-V-8.2.
 - 2) RC-V-8.1.
 - 3) RC-V-2.
 - 4) RC-VREL-2.
 - 5) RC-VREL-1.
 - 6) RC-V-4.
 - s. Close the flush water valve and disconnect the flush water from RC-D-1.
 - t. At the Valve Control Panel, OPLC9J, perform the following:
 - 1) Secure the sample cooler water flow.
 - 2) Close the remote flush isolation valve.
5. Transport the sample to the laboratory in accordance with Reference 3.

6. Analyze the sample in accordance with Reference 4.
7. Calculate the gas dilution factor in accordance with the following:

$$DF = \frac{(V_1) (P_1 + 14.7)}{(V_2) (P_2 + 14.7)}$$

Where: DF = Dilution fraction.
V₁ = System volume (RC-EV-1 and lines to RC-V-15).

P₁ = Pressure reading from Step F.2.q.

V₂ = Volume of RC-DV-2.

P₂ = Pressure reading from Step F.2.v.

8. To dispose of the reactor coolant off-gas sample, proceed in accordance with the following:

a. Verify the following valve lineup:

- 1) RC-V-1.1 (closed).
- 2) RC-V-1.2 (closed).
- 3) RC-V-1.3 (closed).
- 4) RC-V-1.4 (closed).
- 5) RC-V-1.5 (closed).
- 6) RC-V-10 (closed).
- 7) RC-V-11 (CLOSED).
- 8) RC-V-12 (closed).
- 9) RC-V-13 (closed).
- 10) RC-V-14 (closed).
- 11) RC-V-15 (closed).
- 12) RC-DV-2 (9 o'clock).

- b. Install the diluted gas sample bottle on the front panel needle.

- c. Open RC-V-13.
- d. Open RC-V-12 and evacuate until RC-G-2.2 indicates a minimum vacuum of 22 inches mercury.
- e. Turn RC-DV-2 to the 6 o'clock position and continue the evacuation until a minimum vacuum of 22 inches of mercury is indicated on RC-G-2.2.
- f. Close in order RC-V-13 and RC-V-12.
- g. Open RC-V-14 and allow the bottle to pressurize to approximately 1 psig as indicated on RC-G-2.2.
- h. Close RC-V-14.
- i. Open RC-V-13 and RC-V-12 and evacuate until RC-G-2.2 indicates a minimum vacuum of 22 inches mercury.
- j. Close in order RC-V-13 and RC-V-12.
- k. Open RC-V-14 and allow the bottle to pressurize to approximately 1 psig as indicated on RC-G-2.2.
- l. Close RC-V-14.
- m. Repeat Steps F.8.c through F.8.l three times to remove all radioactive gases.
- n. Remove the sample bottle from the panel.
- o. Survey the sample bottle and dispose of as directed by Rad/Chem Supervision.

G. CHECKLISTS

- 1. None.

H. TECHNICAL SPECIFICATION REFERENCES

- 1. None.

ATTACHMENT A
LaSalle County Station
HRSS Analyses

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Date: _____

pH, LZP 1330-23

Standardization Init/Time: _____
Calibration Check Init/Time: _____
Measured pH: _____
Buffer pH Value: _____
Check SAT/UNSAT, ± 0.1 pH units: _____
Sample Init/Time: _____
Sample Temperature, $^{\circ}\text{C}$: _____
Measured pH: _____

If the sample pH > 7.5 , correct the pH to 25°C in accordance with the following formula:

$$\text{pH}_f = \text{pH}_i + 0.03 (T_1 - 25)$$

Where: pH_f = pH corrected to 25°C

pH_i = measured pH

T_1 = Sample Temperature, $^{\circ}\text{C}$

Conductivity, LZP 1330-23

Sample Init/Time: _____
Sample Temperature, $^{\circ}\text{C}$: _____
Measured Conductivity, $\mu\text{mho/cm}$: _____
Correct the measured conductivity to 25°C using the following formula:
$$C_1 = \frac{C_2 - [0.018 + (5.8 \times 10^{-5} \times T_1^2)]}{1 + 0.018 (T_1 - 25^{\circ}\text{C})}$$

Where: C_1 = Conductivity corrected to 25°C

C_2 = Measured Conductivity

T_1 = Sample Temperature, $^{\circ}\text{C}$

Dissolved Oxygen, LZP 1330-23

Calibration Init/Time: _____
Recirc. Water Temperature, $^{\circ}\text{C}$: _____
Recirc. Water O_2 Conc., mg/l : _____
Sample Init/Time: _____
Sample D.O., mg/l : _____

Off-Gas LZP 1330-27

Vacuum, RC-G-2.1., Step F.1.d.4. _____
Pressure, RC-G-2.1., Step F.2.q. _____
Pressure, RC-G-2.1., Step F.2.v. _____
Dilution Factor, Step F.5. _____
Sample Init/Time: _____

Comments: _____

Reviewed: _____

pH at 25°C : _____ Conductivity at 25°C , $\mu\text{mho/cm}$: _____

ATTACHMENT B
VALVE LISTING

RC-V-1.1	Reactor Recirc Loop B Sample Cutout Valve
RC-V-1.2	RT Demin Inlet Sample Coutout Valve
RC-V-1.3	RHR Loop A Sample Coutout Valve
RC-V-1.4	RHR Loop B Sample Cutout Valve
RC-V-1.5	RT Demin Outlet Sample Cutout Valve
RC-V-2	Sample Source Isolation Valve
RC-V-3	Sample Purge Cutout Valve
RC-V-4	Flushing Water Isolation Valve
RC-V-5.1	Pressurized Sample Inlet Isolation Valve
RC-V-5.2	Pressurized Sample Outlet Isolation Valve
RC-V-7	Diluted Sample Bypass Valve
RC-V-8.1	RC-SF-1.2 Inlet Isolation Valve
RC-V-8.2	RC-SF-1.2 Outlet Isolation Valve
RC-V-9	RC-EV-1 Isolation Valve
RC-V-10	RC-EV-1 Evacuation Cutout Valve
RC-V-11	Off-gas 4-way Valve
RC-V-12	Argon to Air Ejector Cutout Valve
RC-V-13	Off-gas Vial Evacuation Cutout Valve
RC-V-14	Argon Supply to Off-gas Vial Cutout Valve
RC-V-15	Off-gas Sample to Gas Chromatograph Isolation Valve
RC-V-16	RC-SF-1.2 Argon Purge Cutout Valve
RC-V-17	Reactor Coolant Grab Sample Cutout Valve
RC-V-18	Reactor Coolant Undiluted Sample Backflush Cutout Valve.
RC-V-19	Reactor Coolant Undiluted Sample Injection Valve
RC-V-20	RC-C-1 Fill Valve
RC-V-21	RC-C-1 Isolation Valve
RC-V-22	Liquid Sample to CAP Isolation Valve

ATTACHMENT B (Cont'd)

Coolant
RC-DV-1 Reactor Coolant and Diluted Sample Injection Valve
RC-DV-2 Off-gas Sample Injection Valve
RC-VREL-1 Reactor Coolant Purge Throttle Valve
RC-VREL-2 Reactor Coolant Sample Throttle Valve

ATTACHMENT A
LSCS PROCEDURE DEFICIENCY SHEET

PROCEDURE #: L2P1330-28

REVISION: 0

PROCEDURE PARAGRAPH #	INFO SOURCE (SEE CODE)	DEFICIENCY	IDENTIFICATION INITIAL/DATE	RESOLUTION INITIAL/DATE
		None		
F.7.	CECO	sample movement procedure	P6K 1-27-81	PHK 9-17-81
F.8.	CECO	sample analytical procedures	P6K 1-27-81	PHK 9-17-81
NA	CECO	PCWT NOT PERFORMED YET	CLW 9/17/81	

COMMENTS: _____

SOURCE CODE: C.E.
S&L
G.E.
By testing
Other

Note: Indicate by title and/or number the specified document needed to resolve deficiency if possible.

SAMPLING OF PROCESS WATERS CONTAINING RADIOACTIVITY
AT THE HIGH RADIATION SAMPLING SYSTEM

A. PURPOSE

The purpose of this procedure is to delineate a method of obtaining samples of the drywell sumps and HRSS waste tank at the High Radiation Sampling System (HRSS) during normal and post-accident conditions.

B. REFERENCES

1. Sentry Equipment Corporation, Post-Accident Sample System, Volume 1.
2. LZP 1330-29, "Sampling at the High Radiation Sampling System (Valve Operations at the HRSS Valve Control Panel)."
3. LZP 1330-31, "HRSS Sample Movement."
4. AAIS-CCP-0005, "Liquid Waste Radionuclide Analysis."

C. PREREQUISITES

1. The operator should be familiar with the operation of the HRSS panels.
2. Establish communications with the Unit Nuclear Station Operator (NSO).
3. Equipment:
 - a. Reach rods.
 - b. Sample cart/cask assembly.
 - c. Sample bottle with septum, 15 ml.
 - d. Needle flush tool with demineralized water filled sample bottle and septum.
4. The sample must have been obtained in accordance with Reference 2 prior to performing this procedure.

D. PRECAUTIONS

1. A Regulatory Guide 1.3 or 1.4 release of fission products implies extremely high levels of radioactivity. Dose rates may be high enough to prevent entry into many areas of the plant that are normally habitable. Rad/Chem Supervision should be contacted prior to entry into any area when such a release of fission products is suspected.
2. Wear radiation dosimetry as recommended by Rad/Chem Supervision.
3. Wear protective clothing and respiratory protection as recommended by Rad/Chem Supervision.
4. Appropriate survey instruments should be available for monitoring during this procedure.

E. LIMITATIONS AND ACTIONS

1. Notify Rad/Chem Supervision if any problems are encountered at the HRSS panels.
2. This procedure, though intended for use under post-accident conditions, can be used for sampling at the HRSS panel during normal operations, during which the precautions listed may have limited applications. However, normal routine sampling precautions should be observed.
3. The splash box door of the Liquid Sample Panel (LSP), OPLD8J, must be closed during panel line purge and grab sample collection operations.

F. PROCEDURE

NOTE

For the noun names associated with the valves operated in this procedure, refer to Attachment A.

1. Perform the following valve lineup at the LSP, OPLD8J:
 - a. RW-V-1.1 (closed).

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- b. RW-V-1.2 (closed).
- c. RW-V-1.3 (closed).
- d. RW-V-1.4 (closed).
- e. RW-V-1.5 (closed).
- f. RW-V-1.6 (closed).
- g. RW-V-1.7 (closed).
- h. RW-V-1.8 (closed).
- i. RW-V-1.9 (closed).
- j. RW-V-1.10 (closed).
- k. RW-V-2.1 (closed).
- l. RW-V-2.2 (closed).
- m. RW-V-2.3 (closed).
- n. RW-V-2.4 (closed).
- o. RW-V-2.5 (closed).
- p. RW-V-2.6 (closed).
- q. RW-V-2.7 (closed).
- r. RW-V-2.8 (closed).
- s. RW-V-2.9 (closed).
- t. RW-V-2.10 (closed).
- u. RW-V-3 (closed).
- v. RW-V-4 (closed).
- w. RW-V-9 (closed).
- x. RW-V-10 (closed).

- y. RW-V-6 (closed).
 - z. RW-V-5 (6 o'clock)-
 - aa. RW-V-7 (BYPASS).
 - ab. RW-V-8 (BYPASS).
2. Connect the flush water hose to RW-D-1 on the LSP, OPLD8J, and open the flush water line valve.
 3. To obtain a diluted (1000:1) radioactive waste sample, proceed to Step F.6. To obtain an undiluted (15 ml) radioactive waste sample, proceed to Step F.5.
 4. To obtain an open grab sample, proceed in accordance with the following at the LSP, OPLD8J or as otherwise directed:
 - a. Open RW-V-1.1 (-1.2, -1.3) depending on the sample source, and recirc for a minimum of six minutes, then close RW-V-1.1 (-1.2, -1.3).
 - b. Open RW-V-2.1 (-2.2, -2.3) depending on the sample source.
 - c. Slowly open RW-V-4 until RW-FI-1 indicates 4-8 inches of water. Purge to waste for a minimum of one (1) minute.
 - d. Open RW-V-6, purge a minimum of 50 ml of liquid to waste, then close RW-V-6.
 - e. Open RW-V-6, collect the desired sample, and close RW-V-6.
 - f. Close RW-V-2.1 (-2.2, -2.3) depending on the sample source.
 - g. Close RW-V-4.
 - h. Dry the sample bottle, remove and place in a tote tray for transporting to the laboratory.
 - i. At the Valve Control Panel, OPLC9J, secure the sampling lineup in accordance with Reference 2, Steps F.2.c.15) through F.2.c.17) OR Steps

F.3.f through F.3.g depending on the sample source sampled.

- j. Fully open RW-V-4.
- k. Slowly open RW-V-3 until RW-FI-1 indicates 4-8 inches of water. Flush with demineralized water for a minimum of two (2) minutes.
- l. Close RW-V-4.
- m. Open RW-V-1.1 (-1.2, -1.3) depending on the sample source sampled.
- n. Fully open RW-V-3 and flush with demineralized water for a minimum of six (6) minutes.
- o. Close RW-V-1.1 (-1.2, -1.3).
- p. Open RW-V-2.1 (-2.2, -2.3) depending on the sample source sampled.
- q. Slowly open RW-V-4 until RW-FI-1 reads 4-8 inches of water. Purge to waste for a minimum of two (2) minutes.
- s. Open RW-V-6, purge a minimum of 50 ml of liquid to waste, then close RW-V-6.
- t. Close RW-V-2.1 (-2.2, -2.3) and RW-V-4.
- u. At the Valve Control Panel, OPLC9J, align the LIQUID SAMPLE BACKFLUSH switch, for radwaste side, to the backflush line associated with the sample source sampled. Flush with demineralized water for a minimum of six (6) minutes.
- v. Align the LIQUID SAMPLE BACKFLUSH switch to the OFF position.
- w. Close RW-V-3.
- x. Close the flush water valve and disconnect the flush water line from RW-DV-1.
- y. If no further samples are to be obtained from this sample source, secure the sampling lineup in accordance with Reference 2, Steps F.2.c.19)

through F.2.d OR Step F.3.i depending on the sample source sampled.

5. To obtain an undiluted (15 ml) radioactive waste sample, proceed in accordance with the following at the LSP, OPLD8J or as otherwise directed:
 - a. Place the bottle on the cart/cask assembly cavity piston.
 - b. Turn the direction valve for the hydraulic piston in the DOWN position and lower the bottle in the cask cavity.
 - c. Close and open the cask to verify that the cover is working properly.
 - d. Position the cask/cart under the LSP undiluted radwaste fill station needles and set the brake.
 - e. Turn the direction valve for the hydraulic piston to the UP position and raise the bottle onto the needles.
 - f. Open RW-V-1.1 (-1.2, -1.3) depending on the sample source, and recirculate for a minimum of six (6) minutes.
 - g. Close RW-V-1.1 (-1.2, -1.3) and open RW-V-2.1 (-2.2, -2.3) depending on the sample source.
 - h. Slowly open RW-V-4 until RW-FI-1 indicates 4-8 inches of water. Purge to waste for a minimum of one (1) minute.
 - i. Turn RW-V-7 to SAMPLE. DO NOT exceed 20 psig on RW-G-1 in this step. Adjust RW-V-4 until RW-G-1 indicates 20 psig or RW-FI-1 indicates 10-14 inches of water. Purge for a minimum of one (1) minute.
 - j. Close RW-V-2.1 (-2.2, -2.3).
 - k. Let RW-G-1 return to 0 psig and wait 30 seconds to allow the bottle to depressurize.

- l. Turn RW-V-7 to BYPASS.
- m. Turn the direction valve for a cask/cart hydraulic plunger to the DOWN position and lower the bottle into the cask.
- n. Close the cask. Release the brake and remove the cart/cask from the sample station.
- o. Install and secure the auxiliary shield on the cart/cask assembly.
- p. Install and secure the needle flush tool on the LSP, OPLD8J.
- q. At the Valve Control Panel, OPLC9J, secure the sample lineup in accordance with Reference 2, Steps F.2.c.15) through F.2.c.17) OR Steps F.3.f through F.3.g depending on the sample source sampled.
- r. Fully open RW-V-4.
- s. Slowly open RW-V-3 until RW-FI-1 indicates 4-8 inches of water. Flush with demineralized water for a minimum of two (2) minutes.
- t. Close RW-V-4.
- u. Open RW-V-1.1 (-1.2, -1.3) depending on the sample source.
- v. Fully open RW-V-3 and flush with demineralized water for a minimum of six (6) minutes.
- w. Close RW-V-1.1 (-1.2, -1.3).
- x. Open RW-V-2.1 (-2.2, -2.3) depending on the sample source.
- y. Slowly open RW-V-4 until RW-FI-1 reads 4-8 inches of water. Purge to waste for a minimum of two (2) minutes.
- z. Close RW-V-2.1 (-2.2, -2.3) and RW-V-4.
- aa. At the Valve Control Panel, OPLC9J, align the LIQUID SAMPLE BACKFLUSH switch, for the radwaste side, to the backflush line associated with

the sample source sampled. Flush with demineralized water for a minimum of six (6) minutes.

- ab. Align the LIQUID SAMPLE BACKFLUSH switch to the OFF position.
 - ac. Turn RW-V-7 to SAMPLE. DO NOT exceed 20 psig on RW-G-1 in this step. Slowly open RW-V-4 until RW-G-1 indicates 20 psig or RW-FI-1 indicates 10-14 inches of water. Purge for a minimum of one (1) minute.
 - ad. Close RW-V-4 and let RW-G-1 return to 0 psig. Wait 30 seconds to allow the bottle to depressurize.
 - ae. Turn RW-V-7 to BYPASS.
 - af. Secure flushing by closing RW-V-3.
 - ag. Close the flush water valve and disconnect the flush water line from RW-DV-1.
 - ah. Remove the needle flush bool from the LSP, OPLD8J.
 - ai. If no further samples are to be obtained from this sample source, secure the sampling lineup in accordance with Reference 2, Steps F.2.c.19) through F.2.d OR Step F.3.a depending on the sample source sampled.
6. To obtain a diluted (1000:1) radioactive waste sample, proceed in accordance with the following at the LSP, OPLD8J or as otherwise directed:
- a. Verify RW-DV-1 is turned to BYPASS. Fill reservoir RW-R-1 with demineralized water. Open RW-V-10 and then RW-V-9. Adjust reservoir RW-R-1 until the water level in graduated cylinder RW-C-1 is 125 ml. Close RW-V-10 and RW-V-9.
 - b. Align RW-V-8 to the BYPASS (9 o'clock) position.

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- c. Align RW-DV-1 to the BYPASS position.
- d. Insert the needle of the hand operated vacuum pump into the septum of the diluted radwaste sample bottle.
- e. Evacuate to the maximum vacuum achievable with the hand operated pump. The vacuum MUST be at LEAST 15 inches of Hg.
- f. Keep the hand operated vacuum pump connected to the evacuated bottle for three minutes to assure that the bottle retains the vacuum.
- g. Remove the bottle from the hand operated vacuum pump and place the bottle on the cart/cask assembly cavity piston.
- h. Turn the direction valve for the hydraulic piston to the DOWN position and lower the bottle into the cask cavity. Close and open the cask to verify that the cover is working properly.
- i. Position the cask/cart under the LSP diluted radwaste fill station needle and set the brake.
- j. Turn the direction valve for the hydraulic piston to the UP position and raise the bottle onto the needle.
- k. Open RW-V-1.1 (-1.2, -1.3) depending on the sample source and recirc for six (6) minutes. Close RW-V-1.1 (-1.2, -1.3).
- l. Open RW-V-2.1 (-2.2, -2.3) depending on the sample source.
- m. Slowly open RW-V-4 until RW-FI-1 indicates 45-50 inches of water. Purge to waste for a minimum of one (1) minute.
- n. Turn RW-V-8 to BYPASS.
- o. Close RW-V-2.1 (-2.2, -2.3).
- p. At the Valve Control Panel, OPLC9J, secure the sample lineup in accordance with Reference 2, Steps F.2.c.15) through F.2.c.17) OR Steps

F.3.f through F.3.g depending on the sample source sampled.

- q. Fully open RW-V-4.
- r. Slowly open RW-V-3 until RW-FI-1 indicates 4-8 inches of water. Flush with demineralized water for a minimum of two (2) minutes.
- s. Close RW-V-4.
- t. Open RW-V-1.1 (-1.2, -1.3) depending on the sample source sampled. Fully open RW-V-3 and flush with demineralized water for a minimum of six (6) minutes.
- u. Close RW-V-1.1 (-1.2, -1.3).
- v. Open RW-V-2.1 (-2.2, -2.3) depending on the sample source sampled.
- w. Slowly open RW-V-4 until RW-FI-1 reads 4-8 inches of water. Flush with demineralized water for a minimum of two (2) minutes.
- x. Close in order RW-V-2 and RW-V-4.
- y. At the Valve Control Panel, OPLC9J, align the LIQUID SAMPLE BACKFLUSH switch, for the radwaste side, to the backflush line associated with the sample source sampled. Flush with demineralized water for a minimum of six (6) minutes.
- z. Align the LIQUID SAMPLE BACKFLUSH switch to the OFF position.
- aa. Turn RW-DV-1 to SAMPLE.
- ab. Crack open RW-V-9, and add 24 ml of water from RW-C-1 to the sample bottle, then close RW-V-9.
- ac. Turn RW-DV-1 to BYPASS.
- ad. Place the direction valve for the hydraulic plunger in the DOWN position and lower the bottle into the cask.

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- ae. Close the cask.
- af. Turn RW-V-8 to the 9 o'clock position.
- ag. Slowly open RW-V-4 until RW-FI-1 indicates 45-50 inches of water. Flush with demineralized water for two (2) minutes.
- ah. Turn RW-V-8 to BYPASS.
- ai. Secure flushing by closing RW-V-4 and RW-V-3.
- aj. Release the brake and remove the cart/cask from the sample station.
- ak. Install and secure the auxiliary shield on the cart/cask assembly.
- al. Close the flush water valve and disconnect the flush water hose for RW-DV-1.
- am. If no further samples are to be obtained from this sample source, secure the sampling lineup in accordance with Reference 2, Steps F.2.c.19) through F.2.d OR Step F.3.i depending on the sample source sampled.

7. Transport the samples to the laboratory in accordance with Reference 3.

8. Analyze the samples in accordance with Reference 4.

G. CHECKLISTS

- 1. None.

H. TECHNICAL SPECIFICATION REFERENCES

- 1. None.

ATTACHMENT A

VALVE LISTING

RW-V-1.1	Spare
RW-V-1.2	Spare
RW-V-1.3	Spare
RW-V-1.4	Spare
RW-V-1.5	Spare
RW-V-1.6	Spare
RW-V-1.7	Spare
RW-V-1.8	HRSS Waste Tank Sample Recirc Valve
RW-V-1.9	U-1 Drywell Equip. Drain Sample Recirc Valve
RW-V-1.10	U-2 Drywell Equip. Drain Sample Recirc Valve
RW-V-2.1	Spare
RW-V-2.2	Spare
RW-V-2.3	Spare
RW-V-2.4	Spare
RW-V-2.5	Spare
RW-V-2.6	Spare
RW-V-2.7	Spare
RW-V-2.8	HRSS Waste Tank Sample Cutout Valve
RW-V-2.9	U-1 Drywell Equip. Drain Sample Cutout Valve
RW-V-2.10	U-2 Drywell Equip. Drain Sample Cutout Valve
RW-V-3	Flushing Water Isolation Valve
RW-V-4	Rad-Waste Sample Throttle Valve
RW-V-5	Backflush Cutout Valve
RW-V-6	Radwaste Grab Sample Valve
RW-V-7	Radwaste Undiluted Sample Injection Valve
RW-V-8	Rad-Waste Diluted Sample Cutout Valve
RW-V-9	RW-C-1 Fill Valve
RW-V-10	RW-C-1 Isolation Valve
RW-DV-1	Rad-Waste Diluted Sample Injection Valve

ATTACHMENT A
LSCS PROCEDURE DEFICIENCY SHEET

PROCEDURE #: L7P 1330-50

REVISION: 0

PROCEDURE PARAGRAPH #	INFO SOURCE (SEE CODE)	DEFICIENCY	IDENTIFICATION INITIAL/DATE	RESOLUTION INITIAL/DATE
B.6	CE	Air Sample Analysis	JL 31 Aug 81	JL 26 Sept 81
B.7 ³ 8	CE	Operation of SAM-2	JL 31 Aug 81	
B.8 ³ 7	CE	Operation of PING-III	JL 31 Aug 81	

COMMENTS: _____

SOURCE CODE: C.E.
S&L
G.E.
By testing
Other

Note: Indicate by title and/or number the specified document needed to resolve deficiency if possible.

RADIATION SURVEYS UNDER ACCIDENT CONDITIONS

A. PURPOSE

The purpose of this procedure is to provide information relevant to the performance of radiation surveys in plant areas during accident conditions. Also provided are survey diagrams for lesser affected areas which are expected to be occupied under these conditions.

B. REFERENCES

1. LRP 1280-2, "Dose Rate Surveys."
2. LRP 1350-22, "Deployment of the Eberline PING-III."
3. LRP 1350-23, "Deployment of the Eberline SAM-2."
4. LRP 1360-6, "Air Sampling of Suspected Radioactive Airborne Areas."
5. LPR 1480-2, "Contamination Surveys."
6. LZP 1360-2, "Use of Potassium Iodide As a Thyroid Blocking Agent."
7. Post Accident Radiation Levels, A Review of the LaSalle County Station in Response to Item 2.1.6.b. of NUREG-0578, Revision 1, August 8, 1980.
8. CCP-0003, "Particulate Radionuclide Analysis."
9. AIR 1-81-331.

C. PREREQUISITES

1. Prior to entering areas of the plant which have or are expected to have abnormal radiation levels, an assessment of the levels enroute to and near the area in question should be performed using installed plant instrumentation. Attachment A provides a listing of instrumentation which may be useful in assessing the situation.

2. Equipment:

a. Dose rate surveys.

- 1) High range exposure rate meter. An extendable probe is preferred.

NOTE

To preclude the entry of noble gases into the chamber, air ionization chambers must be sealed in plastic.

- 2) Appropriate survey sheets for the area to be surveyed. Survey sheets for areas expected to be occupied under emergency conditions are provided in Attachments B through E as follows:

- a) Attachment B: Technical Support Center.
- b) Attachment C: Control Room/Operational Support Center.
- c) Attachment D: Assembly Area.
- d) Attachment E: Emergency Operations Facility/Pressroom.

b. Air sample surveys.

- 1) Grab samples.
 - a) AC or DC powered air sampler with combination particulate/iodine cartridge holder.
 - b) Particulate filters - 47mm Hollingsworth and Vose Model LB 5211 or equivalent.
 - c) Silver Zeolite cartridges - Science Applications, Inc. Model GY-130 or equivalent.
 - d) Stopwatch.
- 2) PING III constant air monitors located as follows:

- a) Technical Support Center (TSC).
- b) Operational Support Center (OSC).
- c) Control Room.
- d) Assembly Area.
- e) Nearsite Emergency Operations Facility (EOF).

c. Contamination surveys (See Reference 5).

D. PRECAUTIONS

- 1. Respiratory protection for plant areas where major releases have occurred or are suspected will be SCBA. In certain circumstances overall exposures can be reduced by using a combination Full Face respirator with Potassium Iodide Thyroid block in lieu of a SCBA, but it must be determined beforehand that the area in question is capable of sustaining life (See Reference 6).

E. LIMITATIONS AND ACTIONS

- 1. If a dose rate survey instrument over ranges or responds in a questionable manner, immediately relocate to an area of relatively low dose rate levels and investigate the cause. Do not assume an over ranged instrument is malfunctioning.
- 2. Radiation exposures shall be kept as low as is reasonably achievable below the maximum allowable quaterly values of:
 - a. 3,000 mRem to the whole body.
 - b. 7,500 mRem to the skin.
 - c. 18,750 mRem to the extremities.

F. PROCEDURE

- 1. Determine a route to the area requiring survey that will minimize exposure of the individual performing the survey. See Step C.1. above the Reference 7.

2. Dress in appropriate protective clothing. Protective clothing requirements for areas that have not been evaluated will be determined by the urgency of the situation. The preferred clothing is as follows:
 - a. Coveralls with cloth hood.
 - b. Cotton or jersey gloves under latex gloves.
 - c. Cloth shoe covers under rubbers (or boots).
 - d. SCBA respirator.

CAUTION

Respiratory protection for plant areas where major releases have occurred or are suspected will be SCBA. In certain circumstances overall exposures can be reduced by using a combination Full Face respirator with Potassium Iodide Thyroid block in lieu of a SCBA, but it must be determined beforehand that the area in question is capable of sustaining life (See Reference 6).

3. Obtain dosimetry of the proper range. The minimum requirements are as follows:
 - a. A minimum of 2 self-reading pocket dosimeters, one of which will be 0-1R or 0-10R in range and the other will be 0-100R or 0-200R in range.
 - b. TLD ring badge.
 - c. Electronic dosimeter, 0-9999mr in range.

NOTE

The electronic dosimeter provides a timekeeping aid in that the necessity for repeated observations of self-reading dosimeters while in elevated dose rates fields can be minimized. It is not necessary for each member of a survey team or work crew to be issued a dosimeter of this type.

4. Obtain equipment as specified in Steps C.2.a. through C.2.c. as appropriate.
5. Proceed to the area in need of survey using the following techniques as appropriate:

- a. Minimize time spent in areas of relative high dose rates.
 - b. Maintain distance from hot spots or other sources of high exposure when possible.
 - c. Take advantage of installed shielding. Note areas of relative low dose rate which can be used as waiting areas for work crews. Areas of low dose rate should be utilized for activities that must be performed in the field such as checking dosimetry for exposure assessment or documenting survey results on survey forms.
- 6. Once the area in need of survey has been reached, conduct surveys in accordance with Reference 1, 4 and 5 as appropriate.
 - 7. Gather all equipment and return to the OSC.

NOTE

To minimize the spread of contamination, survey all equipment. Normal control points may not be appropriate under accident conditions, but every effort should be made to maintain the Auxiliary Building free of loose surface contamination.

- 8. Analyze air samples in accordance with References 3 and 8 or Reference 2 as appropriate.
- 9. If the TSC and OSC are staffed, report survey results to one of the following listed in order of priority:
 - a. Rad/Chem Supervision in the OSC, Ext. 207 who will in turn relay appropriate results to the Rad/Chem Director in the TSC, Ext. 481.
 - b. Rad/Chem Director in the TSC, Ext. 481.
- 10. If the TSC and OSC have not yet been staffed, report survey results to Operating Shift Supervision, Ext. 203.

G. CHECKLISTS

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1. None.

H. TECHNICAL SPECIFICATION REFERENCES

1. None.

ATTACHMENT A
PROCESS RADIATION MONITORS

<u>Channel Name</u>	<u>Location</u>	<u>Floor Elevation</u>	<u>Range (mr/hr)</u>
Main Steam Line	Reactor Bldg.	710'	1 - 10 ⁶
Carbon Bed Vault	Off Gas Filter Bldg.	674'	1 - 10 ⁶
Rx Vent. Exh.	Auxiliary Bldg.	786'	.01 - 10 ²
Fuel Pool Vent. Exh.	Reactor Bldg.	820'	.01 - 10 ²
Control Room HVAC Intake	Auxiliary Bldg. Roof	843'	0.1 - 10 ⁴
Aux. Steam Reboiler	Turbine Bldg.	768'	0.1 - 10 ⁴
Off Gas Pretreat.	Turbine Bldg.	754'	1 - 10 ⁶

ATTACHMENT (CONT'D)

AREA RADIATION MONITORS

Local Ind.
& Alarm

Channel

Name

Elevation

Range
(mr/hr)

1-1	Standby Gas	820'6"	$10^0 - 10^4$	
1-2	RWCU Phase Sep.	807'0"	$10^0 - 10^4$	
1-3	Rx Bldg. Sample Sink	786'6"	$10^{-1} - 10^3$	X
1-4	Containment Purge	786'6"	$10^0 - 10^4$	
1-5	North HCU Modules	761'0"	$10^{-1} - 10^3$	
1-6	South HCU Modules	761'0"	$10^{-1} - 10^3$	
1-7	Off-Gas Equipment & Sample	754'0"	$10^{-1} - 10^3$	X
1-8	Tip Room	740'0"	$10^0 - 10^4$	X
1-9	Tip Drives	740'0"	$10^{-1} - 10^3$	
1-10	CRD Storage & Repair	740'0"	$10^{-1} - 10^3$	
1-11	NW RHR Hx	710'6"	$10^0 - 10^4$	
1-12	SE RHR Hx	710'6"	$10^0 - 10^4$	
1-13	Turb. Bldg. Sample Sink	687'0"	$10^{-1} - 10^3$	X
1-14	Cond. Demin. Regen. Vlv. Aisle	667'0"	$10^0 - 10^4$	X
1-15	UAC Valve Aisle	687'0"	$10^0 - 10^4$	X
1-16	RCIC Turbine	673'4"	$10^0 - 10^4$	X
1-17	HPCS Pump	673'4"	$10^{-1} - 10^3$	
1-18	Conds. Booster Pumps	663'0"	$10^{-1} - 10^3$	

ATTACHMENT A (CONT'D)

AREA RADIATION MONITORSLZP-1330-50
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<u>Channel</u>	<u>Name</u>	<u>Elevation</u>	<u>Range</u> <u>(mr/hr)</u>	<u>Local Ind.</u> <u>& Alarm</u>
1-20	Spare			
1-21	Spare			
1-22	Spare			
1-23	Spare			
1-24	Spare			
1-25	Spare			
1-26	Sapre			
1-27	Spare			
1-29	Spare			
1-30	Spare			
1-10	Spare			

ATTACHMENT A (CONT'D)

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<u>Channel</u>	<u>Name</u>	<u>Elevation</u>	<u>Range</u> (mr/hr)	<u>Local Ind.</u> <u>& Alarm</u>
2-1	Standby Gas	820'6"	$10^0 - 10^4$	
2-2	RWCU Phase Sep.	807'0"	$10^0 - 10^4$	
2-3	Rx. Bldg. Sample Sink	786'6"	$10^{-1} - 10^3$	X
2-4	Containment Purge	786'6"	$10^0 - 10^4$	
2-5	North HCU Modules	761'0"	$10^{-1} - 10^3$	
2-6	South HCU Modules	761'0"	$10^{-1} - 10^3$	
2-7	Off-Gas Equipment & Sample	754'0"	$10^{-1} - 10^3$	X
2-8	Tip Room	749'0"	$10^0 - 10^4$	X
2-9	Tip Drives	740'0"	$10^{-1} - 10^3$	
2-10	CRD Storage & Repair	740'0"	$10^{-1} - 10^3$	
2-11	NW RHR Hx	710'6"	$10^0 - 10^4$	
2-12	SE RHR Hx	710'6"	$10^0 - 10^4$	
2-13	Turb. Bldg. Sample Sink	687'0"	$10^{-1} - 10^3$	X
2-14	Cond. Demin. Regen. Vlv. Aisle	687'0"	$10^{-1} - 10^3$	X
2-15	Spare	-	-	
2-16	RCIC Turbine	673'4"	$10^0 - 10^4$	X
2-17	HPCS Pump	673'4"	$10^{-1} - 10^3$	
2-18	Conds. Booster Pump	663'0"	$10^{-1} - 10^3$	
2-19	Spare			
2-20	Spare			

ATTACHMENT A (CONT'D)

Area Radiation Monitors

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<u>Channel</u>	<u>Name</u>	<u>Elevation</u>	<u>Range</u> <u>(mr/hr)</u>	<u>Local Ind.</u> <u>& Alarm</u>
2-21	Spare			
2-22	Spare			
2-23	Spare			
2-24	Spare			
2-25	Spare			
2-26	Spare			
2-27	Spare			
2-28	Spare			
2-29	Spare			
2-30	Spare			

Area Radiation Monitors

<u>Channel</u>	<u>Name</u>	<u>Elevation</u>	<u>Range (mR/hr)</u>	<u>Local Ind. & Alarm</u>
3-1	Refuel Flr. High Range	843'6"	$10^{-2} - 10^{-6}$	X
3-2	Refuel Flr. Low Range	843'6"	$10^{-1} - 10^{-3}$	X
3-3	New Fuel Storage Vault	842'6"	$10^{-1} - 10^{-3}$	
3-4	Refuel Flr. Equip. Hatch	843'6"	$10^{-1} - 10^{-3}$	X
3-5	Vent Stack Sample	815'0"	$10^{-1} - 10^{-3}$	X
3-6	Main Control Room	768'0"	$10^{-2} - 10^{-2}$	
3-7	HP Turbines	768'0"	$10^{-1} - 10^{-3}$	
3-8	Turb. Bldg. Decon. Pit	768'0"	$10^{-1} - 10^{-3}$	X
3-9	Rx Bldg. Trackway	710'6"	$10^{-1} - 10^{-3}$	
3-10	Hot Lab Corridor	710'6"	$10^{-1} - 10^{-3}$	X
3-11	Turb. Bldg. Bsmt. Elevator	663'0"	$10^{-1} - 10^{-3}$	
3-12	O. G. HVAC Exhaust Area	710'6"	$10^{-1} - 10^{-3}$	
3-13	O. G. Upper Bsmt.	690'0"	$10^{-1} - 10^{-3}$	X
3-14	O. G. Char. Ads. Vlv. Aisle	674'0"	$10^0 - 10^{-4}$	X
3-15	Serv. Bldg. Office Corridor	726'6"	$10^{-2} - 10^{-2}$	
3-16	Laundry	710'6"	$10^{-1} - 10^{-3}$	
3-17	Machine Shop	710'6"	$10^{-1} - 10^{-3}$	X
3-18	Serv. Bldg. Lunchroom Corridor	710'6"	$10^{-2} - 10^{-2}$	
3-19	Spare			
3-20	Spare			

ATTACHMENT A (CONT'D)

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Area Radiation Monitors (Radwaste Control Room) *

<u>Channel</u>	<u>Name</u>	<u>Elevation</u>	<u>Range</u> <u>(mR/hr)</u>	<u>Local Ind.</u> <u>& Local</u>
4-1	Conc. Waste Tanks		$10^0 - 10^4$	
4-2	Unit 1 Fl. Dr. Conc. Pump & Vlv. Rm.		$10^0 - 10^4$	
4-3	Unit 2 Fl. Dr. Conc. Pump & Vlv. Rm.		$10^0 - 10^4$	
4-4	Chem. Wst. Conc. Pump & Vlv. Rm.		$10^0 - 10^4$	
4-5	Radwaste Control Room		$10^{-2} - 10^2$	
4-6	Drum Labelling Station		$10^0 - 10^4$	
4-7	Radwaste Compactor		$10^0 - 10^4$	
4-8	N. High -Lvl. Drum Storage		$10^0 - 10^4$	
4-9	S. High -Lvl. Drum Storage		$10^0 - 10^4$	

ATTACHMENT B

AIR SAMPLE

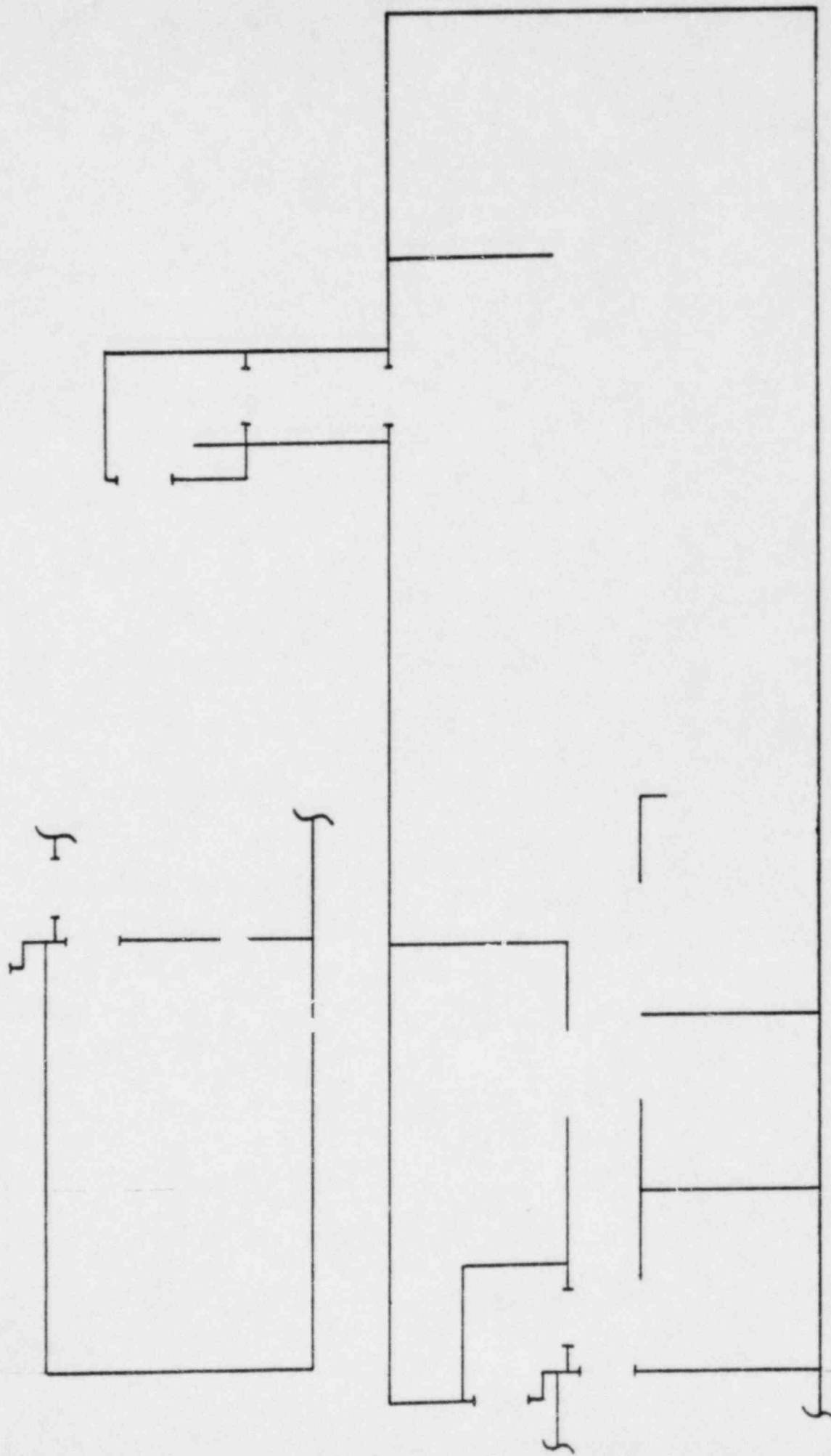
GRAB

PING

TECH. SUPPORT CENTER
 SERVICE BLDG. ELEV. 694'
 1. RAD LEVELS IN mR/hr
 2. SHEARS () IN dpm/100cm²
 3. K = 1000

ΔT 1 2 3 4 5 6 7 8
 B-X
 α

DATE
 TIME
 MWE
 INITIALS
 REVIEW



CONTROL ROOM U-1/OSC

AUX. BLDG. 768'

1. RAD LEVELS IN mR/hr
2. SMEARS () IN dpm/100cm²
3. K = 1000

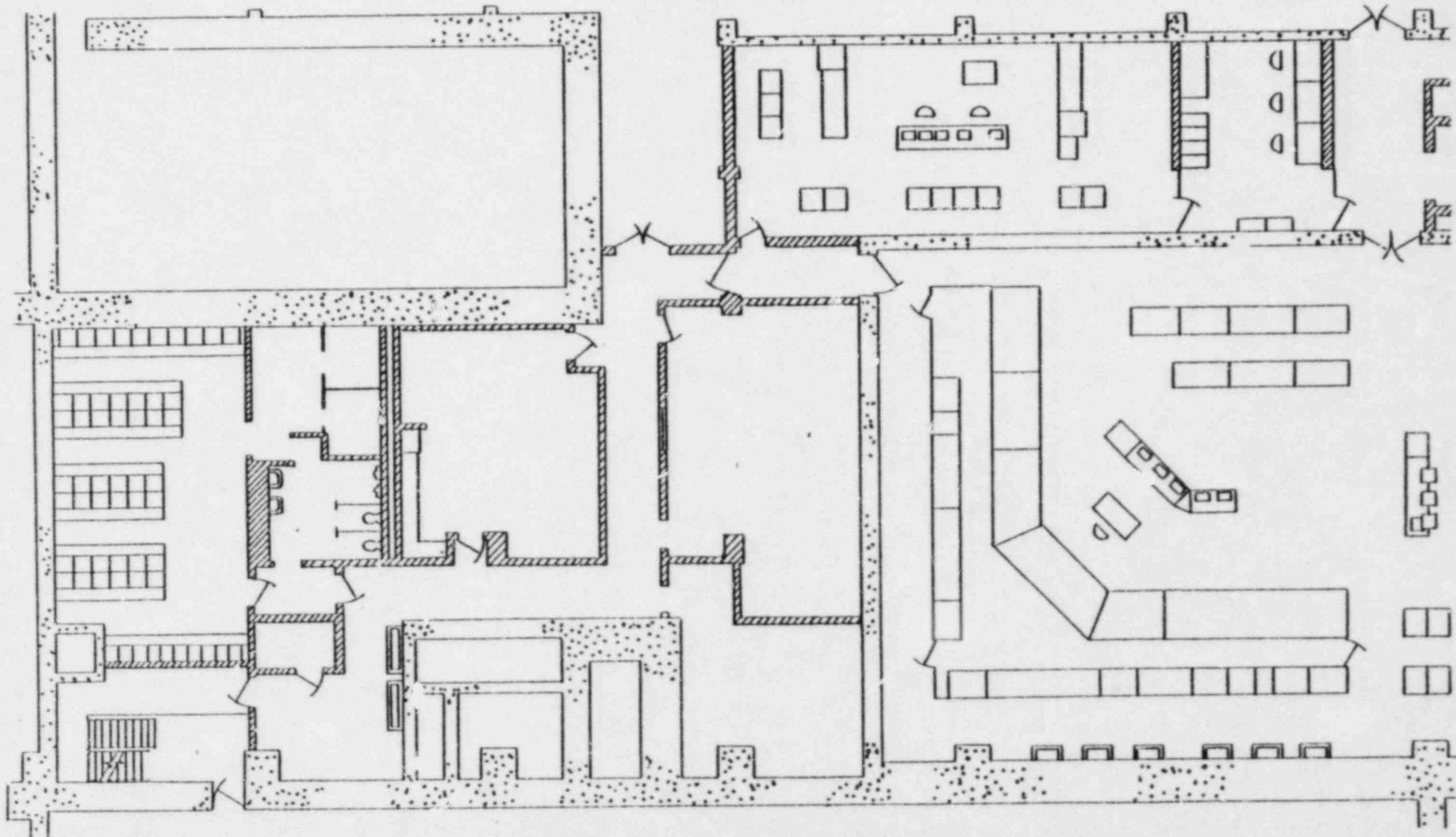
AIR SAMPLE

GRAB

PING

ΔT	1	5
I	2	6
B- γ	3	7
α	4	8

DATE _____
 TIME _____
 NAME _____
 INITIALS _____
 REVIEW _____



ATTACHMENT C (CONT'D)

AIR SAMPLE

GRAB

ΔT 1
B-X
 ∞

PING

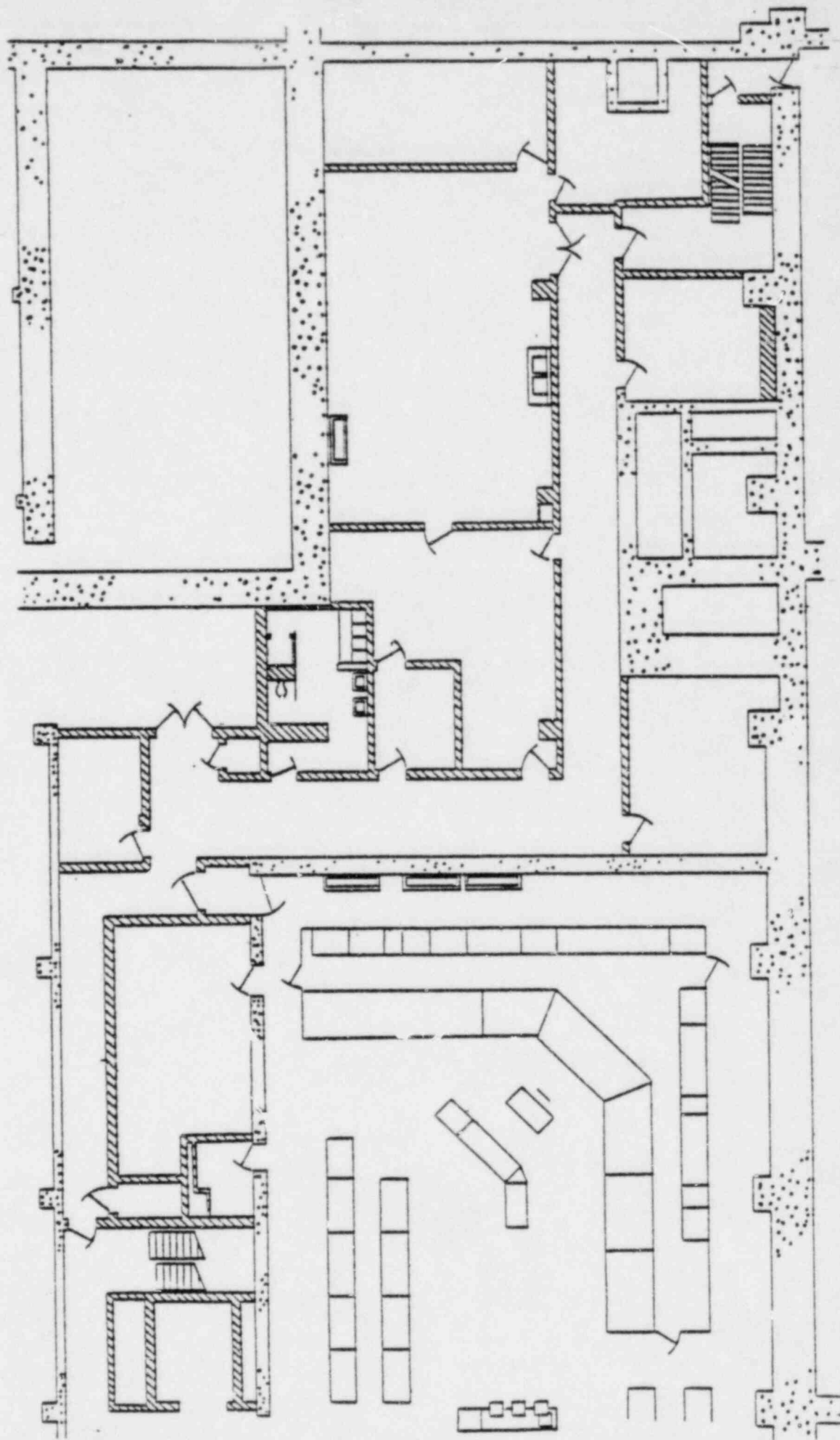
1 2 3 4
5 6 7 8

DATE
TIME
MWE
INITIALS
REVIEW

CONTROL ROOM U-2

AUX. BLDG. 768'

1. RAD LEVELS IN mR/hr
2. SMEARS () IN dpm/100cm²
3. K = 1000



ATTACHMENT D

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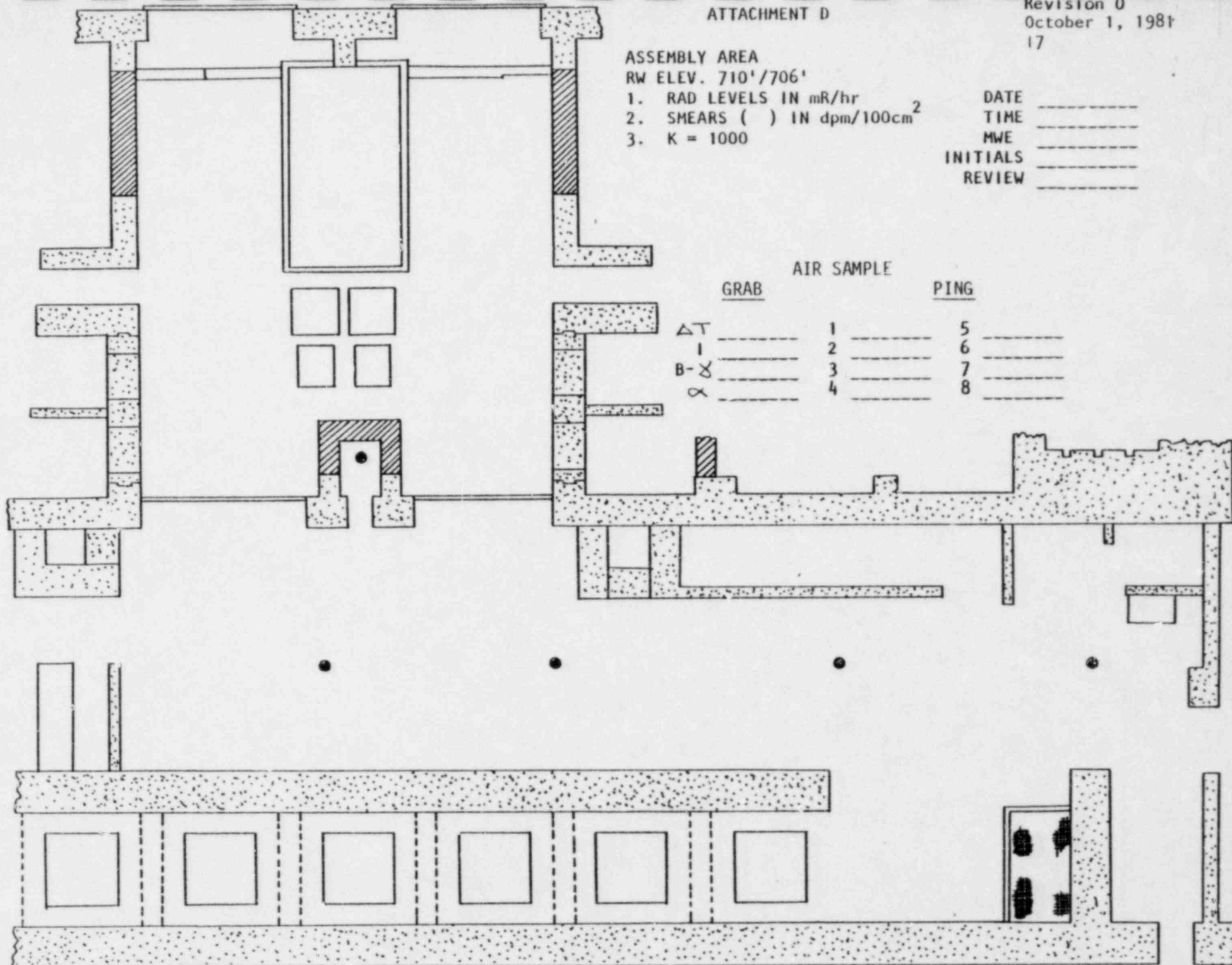
ASSEMBLY AREA
RW ELEV. 710'/706'

1. RAD LEVELS IN mR/hr
2. SMEARS () IN dpm/100cm²
3. K = 1000

DATE _____
TIME _____
MWE _____
INITIALS _____
REVIEW _____

AIR SAMPLE
GRAB PING

ΔT	1	5
I	2	6
B-X	3	7
α	4	8



AIR SAMPLE

NEARSITE EMER. OPS. FACILITY (EOF)

ELEV. 710'

1. RAD LEVELS IN mR/hr
2. SMEARS () IN dpm/100cm²
3. K = 1000

GRABPING

ΔT	1	5
I	2	6
B- γ	3	7
α	4	8

DATE	_____
TIME	_____
MWE	_____
INITIALS	_____
REVIEW	_____

