Op. Com. Rev. Req'd. Yes X No ___
Q.A. Review Req'd. Yes ___ No X
ALARA Review Req'd. Yes X No ___

AIRBORNE IODINE SAMPLING AND ANALYSIS

Procedure A.2-404

Prepared by: G.D. Mathiason ALARA Review: G.D. Mathiason Date 11/29/82
Reviewed by: J.W. Widdekind Q.A. Review: Revision 0 Date 3/10/81
Operations Committee Final Review: Meeting Number: 116-3 Date 12/9/82
Approved by: [signature] Date 1-6-83
Op. Com. Results Review: not required Mtg. # 942 Date 3/12/81

PURPOSE

The purpose of this procedure is to outline the methods which will ensure airborne radioiodine concentrations can be determined within the facility where personnel may be present during accident conditions.

CONDITIONS AND PREREQUISITES

A. An emergency condition has been declared at the Monticello Nuclear Generating Plant, and

B. The Emergency Director or Radiological Emergency Coordinator has directed that airborne iodine be sampled within reactor building, and

C. The PAS System is not adequate or able to draw a sample from the specified area.

ORGANIZATION

Radiological Emergency Coordinator - In Charge
Monitoring Section Leader - Direct Supervision
Radiation Protection Specialists - Conduct of Procedure (two, if available)

DISCUSSION

NUREG 0737, Item III.D.3.3, requires licensees to provide equipment and procedures for accurately determining the airborne radioiodine concentrations in areas personnel may need to be present during accident conditions. Under most circumstances it is hoped such determinations may be made by utilizing the PASS System. Certain situations, however, may necessitate the use of portable monitoring equipment to ensure samples representative of the work site conditions are being obtained. It is the purpose of this procedure to satisfy the NUREG requirement in those extreme situations when more normal methods may not be adequate or suitable for the task at hand.

WP/kk

PRECAUTIONS

A. Exposures of sampling and analysis personnel shall be in accordance with A.2-401, "Emergency Exposure Control".

B. Exposures to all personnel due to sampling and analysis operations should be maintained as low as is reasonably achieveable.

C. When actual or potential radiation levels so warrant, high range portable survey instruments, and self-reading dosimeters shall be provided to sampling and analysis personnel to permit rapid assessment of high exposure rates and accumulated personnel exposure. Alarming dosimeters should also be considered.

D. Appropriate extremity dosimeters should be provided and worn when handling samples which themselves represent high level radiation sources.

E. Use a two-man team to do sampling if personnel are available.

EQUIPMENT REQUIRED

Radgun or equivalent
0-10R dosimeters
Radeco portable battery powered air sampler
Silver zeolite filters
Particulate filters
Protective clothing
Scott Air Pak
Stopwatch
15 ml. off-gas sample vial
Needle

NOTE: All above equipment, except the Scott Air Paks, is located in the Access Control Emergency Cabinet. The Scott Air Paks are mounted on the wall in Access Control.

PROCEDURE

STEP 1 If there is any chance the particulate/silver zeolite sample will be too "hot" to count, a gas vial sample should also be drawn. If no gas vial sample will be taken, simply disregard those portions of this procedure. Obtain direction from the Radiological Emergency Coordinator or the Monitoring Section Leader as to whether or not both types of samples should be taken.

STEP 2 Load the sampler with a silver zeolite and particulate filter.

STEP 3 Turn Radgun on to allow warmup.

STEP 4 Cap the vial and evacuate it using the tygon tubing with needle attached and the hot lab vacuum pump. To the extent which is practical, bag the vial so as to minimize external contamination.

STEP 5 Don protective clothing, proper dosimetry and Scott Air Pak, as required.

WP/kk

PROCEDURE (Cont'd.)

STEP 6 Proceed to determined entry way to sample area. Check the dose rate through the door. If it is determined that the dose rates are low enough to allow entry a short way into the building without exceeding established exposure limits, proceed to STEP 7; if not, contact the Radiological Emergency Coordinator for further instructions.

STEP 7 Proceed to the sample area by the shortest route possible. (If actual dose rates indicate that whole body dose received will exceed estimate, return to Access Control immediately.)

STEP 8 Run sampler for an appropriate length of time, but no shorter than 15 seconds. (Keep track of time with stopwatch.)

STEP 9 Puncture the vial cap with the needle and allow the vial to fill with room air. (Allow about 2 seconds to fill.)

STEP 10 Return to access control with the samples.

STEP 11 Open sampler head and check dose rate of silver zeolite sample.

STEP 12 If the dose rate is $\leq$ 10 mR/hr, bag the sample and analyze it on the GeLi System using normal procedures for counting air samples.

STEP 13 If the silver zeolite filter dose rate is $\geq$ 10 mR/hr, unbag, then rebag the vial and analyze it on GeLi.

STEP 14 From the analysis results, calculate the MPC ratio for each iodine listed below:

$$\text{Ratio} = \frac{\text{Concentration From GAMMAK}}{\text{MPC of Isotope}}$$

Isotope	MPC
I-131	9×10^{-9}
I-132	2×10^{-7}
I-133	3×10^{-8}
I-134	5×10^{-7}
I-135	1×10^{-7}

STEP 15 Report results to Radiological Emergency Coordinator or Monitoring Section Leader.

STEP 16 Save the particulate, silver zeolite and gas vial samples, in case later analysis is desired.

WP/kk

Form 5790-404-6
Revision 0, 11/23/82
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Example of

AIRBORNE IODINE ANALYSIS PROCEDURE #1 CHECKLIST

		Initial
1.	Survey meter, protective clothing, dosimetry, Scott Air Pak, evacuated sample vial and sampler readied.	_____
2.	Samples taken, filter sample time noted (_____ sec.) (flow rate for sampler _____ CFM).	_____
3.	If filter $\leq$ 10 mR/hr, analyzed filter. (Activity _____ µCi/cc).	_____
4.	If silver zeolite sample > 10 mR/hr, analyzed vial.	
5.	Ratios calculated for:	
	(I-131 _____)	
	(I-132 _____)	
	(I-133 _____)	
	(I-134 _____)	
	(I-135 _____)	_____

Performed by: _____ Date _____

Reviewed by: _____ Date _____
REC or MSL

NOTE: After this checklist is completed and is not required for immediate use, it shall be placed in the appropriate container provided for Emergency Records.

WP/kk

Op. Com. Rev. Req'd. Yes ✓ No ___
Q.A. Review Req'd. Yes ___ No ✓
ALARA Review Req'd. Yes ___ No ___

SMALL VOLUME LIQUID SAMPLE OBTAINED AT THE POST ACCIDENT SAMPLING SYSTEM

Procedure A.2-413

Prepared by: [signature] ALARA Review: [signature] Date 1/5/82
Reviewed by: [signature] Q.A. Review: [signature] Date 3/16/82
Operations Committee Final Review: Meeting Number: 1100 Date 7/29/82
Approved by: [signature] Date 12-30-82
Op. Com. Results Review: Not Required Mtg. # 1100 Date 7/29/82

PURPOSE

The purpose of this procedure is to provide special instructions and precautions for collection and handling of small volume liquid samples obtained from the Post Accident Sampling System during and following an emergency at Monticello Nuclear Generating Plant.

CONDITIONS AND PREREQUISITES

The Emergency Director/REC/CSL has requested analysis of RHR or Jet Pump liquid samples.

Actual or potential radiological conditions are such that special methods and/or precautions are necessary in order to collect and analyze samples under conditions which may present a much greater than normal radiation hazard to individuals performing the sampling and analyses. Unless directed otherwise, this procedure should be used in lieu of routine sampling and analysis procedures whenever an Alert or higher emergency classification is declared.

ORGANIZATION AND RESPONSIBILITIES

Emergency Director - Overall responsibility

REC/CSL - Responsible for assigning sample priority and frequency and results review.

Chemistry Technicians - Responsible for sample collection, analysis and results reporting.

PRECAUTIONS

A. Exposures of sampling and analysis personnel shall be in accordance with A.2-401, "Emergency Exposure Control".

B. Exposures to all personnel due to sampling and analysis operations should be maintained as low as is reasonably achieveable. Techniques such as

temporary shielding, remote handling and sample dilution prior to analysis should be considered to reduce exposure to personnel.

C. When actual or potential radiation levels so warrant, high range portable survey instruments, and self-reading dosimeters shall be provided to sampling and analysis personnel to permit rapid assessment of high exposure rates and accumulated personnel exposure. Alarming dosimeters should also be considered.

D. Appropriate extremity dosimeters should be provided and worn when handling samples which themselves represent high level radiation sources.

E. Calculations for exposure rates resulting from radiation within a few hours after a Loss of Coolant Accident point out the desirability of spending minimum amount of time that is necessary near the surface of the sample enclosure. Most of the operation of the Post Accident Sampling System located at 951' of Turbine Building can be performed from the control panel. With the control panel located ten or more feet away from the sample enclosure the dose rates at the control panel due to radiation from the sample enclosure will be below 100 MR/HR. The indicator for the area radiation detector RE-507 is on the PASS control panel and its reading should be noted whenever the presence of radiation is suspected.

REMARKS

1. The Post Accident Sampling Station is located on the south side of the 951' level of the turbine building. The most efficient route to the PASS is through access control and into the turbine building. Move to the 951' level via the east stairway.

2. Two RPS should be used to obtain a post-accident sample when applicable and possible.

3. Obtain controlled access key 33A from R.P. Coordinator and key #153 from Shift Supervisor.

EQUIPMENT REQUIRED

1. 20 ml. sample vial
2. Small volume cask
3. Small mirror
4. Flashlight
5. 1 liter demin water
6. Syringe
7. Neoprene caps
8. Aluminum retainer rings
9. Needles
10. Vial retainer ring crimper
11. Needle changing tool
12. Radector III or equivalent

WP/kk

PROCEDURE

STEP 1 Before traveling to the sampling station advise Shift Supervisor and call control room, to determine whether A or B RHR is operating. Determine from Control Room if RBCCW pumps are operating. Also notify Control Room that jet pump A flow transmitter, FT 2-3-64W or jet pump B flow transmitter FT 2-3-64M may be affected during primary coolant sampling.

NOTE 1 If neither RHR loop is operating, the position of the Liquid Return Selection Switch in STEP 2 is immaterial.

STEP 2 Set switch HC-600 to position A if not already done. Set switch HC-500 to the position corresponding to the sample desired. Set the Liquid Return Selection Switch to A or B corresponding to the operating RHR loop (see STEP 1).

STEP 3 Confirm that the nitrogen supply is still on and the supply pressure is 100 psi.

STEP 4 Confirm that the demineralized tank level is between the two marks on the sight glass level indicator and tank is pressurized at 100 psi and valves DM-136 and DM-137 are closed and DM-138 open.

STEP 5 Check that the small volume cask positioner is in place hanging on the hooks below the sample station. If it is not there, move it into position.

STEP 6 Put the small volume cask into the cask positioner while the positioner is hanging from the hooks on the sample station.

STEP 7 Remove the stopper and carrying handle from the small volume cask by unscrewing it and lifting it out. Leave it near by.

STEP 8 If determination of pH is desired place a pH indicator strip in a 20 ml sample bottle.

STEP 9 Put the 20 ml sample bottle with an outer aluminum retainer ring and neoprene cap into the small volume cask. Check that the bottle lifting lever is free to move up and down. The sample bottle must fit snugly in the holder and be aligned vertically. Place a small pad under the sample vial.

STEP 10 Slide the lead shielding drawer out so that the needles under the sample station enclosure are exposed.

STEP 11 Using a mirror, check the condition of the needles on the right to verify that they are not bent. Replace bent or damaged needles using needle changing tool.

STEP 12 Swing the cask into position under the sample station and attach the chain to the cask holder so the cask and bottle will remain in position.

STEP 13 Verify that the control panel power is on.

PROCEDURE (Cont'd.)

STEP 14 To check the fit and operation of the sample vial without bringing a hot sample into the system turn HC-616-1, SMALL VOLUME SAMPLE, switch to position 3 (Flush Loop).

STEP 15 Turn HC-700 switch to liquid mode. Turn HC-626, LIQUID SAMPLE SOURCE SELECTOR, switch to position 2 (Jet Pump) or position 4 (RHR) as determined by the Emergency Director or his designee.

STEP 16 Raise the sample bottle into position on the needles by lifting the lever on the side of the cask. The bottle position status light on the control panel will change from red to green when the bottle is in position with the needles penetrated through the neoprene cover. Screw the lift rod in to hold the sample bottle in the engaged position.

STEP 17 Turn the liquid sample source selector switch HC-626 to position 1 for Jet Pump Bypass Line or to position 3 for Residual Heat Removal (RHR) Bypass Line. Turn HC-616-1, SMALL VOL SAMPLE, switch to the up and off position if it is not already there.

STEP 18 Read the flow on FI-664 which is on the control panel. The flow should be approximately 1 gpm.

STEP 19 Adjust PCV-627 so that the flow through FCV-627 is 1 gpm as verified on FI-664. Continue this flow for a minimum time of 5 minutes. Record the flow and flush time on the Small Volume Liquid Sampling and Analysis Checklist.

STEP 20 After the flush is completed, turn the Liquid Sample Source selector switch HC-626 to position 2 if the sampling valves were set in STEP 2 above for Jet Pump sample or to position 4 if the sampling valves were set for an RHR sample.

STEP 21 Note that the flow per indicator FI-664 is greatly reduced. With PCV-627 adjust valve FCV-627 for a flow of 0.3 gpm.

STEP 22 Record the following on the Small Volume Liquid Sampling and Analysis Checklist: Flow per FI-664, pressure per PI-661, Temperature per TI-660, Conductivity per CI-663 and Radiation per RI-665.

STEP 23 Turn the small volume liquid sample selector switch HC-616-1 to the "take sample" position. Valve CV-616 will rotate and carry the sample into alignment with the line to the sample bottle. The valve is energized in 10 seconds as indicated by light on mimic board.

STEP 24 Verify that the flow per FI-664 is zero.

NOTE 2 If pH is being determined the syringe in STEP 25 shall be filled with air rather than water.

STEP 25 Load a syringe with 10 cc of demin water.

WP/kk

PROCEDURE (Cont'd.)

STEP 26 Connect the syringe onto the line provided for it on the top-right side of the sample station. Open the two manual valves and press on the syringe and inject all of the 10 cc of water (air) into the line.

STEP 27 Close the manual valves.

STEP 28 Remove the syringe and fill it with air.

STEP 29 Re-attach the syringe and open the two manual valves and inject the air.

STEP 30 Turn the switch HC-616-1 back to the OFF position.

STEP 31 If pH is being determined repeat STEP 23 through 30 at least three times to assure that enough sample has been blown into the sample bottle to moisten the pH paper.

STEP 32 Close the two manual valves and remove the syringe.

STEP 33 Turn the switch HC-616-1 to the FLUSH position. Flush for 2 minutes or until RI-665 reaches a minimum.

STEP 34 When the flush is finished turn switch HC-616-1 back to OFF.

STEP 35 Perform the Drain of Trap, Sump and Collector procedure (Procedure A.2-417).

STEP 36 If pH is being determined remove the sample bottle and compare the color of the pH indicator strip to that of the comparator strips and record results on the Small Volume Liquid Sampling and Analysis Checklist.

STEP 37 Transport sample to hot lab using the small volume liquid cask for analysis per Procedure A.2-419.

WP/kk

Form 5790-413-1
Revision 0, 05/26/82
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Example of

SMALL VOLUME LIQUID SAMPLING AND ANALYSIS CHECKLIST

Sampling

1. Sample Source _____ Date _____ Time _____ _____ RPS
2. Sample Identification No. _____
3. Bypass Flow _____ FI-564 (gpm)
4. Flush Time _____ Minutes
5. Sample Flow _____ FI-664 (gpm)
6. Pressure _____ PI-661 (psia)
7. Temperature _____ TI-660 (°F)
8. Conductivity Meter _____ μmhos/cm Scale _____ CI-663
9. Radiation _____ RI-665

Analysis

		Initial
1.	Spectrum collected (dilution factors _____ x _____)	_____
2.	Analyze spectrum	_____
3.	Activity calculated (μCi/cc)	_____
4.	pH _____	_____
5.	_____ ppb Chloride (From Chemistry Procedure I.1.3)	_____
6.	_____ ppm Boron (From Chemistry Procedure I.1.40)	_____
7.	Other analyses results as requested and comments:	

_____

_____

_____

_____

Performed by: _____ Date _____

Reviewed by: CSL or REC _____ Date _____

NOTE: After this checklist is completed and is not required for immediate use, it shall be placed in the appropriate container provided for Emergency Records.

WP/kk

Op. Com. Rev. Req'd. Yes X No ___
Q.A. Review Req'd. Yes ___ No X
ALARA Review Req'd. Yes X No ___

LARGE VOLUME LIQUID SAMPLE AND/OR DISSOLVED GAS SAMPLE OBTAINED AT POST ACCIDENT SAMPLING SYSTEM

Procedure A.2-414

Prepared by: [signature] ALARA Review: C.D. Mathias Date 11/7/12
Reviewed by: [signature] Q.A. Review: [signature] Date 12/18/92
Operations Committee Final Review: Meeting Number: 1100 Date 7/29/92
Approved by: [signature] Date 12-30-92
Op. Com. Results Review: Not Required Mtg. # 1100 Date 7/29/92

PURPOSE

The purpose of this procedure is to provide special instructions and precautions for collection and handling of large volume liquid and dissolved gas samples during and following an emergency at Monticello Nuclear Generating Plant.

CONDITIONS AND PREREQUISITES

The Emergency Director/REC/CSL has requested a dissolved gas analysis of RHR or Jet Pump liquid samples. A large volume liquid sample may be obtained if requested for offsite analysis and for onsite analysis if coolant activity is low enough that a large volume sample (10 mls.) can be handled in the hot lab without undue exposure to technicians.

Actual or potential radiological conditions are such that special methods and/or precautions are necessary in order to collect and analyze samples under conditions which may present a much greater than normal radiation hazard to individuals performing the sampling and analyses. Unless directed otherwise, this procedure should be used in lieu of routine sampling and analysis procedures whenever an Alert or higher emergency classification is declared.

ORGANIZATION AND RESPONSIBILITIES

Emergency Director - Overall responsibility

REC/CSL - Responsible for assigning sample priority and frequency and results review.

Chemistry Technicians - Responsible for sample collection, analysis and results reporting.

PRECAUTIONS

A. Exposures of sampling and analysis personnel shall be in accordance with A.2-401, "Emergency Exposure Control".

B. Exposures to all personnel due to sampling and analysis operations should be maintained as low as is reasonably achieveable. Techniques such as temporary shielding, remote handling and sample dilution prior to analysis should be considered to reduce exposure to personnel.

WP/kk

PRECAUTIONS (Cont'd.)

C. When actual or potential radiation levels so warrant, high range portable survey instruments, and self-reading dosimeters shall be provided to sampling and analysis personnel to permit rapid assessment of high exposure rates and accumulated personnel exposure. Alarming dosimeters should also be considered.

D. Appropriate extremity dosimeters should be provided and worn when handling samples which themselves represent high level radiation sources.

E. Calculations for exposure rates resulting from radiation within a few hours after a Loss of Coolant Accident point out the desirability of spending the minimum amount of time that is necessary near the surface of the sample enclosure. Most of the operation of the Post Accident Sampling System located at 951' of Turbine Building can be performed from the control panel. With the control panel located ten or more feet away from the sample enclosure the dose rates at the control panel due to radiation from the sample enclosure will be below 100 MR/HR. The indicator for the area radiation detector RE-507 is on the PASS control panel and its reading should be noted whenever the presence of radiation is suspected.

REMARKS

1. The Post Accident Sampling Station is located on the south side of the 951' level of the Turbine Building. The most efficient route to the PASS is through access control and into the Turbine Building. Move to the 951' level via the east stairway.

2. Two-man teams should be used to obtain a post-accident sample when possible.

3. Obtain controlled access key 33A from R.P. Coordinator and key #153 from Shift Supervisor.

EQUIPMENT REQUIRED

1. 15 ml. sample vial
2. Large volume cask
3. Small mirror
4. Flashlight
5. Gas vial cask
6. Gas vial positioner
7. Neoprene cap
8. Aluminum retainer ring
9. Vial retainer ring crimper
10. Needles
11. Needle changing tool
12. Rubber stopper
13. Gas vial carrying cask
14. 20 ml gas vial
15. Large volume liquid cask
16. Rubber septums

PROCEDURE

NOTE 1 Use Form #5790-414-1 when obtaining a large volume liquid sample and Form #5790-414-2 when sampling dissolved gas.

STEP 1 Before traveling to the PASS Station call control room to advise the Shift Supervisor of your intentions and determine whether A or B RHR is operating. Determine if RBCCW pumps are operating. Also notify contro. room that Jet Pump A flow transmitter, FT 2-3-64W or Jet Pump B flow transmitter, FT 2-3-64M may be affected during sampling.

PROCEDURE (Cont'd.)

NOTE 2 If neither RHR loop is operating, the position of the Liquid Return Selection Switch in STEP 2 is immaterial.

STEP 2 Set switch HC-600 to position A if not already done. Set switch HC-500 to the position corresponding to the sample desired. Set Liquid Return Selection Switch to A or B corresponding to the operating RHR loop (see STEP 1).

STEP 3 Confirm that the nitrogen supply is still on and the supply pressure is 100 psi.

STEP 4 Confirm that the demineralized water tank level is between the two marks on the sight glass level indicator and tank is pressurized at 100 psi and valves DM-136 and DM-137 are closed and DM-138 open.

STEP 5 Check that Krypton Tracer gas at approximately 5 psig is available and that valve PAS-57-10 is open.

STEP 6 Slide the lead shield drawer out so that the needles under the sample station enclosure are exposed. Inspect the needles with a mirror and flashlight. Replace bent or damaged needles using needle changing tool.

STEP 7 Remove the lead stopper from the large volume cask and put a 20 ml. sample bottle with an outer aluminum retainer ring and a neoprene cap into the large cask. Check that the bottle lifting plunger moves the bottle up and down. The sample bottle must fit snugly in the holder and be aligned vertically. With the cask in the fully lowered position, roll the cask into the position under the sample station.

STEP 8 To check the fit and operation of the sample vial without bringing a hot sample into the system, turn HC-616-1, SMALL VOLUME SAMPLE, switch to position 3 (Flush Loop).

STEP 9 With the handle on the hydraulic pump of the large volume cask start raising the cask. Look for possible misalignment (by removing the lead shield drawer and looking into the drawer slot the needle area can be seen). If the cask is positioned correctly underneath the sample enclosure the top part of the cask will fit into the bottom opening in the sample station. Stop pumping when the top cask ring is inside and the large volume cask is jut touching the bottom of the sample station. Do not rotate the vial with the bottle on or near the needles.

STEP 10 Turn HC-700 switch to liquid mode. Turn HC-626, LIQUID SAMPLE SOURCE SELECTOR, switch to position 2 (Jet Pump) or position 4 (RHR) as determined by the Emergency Director or his designee.

PROCEDURE (Cont'd.)

STEP 11 Push the cask plunger down that causes the sample bottle to be raised out of the cask and up and onto the two needles. When the bottle is up and correctly onto the needles the "Bottle In" lights on the control panel will change from red to green. Check for a bent needle with a mirror and flashlight if there is any question or problem. If required, replace the needle(s) using the special tool.

STEP 12 If a dissolved gas sample is to be obtained place a 15 ml gas vial with a rubber septum into the gas vial positioner and slide the positioner into the dissolved gas port (lower of two ports) and turn it to lock it into place. Observe that the bottle status light changes from red to green.

STEP 13 Turn the liquid sample source selector switch HC-626 to position 1 for Jet Pump Bypass Line or to position 5 for Residual Heat Removal Bypass (RHR) line corresponding to the sample source.

STEP 14 Turn HC-616-1, SMALL VOLUME SAMPLE, switch to off if it is not already there.

STEP 15 Read the flow on FI-664 which is on the control panel. The flow should be approximately 1 gpm.

STEP 16 Adjust PCV-627 so that the flow through FCV-627 is at least 1 gpm as verified on FI-664. Continue this flow for a minimum time of 5 minutes. Record the flow from FI-664 and the flush time on the appropriate checklist.

STEP 17 After the flush is completed, turn the Liquid Sample Source selector switch HC-626 to position 2 if switch HC-500 was previously positioned for a Jet Pump sample or to position 4 if switch HC-500 was positioned for an RHR sample. Note that the flow per indicator FI-664 is greatly reduced. With PCV-627 adjust valve FCV-627 for a flow of 0.3 gpm.

NOTE 3 Taking a representative sample. The sample system lines and valves are probably filled with quite a bit of air and by going through the complete cycle about 3 times without taking a sample, the air is effectively purged from the system. During the first three cycles turn through positions 5 and 10 quickly. Observe the pressure on PI-662 when in position 9. The readings will be highest on the first cycle and should be repeatable on the last two cycles.

STEP 18 Turn HC-601 through positions 1 through 11 three times allowing 2 or 3 seconds per position except positions 5 and 10 (see NOTE 3).

STEP 19 Turn the Dissolved Gas and Liquid Sample System switch HC-601 to position 1 and observe that P-701 starts and valve CV-622 rotates.

PROCEDURE (Cont'd.)

STEP 20 Turn switch HC-601 to position 2 and observe that P-601 starts.

STEP 21 Record the following on the appropriate checklist: Flow per FI-664, Pressure per PI-662, Temperature per TI-660, Conductivity per CI-663 and Radiation per RI-665.

STEP 22 Turn switch HC-601 to position 3 to isolate the sample and start the dissolved gas separation. Leave in this position for approximately 10 seconds.

STEP 23 Turn to position 4 to inject tracer gas into valve CV-615. Leave in this position for approximately 10 seconds. Read and record the tracer gas supply system pressure so that the amount of tracer gas trapped in valve CV-615 can be accurately calculated.

NOTE 4 If it is desirable not to introduce tracer gas into the loop, turn switch HC-601 through position 5 very quickly and valve CV-615 will not be rotated.

STEP 24 Turn to position 5 to put the tracer gas into the loop (see NOTE 4).

STEP 25 Read the initial pressure of the dissolved gas sample bottle at this time from PI-662 and record as P_o on the appropriate checklist.

NOTE 5 Water will evaporate until a saturated condition is reached. The slow increase in pressure due to this evaporation may be observed on PI-662. Reaching a saturated condition takes about 30 seconds. If you wait for this equilibrium, condensation will be present in the sampling vial. It is recommended that the switch HC-601 be left in position 6 for no more than 5 seconds.

STEP 26 Turn to position 6 for $\leq$ 5 seconds (see NOTE 5).

STEP 27 Turn to position 7 to again circulate the liquid in the P-601 loop. This will bring most of the rest of the dissolved gases into the hold up cylinder V-610. Leave in this position approximately 10 seconds.

STEP 28 Read PI-662 again and record its value as P_1 on the appropriate checklist. This pressure is the approximate pressure of the liquid loop.

STEP 29 Turn to position 8 for no more than 5 seconds.

STEP 30 Turn to position 9 to get ready to take the dissolved gas sample or to relieve the collection chamber pressure. Record PI-662 as P_2 on the appropriate checklist as this is the pressure of the liquid sample loop at the time the sample is taken.

WP/kk

PROCEDURE (Cont'd.)

CAUTION: There is a potential for having a higher gas pressure in the gas chamber than can be safely handled in the dissolved gas sample vial. If the pressure observed (PI-662) indicates an off-scale reading, relieve the pressure to near atmospheric pressure as described in STEP 33 prior to taking the sample as described in STEP 32.

STEP 31 If only a liquid sample is to be obtained skip STEP 32.

STEP 32 Turn switch HC-652 to "Gas Sample" and hold it there while watching PI-662. After at least 10 seconds and when PI-662 is very steady, release HC-652 and it will spring back to its center position. Turn HC-652 again to "Gas Sample" to verify the equalized pressure and read PI-662. Record the steady PI-662 pressure as P_3 reading on the appropriate checklist.

STEP 33 When a dissolved gas sample is not desired it is only necessary to relieve the gas pressure back to the suppression pool by rotating switch HC-652 counterclockwise to the "Relieve Pressure" position and hold it while watching PI-662. The pressures will equalize very rapidly.

STEP 34 If a large volume liquid sample is desired, turn HC-601 to position 10. Pushbutton HC-629-1 must be pushed and held for liquid to be drawn into the sample bottle that was earlier positioned under the sample station. Hold the pushbutton for at least 10 seconds. If a liquid sample is not desired, turn the switch HC-601 to the OFF position very quickly.

STEP 35 Turn HC-601 to OFF if it has not already been done.

STEP 36 Lower the liquid sample bottle into the large cask by pulling up on the plunger handle. Do not turn plunger handle as twisting the bottle while it is on the needles will bend the needles.

STEP 37 Lower the cask on the cart by relieving the hydraulic oil pressure with the small petcock handle on the hydraulic cylinder.

STEP 38 Slide the lead shield drawer back into the enclosure to cover the opening for the needles.

STEP 39 Roll the cask out from under the sample station and quickly put the lead plug in the top of the cask. Be careful not to lean over the top of the cask where there will be a column of radiation before the plug is inserted.

STEP 40 Roll the cask away from the sample station and prepare for off-site shipment or on-site analysis as directed. If a dissolved gas sample was not obtained go to STEP 43.

WP/kk

PROCEDURE (Cont'd.)

STEP 41 Open and place the gas vial carrying cask near the sample station. Remove the gas vial positioner from the sample enclosure. Keep the vial at a maximum distance and quickly insert the sample bottle into the gas vial cask. Close and latch the gas vial cask.

STEP 42 Place a rubber stopper into the port in the sample station from which the gas vial positioner was withdrawn.

STEP 43 Turn the flush system switch HC-628-1 to position 2 which will close the inlet sample lines and start the flush with demineralized water. Observe that there is flow per FI-664.

STEP 44 After RI-665 shows radiation has decreased significantly, turn switch HC-628-1 to position 3. Observe RI-665.

STEP 45 When the radiation reaches a minimum turn switch HC-628-1 to position 4. Observe RI-665.

STEP 46 When the radiation reaches a minimum turn switch HC-628-1 to position 5. Observe RI-665. A change in RI-665 may not be observable.

STEP 47 When the radiation reaches a minimum turn switch HC-628-1 to position 6. The bypass will be open for this flush and the main flow will not be past RI-665 so run this flush for 2-3 minutes.

STEP 48 Turn switch HC-628-1 to position 7. Observe RI-665.

STEP 49 Repeat STEPS 43 through 48.

STEP 50 Perform the Drain of Trap, Sump and Collector per Procedure A.2-417.

STEP 51 Transport the gas sample to the hot lab for analysis using the gas vial carrying cask.

WP/kk

Form #5790-414-1
Revision 0, 05/26/82
Page 1 of 1

Example of

LARGE VOLUME LIQUID SAMPLING AND ANALYSIS CHECKLIST

Sampling

1. Sample Source: _____ Date _____ Time _____ _____ RPS
2. Sample Identification No. _____
3. Bypass Flow _____ FI-664 (gpm)
4. Flush Time _____ Minutes
5. Sample Flow _____ FI-664 (gpm)
6. Pressure _____ PI-661 (psia)
7. Temperature _____ TI-660 (°F)
8. Conductivity Meter _____ Scale _____ CI-663
9. Radiation _____ RI-665 (mR/hr)
10. Initial Pressure P_0 _____ PI-662 (psia)
11. Pressure P_1 _____ PI-662 (psia)
12. Stabilized Pressure P_2 _____ PI-662 (psia)
13. Stabilized Pressure P_3 _____ PI-662 (psia)

Analysis

		Initial
1.	Spectrum Ran (Dilution Factors _____ x _____)	_____
2.	Spectrum Analyzed	_____
3.	Activity Calculated _____ µCi/cc	_____
4.	pH _____	_____
5.	_____ ppb Chloride (From Attachment Chemistry Procedure I.1.3)	_____
6.	_____ ppm Boron (From Attachment Chemistry Procedure I.1.40)	_____

7. Other analyses results as requested and comments:

_____

_____

_____

Performed by: _____ Date _____

Reviewed by: CSL or REC _____ Date _____

NOTE: After this checklist is completed and is not required for immediate use, it shall be placed in the appropriate container provided for Emergency Records.

WP/kk

Form #5790-414-2
Revision 0, 05/26/82
Page 1 of 5

Example of

DISSOLVED GAS SAMPLING AND ANALYSIS CHECKLIST

Sampling

1. Sample Source _____ Date _____ Time _____ _____ RPS
2. Sample Identification No. _____
3. Bypass Flow _____ FI-664 (gpm)
4. Flush Time _____ Minutes
5. Sample Flow _____ FI-664 (gpm)
6. Pressure _____ PI-661 (psia)
7. Temperature _____ TI-660 (°F)
8. Conductivity Meter _____ Scale _____ CI-663
9. Radiation _____ RI-665 (mR/hr)
10. Tracer Gas Supply System Pressure _____ (psia)
11. Initial Pressure, P_0 _____ PI-662 (psia)
12. Pressure, P_1 _____ PI-662 (psia)
13. Stabilized Pressure, P_2 _____ PI-662 (psia)
14. Stabilized Pressure, P_3 _____ PI-662 (psia)

Analysis

		Initial
1.	Spectrum ran (Dilution Factors _____ x _____)	_____
2.	Spectrum Analyzed	_____
3.	Activity Calculated _____ µCi/cc	_____
4.	Dissolved Gas Analysis (complete pages 2 through 5)	_____

5. Other analysis results as requested or comments:

_____

_____

_____

Performed by: _____ Date: _____

Reviewed by: CSL or REC _____ Date: _____

NOTE: After this checklist is completed and is not required for immediate use, it shall be placed in the appropriate container provided for Emergency Records.

WP/kk

Form #5790-414-2
Revision 0, 05/26/82
Page 2 of 5

Example of
DISSOLVED GAS SAMPLING AND ANALYSIS CHECKLIST (Cont'd.)

DISSOLVED GAS CALCULATIONS FOR TOTAL INVENTORY OF H_2, O_2, AND N_2 AS SAMPLED IN THE POST ACCIDENT SAMPLE STATION

The volume of dissolved gas sample in sample vial is:
(Temperature and pressure must be in units of °Kelvin and atmospheres respectively.)

$V_{sx} = 0.05 \times T_s \times P_3 =$ _____ cc (See NOTE page 5)

The volume of O_2, H_2, N_2 and Kr in vial is:

$V_2{}^{O_2} = V_{GC}{}^{O_2} \times V_{sx} =$ _____ cc

$V_2{}^{H_2} = V_{GC}{}^{H_2} \times V_{sx} =$ _____ cc

$V_2{}^{N_2} = V_{GC}{}^{N_2} \times V_{sx} =$ _____ cc

$V_2{}^{Kr} = V_{GC}{}^{Kr} \times V_{sx} =$ _____ cc

The volume of O_2 and N_2 in vial prior to sampling is:
(Pressure must be units of atmospheres.)

$V_1{}^{O_2} = \frac{P_0}{14.7} \times 14.9 \times 0.21 =$ _____ cc

$V_1{}^{N_2} = \frac{P_0}{14.7} \times 14.9 \times 0.78 =$ _____ cc

The volume of oxygen, hydrogen, nitrogen and krypton collected from isolated sample system is:

$V_3{}^{O_2} = V_2{}^{O_2} - V_1{}^{O_2} =$ _____ cc

$V_3{}^{H_2} = V_2{}^{H_2} =$ _____ cc

$V_3{}^{N_2} = V_2{}^{N_2} - V_1{}^{N_2} =$ _____ cc

$V_3{}^{Kr} = V_2{}^{Kr} =$ _____ cc

WP/kk

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Revision 0, 05/26/82
Page 3 of 5

Example of
DISSOLVED GAS SAMPLING AND ANALYSIS CHECKLIST (Cont'd.)

The volume of injected tracer gas (Kr) is:

$V_1^{Kr} = 0.022 \times P_{Kr} =$ _____ cc

The concentration of O_2, H_2 and N_2 in isolated sample system is:

$C_1^{O_2} = (V_3^{O_2}/117.8) \times (V_1^{Kr}/V_3^{Kr}) =$ _____ cc/ml H_2O

$C_1^{H_2} = (V_3^{H_2}/117.8) \times (V_1^{Kr}/V_3^{Kr}) =$ _____ cc/ml H_2O

$C_1^{N_2} = (V_3^{N_2}/117.8) \times (V_1^{Kr}/V_3^{Kr}) =$ _____ cc/ml H_2O

The volume of O_2, H_2 and N_2 in the system being sampled (see Sample Source on Page 1) is:

$C_2^{O_2} = C_1^{O_2} \times V^S =$ _____ cc

$C_2^{H_2} = C_1^{H_2} \times V^S =$ _____ cc

$C_2^{N_2} = C_1^{N_2} \times V^S =$ _____ cc

WP/kk

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Revision 0, 05/26/82
Page 4 of 5

Example of
DISSOLVED GAS SAMPLING AND ANALYSIS CHECKLIST (Cont'd.)

V_{sx} = volume of dissolved gas sample in sample vial (cc)

P_3 = pressure of sample (item #14 on page 1) - psia

T_s = temperature of sample (item #7 on page 1) - psia

$V_{GC}{}^{O_2}$= % O_2 determined by G.C. analysis in sample vial (Chemistry Procedure I.1.36)

$V_{GC}{}^{H_2}$= % H_2 determined by G.C. analysis in sample vial (Chemistry Procedure I.1.36)

$V_{GC}{}^{N_2}$= % N_2 determined by G.C. analysis in sample vial (Chemistry Procedure I.1.36)

$V_{GC}{}^{Kr}$= % Kr determined by G.C. analysis in sample vial (Chemistry Procedure I.1.36)

$V_2{}^{O_2}$ = volume of O_2 in sample vial (cc)

$V_2{}^{H_2}$ = volume of H_2 in sample vial (cc)

$V_2{}^{N_2}$ = volume of N_2 in sample vial (cc)

$V_2{}^{Kr}$ = volume of Kr in sample vial (cc)

P_0 = pressure of sample vial after evacuation (item #11 on page 1) - psia

$V_1{}^{O_2}$ = volume of O_2 in sample vial prior to sampling (cc)

$V_1{}^{N_2}$ = volume of N_2 in sample vial prior to sampling (cc)

WP/kk

Form 5790-414-2
Revision C, 05/26/82
Page 5 of 5

Example of
DISSOLVED GAS SAMPLING AND ANALYSIS CHECKLIST (Cont'd.)

$V_3^{O_2}$ = the volume of O_2 collected from the isolated sample system

$V_3^{N_2}$ = the volume of H_2 collected from the isolated sample system

$V_3^{N_2}$ = the volume of N_2 collected from the isolated sample system

V_3^{Kr} = the volume of Kr collected from the isolated sample system

P_{Kr} = pressure of tracer gas (Kr) (item #10 on page 1)

V_I^{Kr} = volume of injected tracer gas (Kr)

$C_1^{O_2}$ = concentration of O_2 in isolated sample system

$C_1^{H_2}$ = concentration of H_2 in isolated sample system

$C_1^{N_2}$ = concentration of N_2 in isolated sample system

V^s = volume of water in system being sampled
Use either 1.76E8 mls. for reactor coolant or
1.93E9 mls. for torus.

$C_2^{O_2}$ = the volume of O_2 in system being sampled

$C_2^{H_2}$ = the volume of H_2 in system being sampled

$C_2^{N_2}$ = the volume of N_2 in system being sampled

NOTE: The following conversion factors will be required:

$$\text{atmospheres} = \frac{\text{psia}}{14.7}$$

$$^{\circ}\text{Kelvin} = \frac{5}{9} \times (^{\circ}\text{F}-32) + 273.15$$

WP/kk

Op. Com. Rev. Req'd. Yes ✓ No ___
Q.A. Review Req'd. Yes ___ No ✓
ALARA Review Req'd. Yes ✓ No ___

CONTAINMENT GAS SAMPLE OBTAINED AT POST ACCIDENT SAMPLING SYSTEM

Procedure A.2-415

Prepared by: [signature] ALARA Review: [signature] Date 8/4/82
Reviewed by: [signature] Q.A. Review: [signature] Date 8/16/82
Operations Committee Final Review: Meeting Number: 1100 Date 7/29/82
Approved by: [signature] Date 12-30-82
Op. Com. Results Review: Not Required Mtg. # 1100 Date 7/29/82

PURPOSE

The purpose of this procedure is to provide special instructions and precautions for collection and handling of containment gas samples during and following an emergency at Monticello Nuclear Generating Plant.

CONDITIONS AND PREREQUISITES

The Emergency Director/REC/CSL has requested analysis of torus, drywell or secondary containment (935') gas samples.

Actual or potential radiological conditions are such that special methods and/or precautions are necessary in order to collect and analyze samples under conditions which may present a much greater than normal radiation hazard to individuals performing the sampling and analyses. Unless directed otherwise, this procedure should be used in lieu of routine sampling and analysis procedures whenever an Alert or higher emergency classification is declared.

ORGANIZATION AND RESPONSIBILITIES

Emergency Director - Overall responsibility

REC/CSL - Responsible for assigning sample priority and frequency and results review.

Chemistry Technicians - Responsible for sample collection, analysis and results reporting.

PRECAUTIONS

A. Exposures of sampling and analysis personnel shall be in accordance with A.2-401, "Emergency Exposure Control".

B. Exposures to all personnel due to sampling and analysis operations should be maintained as low as is reasonably achieveable. Techniques such as temporary shielding, remote handling and sample dilution prior to analysis should be considered to reduce exposure to personnel.

WP/kk

PRECAUTIONS (Cont'd.)

C. When actual or potential radiation levels so warrant, high range portable survey instruments, and self-reading dosimeters shall be provided to sampling and analysis personnel to permit rapid assessment of high exposure rates and accumulated personnel exposure. Alarming dosimeters should also be considered.

D. Appropriate extremity dosimeters should be provided and worn when handling samples which themselves represent high level radiation sources.

E. Calculations for exposure rates resulting from radiation within a few hours after a Loss of Coolant Accident point out the desirability of spending minimum amount of time that is necessary near the surface of the sample enclosure. Most of the operation of the Post Accident Sampling System located at 951' of Turbine Building can be performed from the control panel. With the control panel located ten or more feet away from the sample enclosure the dose rates at the control panel due to radiation from the sample enclosure will be below 100 MR/HR. The indicator for the area radiation detector RE-507 is on the PASS control panel and its reading should be noted whenever the presence of radiation is suspected.

REMARKS

1. Prior to sampling notify the Control Room and advise Shift Supervisor of your intentions.

2. The Post Accident Sampling Station is located on the south side of the 951' level of the Turbine Building. The most efficient route to the PASS is through access control and into the Turbine Building. Move to the 951' level via the east stairway.

3. Two-man teams should be used to obtain a post-accident sample when possible.

4. Obtain controlled access key 33A from R.P. Coordinator and key #153 from Shift Supervisor.

EQUIPMENT REQUIRED

1. 15 ml sample vial
2. Gas vial positioner
3. Gas vial carrying cask
4. Needles
5. Neoprene cap
6. Needle changing tool
7. Flashlight
8. Vial retainer ring crimper
9. Aluminum retainer ring

PROCEDURE

STEP 1 Set switch HC-600 to position A if not already done. With the "Sump Drain System Switch" (HC-715) in the off position place switch HC-700 (Liquid/Gas Selector) in the "Gas" position.

STEP 2 Install the gas filter drawer into position.

WP/kk

PROCEDURE (Cont'd.)

STEP 3 Turn the "Gas Sample Selector Switch" (HC-723) to the desired sample location. In addition set switch HC-500 to the position corresponding to the sample desired.

STEP 4 Place a standard 15 milliliter off-gas vial with rubber septum into the gas vial positioner, slide the positioner into the gas port (the higher of the two ports) at the sample station and turn it to lock it into place. Observe that the bottle status light changes from red to green.

STEP 5 Turn the "15 ML Gas Sample Switch" (HC-705) to position 2 and "Circulate Gas" for a minimum period of 5 minutes. Be sure that there is flow as read by the rotameter through the sample enclosure window (FI-725). Record flow and flush duration on the Containment Gas Sampling and Analysis Checklist, Form #5790-415-1.

STEP 6 Turn HC-705 to position 3 and "Evacuate" the off-gas vial. Record the pressure of the evacuated vial (PI-708) on the checklist. (Make sure the vacuum in the gas vial reaches a stable minimum reading before recording pressure.)

STEP 7 Turn HC-705 to position 4 "Take Sample". Observe that the pressure reading on PI-708 does not change as such would indicate a system leak.

STEP 8 Press the button to the left of HC-705 (HC-720 "Press for Sample") to obtain a sample. Keep this button depressed until a steady pressure is reached. This will require approximately 5 seconds. Record the final pressure of the sample (PI-708) on the checklist. This pressure corresponds to the actual pressure of the sample being obtained. Record sample temperature (TI-724) on the checklist.

STEP 9 Turn HC-705 to position 5 "FLUSH SYSTEM" and flush for approximately 1 minute or until the ambient radiation monitor located on the sample station reaches a minimum.

STEP 10 Turn through position 6, 7 and 8 and then straight up to "OFF".

STEP 11 Turn to unlock and withdraw the gas vial positioner. Keep the vial at a maximum distance and quickly insert the sample bottle into the gas vial cask. Close and latch the gas vial cask. Put the gas vial positioner back into the port in the sample station.

STEP 12 Perform the Drain, Sump and Collection procedure (Procedure A.2-417).

STEP 13 Transport the sample to the hot lab for dilution and counting per Containment Atmosphere Radiochemical Analysis, Procedure A.2-420, or for hydrogen, oxygen and nitrogen per Chemistry Procedure I.1.36.

STEP 14 Calculate the sample volume (see NOTE 1) at the sample pressure and temperature as recorded in STEP 8 and record on Containment Gas Sampling and Analysis Checklist.

WP/kk

PROCEDURE (Cont'd.)

NOTE 1 Temperature and pressure values must be converted to units of °Kelvin and atmospheres prior to calculating gas volume.

$$\frac{\text{psia}}{14.70} = \text{atmosphere}$$

$$\frac{5}{9} \times (°F-32) + 273.15 = °\text{Kelvin}$$

$$14.9 \times \frac{P_1}{T_1} \times 298.15 = \text{actual sample volume (cc)}$$

Where P_1 = PI-708 value (converted to atm.)
T_1 = TI-724 (converted to °Kelvin)

WP/kk

Form 5790-415-1
Revision 0, 05/27/82
Page 1 of 1

Example of

CONTAINMENT GAS SAMPLING AND ANALYSIS CHECKLIST

Sampling		Initial
1.	Sample Source _____ Date _____ Time _____	_____ RPS
2.	Sample Identification No. _____	
3.	Sample Flow _____ FI-725 Flush Duration _____ Min.	_____
4.	Absolute Pressure of Vial _____ PI-708 (psia)	_____
5.	Final Sample Pressure _____ PI-708 (psia)	_____
6.	Sample Temperature _____ TI-724 (°F)	_____
7.	Calculated Sample Volume _____ cc (As Calculated)	_____

Analysis		
1.	Spectrum Ran (Dilution Factors _____ x _____)	_____
2.	Spectrum Analyzed	_____
3.	Activity Calculated _____ µCi/cc	_____
4.	% H_2 - O_2 - N_2 _____ (See Chemistry Procedure I.1.36)	_____
5.	Other analysis results as requested and comments:	

_____

_____

_____

_____

Performed By: _____ Date: _____

Reviewed by: CSL or REC _____ Date: _____

NOTE: After this checklist is completed and is not required for immediate use, it shall be placed in the appropriate container provided for Emergency Records.

WP/kk

Op. Com. Rev. Req'd. Yes X No ___
Q.A. Review Req'd. Yes ___ No X
ALARA Review Req'd. Yes X No ___

CONTAINMENT IODINE AND PARTICULATE SAMPLES OBTAINED AT POST ACCIDENT SAMPLING SYSTEM

Procedure A.2-416

Prepared by: [signature] ALARA Review: [signature] Date 1/11/82
Reviewed by: [signature] Q.A. Review: [signature] Date 5/11/82
Operations Committee Final Review: Meeting Number: 1100 Date 7/29/82
Approved by: [signature] Date 12-30-82
Op. Com. Results Review: Not Required Mtg. # 1100 Date 7/29/82

PURPOSE

The purpose of this procedure is to provide special instructions and precautions for collection and handling of iodine and particulate samples during and following an emergency at Monticello Nuclear Generating Plant.

CONDITIONS AND PREREQUISITES

The Emergency Director/REC/CSL has requested iodine/particulate analysis of torus, drywell or secondary containment (935') gas samples.

Actual or potential radiological conditions are such that special methods and/or precautions are necessary in order to collect and analyze samples under conditions which may present a much greater than normal radiation hazard to individuals performing the sampling and analyses. Unless directed otherwise, this procedure should be used in lieu of routine sampling and analysis procedures whenever an Alert or higher emergency classification is declared.

ORGANIZATION AND RESPONSIBILITIES

Emergency Director - Overall responsibility

REC/CSL - Responsible for assigning sample priority and frequency and results review.

Chemistry Technician - Responsible for sample collection, analysis and results reporting.

PRECAUTIONS

A. Exposures of sampling and analysis personnel shall be in accordance with A.2-401, "Emergency Exposure Control".

B. Exposures to all personnel due to sampling and analysis operations should be maintained as low as is reasonably achieveable. Techniques such as temporary shielding, remote handling and sample dilution prior to analysis should be considered to reduce exposure to personnel.

WP/kk

PRECAUTIONS (Cont'd.)

C. When actual or potential radiation levels so warrant, high range portable survey instruments, and self-reading dosimeters shall be provided to sampling and analysis personnel to permit rapid assessment of high exposure rates and accumulated personnel exposure. Alarming dosimeters should also be considered.

D. Appropriate extremity dosimeters should be provided and worn when handling samples which themselves represent high level radiation sources.

E. Calculations for exposure rates resulting from radiation within a few hours after a Loss of Coolant Accident point out the desirability of spending minimum amount of time that is necessary near the surface of the sample enclosure. Most of the operation of the Post Accident Sampling System located at 951' of Turbine Building can be performed from the control panel. With the control panel located ten or more feet away from the sample enclosure the dose rates at the control panel due to radiation from the sample enclosure will be below 100 MR/HR. The indicator for the area radiation detector RE-507 is on the PASS control panel and its reading should be noted whenever the presence of radiation is suspected.

REMARKS

1. Prior to sampling notify the Control Room and advise Shift Supervisor of your intentions.

2. The Post Accident Sampling Station is located on the south side of the 951' level of the Turbine Building. The most efficient route to the PASS is through access control and into the Turbine Building. Move to the 951' level via the east stairway.

3. Two-man teams should be used to obtain a post-accident sample when possible.

4. Obtain controlled access key 33A from R.P. Coordinator and key #153 from Shift Supervisor.

EQUIPMENT REQUIRED

1. Silver zeolite cartridges (4)
2. Particulate filters
3. Sample carrying cask
4. Poly bag (medium)
5. Radector III or equivalent

PROCEDURE

STEP 1 Set switch HC-600 to position A if not already done. Set switch HC-500 to the position corresponding to the sample desired.

STEP 2 Verify that the "Sump Drain System" (switch HC-715) is in the OFF position. Place switch HC-700 (Liquid/Gas Selector) in the Gas position.

NOTE 1 See Attachment 1 for a description of filter cartridge retainer.
WP/kk

PROCEDURE (Cont'd.)

STEP 3 Pull out the gas filter drawer and check the filter cartridges. If not already in place, put the 4 filter cartridges (numbered 1 through 4) into the cartridge retainer, and a particulate filter paper in the cap of the cartridge retainer. Then put the cartridge retainer into the gas filter drawer and put the drawer into the sample station and verify that the drawer position light is green.

STEP 4 If a high activity condition exists or is suspected a timed sample should be taken. For a timed sample set the timer KC-712 between the range of 0 to 30 seconds. Select a low enough time so that the activity on the filter cartridge will not be unnecessarily high and cause special handling problems. It is suggested that 5 seconds be used for the first try. Observe the RE-704 reading to determine if there is a rapid activity buildup. (This reading will also include non-adsorbing gases.) If the activity level does not exceed a preset value of 10 mR/hr, another timed flow through the cartridges can be made. Record the selected time on the Iodine/Particulate Sampling and Analysis Checklist, Form #5790-416-1 or record that the sample is untimed. Set the switch located to the left of the timer labeled "Time Sample" on either yes or no as appropriate. If the activity of the first filter is > 10 mR/hr the 2nd, 3rd or 4th filters may be used for counting assuming previous filters are 99% efficient.

STEP 5 Check that the nitrogen supply system is operating with pressure at 100 psig.

STEP 6 Turn the "Gas Sample Selector Switch" (HC-723) to the desired sample source.

STEP 7 Turn the "Iodine Cartridge Sample Switch" (HC-712) to position 2 and "Circulate Gas" for a minimum period of 5 minutes. Record the flush time on the checklist.

STEP 8 Observe flow as read by the rotameter which is visible through the window in the sample station enclosure. Record the flow (FI-725), temperature (TI-724) and pressure PI-726 and PI-727 on the checklist. The two pressure gauges (PI-726 and PI-727), as read through the window, should be the same.

When the switch HC-712 is turned to position 3 the sample gas will start to flow through the filter cartridges. When the upstream pressure (PI-727), as read during the previous step, is above one atmosphere pressure and the downstream pressure (PI-726) is no more than 50% of the upstream pressure, the flow will be "critical". For a short duration timed cycle it will be necessary to have one technician ready to read the downstream pressure gauge at the sample station while another turns the selector switch at the control panel in order to verify that the flow is "critical". When ready, turn switch HC-712 to position 3. On the checklist record pressure PI-727, PI-726 and the sample time duration in seconds. If flow is not critical record flow as indicated by FI-725.

WP/kk

PROCEDURE (Cont'd.)

STEP 9 After the timer has timed out for a timed sample or after the appropriate time has elapsed for a non-timed sample, turn selector switch HC-712 to position 4 to evacuate the filter cartridge.

STEP 10 After approximately 10 seconds turn switch HC-712 to position 5 which will admit an air or nitrogen flush through the filter cartridge to remove Krypton and Xenon gases. This purge should last approximately 20 seconds or until RI-704 is stable. Read and record RI-704 on the checklist.

STEP 11 Rotate HC-712 to its up and off position. Turn other switches off. Withdraw the filter drawer and remove the cartridge retainer and put it into a plastic bag. Close the bag and tie or tape it closed. Put the filter drawer back into the sample enclosure. Turn the handle that compresses the gaskets and moves the drawer tightly into position, which will turn on the green light on the control panel labeled cartridge "IN".

CAUTION: No shielding cask is provided for the cartridge retainer and filter(s). Survey the plastic bag which contains the sample and determine the dose rate. Use tongs to increase your distance from the sample. At the hot lab remove the filter cartridges.

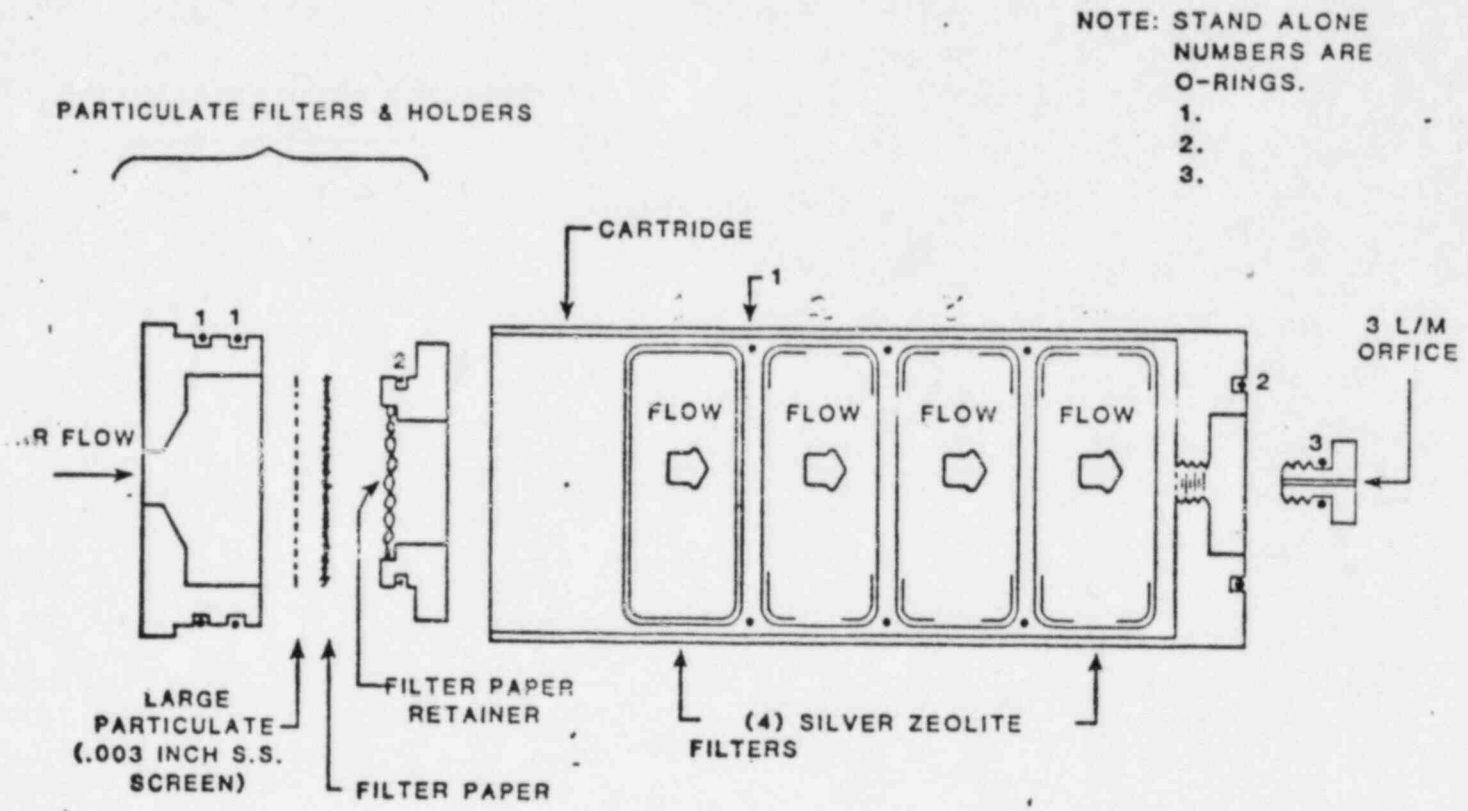
STEP 12 Perform the Drain of Trap, Sump and Collector Procedure (Procedure A.2-417).

STEP 13 Transport the cartridge retainer to the hot lab for preparation for radicchemical analysis per Procedure A.2-421.

STEP 14 Remove the filter cartridges and label 1, 2, 3 and 4. Install new particulate and silver zeolite cartridges into the cartridge retainer for the next sample.

Attachment 1
Page 1 of 1

CUT AWAY VIEW OF FILTER CARTRIDGE



NOTE: Place cartridge into sample drawer with orifice end to the fixed butting surface.

WP/kk

Form #5790-416-1
Revision 0, 05/27/82
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Example of

IODINE/PARTICULATE SAMPLING AND ANALYSIS CHECKLIST

SAMPLING

1. Sample Source _____ Date _____ Time _____ _____ RPS
2. Sample Identification No. _____
3. Time Sample YES or NO _____
4. Flush Time in Minutes _____
5. Sample Flow _____ SCFM FI-725 (not through cartridge)
   Temperature _____ TI-724 (°F)
   Pressure _____ PI-726 (psia)
   Pressure _____ PI-727 (psia)
6. Pressure _____ PI-726 (flow through cartridge)
   Pressure _____ PI-727 (flow through cartridge)
   If flow not critical,
   Sample Flow _____ SCFM FI-725
   If flow critical flow is 3 liters/min.
   Flow Duration _____ Seconds
8. Radiation _____ RI-704 (mR/hr)

ANALYSIS

		Initial
A.	IODINE	
	1. Spectrum Collected	_____
	2. Spectrum Analyzed	_____
	3. Sample Volume _____ cc	_____
	4. Activity Calculated _____ µCi/cc	_____
	5. Filter Number Counted (1-4) _____	_____
B.	PARTICULATE	
	1. Spectrum Collected	_____
	2. Spectrum Analyzed	_____
	3. Sample Volume _____ cc	_____
	4. Activity Calculated _____ µCi/cc	_____

C. Other Analysis Results as Requested and Comments:

_____

Performed by: _____ Date _____

Reviewed by: CSL or REC _____ Date _____

NOTE: After this checklist is completed and is not required for immediate use, it shall be placed in the appropriate container provided for Emergency Records.

WP/kk

Op. Com. Rev. Req'd. Yes X No ___
Q.A. Review Req'd. Yes ___ No X
ALARA Review Req'd. Yes X No ___

DRAINING THE TRAP, SUMP AND COLLECTOR OF POST ACCIDENT SAMPLING SYSTEM

Procedure A.2-417

Prepared by: [signature] ALARA Review: [signature] Date 7/27/82
Reviewed by: [signature] Q.A. Review: [signature] Date 7/28/82
Operations Committee Final Review: Meeting Number: 1100 Date 7/27/82
Approved by: [signature] Date 12-30-82
Op. Com. Results Review: Not Required Mtg. # 1100 Date 7/28/82

PURPOSE

The purpose of this procedure is to provide special instructions and precautions for draining the trap, sump and collector of the PASS.

CONDITIONS AND PREREQUISITES

A sample has been obtained at the PASS.

ORGANIZATION AND RESPONSIBILITIES

Emergency Director - Overall responsibility

REC/CSL - Responsible for requesting a sample be obtained at the PASS.

Chemistry Technician - Responsible for draining the trap, sump and collector.

PRECAUTIONS

A. Exposures of sampling personnel shall be in accordance with A.2-401, "Emergency Exposure Control".

B. Exposures to all personnel due to sampling operations should be maintained as low as is reasonably achieveable.

C. When actual or potential radiation levels so warrant, high range portable survey instruments, and self-reading dosimeters shall be provided to sampling personnel to permit rapid assessment of high exposure rates and accumulated personnel exposure. Alarming dosimeters should also be considered.

D. It is very important that the sump discharge to the suppression pool line be open before the drain and blow out operation is started, especially if valve FCV-627 is left open. If the discharge line is not open the 100 psi nitrogen used for discharging the collector tank V-715 will force the liquid into the liquid sample loop. Note that this may occur even if FCV-627 is closed since it is not a tight shut-off valve.

WP/kk

PRECAUTIONS (Cont'd.)

E. Calculations for exposure rates resulting from radiation within a few hours after a Loss of Coolant Accident point out the desirability of spending minimum amount of time that is necessary near the surface of the sample enclosure. Most of the operation of the Post Accident Sampling System located at 951' of Turbine Building can be performed from the control panel. With the control panel located ten or more feet away from the sample enclosure the dose rates at the control panel due to radiation from the sample enclosure will be below 100 MR/HR. The indicator for the area radiation detector RE-507 is on the PASS control panel and its reading should be noted whenever the presence of radiation is suspected.

REMARKS

1. There is no automatic drain or blow down but there is an alarm light to indicate that the level in the trap T-717 is high and that the trap needs to be drained right away. This trap removes water from the gas sample lines. If the liquid level becomes too high water will be sucked into an air pump and mechanical damage may result.

2. The drain and blow out sequence will take precedence over any other operation. Therefore the drain and blow out operation may be performed at any time by merely turning the Sump Drain System Switch HC-715-1 to any position other than off. Any other operation sequence that may be occurring will immediately be stopped and when the Sump Drain System Switch HC-715-1 is returned to the OFF position, the sample station operation will return to the step previously interrupted, unless other switches were changed in the meantime.

3. The Post Accident Sampling Station is located on the south side of the 951' level of the turbine building. The most efficient route to the PASS is through access control and into the turbine building. Move to the 951' level via the east stairway.

4. Obtain controlled access key 33A from R.P. Coordinator and key #153 from Shift Supervisor.

PROCEDURE

NOTE 1 If neither RHR loop is operating, the position of the Liquid Return Selection Switch in STEP 1 is immaterial.

STEP 1 Set switch HC-500 to the position corresponding to the sample desired. Set the Liquid Return Selection Switch to A or B corresponding to the operating RHR Loop.

STEP 2 Check that the nitrogen tank supply valve and the corresponding valve PAS-57-11 or PAS-57-22 are open and that the pressure is set at 100 psig and verify that system vent at top of station is in the open position.

WP/kk

PROCEDURE (Cont'd.)

STEP 3 Check that the demineralized flush water tank level is within glass markings and is pressurized at 100 psig (PI-4021) and that DM-136 and DM-137 are closed and DM-138 open and demin water supply valve PAS-57-1 on PASS demin water tank is open.

NOTE 2 If tank level is below minimum marking perform Procedure A.2-410 before proceeding.

STEP 4 Use the knob adjacent to PCV-627 gauge on the control panel to obtain a 15 psi reading on the gauge.

STEP 5 Turn all control panel switches up and off and then turn the control panel power selector switch (HC-600) to "A".

STEP 6 Turn the Liquid or Gas selector switch (HC-700) to Liquid.

STEP 7 Turn Flush System Switch HC-628-1 counterclockwise to position 6 to start demineralized water flowing through CV-626 and FCV-627. Observe that approximately 1 gpm flow per FI-664 is occurring and providing a positive indication that the Liquid Return Line is open.

STEP 8 After being assured that the Liquid Return Line is open, drain the collector tank V-715 and Trap T-717 and the sump by turning switch HC-715-1 clockwise through its eight positions. Pause approximately 5 seconds at each position. As soon as the switch is turned to position 2, the Liquid selection status light and Flush System Mode light adjacent to HC-628-1 will turn off.

STEP 9 After the drain and blow out cycle is completed and switch HC-715-1 is again in the OFF position the flush with demin water will automatically resume. Stop the flush operation by turning Flush System switch HC-628-1 clockwise to the UP and OFF position. Turn the Liquid selector switch (HC-700) to OFF.

STEP 10 If this is the end of an operation, turn all switches to UP and OFF position, turn Power Source Selector Switch (HC-600) to OFF, secure nitrogen cylinder and demineralized water system (valve PAS-57-1). Turn PCV-627 fully counterclockwise. If the sampling operation is not complete, make only those changes consistent with the appropriate sampling procedure.

WP/kk

Op. Com. Rev. Req'd. Yes X No ___
Q.A. Review Req'd. Yes ___ No X
ALARA Review Req'd. Yes ___ No ___

POST ACCIDENT SAMPLING STATION DEMIN WATER TANK FILL PROCEDURE

Procedure A.2-418

Prepared by: [signature] ALARA Review: [signature] Date 1/9/82
Reviewed by: [signature] Q.A. Review: [signature] Date 8/16/82
Operations Committee Final Review: Meeting Number: 1100 Date 7/29/82
Approved by: [signature] Date 12-20-82
Op. Com. Results Review: Not Required Mtg. # 1100 Date 7/29/82

PURPOSE

The purpose of this procedure is to provide special instructions for filling the demin water storage tank which supplies the post accident sampling station.

CONDITIONS AND PREREQUISITES

The Emergency Director/REC/CSL has requested a sample be obtained at the PASS and the PASS demin water tank level is below the minimum level as indicated on the sight-glass level indicator mounted on the side of the tank.

ORGANIZATION AND RESPONSIBILITIES

Emergency Director - Overall responsibility

REC/CSL - Responsible for requesting a sample be obtained at the PASS

Chemistry Technician - Responsible for filling the PASS demin water tank

PRECAUTIONS

A. Exposures of personnel shall be in accordance with A.2-401, "Emergency Exposure Control".

B. When actual or potential radiation levels so warrant, high range portable survey instruments, and self-reading dosimeters shall be provided to personnel to permit rapid assessment of high exposure rates and accumulated personnel exposure. Alarming dosimeters should also be considered.

REMARKS

1. Obtain controlled access key 33A from R.P. Coordinator and key #153 from Shift Supervisor.

PROCEDURE

STEP 1 Close valve which supplies N_2 to demin water tank. (Valve is located in upper right corner of back of control panel C-261.)

WP/kk

PROCEDURE (Cont'd.)

STEP 2 Close valve PAS-57-3 and PAS-57-1 on the storage tank.

STEP 3 Open tank vent valve PAS-57-2.

STEP 4 Close valve DM-138.

STEP 5 To begin water flow to tank open valve DM-137 and then DM-136. Use valve DM-136 to throttle flow.

STEP 6 Observe tank level by watching sight-glass level indicator on the side of PASS demin water tank. When the tank level is at its maximum secure valve DM-136 then secure valve DM-137.

STEP 7 Open valve DM-138 and using a pail catch the small amount of water coming out of the discharge.

STEP 8 Close vent valve PAS-57-2.

STEP 9 Open valve which supplies N_2 to the demin water tank and observe that water pressure is 100 psi per PI-4021.

WP/kk

Op. Com. Rev. Req'd. Yes X No ___
Q.A. Review Req'd. Yes ___ No X
ALARA Review Req'd. Yes ___ No X

LIQUID RADIOCHEMICAL ANALYSIS

Procedure A.2-419

Prepared by: [signature] ALARA Review: [signature] Date 8/4/82
Reviewed by: [signature] Q.A. Review: [signature] Date 8/4/82
Operations Committee Final Review: Meeting Number: 1100 Date 7/29/82
Approved by: [signature] Date 12-30-82
Op. Com. Results Review: Not Required Mtg. # 1105 Date 7/29/82

PURPOSE

The purpose of this procedure is to provide special instructions and precautions for handling and analysis of liquid samples during and following an emergency at Monticello Nuclear Generating Plant.

CONDITIONS AND PREREQUISITES

Analysis of a liquid sample obtained at the PASS is requested by the Emergency Director/REC/CSL. Unless otherwise directed, this procedure should be used in lieu of routine analysis procedures whenever an Alert or higher emergency classification is declared.

ORGANIZATION AND RESPONSIBILITIES

Emergency Director - Overall responsibility

REC/CSL - Responsible for assigning sample priority and frequency and results review.

Chemistry Technician - Responsible for sample analysis and results reporting.

PRECAUTIONS

A. Exposures of analysis personnel shall be in accordance with A.2-401, "Emergency Exposure Control".

B. Exposures to all personnel due to analysis operations should be maintained as low as is reasonably achieveable. Techniques such as temporary shielding, remote handling and sample dilution prior to analysis should be considered to reduce exposure to personnel.

C. When actual or potential radiation levels so warrant, high range portable survey instruments, and self-reading dosimeters shall be provided to sampling and analysis personnel to permit rapid assessment of high exposure rates and accumulated personnel exposure. Alarming dosimeters should also be considered.

WP/kk

PRECAUTIONS (Cont'd.)

D. Appropriate extremity dosimeters should be provided and worn when handling samples which themselves represent high level radiation sources.

REMARKS

This procedure provides for isotopic concentration (μCi/ml) analysis of liquid samples obtained at the PASS.

EQUIPMENT REQUIRED

1. Radector III or equivalent
2. 3 - 1 liter poly bottles
3. 1 - 1 ml. pipet and pipet bulb or 1 ml. calibrated syringe
4. 100 ml. vol. flask or graduated cylinder
5. Tongs
6. Several 4 ml. counting vials

PROCEDURE

CAUTION: The activity of the coolant may be as high as 2 Curies per gram and therefore the sample should be stored behind lead bricks and exposure reduction practices (distance, shielding, etc.) should be observed at all times.

STEP 1 Verify that sample is labeled with sample location, date and time.

STEP 2 Place the obtained sample and sample vial behind lead bricks in the Hot Lab.

STEP 3 Transfer 1 ml. of sample, using pipet or syringe to a 4 ml. counting vial.

STEP 4 Measure the dose rate from the sample. If ≤ 10 mR/hr. proceed to STEP 6.

STEP 5 If > 10 mR/hr, dilute the sample by a factor of 100 and repeat STEP 4.

STEP 6 From the undiluted or diluted sample, place 1 ml. into a 1 liter poly bottle containing 500 ml. of demin water. Dilute the mixture to 1 liter with demin water. Record the number of dilutions in the Hot Lab Log Book. Check 1 liter sample to be sure it is ≤ 10 mR/hr.

STEP 7 Place the labeled 1 liter poly bottle in a poly bag and count on the GeLi System for about 1000 seconds.

STEP 8 When the count is complete, analyze the resulting spectrum.

STEP 9 Calculate the μCi/ml using the required dilution factors (see NOTE 1).

WP/kk

PROCEDURE (Cont'd.)

NOTE 1: A small volume sample obtained at the PASS is already diluted 1:100. A large volume sample is undiluted. The total dilution factor is calculated using the following equation (where V_1 and A_1 are 100 and 1 respectively for a small volume sample):

$$\mu Ci/ml \text{ sample} = \mu Ci/ml. \text{ (meas.)} \times \left(\frac{V_1}{A_1}\right) \times \left(\frac{V_2}{A_2}\right) \times \left(\frac{V_3}{A_3}\right) \ldots \left(\frac{V_n}{A_n}\right)$$

Where A = aliquot volume taken
V = total dilution volume

STEP 10 Record the sample results and information in the Hot Lab Log Book and on the Small Volume Liquid Sampling and Analysis Checklist, Form 5790-413-1.

WP/kk

Op. Com. Rev. Req'd. Yes X No ___
Q.A. Review Req'd. Yes ___ No X
ALARA Review Req'd. Yes ✓ No ___

CONTAINMENT ATMOSPHERE RADIOCHEMICAL ANALYSIS

Procedure A.2-420

Prepared by: [signature] ALARA Review: [signature] Date 8/...
Reviewed by: [signature] Q.A. Review: [signature] Date 8/14/82
Operations Committee Final Review: Meeting Number: 1100 Date 7/29/82
Approved by: [signature] Date 12-30-82
Op. Com. Results Review: Not Required Mtg. # 1100 Date 7/29/82

PURPOSE

The purpose of this procedure is to provide special instructions and precautions for analysis of containment atmosphere samples during and following an emergency at Monticello Nuclear Generating Plant.

CONDITIONS AND PREREQUISITES

Analysis of a gas sample obtained at the PASS is requested by the Emergency Director/REC/CSL. Unless otherwise directed, this procedure should be used in lieu of routine analysis procedures whenever an alert or higher emergency classification is declared.

ORGANIZATION AND RESPONSIBILITIES

Emergency Director - Overall responsibility

REC/CSL - Responsible for assigning sample priority and frequency and results review.

Chemistry Technician - Responsible for sample analysis and results reporting.

PRECAUTIONS

A. Exposures of analysis personnel shall be in accordance with A.2-401, "Emergency Exposure Control".

B. Exposures to all personnel due to analysis operations should be maintained as low as is reasonably achieveable. Techniques such as temporary shielding, remote handling and sample dilution prior to analysis should be considered to reduce exposure to personnel.

C. When actual or potential radiation levels so warrant, high range portable survey instruments, and self-reading dosimeters shall be provided to sampling and analysis personnel to permit rapid assessment of high exposure rates and accumulated personnel exposure. Alarming dosimeters should also be considered.

WP/kk

PRECAUTIONS (Cont'd.)

D. Appropriate extremity dosimeters should be provided and worn when handling samples which themselves represent high level radiation sources.

REMARKS

This analysis determines the isotopic concentrations (μCi/cc) of containment atmosphere samples obtained at the PASS.

EQUIPMENT REQUIRED

1. Several 15 cc sample vials with septums
2. Several 0-1 cc gas syringe with needle
3. Radector III or equivalent

PROCEDURE

CAUTION: Due to potentially high sample activity the sample should be stored behind lead bricks and exposure reduction practices (distance, shielding, etc.) should be observed at all times.

STEP 1 Verify that sample is labeled with sample source, date and time.

STEP 2 Measure the dose rate of the sample vial at contact. If $\leq$ 10 mR/hr proceed to STEP 4.

STEP 3 If the dose rate $>$ 10 mR/hr evacuate another 15 cc gas vial. Remove 1 cc of gas sample and inject into the evacuated 15 cc gas vial. Appropriately label the new sample vial and repeat STEP 2.

STEP 4 Place the sample vial in a poly bag and count on the GeLi System for about 1000 seconds. Note any dilutions in the Hot Lab Log Book.

STEP 5 When the count is complete, analyze the resulting spectrum.

STEP 6 Calculate the dilution factor, D_f, using the following equation:

$$D_f = \frac{14.9}{A_1} \times \frac{14.9}{A_2} \cdots \frac{14.9}{A_n}$$

Where A is the aliquot volume.

STEP 7 Calculate the actual μCi/cc value by using the computer generated μCi/cc value, the dilution factor D_f as calculated in STEP 6 and the calculated volume from Procedure A.2-418.

$$\frac{D_f \times 14.9 \times \mu Ci/cc}{Vol} = \text{actual activity, } \mu Ci/cc$$

WP/kk

PROCEDURE (Cont'd.)

STEP 8 Record the sample results and information in the Hot Lab Log Book and on the Containment Atmosphere Gas Sampling and Analysis Checklist, Form #5790-415-1.

STEP 9 Provide the sample results to the Radiological Emergency Director.

WP/kk

Op. Com. Rev. Req'd. Yes X No ___
Q.A. Review Req'd. Yes ___ No X
ALARA Review Req'd. Yes X No ___

CONTAINMENT ATMOSPHERE IODINE/PARTICULATE ANALYSIS

Procedure A.2-421

Prepared by: [signature] ALARA Review: [signature] Date 8/17/82
Reviewed by: [signature] Q.A. Review: [signature] Date 8/16/82
Operations Committee Final Review: Meeting Number: 1100 Date 7/29/82
Approved by: [signature] Date 12-30-82
Op. Com. Results Review: Not Required Mtg. # 1100 Date 7/29/82

PURPOSE

The purpose of this procedure is to provide special instructions and precautions for analysis of iodine/particulate samples during and following an emergency at Monticello Nuclear Generating Plant.

CONDITIONS AND PREREQUISITES

Analysis of a gas sample obtained at the PASS is requested by the Emergency Director/REC/CSL. Unless directed otherwise, this procedure should be used in lieu of routine analysis procedures whenever an Alert or higher emergency classification is declared.

ORGANIZATION AND RESPONSIBILITIES

Emergency Director - Overall responsibility

REC/CSL - Responsible for assigning sample priority and frequency and results review.

Chemistry Technician - Responsible for sample analysis and results reporting.

PRECAUTIONS

A. Exposures of sampling and analysis personnel shall be in accordance with A.2-401, "Emergency Exposure Control".

B. Exposures to all personnel due to analysis operations should be maintained as low as is reasonably achieveable. Techniques such as temporary shielding, remote handling and sample dilution prior to analysis should be considered to reduce exposure to personnel.

C. When actual or potential radiation levels so warrant, high range portable survey instruments, and self-reading dosimeters shall be provided to sampling and analysis personnel to permit rapid assessment of high exposure rates and accumulated personnel exposure. Alarming dosimeters should also be considered.

WP/kk

PRECAUTIONS (Cont'd.)

D. Appropriate extremity dosimeters should be provided and worn when handling samples which themselves represent high level radiation sources.

EQUIPMENT REQUIRED

1. Radector III or equivalent
2. Tongs

PROCEDURE

CAUTION: Due to potentially high sample activity the sample should be stored behind lead bricks and exposure reduction practices (distances, shielding, etc.) should be observed at all times.

NOTE 1: STEP 3 indicates two methods of determining iodine activities. If quick results are required count one of the four filters rather than wait for filter #1 to decay 1 hour decay.

STEP 1 Verify that sample is labeled with sample location, date and time.

STEP 2 Measure the contact dose rate from the #1 iodine filter. If $\leq$ 10 mR/hr proceed to STEP 4.

STEP 3 If the dose rate of filter #1 is > 10 mR/hr measure the dose rates of the other 3 filters. Use the first filter in the series which reads < 10 mR/hr for counting then proceed to STEP 4 or if filter #1 is > 10 mR/hr allow the filter to decay about 1 hour. Measure the dose rate at contact. If $\leq$ 10 mR/hr, proceed to STEP 4. If still > 10 mR/hr at contact, measure the dose rate at 1 foot. Calculate the µCi/cc as I-131 using the equation below and proceed to STEP 5.

I-131 µCi/cc = 420 µCi/mR/hr x dose rate (mR/hr) ÷ sample vol. (cc)

STEP 4 Place the charcoal filter reading $\leq$ 10 mR/hr into a labeled poly bag and count on the GeLi System for about 1000 seconds. When the count is complete, analyze the resulting spectrum. Using the sample volume, calculate the µCi/cc iodine. If the second, third or fourth filter was counted divide the activity of the counted sample by 0.01 for each preceeding filter (assume 99% filter efficiency) to determine iodine activity of the sample source.

STEP 5 Place the particulate filter in a labeled petri dish.

STEP 6 Measure the contact dose rate of the filter. If $\leq$ 10 mR/hr proceed to STEP 8.

STEP 7 If the measured dose rate is > 10 mR/hr, measure the dose rate of the filter at one foot. Calculate the particulate µCi/cc using the equation below:

Particulates µCi/cc = 610 µCi/mR/hr x dose rate (mR/hr) ÷ sample vol. cc)

WP/kk

PROCEDURE (Cont'd.)

STEP 8 Place the particulate filter in a labeled petri dish and count on the GeLi System for about 1000 seconds. When the count is complete, analyze the spectrum. Using the sample volume, calculate the µCi/cc particulates.

STEP 9 Place the sample into the shielded container in the Hot Lab.

STEP 10 Record the sample results and information in the Hot Lab Log Book and on the Containment Atmosphere Iodine/Particulate Analysis Checklist, form #5790-416-1.

STEP 11 Provide the sample results to the Radiological Emergency Director.

WP/kk