EPIP 1.5-10-D
Rev. 4--(MAJOR)

APR 0 8 1983

PLANT OPERATIONS REVIEW COMMITTEE APPROVAL

APPROVED BY STATION SUPERINTENDENT

EFFECTIVE DATE 4-8-83

Connecticut Yankee
Emergency Plan Implementing
Procedure EPIP 1.5-10

OFFSITE EMERGENCY RADIOLOGICAL SURVEYS

1.0 PURPOSE

To provide instructions to the Radiological Monitoring Teams (RMTs) for collecting radiological samples and taking readings for airborne radiological contamination surveys and conducting radiation surveys offsite.

2.0 RESPONSIBILITY

2.1 The Manager of Radiological Dose Assessment (MRDA) is responsible for the following:

- Initial deployment of the offsite RMTs.
- Receiving Offsite Emergency Radiological Survey data.
- Recording the results of surveys on attachment 1.
- Performing dose calculations on attachment 2 based on each reported survey result.
- Providing logistical support for deployed RMTs.
- Keeping the Director of SEO informed of the survey results.
- Making recommendation to the Director of SEO for offsite protective actions, based on survey results.

2.2 RMT members are responsible for carrying out the instructions in this procedure, as outlined in sections 3.0 through 3.8.

2.3 The Corporate MRCA shall relieve the MRDA of the responsibility for deployment and/or redeployment of the RMTs and the Offsite Emergency Radiological Surveys.

- When the Corporate Emergency Operations Center (Corporate EOC) is activated, the Corporate MRCA shall be responsible for:
  - Determining survey locations.
  - Performing dose calculations on attachment 2 based on survey results.
  - Reporting the results of surveys, using the information reported by the RMTs, and other Station data.
  - Keeping the Director of SEO and Director of Corporate Emergency Operations informed of offsite survey results.

3.0 ACTIONS

3.1 RMT members shall inform the MRDA of their presence in the Emergency Operations Facility (EOF) Operational Support Center (OSC).

3.2 RMT members will obtain an Offsite RMT (blue) kit from the Emergency Equipment Storage Room. Verify the contents of the kit to ensure that all listed equipment is in the kit. Sign the form when surveys are completed. Record the instrument serial numbers on attachment 1.

3.3 RMT members shall don TLD dosimetry and pocket dosimeters provided in the RMT kit.

Note: Ensure that the pocket dosimeter is zeroed prior to being deployed offsite.

3.4 RMT members shall perform functional checks on the following emergency equipment.

3.4.1 Perform a functional check on the E-140 and HP210 probe and the RO-2/A portable survey meters as follows:

- o Check the calibration sticker and ensure that the due date has not expired.

Note: If the calibration due date has expired, obtain a backup instrument from the Emergency Equipment Storage Room. Ensure that the backup instrument calibration due date has not expired.

- Check batteries: turn the selector switch to the "BATT" position.

  1) The needle must move into the "BATT OK" band on the meter face.

  2) Replace batteries if the battery check fails.

  Note: The RO-2/A has 2 battery check positions, check both.

- Perform a source check using the Cs-137 check source provided in the kit.

  Note: The source check reading is recorded on each instrument. If the instrument does not respond in the recorded range, replace the instrument with one from the Emergency Equipment Storage Room. Complete the above checks again.

3.4.2 Perform a functional check of the DIG-5 scaler as follows:

- Connect the input cable of the DIG-5 scaler to the audio jack of the E-140.

- With the E-140 probe placed on the source, turn the DIG-5 scaler selector switch to "CC" (continuous count). Press the "Reset" button, then the "Start" button.

- Check to see that the DIG-5 scaler display begins counting.

- Press the "Stop" button, then turn the DIG-5 scaler selector switch to "Off". Disconnect the input cable from the E-140.

3.4.3 Perform a functional check of the portable air sampler as follows:

- Check the calibration sticker to ensure that the due date has not expired.

  Note: If the calibration due date has expired, obtain a backup air sampler from the Emergency Equipment Storage Room. Ensure that the backup instrument calibration due date has not expired.

- Attach air sampler power cable clips to the proper battery terminal and ground.

  Note: There is a 12 volt battery located in the equipment room for testing the air sampler.

- Turn the air sampler ON to verify that it operates.

3.4.4 Perform a functional check of the two-way radio prior to departing the site as follows:

Note: The two-way radios are permanently mounted in the Company vehicles dedicated to offsite radiological monitoring. Backup portable radios are stored in the Emergency Equipment Room.

- Turn the radio on.

- The following radio call signs shall be used by the CY RMTs and the base stations as appropriate:

  - CY RMT-1
  - CY RMT-2
  - CY RMT-3
  - CY RMT-4
  - CY RMT Control (Base Station)
  - Berlin RMT Control (Base Station)
  - Millstone EOF Control (Base Station)

- Select channel 1. Communicate on this channel at all times unless otherwise directed by the MRDA or the Corporate MRCA.

- Turn the SQUELCH knob counterclockwise until static is heard. Turn the knob clockwise until the static just stops.

o Press the push-to-talk button on the side of the hand held microphone and request a radio check from the Field Team Data Coordinator - Connecticut Yankee or Berlin.

Note: Leave the radio on at all times. If radio communications fail while in the field, make commercial telephone contact with the MRDA in the CY EOC at 344-3227, or the Corporate MRCA at 666-3397 or the Corporate MRCA Work Center at 666-5863.

3.5 RMT members will report to the MRDA in the Managers Briefing Room for a predeployment briefing.

Note: When the Corporate EOC is activated and the Corporate MRCA is prepared to assume the responsibility for the RMTs and the Offsite Emergency Radiological Surveys, he shall inform the MRDA and the deployed RMTs. Relief shall be verbal, clear and direct.

- The Site Field Team Data Coordinator will continue to monitor the offsite RMT communications throughout the emergency.

3.5.1 Obtain survey points from the MRDA.

- Circle survey points on attachment 4 and on the maps provided in the RMT kit.

Note: General guidelines on determining the appropriate survey points are provided in attachment 5.

3.5.2 Obtain keys to the dedicated company vehicle from the Manager of Security, and load Offsite RMT (blue) kit, into the vehicle.

- If a Company vehicle is not available, use a private vehicle.

Note: If a private vehicle is used, a portable radio is available in the Emergency Storage Equipment Room.

3.5.3 Record all survey and sample collection data on attachment 1, the Offsite Emergency Radiological Survey form.

3.5.4 Perform the following surveys as directed by the MRDA/Corporate MRCA.

- Radiation Survey,
- Airborne Radioiodine Activity Survey, and
- Airborne Particulate Radioactivity Survey.

3.5.5 Maintain communications with the MRDA or the Corporate MRCA via the Field Team Data Coordinator at regular intervals (about every 10 minutes) to be informed of any changes in survey locations.

3.6 Offsite Emergency Radiological Surveys (Refer to Users Guide attachment 3)

Note: Complete all information on the upper part of the Offsite Emergency Radiological Survey form before commencing a survey.

3.6.1 Radiation Survey

3.6.1.1 Enroute to each survey point continuously monitor for radiation in the event that the plume path changes.

Note: Immediately notify the MRDA/Corporate MRCA via the Field Team Data Coordinator if, while enroute to the next survey point, radiation levels exceed the levels previously recorded.

3.6.1.2 Proceed to the first survey point. Record the readings on the survey form (attachment 1).

- Obtain the following readings:
  - While standing, hold the RO-2/A above your head with the bottom of the instrument facing up and the meter facing down. Take the reading with the Beta window shield closed, wait until the meter reading stabilizes (about 5 to 10 seconds).
  - Record the reading on the survey form (attachment 1).

- While standing, hold the RO-2/A above your head with the bottom of the instrument facing up and the meter facing down. Take the reading with the Beta window shield open, wait until the meter stabilizes (about 5 to 10 seconds).

- Record the reading on the survey form, (attachment 1).

- While standing, hold the RO-2/A at waist level (approximately 3' above the ground) with the bottom of the instrument parallel to the ground. Take the reading with the Beta window shield closed, wait until the meter reading stabilizes (about 5 to 10 seconds);

- Record the reading on the survey form, (attachment 1).

- Obtain the above readings at each designated survey location.

3.6.2 Airborne Particulate Radioactivity Survey

3.6.2.1 Commence a background count with the E-140 detector and the HP210 probe wait until the meter to stabilize (about 15 to 20 seconds) at each survey location as follows:

- Ensure that there is no sample in the sample holder.

- Close the slide tray.

- Ensure that the HP210 probe is placed in the slot on top of the sampler holder.

- Record the background CPM on the survey form (attachment 1).

Note: If the background count rate exceeds 300 CPM, notify the MRDA/Corporate MRCA via the Field Team Data Coordinator.

3.6.2.2 Load an approved iodine cartridge into the air sampler as follows:

- Unscrew the large brass-colored ring on the cartridge holder.
- Remove an iodine cartridge from the paint can, CLOSE the can securely.
- Place the cartridge into the cartridge holder with the arrows pointing toward the air sampler.
- Screw the brass-colored ring back onto the cartridge holder.

3.6.2.3 Load an air particulate filter into the air sampler as follows:

- Mark an "X" on the one side of the filter.
- Unscrew the small brass-colored ring on the cartridge holder.
- Place the particulate filter into filter holder with the "X" side up.
- Screw the small brass-colored ring back onto the cartridge holder.

3.6.2.4 Attach the air sampler power cable clips on the proper battery terminal and to ground.

3.6.2.5 Commence a five (5) minute air sample.

- Observe the flow rate on the air sampler.
- Record the observed flow rate of the air sampler on the survey form, attachment 1.
- Record the time the air sampler was started and stopped on the survey form, attachment 1.

3.6.2.6 Evaluate the iodine cartridge with the E-140 detector and the HP210 probe as follows:

- Place the cartridge in the sample holder with the arrows pointing down.
- Ensure that the HP210 probe is placed in the slot on top of the sample holder.
- Count the iodine cartridge for about 15 to 20 seconds to allow the meter to stabilize.

  Note: If the E-140 indicates a count rate greater than 50,000 CPM (per count minute) connect the DIG-5 instrument to the phone jack of the E-140 and read the total counts.

- Record the sample CPM or total counts on the survey form (attachment 1).

3.6.2.7 Record the following information on the outside of the envelope:

- Sample start and stop time,
- Flow rate,
- Date,
- Sample location,
- CPM/total counts, and
- Place the iodine cartridge in the sample envelope.
- Attach the sample envelope to the survey form.

3.6.2.8 Evaluate the particulate filter with the E-140 detector and the HP210 probe as follows:

- Place the filter on the slide tray planchette with the "X" facing up.
- Ensure the HP210 probe is placed in the slot on top of the sample holder.
- Count the filter for about 15 to 20 seconds to allow the meter to stabilize.

  Note: If the E-140 indicates a count rate greater than 50,000 CPM connect the DIG-5 instrument to the phone jack of the E-140 and read the total counts.

- Record the sample CPM or the total counts on the survey form (attachment 1).

3.6.2.9 Record the following information on the outside of the envelope:

- Sample start and stop time,
- Flow rate,
- Date,
- Sample location,
- CPM/total counts, and
- Place the filter in the sample envelope provided.
- Attach the sample envelope to the survey form.

3.7 When each survey has been completed, report the results to the MRDA/Corporate MRCA via the Field Team Data Coordinator. The MRDA/Corporate MRCA or designee shall record the survey results on attachment 1.

3.8 Upon returning to the EOF, deliver all survey forms to the MRDA and the attached samples to the EOF Counting Room. The MRDA will retain the survey forms and samples as necessary.

4.0 ATTACHMENTS

Note: A User's Guide for the RMT Kit is included in the kit itself.

5.0 PROCEDURE CROSS REFERENCE

5.1 EPIP 1.5-22, Manager of Radiological Consequence Assessment

5.2 EPIP 1.5-37, Manager of Radiological Dose Assessment.

5.3 CONI 4.01 , Corporate Manager of Radiological Consequence Assessment

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ATTACHMENT 1

OFFSITE EMERGENCY RADIOLOGICAL SURVEY

(to be completed by the Offsite RMT #_____)

RMT Member:_____ Date:_____ Instrument Serial Number: E-140:_____ DIG-5:_____
(Signature)

RMT Member:_____ Air Sampler:_____ RO-2/A:_____
(Signature)

		Radiation Survey(RO-2A)			Airborne I-131 Survey(Air Sampler/E-140/HP210/DIG-5)						Particulate Filter	
Survey Location	Sample Time	Head Level CW	Head Level OW	Waist Level CW	Start Time	Stop Time	Total Air Sample Time (min)	Flow Rate	Background Count per Minute	Sample Count per Minute	Sample Count per Minute	Time Reported

NOTE: When the DIG-5 Sealer is used, record and report the following information to the Field Team Data Coordinator:

1. Time factor used (should be .1 unless directed to use another time factor).
2. Total counts indicated on the DIG-5.
3. Circle DIG-5 when it is used.

NOTE: Use only military time where time is recorded.

LEGEND: CW - Closed Window
OW - Open Window

Attachment 2

Offsite Emergency Radiological Calculation Form
(To be completed by MRDA)

Part A.
I-131 Concentration in Air

Calculation of I-131 Dose Equivalent Concentration if not previously calculated:

Sample Volume (cc) _____ (A) = _____ Time of Air Sample (Minutes) x _____ CFM x 2.8×10^4

Sample CPM _____ - Background CPM _____ = _____ C (B) CPM

(C) Factor = (Circle One)

Time Since Shutdown	Origin. of Release	Factor, uCi/ccpm
0 - 5 hrs	Primary System	1.1×10^{-5}
5 - 12 hrs	Primary System	2.3×10^{-5}
12 - 24 hrs	Primary System	3.9×10^{-5}
24 - 96 hrs	Primary System	8.5×10^{-5}
*96 hrs	Primary System	1.7×10^{-4}
At all times	Other than Primary System	1.7×10^{-4}

I-131 Dose Equivalent uCi/cc = _____ (B) x _____ (C) = _____ (D) uCi/cc

I-131 Dose Equivalent uCi/cc = (D)/(A) = _____ = _____ (E) uCi/cc

Ge(Li) Results (if available) = _____ (E) uCi/cc

Part B.
Calculation of I-131 Dose to Childs Thyroid in Mrem/hr.

I-131 Dose Equivalent uCi/cc ____ (E) x 3.43×10^9 $\frac{\text{mrem-cc}}{\text{hr - uCi}}$ = ____ (F) $\frac{\text{mrem}}{\text{hr}}$

Part C.
Calculations and Review

Calculations performed by: _____ MRDA (Designee) Date: _____

Review performed by: _____ MRDA/MRCA (Designee) Date: _____

Attachment 3

CONNECTICUT YANKEE OFFSITE EMERGENCY MONITOR POINTS

POINT	MAP#	DIRECTIONS
A1.1	17	Injun Hollow Road to Rock Landing Road. Turn right on Rock Landing Road. Go .6 miles to Quarry Hill Road. Turn right on Quarry Hill Road. Go 1.3 miles on Quarry Hill Road. Bear left at fork to Jenks Hill Road. Go .5 mile. Sample point on side of road.
A2.1	16	Right on Rte. 151 approximately 1-1/2 miles to Pine Brook Road. Right on Pine Brook Road for approximately .2 miles. Sample at road side.
A3.1	11	Right on Rte. 151 for approximately 1 mile to Sexton Road on left side. Sample at intersection.
A4.1	11	Right on Rte. 151 to Rte. 196N approximately 1-1/2 miles to Upper Old Young Street. Sample at intersection.
A6.1	10	Left on Rte. 151 to Rte. 66E, to Rte. 16E, to Rte. 196. Sample at intersection.
A7.1	15	Left on Rte. 151 to Rte. 66E, to Rte. 196S. Go approximately 1/2 mile to Flanders Road on left. Take Flanders Road for .2 mile to Smith Street. Sample at intersection.
A8.1	15	Left of Rte. 151 to Rte. 66E to Rte. 196. Sample at intersection.
A9.1	15	Left on Rte. 151 to Rte. 66E approximately 5 miles to Flood Road on right. Go .6 miles on Quinn Road. Sample at intersection of Flood Road and Quinn Road.
A9.2	10	Left on Rte. 151 to Rte. 66E approximately 2 miles to North Main Street on left. Take North Main Street to Lake Drive to Mott Hill Road. Sample at intersection.
A10.1	15	Left on Rte. 151 to Rte. 66E approximately 6 miles to Flood Road. Sample at intersection.
B3.1	16	Right on Rte. 151 to Rte. 196 on left. Sample at intersection.
B3.2	16	Right on Rte. 151 2.7 miles. Sample at Power House Road on left side of road.
B4.1	16	Left on Rte. 151 to Rte. 66E to 16E for approximately 3-1/2 miles to Tarita Road on right. Right on Tarita Road to Wopawog Road. Sample at intersection.
B5.1	16	Right on Rte. 151 to Rte. 149E for .2 miles to North Moodus Road on left. Take North Moodus Road for approximately 2 miles to Stockburger Road. Sample at intersection.

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POINT	MAP#	DIRECTIONS
B5.2	16	Left on Rte. 151 to Rte. 66E to Rte. 16E for approximately 3-1/2 miles to Tarita Road on right. Take Tarita Road for 1.5 miles. Sample at side of road.
B6.1	16	Left on Rte. 151 to Rte. 66E to Rte. 16E. Go approximately 4 miles to Salmon River. Sample on road by Covered Bridge.
B6.2	15	Left on Rte. 151 to Rte. 66E to Rte. 16E approximately 3-1/2 miles to Tarita Road on right. Sample at intersection.
B7.1	15	Left on Rte. 151 to Rte. 66E to Rte. 16E for approximately 5 miles to Browns Mill on left. Take Browns Mill to River Road to Bull Hill Road approximately 1 mile to Dirt Road on right. Sample at point.
B8.1	15	Left on Rte. 151 to Rte. 66E approximately 6 miles to Flood Road. Right on Flood Road for approximately 1-1/4 miles to Ogden Lord Road on right. Take Ogden Lord Road for approximately 1.3 miles to Bull Hill Road. Sample at intersection.
B9.1	20	Left on Rte. 151 to Rte. 66E approximately 6 miles to Flood Road. Right on Flood Road for approximately 2 miles to South Road. Right on South Road approximately 1-1/4 miles to Millstone Drive on left where Millstone Drive intersect for the second time. Sample at intersection.
B.10.1	20	Left on Rte. 151 to Rte. 66E approximately 6 miles to Flood Road. Right on Flood Road for approximately 2 miles to South Road. Right on South Road approximately 1/2 mile to Garder Lane. Left on Garder Lane to the New London Turnpike to Rte. 2 overpass. Sample at overpass.
C2.1	16	Right on Rte. 151 to Rte. 149S (Moodus Leesville Road). Sample at intersection.
C4.1	16	Right on Rte. 151 4.8 miles to Rte. 149N .2 miles to North Moodus Road. Left on North Moodus Road .9 miles to Banner Road. Sample at Banner Road and North Moodus Road.
C4.2	16	Right on Rte. 151 to Rte. 149N for .2 miles to North Moodus Road on left. North Moodus Road approximately 1-1/2 miles to Sillimanville Road on right. Sample at intersection.
C5.1	21	Right on Rte. 151 to Rte. 149N approximately 2 miles to Trowbridge Road on left. Take Trowbridge Road approximately 1 mile to Peckerel Lake Road. Sample at intersection.

Attachment 3 (cont'd)

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POINT	MAP#	DIRECTIONS
C6.1	21	Right on Rte. 151 to Rte. 149N. Take 149N approximately 4 miles to Starr Road on right. Sample at intersection.
C7.1	21	Right on Rte. 151 to Rte. 149N to Rte. 16. Sample at intersection.
C8.1 20	20	Right on Rte. 151 to Rte. 149N approximately 6-1/2 miles to Shailor Hill Road on left. Sample at intersection.
C8.2	21	Right on Rte. 151 to Rte. 149N to Rte. 16E approximately 2-3/4 miles to Skinner Road on right. Sample at intersection.
C9.1	20	Right on Rte. 151 to Rte. 149N to Rte. 16E for approximately 3 miles to Cato Corner Road on left. Cato Corner Road for approximately 3/4 mile to Davidson Road (Prospect Hill Road). Sample at intersection.
C10.1	20	Right on Rte. 151 to Rte. 149N to Rte. 2. Sample at overpass.
C10.2	25	Right on Rte. 151 to Rte. 149N to Rte. 16E to Buckley Hill Road on right. Sample at intersection.
D2.1	17	Right on Rte. 151 to Johnsonville Road on right. Take Johnsonville Road to Cover Road. Take Cover Road approximately 3/4 mile. Sample at side of road.
D2.2	17	Right on Rte. 151 to 149S. Take Rte. 149S for approximately 1/2 miles to Johnsonville Road. Sample at intersection.
D3.1	17	Right on Rte. 151 5.3 miles to Joe Williams Road on left side of road. Sample at intersection.
D4.1	16	Right on Rte. 151 to Rte. 149N for approximately 1-3/4 miles to Great Hill Road on right. Sample at intersection.
D5.1	21	Right on Rte. 151 to Rte. 149N. Take Rte. 149N approximately 2-1/4 miles to Mott Lane next to Moodus Reservoir. Sample at intersection.
D6.1	21	Right on Rte. 151 to Rte. 149N. Rte. 149N approximately 2-1/4 miles to Mott Lane, next to Moodus Reservoir. Take Mott Lane to East Haddam-Colchester Turnpike. Sample at intersection.
D7.1	21	Right on Rte. 151 to Rte. 149N to 16E for approximately 1 mile to Miles Standish Road on right. Take Miles Standish Road for approximately 1-1/4 miles to Wickam Road. Take Wickam Road for approximately 1 mile to Ackley Road. Sample at intersection.

Attachment 3 (cont'd)

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POINT	MAP#	DIRECTIONS
D8.1	26	Right on Rte. 151 to Rte. 149N to Rte. 16E. Rte. 16E for approximately 3-1/4 miles to Buckley Hill Road on right. Take Buckley Hill Road to O'Connell Road to Taylor Road. Sample at corner.
D9.1	26	Right on Rte. 151 to Rte. 149N to Rte. 16E. Rte. 16E for approximately 3-1/4 miles to Buckley Hill Road on right. Take Buckley Hill Road to O'Connell Road. Sample at corner.
D10.1	26	Left on Rte. 151 to Rte. 149N to Rte. 16E approximately 3-1/2 miles to Buckley Hill Road on right. Take Buckley Hill Road approximately 1-1/4 miles to Falls Circle. Sample at intersection.
E2.1	17	Right on Rte. 151 to Rte. 149S approximately 2 miles to Creek Row. Sample at intersection.
E3.1	17	Right on Rte. 151 approximately 6.4 miles to East Haddam-Colchester Turnpike. Sample at intersection.
E4.1	22	Right on Rte. 151 approximately 6-1/2 miles to East Haddam-Colchester Turnpike. Left on East Haddam-Colchester Turnpike approximately 1.4 miles to Alger Road. Right on Alger Road approximately .9 miles to Smith Road. Sample at intersection.
E4.2	22	Right on Rte. 151 approximately 7.2 miles to Daniels Road on left. Take Daniels road to Bogel Road. Sample at intersection.
E5.1	22	Right on Rte. 151 for approximately 7 miles to Daniels Road on left. Take Daniels Road approximately 3/4 miles to Bogel Road. Left on Bogel Road to Smith Road. Sample at intersection.
E6.1	22	Right on Rte. 151 for approximately 7-3/4 miles to Mt. Parnassus Road. Take Mt. Parnassus Road for 1-1/2 miles to Milli gton Hop Yard Road. Take Millington Hop Hard Road for 1.5 miles to Schulman-Veselak Road. Take Schulman-Veselak Road 1-1/4 miles to New Berry Road. Sample at intersection.
E6.2	22	Right on Rte. 151 for approximately 7-3/4 miles to Mt. Parnassus Road. Go approximately 1-1/2 miles to Millington Hop Yard Road for approximately .6 miles to Parker Road on right. Sample at intersection.
E7.1	27	Right on Rte. 151 for approximately 7-3/4 miles to Parnassus Road. Go approximately 4-1/2 miles to Mt. Parnassus Road/Millington Hop Yard Road to Wickham Road on left.

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POINT	MAP#	DIRECTIONS
		Take Wickam Road for approximately 1/2 mile to Newberry Road on left. Sample at intersection.
E8.1	27	Right on Rte. 151 for approximately 7-3/4 miles to Mt. Parnassus Road. Left on Mt. Parnassus Road to Willington Hop Yard Road to Haywardville Road for approximately 6-1/2 miles to Hopyard Road (Devil's Hopyard State Park sign). Sample at intersection.
E9.1	27	Right on Rte. 151 for approximately 7-3/4 miles to Mt. Parnassus Road on left. Mt. Parnassus Road to Willington Hop Yard Road to Haywardville Road for approximately 6-1/2 miles to Hopyard Road (Devil's Hopyard State Park sign). Take Hopyard Road for approximately 2 miles to intersection of Jones Hill Road (4-way stop sign). Sample at intersection.
E10.1	27	Right on Rte. 151 for approximately 7-3/4 miles to Mt. Parnassus Road on left. Mt. Parnassus Road to Willington Hop Yard Road to Haywardville Road to Hopyard Road (Devil's Hopyard State Park sign). Take Hopyard Road to Foxtown Road on left. Take Foxtown to Ed Williams Road to Baker Road, right on Baker Road to West Road. Sample at intersection.
F2.1	17	Right on Rte. 151 to Rte. 149S approximately 2 mile to Creek Row. Sample 1.2 miles beyond Creek Row on Rte. 149.
F2.2	17	Right on Rte. 151 to Rte. 149S approximately 2 miles to Creek Row. Left on Creek kow. Go approximately .5 miles on Creek Row. Sample on side of road.
F3.1	17	Right on Rte. 151 for 7 miles to Boardman Road. Right on Boardman Road to Maple Avenue. Sample at intersection.
F4.1	17	Right on Rte. 151 for 7.7 miles to Rte. 82. Sample at intersection.
F5.1	22	Right on Rte. 151 for 7-3/4 miles. Left on Mt. Parnassus Road for approximately 1-1/2 miles to Shanaghans Road for .3 miles. Right on Shanaghans Road. Sample at side of road.
F5.2	22	Right on Rte. 151 for approximately 8 miles to Petticoat Lane on left. Take Petticoat Lane for .7 miles. Sample at road side.
F6.1	22	Right on Rte. 151 to Rte. 82E. Rte. 82E for approximately 2 miles to Cold Spring Road on left (opposite gasoline pumps). Take Cold Spring Road for .7 miles to Petticoat Lane. Sample at intersection.

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POINT	MAP#	DIRECTIONS
F7.1	22	Right on Rte. 151 to Rte. 82E. Rte. 82E for approximately 3-1/4 miles to Clark Hill Road on left. Take Clark Hill Road to Mill Road on left. Sample at intersection.
F8.1	28	Right on Rte. 151 to Rte. 82E for approximately 6 miles to Hedlund Road on left. Sample at intersection.
F9.1	28	Right on Rte. 151 to Rte. 82E to Rte. 156. Sample at intersection.
F10.1	28	Right on Rte. 151 to Rte. 82E to Rte. 156S for 1.8 miles to Beaver Brook Road (by Lyme Town Hall). Sample at intersection.
G2.1	17	Rte. 151S to Rte. 149S to Rte. 82W to Rte. 9A. Turn right. Follow Rte. 9A 1.5 miles to River Road. Sample at intersection.
G3.1	17	Right on Rte. 151 to Rte. 149S to Main Street. Sample in front of cemetery.
G4.1	17	Right on Rte. 151 to Rte. 149S to Rte. 82E. Cross Rte. 82E to Creamery Road. Follow Creamery Road for .7 miles. Sample at side of road.
G5.1	22	Right on Rte. 151 to Rte. 82E for approximately 1-1/4 miles to River Road at right (Gillette Castle State Park sign). Turn right on River Road for approximately 1 mile. Sample on side of road.
G6.1	23	Right on Rte. 151S to Rte. 82E for approximately 1-1/4 miles to River Road on right (Gillette Castle State Park sign). Take River Road to Bone Hill Road to Geer Hill Road to Ferry Landing. Sample at landing.
G7.1	23	Right on Rte. 151S to Rte. 82E to Rte. 148. Sample at intersection.
G8.1	23	Right on Rte. 151 to Rte. 82 for approximately 4 miles to Brush Hill Road. Take Brush Hill Road for approximately .7 miles to Mitchell Hill Road. Sample at intersection.
G9.1	28	Right on Rte. 151S to Rte. 82E approximately 4 miles to Brush Hill Road for approximately 2 miles to Tantumorantam Road. Sample at intersection.
G9.2	23	Right on Rte. 151S to Rte. 82E approximately 4 miles to Brush Hill Road for approximately 2 miles to Tantumorantam Road on right. Go approximately 1-1/2 miles on Tantumorantam Road to Joshua Town Road. Sample at intersection.

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POINT	MAP#	DIRECTIONS
G10.1	28	Right on Rte. 151S to Rte. 82E approximately 4 miles to Brush Hill Road for approximately 2 miles to Tantumorantam Road on right. Go approximately 1-1/2 miles on Tantumorantam Road to Joshua Town Road. Left on Joshua Town Road to Rte. 156. Sample at intersection.
H1.1	17	Right on Rte. 151 to Rte. 149S to Rte. 82W to Rte. 9A. Turn right. Follow Rte. 9A 1.9 miles to Horton Road. Sample point .2 miles on left side of road. Pass Horton Road on 9A.
H2.1	17	Right on Rte. 151 to Rte. 149S to Rte. 82W to Rte. 9A, Rte. 9A North approximately 3/4 miles to Old Turnpike Road to Old Cart Road on right. Take Old Cart Road .5 mile. Sample at side of road.
H3.1	17	Right on Rte. 151 to Rte. 149S to Rte. 82W to Rte. 9A. Sample at intersection.
H4.1	17	Right on Rte. 151 to Rte. 149S to Rte. 82W to Rte. 9A. South on 9A to Clark Hill Road. Sample at intersection.
H5.1	18	Right on Rte. 151 to Rte. 149S to Rte. 82W to Rte. 9A South. Go left approximately 1-3/4 miles to Goose Hill Road on right. Take Goose Hill to County Road. Sample at intersection.
H6.1	18	Right on Rte. 151 to Rte. 149S to Rte. 82W to Rte. 9A South for approximately 3 miles to Kings Highway on right. Take Kings Highway for approximately 1/2 mile to Goose Hill Road. Sample at intersection.
H7.1	18	Right on Rte. 151 to Rte. 149S to Rte. 82W to Rte. 9A South for approximately 3-3/4 miles to Main Street on right. Sample at intersection.
H8.1	23	Right on Rte. 151 to Rte. 149S to Rte. 82W to Rte. 9A South to Rte. 80. Sample at intersection.
H9.1	19	Right on Rte. 151 to Rte. 149S to Rte. 82W to Rte. 9A South to Kilsey Hill Road to Warsaw Street. Sample at intersection.
H9.2	23	Right on Rte. 151 to Rte. 149S to Rte. 82W to Rte. 9A South for approximately 5 miles to Essex Street on left. Take Essex Street for approximately 1 mile to Book Hill Road on right. Take Book Hill Road to Long Hill Road. Sample at intersection.

Attachment 3 (cont'd)

CONNECTICUT YANKEE OFFSITE EMERGENCY MONITOR POINTS

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POINT	MAP#	DIRECTIONS
H10.1	24	Right on Rte. 151 to Rte. 149S to Rte. 82W to Rte. 9A South for approximately 6-1/2 miles to Rte. 9 overpass. Sample at overpass.
J1.1	17	Right on Rte. 151 to 149S to Rte. 82W to Rte. 9A. Turn right. Follow Rte. 9A 2.6 miles. Sample point on right side of road.
J2.1	17	Right on Rte. 1515 to 149S to Rte. 82W to Rte. 9A North for approximately 2-1/2 miles to Plains Road on left. Go .7 mile on Plains Road. Sample at road side.
J3.1	17	Right on Rte. 151 to 149S to Rte. 82W to Rte. 9A North for approximately 2-1/2 miles to Plains Road on left. Go approximately 1-1/4 miles on Plains Road to pole mounted siren. Sample at siren pole.
J4.1	18	Right on Rte. 151 to Rte. 149S to Rte. 82W. Sample approximately 1-1/2 miles on Rte. 9 connector. Sample at Haddam-Chester town line sign.
J5.1	18	Right on Rte. 151 to Rte. 149S to Rte. 82W to Rte. 9. Sample where road splits North and South.
J6.1	18	Right on Rte. 151 to Rte. 149S to Rte. 82W to Rte. 9S to Rte. 148W (West Main Street) approximately 1 mile to Wig Hill on right. Sample at intersection.
J7.1	13	Right on Rte. 151 to Rte. 149S to Rte. 82W to Rte. 9S to Rte. 148W approximately 1.5 miles to Rte. 145. Take Rte. 145 (Winthrop Road) to entrance to Chester Airport. Sample at entrance.
J8.1	14	Right on Rte. 151 to Rte. 149S to Rte. 82W to Rte. 9S to Rte. 148W to Rte. 145 on left. Take Rte. 145 approximately 1-1/2 miles to Dirt Road on right. Sample on Rte. 145 (midway between Rtes. 148 and 80).
J9.1	19	Right on Rte. 151 to Rte. 149S to Rte. 82W to Rte. 9S to Rte. 80W approximately 3-1/2 miles to Rte. 145. Sample at intersection.
J9.2	14	Right on Rte. 151 to Rte. 149S to Rte. 82W to Rte. 9S to Rte. 80W approximately 5 miles to Tower Hill Road intersection. Sample at intersection.
J10.1	19	Right on Rte. 151 to Rte. 149S to Rte. 82W to Rte. 9S Rte. 80W to Rte. 145S. Take 145S 1 mile. Sample at roadside, Deep River - Westbrook town line.

CONNECTICUT YANKEE OFFSITE EMERGENCY MONITOR POINTS

POINT	MAP#	DIRECTIONS
K1.1	12	Right on Rte. 151 to Rte. 149S to Rte. 82W to Rte. 9A. Turn right. Follow Rte. 9A 2.8 miles. Sample point at intersection of Park Road and Rte. 9A.
K2.1	12	Right on Rte. 151 to Rte. 149S to Rte. 82W to Rte. 9A for 3.3 miles to Jail Hill Road. Left on Jail Hill for approximately 3/4 mile to Turkey Hill Road. Left on Turkey Hill Road to Filley Road. Sample at intersection.
K3.1	12	Right on Rte. 151 to Rte. 149S to Rte. 82W to Rte. 9A. Turn right. Follow Rte. 9A 3.3 miles. Turn left on Jail Hill Road. Go .9 mile on Jail Hill Road to Turkey Hill Road. After crossing bridge bear left for .4 miles to Filley Road. Turn right on Filley Road. Go 1 mile on Filley Road. Sample at Rte. 9 underpass.
K4.1	12	Right on Rte. 151 to Rte. 149S to Rte. 82W to Rte. 9A. Turn right. Follow Rte. 9A 3.3 miles. Turn left on Jail Hill Road. Go .9 miles on Jail Hill Road to Turkey Hill Road. After crossing bridge bear left for .7 miles to Cedar Lake Road. Turn right on Cedar Lake Road to Dickinson Road. Sample at intersection.
K5.1	13	Right on Rte. 151 to Rte. 149S to Rte. 82W to Rte. 9S to Rte. 148W approximately 1-1/2 miles to Cedar Lake Road on right. Cedar Lake Road approximately 1-1/2 miles to Filley Road approximately 1 mile to Old Country Road on left. Sample at intersection.
K6.1	13	Right on Rte. 151 to Rte. 149S to Rte. 82W to Rte. 9S to Rte. 148W approximately 1-1/2 miles to Cedar Lake Road on right. Cedar Lake Road approximately 1-1/2 miles to Filley Road. Sample at intersection.
K6.2	13	Right on Rte. 151 to Rte. 149S to Rte. 82W to Rte. 9S to Rte. 148W approximately 3-1/2 miles to Parker Hill Road on right. Take Parker Hill Road approximately 1-1/2 miles to Parker Hill Road on left. Sample at intersection.
K7.1	13	Right on Rte. 151 to Rte. 149S to Rte. 82W to Rte. 9S to Rte. 148W approximately 3-1/2 miles to Parker Hill Road. Sample at intersection.
K8.1	8	Right on Rte. 151 to Rte. 149S to Rte. 82W to Rte. 9S to Rte. 148W to Rte. 81. Sample at intersection.
K9.1	9	Right on Rte. 151 to Rte. 149S to Rte. 82W to Rte. 9S to Rte. 148W to Rte. 81. Left on Rte. 81 to Killingworth Firehouse on left. Sample on side of road.

Attachment 3 (cont'd)

CONNECTICUT YANKEE OFFSITE EMERGENCY MONITOR POINTS

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POINT	MAP#	DIRECTIONS
K10.1	9	Right on Rte. 151 to Rte. 149S to Rte. 82W to Rte. 9S to Rte. 80W to Rte. 81. Sample at intersection.
L1.1	12	Right on Rte. 151 to Rte. 149S to Rte. 82W to Rte. 9A. Turn right. Follow Rte. 9A 3 miles, to Quarry Hill Road on left. Sample at intersection.
L2.1	12	Right on Rte. 151 to Rte. 149S to Rte. 82W toRte. 9A. Turn right. Follow Rte. 9A 3.3 miles. Turn left on Jail Hill Road. Go .9 miles on Jail Hill Road. Sample at bridge.
L3.1	12	Right on Rte. 151 to Rte. 149S to Rte. 82W to Rte. 9A. Turn right. Follow Rte. 9A 3.3 miles. Turn left on Jail Hill Road. Go .9 miles on Jail Hill Road. After crossing bridge bear right. Go 1 mile on Beaver Meadow Road to Hubbard Road on right. Sample at intersection.
L4.1	12	Right on Rte. 151 to Rte. 149S to Rte. 82W to Rte. 9N to Beaver Meadow Road Exit (next exit north). Turn left on Beaver Meadow Road for approximately 1 mile to Mottland Road on left. Sample at intersection.
L5.1	13	Right on Rte. 151 to Rte. 149S to Rte. 82W to Rte. 9N to Beaver Meadow Road Exit (next exit north). Turn left on Beaver Meadow Road for approximately 3 miles to Parker Hill Road on right. Go right on Parker Hill Road to Rte. 81. Sample at intersection.
L6.1	8	Right on Rte. 151 to Rte. 149S to Rte. 82W to Rte. 9S to Rte. 148W to Rte. 81E. Turn right on 81E for approximately 2 miles. Sample at intersection of Hidden Lake Road on left.
L7.1	8	Right on Rte. 151 to Rte. 149S to Rte. 82W to Rte. 9S to Rte. 148W to Rte. 81E. Turn right on 81E approximately 1 mile to Pond Meadow Road on left. Go approximately 1/2 mile on Pond Meadow Road to Bethke Road. Sample at intersection.
L8.1	8	Right on Rte. 151 to Rte. 149S to Rte. 82W to Rte. 9S to Rte. 148W approximately 9 miles to Burr Hill Road on right. Sample at intersection.
L9.1	8	Right on Rte. 151 to Rte. 149S to Rte. 82W to Rte. 9S to Rte. 148W approximately 9 miles to Emmanual Church Road on left. Take Emmanual Church Road to Chestnut Hill Road. Sample at intersection by Church.
L10.1	4	Right on Rte. 151 to Rte. 149S to Rte. 82W to Rte. 9S to Rte. 80W approximately 13 miles to Summer Hill Road on right. Take right on Summer Hill Road 1.8 miles to Bunnell Bridge Road on right. Sample at intersection.

CONNECTICUT YANKEE OFFSITE EMERGENCY MONITOR POINTS

POINT	MAP#	DIRECTIONS
M1.1	12	Right on Rte. 151 to Rte. 149S to Rte. 82W to Rte. 9A. Turn right. Follow Rte. 9A 3.4 miles. Sample point at intersection of Jail Hill Road and Rte. 9A.
M2.1	12	Right on Rte. 151 to Rte. 149S to Rte. 82W to Rte. 9A North for approximately 3-3/4 miles to Hayden Hill Road. Turn left. Go approximately 1/4 mile to Timms Hill Road. Sample at intersection.
M3.1	12	Right on Rte. 151 to Rte. 149S to Rte. 82W to Rte. 9A South for 3.3 miles to Jail Hill Road on left. Go .9 mile on Jail Hill Road. After crossing bridge bear right. Go 1 mile on Beaver Meadow Road. Turn right on Hubbard Road to the Rte. 9 overpass. Sample at overpass.
M4.1	12	Right on Rte. 151 to Rte. 149S to Rte. 82W to Rte. 9A South for 3.3 miles to Jail Hill Road on left. Go .9 miles on Jail Hill Road. After crossing bridge bear right. Go 1 miles on Beaver Meadow Road. Turn right on Hubbard Road to Rte. 81. Sample at intersection.
M5.1	7	Right on Rte. 151 to Rte. 149S to Rte. 82W to Rte. 9A North on Rte. 81W. Rte. 81W for approximately 2-1/2 miles to Little City Road. Turn right on Little City Road for approximately 1 mile to Gunger Hill Road. Sample at intersection.
M6.1	7	Right on Rte. 151 to Rte. 149S to Rte. 82W to Rte. 9A North for approximately 6-1/2 miles to Candlewood Hill Road for approximately 2 miles to Little City Road on left. Take Little City Road approximately 3/4 mile to Schuler Road. Sample at intersection.
M7.1	8	Right on Rte. 151 to Rte. 149S to Rte. 82W to Rte. 9A North to Rte. 81W for approximately 2.5 miles to Little City Road. Take Little City Road for approximately 4 miles to Jackson Road. Sample at intersection.
M8.1	3	Right on Rte. 151 to Rte. 149S to Rte. 82W to Rte. 9S to Rte. 148W to Blue Hills Road. Just before Rte. 79 junction go right on Blue Hills Road for approximately 1-1/2 miles to Higganum Road. Sample intersection.
M9.1	4	Right on Rte. 151 to Rte. 149S to Rte. 82W to Rte. 9S to Rte. 148W for approximately 11 miles to Rte. 79S junction. Sample at intersection.

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POINT	MAP#	DIRECTIONS
M10.1	4	Right on Rte. 151 to Rte. 149S to Rte. 82W to Rte. 9 South to Rte. 148W for approximately 11 miles to Rte. 79S. Take Rte. 79S for approximately 2 miles to County Road. Sample at intersection.
N1.1	12	Right on Rte. 151 to Rte. 149S to Rte. 82W to Rte. 9A. Turn right. Follow Rte. 9A 3-1/4 miles to Walkley Hill Road on left. Sample at intersection.
N2.1	12	Right on Rte. 151 to Rte. 149S to Rte. 82W to Rte. 9A North for approximately 3-1/4 miles to Walkley Hill Road on left. Take Walkley Hill Road for approximately 1/2 mile to Meeting House Road. Sample at intersection..
N4.1	12	Right on Rte. 151 to Rte. 149S to Rte. 82W to Rte. 9A. Turn right. Follow Rte. 9A 6.5 miles to Rte. 81W. Turn left on Rte. 81W. Go 1.2 miles. Sample point at intersection of Rte. 81W and Skinner Road.
N5.1	7	Right on Rte. 151 to Rte. 149S to Rte. 82W to Rte. 9A North for approximately 6-1/2 miles to Candlewood Hill Road on left. Take Candlewood Hill Road for approximately 1 mile to Maple Avenue. Sample at intersection.
N6.1	7	Right on Rte. 151 to Rte. 149S to Rte. 82W to Rte. 9A North for approximately 6-1/2 miles to Candlewood Hill Road on left. Take Candlewood Hill Road for approximately 2 miles to Wiese Albert Road on right. Sample at intersection.
N7.1	3	Right on Rte. 151 to Rte. 149S to Rte. 82W to Rte. 9A North for approximately 6-1/2 miles to Candlewood Hill Road on left. Take Candlewood Hill Road for approximately 3 miles to Foot Hills Road on right. Take Foot Hills Road for approximately 1-1/2 miles to where Wiese Albert Road intersects Foot Hills Road for the 2nd time. (on top of hill). Sample at intersection.
N8.1	3	Left on Rte. 151 to Rte. 66W to Rte. 17S to Rte. 9S to Rte. 17S Haddam Quarter Road on left. Take Haddam Quarter Road for approximately 2 miles to Johnson Lane. Sample at intersection.
N9.1	3	Left on Rte. 151 to Rte. 66W to Rte. 9S to Rte. 17S to Haddam Quarter Road on left. Take Haddam Quarter Road for approximately 2 miles to Johnson Lane. Right on Johnson Lane to Maiden Lane. Left on Maiden Lane to Bear Rock Road on left. Sample at intersection.
N10.1	3	Left on Rte. 151 to Rte. 66W to Rte. 9S to Rte. 17S to Rte. 79. Sample at intersection.

CONNECTICUT YANKEE OFFSITE EMERGENCY MONITOR POINTS

POINT	MAP#	DIRECTIONS
N10.2	3	Left to Rte. 151 to Rte. 66W to Rte. 9S to Rte. 17S to Rte. 68. Sample at intersection.
P2.1	12	Right on Rte. 151 to Rte. 149S to Rte. 82W to Rte. 9A North for approximately 3-1/2 miles to Haddam Island Meadows State Park on right (opposite Island Park Road). Sample in parking area.
P3.1	12	Right on Rte. 151 to Rte. 149S to Rte. 82W to Rte. 9A North for approximately 6 miles to Walkley Hill Road on left. Sample at intersection.
P4.1	12	Right on Rte. 151 to Rte. 149S to Rte. 82W to Rte. 9A. Turn right. Follow Rte. 9A 6.5 miles. Turn left on Rte. 81W. Go approximately 30 feet. Sample at intersection of Maple Avenue and Rte. 81W.
P5.1	6	Right on Rte. 151 to Rte. 149S to Rte. 82W to Rte. 9A North for approximately 8 miles to Thayer Road on left. Sample at intersection.
P6.1	6	Left on Rte. 151 to Rte. 66W to Rte. 9S to Exit 10 (Aircraft Road). Sample at intersection of Rte. 9 and 9A.
P7.1	6	Left on Rte. 151 to Rte. 66W to Rte. 9S to Exit 11. At exit go right to Bartholomew Road. Go right on Bartholomew Road for approximately 2-1/2 miles to Chamberlain Road. Sample at intersection.
P8.1	6	Left on Rte. 151 to Rte. 66W to Rte. 9S to Exit 11 (Randolph Road). Sample at Randolph Road.
P9.1	2	Left on Rte. 151 to Rte. 66W to Rte. 9S to Exit 11 (Randolph Road). Left on Randolph Road to Arbutus Street. Sample at intersection by church.
P10.1	2	Left on Rte. 151 to RDte. 66W to Rte. 9S to Exit 11 Randolph Road. Left on Randolph Road across Rte. 155 intersection to Long Hill Road. Sample at intersection.
Q1.1	12	From CY plant gate travel 1.15 miles on Injun Hollow Road to Ben Clark Lane. Sample at intersection.
Q2.1	12	Injun Hollow Road to Rock Landing Road. Left on Rock Landing Road to Water. Sample at water.
Q3.1	11	Injun Hollow Road right on Rock Landing Road to Hurd Park Road. Left on Hurd Park Road for approximately 1/2 mile to Clarkhurst Road on left. Left on Clarkhurst 1/4 mile. Sample at side of road.

CONNECTICUT YANKEE OFFSITE EMERGENCY MONITOR POINTS

POINT	MAP#	DIRECTIONS
Q5.1	6	Left on Rte. 151 to Rte. 66W to Rte. 9S to Exit 10 (Aircraft Road) to end of road. Sample at Pratt and Whitney entrance.
Q6.1	6	Left on Rte. 151 to Rte. 66W to Rte. 9S to Exit 10 Aircraft Road. Left on Marroms Road to Brooks Road. Sample at intersection.
Q7.1	6	Left on Rte. 151 to Rte. 66W to Rte. 9S to Silver Street (Exit 12). Take Silver Street past Connecticut Valley Hospital to River Road. Turn right on River Road to Hartford Electric company, Middletown Station. Sample at entrance.
Q8.1	6	Left on Rte. 151 to Rte. 66W to Rte. 9S to Silver Street (Exit 12). Take left on Silver Street past Connecticut Valley Hospital to River Road. Turn right on River Road to sand and gravel plant on right. Sample at road side.
Q8.2	5	Left on Rte. 151 to Rte. 66W for approximately 2 miles to Middle Haddam Road on right. Sample at intersection.
Q9.1	5	Left on Rte. 151 to Rte. 66W for approximately 3-1/2 miles to Rte. 17. Sample at intersection.
Q10.1	1	Left on Rte. 151 to Rte. 66W to Rte. 17A (Portland Center). Sample at intersection.
Q10.2	5	Left on Rte. 151 to Rte. 66W to Rte. 17N 1.1 miles to Bartlett Street. Sample at 4-way intersection.
R1.1	12	Injun Hollow Road to Rock Landing Road. Turn right on Rock Landing Road. Go .6 miles to Quarry Hill Road. Turn right on Quarry Hill Road. Go 1.3 miles, bear right at fork to Ague Spring Road. Sample point on left side of road.
R2.1	11	Injun Hollow Road to Rock Landing Road. Turn right on Rock Landing Road. Go .6 miles to Quarry Hill Road. Turn right on Quarry Hill Road to School House Road. Go 1.0 miles. Sample at intersection.
R3.1	11	Injun Hollow Road to Rock Landing Road, to Quarry Road. Sample at intersection by Haddam Neck Fire Station.
R4.1	11	Injun Hollow Road to Rock Landing Road to Haddam Neck Road to Rte. 151. Sample at intersection.
R5.1	11	Right on Rte. 151 to Rte. 196 North for approximately 3 miles to Old Chestnut Hill Road on left. Take Old Chestnut Hill Road for approximately 1 mile to Chestnut Hill Road. Sample at intersection.

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POINT	MAP#	DIRECTIONS
R6.1	10	Left on Rte. 151 to Rte. 66E to Rte. 16E approximately .6 miles to Chestnut Hill Road on right. Sample at intersection.
R7.1	11	Left on Rte. 151 to Rte. 66. Sample at intersection.
R8.1	10	Left on Rte. 151 to Rte. 66E for approximately 1.2 miles to Cone Road on left. Left on Cone Road to Abbey Road to North Cone Road on right. At the end of North Cone Road bear left to Cobalt Road on right. Sample at end of pavement on Cobalt Road by brook.
R9.1	5	Left on Rte. 151 to Rte. 66, across Rte. 66 to Depot Hill Road bear left to Middle Haddam Road, go 1/4 mile to Penfield Hill Road on right, take Penfield Hill Road for approximately 1-1/2 miles to Stewart Hill Road on right. Take Stewart Hill Road 1/2 mile to Great Hill Road. Sample at intersection.
R10.1	5	Left on Rte. 151 to Rte. 66, across Rte. 66 to Deport Hill Road bear left to Middle Haddam Road, go 1/4 mile to Penfield Hill Road on right, go Penfield Hill Road to Cox Road. Sample at intersection.
R10.2	5	Left on Rte. 151 to Rte. 66W across 66 to DEpot Hill Road, bear left to Middle Haddam Road, go 1/4 mile to Penfield Hill Road on right, go Penfield Hill Road to Cox Road. Right on Cox Road to South Road. Take left onto South Road to Marlborough Tpke. Sample at intersection.

Attachment 4

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General Guidelines for
Offsite Survey Locations

It is important to realize that the meteorological data taken from the tower is for one specific location, one specific height, and one specific instant in time. Under most conditions, it will provide a good estimate of the general direction of the plume. However, due to local topography, local meteorology, wide variations in wind direction at low wind speeds, etc., there can be a great deal of uncertainty as to the actual plume location. Thus, for example, a wind direction reading of 270° does not necessarily mean that field team surveys taken downwind in the 90° sector or one sector either side will find the plume. Thus, it may be necessary to perform wide ranging surveys in order to locate the plume. The attached table provides guidelines on the number of sectors which should be surveyed as a function of meteorological conditions. In addition, the following general guidelines are also presented:

General Guidelines

1. It is extremely important for the field teams to constantly observe their dose rate meters while enroute to specified survey locations and report any unexpected readings.

2. The met tower wind direction readings should be rechecked at least every 15 to 30 minutes.

3. If time or manpower is extremely short, preference should be given to the indicated downwind direction and then expanded per the guidance given in the attached table.

4. If releases are still continuing, offsite surveys should always be done first within the 2 mile radius per the directional guidance given in the attached table. This means that the field team should stay within 2 miles and survey crosswind for the number of sectors shown in the table. If an additional team is available, they should concentrate on the distance from 2-5 miles and also survey crosswind for the number of sectors indicated in the table. This will provide a more rapid indication or verification of the plume direction. If positive readings are observed and give a clear indication of the sector where the plume is located, surveys should be expanded to greater distances in that sector and one sector to either side.

5. The time of the release, wind speed, and field team transit time must be considered in determining the distance at which surveys should be taken. For example, if the release just started 30 minutes ago and the wind speed is only 2 MPH, it would not make

General Guidelines for
Offsite Survey Locations

sense to send the field teams out 3 to 10 miles at this time as the plume would not be there yet. As another example, if the releases terminated 15 minutes ago and the wind speed is 4 MPH and it will take the field team at least another 30 minutes to load their equipment and get out in the downwind direction, then they would have to go out at least 3 to 4 miles to find the plume. However, surveys should be done as soon as possible at closer distances to determine residual contamination levels.

6. After surveys are done at the plume centerline (if it can be determined), preference should be given to areas of higher population density, including a consideration of schools, factories, etc., that are in the same general direction as the plume.

7. For ground releases, the maximum dose rates and iodine concentrations should be at the site boundary and then continuously decrease with distance. Hence air samples taken at the location of highest dose rates should indicate iodine activity if it is being released.

8. For elevated stack releases, the highest dose rates should still be at the site boundary and decrease with distance, even if the plume is not at the ground yet. (This is due to the effect of the overhead gamma radiation). However, for iodine samples the plume must be on the ground to get measurable results. Depending on stability, wind speed, and local topography, it may be many miles before the plume touches ground (usually the greater the stability the greater the distance). Hence the maximum dose rate locations may not correspond to the maximum iodine concentrations.

   If an air sample taken at a measurable dose rate location does not indicate any significant activity on the iodine cartridge, a couple of methods to determine if the plume was on the ground are:

   a. Do a quick count on the particulate filter, if the plume was on the ground it should contain short lived noble gas daughters (assuming a fresh release).

   b. Compare the head high dose rate with the windows pointed up to the waist height dose rate with the window pointed parallel to the ground. If the head high dose rate is greater, the plume is probably still overhead. If the dose rates are the same, the plume may be on the ground. (This is not a foolproof method.)

GUIDANCE ON SURVEY DIRECTIONS

I. STACK RELEASES - USE 196' MET DATA

	STABILITY CLASS	WIND SPEED	GUIDANCE
1.	Unstable or Neutral	Greater Than 5 MPH	Survey in downwind sector and one sector either side
	(ΔT196 < +0.5°F)	1-5 MPH	Survey in downwind sector and three sectors on either side
		Calm < 1 MPH	Survey in all directions
2.	STABLE (ΔT196 > +0.5°F)	Greater Than 5 MPH	Survey in downwind sector and two sectors either side
		1-5 MPH	Survey in downwind sector and three sectors either side
		Calm < 1 MPH	Survey in all directions

II. GROUND OR NON-STACK RELEASES

1. If the wind direction at 196' and 33' are within 20° of each other - Survey in downwind direction and one sector either side (regardless of stability or speed)

2. If 196' and 33' wind directions are not within 20°

   a. If an elevated steam release (e.g. - atmospheric steam dump) - Use guidance above for stack +196' data

   b. If any other ground release - Use 33' data

      (i) Wind Speed >5 MPH - Survey downwind sector + one sector each side
      (ii) Wind Speed 1-5 MPH - Survey downwind sector + three sectors each side
      (iii) Wind Speed Calm - <1 MPH - Survey all directions

EPIP 1.5-20-D
Rev. 2--(MAJOR)
(EPIP4)

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PLANT OPERATIONS REVIEW COMMITTEE APPROVAL

Connecticut Yankee
Emergency Plan Implementing
Procedure No. EPIP 1.5-20

REENTRY AND RECOVERY

APPROVED BY STATION SUPERINTENDENT

EFFECTIVE DATE 4-5-83

1.0 PURPOSE

To provide guidance to the Station Emergency Response Organization following an incident/accident in which emergency actions have subsequently brought the plant to a safe condition. Procedures provide for directing reentry into affected areas of the plant, initiating recovery operations, and activating the Corporate Organization for Recovery Operations (CORO) to replace the Emergency Response Organization when extended periods of time are required for the recovery phase.

2.0 RESPONSIBILITY

2.1 The Director of Station Emergency Operations (Director of SEO) is responsible for implementing reentry and initial or short-term recovery actions which may include:

- o Evaluating existing site, Station, and plant area conditions for feasibility of reentry/recovery.
- o Determining recovery actions necessary.
- o Preempting previously established protective measures to allow reentry by the Emergency Repair Teams (ERTs).

2.2 The Manager of Onsite Resources (MOR) is responsible for staffing and organizing the ERTs with available personnel qualified to accomplish the specific recovery actions.

2.3 CORO, once activated as described in section 3.6, is responsible for long-term recovery operations.

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3.0 ACTIONS

3.1 Reentry Guidelines

3.1.1 Reentry into an evacuated area should not normally be accomplished until the following conditions permit protective measures to be relaxed:

- o All off-site radiological releases are terminated.
- o Plant is stable.
- o Cold shutdown is in effect.

3.1.2 Extreme situations may necessitate reentry into an evacuated area before the above conditions are met. The risk of exposure and injury must be carefully weighed against the probability of success and benefits gained from emergency reentry operations. The following serve as guidelines in making decisions to waiver or extend exposure limits and deploy personnel in high radiation and otherwise hazardous areas.

3.1.2.1 Life-saving actions such as search and rescue and removal of injured persons, or entry to prevent conditions that would probably injure persons shall be limited to a one-time exposure. Whole body exposures shall not exceed 75 Rem.

3.1.2.2 Situations where it is necessary to enter a hazardous area to protect equipment and/or facilities, eliminate future discharge of radioactive effluents or to control fires shall be limited to a one-time exposure. Whole body exposures shall not exceed 25 Rem.

3.1.2.3 Decisions to accept hazardous assignments is on a volunteer basis. Volunteers should be in good health, preferably at least 45 years of age and not planning to procreate. The volunteers should be familiar with the risks and consequences of the task.

Stay times are controlled to minimize external exposure with the use of the best available respiratory protection equipment and protective clothing to minimize internal and external contamination. The volunteer should avoid risk in cases where the victim's exposure is known to be already fatal. Personnel who have been exposed to a significant fraction of the established guideline are removed from further emergency duty and placed under the care of a physician.

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3.2 Planning for Reentry Operations

3.2.1 The Director of SEO shall review the following data and preplan all activities prior to authorizing reentry by an ERT.

3.2.2 The Director of SEO and/or designated manager(s) shall give detailed briefing for personnel entering the evacuated areas. The briefing may include, but not be limited to, the following:

- o Areas to be surveyed.
- o Known and anticipated radiation data to determine plant areas potentially affected by high levels of radiation and contamination.
- o Adverse environmental conditions such as temperature, gases, and smoke that the reentry team will encounter.
- o Routes and alternate routes to be followed including entry and decontamination points.
- o Access control and exit procedures.
- o Shielding, protective clothing, respirators, and other protective equipment required.
- o Communications.
- o Radiation survey equipment required.
- o Current radiation exposures of emergency personnel who will participate in the reentry operation.
- o Exposure control limits and personnel dosimetry requirements.
- o Risk of overexposure.
- o ALARA observance.

3.2.3 The Director of SEO shall evaluate the need for additional personnel and direct the MOR to obtain the required personnel. The MOR will organize ERTS consisting of personnel (minimum of three) from the following groups as available:

- o Maintenance
- o Operations
- o Health Physics
- o Plant Engineering

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3.3 Implementing Reentry Operations

3.3.1 The Director of SEO will direct the actions to be accomplished during initial reentry.

3.3.1.1 Brief the ERT members on their objectives, instructions, and precautions.

3.3.1.2 Instruct the ERT members to assess the following items in the priority specified:

- Determination of initially required recovery operations including assessment of equipment damage.
- Determination of existing or potential hazards associated with the required recovery operations.

3.3.1.3 If exposure limits allow, instruct the ERT to perform the following actions after all assessments have been completed:

- Conduct comprehensive radiation surveillance of plant facilities and define radiologically hazardous areas.
- Isolate and post areas in the plant with the appropriate signs and barriers.

3.3.1.4 After reentry operations have been completed, the ERT will:

- Follow established self-monitoring decontamination procedures as necessary.
- Record and report to the Director of SEO the assessment of equipment damage, potential hazards and the radiological assessments in the affected areas.

3.4 Planning for Recovery Operations

3.4.1 The Emergency Response Organization shall evaluate the radiological conditions and damage assessment reports.

3.4.2 Based on the above evaluation, the Director of SEO will determine the following:

- o The plant and Station areas that have been affected by the incident/accident.
- o Action required to restore the plant and Station to normal conditions.
- o Radiological measures and Health Physics requirements.
- o Personnel, equipment, and time requirements.

3.5 Implementing Short-Term Recovery

3.5.1 During short-term recovery operations, the Manager of Radiological Consequence Assessment will ensure that all work is performed in accordance with accepted health physics principles and procedures. Personnel radiation exposure during the recovery phase of the incident/accident shall be closely controlled and documented.

3.5.2 The Director of SEO shall designate applicable recovery teams to perform the following actions as needed:

- o Installation of shielding
- o Posting of controlled areas
- o Application of clearance tags
- o Decontamination and clean-up as required to place the plant in an acceptable long-term safe condition

3.5.3 The MOR is responsible for staffing and organizing the required personnel for the recovery teams.

3.5.4 The Emergency Response Organization will continually evaluate damage assessments and the actions of the recovery teams to keep appraised of the plant equipment and site areas that have been affected by the incident/accident.

3.5.5 Based on the Emergency Response Organization recommendations, the Director of SEO will designate applicable recovery teams to perform the following actions:

- o Evaluate the repair work required to modify plant equipment.
- o Repair and/or modify plant systems and/or components as authorized.
- o Develop test programs to confirm fitness for return to service of all plant systems and/or components affected by the incident/accident.

3.6 Implementing Long-Term Recovery

3.6.1 Based on the extent of the emergency and the magnitude of the recovery, CORO may be activated to replace the Station Emergency Response Organization.

3.6.2 The Director of SEO recommends activation of CORO to the Senior Vice President, Nuclear Engineering and Operations, who makes the final decision. Criteria for activating CORO include:

- o The Plant is in a stable condition.
- o The emergency action levels indicate a reduction of incident classification to at least an ALERT (posture code CHARLIE-ONE).
- o Major radioactive releases offsite have been terminated.
- o There is no longer a danger, either existing or potential, of substantial degradation to the plant's level of safety.

3.6.3 The Director of SEO shall ensure that radiopager (Level II) notification to state and local communities is accomplished indicating that CORO is activated and assumed responsibility for long-term recovery, emergency operations have been terminated, and Station Emergency Response Organization is no longer in effect.

3.6.4 The Managers of the Station Emergency Response Organization shall brief CORO at the Emergency Operations Facility concerning the incident, subsequent emergency actions, the existing conditions of the plant, and other related matters to ensure adequate understanding of plant status.

3.6.5 The organizational structure of CORO is shown in attachment I and described below:

3.6.5.1 The Director of Recovery Operations is responsible for overall direction of recovery and reports to the Senior Vice President, Nuclear Engineering and Operations of CYAPCO and NUSCO.

3.6.5.2 The Manager of Technical Support is responsible for analyzing core parameters and other technical information, providing licensing support, providing a central facility for the collection, retention, and retrieval of data, and developing recovery procedures.

3.6.5.3 The Manager of Plant Operations is responsible for implementing Station recovery activities, Station maintenance and repair activities, training Station staff as required to support recovery operations, and coordinating health physics activities.

3.6.5.4 The Manager of Radiation Control/Radwaste is responsible for developing plans and procedures to sample. process, and control liquid, gaseous, and solid radioactive wastes. In addition, he/she will develop decontamination plans to support the Station staff.

3.6.5.5 The Manager of Resources/Construction is responsible for acquiring and coordinating personnel, housing, and equipment for offices and construction to support repair activities; arranging for purchasing assistance; and providing general office support.

3.6.5.6 The Manager of Engineering is responsible for providing necessary engineering support services and interfacing and consulting with various technical experts as needed.

3.6.5.7 The Manager of Scheduling/Planning is responsible for scheduling and expediting recovery operations, coordinating recovery staff meetings, tabulating, expediting and closing out commitment list items in support of recovery operations.

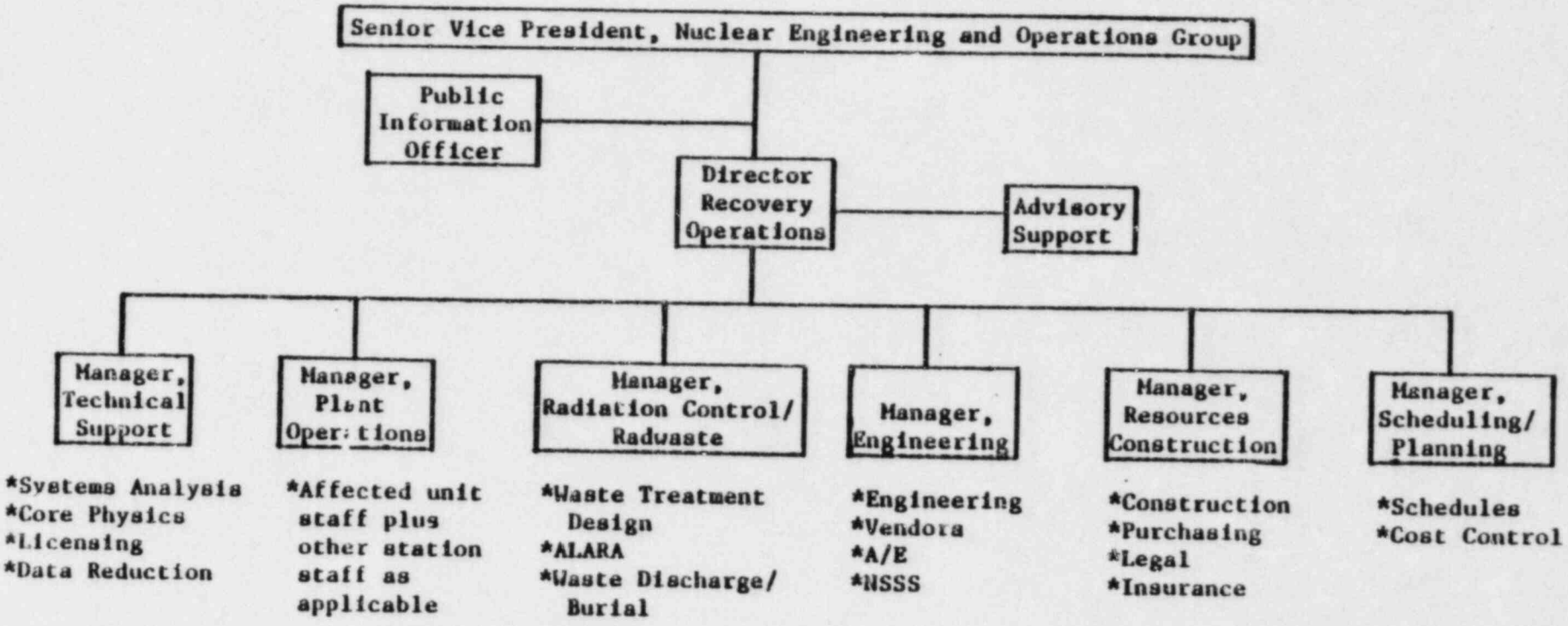
3.6.5.8 The Advisory Support personnel serve as a staff function for advice and support to the Director of Recovery Operations in various areas.

4.0 ATTACHMENTS

5.0 PROCEDURE CROSS REFERENCE

5.1 EPIP 1.5-21, Director of Station Emergency Operations
5.2 EPIP 1.5-27, Manager of On-Site Resources
5.3 CONI 1.06, Corporate Organization for Recovery Operations

CORPORATE ORGANIZATION FOR RECOVERY OPERATIONS



EPIP 1.5-30-D
Original
(EPIP3)
APR 0 8 1983

PLANT OPERATIONS REVIEW COMMITTEE APPROVAL

Connecticut Yankee
Emergency Plan Implementing Procedure
EPIP 1.5-30

APPROVED BY STATION SUPERINTENDENT

EFFECTIVE DATE 4-8-83

ON-SHIFT CHEMISTRY TECHNICIAN

1.0 PURPOSE

To provide guidance to the On-Shift Chemistry Technician for emergency actions during a plant emergency.

2.0 RESPONSIBILITY

2.1 The Operations Shift Supervisor/Manager of Control Room Operations (MCRO) is responsible for directing the immediate actions of the On-Shift Chemistry Technicians.

2.2 The Manager of Radiological Consequence Assessment (MRCA) is responsible for the emergency actions of the On-Shift Chemistry Technician when the Emergency Operations Center (EOC) is operational.

2.3 The MRCA shall request the Manager of Onsite Resources to call-in one of the Chemistry Supervisors to advise the Director of SEO and MRCA on Chemistry related matters.

2.4 The call-in Chemistry Supervisor shall at the request of the MRCA supervise the post-incident/accident activities of the On-Shift Chemistry Technician and be responsible for determining additional analysis as required by the Chemistry Department Procedures to satisfy Technical Specifications or safety-related system analysis.

2.5 The On-Shift Chemistry Technician is responsible for implementing this procedure.

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3.0 ACTIONS

3.1 Immediate actions.

3.1.1 When the Station Evacuation Alarm is sounded, the On-Shift Chemistry Technician shall:

- Report to the Immediate Response Operational Support Center (IROSC) located in the Control Room viewing gallery.
- Notify the Operations Shift Supervisor/MCRO of your presence in the IROSC.
- Obtain a portable radio from the Control Room and establish and maintain continuous communication (channel 3) with the Operations Shift Supervisor.

  Note: Telephone communications may be used if available.

- When the EOC is operational, establish and maintain continuous communications with the MRCA (channel 3).
- Based on plant conditions, the Operations Shift Supervisor/MCRO will assign the On-Shift Chemistry Technician to perform emergency actions as necessary.

3.2 Subsequent actions.

3.2.1 Depending upon the situation, the MRCA may assign the On-Shift Chemistry Technician to responsibilities, which may include:

- Performing Search and Rescue operations in accordance with EPIP 1.5-15, "Search and Rescue".
- Performing the actions of a fire brigade member, in accordance with EPIP 1.5-16, "Fire."

3.2.2 The On-Shift Chemistry Technician shall perform sampling and analysis as follows:

- As outlined in the Chemistry Department procedures to monitor and document planned and unplanned evolutions such as gas and liquid releases.
- As directed by the MRCA and the call-in Chemistry Supervisor to monitor or document potentially damaging conditions to plant systems as well as the environment and to gather information for evaluations necessary to plant functions.

3.2.3 The On-Shift Chemistry Technician shall perform sampling and anaylsis directed by the Director of SEO and as outlined in, but not limited to, the following procedures:

- o EPIP 1.5-38, Containment Curie Level Estimation.
- o EPIP 1.5-39, Post-Accident Sampling of Reactor Coolant.
- o EPIP 1.5-40, Post-Accident Sampling of Containment Atmosphere.
- o EPIP 1.5-41, Core Damage Estimate.

NOTE: The potential exists for more than one of the above situations to occur simultaneously, requiring the On-Shift Chemistry Technician to perform more than one function at a time. The MRCA or Chemistry Supervisor shall determine the precedence of these actions to be performed.

- o CHM 7.1-2, Steam Generator Chemistry Control (All Volatile Treatment)
- o CHM 7.1-3, Steam Generator Chemistry Control (Cold Shutdown, Hot Standby, Power Operation Less than 25%)
- o CHM 7.3-3, Pressurizer Chemistry Control
- o SUR 5.4-2, Boric Acid Mix Tank Chemical Surveillance
- o SUR 5.4-4, Reactor Coolant Chemistry Surveillance
- o SUR 5.4-9, Accountability of Radioactive Gas Released to Stock When Sampling Reactor Coolant.
- o SUR 5.4-12, Environmental Technical Specifications Chemical Parameters.
- o SUR 5.4-13, Liquid Radwaste Release Surveillance
- o SUR 5.4-14, Gaseous Radwaste Release Surveillance

4.0 ATTACHMENTS

None

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5.0 PROCEDURE CROSS REFERENCE

5.1 EPIP 1.5-15, Search and Rescue
5.2 EPIP 1.5-16, Fire
5.3 EPIP 1.5-22, Manager of Radiological Consequence Assessment
5.4 EPIP 1.5-26, Manager of Control Room Operations
5.5 EPIP 1.5-38, Containment Curie Level Estimation
5.6 EPIP 1.5-39, Post-Accident Sampling of Reactor Coolant
5.7 EPIP 1.5-40, Post-Accident Sampling and Containment Atmosphere
5.8 EPIP 1.5-41, Core Damage Estimate
5.9 CHM 7.1-2 , Steam Generator Chemistry Control (All Volatile Treatment)
5.10 CHM 7.1-3 , Steam Generator Chemistry Control (Cold Shutdown, Hot Standby, Power Operation Less Than 25%)
5.11 CHM 7.3-3 , Pressurizer Chemistry Control
5.12 SUR 5.4-2 , Boric Acid Mix Tank Chemical Surveillance
5.13 SUR 5.4-4 , Reactor Coolant Chemistry Surveillance
5.14 SUR 5.4-9 , Accountability of Radioactive Material Released as the Result of a Primary to Secondary Leak
5.15 SUR 5.4-12, Environmental Tech. Spec. Chemical Parameters
5.16 SUR 5.4-13, Liquid Radwaste Release Surveillance
5.17 SUR 5.4-14, Gaseous Radwaste Release Surveillance

EPIP 1.5-39-D
Revision 3
APR 0 8 1983

PLANT OPERATIONS REVIEW COMMITTEE APPROVAL

Connecticut Yankee
Emergency Plan Implementing Procedure
No. EPIP 1.5-39

POST ACCIDENT SAMPLING OF REACTOR COOLANT

APPROVED BY STATION SUPERINTENDENT

EFFECTIVE DATE 4-8-83

1.0 PURPOSE

The purpose of this procedure is to establish the method by which the reactor coolant is remotely sampled following an accident.

2.0 LICENSE OR ADMINISTRATIVE REQUIREMENTS

2.1 Connecticut Yankee Technical Specifications, Section 6.0, Administrative Control (where applicable).

3.0 REFERENCES

3.1 NUREG 0578.

3.2 NURE7 0737.

3.3 General Dynamics Technical Manual for Reactor Coolant Post Accident Sample System.

3.4 NUSCO Drawing No. 16103-26057, P&ID--Post Accident Sample System.

3.5 NUSCO Drawing No. 16103-29436, Sheet 2--PASS Schematic--Reactor Coolant.

4.0 PREREQUISITES

4.1 Adequate nitrogen supply regulated to a maximum of 1800 PSIG.

4.2 Communication established between Chemistry lab and Control Room.

4.3 Primary Auxiliary Building Ventilation System is in operation.

4.4 Health Physics requirements established for personnel retrieving sample specified on the Radiation Work Permit.

4.5 Adequate deionized water supply for system flushing.

4.6 Deionized water flush module operational.

4.7 Component cooling supplied to drain header sample heat exchanger E-9-1A, if drain header is to be sampled.

4.8 All manual valves aligned to complete a flow path prior to sampling as per Attachment B. Inproper alignment may cause a situation where accident coolant high radiation levels prevent access to an area necessary to reposition a valve.

4.9 Director or Duty Officer informed and permission granted to operate sample panel.

4.10 Ensure that the following circuits are energized in the switchgear room: old security panel - circuit 3,4,5,7,9 and 11.

5.0 PRECAUTIONS

5.1 If PAB ventilation is not operational, consider removing the blower fuse at the remote operating module, thereby avoiding potential discharges out of the area ventilation exhaust ducting.

5.2 Do not exceed 165°F as read on Temperature Indicator Channel T-1. The influent "high temperature" light will flash when this temperature limit is exceeded. If the temperature reaches this point, secure the sample flow to the SAMPLE MODULE immediately.

5.3 Do not open V-16 or V-17 except during flush operations or when reactor coolant pressures are 250 psig or less as damage to the pH probe may occur.

5.4 Do not exceed 2500 psig in the sample system as damage may occur to the components.

5.5 Valve V-18 must always be positioned to "LOWFLOW" when system pressure is above 400 psig to prevent high pressure spikes due to water hammer.

5.6 Do not run the flush module pump dry for longer than five (5) minutes as damage to the pump may occur.

5.7 Post expected radiation boundaries prior to sampling and monitor radiation levels in the sample area prior to entry and during sample retrieval.

5.8 V-9 and V-14 must be closed at all times except when the syringe is inserted into the sample chamber.

6.0 PROCEDURE

6.1 Preparation for sampling

6.1.1 Obtain a copy of Attachment A on which data will be recorded. _____

6.1.2 Unlock and remove the Anti-tamper cover from the Remote Operating Module. _____

6.1.3 Energize the modules by pressing the power- on switch. Allow 15 minutes warmup period for instrumentation. _____

6.1.4 Preparation of sample module area (service building sampling room). _____

6.1.4.1 Place sample transfer containers and syringes in a convenient location. _____

6.1.4.2 Check that the 2 ml removable grab sample container is installed and quick connects are engaged properly. _____

6.1.4.3 Check that the 2 ml removable grab sample container flexible hoses are connected to the valve operator. The blue ends on one set of quick-connects should be connected together. _____

6.1.4.4 At the sample cabinet, check that V-9 and V-14 (5 ml sample chamber sample valves) are closed. _____

6.1.5 Charge Nitrogen Flask

6.1.5.1 Shut V-23. Open V-22. Crack open V-24 admitting nitrogen to the flask. When pressure equalize, fully open V-24. Caution: Do Not pressurize flask above 1800 PSIG. _____

6.1.5.2 Back off the nitrogen pressure regulator until 0 psig is indicated on the NITROGEN REGULATED PRESSURE guage. _____

6.1.6 Check that the temperature indicator switch is set to T-1. On the temperature readout instrument, ensure that the T-1 button is depressed and the T-2 button is not depressed. _____

6.1.7 Adjust the nitrogen pressure regulator to 80 PSIG. _____

6.1.8 Postion valves as follows:

V-1	BYPASS _____	V-7	BYPASS _____	V-15	CLOSED _____
V-2	GRAB _____	V-8	BYPASS _____	V-16	CLOSED _____
V-3	SAMPLE _____	V-11	LIQUID _____	V-17	CLOSED _____
V-4	CLOSED _____	V-12	BYPASS _____	V-18	LOFLOW _____
V-6	CLOSED _____	V-13	BYPASS _____		

_____

6.1.9 Align a Sample Return Path

6.1.9.1 To return to RHR open SS-SOV-164 (control) and SS-SOV-165 (PASS PANEL) _____

OR

6.1.9.2 To return to the VCT open SS-SOV-173 (control) and SS-SOV-166 (PASS PANEL) _____

CAUTION: It is imperative that all manual valves necessary to complete the sample flow path are properly positioned. Failure to do so may create a situation where high radiation levels of accident coolant prevents access to an area for repositioning a valve once coolant flow to the sample module has been initiated.

6.1.10 Fill the sample module gas loop as follows:

6.1.10.1 Position V-11 to GAS _____

6.1.10.2 Open V-15 _____

6.1.10.3 Position V-7 to INLINE _____

6.1.10.4 Open V-6 and wait 30 seconds _____

6.1.10.5 Position V-12 and V-13 to INLINE and wait 30 seconds _____

6.1.10.6 Position V-12 to BYPASS _____

6.1.10.7 Position V-8 to INLINE and wait 30 seconds _____

6.1.10.8 Position V-7 and V-8 to BYPASS and wait 30 seconds _____

6.1.10.9 Close V-15 _____

6.1.10.10 Position V-11 to LIQUID _____

6.1.10.11 Close V-6 _____

6.1.10.12 Position V-13 to BYPASS _____

6.1.11 Align a sample supply line

6.1.11.1 Sample point downstream of drain header sample heat exchanger (E-9-1A.) Open SS-SOV-167 (PASS panel) and SS-AOV-950 (control room)

OR

6.1.11.2 From RHR system. Open SS-SOV-168 (PASS panel) and SS-SOV-169(control room) _____

6.1.12 Record totalizer meter reading on line 1 of Attachment A. _____

6.1.13 Initiate sample flow by positioning V-2 to BYPASS. Monitor flowmeter reading and radiation levels on the installed rad meter. When radiation levels increase markedly a representative sample is passing through the sample module. _____

6.2 Isolating the Grab Sample

CAUTION: Do not perform any of the Steps under Section 6.2 unless specifically directed to do by the director.

6.2.1 Position V-1 and V-2 to the GRAB position (a reduction in flowrate should be evident). Allow approximately 30 seconds for flow to stabilize. _____

6.2.2 Pressurized 2ml GRAB sample

6.2.2.1 Position V-2 to BYPASS (flowrate should drop to zero) _____

6.2.2.2 Position V-3 to NORMAL and FLUSH. _____

OR

6.2.3 Depressurized 2ml GRAB sample

6.2.3.1 Position V-1 to BYPASS (flowrate should drop to zero) _____

6.2.3.2 Position V-3 to NORMAL and FLUSH _____

6.3 Inline samples (if required. If not go to Section 6.4)

6.3.1 Isolate reactor coolant in liquid loop as follows:

6.3.1.1 Position V-1 to GRAB and V-2 to BY-PASS Open V-4 and V-6. Monitor flow on the FLOWMETER. _____

6.3.1.2 After a 15 second wait, position V-7 and V-8 to INLINE. _____

6.3.1.3 Wait 15 seconds and position V-8 to BY-PASS. _____

6.3.1.4 Start the stripping pump and run for 15 seconds, then secure the pump. _____

6.3.1.5 Close V-6 and wait 10 seconds. _____

6.3.1.6 Close V-4. _____

A pressurized sample of known volume is trapped within the boundaries of V-4, V-6 and V-11. _____

6.3.2 Isolate the sample supply line to the SAMPLE MODULE.

6.3.2.1 Sample point downstream of drain header sample cooler E-9-1A. Close SS-SOV-167 and SS-AOV-950. _____

OR

6.3.2.2 Sample from RHR system. Close SS-SOV-168 and SS-SOV-169. _____

6.3.3 Determine total dissolved gas as follows:

6.3.3.1 Note and record the pressure from the digital pressure readout. Enter reading on Line 2 of Attachment A. _____

6.3.3.2 Position V-12 to IN-LINE. _____

6.3.3.3 Position V-11 to GAS, allowing the liquid loop to depressurize and dissipate released gas to the gas loop. _____

6.3.3.4 Position V-12 to BY-PASS _____

6.3.3.5 Position V-7 to BY-PASS _____

6.3.3.6 Start the stripping PUMP. Allow it to run for one minute then stop the PUMP. _____

6.3.3.7 When pressure, as read on the digital pressure readout, stablizes (about 15 seconds) position valves V-7, V-8 V-12 and V-13 to IN-LINE. _____

6.3.3.8 Restart the stripping PUMP. Allow it to run for one minute then stop the PUMP and allow pressure to stablize. Repeat this step two more times. _____

6.3.3.9 Position V-7, V-8, V-12 and V-13 to BY-PASS V-11 to liquid. _____

6.3.3.10 Note and record the pressure from the digital pressure readout. Enter the reading on line 3 of Attachment A. _____

6.3.3.11 Note and record the temperature T2 from the digital temperature readout. Enter the reading on line 4 of Attachment A. _____

Total dissolved gas (TDG) can be calculated per the calculation instructions of Attachment A. A sample of degassed liquid is now isolated in the liquid sample chamber and a sample of reactor coolant gas, mixed with nitrogen, is isolated in the gas sample chamber. _____

6.4 Flush Preparatory to Sample Retrieval

6.4.1 If valves are not in the following positions, reposition them.

V-1	BY-PASS _____	V-7	BY-PASS _____	V-15	CLOSED _____
V-2	GRAB _____	V-8	BY-PASS _____	V-16	CLOSED _____
V-3	NORMAL _____	V-11	LIQUID _____	V-17	CLOSED _____
V-4	CLOSED _____	V-12	BY-PASS _____	V-18	LO-FLOW _____
V-6	CLOSED _____	V-13	BY-PASS _____		

6.4.2 Align the flush module by opening SS-SOV-170. _____

6.4.3 Flush as follows:

6.4.3.1 Open V-4, V-16 and V-17 _____

6.4.3.2 Monitor and record on line 5 Attachment A-1 the pH reading and the temperature T-1 _____

6.4.3.3 Start the flushing pump _____

INITIALS

6.4.3.4 Position V-18 to HI-FLOW and start stripping pump. _____

6.4.3.5 Verify flow meter registers flow. _____

6.4.3.6 Continue flushing for 5 minutes. During the flush, cycle valves V-4, V-16, and V-17 at least 3 times to ensure all liquid is flushed from under the valve seats. Monitor flow and radiation levels to assess flush effectiveness. _____

6.4.3.7 Reposition valves as follows:

V-6	OPEN	_____	_____
V-16	CLOSED	_____	_____
V-17	CLOSED	_____	_____

6.4.3.8 Continue flush for another 2 minutes. During this 2 minute period cycle V-6 at least 3 times to ensure all liquid is flushed from under the valve seats. _____

6.4.3.9 Position V-11 to GAS, continue flushing for two (2) minutes then secure the stripping PUMP and CLOSE V-6. _____

6.4.3.10 Position V-2 to BY-PASS then position V-4 to CLOSED, continue flushing for 1 minute. _____

6.4.3.11 Reposition valves V-1 and V-2 to GRAB. Continue flushing for one (1) minute then secure the flushing PUMP. Shut SS-SOV-170. _____

6.4.3.12 Monitor radiation levels as indicated on the Remote Module Radiation Detector Readout. If radiation - levels have not been reduced as desired, repeat the flush 6.4.1 thru 6.4.3, as often as required to reduce radiation to the desired level. _____

6.4.4 Isolate Sample Return path

6.4.4.1 Isolate return to RHR by closing SS-SOV-164 and SS-SOV-165. _____

OR

6.4.4.2 Isolate return to VCT by closing SS-SOV-166 and SS-SOV-173. _____

CAUTION: At this time, steps should be taken to ensure that isolation valves are closed and that they cannot be inadvertently operated while operator is retrieving samples.

6.5 GRAB Sample Retrieval

6.5.1 Review sample retrieval scenario in Appendix B-1 of reference 3.3. _____

6.5.2 Perform a rapid radiation survey to ensure radiation levels are within acceptable limits. _____

6.5.3 Place the sample transfer container and spare 2 ml sample chamber near the sample module. Remove the transfer container lid. _____

6.5.4 Retrieve the 2ml GRAB Sample as follows:

6.5.4.1 Open the lower sample access door. _____

6.5.4.2 Grasp the unlatching knob and pull the grab sample tray assembly forward, outside the module. _____

6.5.4.3 Disconnect the flexible hoses from the grab sample valve operator. _____

6.5.4.4 Lift the grab sample chamber from the tray and place it in the transfer container. Place the lid on the transfer container. _____

INITIALS

6.5.4.5 Place the new grab sample chamber on the slide tray. Check that the sample chamber is located so that the quick connect collars are properly positioned in the yoke and the grab sample chamber is pressed firmly down onto the slide tray. _____

6.5.4.6 Connect the flexible hoses to the grab sample chamber air operator. Ensure the blue color coded quick-connects are mated. _____

6.5.4.7 Push the slide tray with grab sample chamber back into the cabinet until the liquid quick-connects latch. _____

6.5.4.8 Close the access door _____

6.5.4.9 Exit the area with the sample. _____

6.6 Inline Sample Retrieval

6.6.1 Review the Sample Retrieval scenario in Appendix B1 of reference 3.3. _____

6.6.2 Perform a rapid radiation survey to ensure radiation levels are within acceptable limits. _____

6.6.3 Place transfer containers and syringes near the sample module. Remove transfer container lids. Check that syringes are open (needle nut tight against body) _____

6.6.4 Retrieve Depressurized Liquid Sample as follows:

6.6.4.1 Open the lower access door. _____

6.6.4.2 Gently insert the liquid sample syringe into the brass needle guide, bottoming the needle on the septum. _____

INITIALS

6.6.4.3 Open V-9 by gently pulling the valve handle out to its stop. _____

6.6.4.4 Complete insertion of the syringe needle into the brass needle guide until the syringe needle nut mates into the brass needle guide slot _____

6.6.4.5 Withdraw 100 ml then lock the sample in the syringe by unscrewing the syringe body two turns. Use the red dots on the syringe as a reference to determine the two turns. _____

6.6.4.6 Withdraw the syringe carefully from needle guide and close V-9 by gently pushing the valve handle onto its stop (handle is parallel to chamber). _____

6.6.4.7 Place syringe in transfer container. _____

6.6.4.8 Place shield top on transfer containers. _____

6.6.4.9 Repeat 6.6.4.2 through 6.6.4.8 to obtain a 200 ml sample. _____

6.6.4.10 Close lower sample access door. _____

6.6.5 Retrieve a gaseous sample as follows:

6.6.5.1 Open the upper access door. _____

6.6.5.2 Gently insert gas sample syringe into the brass needle guide, bottoming the needle on the septum. _____

6.6.5.3 Open V-14 by gently pulling the valve handle out to its stop. _____

INITIAL

6.5.4 Complete insertion of the syringe needle into brass needle guide until the syringe needle nut mates into the brass needle guide slot. _____

6.6.5.5 Withdraw 100 ul of gas, then lock the sample in the syringe by unscrewing the syringe body two turns. Use the red dots on the sryinge as a reference to determine the two turns. _____

6.6.5.6 Withdraw the syringe carefully from the brass needle guide and close V-14 by gently pushing the valve handle onto its stop. _____

6.6.5.7 Place the syringe in the SAMPLE TRANSFER CONTAINER. _____

6.6.5.8 Place shield top on the transfer container. _____

6.6.5.9 With the remaining syringe perform steps 6.6.5, 6.6.5.1 through 6.6.5.8. _____

6.6.5.10 Close upper access door. _____

6.6.6 Exit area with sampler. _____

6.7 Analysis

CAUTION: Survey transport containers with covers off. If greater than 1 Rem/hr. notify the manager of radiological assessment and request instructions for handling. If less than 1 Rem/hr. treat as a normal radioactive sample minimizing exposure in performing the required analysis.

6.7.1 Remove 100 ul liquid sample syringe from transport container and inject its contents into a liter bottle of demineralized water. _____

INITIALS

6.7.2 Isotopic Analysis

6.7.2.1 Transfer one ml, of sample prepared in 6.7.1, to a liter bottle of demineralized water. _____

6.7.2.2 Gamma scan the sample prepared in section 6.7.2.1 according to the applicable procedure using the GeLi detector. _____

6.7.3 Chloride Analysis using the 200 ml sample

6.7.3.1 Perform a chloride analysis on the Polarographic Analyzer as per applicalbe procedure. _____

6.7.4 Boron Analysis

6.7.4.1 Pour approximately 5 ml of sample prepared in section 6.7.3.1 into a beaker. _____

6.7.4.2 Perform a boron analysis on the ICP5000 using the applicable procedure _____

6.7.5 Gaseous Isotopic

6.7.5.1 Transfer the contents of one of the gas sample syringes into an appropriate counting sample chamber. _____

6.7.5.2 Perform a gamma analysis according to the applicable procedure using the GeLi detector. _____

6.7.6 Gas Composition Analysis

6.7.6.1 With the remaining full gas sample syringe perform a hydrogen analysis on the gas chromotograph using the applicable procedure. _____

INITIALS

6.8 If a back-up sample is not required, proceed to step 6.10. _____

6.9 If a back-up sample is required, then obtain new syringes and repeat.

6.9.1 Back-up in-line liquid sample step 6.6. _____

6.9.2 Back-up in-line gaseous sample step 6.6.5. _____

6.10 Flush following Sample Retrieval

6.10.1 Line up Sample Modules as follows:

V-1	BY-PASS	_____	V-7	INLINE	_____	V-15	CLOSED _____
V-2	GRAB	_____	V-8	BYPASS	_____	V-16	CLOSED _____
V-3	SAMPLE	_____	V-11	GAS	_____	V-17	CLOSED _____
V-4	CLOSED	_____	V-12	IN-LINE	_____	V-18	HI-FLOW _____
V-6	CLOSED	_____	V-13	BY-PASS	_____		

6.10.2 Align a sample return path

6.10.2.1 To RHR open SS-SOV-164 (control) and SS-SOV-165 (PASS panel) _____

6.10.2.2 To VCT open SS-SOV-173 (control) and SS-SOV-166 (PASS panel) _____

6.10.3 Align the flush system by opening SS-SOV-170 (PASS Panel) _____

6.10.4 Flush as follows:

6.10.4.1 Start flushing pump and open V-4, V-6, V-16 and V-17. _____

6.10.4.2 Position V-13 to IN-LINE and start the stripping PUMP. A flow should be evident on the FLOW-METER. Continue this flush for about three (3) minutes. _____

INITIALS

6.10.4.3 Position V-12 and V-13 to BYPASS for 30 seconds and then position:

V-8 to IN-LINE, stop the stripping PUMP and position V-12 to IN-LINE. Continue this flush for about three (3) minutes. _____

6.10.4.4 Position V-7 and V-8 to BY-PASS, then position V-2 to BY-PASS. In 30 seconds, CLOSE V-4, V-6, V-16 and V-17, then position V-1 and V-2 to GRAB. _____

6.10.4.5 Flush for three (3) minutes and then position V-3 to NORMAL and FLUSH. _____

6.10.5 Secure the flush pump and align valves as follows:

SS-SOV-170 Shut _____

V-1	GRAB _____	V-8	IN-LINE _____	V-15	CLOSED _____
V-2	BY-PASS _____	V-11	GAS _____	V-16	CLOSED _____
V-3	SAMPLE _____	V-12	BY-PASS _____	V-17	CLOSED _____
V-4	OPEN _____	V-13	BY-PASS _____	V-18	HI-FLOW _____
V-7	BY-PASS _____				

6.11 Restore system for further sampling

6.11.1 Close V-4, open V-15 and blowdown the upper leg of the gas loop. Position V-12 and V-13 to IN-LINE and continue the blowdown. Then place V-12 in BY-PASS. _____

6.11.2 Position V-8 to BY-PASS and blow down the lower leg of the gas loop. Position V-7 and V-8 to IN-LINE and continue the blowdown. Position V-12 to IN-LINE and continue blowdown for 10 seconds. _____

6.11.3 Close V-15 and position V-11 to liquid. _____

6.11.4 Align the modules as follows:

V-1	GRAB _____	V-6	CLOSED _____	V-11	LIQUID _____	V-15	CLOSED _____
V-2	BY-PASS _____	V-7	BY-PASS _____	V-12	INLINE _____	V-16	CLOSED _____
V-3	NORMAL and FLUSH _____	V-8	BY-PASS _____	V-13	INLINE _____	V-17	CLOSED _____
V-4	CLOSED _____	V-18	LO-FLOW _____				

_____

INITIALS

6.1.5I Isolate the sample return path

6.11.5.1 To RHR close SS-SOV-164 (control) and SS-SOV-165 (PASS Panel). _____

6.11.5.2 To VCT open SS-SOV-173 (control) and SS-SOV-166(PASS Panel). _____

6.11.6 Back off the nitrogen pressure regulator of 0 PSIG as read on the Nitrogen Regulated Pressure gauge. _____

6.11.7 Record totalizer meter reading on line 6, Attachment A. _____

6.12 Perform final valve lineup as per Attachment B. _____

6.13 Notify shift supervisor that procedure is complete. _____

The system is now checked out and ready for operation, or it can be secured to shutdown just turn off power by depressing PASS panel power on button.

6.14 Close and lock the anti-tamper cover on the remote operating module. _____

ATTACHMENT A
DETERMINATION OF TOTAL DISSOLVED GAS
AND
VOLUME OF LIQUID DISCHARGED TO WASTE

Sample No.: _____

Date/Time
Started: _____

A.1 RECORD (Data)

1. Totalizer meter reading (step 6.1.12) Qi ----------gal

2. Initial pressure in gas loop (step 6.3.3 Pi _____psig

3. Final pressure in gas loop (step 6.3.3 Pf _____psig

4. Temperature (Step 6.3.3 T2 _____ °F

5. PH _____Temperature T1_____
(Step 6.4.3.3)

6. Totalizer meter reading (Step 6.11.7) Qf _____ gal

A.2 CALCULATE

7. Correct initial pressure (Pi) reading as follows:

Pi x 0.98 = Pic Pic _____psig

8. Convert T2 to Rankine as follows:

T2 + 460 = TR TR _____ °R

9. Determine vapor pressures (Pvp) as follows:

Enter figure A-1 with the temperature T-2 (line 4) and record Pvp. Pvp _____psi

10. Determine partial pressure (Pp) of the gas as follows: Pp = _____psi

Pf - Pic - Pvp = Pp

11. Calculate TDG* as follows: TDG _____ cc/Kg

$$cc/Kg = 2.927 \times 10^{4} \times \frac{Pp}{TR} + 1.36\ Pp$$

OR use the graph, figure A-2.

12. Calculated total inventory of liquid passed through unit as follows:

Qf - Qi = Q Q = _____ gal

A.3 SUMMARY

13. Total dissolved gas content (from line 10) = _____ cc/Kg

14. Total liquid passed through unit (from line 11) = _____ gal

Data recorded by:

_____

Date: _____

Calculation made by:

_____

Date: _____

Checked by:

_____

Date/Time: _____

*Related to standard temperature (0° C) and pressure (1 atm).

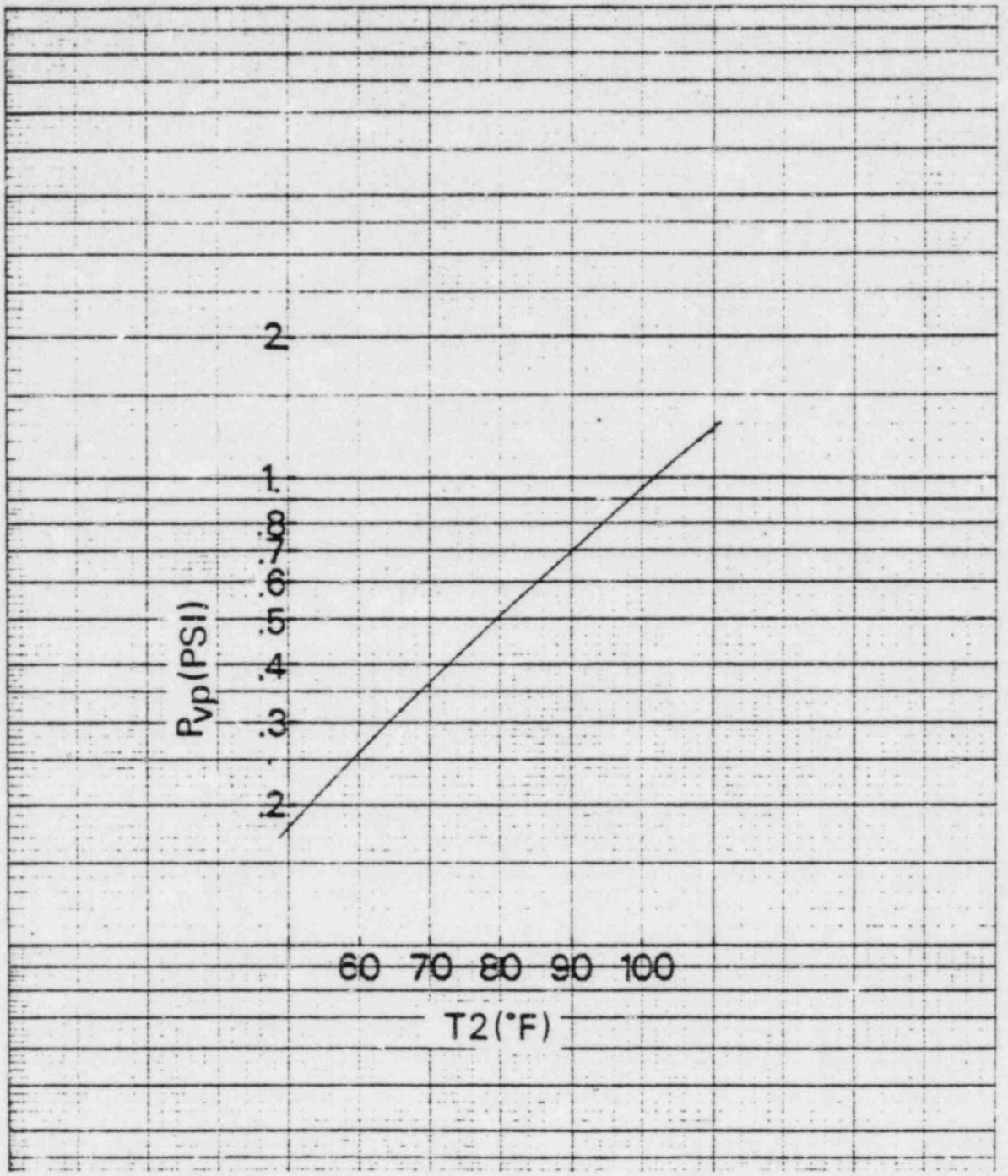

Figure A-1. Vapor Pressure Graph

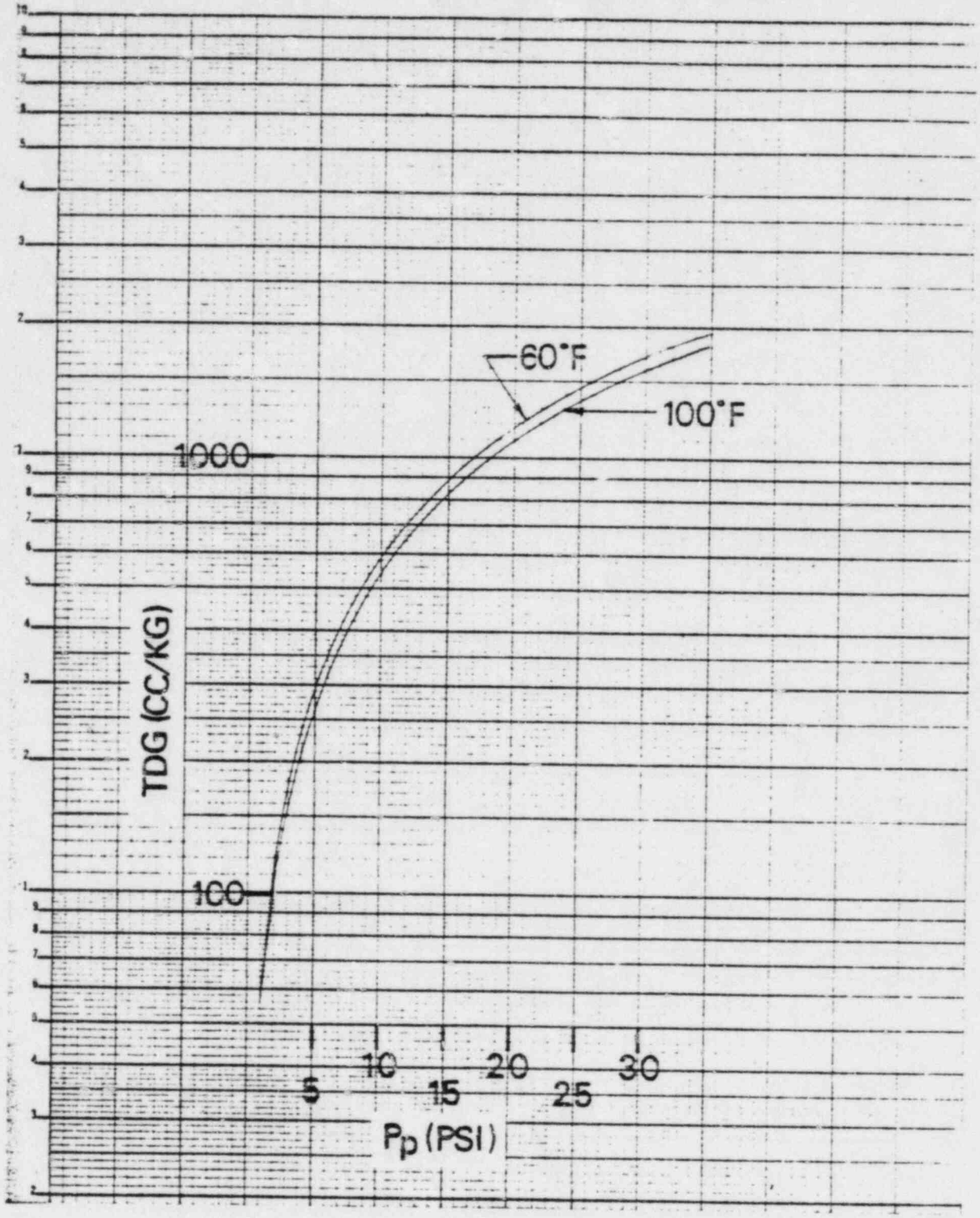

Figure A-2. Total Dissolved Gas (TDG) Graph

POST ACCIDENT SAMPLING SYSTEM (Training)
VALVE ALIGNMENT CHECKLIST

VALVE NUMBER	VALVE TITLE	VALVE LOCATION	VALVE STATUS INITIAL Pos.	Oper	FINAL Pos.	Ope
SS-V-181	Flush Module discharge	Chem. Lab.	OP		OP	
SS-V-191	Discharge from Pass Module	WRGM Room	OP		OP	
SS-V-184	Inlet to Pass Module	WRGM Room	OP		OP	
SS-V-951	Drain Cooler Inlet	Valve Room PAB	OP		OP	
SS-V-952	Drain Cooler Outlet	Valve Room PAB	CL		CL	
SS-AOV-950	Drain Header Isolation	Control Room Board	CL		CL	
RH-V-782	Suction RHR Pumps	Valve Room Pipe Chase	OP		OP	
RH-V-800	Discharge RHR Pumps	Valve Room Pipe Chase	OP		OP	
SS-V-971A	RHR Sample Inlet	Valve Room PAB	CL		CL	
SS-V-724	Isolation Inlet to Boron Analysis	(PAB)	RED TAG CL		RED TAG CL	
SS-V-731	Isolation Outlet to Boron Analysis	(PAB)	RED TAG CL		RED TAG CL	
SS-V-971B	RHR Return to Sample Sink	Valve Room PAB	CL		CL	
SS-SOV-164	EFF to RHR	Control Room Board	CL		CL	
SS-SOV-165	PASS Effluent to RHR	Chem. Lab.	CL		CL	
SS-SOV-166	Pass discharge to VCT	Chem. Lab.	CL		CL	
SS-SOV-167	Drain Header to Pass	Chem. Lab.	CL		CL	
SS-SOV-168	RHR inlet to Pass	Chem. Lab.	CL		CL	
SS-SOV-169	RHR inlet to Pass	Control Room Board	CL		CL	
SS-SOV-173	Pass discharge to VCT	Control Room Board	CL		CL	
SS-V-193	Discharge to VCT	Valve Room PAB	OP		CL	
SS-V-194	Discharge to VCT	Valve Room PAB	OP		CL	
SS-SOV-170	Flushing Pump Discharge	Chem. Lab.	CL		CL	
SS-V-193	Pass to VCT	PAB Metering Pump Cubical	OP		OP	
SS 194	Pass to VCT	PAB Metering Pump Cubical	OP		OP	

KEY: CL = CLOSED
OP = OPEN