Preparation and Use of the HAPSITE Gas Chromatograph/Mass Spectrometer

Tank Farm Plant Operating Procedure

OPERATIONS

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## Preparation and Use of the HAPSITE Gas Chromatograph/Mass Spectrometer

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1.0 PURPOSE AND SCOPE

1.1 Purpose

This procedure delineates the proper preparation and use of the HAPSITE® gas chromatograph/mass spectrometer (GC/MS) in support of field sampling performed in accordance with an Industrial Hygiene Sampling Plan or Industrial Hygienist (IH) direction.

1.2 Scope

The procedure applies to the following activities:

- Operation of the HAPSITE in Concentrator Mode, Loop Mode, and Survey Mode
- Use of the HAPSITE with or without the service module
- Concentrator tube installation and removal.
- Installation and operation of the thermal desorber

2.0 INFORMATION

2.1 Terms and Definitions

- Concentrator Mode - Used when the known concentration of the VOC sample is in the low parts per billion (ppb) to the high part per trillion range
- Loop Mode - Used when the known VOC concentration is in the low part per million (ppm) to the high ppb range
- Survey Mode Used when the known concentration of the VOC sample is greater than 10 ppm
- Service Module Provides a source of power as well as a vacuum source external to the HAPSITE
- Tube or “air” blank – Charcoal tube placed at the inlet of the HAPSITE and used to determine the cleanliness of the GC column.
2.2 General Information

The GC/MS provides for, or should be operated within, the following parameters:

- Weight - ~ 35 lbs without the battery
- Designed for indoor and outdoor use
- Temperature range: 32 to 113 F
- Relative humidity: up to 95% Relative Humidity (non-condensing)
- Operating time: 2 to 3 hours on battery
- Range: 1 – 300 atomic mass units
- Detection limit: (1) in the concentrator mode, low ppb to high ppt range, (2) in the loop mode, low ppm to high ppb range, (3) in the survey mode, greater than 10 ppm
- Accuracy: ± an order of magnitude using the concentration estimation method
- Chemical composition of sample: 1 to 12 carbon atoms
- Boiling point of sample: < 250 C
- Carrier gas use rate: ~ 1 canister per 8 hrs of use
- Internal standard gas use rate: ~ 1 canister per 24 hrs of use.

3.0 PRECAUTIONS AND LIMITATIONS

3.1 Personnel Safety

3.1.1 HAPSITE is not intrinsically safe. Use of the HAPSITE in any atmosphere that contains dangerous vapor concentrations is prohibited.

3.1.2 HAPSITE is not intrinsically safe. Use of the HAPSITE in source and enclosed environments that have not been tested with an LEL meter before monitoring with the HAPSITE, is prohibited.

3.1.3 The HAPSITE is a heavy instrument. Whenever possible, use a portable cart to secure and transport the HAPSITE to prevent injury.

3.1.4 Refer to the following general potential hazards with using the HAPSITE:
   - Sharp and jagged glass edges on the sorbent tubes
   - Hot surfaces inside the HAPSITE
   - Instrument is heavy.

3.1.5 The TD tube in the thermal desorber is extremely hot and can cause personal injury if handled or removed while the temperature LED is flashing red.
3.2 Equipment Safety

CAUTION Finger tightening the nuts greater than ¼ turn may result in excessive force and damage to the fragile glass tube.

3.2.1 The GC/MS identifies VOCs at the ppb level, therefore, care should be taken not to over range the instrument.

3.2.2 A VOC reading greater than 100,000 ppb prior to HAPSITE analysis may result in over ranging the instrument. High VOC’s should use short sampling periods, i.e., 10 sec 33-250 volatile method. Stop and contact the Project Industrial Hygienist prior to continuing.

3.3 Radiation and Contamination Control

3.3.1 Do not use the HAPSITE instrument within an area posted for contamination control.

4.0 PREREQUISITES

4.1 Special Tools, Equipment, and Supplies

- Nitrogen carrier gas – purple-banded
- Internal gas standard – yellow-banded
- Portable hand cart for transportation
- Concentrator tube.

4.2 Performance Documents

The following documents may be needed to perform this procedure:

- Site Form A-6003-860, IH DRI Monitoring Field Log form or approved equivalent
- Site Form A-6003-861, IH DRI Functional Test Data form or approved equivalent
- TFC-BSM-IRM_DC-C-02, “Records Management”
- TF-OPS-IHT-007, “Using Direct Reading Instruments.”

4.3 Field Preparation

4.3.1 REVIEW the applicable Industrial Hygiene Sampling Plan (IHSP).
5.0 PROCEDURE

NOTE - Sections 5.1 through 5.23 may be performed independently or in any logical order.

- Not all sections of this procedure will be performed at one time due to the different uses of the instrument.

- The HAPSITE or its attachments exhibit damage, satisfactory results cannot be achieved during the performance of this procedure or any condition that the user determines is prohibiting use of the equipment or execution of the procedure, a green tag “IH Instrument Service Tag” (BT-6004-019), documenting the condition and notify the equipment custodian.

5.1 Instrument Preparation from Shutdown or Cold Standby

5.1.1 IF the HAPSITE has not been turned on, PERFORM Steps 5.1.2 through 5.1.10.2.

5.1.2 PRESS the power button (located on the bottom left corner of the control panel AND

OPEN the HAPSITE.

NOTE - There are two options for nitrogen “CARRIER GAS” use.

5.1.2.1 INSERT the purple-banded nitrogen “CARRIER GAS” into the top opening labeled with a purple band. Proceed to 5.1.3.

5.1.2.2 TURN Nitrogen Cylinder “CARRIER GAS” valve counter clockwise until completely open. Proceed to 5.1.6

5.1.3 DEPRESS the “PUSH” lever AND

INSERT the canister so that it will seat.

5.1.4 RELEASE the “PUSH” lever AND

GENTLY PULL on the canister to be sure it is properly seated.

5.1.5 INSERT the yellow-banded “INTERNAL STANDARD” gas canister into the bottom opening labeled with a yellow band.

5.1.6 DEPRESS the “PUSH” lever AND

INSERT the canister so that it will seat.
5.1 Instrument Preparation from Shutdown or Cold Standby (Cont.)

5.1.7 RELEASE the “PUSH” lever AND
GENTLY PULL on the canister to be sure it is properly seated.

5.1.8 CLOSE the instrument panel.

5.1.9 SLIDE the toggle switch (located to the right of the handle) to the right to turn ON the PC.

5.1.10 OPEN the software program as follows:

5.1.10.1 DOUBLE-CLICK the “Smart IQ” application icon.

5.1.10.2 DOUBLE-CLICK the “Front Panel Display” icon (top right of screen).

5.1.11 IF the HAPSITE is on “Extended Standby”, GO TO Section 5.2.

5.1.12 IF the HAPSITE or its attachments exhibit damage, satisfactory results cannot be achieved during the performance of this procedure or any condition that the user determines is prohibiting use of the equipment or execution of the procedure, COMPLETE a green tag “IH Instrument Service Tag” (BT-6004-019), documenting the condition and notify the equipment custodian.
5.2 Preparing the HAPSITE GC/MS for Operation in the Concentrator Mode

**NOTE** - The HAPSITE checks the expiration dates on the gas canisters automatically through the use of the memory chip located on the bottom of the cans.

5.2.1 **CHECK** the “Expiration Date” and “Use by Date” on the “INTERNAL STANDARD” and “CARRIER GAS” canisters, respectively.

5.2.2 **FIRMLY PULL** at the upper corners of the front panel **AND** **OPEN** the HAPSITE.

**NOTE** - There are two options for nitrogen “CARRIER GAS” use.

5.2.2.1 **INSERT** the purple-banded nitrogen “CARRIER GAS” into the top opening labeled with a purple band. Proceed to 5.2.3.

5.2.2.2 **TURN** Nitrogen Cylinder “CARRIER GAS” valve counterclockwise until completely open. Proceed to 5.2.6

5.2.3 **DEPRESS** the “PUSH” lever **AND** **INSERT** the canister so that it will seat.

5.2.4 **RELEASE** the “PUSH” lever **AND** **GENTLY PULL** on the canister to be sure it is properly seated.

5.2.5 **INSERT** the yellow-banded “INTERNAL STANDARD” gas canister into the bottom opening labeled with a yellow band.

5.2.6 **DEPRESS** the “PUSH” lever **AND** **INSERT** the canister so that it will seat.

5.2.7 **RELEASE** the “PUSH” lever **AND** **GENTLY PULL** on the canister to be sure it is properly seated.

5.2.8 **CLOSE** the instrument panel.

**NOTE** - The arrow on the charcoal tube should be pointing toward the inlet of the HAPSITE.

5.2.9 **ENSURE** a charcoal tube is placed in the wand opening.
5.2 Preparing the HAPSITE GC/MS for Operation in the Concentrator Mode (Cont.)

NOTE - Commands may be initiated by using one of three controls located on the: (1) HAPSITE’s front panel, (2) wand or the (3) Panasonic PC after double-clicking the “Smart IQ Application” icon or double-clicking the “Front Panel Display” icon. Unless noted, the Panasonic’s controls will be used in this procedure.

5.2.10 SLIDE the toggle switch (located to the right of the handle) to the right to turn ON the PC.

5.2.11 OPEN the software program as follows:

5.2.11.1 DOUBLE-CLICK the “Smart IQ” application icon.

5.2.11.2 DOUBLE-CLICK the “Front Panel Display” icon.

NOTE - The HAPSITE will check internal pressures and automatically heat up all necessary zones to the setpoint temperatures specific to the selected method. Once all temperature zones have reached their set points, the HAPSITE will automatically run a tune check, ie “AutoTune”. This heat and tune check will take approximately 20 minutes. A tune is pre-programmed to run every 12 hours from the last tune check.

5.2.12 IF this is the initial daily start up, PERFORM the following:

5.2.12.1 PRESS “END STANDBY” to initiate HAPSITE tune (preparing)
5.2  Preparing the HAPSITE GC/MS for Operation in the Concentrator Mode (Cont.)

   NOTE - The following step may be performed at any time between sample runs as deemed necessary by the instrument operator but is required at the initial daily startup of the instrument.

5.2.12.2  REMOVE any obstruction to the intake of the sample wand, e.g., charcoal tube cap.

5.2.12.3  CHOOSE “CONC OPTIONS” AND PRESS “CONCENTRATOR CLEAN-OUT”.

   NOTE - HAPSITE will continue conc cleanout process. Allow it to finish before proceeding.

5.2.12.4  PRESS “OK”.

5.3 Running a Tube or “Air Blank”

5.3.1 SELECT cleanout method “180C 60 sec Desorb-Cleanout”

5.3.2 SELECT “METHOD”.

5.3.3 USE arrow keys or mouse or HAPSITE touch screen AND

SELECT “180C 60 sec Desorb-Cleanout”.

NOTE HAPSITE will prepare method. “Read” will appear to the right of “Analyze” title on screen

5.3.4 PRESS “RUN ANALYZE”.

NOTE - When run is completed, “Finished” will appear on display. TIC-MAX should not exceed 1 million.

5.3.5 IF 1 million cannot be achieved after 3 cycles. REPEAT Steps 5.3.1 to 5.3.4 until fulfilled.

5.3.6 IF the TIC Max is not less than 1 million, CONTACT Project Industrial Hygienist after three cycles have been completed.
5.3 Running a Tube or “Air Blank” (Cont.)

5.3.6.1 AFTER this tube or air blank is run, CONFIRM the following results are observed:
- Retention times for the first and second internal standards should be 1:53-1:57 and 5:55-6:05 respectively
- The TIC, for the first and second internal standards should be 1 to 4 million and 2 to 6 million counts, respectively
- To confirm TIC counts, slide green arrow at the bottom of graph to 1st internal standard and 2nd internal standard.
- The TIC ratio of the first internal standard over the second internal standard should be in the range of 0.25 to 0.5, i.e.,
  \[
  \frac{\text{TIC - 1’st Internal Standard}}{\text{TIC - 2’nd Internal Standard}} = 0.25 \text{ to } 0.5
  \]
- Other peaks on the chromatogram should be about one-third or less the peak height of the first internal standard.

5.3.6.2 IF one or more of the above criteria is not met, PRESS “RUN ANALYZE” again.

5.3.6.3 IF the above criteria cannot be met after 3 cycles, CONTACT Project Industrial Hygienist

5.3.6.4 IF all the criteria are met, CONTINUE with Section 5.4.
5.4 SCREEN Bag Sample for Volatile Organic Compounds and Ammonia

5.4.1 IF under 1 ppm, **PROCEED** to Section 5.5.

**NOTE** - The bag sample must be diluted if it is greater than 1 ppm.

5.4.2 IF directed by project Industrial Hygienist, **PERFORM** 5.4.3 to 5.4.7

**Dilute the Bag Sample**

5.4.3 **ATTACH** the syringe adapter with tubing by twisting it finger-tight onto the 1.0 ml gas syringe.

5.4.4 **ATTACH** this unit to the sample bag inlet valve.

5.4.5 **OPEN** the valve and flush the syringe two or three times.

5.4.6 **REMOVE** 1 ml from the sample bag.

5.4.7 **CLOSE** the inlet valve.

5.4.8 **PERFORM** Section 5.11 for analysis.
5.5 Running a Bag Sample Through the Concentrator Mode

5.5.1 SELECT “SELECT METHOD”

5.5.2 SCROLL to approved method (determined by Project Industrial Hygienist)

5.5.3 OPEN the valve

5.5.4 CONNECT the bag to the sample probe

5.5.5 REMOVE the charcoal tube AND CAP the tube.

NOTE - The HAPSITE will enter a 2 minute “LinePurge” countdown.
- Upon completion of the “LinePurge”, the sample will be pulled into the concentrator for the length of time for the method chosen. This will be designated by “ConcFill”.

5.5.6 AFTER the “ConcFill” has ended, DISCONNECT the sample bag AND CLOSE the valve.

5.5.7 UN-CAP AND RE-INSTALL the charcoal tube to the probe inlet.

NOTE - The analysis will take a pre-programmed length of time to finish depending on the method used. Once the analysis has reached its end, the HAPSITE will indicate “Method Complete.”

5.5.8 IF finished, GO TO Section 5.8.

5.5.9 RENAME the file by adding DRI Number_Location info to the original file name. An example of the naming convention is:

Original Name- 2min-200ml_33-250_Volatile Method_20170223_001.hps

New Name- 17-00234_A-Farm_2min-200ml_33-250_Volatile Method_20170223_001.hps.
5.6 Placing the HAPSITE on “Extended Standby”

5.6.1 PRESS “ESC” three times until “HAPSITE Main Menu” appears.

5.6.2 CHOOSE “5. Exit” AND PRESS “SEL”.

5.6.3 CHOOSE “4. Standby Modes” AND PRESS “SEL”.

5.6.4 SELECT “2. Extended Standby” AND PRESS “SEL”.

NOTE - When cooled down, display will indicate “System is in Extended Standby and the gas canisters should be removed.

5.6.5 WAIT for the HAPSITE to cool down.

5.6.6 FIRMLY PULL at the upper corners of the front panel AND OPEN the HAPSITE.

5.6.7 PRESS the “PUSH” lever on the “CARRIER GAS” canister AND GENTLY PUSH OR TWIST on the canister to release it.

5.6.8 REPEAT Step 5.6.7 with the “INTERNAL STANDARD” canister AND CLOSE the front panel.

5.6.9 PLACE the cap at the end of the charcoal tube AND POSITION it in front of the wand.

5.6.10 CLOSE the front panel.
5.7 Managing and Saving Files on the Computer

NOTE - Step 5.7.1 opens a window divided into two sections, ie “PC Files” and “HAPSITE Files”.

5.7.1 WITH the “Smart IQ” software open, CLICK on the “Manage Files” icon.

5.7.2 IN “PC Files”, CREATE a new folder using the icon.

NOTE - Example: “2008-02-07”

5.7.3 NAME this new file in the following manner, ie “YYYY-MM-DD” AND PRESS “OK”.

5.7.4 DOUBLE-CLICK on this file to open it.

5.7.5 IN “HAPSITE Files”, DOUBLE-CLICK on the “Tune” file AND SINGLE-CLICK on the “default.tun” file.

5.7.6 USE the highlighted “←Copy” command AND COPY this file to the newly created file.

5.7.7 IN “HAPSITE Files”, CLICK on the icon once.

5.7.8 DOUBLE-CLICK on the “Data” file.

5.7.9 DOUBLE-CLICK on the “Analyze” file.

5.7.10 DOUBLE-CLICK on “Concentrator” or “Loop” whichever method was used.

5.7.11 IF the HAPSITE was used in the “Concentrator” mode, DOUBLE-CLICK on “180C_60_sec_Desorb-Cleanout” corresponding to the date of analysis.

5.7.12 USE the date and time to determine the correct file AND HIGHLIGHT the newest file(s) created.

NOTE - This is usually the first one or more file(s) and can be determined by like dates.

5.7.13 HIGHLIGHT the first file.
5.7 Managing and Saving Files on the Computer (Cont.)

5.7.14 PRESS the “Shift” key AND
CLICK on the last file to copy multiple files.

5.7.15 USE the highlighted “←Copy” command AND
COPY this file to the newly created file.

5.7.16 USE the icon under the “HAPSITE Files” AND
RETURN to the previous screen.

5.7.17 DOUBLE-CLICK on the sample method that was used for this analysis,
typically “2min_200ml_33-250-Volatile”.

5.7.18 HIGHLIGHT the tube blank and sample file(s) created.

NOTE - These may be the first files of the day the date and times are used to determine
the correct files.

- Multiple files are copied by highlighting the first file, and pressing the “Shift” key, click on the last file to copy.

5.7.19 USE the highlighted “←Copy” command AND
COPY this file to the newly created file.

5.7.20 RIGHT-CLICK on the new files AND
RENAME them, eg “blank”, sample name.

EXAMPLE: Original Name- 2min-200ml_33-250_Volatile
New Name- Blank_2min_200ml_33-250_Volatile
5.7 Managing and Saving Files on the Computer (Cont.)

5.7.21 PRESS “OK” AND PRESS “DONE”.

5.7.22 CLICK on “File” AND CLICK “Exit” to shut down the PC.

5.7.23 CHOOSE the “start” icon.

5.7.24 SELECT “Turn Off Computer” command AND THEN “Turn Off”.

5.8 HAPSITE Concentrator Tube Removal and Sample Loop Installation

5.8.1 FIRMLY PULL at the upper corners of the front panel AND OPEN the HAPSITE.

5.8.1.1 REMOVE the black CONCENTRATOR cover.

NOTE - The nuts have knurling to facilitate finger loosening and tightening and are loosened by turning the top nut to the left and the bottom nut to the right.

5.8.2 LOOSEN the nuts on the top and bottom of the concentrator.

5.8.2.1 DO NOT REMOVE the hardware from the loop AND PLACE the removed ferrules and nuts inside the loop cover for safe storage.

5.8.3 WHEN the concentrator tube is fully loosened, PERFORM the following:

5.8.3.1 LIFT the elbow joint up.

5.8.3.2 TAKE care not to lose the nuts and ferrules on each end of the tube AND REMOVE the concentrator tube.

5.8.3.3 WRAP the concentrator tube in tissue AND RETURN it to the vial for safe storage.

5.8.4 REMOVE the sample loop from its storage container AND PERFORM the following:

5.8.4.1 ORIENT the nuts and ferrules onto the “Sample Loop” by placing a nut on each end of the loop with the threaded end facing away from the center of the loop.

5.8.4.2 PLACE the wide end of the ferrule into the threaded end of each nut.

5.8.4.3 HOLD the nut and ferrule in place AND CAREFULLY PLACE one end of the sample loop into the lower elbow fitting.
5.8 HAPSITE Concentrator Tube Removal and Sample Loop Installation (Cont.)

5.8.4.4 CAREFULLY LIFT UP on the top elbow fitting AND

INSERT the top of the sample loop.

5.8.4.5 KEEP the sample loop aligned between the two elbow fittings AND

GENTLY PRESS down on the top fitting with just enough force to seat the loop.

5.8.4.6 MAINTAIN steady pressure on the top elbow fitting AND

FINGER- TIGHTEN the bottom nut of the sample loop first, then the top nut.

CAUTION

Finger tightening the nuts greater than ¼ turn may result in excessive force and damage to the fragile glass tube.

NOTE - The bottom nut is turned to the left to tighten and the top nut is turned to the right to tighten.

5.8.4.7 CONTINUE to hold pressure on the top fitting AND

FINGER TIGHTEN each of the nuts 1/8 to 1/4 turn.

5.8.4.8 RELEASE pressure from the top fitting AND

CONFIRM the elbow does not move.

5.8.4.9 APPLY gentle upward pressure to the top elbow joint AND

CONFIRM the elbow does not move.

5.8.4.10 IF the elbow moves, then the tube is not properly seated, LOOSEN the sample loop and repeat Steps 5.8.4.1 through 5.8.4.9.
5.8 HAPSITE Concentrator Tube Removal and Sample Loop Installation (Cont.)

NOTE - The cover should fit easily, excessive force is not necessary to place the cover over the loop if it is properly installed.

5.8.5 PLACE the black sample loop cover, ie “SAMPLE LOOP”, over the sample loop and elbow assembly.

NOTE - The “SAMPLE LOOP” cover contains three metal contacts, for proper installation, these metal contacts will be situated at the bottom of the cover.

5.8.6 INSPECT the “SAMPLE LOOP” three metal contacts AND

CONFIRM they are not bent or cramped too close.

5.8.7 CLOSE the front panel.
5.9  HAPSITE Sample Loop Removal and Concentrator Tube Installation

5.9.1  **FIRMLY PULL** at the upper corners of the front panel **AND**

**OPEN** the HAPSITE.

5.9.1.1  **REMOVE** the black sample loop cover.

**NOTE** - The nuts are loosened by turning the top nut to the left and the bottom nut to the right.

5.9.2  **LOOSEN** the nuts on the top and bottom of the sample loop.

5.9.2.1  **DO NOT REMOVE** the hardware from the loop **AND**

**PLACE** the removed loop, ferrules and nuts inside the loop cover for safe storage.

5.9.3  **WHEN** the sample loop is fully loosened, **PERFORM** the following:

5.9.3.1  **TAKE** care not to lose the nuts and ferrules on each end of the loop.

5.9.3.2  **LIFT** the elbow joint up.

5.9.3.3  **REMOVE** the loop.

5.9.3.4  **DO NOT REMOVE** the hardware from the loop **AND**

**PLACE** the removed loop, ferrules and nuts inside the loop cover for safe storage.
5.9 HAPSITE Sample Loop Removal and Concentrator Tube Installation (Cont.)

NOTE - The concentrator tube is directional, with the smooth metal end pointing DOWN and the grooved metal end pointing UP.

5.9.4 REMOVE the concentrator tube from its storage container AND

PERFORM the following:

5.9.4.1 PLACE a nut on each end of the tube with the threaded end facing away from the center of the tube AND

ORIENT the plastic nuts and ferrules onto the glass concentrator tube.

5.9.4.2 PLACE the wide end of the ferrule into the threaded end of each nut.

5.9.5 HOLD the nut and ferrule in place AND

CAREFULLY PLACE the smooth metal end of the concentrator tube into the lower elbow fitting.

5.9.6 CAREFULLY LIFT up on the top elbow fitting AND

INSERT the grooved metal end of the concentrator tube into the fitting.

5.9.7 KEEP the concentrator tube aligned between the two elbow fittings AND

GENTLY PRESS DOWN on the top fitting with just enough force to seat the tube.

5.9.8 MAINTAIN steady pressure on the top elbow fitting AND

PERFORM Steps 5.9.9 through 5.9.12:

NOTE - The bottom nut is turned to the left to tighten.

5.9.9 FINGER-TIGHTEN the bottom nut of the concentrator tube.

NOTE - The top nut is turned to the right to tighten.

5.9.10 FINGER-TIGHTEN the top nut.
5.9 HAPSITE Sample Loop Removal and Concentrator Tube Installation (Cont.)

**CAUTION**

Finger tightening the nuts greater than ¼ turn may result in excessive force and damage to the fragile glass tube.

5.9.11 CONTINUE TO HOLD pressure on the top fitting AND

FINGER TIGHTEN each of the nuts 1/8 to 1/4 turn.

5.9.12 RELEASE pressure from the top fitting AND

OBSERVE that the elbow does not move.

5.9.13 APPLY gentle upward pressure to the top elbow joint AND

OBSERVE the elbow does not move.

5.9.14 IF the elbow moves in Steps 5.9.12 and/or 5.9.13, then the tube is not properly seated, LOOSEN the sample loop AND

REPEAT Steps 5.9.2 through 5.9.13.

NOTE - The cover should fit easily, excessive force is not necessary to place the cover over the tube if it is properly installed.

5.9.15 PLACE the black tri–bed concentrator cover, i.e., “CONCENTRATOR”, over the concentrator tube and elbow assembly.

NOTE - The “CONCENTRATOR” cover contains three metal contacts. For proper installation, these metal contacts will be situated at the bottom of the cover.

5.9.16 INSPECT the three metal contacts in the “CONCENTRATOR” cover to make sure they are not bent or crimped too close.

NOTE - The cover should fit easily when installing, excessive force is not necessary to place the cover over the loop if it is properly installed.

5.9.17 PLACE the black sample loop cover, (i.e., “CONCENTRATOR”), over the sample loop and elbow assembly AND

CLOSE the front panel.
5.10 Initial Start Up of the HAPSITE

5.10.1 FIRMLY PULL at the upper corners of the front panel AND OPEN the HAPSITE.

5.10.2 INSERT the purple-banded nitrogen “CARRIER GAS” into the top opening labeled with a purple band.

5.10.3 DEPRESS the “PUSH” lever AND INSERT the canister so that it will seat.

5.10.4 RELEASE the “PUSH” lever AND GENTLY PULL on the canister to be sure it is properly seated.

5.10.5 INSERT the yellow-banded “INTERNAL STANDARD” gas canister into the bottom opening labeled with a yellow band.

5.10.6 DEPRESS the “PUSH” lever AND INSERT the canister so that it will seat.

5.10.7 RELEASE the “PUSH” lever AND GENTLY PULL on the canister to be sure it is properly seated.

NOTE - A fully charged battery will indicate “100” after pressing the “TEST” button on its face.

- The charging light will turn “AMBER” when fully charged.

5.10.8 IF the battery is not fully charged, CHECK the 3 – pin orientation at the bottom of the battery slot AND PLACE the battery in the “HAPSITE BATTERY CHARGER”.

NOTE - The battery should be inserted with the curved side facing the left side of the opening.

5.10.9 INSERT a fully charged battery into the rectangular opening to the left of the canisters AND CONFIRM the battery “clicks” indicating it is properly seated.

5.10.9.1 GENTLY PULL on the battery to be sure it is properly seated.
5.10 Initial Start Up of the HAPSITE (Cont.)

5.10.10  CLOSE the instrument panel.

NOTE -  The red dot on the plug should face toward the front of the HAPSITE.
 -  The AC adapter should be oriented so that it rests on the 4 rubber feet.

5.10.11  CONNECT the 4-prong plug of the power supply cord from the AC adapter to the left side of the HAPSITE labeled “24VDC” AND PLUG the other end of the power supply cord from the AC adapter into a wall outlet.

NOTE -  The red dots on the LEMO connector and 4-prong port should line up.

5.10.12  INSERT the LEMO connector end into the 4-prong port located on the inside of the top yellow cover to connect the sampling probe to the HAPSITE.

NOTE -  The HAPSITE port is located next to the sampling probe port. This Ethernet port may be covered by a screw cap.

5.10.13  IF using a laptop, USE the yellow crossover cable AND CONNECT it to the HAPSITE.

5.10.14  SLIDE the toggle switch (located to the right of the handle) to the right to turn ON the PC.

5.10.15  OPEN the software program as follows:

5.10.15.1  DOUBLE-CLICK the “Smart IQ” application icon.

5.10.15.2  DOUBLE-CLICK the “HAPSITE” icon (yellow “suitcase”).

5.10.16  IF no display is observed, PRESS AND BRIEFLY HOLD DOWN the “POWER” toggle switch located inside at the left of the front panel.

5.10.17  CLOSE the front panel AND CONFIRM “POWER” is illuminated at the left-hand side.
5.10 Initial Start Up of the HAPSITE (Cont.)

NOTE - After the HAPSITE turns on (~ 1 minute), it will automatically begin heating up various zones in preparation to run the designated start-up method. The factory programmed start-up method is “Survey”. The HAPSITE will check pressures and automatically heat up all necessary zones to the setpoint temperatures specific to the selected method.

- Once all the temperature zones have reached their setpoints, the HAPSITE will automatically run a tune check. The heat and tune process will run about 20 minutes. When the tune check is complete, “Instrument is tuned” will appear on the screen.

5.10.18 PRESS any button to continue,

OR

ALTERNATELY PRESS “OK” to continue from the laptop.

NOTE - HAPSITE will default to “Survey” mode.

5.10.19 CONFIRM a prompt appears to “Press RUN to start method”. The designated start-up method is now ready to run.
5.11 Running a Syringe Sample Through the Concentrator Mode

5.11.1 FLUSH the syringe with sample gas/vapor from the bag.

5.11.2 FILL the syringe with a little over 1 ml of sample gas/vapor.

5.11.3 ATTACH sample “T” (with charcoal tube and syringe attached) to the HAPSITE inlet.

5.11.4 PRESS “RUN”.

NOTE - The HAPSITE will enter a 2 minute “LinePurge” countdown.
- The charcoal tube must be left on the inlet during “LinePurge”.

5.11.5 WHEN “ConcFill” begins after about 10 – 15 seconds, SLOWLY INJECT the syringe over a 15 to 30 sec period AND COMPLETE injection so that 15 seconds remain to sweep the syringe contents onto the concentrator tube.

5.11.6 KEEP the syringe attached until “ConcFill” has been completed.

5.11.7 AFTER injecting the 1 ml sample, REMOVE the syringe from the inlet.
5.12 Field Use of the GC/MS

5.12.1 ENSURE that the HAPSITE is detached from the service module per Section 5.21.

5.12.2 ENSURE sufficient supplies of the following accompany the HAPSITE when it is in the field:
- Carrier Gas
- Internal Standard
- Gas Loop
- Sample Loop cover
- Extra concentrator tube
- Charcoal tube blanks & caps.

5.12.3 DISCONNECT the yellow computer crossover cable from the top of the HAPSITE.

5.12.4 DISCONNECT the gray power cable from the left side of the HAPSITE.

NOTE - The handle can be re-positioned by simultaneously depressing the release buttons on both sides of it.

5.12.5 USE the front handle AND RAISE the HAPSITE off of the service module.

5.12.6 PLACE the yellow valve cover over the open connection on the bottom of the HAPSITE.

5.12.7 PLACE the aluminum storage cap and yellow cover over the open connection on the Service Module.

5.12.8 USE either the designated carrying cart or the attached carrying strap if he HAPSITE is to be taken into the field at this time.
5.13 Running a Sample Through the Concentrator Tube Using the Sample Probe

5.13.1 SELECT on the HAPSITE “Methods” screen “Recent Methods”.

5.13.1.1 SELECT the method to be used for the analysis AND PRESS the “Run” key.

5.13.2 WAIT for the HAPSITE heaters to stabilize.

NOTE - After the heaters stabilize, the HAPSITE will enter a 60 second “LinePurge”. The “Line Purge” is drawing outside air through the sample line and venting it through the HAPSITE downstream of the concentrator tube. Upon completion of the “LinePurge”, a sample will be pulled into the concentrator for the length of time for the method chosen. This will be designated by “ConcFill”.

- After the “ConcFill” has ended, the sample collection is complete.

- The HAPSITE will begin analysis after a 7 second “PreDesorb” and a 30 second “Desorb” has been completed. The analysis will take a pre-programmed length of time to finish depending on the method used. Once the analysis has reached its end, the HAPSITE will be ready for the next analysis.

5.13.3 HOLD the sample probe in the direction of the area of contamination to collect this sample.
5.14 Thermal Desorber Installation

NOTE - Do not attach the Thermal Desorber Accessory with the TD tube inside.

5.14.1 UNSCREW the Universal Bulkhead connector AND PULL OUT the LEMO® connection to remove the air probe.

5.14.2 ATTACH the Thermal Desorber Accessory by inserting the LEMO connection.

5.14.3 SCREW in the Universal Bulkhead connector by turning clockwise until tight.

5.14.4 TOUCH “Thermal Desorber” from the pop-up box on the front panel.

5.14.5 TOUCH “Accessories” icon to verify the Thermal Desorber accessory is properly attached.
5.15 Thermal Desorber Tube Installation

5.15.1 CONFIRM the concentrator is installed before selecting method.

5.15.2 TOUCH “Select Method”.

5.15.3 SELECT the method to initiate method preparation AND TOUCH “Select”.

5.15.4 When the method is ready, gently PULL BACK the carrier gas tube and ROTATE away from the Thermal Desorber heater.

5.15.5 INSTALL the pre-conditioned TD tube into the Rear Thumb Wheel by matching the arrow on the tube to the arrow on top of the heater.

5.15.5.1 TURN the thumbwheel clockwise until gently tight.

CAUTION

Using excessive force when inserting the TD tube into the TD heater can cause the tube to break.

5.15.6 PULL the Carrier Gas tube out. ROTATE towards the TD heater AND Gently PUSH the TD tube into the heater until seated into the internal O-ring.
5.16 Thermal Desorber Survey Operation

5.16.1 SELECT Survey Method to be used.

5.16.2 When the screen prompts, “SYSTEM READY”, INSTALL the thermal desorption tube and

5.16.3 TOUCH “RUN SURVEY”.

5.16.4 RUN Survey until the TD tube is completely desorbed (at least 15 minutes).

5.16.5 TOUCH “STOP” to end the run.

NOTE- The TD tube is considered to be clean when the baseline is flat and steady.

WARNING
DO NOT remove the TD tube while the temperature LED is flashing red. TD tube is extremely hot and can cause personal injury if handled.

5.16.6 REMOVE the TD tube when the oven temperature (LED) is green,

5.16.7 SEAL the tube in its storage container AND

STORE in a clean environment until ready for sample collection.
5.17 Thermal Desorber Analyze Operation

5.17.1 SELECT the “Analyze” method to be used.

5.17.2 When the screen prompts, “SYSTEM READY”, INSTALL the TD tube AND TOUCH “RUN ANALYZE”

5.17.3 ENTER the sample volume in units of liters or milliliters or the calculation can be performed by the HAPSITE by entering flow rate and time.

5.17.4 REPEAT steps 5.16.6 and 5.16.7.
5.18 Running a Bag Sample Using the Loop Method

5.18.1 PRIOR to using the loop method, RUN a tube blank.

5.18.2 PRESS “ESC” to return to the “Main Menu” on the front panel.

5.18.3 SELECT “Run Method” from the “Main Menu” AND PRESS “SEL”.

5.18.4 USE the arrow keys or the number pad AND CHOOSE “GC/MS”.

5.18.5 PRESS “SEL”.

5.18.6 HIGHLIGHT “Loop” AND PRESS “SEL”.

5.18.7 CHOOSE “Air 15 min Loop” OR “AL 15m 45 250” AND PRESS “SEL”.

NOTE - When a desired method is selected, the HAPSITE will check pressures and automatically heat up all necessary zones to the setpoint temperatures specific to the method selected as indicated by a bar graph. Once all temperature zones have reached their set point, the prompt “Press RUN to start method” will appear.

- The sample pump will run for one minute. This is the “Loopfill” cycle.

5.18.8 CONNECT the sample bag to the end of the open probe AND PRESS “RUN” on the probe or the front panel.

NOTE - Sampling is complete and the method will run for an additional 15 minutes.

5.18.9 WHEN the “Loopfill” cycle is complete AND the sample pump stops running, REMOVE the bag from the probe AND CLOSE the valve.
5.19 Taking a Direct Sample Using the Loop Method

5.19.1 PRIOR to using the loop method, RUN a tube blank.

5.19.2 PRESS “ESC” to return to the “Main Menu” on the front panel.

5.19.3 CHOOSE “Run Method” from the “Main Menu” AND PRESS “SEL”.

5.19.4 USE the arrow keys or the number pad AND SELECT “GC/MS”.

5.19.5 PRESS “SEL”.

5.19.6 CHOOSE “Loop” AND PRESS “SEL”.

5.19.7 SELECT “Air 15 min Loop” OR “AL 15m 45 250” AND PRESS “SEL”.

NOTE - When a desired method is selected, the HAPSITE will check pressures and automatically heat up all necessary zones to the setpoint temperatures specific to the method selected as indicated by a bar graph. Once all temperature zones have reached their set points, the prompt “Press RUN to start method” will appear.

- The sample pump will run for one minute. This is the “Loopfill” cycle.

5.19.8 HOLD the open ended probe over the area of interest AND PRESS “RUN” on the probe or the front panel.

NOTE - Sampling is complete and the method will run for an additional 15 minutes.

5.19.9 WHEN the “Loopfill” cycle is complete AND the sample pump stops running, REMOVE the probe from the area of interest.
5.20 Running the HAPSITE in the Survey Mode

5.20.1 ENSURE the following:
- HAPSITE is undocked
- Out of “Extended Standby”
- Heated up and tuned.

5.20.2 WHEN Step 5.20.1 is completed, PRESS “ESC” to return to the “Main Menu”.

5.20.3 CHOOSE “Run Method” from the “Main Menu” AND PRESS “SEL”.

5.20.4 USE arrow keys or the number pad AND SELECT “Survey”.

5.20.5 PRESS “SEL”.

NOTE - When the desired method is selected, the HAPSITE will check pressures and automatically heat up all necessary zones to the setpoint temperatures specific to the selected method as indicated by a bar graph. Once all temperature zones have reached their setpoints, the prompt “Press RUN to start method” will appear.

5.20.6 PRESS “RUN” on the probe or the front panel to start the method.

5.20.7 SAMPLE the background for 1 minute AND NOTE the “TIC”.

5.20.8 HOLD the probe over the area of interest for up to 1 minute.

NOTE - A peak or a peak and identification may appear if the compound present is >10 ppm. No response may indicate either the compound present is less than the detectable limit, or that no detectable compound is present.

-Pressing “RUN” again will pause the method and save the data.

5.20.9 MOVE the probe away from area of interest AND WAIT until the “TIC” level returns to the initial background level.

5.20.10 USE the arrow keys on the front panel at any time to highlight the “TIC” in the upper left corner of the display to view the chromatogram.
5.21 Detaching the HAPSITE from the Service Module Using the Front Panel

NOTE - When the HAPSITE is in the Survey mode, all the internal tubes are bypassed and the sample goes directly to the mass spectrometer. This, in essence, converts the HAPSITE into a photo-ionization detector (PID).

5.21.1 SELECT “3” “Service Module” From the “Main Menu” on the front panel AND
PRESS “SEL”.

5.21.2 SELECT “2”, DETACH the service module AND
PRESS “SEL”.

NOTE - The “Detach HAPSITE Successful” screen will be displayed if the detachment was achieved.

5.21.3 SELECT “1. Yes” AND
PRESS “SEL”.

5.21.4 RELEASE the black clamps on both the sides of the service module AND
REMOVE the HAPSITE from the service module.
5.22 Attaching the HAPSITE to the Service Module Using the Front Panel

5.22.1 REMOVE the yellow plastic cover and then the aluminum storage cap from the top of the service module.

5.22.2 CHECK for debris or dust on the rubber O-ring.

5.22.3 IF any debris or dust is present, USE a lint-free wipe dampened with methanol AND REMOVE debris or dust.

5.22.4 INSPECT the O-ring for breaks and cracks.

5.22.4.1 IF the O-ring damaged, REPLACE the O-ring.

5.22.5 REMOVE the yellow plastic cover from the bottom of the HAPSITE.

5.22.6 PLACE the HAPSITE on the service module.

5.22.7 LINE UP the interconnect valve openings.

5.22.8 REPOSITION the front handle to proper position.

5.22.9 USE the two black clamps on both sides of the module AND SECURE the service module to the HAPSITE.

5.22.10 PRESS the “ESC” button on the front of the HAPSITE panel to return to the “Main Menu”.

5.22.11 SELECT “3. Attach SM” from the “Main Menu” on the HAPSITE front panel AND PRESS “SEL”.

5.22.12 CHOOSE “1. Attach SM” AND PRESS “SEL”.

NOTE - The “Attach HAPSITE Successful” screen will be displayed if the attachment was successful.

5.22.13 SELECT “1. Yes” AND PRESS “SEL”. 
5.22 Attaching the HAPSITE to the Service Module Using the Front Panel (Cont.)

5.22.14 **RECONNECT** the gray power cable to the left side of the HAPSITE with the red indicator dot facing forward.

5.22.15 **RECONNECT** the yellow computer crossover cable to the connection port on the top of the HAPSITE.

5.22.16 **USE** the appropriate “Smart Start” and the HAPSITE is ready to be used in the lab setting.

5.23 Troubleshooting Tips

5.23.1 **REPLACE** the two short pieces of Masterflex and silicone tubing connecting the charcoal tube to the wand.

5.23.2 **IF** the HAPSITE or its attachments exhibit damage, satisfactory results cannot be achieved during the performance of this procedure or any condition that the user determines is prohibiting use of the equipment or execution of the procedure, **COMPLETE** a green tag “IH Instrument Service Tag” (BT-6004-019), documenting the condition and notify the equipment custodian.
5.24 Records

Data and attachments are entered into the Site-Wide Industrial Hygiene Database and when reviewed and completed by the Industrial Hygienist, are uploaded to IDMS via an automated interface. The record custodian identified in the Company Level Records Inventory and Disposition Schedule (RIDS) is responsible for record retention in accordance with TFC-BSM-IRM_DC-C-02.