

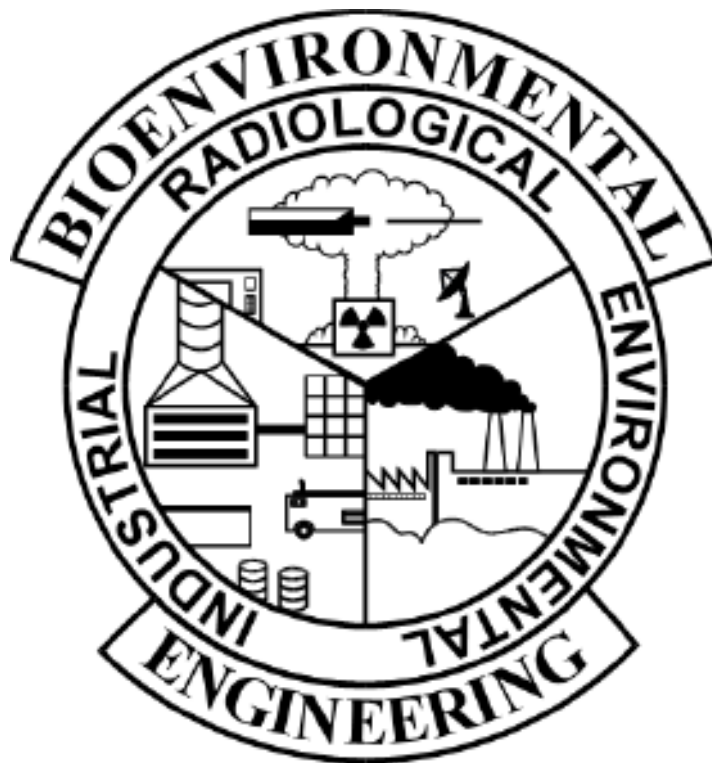
DEPARTMENT OF THE AIR FORCE
Headquarters US Air Force
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AIR FORCE SPECIALTY CODE 4B071 BIOENVIRONMENTAL ENGINEERING

Water/Liquid Sampling



QUALIFICATION TRAINING PACKAGE

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Table of Contents

STS Line Item 4.15.3.5.1: Portable GC/MS (HAPSITE®)	1
TRAINER GUIDANCE	1
TASK STEPS	2
PERFORMANCE CHECKLIST	8
STS Line Item 4.15.3.5.2: Portable laboratory analysis kit (e.g. DREL)	12
TRAINER GUIDANCE	12
TASK STEPS	14
PERFORMANCE CHECKLIST	17
STS Line Item 4.15.3.5.3: FT-IR (e.g., HazMatID)	20
TRAINER GUIDANCE	20
TASK STEPS	21
PERFORMANCE CHECKLIST	23
STS Line Item 4.15.3.6: Calibrate / Operate water sampling equipment	25
TRAINER GUIDANCE	25
TASK STEPS	27
PERFORMANCE CHECKLIST	30

STS Line Item 4.15.3.5.1: Portable GC/MS (HAPSITE®)*

TRAINER GUIDANCE

Proficiency Code:	3c
PC Definition:	Can do all parts of the task. Needs only a spot check of completed work. Can identify why and when the task must be done and why each step is needed.
Prerequisites:	Complete Computer Based Training.
Training References:	<ul style="list-style-type: none"> • Inficon Equipment User's Manual. • <i>HAPSITE® Smart Plus Chemical Identification System Operating Manual (ESOH Service Center Website)</i>
Additional Supporting References:	<ul style="list-style-type: none"> • <i>Fundamentals of Industrial Hygiene</i>, 5th Edition, Chapter 17. • <i>Technical Report on BE HAPSITE® Preventive Maintenance and KD Analytical Support Guidance</i>, July 21, 2010 • <i>HAPSITE® GC/MS Training Guide – United States Training Version</i>, 2002
CDC Reference:	4B051
Training Support Material:	HAPSITE® (GC/MS) VOC test sample
Specific Techniques:	Conduct hands-on training and evaluation.
Criterion Objective:	Given a HAPSITE® (GC/MS), perform pre-operational check and operate instrument successfully completing all checklist items with NO trainer assistance.
<p>Notes:</p> <p>*The HAPSITE® is a gas chromatograph/mass spectrometer (GC/MS) proven to provide verifiable data for critical health-risk decisions. The HAPSITE® systems deliver fast, dependable on-site analysis of volatile organic compounds (VOCs) in air, water, and soil for emergency response, environmental, hazardous waste, industrial hygiene, process monitoring, and medical applications. The HAPSITE® Headspace sampling system supports the HAPSITE® Smart Chemical Identification System in detecting and identifying VOCs in water or soil on-site or from another location.</p> <p>INFICON recommends storing the HAPSITE® Smart in extended standby mode. This keeps the NEG (pump) operating at 400°C and the ion pump ON to maintain proper vacuum conditions. Extended standby ensures the battery is charged and ready for deployment/response. While extended standby is recommended, it is not a substitute for system use and it is not a feature to extend the time period between system operations. Using the system or running a weekly Blank Run is the best method to ensure overall operational readiness.</p> <p>The Guidance Document (HAPSITE® Field Guide) referenced above is designed to provide user's the capability to maximize the use of deployment technology at both garrison and deployed environments in both routine and emergency response situations.</p> <p>Completion of this Craftsman QTP Training Module also satisfies Craftsman QTP Training 4.5.2.6.3.</p>	

TASK STEPS

START UP FROM STANDBY MODE:

(These steps are *ONLY* for resuming use when the HAPSITE® has been placed in STANDBY MODE.)

1. Using your thumbs, Open front panel of HAPSITE®.¹
2. Insert purple-banded Nitrogen gas canister into the opening with the purple stripe².
3. Insert yellow-banded Internal Standard gas canister into bottom canister opening marked with yellow stripe.²
4. Insert a fully charged battery into the rectangular opening to the left of the canister openings.³
5. Ensure the sample loop is installed.⁴
6. Navigate to main menu.
7. Allow the HAPSITE® to boot up and run auto tune check (self-calibration).⁵

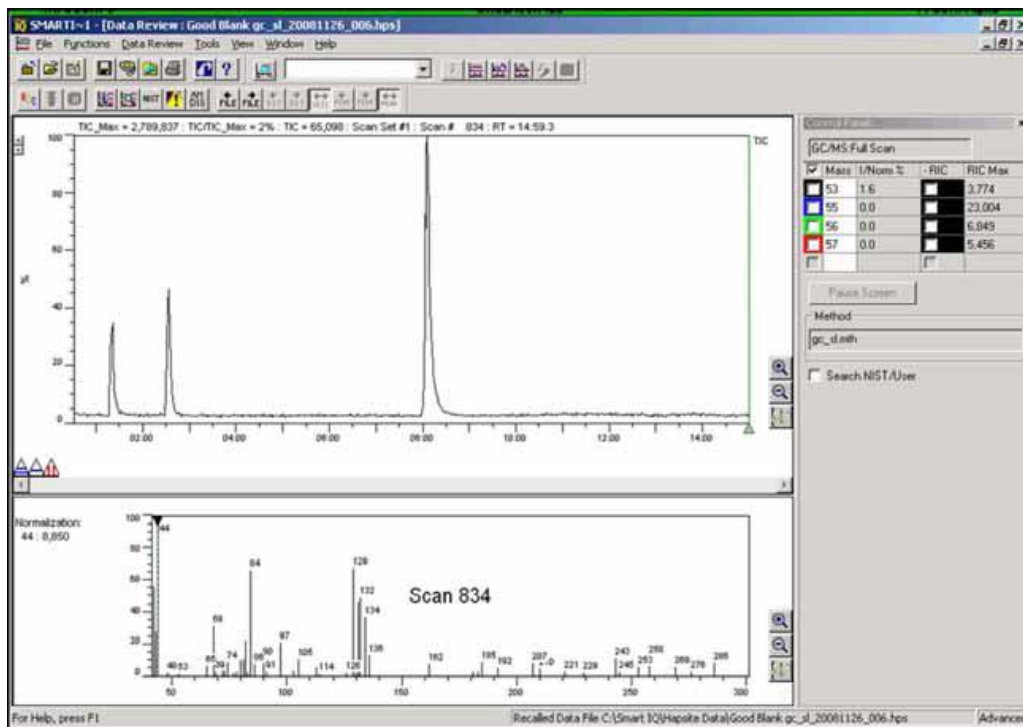
HAPSITE® SEQUENCE OF OPERATION (SURVEY MODE):

1. Ensure HAPSITE is turned on and warmed up.
2. Navigate to main screen.
3. Choose “Return to Main Menu”
4. Choose “Run Method”
5. Choose JPMESG Rev 2 Methods
6. Choose JPMESG Survey
7. Ensure Tune parameters are OK,
8. Press **Run** and sample background in ambient air surrounding for about a minute to allow the background to drop and stabilize.⁶
9. Get a volatile organic compound (VOC) sample to test (e.g., toluene, acetone, gasoline).
10. Hold probe over sample for up to one minute while monitoring the TIC count. Look for a response (spike) and pull probe away. (Remember: TIC count over 60 million is indicative of oversaturation.)
11. Keep running the HAPSITE® for at least one minute away from the sample and allow background to drop again.
12. After the clean background has been obtained leave the HAPSITE® running in the clean area for a minimum of a minute prior to entering a suspected contaminated area.
13. When entering an area ensure the TIC count is being observed at all times, if the TIC count reaches 60,000,000 back away from the area.
14. Return to the clean area and let HAPSITE® run for 1 minute
15. Select **Escape** to end the method and return to main menu.
16. Review findings

HAPSITE® SEQUENCE OF OPERATION (SAMPLE LOOP BLANK):

1. Ensure HAPSITE is turned on and warmed up.
2. Navigate to main screen.
3. Choose “Return to Main Menu”
4. Choose “Run Method”
5. Choose JPMESG Rev 2 Methods
6. Choose JPMESG GCMS
7. Ensure the Sample Loop is installed with the correct cover. Sample Loop cover will have **Sample Loop** written on it.
8. Select **JPMESG Loop Method**
9. Select **gc_sl**.
10. Press **Run**.
11. HAPSITE® will start sampling as soon as the user selects the run button.
12. Sample collection time is 60 seconds, collection of sample is indicated on the bottom of the screen as “loop fill”
13. When complete, review the blank run. It should show the following:⁸
 - Air Peak at 1:20 +/- 10 seconds
 - Internal Standard #1 at 2:30 minutes +/- 10 seconds (TRIS)
 - Internal Standard #2 at: 8:00 minutes +/- 10 seconds (BPFb)
 - No additional peaks and low background

All four criteria constitute a satisfactory blank run. See the figure below for an example of a good Sample Loop blank run with all three peaks identified and no additional peaks.



Sample Loop Blank Chromatogram

HAPSITE® SEQUENCE OF OPERATION (TRI-BED CONCENTRATOR BLANK):

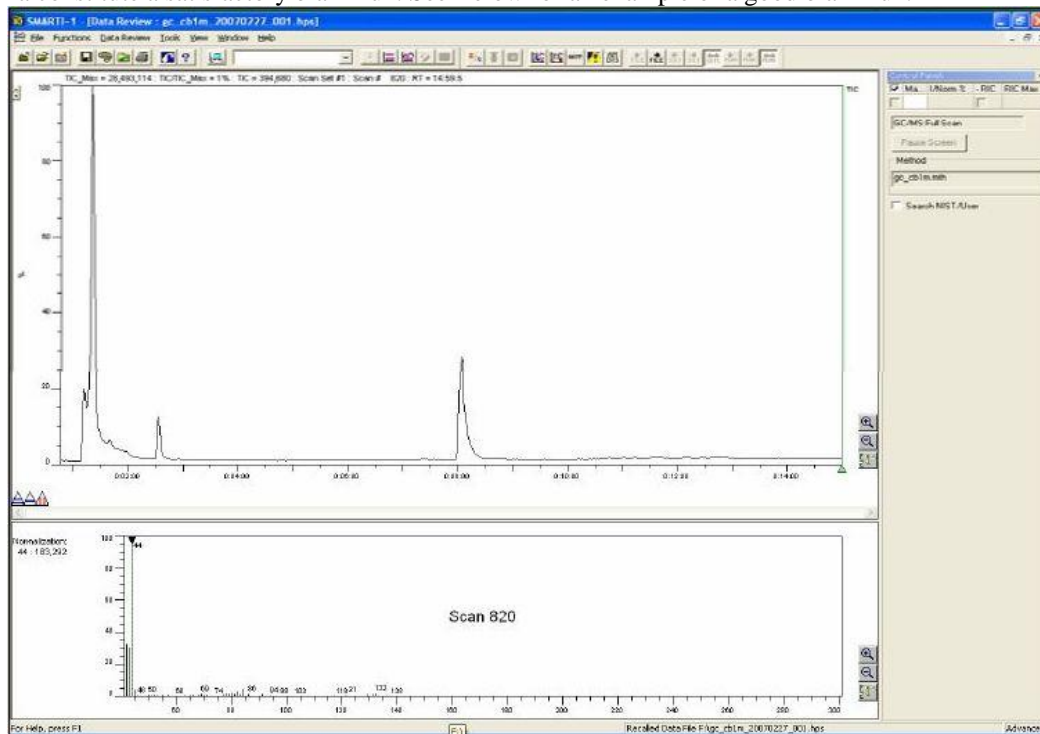
1. Ensure HAPSITE is turned on and warmed up.
2. From Main screen, choose press the ESC button
3. Ensure that the Tri-bed concentrator is installed with groove facing up and the appropriate cover is attached. If a problem should occur when running a concentrator, the following message may appear:

No Concentrator Installed/Incorrect Concentrator:

- (1) Indicates the concentrator cover may not be on.
- (2) Indicates the concentrator is not being recognized; may be due to a chipped end at the base of tube. Chipped concentrator will show Low Column Pressure Warning.⁹

4. Choose "Run Method"
5. Choose JPMESG Rev 2 Methods
6. Choose JPMESG GCMS
7. Choose JPMESG Concentrator
8. Select **JPMESG Concentrator Clean-out (gc_cbcl)**. Press **Run** and observe the maximum TIC during this three-minute run. If the TIC is greater than 500,000 at the end of run, repeat clean-out.
9. Note the number of clean-outs required to get TIC below 500,000, and note the actual TIC in comments.¹⁰
10. Choose "Return to Main Menu"
11. Choose "Run Method"
12. Choose JPMESG Rev 2 Methods
13. Choose JPMESG GCMS
14. Choose JPMESG Concentrator
15. Select **JPMESG Tri-bed concentrator method (gc_cb1m)**, and press **Run**. (Check the Tune Report if you have not already done so.)
16. Sample collection time is 60 seconds, collection of sample is indicated on the bottom of the screen as "conc fill"
17. When complete, review the blank run. It should show the following:¹¹
 - Air Peak at 1:20 +/- 10 seconds
 - Internal Standard #1 at 2:30 minutes +/- 10 seconds (TRIS)
 - Internal Standard #2 at: 8:00 minutes +/- 10 seconds (BPFb)
 - No additional peaks and low background.

All four criteria constitute a satisfactory blank run. See Below for an example of a good blank run.



Tri-bed Concentrator Blank Chromatogram

HAPSITE® SEQUENCE OF OPERATION (HEADSPACE SAMPLING SYSTEM (HSS) SET-UP METHOD):¹²

1. Ensure HAPSITE® is in Extended Standby Mode.
2. Attach "Y"-Cable Power Splitter. Connect the single connector end of the cable to the Convertex, power supply. Connect one of the split ends of the cable to the left side of the HAPSITE® and the other to the back of the Headspace unit.



Back of HAPSITE® Analytical Module

3. Remove probe from the HAPSITE[®]. Connect the HSS transfer line and ensure that the end of the HSS transfer line with the yellow label marked "This End to HAPSITE[®]" is connected to HAPSITE[®]. Connect the end of transfer line with the white label marked "This End to Headspace" to the back of the HSS.

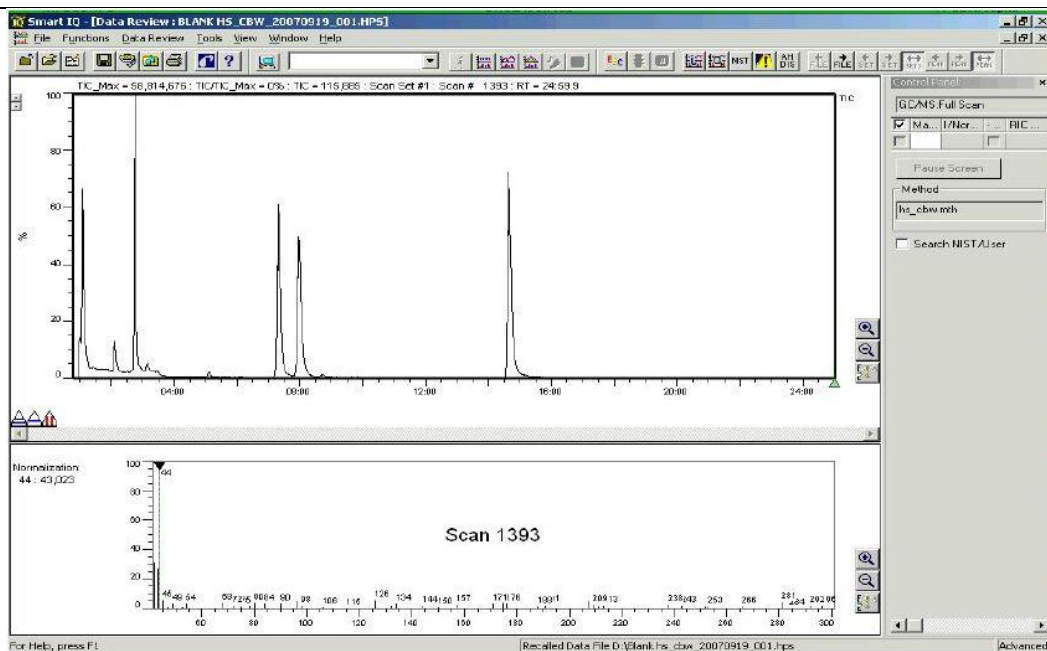


HAPSITE[®] Headspace Transfer Line

4. Insert a nitrogen canister and a charged battery into the HSS and turn on the power.

HAPSITE[®] SEQUENCE OF OPERATION (HEADSPACE TRI-BED PERFORMANCE STANDARD):

1. Select **Run** Method from Main Menu.
2. Select JPMESG GCMS Methods
3. JPMESG HeadSpace
4. Select Headspace. Select **hs_slwqc** method.
5. HAPSITE[®] warm-up heaters window will appear. This process takes approximately 15–20 minutes.
6. Automatic tune will initiate (see HAPSITE[®] LCD screen). The message **Instrument is Tuned** should appear.
7. Measure 20 mL of deionized or sterile water into a 40 mL vial. Inject 1 µL of the Headspace Performance Standard into the 20 mL of de-ionized water through the septum. Gently mix, and then place in the Headspace. Place a clean empty vial in the Headspace next to the vial with Performance Standard.
8. Close yellow cover and press **Run** to start method. Observe on HAPSITE[®] or laptop screen. Data file name will automatically be generated on HAPSITE[®] LCD screen.
9. After the run is complete, follow screen directions. Put needle in clean vial and press SEL to purge. Purging takes approximately two minutes.
10. Press **SEL** to view results from front panel LCD.



Headspace Tri-bed Performance Test Method

RECORD DATA:

1. Utilize DOEHS or equivalent as applicable.

LOCAL REQUIREMENTS:**NOTES:**

1. Place hands on top of front panel, using thumbs, pull panel down and outward to open. Care should be taken not to tear the seal.
2. Insert instructions for canisters are located on the inside of the front panel and require the operator to press and hold the PUSH button located to the right of the containment area while inserting canister. With canister pushed in, release the button and this should engage the canister to stay in the containment area. If you can pull it out then it was not inserted properly.
3. The battery is loaded in the opening to the left of the canisters. The INFICON name will be in the upper left corner of the battery and the TEST button in the upper right corner when the battery has been inserted correctly. When the HAPSITE® is in extended standby a battery should be in the machine. The battery will be recharged while in extended standby.
4. Sample loop is located to the right of the canisters. When installing the Sample Loop do **not** over tighten.

5. When tune check is complete, *PRESS ANY BUTTON TO CONTINUE* will appear at the top of the display screen. Any button you press on the HAPSITE® will cause the display window to show the MAIN MENU.
6. TIC generally should be less than 200,000. If not, check area for interferences such as chemicals that may be in the area.
7. Instrument will continuously run until you stop it while in Survey Mode.
8. Monitoring what a normal blank looks like is one step in verifying the operation of the HAPSITE® and determining if there is a problem. If there are additional peaks in the blank spectrum, and they cannot be removed with additional blank runs, review your blank chromatogram, note the additional analytes, and contact the ESOH Service Center.
9. It is important to blow out the ferrule chamber to ensure broken pieces of the chipped tube are not imbedded.
10. Clean-outs required.
11. If there are additional peaks in the blank spectrum, and they cannot be removed with additional blank runs, AND they are not getting in the way of other analytes, note the additional analytes, and adjust your sample spectrum accordingly. Remember that in future samples, if the chemical that showed up in the blank run is sampled, there will be an increase in peak heights.
12. The Headspace Performance Standard is a test of the HAPSITE® and Headspace connections using the Tri-bed concentrator.

PERFORMANCE CHECKLIST

STS Line Item 4.15.3.5.1: Portable GC/MS (HAPSITE®)

Proficiency Code:	3c
PC Definition:	Can do all parts of the task. Needs only a spot check of completed work. Can identify why and when the task must be done and why each step is needed.

DID THE TRAINEE...		YES	NO
START UP FROM STANDBY MODE			
1. Use thumbs to open front panel of HAPSITE®?			
2. Insert purple-banded Nitrogen gas canister into the opening with the purple stripe?			
3. Insert yellow-banded Internal Standard gas canister into bottom canister opening marked with yellow stripe?			
4. Insert a fully charged battery into the rectangular opening to the left of the canister openings?			
5. Ensure the sample loop is installed?			
6. Press and hold the power button located on the outside of the HAPSITE®'s face panel?			
7. Allow the HAPSITE® to boot up and run auto tune check (self-calibration)?			
HAPSITE® SEQUENCE OF OPERATION (SURVEY MODE)			
1. Ensure HAPSITE is turned on and warmed up?			
2. From Main screen, choose Press the ESC button?			
3. Choose Return to Main Menu?			
4. Choose Run Method?			
5. Choose JPMESSG Rev 2 Methods?			
6. Choose JPMESSG Survey?			
7. Ensure Tune parameters are OK			
8. Press Run and sample background in ambient air surrounding for about a minute to allow the background to drop and stabilize?			
9. Get a volatile organic compound (VOC) sample to test?			

10. Hold probe over sample for up to one minute while monitoring the TIC count?			
11. Keep running the HAPSITE® for at least one minute away from the sample and allow background to drop again repeating steps 4 and 5 two or three times?			
12. After the clean background has been obtained leave the HAPSITE® running in the clean area for a minimum of a minute prior to entering a suspected contaminated area?			
13. When entering an area ensure the TIC count is being observed at all times?			
14. Return to the clean area and let HAPSITE® run for one minute?			
15. Select ESC to end the method and return to main menu?			
16. Review findings?			
HAPSITE® SEQUENCE OF OPERATION (SAMPLE LOOP BLANK)			
1. Ensure HASPITE is turned on and warmed up?			
2. From Main screen, choose press the ESC button?			
3. Choose Return to Main Menu ?			
4. Choose Run Method ?			
5. Choose JPMSG Rev 2 Methods ?			
6. Choose JPMSG GCMS ?			
7. Ensure the Sample Loop is installed with the correct cover?			
8. Select JPMSG Loop Method ?			
9. Select gc_sl ?			
10. Press Run ?			
11. Allow sample collection time of 60 seconds?			
12. When complete, review the blank run?			
HAPSITE® SEQUENCE OF OPERATION (TRI-BED CONCENTRATOR BLANK)			
1. Ensure HASPITE® is turned on and warmed up?			
2. From Main screen, choose the ESC button?			

3. Ensure that the Tri-bed concentrator is installed with groove facing up and the appropriate cover is attached?			
4. Choose Return to Main Menu?			
5. Choose Run Method?			
6. Choose JPMSG Rev 2 Methods?			
7. Choose JPMSG GCMS?			
8. Choose JPMSG Concentrator?			
9. Select JPMSG Concentrator Clean-out (gc_cbcl)?			
10. Press Run and observe the maximum TIC during this three-minute run?			
11. Note the number of clean-outs required to get TIC below 500,000, and note the actual TIC in comments?			
12. Choose Return to Main Menu?			
13. Choose Run Method?			
14. Choose JPMSG Rev 2 Methods?			
15. Choose JPMSG GCMS?			
16. Choose JPMSG Concentrator?			
17. Select JPMSG Tri-bed Concentrator Method (gc_cb1m)?			
18. Press Run?			
19. Allow a sample collection time of 60 seconds?			
20. When complete, review the blank run?			
HAPSITE® SEQUENCE OF OPERATION (HEADSPACE SAMPLING SYSTEM (HSS) SET-UP METHOD)			
1. Ensure HAPSITE® is in Extended Standby Mode?			
2. Attach “Y”-Cable Power Splitter?			
3. Remove probe from the HAPSITE®?			
4. Connect the HSS transfer line?			

5. Ensure that the end of the HSS transfer line with the yellow label marked “This End to HAPSITE®” is connected to HAPSITE®?			
6. Connect the end of transfer line with the white label marked “This End to Headspace” to the back of the HSS?			
7. Insert a nitrogen canister and a charged battery into the HSS and turn on the power?			
HAPSITE® SEQUENCE OF OPERATION (HEADSPACE TRI-BED PERFORMANCE STANDARD)			
1. Select Run Method from Main Menu?			
2. Select JPMSG GCMS Methods ?			
3. Select Headspace?			
4. Select hs_slwgc method?			
5. Wait until the message Instrument Is Tuned appeared?			
6. Measure 20 mL of deionized or sterile water into a 40 mL vial?			
7. Inject 1 µL of the Headspace Performance Standard into the 20 mL of de-ionized water through the septum?			
8. Gently mix, and then place in the Headspace?			
9. Place a clean empty vial in the Headspace next to the vial with Performance Standard?			
10. Close yellow cover?			
11. Press Run to start method?			
12. Observe on HAPSITE® or laptop screen?			
13. After the run completed, follow screen directions?			
14. Put needle in clean vial and press SEL to purge?			
15. Press SEL to view results from front panel LCD?			
RECORD DATA			
Utilize DOEHS or equivalent as applicable			
Did the trainee successfully complete the task?			

 TRAINEE NAME (PRINT)

 TRAINER NAME (PRINT)

STS Line Item 4.15.3.5.2: Portable laboratory analysis kit (e.g. DREL)

TRAINER GUIDANCE

Proficiency Code:	3c
PC Definition:	Can do all parts of the task. Needs only a spot check of completed work. Can identify why and when the task must be done and why each step is needed.
Prerequisites:	N/A
Training References:	<ul style="list-style-type: none"> • DREL 2800™ <i>USER MANUAL</i>, Aug 2013 , 4th edition • AFI 48-144, <i>Drinking Water Surveillance Program</i>, 28 Sept 2010
Additional Supporting References:	<ul style="list-style-type: none"> • DREL 2800™ Spectrophotometer <i>PROCEDURES MANUAL</i>, Aug 2013 , 4th edition • USAFSAM Automated Sample Guide or servicing laboratory guidance • 40 CFR 141, National Primary Drinking Water Regulations • Sampling, Analysis and Monitoring (SAM) Plan, if available • EPA SOP #2013, Surface Water Sampling • USAFSAM Automated Sample Guide or servicing laboratory guidance
CDC Reference:	4B051
Training Support Material:	<ul style="list-style-type: none"> • DREL 2800™ Spectrophotometer • Plug-in power supply • Dust cover • Cell adapter B • Light Shield • Protective Cover • Deionized water • Water sample for testing • Ultra Low Range (ULR) Chlorine Buffer Solution, 1.5 ml ampules • DPD Indicator Solution for (ULR) Chlorine, 1.5 ml ampules • Blanking Reagent for ULR Chlorine • Beaker, 250 ml • Cylinder, graduated mixing, 50 ml • Pipet, Tensette®, 0.1 to 1.0 ml • Pipet Tips for TenSette® Pipet x 2 • Pour-Thru Module and Cell
Specific Techniques:	Conduct hands-on training and evaluation.
Criterion Objective:	Given a DREL 2800™ Spectrophotometer, perform pre-operational check and operate instrument successfully completing all checklist items with no trainer assistance.

Notes:

DREL 2800™ Complete Water Quality Lab with Meters is designed to function as a fully equipped portable laboratory, able to run approximately 100 tests on 20 different parameters. We cannot cover all of the tests in this QTP so we will concentrate on one test, the test for Chlorine using the Pour-Thru Cell method. This method is designed for clean water, low in color and turbidity. The main applications include monitoring for trace chlorine break-through of activated carbon beds and feedwater to reverse osmosis membranes or ion-exchange resins.

Before starting the Chlorine test it must be noted that samples have to be analyzed immediately. Samples containing chlorine cannot be preserved for later analysis. Additionally, be aware that ampules, in order to ease transfer, contain more than the 1.0 ml of solution needed. Discard excess reagent.

Refer to the instrument USER MANUAL for Pour-Thru cell and module assembly and installation.

The Task Steps below require that determining the blanking reagent value is completed while the DREL 2800™ is still on and the Pour-Thru Cell is still attached.

To protect the Pour-Thru Cell from contamination when not in use by inverting a small beaker over the top of the glass funnel. See Treating Analysis Labware on page 6 of the DREL 2800™ Spectrophotometer *PROCEDURES MANUAL*.

TASK STEPS

Determining Level of Chlorine Using the Pour-Thru Cell Method

1. Ensure the DREL 2800™ is plugged in.¹
2. Press and hold the **ON/OFF** switch (located on the back of DREL 2800™ for about 1 second to turn the DREL 2800™ on.²
3. Press **STORED PROGRAMS** in the Main Menu.
4. Use arrows to scroll down and select *Chlorine* from the list.³
5. Press **START** to begin the test.
6. Insert Adapter B.
7. Install the Pour-Thru Cell with the 1-inch (round) path in line with the adapter arrow.
8. Flush the Pour-Thru Cell with 50 ml of deionized water.
9. Pour at least 50-ml of sample into the Pour-Thru Cell.
10. When the flow stops, press **TIMER>OK**.⁴
11. When the timer expires, press **ZERO**.⁵
12. Break open one ULR Chlorine Buffer Solution Ampule.
13. Using a Tensette® Pipet and a clean tip, transfer 1.0 ml of buffer from the ampule to a clean, treated 50-ml graduated mixing cylinder.
14. Break open on ampule of DPD Indicator Solution for ULR Chlorine.
15. Using a Tensette® Pipet and a clean tip, transfer 1.0 ml of indicator from the ampule to the graduated mixing cylinder and swirl to mix.⁶
16. Avoiding extra agitation, carefully fill the cylinder to the 50-ml mark with collected water sample and stopper the cylinder.
17. Gently invert it twice to mix.
18. Press **TIMER>OK**.⁷
19. Introduce the contents of the graduated mixing cylinder into the Pour-Thru Cell.
20. When the timer expires, press **READ**.⁸
21. Flush the Pour-Thru Cell with at least 50-ml of deionized water immediately after use.

Determining the Reagent Blank Value

22. Press **STORED PROGRAMS** in the Main Menu.
23. Use arrows to scroll down and select *Chlorine Total ULR* from the list.³
24. Press **START** to begin the test.
25. Make sure that the reagent blank setting is off by pressing **OPTION>MORE>REAGENT BLANK>OFF**.
26. Collect about 100-ml of deionized or tap water in a clean, 250-ml beaker.
27. Using a Tensette® Pipet, add 1.0 ml of Blanking Reagent to the beaker and swirl several times to mix.⁹
28. Press **OPTIONS>MORE>TIMER>GENERAL TIMER**.
29. Set a 5-minute timer and press **OK**.
30. After the timer expires, break open one ampule of ULR Chlorine Buffer Solution.
31. Using a Tensette® Pipet and a clean tip, transfer 1.0 ml of buffer from the ampule to a clean 50-ml graduated mixing cylinder.
32. Break open on ampule of DPD Indicator Solution for ULR Chlorine.
33. Using a Tensette® Pipet and a clean tip, transfer 1.0 ml of indicator from the ampule to the cylinder and swirl to mix the reagents.¹⁰
34. Fill the cylinder to the 50-ml mark with dechlorinated water from Step 27.¹¹
35. Cap the cylinder and invert twice.
36. Press **TIMER>OK**.¹²
37. During the reaction period, flush the Pour-Thru Cell with the remainder of original dechlorinated water from Step 27.
38. When the flow stops, press **ZERO**.¹³
39. When the timer expires, introduce the contents of the cylinder into the Pour-Thru Cell.
40. Press **READ**.¹⁴
41. Use value obtained in Step 40 to correct the sample result obtained in Step 20.¹⁵

42. Flush the Pour-Thru Cell with at least 50-ml of deionized water immediately after use.
43. Record results.
44. Press and hold the **ON/OFF** switch for 3-5 seconds to turn the DREL 2800™ off.¹⁶
45. Properly dispose of sample solution.¹⁷

Reporting Results

46. Report IAW local policy.
47. Record data in OEHMIS (DOEHRS or equivalent) as applicable.

LOCAL REQUIREMENTS:**NOTES:**

1. Or insert the battery for field analysis.
2. Each time the DREL 2800™ is turned on, a score of diagnostic tests are performed automatically. This operational check will take approximately two minutes. A check mark confirms each test was completed and functions correctly.
3. All of the stored programs are listed in alphabetical order with program numbers.
4. A three-minute reaction period will begin. This time allows turbidity or solids to settle and ensures a stable reading.
5. The display will show 0 µ/L.
6. Proceed to Step 16 within one minute.
7. A three-minute reaction time will begin. Measure the reacted sample 3-4 minutes after mixing the sample and reagents. If less than three minutes elapses, the reaction with chloramines may be incomplete. A reading after four minutes may result in higher reagent blank values.
8. Results are in µ/L chlorine. If a dechlorinating agent such as sulfite or sulfur dioxide is present, the sample result (corrected for the reagent blank) will read "0" or a slightly negative value.
9. The Blanking Reagent removes chlorine and chloramines from the water.
10. Proceed to Step 34 within one minute.
11. Save the remaining water for Step 37.
12. A three-minute reaction time will begin.
13. The display will show 0 µ/L Cl₂.
14. Results are in 0 µ/L chlorine.

15. The reagent blank value is most important to measure and subtract from test results when measuring low concentrations. For example, subtracting a reagent blank value of 0.02 μL from a test result of 0.06 μL changes the result by more than 30 percent. On the other hand, subtracting a reagent blank value of 0.02 μL from a result of 1.23 μL changes the results by less than 2 percent.
16. An acoustic signal confirms that the instrument has been switched off.
17. If the solution contains other regulated materials such as chloroform or heavy metals, it may still need to be collected for hazardous waste disposal. Never flush hazardous wastes down the drain.



DREL 2800™ Spectrophotometer

PERFORMANCE CHECKLIST

STS Line Item 4.15.3.5.2: Portable laboratory analysis kit (e.g. DREL)

Proficiency Code:	3c
PC Definition:	Can do all parts of the task. Needs only a spot check of completed work. Can identify why and when the task must be done and why each step is needed.

DID THE TRAINEE...		YES	NO
DETERMINING LEVEL OF CHLORINE USING THE POUR-THRU CELL METHOD:			
1. Ensure the DREL 2800™ is plugged in?			
2. Press and hold the ON/OFF switch (located on the back of DREL 2800™ for about 1 second to turn the DREL 2800™ on?			
3. Press STORED PROGRAMS in the Main Menu?			
4. Use arrows to scroll down and select <i>Chlorine</i> from the list?			
5. Press START to begin the test?			
6. Insert Adapter B?			
7. Install the Pour-Thru Cell with the 1-inch (round) path in line with the adapter arrow?			
8. Flush the Pour-Thru Cell with 50 ml of deionized water?			
9. Pour at least 50-ml of sample into the Pour-Thru Cell?			
10. When the flow stops, press TIMER>OK ?			
11. When the timer expires, press ZERO ?			
12. Break open one ULR Chlorine Buffer Solution Ampule?			
13. Using a Tensette® Pipet and a clean tip, transfer 1.0 ml of buffer from the ampule to a clean, treated 50-ml graduated mixing cylinder?			
14. Break open on ampule of DPD Indicator Solution for ULR Chlorine?			
15. Using a Tensette® Pipet and a clean tip, transfer 1.0 ml of indicator from the ampule to the graduated mixing cylinder and swirl to mix?			

16. Avoiding extra agitation, carefully fill the cylinder to the 50-ml mark with collected water sample and stopper the cylinder?			
17. Gently invert it twice to mix?			
18. Press TIMER>OK ?			
19. Introduce the contents of the graduated mixing cylinder into the Pour-Thru Cell?			
20. When the timer expires, press READ ?			
21. Flush the Pour-Thru Cell with at least 50-ml of deionized water immediately after use?			
DETERMINING THE REAGENT BLANK VALUE:			
22. Press STORED PROGRAMS in the Main Menu?			
23. Use arrows to scroll down and select <i>Chlorine Total ULR</i> from the list?			
24. Press START to begin the test?			
25. Make sure that the reagent blank setting is off by pressing OPTION>MORE>REAGENT BLANK>OFF ?			
26. Collect about 100-ml of deionized or tap water in a clean, 250-ml beaker?			
27. Using a Tensette [®] Pipet, add 1.0 ml of Blanking Reagent to the beaker and swirl several times to mix?			
28. Press OPTIONS>MORE>TIMER>GENERAL TIMER ?			
29. Set a 5-minute timer and press OK ?			
30. After the timer expires, break open one ampule of ULR Chlorine Buffer Solution?			
31. Using a Tensette [®] Pipet and a clean tip, transfer 1.0 ml of buffer from the ampule to a clean 50-ml graduated mixing cylinder?			
32. Break open on ampule of DPD Indicator Solution for ULR Chlorine?			
33. Using a Tensette [®] Pipet and a clean tip, transfer 1.0 ml of indicator from the ampule to the cylinder and swirl to mix the reagents?			
34. Fill the cylinder to the 50-ml mark with dechlorinated water from Step 27?			
35. Cap the cylinder and invert twice?			
36. Press TIMER>OK ?			
37. During the reaction period, flush the Pour-Thru Cell with the remainder of original dechlorinated water from Step 27?			

38. When the flow stops, press ZERO ?			
39. When the timer expires, introduce the contents of the cylinder into the Pour-Thru Cell?			
40. Press READ ?			
41. Use value obtained in Step 40 to correct the sample result obtained in Step 20?			
42. Flush the Pour-Thru Cell with at least 50-ml of deionized water immediately after use?			
43. Record results?			
44. Press and hold the ON/OFF switch for 3-5 seconds to turn the DREL 2800™ off?			
45. Properly dispose of sample solution?			
REPORTING RESULTS:			
46. Report IAW local policy?			
47. Record data in OEHMIS (DOEHRS or equivalent) as applicable?			
Did the trainee successfully complete the task?			

 TRAINEE NAME (PRINT)

 TRAINER NAME (PRINT)

STS Line Item 4.15.3.5.3: FT-IR (e.g., HazMatID)

TRAINER GUIDANCE

Proficiency Code:	3c
PC Definition:	Can do all parts of the task. Needs only a spot check of completed work. Can identify why and when the task must be done and why each step is needed
Prerequisites:	Complete Computer Based Training.
Training References:	HazMatID Equipment User's Manual 2009
Additional Supporting References:	ESOH service center HazMatID checklist
CDC Reference:	4B051, Volume 3 Unit 4
Training Support Material:	HazMatID Liquid sample Pipette/ Eye dropper Liquids well Volatile cover
Specific Techniques:	Conduct hands-on training and evaluation.
Criterion Objective:	Given a HazMatID, perform pre-operational check and operate instrument successfully completing all checklist items with limited assistance on only the hardest parts.
Notes: * The HazMatID can be used for qualitative analysis of solids, powders, pastes, gels and liquids. The HazMatID is intended to provide initial determinations, presence and absence, of hazardous chemicals. The information obtained from the HazMatID is not an absolute or conclusive identification of unknown substances. *WARNING: <ul style="list-style-type: none"> • The HazMatID is NOT intrinsically safe. • DO NOT open battery compartment door in a contaminated environment. • HazMatID CANNOT identify sulfur, phosphorus, ionic salts, sodium chloride and calcium chloride. • CANNOT detect substances that are less than 10% of the sample composition. • CANNOT DETECT BIOLOGICAL AGENTS! Only detects the presence of proteins. 	

TASK STEPS

START UP FROM OFF:

1. Open the battery compartment.¹
2. Plug the power cable into the power connection in the battery compartment or into electrical outlet, if available.
3. Turn the black power switch to ON position.²

PREPARE FOR DATA COLLECTION:

4. Log on to the system.
5. Click **START** to proceed.
6. Clean the crystal with isopropyl alcohol.
7. Select **CONTINUE** to proceed to background collection.
8. Enter the Incident Name and Sample ID by using the Keyboard feature.^{3, 4}

PREPARE LIQUID SAMPLES:

9. Ensure that the pressure application arm is fully disengaged.
10. Apply the liquid directly to the crystal using a pipette, eye dropper, or other suitable tool.⁵

PERFORM THE ANALYSIS:

11. Click on **Continue** to proceed.⁶
12. Select the **VISUAL COMPARE** button to compare the sample spectrum to spectra from the search list.⁷
13. Click **OVERLAY** to view the spectra over one another.
14. Accurately identify three criteria for positive identification.⁸

LOCAL REQUIREMENTS:

NOTES:

1. Lift the small round screw cover on the right of the battery compartment. Using a flat/slotted screw driver, turn the battery cover screw counterclockwise.
2. Allow the analyzer to warm up for 20 minutes. You will be prompted on the screen to “Please Log In”.
3. See the “Testing a Material” section of the HazMatID Software User’s Guide for additional details.
4. The Sample ID name will have a date and time stamp added to the end of the name. Use names that you will be able to identify at a later date.
5. For highly volatile samples use the liquids well and volatile cover. This will prevent the sample from evaporating prior to the analysis being completed. Position and reanalyze the sample until an absorbance of 0.1 is achieved.
6. When the collection process is complete, your spectral data and library search results will be displayed.
7. The Compare Spectra dialog box is displayed.
8. Additionally, the following three criteria must be met for a positive identification:
 - Quality (correlation) over 0.95
 - Sample and library match VISUALLY
 - PHYSICAL properties match

PERFORMANCE CHECKLIST

STS Line Item 4.15.3.5.3: FT-IR (e.g., HazMatID)

Proficiency Code:	3c
PC Definition:	Can do all parts of the task. Needs only a spot check of completed work. Can identify why and when the task must be done and why each step is needed

DID THE TRAINEE...		YES	NO
START UP FROM OFF:			
1. Open the battery compartment?			
2. Plug the power cable into the power connection in the battery compartment or into electrical outlet, if available?			
3. Turn the black power switch to ON position?			
PREPARE FOR DATA COLLECTION:			
4. Log on to the system?			
5. Click START to proceed?			
6. Clean the crystal with isopropyl alcohol?			
7. Select CONTINUE to proceed to background collection?			
8. Enter the Incident Name and Sample ID by using the Keyboard feature?			
PREPARE LIQUID SAMPLES:			
9. Ensure that the pressure application arm is fully disengaged?			
10. Apply the liquid directly to the crystal using a pipette, eye dropper, or other suitable tool?			
PERFORM THE ANALYSIS:			
11. Click on Continue to proceed?			
12. Select the VISUAL COMPARE button to compare the sample spectrum to spectra from the search list?			

13. Click OVERLAY to view the spectra over one another?			
14. Accurately identify three criteria for positive identification?			
Did the trainee successfully complete the task?			

TRAINEE NAME (PRINT)

TRAINER NAME (PRINT)

STS Line Item 4.15.3.6: Calibrate / Operate water sampling equipment

TRAINER GUIDANCE

Proficiency Code:	3c
PC Definition:	Can do all parts of the task. Needs only a spot check of completed work. Can identify why and when the task must be done and why each step is needed.
Prerequisites:	N/A
Training References:	<ul style="list-style-type: none"> • DREL 2800™ <i>USER MANUAL</i>, November 2009, Edition 3 • AFI 48-144, <i>Drinking Water Surveillance Program</i>, 28 Sept 2010
Additional Supporting References:	<ul style="list-style-type: none"> • DREL 2800™ Spectrophotometer <i>PROCEDURES MANUAL</i>, June 2007 Edition 2 • USAFSAM Automated Sample Guide or servicing laboratory guidance • 40 CFR 141, National Primary Drinking Water Regulations • Sampling, Analysis and Monitoring (SAM) Plan, if available • EPA SOP #2013, Surface Water Sampling • USAFSAM Automated Sample Guide or servicing laboratory guidance
CDC Reference:	4B051
Training Support Material:	<ul style="list-style-type: none"> • DREL 2800™ Spectrophotometer • Plug-in power supply • Dust cover • Cell adapter B • Light Shield • Protective Cover • Deionized water • Water sample for testing • Ultra Low Range (ULR) Chlorine Buffer Solution, 1.5 ml ampules • DPD Indicator Solution for (ULR) Chlorine, 1.5 ml ampules • Blanking Reagent for ULR Chlorine • Beaker, 250 ml • Cylinder, graduated mixing, 50 ml • Pipet, Tensette®, 0.1 to 1.0 ml • Pipet Tips for TenSette® Pipet x 2 • Pour-Thru Module and Cell
Specific Techniques:	Conduct hands-on training and evaluation.
Criterion Objective:	Given a DREL 2800™ Spectrophotometer, perform pre-operational check and operate instrument successfully completing all checklist items with NO trainer assistance.

Notes:

DREL 2800™ Complete Water Quality Lab with Meters is designed to function as a fully equipped portable laboratory, able to run approximately 100 tests on 20 different parameters. We cannot cover all of the tests in this QTP so we will concentrate on one test, the test for Chlorine using the Pour-Thru Cell method. This method is designed for clean water, low in color and turbidity. The main applications include monitoring for trace chlorine break-through of activated carbon beds and feedwater to reverse osmosis membranes or ion-exchange resins.

Before starting the Chlorine test it must be noted that samples have be analyzed immediately. Samples containing chlorine cannot be preserved for later analysis. Additionally, be aware that ampules, in order to ease transfer, contain more than the 1.0 ml of solution needed. Discard excess reagent.

Refer to the instrument USER MANUAL for Pour-Thru cell and module assembly and installation.

The Task Steps below require that determining the blanking reagent value is completed while the DREL 2800™ is still on and the Pour-Thru Cell is still attached.

To protect the Pour-Thru Cell from contamination when not in use by inverting a small beaker over the top of the glass funnel. See Treating Analysis Labware on page 6 of the DREL 2800™ Spectrophotometer *PROCEDURES MANUAL*.

TASK STEPS

Determining Level of Chlorine Using the Pour-Thru Cell Method

1. Ensure the DREL 2800™ is plugged in.¹
2. Press and hold the **ON/OFF** switch (located on the back of DREL 2800™ for about 1 second to turn the DREL 2800™ on.²
3. Press **STORED PROGRAMS** in the Main Menu.
4. Use arrows to scroll down and select *Chlorine* from the list.³
5. Press **START** to begin the test.
6. Insert Adapter B.
7. Install the Pour-Thru Cell with the 1-inch (round) path in line with the adapter arrow.
8. Flush the Pour-Thru Cell with 50 ml of deionized water.
9. Pour at least 50-ml of sample into the Pour-Thru Cell.
10. When the flow stops, press **TIMER>OK**.⁴
11. When the timer expires, press **ZERO**.⁵
12. Break open one ULR Chlorine Buffer Solution Ampule.
13. Using a Tensette® Pipet and a clean tip, transfer 1.0 ml of buffer from the ampule to a clean, treated 50-ml graduated mixing cylinder.
14. Break open on ampule of DPD Indicator Solution for ULR Chlorine.
15. Using a Tensette® Pipet and a clean tip, transfer 1.0 ml of indicator from the ampule to the graduated mixing cylinder and swirl to mix.⁶
16. Avoiding extra agitation, carefully fill the cylinder to the 50-ml mark with collected water sample and stopper the cylinder.
17. Gently invert it twice to mix.
18. Press **TIMER>OK**.⁷
19. Introduce the contents of the graduated mixing cylinder into the Pour-Thru Cell.
20. When the timer expires, press **READ**.⁸
21. Flush the Pour-Thru Cell with at least 50-ml of deionized water immediately after use.

Determining the Reagent Blank Value

22. Press **STORED PROGRAMS** in the Main Menu.
23. Use arrows to scroll down and select *Chlorine Total ULR* from the list.³
24. Press **START** to begin the test.
25. Make sure that the reagent blank setting is off by pressing **OPTION>MORE>REAGENT BLANK>OFF**.
26. Collect about 100-ml of deionized or tap water in a clean, 250-ml beaker.
27. Using a Tensette® Pipet, add 1.0 ml of Blanking Reagent to the beaker and swirl several times to mix.⁹
28. Press **OPTIONS>MORE>TIMER>GENERAL TIMER**.
29. Set a 5-minute timer and press **OK**.
30. After the timer expires, break open one ampule of ULR Chlorine Buffer Solution.
31. Using a Tensette® Pipet and a clean tip, transfer 1.0 ml of buffer from the ampule to a clean 50-ml graduated mixing cylinder.
32. Break open on ampule of DPD Indicator Solution for ULR Chlorine.
33. Using a Tensette® Pipet and a clean tip, transfer 1.0 ml of indicator from the ampule to the cylinder and swirl to mix the reagents.¹⁰
34. Fill the cylinder to the 50-ml mark with dechlorinated water from Step 27.¹¹
35. Cap the cylinder and invert twice.
36. Press **TIMER>OK**.¹²
37. During the reaction period, flush the Pour-Thru Cell with the remainder of original dechlorinated water from Step 27.
38. When the flow stops, press **ZERO**.¹³
39. When the timer expires, introduce the contents of the cylinder into the Pour-Thru Cell.
40. Press **READ**.¹⁴
41. Use value obtained in Step 40 to correct the sample result obtained in Step 20.¹⁵

42. Flush the Pour-Thru Cell with at least 50-ml of deionized water immediately after use.
43. Record results.
44. Press and hold the **ON/OFF** switch for 3-5 seconds to turn the DREL 2800™ off.¹⁶
45. Properly dispose of sample solution.¹⁷

Reporting Results

46. Report IAW local policy.
47. Record data in OEHMIS (DOEHRS or equivalent) as applicable.

LOCAL REQUIREMENTS:**NOTES:**

1. Or insert the battery for field analysis.
2. Each time the DREL 2800™ is turned on, a score of diagnostic tests are performed automatically. This operational check will take approximately two minutes. A check mark confirms each test was completed and functions correctly.
3. All of the stored programs are listed in alphabetical order with program numbers.
4. A three-minute reaction period will begin. This time allows turbidity or solids to settle and ensures a stable reading.
5. The display will show 0 µ/L.
6. Proceed to Step 16 within one minute.
7. A three-minute reaction time will begin. Measure the reacted sample 3-4 minutes after mixing the sample and reagents. If less than three minutes elapses, the reaction with chloramines may be incomplete. A reading after four minutes may result in higher reagent blank values.
8. Results are in µ/L chlorine. If a dechlorinating agent such as sulfite or sulfur dioxide is present, the sample result (corrected for the reagent blank) will read "0" or a slightly negative value.
9. The Blanking Reagent removes chlorine and chloramines from the water.
10. Proceed to Step 34 within one minute.
11. Save the remaining water for Step 37.
12. A three-minute reaction time will begin.
13. The display will show 0 µ/L Cl₂.
14. Results are in 0 µ/L chlorine.

15. The reagent blank value is most important to measure and subtract from test results when measuring low concentrations. For example, subtracting a reagent blank value of 0.02 μL from a test result of 0.06 μL changes the result by more than 30 percent. On the other hand, subtracting a reagent blank value of 0.02 μL from a result of 1.23 μL changes the results by less than 2 percent.
16. An acoustic signal confirms that the instrument has been switched off.
17. If the solution contains other regulated materials such as chloroform or heavy metals, it may still need to be collected for hazardous waste disposal. Never flush hazardous wastes down the drain.



DREL 2800™ Spectrophotometer

PERFORMANCE CHECKLIST

STS Line Item 4.15.3.6: Calibrate / Operate water sampling equipment

Proficiency Code:	3c
PC Definition:	Can do all parts of the task. Needs only a spot check of completed work. Can identify why and when the task must be done and why each step is needed.

DID THE TRAINEE...		YES	NO
DETERMINING LEVEL OF CHLORINE USING THE POUR-THRU CELL METHOD:			
1. Ensure the DREL 2800™ is plugged in?			
2. Press and hold the ON/OFF switch (located on the back of DREL 2800™ for about 1 second to turn the DREL 2800™ on?			
3. Press STORED PROGRAMS in the Main Menu?			
4. Use arrows to scroll down and select <i>Chlorine</i> from the list?			
5. Press START to begin the test?			
6. Insert Adapter B?			
7. Install the Pour-Thru Cell with the 1-inch (round) path in line with the adapter arrow?			
8. Flush the Pour-Thru Cell with 50 ml of deionized water?			
9. Pour at least 50-ml of sample into the Pour-Thru Cell?			
10. When the flow stops, press TIMER>OK ?			
11. When the timer expires, press ZERO ?			
12. Break open one ULR Chlorine Buffer Solution Ampule?			
13. Using a Tensette® Pipet and a clean tip, transfer 1.0 ml of buffer from the ampule to a clean, treated 50-ml graduated mixing cylinder?			
14. Break open on ampule of DPD Indicator Solution for ULR Chlorine?			
15. Using a Tensette® Pipet and a clean tip, transfer 1.0 ml of indicator from the ampule to the graduated mixing cylinder and swirl to mix?			

16. Avoiding extra agitation, carefully fill the cylinder to the 50-ml mark with collected water sample and stopper the cylinder?			
17. Gently invert it twice to mix?			
18. Press TIMER>OK ?			
19. Introduce the contents of the graduated mixing cylinder into the Pour-Thru Cell?			
20. When the timer expires, press READ ?			
21. Flush the Pour-Thru Cell with at least 50-ml of deionized water immediately after use?			
DETERMINING THE REAGENT BLANK VALUE:			
22. Press STORED PROGRAMS in the Main Menu?			
23. Use arrows to scroll down and select <i>Chlorine Total ULR</i> from the list?			
24. Press START to begin the test?			
25. Make sure that the reagent blank setting is off by pressing OPTION>MORE>REAGENT BLANK>OFF ?			
26. Collect about 100-ml of deionized or tap water in a clean, 250-ml beaker?			
27. Using a Tensette [®] Pipet, add 1.0 ml of Blanking Reagent to the beaker and swirl several times to mix?			
28. Press OPTIONS>MORE>TIMER>GENERAL TIMER ?			
29. Set a 5-minute timer and press OK ?			
30. After the timer expires, break open one ampule of ULR Chlorine Buffer Solution?			
31. Using a Tensette [®] Pipet and a clean tip, transfer 1.0 ml of buffer from the ampule to a clean 50-ml graduated mixing cylinder?			
32. Break open on ampule of DPD Indicator Solution for ULR Chlorine?			
33. Using a Tensette [®] Pipet and a clean tip, transfer 1.0 ml of indicator from the ampule to the cylinder and swirl to mix the reagents?			
34. Fill the cylinder to the 50-ml mark with dechlorinated water from Step 27?			
35. Cap the cylinder and invert twice?			
36. Press TIMER>OK ?			
37. During the reaction period, flush the Pour-Thru Cell with the remainder of original dechlorinated water from Step 27?			

38. When the flow stops, press ZERO ?			
39. When the timer expires, introduce the contents of the cylinder into the Pour-Thru Cell?			
40. Press READ ?			
41. Use value obtained in Step 40 to correct the sample result obtained in Step 20?			
42. Flush the Pour-Thru Cell with at least 50-ml of deionized water immediately after use?			
43. Record results?			
44. Press and hold the ON/OFF switch for 3-5 seconds to turn the DREL 2800™ off?			
45. Properly dispose of sample solution?			
REPORTING RESULTS:			
46. Report IAW local policy?			
47. Record data in OEHMIS (DOEHRS or equivalent) as applicable?			
Did the trainee successfully complete the task?			

 TRAINEE NAME (PRINT)

 TRAINER NAME (PRINT)