U.S. Environmental Protection Agency, Region 5

Field Quality Procedures

TECHNICAL FIELD STANDARD OPERATING PROCEDURE

Standard Operating Procedure for collection of VOC samples

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REVISION/CHANGE HISTORY

The table below identifies changes to this controlled document and the respective effective date(s) over time.

Revision Number	History/Change Description	Document Author/Owner	Management Approver	Effective Date
0	Original Document	Chad McEvoy	Michael Compher	03-31-2015
1	Updated to include Canister Sampling Field Test Data Sheet, more specific instructions for conducting the sample collection, and other minor edits	Jacqueline Nwia	Michael Compher	05-03-2017

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1.0 PURPOSE

1.1 This standard operating procedure describes steps for collecting air samples in the field for later analysis at Region 5 Chicago Regional Laboratory (CRL). This SOP is intended for use by field technicians so samples are collected consistently and documented properly.

2.0 APPLICABILITY/SCOPE

2.1 This document applies to the collection of air samples in the field. Field technicians should follow this SOP to ensure samples are collected properly and consistently, and that all documentation is completed.

2.2 The official signed copy of this SOP will be stored in the QA Tracking system under the folder "VOC SOP" and will be available to all field sampling staff. The SOP should be reviewed annually.

2.3 This document outlines obtaining the sampling vessels (i.e. bottles or canisters) from CRL, collecting and documenting the sample in the field, completing the chain-of-custody, and returning the samples to CRL.

2.4 This SOP is written to provide general instruction for collecting samples; individual projects will have specific needs and processes. Refer to the project specific Quality Assurance Project Plan (QAPP) or sampling plan for details.

3.0 DEFINITIONS

COC	Chain of Custody
CRL	Chicago Regional Laboratory
GMAP	Geospatial Monitoring of Air Pollutants
PID	Photo Ionization Detector
QAPP	Quality Assurance Project Plan
VOC	Volatile Organic Compounds

4.0 SUMMARY OF METHOD/PROCEDURE

4.1 Field staff will use containers supplied by CRL to collect air samples by opening the

valve on the canister, allowing the sample to enter the canister or bottle and then closing the valve. Samples may be grab samples or composite samples collected over a period of time. Staff will document relevant information on the sample labels (supplied by CRL), Canister Sampling Field Test Data Sheet (from Compendium Method TO-15) and chain of custody form (supplied by CRL). Labelled samples, Field Test Data Sheet and the chain of custody form(s) are then returned to CRL's sample custodian. Results will be reported by CRL at a future date.

5.0 PERSONNEL QUALIFICATION/RESPONSIBILITIES

5.1 Personnel involved in the collection of samples must meet the minimum training requirements for safety and technical expertise. Minimum training will include a background in air programs and hands on training with CRL or air monitoring personnel. The field staff is also responsible for reviewing this SOP prior to conducting sampling using passive canisters. Approved copies of this SOP and the project-specific air monitoring Quality Assurance Project Plan (QAPP) will be available to field staff throughout the duration of sampling activities.

6.0 EQUIPMENT AND SUPPLIES

6.1 Equipment used for the collection of VOC samples will vary depending on the objective of the project and the compounds of interest. Metal canisters or glass bottles could be used to hold the sample, and different volumes of containers are available. Both factors are dictated by the compounds of interest, project goals, and resource availability. Regulators/orifices (obtained from CRL and provided with the vessels) may be attached to the vessels to restrict the flow, allowing for a longer and/or specific sampling time.

6.2 Sample labels and chain of custody form will be supplied by CRL to document sample information.

7.0 REAGENTS AND STANDARDS

7.1 No reagents or standards are used during sample collection.

7.2 All reagents and standards used as part of the laboratory analysis can be found in section 7 (Reagents & Standard Gas Mixtures) of the Central Regional Laboratory's "SOP for VOCs in Air from TO-15" CRL SOP MS-005 Revision 6, Dated 06/04/2013.

8.0 HEALTH AND SAFETY CONSIDERATIONS

8.1 Field staff must complete the minimum safety training as required by the USEPA. Minimum safety trainings include the USEPA 24-hour field safety course and annual 8 hour refresher courses as required. Any necessary health and safety equipment needs for specific projects must be made in coordination with the Regional Safety Manager.

9.0 INTERFERENCES

9.1 The possibility of contamination of canister samples exists due to the improper handling and wear of canister valves.

9.2 Special attention must be given to canisters with QT valves; QT valves are normally in a closed position to minimize leakage, a protective cover should be placed over the valve to minimize leakage and prevent contamination of the canister. Bottles with QT valves should be evacuated using a dual stage pump in the field on the day of sampling, or as close to the day of sampling as possible. The dual stage pump should be capable of creating a strong vacuum within the bottle.

9.3 Additional possibilities of laboratory and storage contamination and preventative procedures can be found in section 5 (Caution & Interferences) of the Central Regional Laboratory's "SOP for VOCs in Air from TO-15" CRL SOP MS-005 Revision 6, Dated 06/04/2013.

10.0 PROCEDURE

10.1 Instrument or Method Calibration and Standardization

1. No instrument or method calibrations are expected for sample collection.

2. Steps should be taken to standardize sample collection as much as possible. Field technicians should consider the following:
   a) Avoid wearing perfumes, lotions, or hand sanitizers prior to or during sample collection.
   b) Record data (GPS values, time, etc) from the same source each time.
   c) If taking grab samples, hold away from the body.
   d) Note any nearby activity that may influence the sample on the sample label and in field notes.

e) An upwind or background sample may be helpful; refer to the project QAPP or sampling plan.
f) Copy or photograph sample labels and the completed chain of custody form.

10.2 General field or equipment procedures

1. Field staff must request VOC sample bottles or canisters from CRL's sample coordinator (Amanda Wroble) by completing "CRL Form 008 Rev 1.1- November 2013". CRL chemists are available to discuss, and recommend, possible lab analyses. The lab may need some time to ensure sufficient, appropriate sample containers are available, and may need time to prepare the analysis equipment. Field staff should also be familiar with the sample return process in order to efficiently return the samples to the sample custodian (Rob Snyder 312-353-9083). Information on shipping samples are available on CRL Form 008 Rev 1.1- November 2013.

10.3 Sample Collection

a. Grab sample Procedure:
    1. Choose canister and gather COC and canister sticker (if applicable).
    2. Record all information on the sample label provided by CRL and place the label on the canister.
    3. Record all information on the COC as follows. If errors are made on the form strike through with one line, initial and date the error. Then write the correct information on the form. A sample COC form is in Appendix C. It is acceptable to use two lines for one canister to record information if needed. Be sure to draw a full line through the row in the areas where additional space was not needed.
        a. PROJECT NAME = Project name should be a unique name for you to identify this group of samples.
        b. SAMPLER NAME = Write the samplers name and signature.
        c. STA. NO. = Station Number. For the first canister write "1" for the second canister write "2", etc.
        d. DATE = write the date.
        e. TIME = write the time the sample was taken. This should be filled out last since it will take some time to complete all paperwork before the sample is actually taken.
        f. COMP/GRAB = "Composite or Grab Sample". Check the box under Grab sample.
        g. STATION LOCATION = Write the GPS coordinates of where the sample was taken.
        h. NO. OF CONTAINERS = "1"
    4. Remove the ¼ inch cap from the inlet of the canister.

5. Hold the canister out away from the sampler's body facing the direction where the air is coming from and in the direction of the air you want to sample. Hold the canister as far as possible with the inlet facing away from you, above your head, if possible.
6. Open the canister valve (righty-tighty, lefty loosey). The sampler should hear a distinct hiss for 5-10 seconds. This sound is the sample canister filling up with sample air.
7. Leave the valve open until the hissing stops and then close the valve tightly. Replace the ¼ inch cap and tighten.
8. Record the sample time on the COC.
9. Place the canister back in the box and store it in a safe spot under lock and key. Sample should be delivered to CRL as soon as possible. Ensure that the sampler signs and dates the COC under "relinquished by" and that the sample custodian signs and dates the COC under "received by". The pink copy should be given to the sampler.
10. Additional notes may be helpful such as pressure, temperature, other meteorological conditions and distinct odors.

b. Composite sample Procedure:
   1. Choose canister and gather COC, canister sticker (if applicable) and field data form.
   2. Record all information on the sample label provided by CRL and place the label on the canister.
   3. Record all information on the COC as follows. If errors are made on the form strike through with one line, initial and date the error. Then write the correct information on the form. A sample COC form is in Appendix C. It is acceptable to use two lines for one sample to record information if needed. Be sure to draw a full line through the row in the areas where additional space was not needed.
      a. PROJECT NAME = Project name should be a unique name for you to identify this group of samples.
      b. SAMPLER NAME = Write the samplers name and signature. Each sampler must utilize their own COC.
      c. STA. NO. = Station Number. For the first canister write "1" for the second canister write "2", etc.
      d. DATE = write the date.
      e. TIME = write the time the sample begins.
      f. COMP/GRAB = "Composite or Grab Sample". Check the box under Composite sample.
      g. STATION LOCATION = Write the GPS coordinates of where the sample was taken.
      h. NO. OF CONTAINERS = "1"

4. Remove the ¼ inch cap from the inlet of the canister.
5. Install the sample inlet assembly and tighten snugly with a 9/16" wrench.
6. Place the canister in the desired sampling position.
7. Record the following information on the Canister Sampling Field Test Data Sheet (Appendix D). Note that not all information requested on the general TO-15 form is needed.
    a. Site Location
    b. Sampling Date
    c. Canister SN
    d. Operator
    e. Temperature Start Ambient
    f. Canister Pressure start
    g. Local Time start
    h. Leave all of Section C blank
8. Open the canister valve (righty-tighty, lefty loosey).
9. The canister is now filling. It is a good idea to return to the station in a few hours to observe the pressure. It is imperative that the canister still be under slight vacuum at the conclusion of the sampling time.
10. At the conclusion of the sampling time close the valve tightly, remove the sample inlet assemble and replace the ¼ inch cap and tighten.
11. Record the following information on the Canister Sampling Field Test Data Sheet (Appendix D). Note that not all information requested on the general TO-15 form is needed.
    a. Temperature End Ambient
    b. Canister Pressure End
    c. Local Time Stop
    d. Leave all of Section C blank
12. Place the canister back in the box and store it in a safe spot under lock and key. Sample should be delivered to CRL as soon as possible. Ensure that the sampler signs and dates the COC under "relinquished by" and that the sample custodian signs and dates the COC under "received by". The pink copy should be given to the sampler.
13. Additional notes may be helpful such as other meteorological conditions and distinct odors.

10.4 Sample Handling and Preservation

1. Samples should be handled gently and packed to prevent breakage. Ensure all information has been recorded on sample labels.
2. Immediately transport or mail samples back to CRL's sample custodian with completed Canister Sampling Field Test Data Sheet and COC.

10.5 Sample Preparation and Analysis

Samples will not be prepared or analyzed in the field. Samples will be prepared and analyzed by CRL following their procedures in the laboratory.

10.6 Troubleshooting

1. Field technicians should inspect sample vessels before collecting a sample to be sure the vessel hasn't been compromised prior to use. Do not use any vessel suspected of having a leak prior to sample collection.
2. Technicians may hear a hiss or pop as air rushes into a vessel (especially for a grab sample). No sound may indicate the vessel leaked prior to use.
3. Record all information onto the sample label **at the time of collection**.

10.7 Data Acquisition, Calculations, and Data Reduction

N/A

10.8 Data Review and Acceptance

Ensure all fields on the sample label(s), Canister Sampling Field Test Data Sheet and chain of custody form(s) have been completed.

11.0 WASTE MANAGEMENT

N/A

12.0 DATA AND RECORDS MANAGEMENT

12.1 All COC forms and other field notes will be submitted to the project manager and will be stored with other data associated with the project (i.e. GMAP data). The CRL will complete analysis of the canisters or bottles as soon as possible after sampling. CRL will submit validated data to the project manager.

13.0 QUALITY CONTROL & QUALITY ASSURANCE

The field staff must note any deviations from the sample plan or procedure on the sample label and field notes. Also note anything unusual or unexpected that may influence the sample results (i.e. markers, vehicle fuels, newly paved roads, nearby non-target activities, etc.).

14.0 REFERENCES

SOP for VOCs in Air from TO-15 CRL SOP MS-005 Revision 6, Dated 06/04/2013

15.0 ATTACHMENTS

APPENDIX A	CRL Form 008 Rev 1.1- November 2013
APPENDIX B	CRL Sample Label
APPENDIX C	CRL Chain of Custody
APPENDIX D	COMPENDIUM METHOD TO-15 CANISTER SAMPLING FIELD TEST DATA SHEET

APPENDIX A CRL Form 008 Rev 1.1- November 2013

APPENDIX A CRL Form 008 Rev 1.1- November 2013

U.S. ENVIRONMENTAL PROTECTION AGENCY—REGION 5
CHICAGO REGIONAL LABORATORY
ANALYTICAL REQUEST FORM

This analytical request form should be completed before sending samples to CRL for analysis. The requester should complete all relevant fields and email the form and electronic copy of the quality assurance project plan (QAPP) and/or sampling plan to the CRL Sample Coordinator Rob Thompson (Thompson.robert@epa.gov).

GENERAL PROJECT INFORMATION

Requester:		**Request Date:**	
Title:		**Division/Office:**	
Address:			
Phone:		**E-mail:**	

☐ **One-time** or ☐ **Continuous request** (*check one*)

A continuous request is defined as a standing request for the same analytical service (analyses and sample matrices) that may span several sites/projects/sampling events. Please note that submission of this analytical request form is only required once for a continuous request. However, QAPPs and/or sampling plans should still be submitted for every site/project.

Site Name and Location:	
Expected Arrival Date at CRL:	
Turnaround Time Requested (*standard TAT is 45 days*):	

CRL ANALYTICAL SERVICES

Disclaimer:

The effective versions of all Standard Operating Procedures (SOPs) are available in pdf format on the R5 Intranet. By submitting an analytical request form, the requestor is implying consent for the use of the appropriate effective SOPs. It is the responsibility of the requester to check the intranet for SOP deviations (known at CRL as Pen&Ink changes) and version updates. Should the CRL suspect that an SOP deviation affect the data, the CRL Sample Coordinator will contact the requester via email or phone to obtain a Pen&Ink consent. As defined by CRL, SOP deviations "affect the data" when there is a change in the laboratory's ability to identify or quantify the analytes in the SOP or when there is a deviation in the regulatory method.

Form Instructions:

1. In the table below, select the appropriate checkbox to request an analysis and enter the proposed number of samples of each matrix type. An analysis is not currently available for a matrix where the box is shaded.

2. For other/waste, briefly describe the matrix in the space provided. Additional space for a detailed matrix description is available at the end of the table, if needed.

3. For multi-analyte tests, list specific classes/subsets (e.g., PAHs, RCRA metals, etc.) in the space given at the end of this table, if requested.

General Chemistry

Analysis Request		Sample Matrix and Number		
Analysis	**Check to Request**	**soil/sediment**	**water/liquid**	**other/waste***
acidity	☐		____	____
alkalinity	☐		____	____
ammonia-N	☐	____	____	____
anions**	☐	____	____	____
biochemical oxygen demand-5 day (BOD)	☐		____	____
carbonaceous BOD-5 day (CBOD)	☐		____	____
corrosivity by pH	☐		____	____
cyanide, amenable to chlorination	☐		____	____
cyanide, total	☐	____	____	____
dissolved organic carbon (DOC)	☐		____	____
fluoride	☐	____	____	____
grain size	☐	____		____
ignitability by flashpoint	☐		____	____
nitrate-nitrite-N	☐		____	____
paint filter liquid test	☐		____	____
pH	☐	____	____	____
residue, filterable (TDS)	☐		____	____
residue, non-filterable (TSS)	☐		____	____
solvent ID	☐		____	____
total Kjeldahl nitrogen (TKN)	☐	____	____	____
total organic carbon (TOC)	☐	____	____	____
total phosphorus (TP)	☐	____	____	____
total dissolved phosphorus (TDP)	☐		____	____
total solids (TS)	☐		____	____
total volatile solids (TVS)	☐		____	____
turbidity	☐		____	____
water content	☐		____	____

Metals

Analysis Request		Sample Matrix and Number		
Analysis	Check to Request	soil/sediment	water/liquid	other/waste*
chromium (VI)	☐	____	____	
dissolved metals** (except Hg & Cr (VI))	☐		____	____
hardness	☐		____	____
mercury (Hg)	☐	____	____	
total metals** (except Hg & Cr (VI))	☐	____	____	____ wipe/filter

Organics

Analysis Request		Sample Matrix and Number		
Analysis	Check to Request	soil/sediment	water/liquid	other/waste*
air toxics**	☐			____ air
1,4-dioxane, low level	☐		____	____
oil & grease	☐		____	____
polychlorinated biphenyls (PCB) congeners	☐	____		____
perfluorinated compounds** (PFCs)	☐	____	____	____
pesticides, chlorinated**	☐	____	____	____
PCB aroclors**	☐	____	____	____
semi-volatiles** (SVOCs)	☐	____	____	____
total petroleum hydrocarbons (TPH as DRO/ORO)	☐	____	____	____
(tri-n-butyl)-n-tetradecylphosphonium chloride (TTPC)	☐	____	____	____
volatiles** (VOCs)	☐	____	____	____

Toxicity Characteristic Leaching Procedure (TCLP)

Analysis Request		Sample Matrix and Number		
Analysis	Check to Request	soil/sediment	water/liquid	other/waste*
TCLP Hg	☐	____	____	____
TCLP metals	☐	____	____	____
TCLP pesticides	☐	____	____	____
TCLP SVOCs	☐	____	____	____
TCLP VOCs	☐	____	____	____

*Additional Matrix Description

Please describe *other/waste* matrix, if not specified above:

**Specific Analyte Class/Subset Request

Please list or attach specific class/subset for multi-analyte test, if requested:

NON-STANDARD REQUESTS

For analyses/matrices not listed above or to obtain analyte lists, quality control limits, and/or reporting limits, please contact the CRL Sample Coordinator to discuss. (Thompson.robert@epa.gov, 312-353-9078)

CRL DATA FORMAT

The CRL standard data deliverable includes: 1) a pdf of the work order 2) a pdf of the final Level II report and 3) an electronic data deliverable (EDD) that includes batch quality control sample data. EDD typically refers to an Excel spreadsheet of the data, but EDDs are available in a variety of formats and can be customized upon request. A full data package (Level IV) is also available upon request and will be transmitted electronically via the CRL SharePoint. Contact Sylvia Griffin, CRL Data Coordinator, for additional details. (Griffin.sylvia@epa.gov, 312-353-9073)

CRL SAMPLE DISPOSAL POLICY

Due to space limitations in a controlled temperature environment, samples are relocated to secure room temperature storage six months after the analysis completion of the project. Notification of the intent to relocate the samples is given to the customer with sufficient time for the customer to respond with any objections. Samples remain in secure room temperature storage until the case/project is completed and the samples are no longer needed. Notification is given to the customer with sufficient time for customer response prior to sample disposal.

CRL SAMPLE SHIPMENT REQUIREMENTS

Before collecting samples, please refer to the attached table for sample sizes, containers, and preservatives. Notify the CRL Sample Custodian (312.353.9083, Snyder.robert@epa.gov) and the CRL Sample Coordinator (312.353.9078, Thompson.robert@epa.gov) before shipping any samples and to arrange for sample receipt.

When packing samples for shipment:

- ✓ Seal individual samples in plastic bags, preferably Ziploc bags.
- ✓ The temperature of samples requiring refrigeration during transport MUST be maintained at or below 6°C.
- ✓ Ice in a sealed plastic bag or reusable ice substitute freeze packs are acceptable cooling media.
- ✓ Chain of custody forms MUST be sealed in a large Ziploc bag and taped to the inside of the cooler lid.
- ✓ Include the address to which the cooler should be returned.

After items are packed for shipment, secure the cooler with tape and attach a custody seal across the seam of the cooler lid.

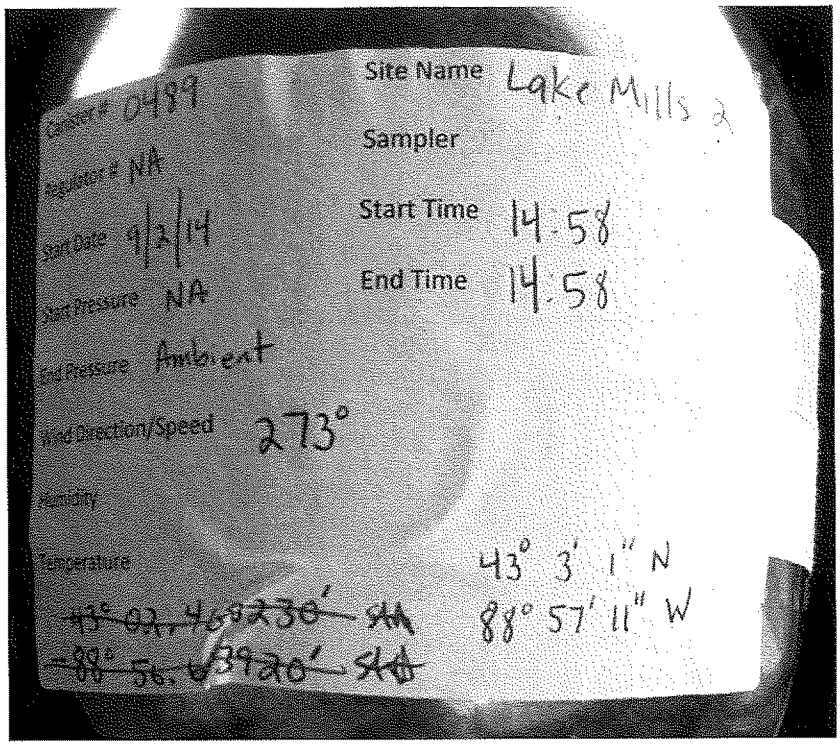
All samples MUST be shipped overnight to arrive Monday thru Friday or hand-delivered. No deliveries are accepted on weekends or Federal holidays. Exceptions may be made on a case by case basis depending on sampling priority/emergency status.

Send all samples to:

Robert Snyder
US EPA Region 5
Chicago Regional Laboratory
536 S. Clark Street, 10th Floor
Chicago, IL 60605

APPENDIX B CRL Sample Label

1. Completed CRL Sample Label – Example



APPENDIX C CRL Chain of Custody

1. Completed CRL Chain of Custody Form – Example

ENVIRONMENTAL PROTECTION AGENCY
Office of Enforcement

REGION 5
77 West Jackson Boulevard
Chicago, Illinois 60604

CHAIN OF CUSTODY RECORD

Activity Code:

PROJ. NO.	PROJECT NAME
	Lake Mills, WI

SAMPLERS: *(Print Name and Sign)* Scott Hamilton

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	Analyte:						TAG NUMBERS
1	[illegible]	[illegible]		✓	[illegible]	1	[illegible]						0805
2	[illegible]	[illegible]		✓	[illegible]	1	[illegible]						0137
3	[illegible]	[illegible]		✓	[illegible]	1	[illegible]						0821

Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*	Ship To:
[illegible]	[illegible] 10:30		
Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*	ATTN:
Relinquished by: *(Signature)*	Date / Time	Received for Laboratory by: *(Signature)* [illegible] / Date / Time [illegible]	Airbill Number
			Chain of Custody Seal Numbers

Distribution: White - Accompanies Shipment; Pink - Coordinator Field Files; Yellow - Laboratory File

Printed on Recycled Paper/Printed with Soy-Based Ink

5-68570

APPENDIX D COMPENDIUM METHOD TO-15 CANISTER SAMPLING FIELD TEST DATA SHEET

COMPENDIUM METHOD TO-15
CANISTER SAMPLING FIELD TEST DATA SHEET

A. GENERAL INFORMATION

SITE LOCATION: _____
SITE ADDRESS: _____
_____
SAMPLING DATE: _____

SHIPPING DATE: _____
CANISTER SERIAL NO.: _____
SAMPLER ID: _____
OPERATOR: _____
CANISTER LEAK
CHECK DATE: _____

B. SAMPLING INFORMATION

	TEMPERATURE				PRESSURE	
	INTERIOR	AMBIENT	MAXIMUM	MINIMUM	CANISTER PRESSURE	
START						
STOP						

	SAMPLING TIMES		FLOW RATES		
	LOCAL TIME	ELAPSED TIME METER READING	MANIFOLD FLOW RATE	CANISTER FLOW RATE	FLOW CONTROLLER READOUT
START					
STOP					

SAMPLING SYSTEM CERTIFICATION DATE: _____
QUARTERLY RECERTIFICATION DATE: _____

C. LABORATORY INFORMATION

DATA RECEIVED: _____
RECEIVED BY: _____
INITIAL PRESSURE: _____
FINAL PRESSURE: _____
DILUTION FACTOR: _____
ANALYSIS
GC-FID-ECD DATE: _____
GC-MSD-SCAN DATE: _____
GC-MSD-SIM DATE: _____
RESULTS*: _____
_____
GC-FID-ECD: _____
GC-MSD-SCAN: _____
GC-MSD-SIM: _____

_____
SIGNATURE/TITLE

Figure 9. Canister sampling field test data sheet (FTDS).