

Title: Standard Operating Procedure for the Collection of VOCs in Ambient Air Using Summa Canisters and Xontech Sampler		
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1. INTRODUCTION AND SCOPE

To obtain timely data for the purpose of air quality assessment, air quality trend reporting and to meet the requirements for inclusion of the data in provincial and national air quality databases, a 24-hour method of sampling and analyzing Volatile Organic Compound (VOC) concentrations in ambient air is used. Commercially available VOC gaseous samplers are used in this method.

This method is applicable for the measurement of VOC concentrations in ambient air in the range of 0.01 to 20 parts per billion (ppb) range.

This method adheres to the requirements of the current Air Monitoring Directive (AMD) drafted by Alberta Environment in 1989. In some cases the limits and specifications exceed the requirements of the current AMD. It should be considered that the current and any future amendments or drafts of the AMD will be used as the benchmark for requirements and criteria for ambient air monitoring practices conducted in the Province of Alberta. Information used to write this procedure was also taken from sources identified in the reference section.

2. PRINCIPLE OF THE METHOD

A gaseous sampler is used to collect a representative sample of ambient air over a 24 hour period for later laboratory analysis. Sampling is conducted on a schedule and at locations that are predetermined. Samples are collected in stainless steel canisters with a polished interior coating of chrome-nickel oxide. The coated stainless steel is an inert material which will not react with pollutants in the ambient sample. Airflow to the canister is uniformly maintained in order to fill to a sufficient volume for laboratory analyses as well as to obtain a representative sample.

3. MEASUREMENT RANGE AND SENSITIVITY

The VOC gaseous sampler used in this method is commercially available and is used to collect a representative ambient sample for analysis of chemical components that are in the ppb or sub-ppb concentration range; generally in the 0.01 to 20 parts per billion (ppb) range.

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4. EQUIPMENT AND APPARATUS

The following are commercially available air samplers and canisters suitable for use in this method, and are currently in use in the AENV network:

- XonTech 910A gaseous sampler
- 6 litre sample canisters: Restek™, SilcoSteel® or SUMMA® treated canisters

This list does not exclude the use of other equipment that has received the USEPA Reference and Equivalent Method designation.

5. INTERFERENCES

Exposure of the sampling apparatus to extraneous compounds such as hydrocarbon solvents or calibration gases could interfere with subsequent analysis. When the sampler is not running or not in use every effort must be made to keep it clean and, if possible, in a clean environment. The sample outlet line must be capped when the sampler is not in use, or alternatively, the outlet line can be connected to a clean canister. Cap inlet and outlet ports when the sampler is out of service.

6. PRECISION AND ACCURACY

Flow rate is a critical parameter used in the calculation of concentration of VOCs. Flow calibration is performed both in the laboratory and in the field in an attempt to ensure the accuracy of the calculated concentration in the laboratory.

7. SITE REQUIREMENTS

Site location for VOC samplers should be determined according to the intended application of the monitoring data. Unobstructed sites should be chosen with:

- no trees within 20 meters of sampler;
- a sampler intake height of 2 to 15 meters above the ground;
- no physical or other source interferences between the source of interest and the sampler;

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- a distance from the sampler to any obstacle, at least twice the height of the obstacle above the sampler;
- a 270 degree arc of unrestricted air flow around the sampler;
- at least 2 meters distance from any wall, parapet, penthouse, nearby flues, etc. if placed on a roof;
- at least 15 meters from traffic for moderate pollutant concentration and 60 meters from traffic for low pollutant concentration. Choose a site as far as possible away from dusty roads.

8. INSTALLATION REQUIREMENTS

The installation procedures are specified by the manufacturer in the Operating Manual, as well as section Q.1.1 of the California Air Resources Board(CARB) SOP - Appendix Q. Considerations for site requirements can be found in section 7.0 above. General requirements listed below must also be followed:

- when the sampler is mounted in a stand alone enclosure always anchor the sampler with screws or heavy items like sand bags to prevent blow over;
- canisters must be cleaned and certified by an accredited lab before use. If the canister has not been used within 2 ½ months from the certification date it should be returned for re-certification;
- double check the sample log sheet from the previous sample and add any information that may not have been recorded. If the log sheet is not available at the time record the following: the final canister pressure(s); final sample hours (hh-mm); final in sector hours (hh-mm);
- ensure that all sampling information has been completed on the new log sheet;
- ensure the canister valve is closed. Remove the plugs on the canister and fill tube. Install canister on fill tube and snug fittings with wrenches;
- store any removed caps in clean plastic bags, when possible screw two unused caps together for storage. Store fittings and wrenches in canister shipping case. When collecting a sample that has already been taken, disconnect the filled canister and connect a new one or cap the line immediately. Always keep caps on the sample canisters and the end of fill tubes when no canister is connected;
- leak test the canister connections;

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- record the initial information on the data sheet; canister ID number(s), initial canister vacuum(s), initial in sector hours, initial sample hours;
- close the canister valve.
- take photographs of the sampler installation as well as looking in each of the 4 cardinal directions from the sampler. Note the location on an appropriately scaled map.

9. OPERATIONAL REQUIREMENTS

The sampling procedures are specified by the manufacturer in the Operating Manual, as well as section Q.1.2 of the CARB SOP - Appendix Q. All sections of the log sheet shall be completed when operating a VOC gaseous sampler. Comments should include any observations that may affect the interpretation of the results at the sampling location or other helpful information related to the sample taken.

9.1 Sampling Frequency

Sampling can be conducted on a predetermined schedule (over long sampling projects a 6 day interval can be used) or samples can be taken during air pollution 'events' when air quality is perceived to be adverse. If event based sampling is preferred, then if possible, at least two samplers should be used, sited on opposite sides of the source so a few upwind samples can be collected at the same time as the downwind ones. If this sampler arrangement is not possible the sampler can be moved to the upwind site when appropriate or, alternatively, samples can be taken at the same site both during a pollution event and on perceived good days.

The canister sampler can be configured to sample dependant on wind direction. In this mode, sample air can fill a canister when wind is from a specified quadrant while a second canister is filled when wind is outside of the critical sector. When operating in this mode however it may be necessary to extend the sample time to collect sufficient sample in a canister.

Consideration should be given to lab costs when planning a sampling schedule. Further samples may be required once analysis results are received from the lab.

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9.2 Sample Collection

Event-based sampling can be conducted either by AENV personnel or a person outside the department. A complainant or interested party, for example can be instructed to turn on the sampler during perceived air pollution events. At no time should these persons be allowed to handle the sample, merely turn the sampler on and off. They should be given a log sheet to record sample information and, at minimum, record the sample on/off times, date, and any comments about air quality or meteorological conditions.

9.3 Sample Collection Procedure

For XonTech 910A sampler

- open the canister valve;
- move pump switch (red switch #1) to I position. Pump will start running. Pump pressure should be 25 psi;
- after 15 min. of purging, move sample switch (red switch #2) to I position. After a 10 second delay the green 'Sample' light will come on. (if wind speed > 1mph). Then after a further 10 seconds the red 'In Sector' light will come on (if wind is from the correct sector). Sample will begin to slowly fill either in or out sector canisters depending on wind conditions;
- record time of day that sample switch was moved as the 'Start Time' on the data sheet;
- check and record the sample flow on the data sheet. Should be approximately 10 standard cubic centimeters per minute (sccm) on panel meter;
- after 24 hours of sampling move both switches #1 and #2 to OFF;
- record the following on the data sheet: time of day sampling was stopped; final canister pressure(s); final sample hours (hh-mm); final in sector hours (hh-mm);
- close the canister valve.

9.4 Transporting Sample Canisters

Canisters must be capped using a ¼" plug at the inlet at all times when transporting or not in use to avoid contamination. The sampler intake must also be capped using ¼" and 1/8" plugs when transporting or not in use. Canisters must be transported in appropriate cases to prevent damage. As previously

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Additional copies are available from the Air Monitoring Team Leader or designate

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arranged, ship the canister along with a copy of the completed data sheet to the AENV Air Monitoring and Audit lab or directly to the analytical lab. Fax a copy of the data sheet to AENV Air Monitoring Lab. Keep the original data sheet with other field data sheets from the project.

10. CALIBRATION

Flow calibration is performed in the laboratory and a sticker is affixed to the sampler to denote the required flow set point, which is altitude dependent. In the field, the operator checks the flow rate display and the duo-dial potentiometer to verify that they are at the specified set point. If it is not at this set point, the operator is to readjust the flow controller (duo, dial potentiometer).

See section Q.2.1 of the CARB SOP - Appendix Q for an overview of the laboratory and field calibration procedures.

11. APPLICABLE DOCUMENTS

- **EM-016a** XonTech Model 910A Operating Manual;

12. LITERATURE REFERENCES

- State of California Air Resources Board (CARB) Air Monitoring Quality Assurance Volume II Standard Operating Procedures for Air Quality Monitoring Appendix Q, dated March 1996.

13. REVISION HISTORY

Revision 0 (new document)

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14. APPROVAL



Approved by: Harry Benders
Title: Air Monitoring Team Leader

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