STANDARD OPERATING PROCEDURE
Instructions for Calibration and Use of a SilcoCan® Canister

KEY WORDS

Air sampling, Canister

APPROVALS

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1.0 INTRODUCTION

1.1 Purpose

This standard operating procedure (SOP) describes the procedures used for collecting passive air canister samples for the Air Monitoring Network.

1.2 Definitions

1.2.1 Passive sampling refers to air pulled through a flow controller into an evacuated canister over a given time interval ranging from five minutes to 24 hours.

1.2.2 Time-integrated sampling produces a linear flow over a time period to ensure an “average” composited or time-weighted average (TWA) sample.

1.2.3 Sample train consists of PTFE inlet tubing, metal particle filter, critical orifice, flow controller, and canister.

1.2.4 The particle filter is installed ahead of the flow controller to prevent particles from clogging the flow path, which would alter the flow rate. Two types of filters are employed in the sample train: an inline filter employing a sintered element and a frit filter at the inlet to the flow controller.

1.2.5 A flow controller maintains a constant sample flow over the integrated time period, despite changes in the canister vacuum or changes in environmental conditions.

2.0 MATERIALS

2.1 6-L SilcoCan®

2.2 Veriflo® flow controller

2.3 SilcoSteel® in-line filter (7um)

2.4 1/8” PTFE tubing, 1/16” I.D.

2.5 Bios® Defender 530-L flow meter

2.6 Calibration tubing and tip

2.7 Two 9/16” wrenches

2.8 Allen Hex key wrench, 3mm

2.9 Chain of custody (COC) form

2.10 Metal carrying case

3.0 PROCEDURES

3.1 General

The study methods and sampling procedures should be designed depending on the specific study objectives, which should be clearly stated in the study protocol.

3.2 Setting the flow rate on the Veriflo® flow controller

3.2.1 Remove the dust over on the side of the flow controller using a 3 mm hex key wrench.

3.2.2 Connect the flow controller to an evacuated canister, and tighten the nut with a 9/16” combination wrench. Use two wrenches, one as a brace to prevent torqueing the sample train.

3.2.3 Attach the PTFE tubing to the top of the inline filter on the flow controller; again use two 9/16” wrenches to tighten nut.

3.2.4 Open canister valve by hand, turning the blue knob counterclockwise.

3.2.5 Connect flow meter tubing to the inlet of the PTFE tubing.

3.2.6 Use the 3 mm hex key wrench to adjust the piston gap screw to achieve the desired flow rate. Make sure to allow the flow to equilibrate for several minutes between adjustments.

3.2.6.1 If the measured flow rate is within +/- 10% of the desired flow rate, the flow controller is ready for use in field sampling. When taking a 24-hour TWA sample with a 6-L canister, flow should be 2.8 to 3.5 ml/min.

3.2.7 Once the desired flow rate is attained, replace the dust cover. To close blue knob tighten by hand turning clockwise. Then disconnect the flow controller from the canister and the flow meter from the sample inlet. Set aside the canister and mark it for cleaning/re-evacuation.

3.3 Sampling in the Field

3.3.1 Label canister with next sample number in sequence.

3.3.2 Remove brass cap nut from canister valve using a 9/16” combination wrench.

3.3.3 Attach Veriflo® flow controller, with the inline filter attached, to canister.

3.3.3.1 The flow controller has seated properly when the nut spins freely during finger tightening.

3.3.3.2 Using the 9/16” wrench, tighten ¼ turn past finger-tight. Do not over-tighten as this can cause leakage.

3.3.3.3 Be sure to use two wrenches when tightening nut to prevent torqueing the sample train.

3.3.4 Record the initial vacuum reading (should be -30” Hg), canister #, and regulator # on the COC.

3.3.5 Open the canister valve by turning the blue knob counterclockwise, and record the starting time on the COC.

3.3.6 Attach the flow meter tubing to the sample inlet.

3.3.7 Turn on the flow meter and select the “Measure” function, then select “Burst.”

3.3.8 Once the flow has stabilized, record the initial flow on the COC.

3.3.8.1 The flow should be between 2.8 to 3.5 ml/min for a 24-hour, 6-L canister sample. If the flow is not within this range, exchange the flow controller. Mark the faulty flow controller to be re-calibrated.

3.3.9 Return to the site prior to the end of sample period to take a final flow reading in the same manner that you measured the initial flow reading. Record the final flow reading on the COC.

3.3.10 At the end of the sample period, record the final pressure reading from the flow controller vacuum gauge on the COC. Close the canister valve by turning the blue knob clockwise, and record the ending time and the run time on the COC.

3.3.10.1 Acceptable ending pressures range from -10”Hg to -4”Hg. If a sample pressure falls outside this range, another sample must be run to replace the invalid canister. This replacement sample should be started immediately.

3.3.11 Remove flow controller with tubing attached from canister and replace brass cap nut to canister.

3.3.12 Place regulator with PTFE tubing inside shelter and loosely coil, making sure not to kink the tubing.

3.3.13 Place sampled canister in canister carrying case and transport back to the warehouse for storage.

3.3.14 At the warehouse, place sampled canisters in yellow “SUMMA cabinet.”

3.4 Assembling the fittings on the sample tubing

3.4.1 Gather the appropriate length of PTFE tubing required for the particular study, the Swagelok® fittings, and the flow controller.

3.4.2 Attach the PTFE tubing to the Swagelok® reducer (SS-200-R-4). To do this, slip the nut onto the tubing, followed by the PTFE back ferrule and front ferrule (T-200-SET). Then insert the PTFE tubing into the threaded ended of the reducer. Finger-tighten the nut.

3.4.3 Slide nut of nut and ferrule set onto the tubing/reducer assembly. Then slide back ferrule and front ferrule onto the reducer.

3.4.4 Screw this assembly onto the inline filter until it is finger-tight.

3.4.5 Per the instructions on page 10 of "An Installer's Pocket Guide for Swagelok® Tube Fittings," use a marker to draw a line on the nut. Then, using a wrench to hold the inline filter steady, use a second wrench to turn the nut one and one-quarter turns.

3.4.6 Now the nut is permanently attached to the reducer and the tubing is ready for use in field sampling.

4.0 REFERENCES

http://www.restek.com/pdfs/EVTG1073A.pdf
"An Installer's Pocket Guide for Swagelok® Tube Fittings"