Roy Cooper
*Governer*
Elizabeth Biser
*Secretary*
Michael A. Abraczinskas
*Director*

NORTH CAROLINA
*Environmental Quality*

# DAQ-03-001.1 Standard Operating Procedure (SOP)

# Xonteck 911 Urban Air Toxics Volatile Organic Compound (VOC) Sampler

for the North Carolina Division of Air Quality (DAQ)

ECB Responsibilities

Revision: 0

Effective Date: 6/21/2022

NORTH CAROLINA
Department of Environmental Quality

## 1.0 Approval Sign-Off Sheet

I certify that I have read and approve of the contents of the Standard Operating Procedure for the Xonteck 911 Urban Air Toxics Volatile Organic Compounds Sampler, Electronics & Calibration Branch (ECB) Responsibilities written here with an effective date of 6/21/2022.

**Director, Air Quality Division**

Mike Abraczinskas

Signature: DocuSigned by: Michael Abraczinskas D5013FED0218423... Date: 6/20/2022

**Ambient Monitoring Section Chief**

Patrick Butler

Signature: DocuSigned by: Patrick Butler 4290A7E2D2A0429... Date: 6/20/2022

**Laboratory Analysis Branch Supervisor**

Jim Bowyer, Environmental Program Supervisor

Signature: DocuSigned by: Jim Bowyer C96894826C9B41D... Date: 6/20/2022

**Projects and Procedures Branch Supervisor**

Joette Steger, Environmental Program Supervisor

Signature: DocuSigned by: B278F8186CEC4DC... Date: 6/20/2022

**Primary SOP Author**

Steven Walters, Chemist II

Signature: DocuSigned by: Steven Walters AE6DEE7D0265442... Date: 6/20/2022

Disclaimer:

This document, and any revision hereto, is intended solely as a reference guide to assist users in the certification, field installation, and general maintenance of the Xonteck 911 sampler used to collect ambient air into 6-Liter canisters for the North Carolina Division of Air Quality's Urban Air Toxics (UAT) Program.

## SOP Acronym Glossary

CFR – Code of Federal Regulations
COA – Certificate of Analysis
DAQ - North Carolina Division of Air Quality
ECB – Electronics and Calibration Branch
EPA – United States Environmental Protection Agency
FAS – fixed asset system
LAB – Laboratory Analysis Branch
mL/min – milliliters per minute
NATTS – National Air Toxics Trends Station
NIST – National Institute of Standards and Technology
psi – pounds per square inch (gauge pressure)
SN – serial number
SOP - Standard Operating Procedure
TAD – Technical Assistance Document
TO – Toxic Organic
UAT – Urban Air Toxics
UHP – Ultra-High Purity
UHPLC – Ultra-High Purity Liquid Chromatography
VOC – Volatile Organic Compound

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## 2.0 SCOPE AND PURPOSE

This standard operating procedure (SOP) describes the process of procuring volatile organic compound (VOC) canister samplers, initial testing and cleanliness requirements, site installation, and ongoing maintenance of the samplers used to support the North Carolina Division of Air Quality's (DAQ's) Urban Air Toxics (UAT) monitoring network.

See figure 1 below for an example of the VOC canister sampler used by DAQ.

*Figure 1: Xonteck VOC Canister Sampler*


## 3.0 EQUIPMENT CHECKS AND MATERIALS

This section describes the equipment and materials required to complete the steps described in this document.

### 3.1 Sampler Procurement

The Laboratory Analysis Branch's (LAB) electronics technician or trained designee shall procure VOC samplers that meet or exceed the VOC canister sampling method requirements described in section 7 and 8 of the United States Environmental Protection Agency (EPA) Compendium Method Toxic Organic (TO)-15 and section 4.3 of the National Air Toxics Trends Station (NATTS) Technical Assistance Document (TAD).

## 3.1 Equipment and Material List

- Xonteck 911 model air sampler
- A cylinder of Ultra-High Purity (UHP) Zero Air or UHP Nitrogen
- Regulator
- Rotameter
- Chromatographic-grade stainless-steel manifold vented to atmosphere
- 1/8-inch chromatographic-grade stainless-steel tubing
- ¼-inch chromatographic-grade stainless-steel tubing
- National Institute of Standards and Technology (NIST)-traceable flow meter
- NIST-traceable clock
- Vacuum oven
- Sonicator
- Aluminum pans
- Aluminum foil
- Alconox or other low residue detergent
- Methanol
- Ultra-High Purity Liquid Chromatography (UHPLC)-grade water
- Open ended wrenches
- Swagelok fittings and ferrules
- Sampler Logbook
- Blank Certification Stickers
- Indelible ink pen (black or blue)
- Tools including a heavy-duty drill, drill bits, screw drivers, pliers, various sizes of open-ended wrenches, zip ties, pipe cutter, and a pipe bender.

## 3.2 Chemical and Material Checks

All chemicals and materials used in this SOP are inspected prior to use and upon receipt at the LAB. All materials must be undamaged. All standards must be NIST traceable and used within their current calibration or calibration verification requirements. Canisters used to collect sampler certification samples are cleaned and certified according to SOP **DAQ-03-03-005.2**.

## 3.3 Support Equipment Checks

### 3.3.1 Sampler Certification Canister Checks

Verify the selected canister's "clean canister age" is ≤ 30 days from the date the sampler collects the certification canister.

For example, if the clean canister age is 28 days based on the current date and the sampler is programmed to collect the certification sample 3 days later, the certification sample canister is considered invalid, and the test will have to be performed again using a different canister that meets the 30-day clean canister age criteria.

Lastly, verify the recorded information on the canister tag by comparing the batch number and canister number against the canister cleaning records and the manufacturer stamped canister number.

### 3.3.2 Flow Meter Check

The flow meter used to set the sampler flow rate should be inspected for functionality. Also, verify the flow meter is used before the NIST-traceable calibration expires. Verify the current date of use is less than 365 days since the most recent NIST calibration or NIST calibration verification.

### 3.3.3 Clean Air Source Check

The source of air used to certify the sampler must be a cylinder of UHP Zero-Air or UHP Nitrogen. A certificate of analysis (COA) of the cylinder must be on file and traceable to the lot number of air used to certify the sampler. The air source must be used prior to the expiration date.

## 4.0 SITE CHECKS

Site checks do not apply to this SOP. For operator site checks pertaining to the canister sampler, please see SOP **DAQ-03-001.2**.

## 5.0 DETAILED PROCEDURES

The procedures described in this section must be performed if one of the following are true.

- The canister sampler has been sent to the manufacturer for repair and returned to the LAB.
- Receiving a new canister sampler out of the box.
- The canister sampler has been operating in field for 365 days and returned to the LAB.
- The canister sampler has been deemed contaminated through a corrective action report.

The LAB electronics technician or trained designee must verify the new, used, or contaminated sampler is functional, and verify the sampler is free from contamination before sampler re-installation at the sampling site.

### 5.1 Functionality Checks

When the sampler is powered on, the user should verify the accuracy of the sampler pressure gauge, the accuracy of the sampler's over-pressure limit set-point, and that the pump, solenoid valve, flow controller, and digital timer are working as designed. Install fresh batteries into digital timers that are battery powered.

### 5.2 Sampler Pressure Gauge Accuracy Check

1. Attach a certified pressure gauge to the sampler outlet.
2. Turn on the sampler and allow the internal pressure to reach approximately 10-20 pounds per square inch (psi) reading on the sampler pressure gauge.
3. Compare the certified pressure gauge reading to the sampler pressure gauge reading. The absolute value of the difference between these two gauges must be ≤ 2 psi. If the absolute value of the pressure difference exceeds this limit, the sampler pressure gauge must be replaced, and this check must be performed again using the replacement sampler pressure gauge.

## 5.3 Sampler Over-Pressure Limit, Leak Tightness Check, and Pump Check

The sampler contains an over pressure relief valve that must be checked and set to approximately 30 psi.

1. Turn on the sampler and cap the sampler outlet to begin building pressure on the internal sampler components.
2. The sampler pressure gauge should also be rising. If the sampler pressure gauge does not reach 30 psi after a couple minutes of operation, slowly tighten the over-pressure valve to increase pressure until 30 psi is achieved on the sampler pressure gauge. If the sampler pressure gauge exceeds 30 psi, slowly loosen the over-pressure valve to release pressure until 30 psi is achieved on the sampler pressure gauge.
3. Turn off the sampler to start the leak check. The absolute value of the pressure difference between the sampler pressure reading at the initial leak check start and the sampler pressure reading at the end of the leak check musts be maintained at 30 psi over a 5-minute period.
4. If the over-pressure valve is fully closed and the sampler pressure does not reach 30 psi, the sampler pump is probably failing and should be replaced. Retest the over-pressure limit setting on the sampler after pump replacement.

## 5.4 Canister Fill Line

The canister fill line connects the sampler outlet to the canister. This line must be 1/8-inch diameter, chromatographic-grade stainless steel. The fill line should be approximately 4 feet long but may be longer or shorter depending on the sampler setup at the monitoring site.

To help prevent over-tightening and cross-threading canister threads, install a quick-connect fitting to the end of the canister fill line that will connect to the canister and flow meter. The section of the fill-line that connects to the sampler must be made with appropriate Swagelok fittings.

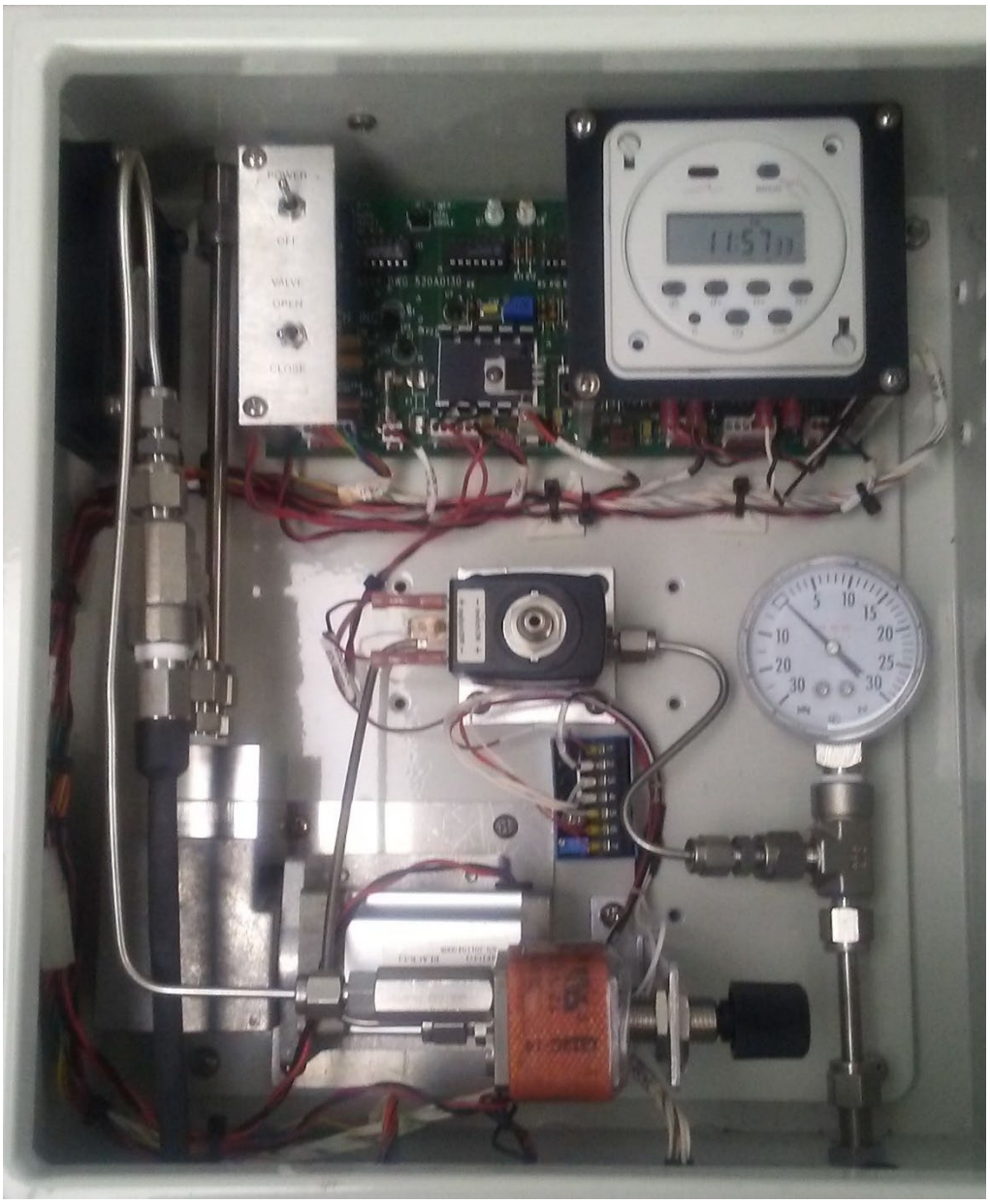
## 5.5 Positive Bias Check

The positive bias check is performed at the LAB by the LAB electronics technician or trained designee.

### 5.5.1 Sampler Flow Path Cleaning

1. Place the sampler on the work bench and expose the internal components. See figure 2 below for a picture of the sampler internal components.

*Figure 2: Internal Sampler Components*




2. Disassemble the sampler flow path from the sampler inlet up to and including the removal of the variable flow controller and flow orifice.
3. Place the disassembled flow path parts and fittings into a sonicator batch of detergent and UHPLC grade water and sonicate the parts for approximately 60 minutes.
4. Drain the sonicator and add pure UHPLC grade water sonicate for a few more minutes and drain the sonicator. Repeat this step about two more times to completely rinse away residual detergent.
5. Perform a final rinse of the flow path parts using UPHLC grade methanol.
6. Set the parts on a clean absorbent pad.

7. Place the flow path parts into the vacuum drying oven set to 50 degrees Celsius.
8. Turn on the vacuum pump and pull a vacuum on the oven. Bake the parts for approximately 1-hour.
9. Turn off the oven and keep the oven under vacuum, allow the temperature to cool to approximately room temperature.
10. Turn off the vacuum pump and retrieve the cleaned flow path parts
11. Reassemble the sampler flow path and perform a sampler leak check. A canister does not have to be installed to determine leak-tightness of the sampler flow path. A sampler certification canister cannot be collected until a passing leak check is achieved. Adjust sampler flow path fittings and replace fittings, as needed, until a passing leak check is achieved.

### 5.5.2 Collecting the Certification Canister

1. Obtain a certified clean, routine field sample canister from the canister cleaning laboratory.
2. Verify the information recorded on the canister tag matches the canister cleaning record and matches the canister manufacturer's label stamped on the canister.
3. Verify the age of the clean canister (certification sample date – canister batch cleaning date). The clean canister age must be ≤ 30 days.
4. Verify the canister vacuum is ≥ -28 inches of mercury using a NIST certified pressure gauge. Canisters with pre-sampling vacuum readings of -27, -26, -25, etc. inches of mercury cannot be used to collect the sampler certification sample.
5. Verify the sampler display to be within ± 5 minutes of the NIST-traceable time keeping device, local standard time. Do not program the sampler timer to daylight savings time.
6. Connect the fill tube (approximately 2-4 feet of 1/8-inch diameter, chromatographic stainless steel) to the sampler outlet using the appropriate Swagelok fittings.
7. Attached the sampler inlet to the manifold that is being filled with an excess flow of UHP zero-air or UHP nitrogen.
8. Turn on the sampler and attach a NIST-traceable flow meter to outlet end of the fill tube and allow a few minutes for the flow to stabilize.
9. Adjust the sampler flow to approximately 8-12 milliliters per minute (mL/min).
10. Turn off the sampler, remove the flow meter and attach the certification canister to the fill tube.
11. With the certification canister valve closed, perform a leak check.
12. After a passing leak check, open the certification canister valve and verify the starting vacuum reading on the sampler pressure gauge. This value should be ≥ -28 inches of mercury vacuum.
13. Program the sampler to collect a 24-hour sample.
14. After the sample period completes, verify a valid sample collection occurred, remove the certification canister from the sampler and hand-deliver the canister to the VOC analysis laboratory.
15. Cap the inlet and outlet of the sampler while waiting for the analysis results and keep the sampler capped while transporting to the field site.
16. In the sampler logbook assigned to the sampler being certified, record a summary of the sampler certification process including parts that were replaced, cleaned, and reinstalled in the sampler such as pumps, flow orifices, and flow controllers. Record critical sampling data such as flow rates, leak check results, canister numbers, pre-sampling canister pressures, post-sampling

canister pressures, sampler certification date, and initials of the person performing the certification.

17. Obtain a blank certification sticker and label the sticker with the sampler's expiration date that determined to exactly one calendar year from the start date of the sampler certification canister. For example, if the sampler certification canister was collected on 5/15/2022, the expiration date on the certification sticker must be 5/14/2023. Add your initials to the certification sticker.

### 5.6 Preparing The Sampler Inlet Line "Candy Cane" Section

The first 2-3 feet of the sample inlet is also known as the "candy-cane". This portion of the inlet encounters the ambient air first during a sample collection event. This section of the sampler inlet line consists of chromatographic stainless- steel tubing, a stainless steel inline particulate filter, and an inverted stainless-steel funnel.

Clean the inline filter, inline filter holder, and funnel using steps in section 5.4.1 above. The tubing used to make the candy cane must be new ¼-inch chromatographic-grade stainless steel.

Use a pipe bender to prevent kinking the stainless-steel tubing when making the U-bend that connects the inverted funnel to the stainless-steel particle filter. When transporting the candy cane from the laboratory to the site, cap the ends of the candy cane to prevent dust and debris from getting into the candy cane.

## 6.0 DATA REVIEW

This section of the SOP describes the steps to complete the self-review (Level 1) and peer-review (Level 2) of the sampler logbook recording the sampler certification process and the analysis results packet for the sampler certification canister.

### 6.1 Self Review (Level 1)

The self-review is performed by the LAB electronics technician or trained designee that performed the sampler cleaning and sampler setup to collect the certification canister and recorded the results in the sampler logbook.

1. Examine the sampler logbook entries to be sure the following items are recorded:
    - Summary of sampler certification activities.
    - List of parts replaced.
    - List of parts cleaned.
    - Lot # of water used to clean the parts.
    - Lot # of methanol used to rinse the parts.
    - Lot # of zero-air cylinder or Lot # of nitrogen cylinder.
    - Cylinder #.
    - Sampler pressure gauge accuracy check readings in psi.
    - Pre-sampling canister pressure reading in inches mercury vacuum.

- Leak check readings in psi and duration of leak test in minutes.
- Post-sampling canister pressure reading in psi.

2. Examine the analysis results packet provided by the analyst that summarizes the analysis results of the sampler certification canister and provides a pass/fail status.
3. Ideally, all VOCs should be ≤ 0.2ppb. Typically, some VOCs are detected at levels > 0.2ppb no matter how many times the sampler is cleaned and re-certified. Samplers that fail cleanliness criteria for one or more VOCs can be deployed to the field but any detections of the failing VOCs in the subsequent sample canisters collected using that sampler must be qualified (i.e., flagged) prior to reporting.
4. Examine the results report provided by the analyst for accuracy of the decision to pass or fail the sampler certification.
5. Make sure the sampler serial number (SN) or sampler Fixed Asset System (FAS) number recorded in the "sample name" field of the analysis results report matches the sampler being cleaned and certified.
6. Any errors found or questions that arise from reviewing the results report packet, should be directed to the VOC analyst for correction or explanation. If no errors or questions are found or all questions and errors are addressed, initial and date the results report.
7. Scan a copy of the results report and save the scanned copy using this naming system: "Xonteck_SN or FAS #_SamplerCert_MMDDYY" where MMDDYY is the date the sampler started collecting the certification canister. Store the scanned copy on the Raleigh Central Office group drive in this location: **P:\Toxics\Urban Air Toxics\VOC's Current Year Data\Canister Sampler Cert Results**.
8. Store the original analysis results report and the sampler logbook in a secure file cabinet at the laboratory.

## 6.2 Peer Review (Level 2)

The peer-review must be performed by trained LAB staff who did not perform the original sampler certification.

1. Examine the sampler logbook entries and make sure the bulleted items listed in section 6.1 of this document are recorded in the sampler logbook. Also, verify the following criteria are achieved:
    - Sampler pressure gauge accuracy must be ± 1 psi.
    - Pre-sampling canister pressure must be ≥ -28 inches mercury vacuum.
    - Leak check must indicate no leaks during the testing period.
    - Pre-sampling and Post-sampling flow rates must be 8-12 mL/min.
    - Post sampling canister pressure must be 12-30 psi.
2. Examine the analysis results report packet of the sampler certification canister and verify the sampler SN or sampler FAS number entered on the analysis results matches the sampler SN or sampler FAS number stamped on the equipment.
3. Examine all injections in the analysis results report packet and verify the validity of VOCs detected in the sampler certification canister.

4. A valid VOC detection in the sampler certification canister must > 0.2ppb and meet blank criteria and meet accuracy criteria. For example, if the VOC detected in the certification canister is > 0.2ppb and the same VOC meet cleanliness criteria in the method blank/lab blank but fails accuracy criteria in the calibration verification then the detection in the certification canister should be consider invalid. If the same VOC passes the blank criteria and accuracy criteria, then the VOC is considered valid and will have to be flagged in all samples if the sampler is used in the field.
5. Examine the sampler being certified and locate the certification sticker. Is the expiration date on the sticker exactly 365 days from the sample date of the certification canister? For example, if the certification canister was collected on 5/15/2022 the expiration date recorded on the certification sticker should be 5/14/2023.
6. If the sampler is properly stickered and all logbook entries are recorded and meet criteria, initial and date your approval in the sampler logbook.
7. If the analysis results report packet for the sampler certification canister is accurate, initial and date your approval on the report packet.
8. Return the reviewed results report packet and reviewed sampler logbook to the LAB electronics technician or trained designee that performed the original sampler certification.

## 7.0 SITE INSTALLATION

Sampler installation at the sampling site must be conducted by the LAB electronics technician or trained designee.

### 7.1 Sampler Inlet Siting Criteria

Proper siting of the canister sampler inlet is critical, and the material used to create the sampler inlet must be made of acceptable materials. The sampler must be installed inside a climate-controlled shelter. The sampler inlet tubing and canister fill tubing must be made of chromatographic grade stainless steel or borosilicate glass.

The point where outside ambient air enters the sampler inlet (inverted funnel on the candy cane) should be sited according to the following:

- 2-15 meters above ground level.
- 0-4 horizontal meters away from any collocated VOC canister sampler inlet.
- ≤ 3 vertical meters away from any collocated VOC canister sampler inlet.
- ≥ 2 meters away from any existing, on-site high volume (flow rates > 200 L/min) sampler inlet,
- ≥ 1 vertical and horizontal meters away from any supporting structure.
- 2 times the height of any obstruction in horizontal meters from the obstruction (for example, if a nearby monitoring shelter is 4 meters above the VOC canister sampler inlet, place the sampler inlet at least 8 meters away from the monitoring shelter obstructing air flow).
- All inlets must be ≥ 10 meters from the drip line of any nearby tree.
- Siting of the sampler inlet from roadways must follow table 1 below.

*Table 1: Sampler Inlet Distance from Roadways*

| Roadway Average Daily Traffic (ADT), Vehicles per Day | Minimum Distance to Inlet (m)[a] |
|---|---|
| ≤ 15,000 | 15 |
| 20,000 | 20 |
| 40,000 | 40 |
| 60,000 | 60 |
| 80,000 | 80 |
| ≥ 100,000 | 100 |

[a] *Distance from edge of nearest traffic lane. The distance for intermediate traffic counts should be interpolated from the table values based on measured traffic counts. Values in this table are taken from 40 Code of Federal Regulations (CFR) Part 58, Appendix E, Figure E-1 for neighborhood scale sites.*

## 7.2 Installing Sampler in the Site Shelter

Make every effort to mount the sampler on a wall in the site shelter that allows for easy access to the sampler's internal components, easy access to the sampler inlet and sampler outlet connections and allows the site operator easy access to install a flow meter and install a sample canister. Lastly, consider the sampler location compared to other existing monitoring shelter equipment and mount the sampler in a location that does not interfere with other monitoring equipment installed at the site. Also, mount the inlet so that it is far enough away from existing monitoring equipment sampling inlet ports.

## 7.3 Installing the Sampler Inlet Line and Canister Fill Line

1. Find a suitable location outside of the site shelter to attach the candy cane section of the sampler inlet line.
2. Secure the candy cane using heavy duty zip ties or pipe clamps to the support structure on the monitoring shelter roof.
3. Make sure the funnel is located according to siting criteria in section 7.1 of this SOP.
4. Return to the sampler inside the monitoring shelter and attached one end of the ¼-inch tubing to the sampler inlet port using the appropriate Swagelok fittings.
5. Run the other end of the sampler inlet line to the outside of the monitoring shelter by using the pre-drilled sample line ports on the existing shelter. If all pre-drilled sample line ports are in use, drill an extra sample line port on the shelter.
6. Run the sampler inlet line up to the candy cane and cut the sample line to length and attach the sample line to the candy cane using the appropriate Swagelok fittings.
7. All sections of the sampler inlet tubing that is inside the site shelter must be covered with foam pipe insulation to help prevent moisture condensing on the inside of the sampler inlet line.
8. After the sampler inlet line is connected securely to the sampler and candy cane, attach the canister fill line to the sampler.

## 7.4 Verifying Sampler Functionality After Installation

1. Open the sampler and expose the internal components.
2. Verify the timer is set to the current day and current time (local standard time). Do not adjust timer for daylight savings time.

3. Turn on the sample and listen for the pump to turn on and the solenoid valve to click open.
4. Observe the canister pressure gauge, it should begin to rise.
5. Verify the sampler pressure reaches the overpressure limit.
6. Turn off the sampler and observe the canister pressure for the sampler leak rate.
7. The sampler should not leak at all. The difference between the starting leak check pressure and ending leak check pressure should be 0.0 psi.
8. Release the pressure by pulling the spring-loaded quick connect fitting on the canister fill line.
9. Install a flow meter and verify the flow is between 8-12mL/min. Adjust the variable flow controller until the desired flow rate is achieved.
10. Turn off the sampler, release any build up pressure in the sample line.
11. The sampler is now ready for routine field use.

### 7.5 Site Logbook

After installing the sampler, connecting all the inlets, and verifying the sampler is functional, record a summary of the field activities, including recording the serial numbers or other identification numbers of the sampler being removed and the sampler being installed. Also, initial and date the site logbook entry.

## 8.0 ROUTINE MAINTENANCE

Routine maintenance of the sampler, inlet lines, and canister fill lines should be performed by the LAB electronics technician or trained designee.

### 8.1 Sampler Maintenance

The canister sampler must be removed from the field site and cleaned according to section 5.0 of this SOP prior to the expiration date recorded on the sampler certification sticker. This is typically done by switching out the old sampler with a freshly cleaned and certified sampler. When the sampler is replaced, the candy cane section of the sampler inlet line should also be replaced. This dual replacement of sampler and candy cane ensures two separate expiration dates will not be tracked and potentially overlooked.

Sampler pumps will also wear out from time to time. Worn out sampler pumps are usually found when the final sampled canister pressures are routinely below 12 psi for several consecutive sample events. Due to the amount of contact of the sampled ambient air in the pump, replacing the pump requires recertification of the sampler. When the pump must be replaced, it is best to replace the defective sampler with a freshly cleaned and certified sampler. Also, replace the candy cane section of the sampler inlet line when replacing the sampler.

### 8.2 Sampler Inlet Line and Canister Fill Line Maintenance

The sampler inlet line isn't routinely replaced. Routine replacement of the candy cane and sampler on the required intervals prolongs the life of the sampler inlet line.

The canister fill line will have to replaced more frequently because the canister fill line is constantly handled, making and breaking connections between the canister and flow meter. Fittings wear out

during continued use and worn out fittings are not typically found until systemic failures of leak checks are observed, or consistently low flow rates are observed.

### 8.3 Sampler Timer Maintenance

During routine field operation, the site operator may indicate problems with the sampler timer through comments written on the VOC canister COC forms and through direct contact with LAB staff. For sampler timer issues that cannot be corrected with new batteries (if a battery timer is installed), a replacement timer can be sent to the site operator if they're comfortable replacing the sampler timer. Every effort should be made to ensure the sampler is operating as designed and ensure all sampler repairs are made in a timely manner to limit the number of missed samples

## 9.0 TROUBLESHOOTING AND ROUTINE CORRECTIVE ACTIONS

### 9.1 Failing Leak Check

When re-assembling the sampler flow path after cleaning and drying, the sampler tends to leak at nearly every flow patch connection point. Always make sure each connection is snug and not cross-threaded.

In most cases, the cause of the failing leak check is typically due to the sampler or due to the connection between the canister and canister fill line. When a sample canister is attached to the sampler via the canister fill line and a failing leak check is observed, remove the canister fill line, and disconnect the sampler inlet line. Cap both ends of the sampler and perform the leak check again. A repeated failing leak check indicates a leak inside the sampler. A passing leak check indicates the original leak is probably from a leaking canister connection.

### 9.2 Sampler Timer Failure

Some sampler timers are powered by AA batteries and the timer does not provide an overall battery life indicator. Issues with battery powered timers are usually corrected by replacing the batteries. When battery replacement does not work, the entire timer may have to be replaced. Timers that are powered by the sampler that also fail will have to be completely replaced with a new timer.

## 10.0 REVISION HISTORY

1. Revision 0, sjw 5/31/2022

## 11.0 REFERENCES

1. Canister sampler features and specifications: https://xonteck.com/911.html
2. Technical Assistance Document for the National Air Toxics Trends Stations Program, Revision 3, Prepared for: U.S. Environmental Protection Agency Office of Air Quality Planning and Standards (C304-06) Research Triangle Park, NC 27711. https://www3.epa.gov/ttnamti1/files/ambient/airtox/NATTS%20TAD%20Revision%203_FINAL%20October%202016.pdf

3. Compendium Method TO-15 Determination of Volatile Organic Compounds (VOCs) in Air Collected in Specially Prepared Canisters and Analyzed by Gas Chromatography Mass Spectrometry (GC-MS), Center of Environmental Research Information Office of Research and Development U.S Environmental Protection Agency Cincinnati, OH 45268, January 1999. https://www3.epa.gov/ttnamti1/files/ambient/airtox/to-15r.pdf

## 12.0 APPENDICES

No appendices at this time.