**VOC and Sulfur Compound Analysis Utilizing SUMA Canisters**

**Sample Setup----Start SUMA after tube sampling started---**

1. Record the serial number of the SUMA canister and Flow Controller on Chain of Custody Sheet.
2. Using a clean evacuated canister, remove the brass protective cap.
3. Remove black plastic cap from Entech Flow Controller while holding the sampler upside down. **Take care to prevent the fittings (ferrules) from slipping off of the** Flow Controller. If the fitting does slip off and hits the ground, use a fresh fitting that has been provided or another Flow Controller. Try to slip on the new fitting without excessive handling to prevent contamination.
4. Connect the Entech Flow Controller to the canister and finger tighten, then tighten the fitting with a 9/16 wrench while holding the canister valve to prevent it from rotating. Turn 1/8 to 1/4 turn past finger tight so it’s snug. Do not over tighten.
5. When ready to begin sampling, ensure the “sample in” cap is removed from the Flow Controller and open the canister valve. Do not continue to stand near setup after sampling begins.
6. Note the canister pressure on the Entech Flow Controller gauge. **If the vacuum is not -28 to-30 inHg on the pressure gauge, close the canister valve, tag the canister “Leaked - Do Not Analyze” and return it to the lab**. Begin procedure again with a fresh canister.
7. Write the following on the sample ID card and retain in enclosure with plastic zip tie until collection:
* Sample Date
* Sample Start Time (Time in military format)
* Initial Canister Pressure (also include on Chain of Custody sheet)
* Sampling ID-- Sherwood Park (SHP), Keystone Landfill (KSL), Mid-Valley HS (MVH)
* Example Sherwood Park sample on January 21, 2016 would be “SHP012116”
* Comments (Activities, Interferences, Weather, etc.)

**Collecting the Sample**

1. **Record final pressure, then Close the canister valve**.
2. Write the following on the sample ID card found in sampler housing:
* Sample End Time (Time in military format)
* Final Canister Pressure.
1. Disconnect Entech Flow Controller from canister. Again be careful when disconnecting to not let the fittings slip off.
2. Put black plastic protective cap onto Entech Flow Controller.
3. If the Entech Flow Controller has a fitting for a cap at the “Sample In” location, screw cap back on finger tight. Place back in shipping box.
4. Screw brass cap back onto canister finger tight.
5. Attach a plastic/string-tie tag to the canister and attach the sample ID card. **Do not use tape and magic marker to label the can!**
6. When done collecting sample, if not already done, enter canister serial #, Flow Controller serial #, on the Chain of Custody form and seal each box on both sides with legal seal. Identify the legal seal and sampling location on the Chain of Custody form.
7. After collecting the canisters from each of the 3 sampling locations, place sampled canister boxes, Chain of Custody form (with your name, date and time) along with the 3 Flow Controllers in their box into the final shipping box and seal.
8. Bring box to office for mailing or mail from the FedEx Pittston facility located at 100 Sathers Drive, Pittston PA 18640 Monday-Thursday until 8pm or Saturday up to 5pm using the shipping labels provided.

**Sorbent Tube Sampling Procedure**

* **Only handle the sampling tubes with non-powdered vinyl/nitrile gloves that are provided for sampling**.
* Be careful when breaking and recapping glass tubes.
* At least one field blank tube must be submitted weekly. A field blank is handled the same as the sample cartridge except no air is drawn through the tube.
* Sealed glass sample tubes have two layers of adsorbent material. There is an arrow printed on the tube indicating the direction of air flow through the tube. The air enters through the larger adsorbent bed.

**Setup**

1. When initially setting up tubes in the sampler housing, ensure the pumps are turned off and break each end of tube with tube breaker or remove caps and place the corresponding **calibration tube** (color coded) in the corresponding sample port. Ensure you are wearing safety glasses and vinyl gloves. Then turn pumps on by pressing the up and down arrows simultaneously.
2. Perform pre-sample calibration check. Connect the tube from the top of the flow meter to the inlet of the sample probe. Hold the flow meter vertically and record the reading at the center of the ball. The ball may stick at low flow rates. Gently tap or shake the meter to make sure the ball moves freely. The meter has a top glass/black ball for low flows and a steel ball for higher flow rates.
3. Look up the corresponding flow rate for the rotometer reading in the calibration table, attached. The measured flow rate should be:

                                Tube #                  Vol.         Flow      Reading

                                                                Liters     ml/min

Ammonia (RED)            226-10-06         96          67          131 Glass Ball

Formaldehyde (BLUE)  226-119         216         150          115 **Steel** Ball

Methanol (GREEN)           226-51            5               5             30 Glass Ball

Methylamine (ORANGE)    226-96         20             15           62 Glass Ball

Triethylamine (YELLOW)   226-98         20           15            62 Glass Ball

1. The flow rate is adjusted with the brass screw on the low flow adapter, not the flow rate on the sampling pump. Record initial calibrated flow rates for each tube on checklist. Turn off pumps by pressing the up and down arrows simultaneously.
2. Remove **calibration tubes**.
3. Carefully break each end of the new sampling tubes with a tube breaker and install according to color codes.
4. Install the sample tubes in the fitting with the arrow pointing to the pump and tighten about 1/8 turn so the tube is held firmly.
5. Turn the pump on by pressing the up and down arrows simultaneously to begin sampling and record the start time.
6. Close the pump enclosure.
7. Note any odors, weather conditions, etc on Odor Survey sheet for each site.

**Collection**

1. Open enclosure and shut pumps off. Document sample end time.
2. Put on disposable vinyl gloves provided for the sampling project.
3. Remove the tube from the sampling train and cap both ends of the tube with the plastic caps provided with the tubes. Enclose the 5 samples in plastic bag provided and fill in the sample submission form for each location, identify locations with location code and date (ex. KSL01222016) **DATE COLLECTED**. Fill in the sample volume after conducting the post calibration and calculation on the checklist. Include the sample submission sheet in the plastic bag. Each location will have an individual bag and sample submission form.
4. Perform post-sample calibration check with calibration tubes. Connect the tube from the top of the flow meter to the inlet of the sample probe. Hold the flow meter vertically and record the reading at the center of the ball. The ball may stick at low flow rates. Gently tap or shake the meter to make sure the ball moves freely. The meter has a top glass ball for low flows and a steel ball for higher flow rates.
5. Look up the corresponding flow rate for the rotometer reading in the calibration table, attached. The measured flow rate should be:

                                Tube #                  Vol.         Flow      Reading

                                                                Liters     ml/min

Ammonia (RED)            226-10-06         96          67          131 Glass Ball

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Methylamine (ORANGE)    226-96         20             15           62 Glass Ball

Triethylamine (YELLOW)   226-98         20           15            62 Glass Ball

1. The flow rate is adjusted with the brass screw on the low flow adapter, not the flow rate on the sampling pump. Record post calibrated flow rates for each tube on checklist. Turn off pumps by pressing the up and down arrows simultaneously.
2. Remove **calibration tubes**.
3. **Install dummy tubes (DO NOT BREAK) in all 4 exterior lines to block the entrance.**
4. After collecting the tubes from all 3 locations, place the 3 bags of samples (one sample submission form should be in each bag) into the bubble wrap sample bag and place legal seal over the opening.
5. Note any odors, weather conditions, etc on Odor Survey sheet for each site.
6. If you are collecting the second round of sampling for the week, you will include a field blank for each tube and include in a separate plastic bag.
7. **To collect a field blank**, carefully break each end of a new sampling tube with a tube breaker, expose to ambient air for 30 seconds, then cap each end and identify location, date and “BLANK” on marking tape.
8. Return sample tubes to the office and place in freezer located in the sample room. If you are unable to return to the office, place tubes in cooler with ice pack until the samples can be submitted for analysis.
9. Fill out Chain of Custody form at the end of each day.

In case of problems contact:

**Chuck Rogers Roger Bellas Chris Ostrowski**

Work-826-2349 826-2201 826-2551

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Rotameter  | 9401014C011844/1 |  |  |  |
| Date | 1/15/2016 |  |  |  |  |  |  |
| Temperature | 23 | deg C |  |  | Correction  | 0.977353 |  |
| Barometer | 29.44 | in Hg |  |  |  |  |  |
|  |  | ml/min |  ml/min |  Data Sheet |  Data Sheet | % Error | % Error |
| Steel Ball | Glass Ball | Bubble meter | Std Flow |  Glass Ball |  Steel Ball | Steel Ball | Glass Ball |
| 13.5 | 30 | 5.027 | 4.9 | 4.41 |  |  | -10.2 |
| 21.5 | 40 | 7.54 | 7.4 | 6.82 |  |  | -7.5 |
| 27.5 | 50 | 10.55 | 10.3 | 9.86 |  |  | -4.4 |
| 24 | 60 | 14.25 | 13.9 | 13.96 |  |  | 0.2 |
| 41 | 70 | 19.5 | 19.1 | 18.34 |  |  | -3.8 |
| 46 | 80 | 24.4 | 23.8 | 23.46 | 26.3 | 10.3 | -1.6 |
| 51.4 | 90 | 31 | 30.3 | 29.84 | 32 | 5.6 | -1.5 |
| 59.8 | 100 | 39.04 | 38.2 | 37.38 | 42.1 | 10.3 | -2.0 |
| 65.5 | 110 | 47.7 | 46.6 | 45.48 | 49.55 | 6.3 | -2.4 |
| 64 | 110 | 47.08 | 46.0 | 45.48 | 47.6 | 3.4 | -1.2 |
| 67.9 | 114.8 | 51.15 | 50.0 | 49.5 | 52.7 | 5.4 | -1.0 |
| 71.8 | 120 | 56.61 | 55.3 | 53.87 | 58.1 | 5.0 | -2.6 |
| 78.5 | 130 | 67.57 | 66.0 | 63.86 | 68.7 | 4.0 | -3.3 |
| 84.5 | 140 | 78.47 | 76.7 | 75.3 | 80 | 4.3 | -1.8 |
| 90 | 149.5 | 89.5 | 87.5 | 87.57 | 91.2 | 4.3 | 0.1 |
| 95 |  | 99.42 | 97.2 |  | 102.3 | 5.3 |  |
| 100 |  | 110.8 | 108.3 |  | 113.7 | 5.0 |  |
| 105 |  | 122.9 | 120.1 |  | 125.5 | 4.5 |  |
| 110 |  | 135.2 | 132.1 |  | 138.1 | 4.5 |  |
| 115 |  | 149.7 | 146.3 |  | 151 | 3.2 |  |
| 120 |  | 163.8 | 160.1 |  | 164.3 | 2.6 |  |
| 130 |  | 195 | 190.6 |  | 193.2 | 1.4 |  |
| 131.1 |   | 200.1 | 195.6 |  | 196.5 | 0.5 |  |
| 135 |   | 209.5 | 204.8 |  | 208.3 | 1.7 |  |
| 140 |  | 226.2 | 221.1 |  | 224.4 | 1.5 |  |
|  |  |  |  |  |  |  |  |

**Sherwood Park (SHP) Site Inspector(s) Date , 2016**

**Daily Checklist**

[ ]  Proper materials

 Sorbent tubes and extras (min of 7 of each tube)

 SUMA canisters (4, one is extra)

 Vinyl Gloves/safety glasses

 Binder, Odor Survey, Shipping labels, Chain of Custody form, Legal seals (min 10)

 and checklists

 Plastic bags

 Packet with calibration tubes, Rotometer, and tubing

 Windmate (temperature and wind speed/direction)

**Sorbent Tube Checklist Setup**

[ ]  Calibration Initial/Final

Red tape-Ammonia-(**67**mL/Min) Rotometer Initial Post calibration (if necessary) .

Blue tape-Aldehydes-(**150**mL/Min) Rotometer Initial Post calibration (if necessary) .

Green tape-Methanol-(**5** mL/Min) Rotometer Initial Post calibration (if necessary) .

Orange tape-Methylamine-(**15**mL/Min) Rotometer Initial Post calibration (if necessary) .

Yellow tape-Triethylamine-(**15**mL/Min) Rotometer Initial Post calibration (if necessary) .

[ ]  Pumps on (red light blinks), enclosure is closed and odor survey complete. Sample start time .

**Sorbent Tube Checklist Collection**

[ ]  Pumps turned off, samples removed, capped, and placed in plastic bag with sample submission form

[ ]  Sample end time .

[ ]  Post-Calibration Initial/Final

Red tape-Ammonia-(**67**mL/Min) Rotometer Initial Post calibration (if necessary) .

Blue tape-Aldehydes-(**150**mL/Min) Rotometer Initial Post calibration (if necessary) .

Green tape-Methanol-(**5** mL/Min) Rotometer Initial Post calibration (if necessary) .

Orange tape-Methylamine-(**15**mL/Min) Rotometer Initial Post calibration (if necessary) .

Yellow tape-Triethylamine-(**15**mL/Min) Rotometer Initial Post calibration (if necessary) .

[ ]  Calculate duration of sampling and volume of sampled for each tube

 ( Minutes X mL/min **Avg** Flow rate) / 1000 = Liters sampled

[ ]  Field Blanks collected (if necessary)

[ ]  Odor Survey and Chain of Custody form complete

**Canister Checklist Setup**

[ ]  Initial Pressure reading -28 to -30 and documented on sample tag “ - " inHg

[ ]  Canister serial # passive sampler serial # .

[ ]  Odor/observation log filled out

[ ]  Canister open to begin sampling and all caps removed am/pm

**Canister Checklist Collection**

[ ]  Turn valve on canister off and document final pressure reading and time on sample tag

 - inHg am/pm

[ ]  Return all caps to the canister and passive sampler

[ ]  Attach filled out sample tag to the canister using plastic tie

[ ]  Attach legal seals to the both sides of box. Legal seal #’s and ,

[ ]  Mail 3 boxes of canisters and 3 boxes of passive samplers with Chain of Custody form.

**Weather data Time: Temp: Wind speed and direction (from): .**

**Mid-Valley School (MVH) Site Inspector(s) Date , 2016**

**Daily Checklist**

[ ]  Proper materials

 Sorbent tubes and extras (min of 7 of each tube)

 SUMA canisters (4, one is extra)

 Vinyl Gloves/safety glasses

 Binder, Odor Survey, Shipping labels, Chain of Custody form, and checklists

 Plastic bags

 Legal seals (min 10)

 Windmate (temperature and wind speed/direction)

**Sorbent Tube Checklist Setup**

[ ]  Calibration Initial/Final

Red tape-Ammonia-(**67**mL/Min) Rotometer Initial Post calibration (if necessary) .

Blue tape-Aldehydes-(**150**mL/Min) Rotometer Initial Post calibration (if necessary) .

Green tape-Methanol-(**5** mL/Min) Rotometer Initial Post calibration (if necessary) .

Orange tape-Methylamine-(**15**mL/Min) Rotometer Initial Post calibration (if necessary) .

Yellow tape-Triethylamine-(**15**mL/Min) Rotometer Initial Post calibration (if necessary) .

[ ]  Pumps on (red light blinks), enclosure is closed and odor survey complete. Sample start time .

**Sorbent Tube Checklist Collection**

[ ]  Pumps turned off, samples removed, capped, and placed in plastic bag with sample submission form

[ ]  Sample end time .

[ ]  Post-Calibration Initial/Final

Red tape-Ammonia-(**67**mL/Min) Rotometer Initial Post calibration (if necessary) .

Blue tape-Aldehydes-(**150**mL/Min) Rotometer Initial Post calibration (if necessary) .

Green tape-Methanol-(**5** mL/Min) Rotometer Initial Post calibration (if necessary) .

Orange tape-Methylamine-(**15**mL/Min) Rotometer Initial Post calibration (if necessary) .

Yellow tape-Triethylamine-(**15**mL/Min) Rotometer Initial Post calibration (if necessary) .

[ ]  Calculate duration of sampling and volume of sampled for each tube

 ( Minutes X mL/min **Avg** Flow rate) / 1000 = Liters sampled

[ ]  Field Blanks collected (if necessary)

[ ]  Odor Survey and Chain of Custody form complete

**Canister Checklist Setup**

[ ]  Initial Pressure reading -28 to -30 and documented on sample tag “ - " inHg

[ ]  Canister serial # passive sampler serial # .

[ ]  Odor/observation log filled out

[ ]  Canister open to begin sampling and all caps removed am/pm

**Canister Checklist Collection**

[ ]  Turn valve on canister off and document final pressure reading and time on sample tag

 - inHg am/pm

[ ]  Return all caps to the canister and passive sampler

[ ]  Attach filled out sample tag to the canister using plastic tie

[ ]  Attach legal seals to the both sides of box. Legal seal #’s and ,

[ ]  Mail 3 boxes of canisters and 3 boxes of passive samplers with Chain of Custody form.

**Weather data Time: Temp: Wind speed and direction (from): .**

**Keystone Landfill (KSL) Site Inspector(s) Date , 2016**

**Daily Checklist**

[ ]  Proper materials

 Sorbent tubes and extras (min of 7 of each tube)

 SUMA canisters (4, one is extra)

 Vinyl Gloves/safety glasses

 Binder, Odor Survey, Shipping labels, Chain of Custody form, and checklists

 Plastic bags

 Legal seals (min 10)

 Windmate (temperature and wind speed/direction)

**Sorbent Tube Checklist Setup**

[ ]  Calibration Initial/Final

Red tape-Ammonia-(**67**mL/Min) Rotometer Initial Post calibration (if necessary) .

Blue tape-Aldehydes-(**150**mL/Min) Rotometer Initial Post calibration (if necessary) .

Green tape-Methanol-(**5** mL/Min) Rotometer Initial Post calibration (if necessary) .

Orange tape-Methylamine-(**15**mL/Min) Rotometer Initial Post calibration (if necessary) .

Yellow tape-Triethylamine-(**15**mL/Min) Rotometer Initial Post calibration (if necessary) .

[ ]  Pumps on (red light blinks), enclosure is closed and odor survey complete. Sample start time .

**Sorbent Tube Checklist Collection**

[ ]  Pumps turned off, samples removed, capped, and placed in plastic bag with sample submission form

[ ]  Sample end time .

[ ]  Post-Calibration Initial/Final

Red tape-Ammonia-(**67**mL/Min) Rotometer Initial Post calibration (if necessary) .

Blue tape-Aldehydes-(**150**mL/Min) Rotometer Initial Post calibration (if necessary) .

Green tape-Methanol-(**5** mL/Min) Rotometer Initial Post calibration (if necessary) .

Orange tape-Methylamine-(**15**mL/Min) Rotometer Initial Post calibration (if necessary) .

Yellow tape-Triethylamine-(**15**mL/Min) Rotometer Initial Post calibration (if necessary) .

[ ]  Calculate duration of sampling and volume of sampled for each tube

 ( Minutes X mL/min **Avg** Flow rate) / 1000 = Liters sampled

[ ]  Field Blanks collected (if necessary)

[ ]  Odor Survey and Chain of Custody form complete

**Canister Checklist Setup**

[ ]  Initial Pressure reading -28 to -30 and documented on sample tag “ - " inHg

[ ]  Canister serial # passive sampler serial # .

[ ]  Odor/observation log filled out

[ ]  Canister open to begin sampling and all caps removed am/pm

**Canister Checklist Collection**

[ ]  Turn valve on canister off and document final pressure reading and time on sample tag

 - inHg am/pm

[ ]  Return all caps to the canister and passive sampler

[ ]  Attach filled out sample tag to the canister using plastic tie

[ ]  Attach legal seals to the both sides of box. Legal seal #’s and ,

[ ]  Mail 3 boxes of canisters and 3 boxes of passive samplers with Chain of Custody form.

**Weather data Time: Temp: Wind speed and direction (from): .**