

Instructions for Collecting Soil Vapor into Summa Canisters

Recommended Tools

- (2) Adjustable crescent wrenches, small to medium size
- Open end combo wrenches 9/16" –1/2"
- Scissors/Snips to cut tubing
- Ball point pen
- Nitrile Gloves

Sample Parts Provided

- Sampling assembly to fill mini-summa canisters (**see photo #1**).
 Consists of:
 - 0-30" vacuum gauge
 - female quick-connect
 - 100-150 mL/min flow restrictor
 - 1/4" barb fitting to connect to soil vapor probe
- Male quick-connect adapter (**see photo #2**)
- Plastic 60mL syringes with 3-way valves to purge soil vapor probe and to flush assembly between samples
- Extra tygon tubing, 1/4" and 3/8" outer diameter
- Cable ties – 4"



Photo 1:
Sampling gauge

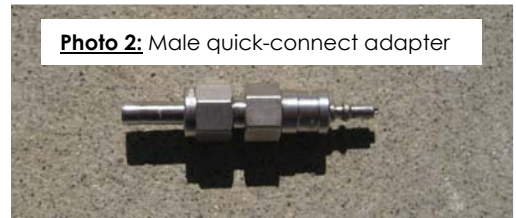


Photo 2: Male quick-connect adapter

Inspection and Vacuum Testing of Sampling Assembly

Be sure that all fittings are tight before use. Check this by grabbing all the fittings with your fingers and seeing if any fittings rotate. Swagelok fittings should not rotate. The only fittings that should rotate are the quick-connect fittings, specifically the "collar" on the female quick-connect.

To vacuum test the assembly:

1. Connect the male quick-connect piece provided to 3-way valve on a 60mL plastic syringe (**see photo #3**).
2. Connect syringe with male quick-connect to sample assembly (**see photo #4**).
3. Terminate the barbed end of the sample assembly by any of the following methods:
 - If valve is attached to end, make sure it is off towards the assembly (see "Connecting Sample Assembly to Soil Vapor Probe, #1).

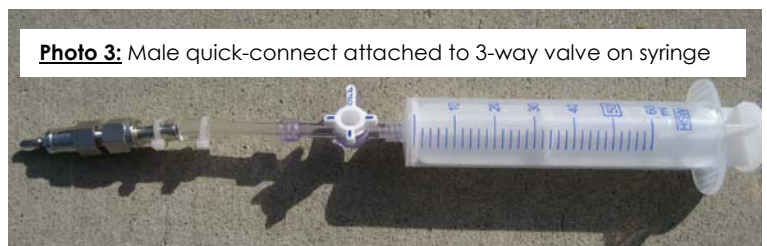


Photo 3: Male quick-connect attached to 3-way valve on syringe

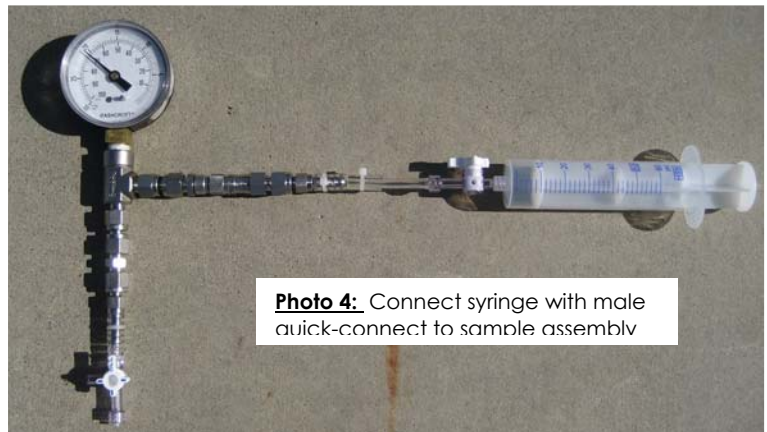


Photo 4: Connect syringe with male quick-connect to sample assembly

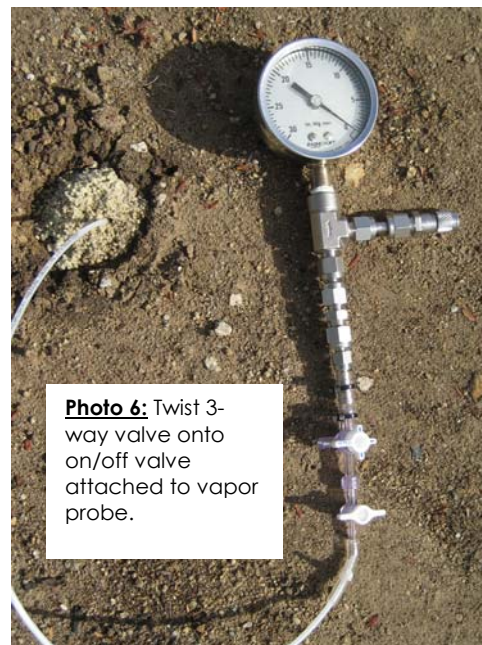
- Remove barb and attach a Swagelok plug to end of assembly – if available.
 - Attach tubing to barb and terminate tubing with a valve, plug or block off with finger if necessary.
4. Pull back plunger on the syringe and hold. The needle on the vacuum gauge should have moved to around – 20" of mercury. Disconnect male quick-connect.

Once disconnected, the needle on the vacuum gauge should continue to hold at the point it came to rest once the syringe was disconnected. If the vacuum holds for 30 seconds to 1 minute, the assembly is airtight and ready for sampling. If the needle slowly drops after the syringe is disconnected, there is a leak somewhere in the sample assembly. If this occurs, tighten all Swagelok connections with a wrench and pay special attention to termination at barbed end of assembly. Retest assembly. If the assembly still appears to leak, repeat process once more. If it still appears to be leaking, contact H&P for further assistance.

Connecting Sample Assembly to Soil Vapor Probe

If sampling soil vapor probes supplied by H&P:

1. Connect 3-way valve to the barbed end of the sample assembly with the 3/8" tygon tubing. Make sure luer-lock end is facing away from assembly (**see photo #5**).
2. Use cable ties at both connections to ensure airtight seal.
3. Sample assembly can now be quickly connected to soil vapor probes by twisting 3-way valve onto on/off valve attached to probe (**see photo #6**).



If sampling soil vapor probes other than those supplies by H&P:

1. Use extra tubing provided to connect barb on sample assembly to soil vapor probe termination (i.e. tubing, valve, etc.). (See photo #7).
2. Be sure to cable tie all connections.

Purging Soil Vapor Probes

This procedure is for purging the soil vapor tubing through the sampling assembly.

1. Connect male quick-connect to 3-way valve on a 60mL plastic syringe (see photo #8).
2. Connect syringe with male quick-connect to sample assembly (see photo #8).
3. Turn 3-way valve so the valve is off towards the open port, allowing the syringe to draw in the sample through the sample assembly.
4. Slowly pull back plunger on syringe to allow syringe to fill up to 60mL with vapor.
**Note: The 150mL/min flow restrictor in the sample train will create some vacuum and the needle on the gauge will rise as vacuum is created. Once plunger is pulled back to desired volume, allow needle in gauge to fall back to zero before evacuating syringe.*
5. Turn 3-way valve so the valve is off towards the sample assembly and push the plunger in completely to evacuate syringe.
6. Continue this procedure until proper purge volume has been evacuated.
7. Disconnect syringe at quick-connect.



Photo 7: Connect barb on sample assembly to vapor probe termination with extra to 1/4" tubina.

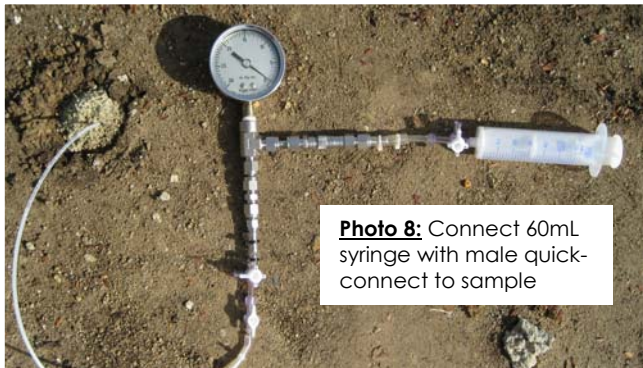


Photo 8: Connect 60mL syringe with male quick-connect to sample

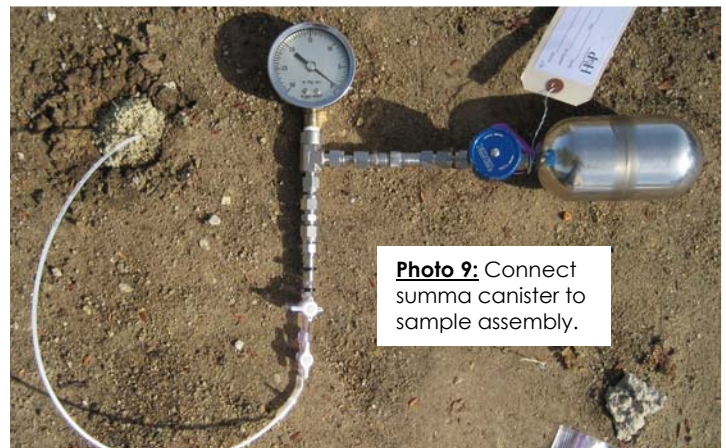


Photo 9: Connect summa canister to sample assembly.

Sample Collection

Connect the summa canister to the sampling assembly (**see photo #9**). Summa canisters without valves will begin to fill immediately. If the summa canister has a valve, open the valve to commence filling. The needle of the vacuum gauge should immediately go to at least - 25" of mercury. If the needle does not, the summa canister should not be used and labeled as having low vacuum and another canister should be used. Once connected and/or the valve opened, the needle should slowly start moving down the dial. The sample assembly has a flow restrictor which will limit the flow into the can to a rate of 100 – 150mL per minute. Because of this, the 400mL summa canister should take approximately 3 to 4 minutes to fill. Allow the needle to reach zero before disconnecting canister.

Leak/Tracer Compound

If leak/tracer compound is required, follow these steps:

1. Place paper towel or cloth towel in large ziplock bag.
2. Lightly spray towel with leak check compound.

**H&P recommends using 1,1 difluoroethane as the leak check compound which can be commonly found in most duster sprays found at office supply stores (make sure the bottle states that it contains 1,1 difluoroethane).*

3. Close ziplock bag until you are ready to sample.
4. Make sure all connections are snug and tightened before placing towel down.
5. Prior to sampling, place towel saturated with leak check compound around the base of the soil vapor probe where tubing enters the ground and a separate towel around the sample assembly (see photo #10).
6. Commence sampling.
7. Wash hands or remove gloves between samples to ensure the leak/tracer compound is not on your fingers when connecting fittings.

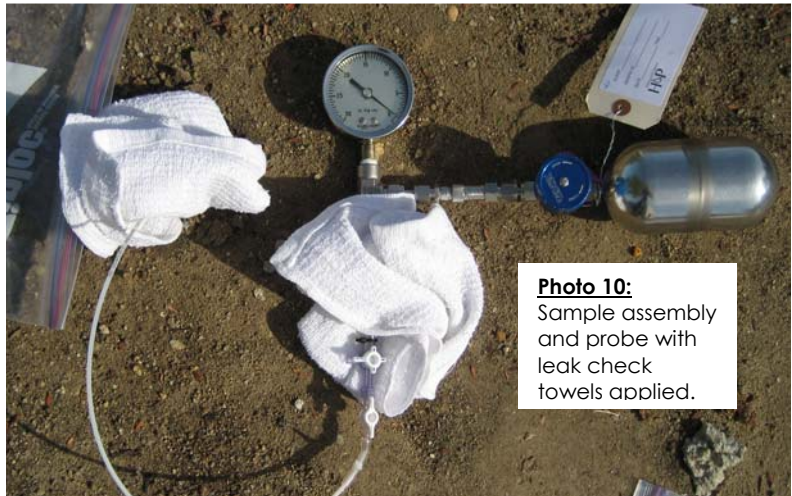


Photo 10:
 Sample assembly
 and probe with
 leak check
 towels applied.

Collection Notes

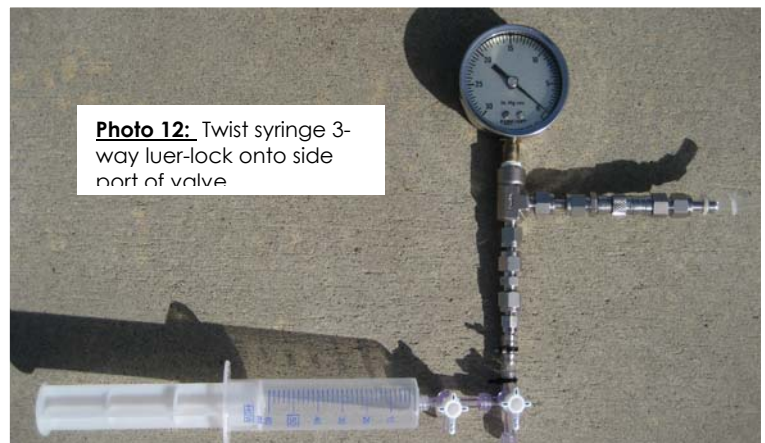
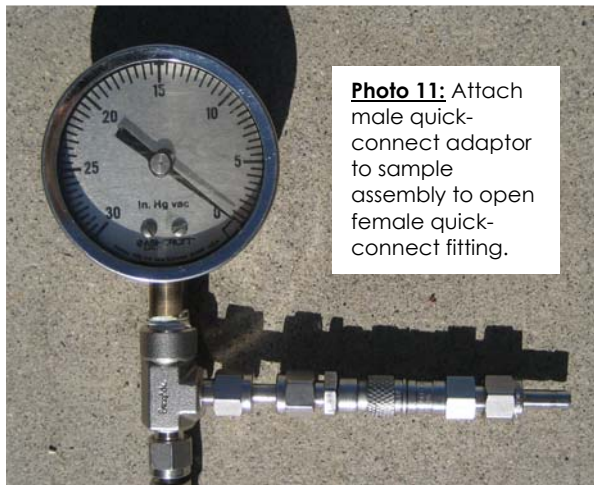
- The summa canister should fill in 3 to 5 minutes depending upon soil permeability. If the summa is not filled within 5 minutes, make note of the vacuum reading. Allow the summa to fill for another 5 minutes. If it is not filled after another 10 minutes, make a note of the vacuum reading and stop collection. If the next summa canister also is not filling at a proper rate, the flow restrictor may be clogged. Replace with spare restrictor if available.
- **If water droplets are observed, stop collection immediately and note the presence of water on the sample label and Chain of Custody.**
- Keep summa canisters out of sun and do not chill. Keep at room temperature.
- Label samples with a ballpoint pen. DO NOT USE SHARPIE!
- Wash hands or remove gloves between samples to ensure the leak/tracer compound is not on your fingers when connecting fittings.

Flushing of Sampling Assembly Between Samples

The sampling assembly should be flushed with ambient air or, if available, lab air between sample collections.

To flush with ambient air using syringes:

1. Attach provided male quick-connect adaptor (refer back to photo #2) to sampling assembly to open female quick-connect fitting. *Do not leave purge syringe on when flushing* (see photo #11).
2. Attach an individual flushing syringe with 3-way valve to the other end of sampling assembly.
 - If you have connected a 3-way valve to the barb end of the assembly, twist the syringe 3-way luer-lock onto side port of valve (see photo #12).
 - If you are connected directly to probe tubing, use extra tubing provided to connect the syringe to barbed end.
3. Turn valve on syringe off to sampling assembly and pull back on the plunger to draw in ambient air into the syringe.
4. Turn valve back so that the ambient air in the syringe can be forced through the sampling assembly by pushing the plunger in (the restrictor in the assembly will create resistance, so continuous force must be kept on the plunger until the syringe is empty). **Repeat this process 5 to 10 times.**



INSTRUCTIONS FOR SOIL GAS COLLECTION IN TEDLAR BAGS FULFILLING MISSOURI DNR GUIDELINES

Collecting Samples into Tedlar Bags

1. Connect a 2-way valve on to the soil gas probe using flex tubing. Connect the vacuum gauge to the 2-way valve and to a 3-way valve on 60 cc syringe as shown in Figure 1. BEWARE, STEM ON 3-WAY VALVE POINTS TO THE OFF DIRECTION.



Fig 1: Attach syringe & vacuum gauge to soil gas probe tubing using 2-way & 3-way valves. Be sure to zip tie the connections.



2. Leak test the sampling train by pulling on the syringe with the 2-way valve on the soil gas probe in off position. The vacuum gauge should deflect to ~10" to 15" of HG.
3. Turn the 3-way valve on the syringe so that the flow-path to the vacuum gauge is off. Watch the vacuum gauge. If vacuum remains steady for 30 seconds, sampling train is leak-tight. If the vacuum does not remain steady, find the leak, correct, and repeat leak test.
4. Open the 3-way and 2-way valves so that the soil gas probe is open to the syringe and purge appropriate volume from probe using 60 cc syringe). Use 3 internal dead-volumes unless otherwise instructed to do so. Dead volume of 1/8" nylaflo is 1 cc per foot. Dead volume of 1/4" tubing is 5 cc/foot.

5. After purging, leave the syringe connected to the vapor gauge & vapor probe and connect a tedlar bag to the side port of the 3-way valve using flex tubing (figure 2).



Fig 2: Connect tedlar to the side port of the 3-way valve and fill bag with 300-450 cc vapor sample.

6. If a leak/tracer compound is required, place leak compound around base of probe where it enters the ground. An easy way to do this is to dampen a paper towel with isopropyl alcohol (rubbing alcohol) or difluoroethane (duster spray) and place around the base of probe.
7. Open valve on the tedlar bag. Fill tedlar bag with 300 cc to 400 cc using the syringe and switching the position of the 3-way valve from the probe to the tedlar bag. Note: if tedlar bags are to be shipped by air, only fill them with 300 cc. If the samples in the tedlar will be transferred to mini-canisters on-site, put 450 cc into the tedlar.
8. Once filled, close valve on tedlar bag and remove from 3-way valve.

Note: When filling with a syringe, you control the flow rate by how fast you pull on the syringe. Hence, a flow meter should not be necessary. If you wish to install a flow meter, place it between the 60 cc syringe and the vacuum gauge.

Transferring Samples From Tedlar Bags to Canisters

1. Connect transfer piece to the side port of tedlar bag using flex tubing (figure 3).

Fig 3: Connect transfer piece to tedlar bag.



2. Open valve on tedlar bag. Then connect summa to transfer piece at the quick-connect fitting (figure 4). Some summas have their own on/off valve, while some have just the quick connect. If summa has an on/off valve, turn valve to open now. Be sure to close valve before disconnecting from transfer piece.



Fig 4: Connect summa to the tedlar with the transfer piece.



3. Summa can will fill within 15 seconds. There should be some residual soil gas left in tedlar as the mini-can volume is less than 450 cc. Disconnect summa from transfer piece.
4. Clean transfer piece between samples by connecting male quick-connect to female quick-connect and flushing with ambient air using the syringe (figure 5).



Fig 5: Flushing transfer piece

5. Keep canisters out of sun and do not chill