



**FIELD KIT GUIDE**  
**FOR**  
**PASSIVE SOIL-GAS INVESTIGATIONS**  
*[PLEASE READ ENTIRE GUIDE BEFORE STARTING SURVEY]*

**I. General Information**

A. BEACON is furnishing this kit to **RMT, Inc.** (RMT) specifically for use on the **Tecumseh Products site in Tecumseh, MI.** To meet the project objectives the Samplers will be retrieved **seven (7) days after installation.** Please contact BEACON following installation of the samplers at (800) 878-5510 with anticipated date when samples will arrive at BEACON's laboratory.

B. Prior to returning the Kit to BEACON, RMT should verify that the caps are tight on the Passive Soil-Gas (PSG) Samplers and that the Samplers are sealed individually in the small Sampler Bags and also in the larger Return Shipment Bag, with an adsorbent pak.

C. *Before going to the field* please inventory the contents of the Kit, checking them against the enclosed list to verify item counts and to become familiar with all components. (Because the components are thoroughly cleaned prior to shipment, the inventory should be conducted without opening the plastic bags.) Note that Trip Blanks are to remain sealed throughout the Survey.

D. Upon receipt of the Field Kit, BEACON requests that RMT sign and date the enclosed Chain-of-Custody Form to document receipt of the Kit. The Field Deployment Report is to be completed during the course of the survey.

E. Following completion of the survey, fill out the Chain-of-Custody Form with the following information: (i) Field Sample IDs, (ii) the name and contact phone number of the person submitting the samples, (iii) the unique number of the custody seal that will be used, and (iv) signature and date of person relinquishing samples. The Chain-of-Custody Form and Field Deployment Report are to be returned with the Field Kit to BEACON. If possible, retain photocopies for your record. Next, pack the Samplers, tools, containers, sampling caps, and requisite documentation in the Field Kit.

**Note:** Place the Return Shipment Bag, which contains the individually bagged PSG Samplers, in the upper tray and place the tools in the lower compartment of the Kit so they do not damage the Samplers. One trip blank should be included with each Return Shipment Bag.

Affix the tug-tight custody seal to the latch on the Field Kit, pack it in its original cardboard shipping container, and send the shipment via overnight courier (FedEx, UPS, DHL) to:

Beacon Environmental Services, Inc.  
Attn: Sample Receiving  
323 Williams Street, Suite D  
Bel Air, MD 21014  
410-838-8780

**NOTE: DO NOT PACK IN THE KIT OR SHIPPING BOX STYRENE PEANUTS, NEWSPAPER, OR OTHER MATERIALS THAT COULD CONTAMINATE THE SAMPLES. PLEASE AVOID SMOKING WHILE HANDLING SAMPLERS.**

## II. Contents

A. This Field Kit contains the components needed for a **148**-point soil-gas survey, plus sufficient additional cartridges for **5** trip blanks (vial labeled **Trip-1 through Trip-5**, not to be opened), and **4** extra Samplers for use in the event of breakage or accidental contamination. In addition, **3** extra transport vials are provided in case a Sampler Vial breaks during retrieval. **Do not open bags until deployment.**

<u>Code/Item</u>	<u>Quantity</u>
(1) PASSIVE SOIL-GAS SAMPLERS	<b>157</b>
(2) EXTRA TRANSPORT VIALS	<b>3</b>
(3) SAMPLING CAPS (in container)	<b>160</b>
(4) CAP STORAGE CONTAINERS	<b>2</b>
(5) TAPPING DOWELS	<b>1</b>
(6) 12" LENGTHS OF METAL PIPE	<b>152</b>
(7) WIRE CUTTERS	<b>1</b>
(8) GAUZE CLOTHS	<b>160</b>
(9) PIPE CUTTER	<b>1</b>
(10) SCRATCH AWL	<b>1</b>
(11) VISE GRIPS	<b>1</b>
(12) 3" x 4" PLASTIC SAMPLER BAGS (for return shipment of samples)	<b>160</b>
(13) 12" x 12" PLASTIC RETURN SHIPMENT BAG	<b>1</b>

B. In addition to the materials found in the kit, field teams will need:

- NITRILE GLOVES
- CLEAN TOWEL
- HAMMER
- ELECTRIC ROTARY HAMMER DRILL WITH:  
    ½"-DIAMETER BIT WITH AT LEAST 36 INCHES OF CUTTING LENGTH and  
    1¼" to 1½" DIAMETER BIT WITH AT LEAST 12 INCHES OF CUTTING LENGTH
- PIPE WRENCH (to dislodge drill bits should they become stuck)
- BALL-POINT PEN and CLIPBOARD
- PIN FLAGS, WOODEN STAKES, or OTHER LOCATION MARKERS
- FLAGGING TAPE
- BOX OF ALUMINUM FOIL

C. Additional materials necessary only for deployment through asphalt or concrete:

- DRY CONCRETE MORTAR MIX and ASSOCIATED EQUIPMENT (for temporary patching of the sample holes) including:  
    SMALL PAIL, WATER, SMALL PLASTIC PUTTY KNIFE
- CHISEL or SCREWDRIVER (to remove the temporary patch)
- ASPHALT COLD PATCH or CEMENT (for final repair of the sample holes)

## III. Instructions

A. GENERAL:

Deployment and retrieval of Samplers requires only one person. Separate step-by-step procedures are detailed below for sampling through vegetation or bare soils and for sampling in areas covered by asphalt, concrete, or gravel. **Keep exposure of sample cartridges to ambient air to a minimum.**

**Note:** Do not deploy Samplers within 10 feet of a monitoring well, penetrometer, hydropunch shaft, or other intrusive sampling apparatus that potentially creates a preferential pathway for gases.

**REMEMBER: TRIP BLANKS ARE NOT TO BE OPENED.**

B. SAMPLER DEPLOYMENT:

**Note:** Each Sampler contains two sets of adsorbent cartridges. BEACON will analyze one set per Sampler; however, the second set in each Sampler can be analyzed as a field sample duplicate. RMT will note at which locations, if any, duplicates are to be analyzed by writing separate entries corresponding to the sample location followed by the letter “D” (*i.e.*, 3, 3-D, 4, 4-D) on the Chain-of-Custody Form. It is not necessary to alter the deployment pattern to have the duplicate samples analyzed. There is an additional per sample charge for analysis of any duplicates.

Vegetation or Bare Soils:

1. At each survey point, clear vegetation as necessary and, using a hammer drill and drill bit, create a 1¼”- to 1½”-diameter hole approximately 12 inches deep. Then, using the ½” drill bit, extend the hole to a three foot depth. **Note:** In areas of very organic topsoil or landscaped areas (ie, mulched areas, gardens, etc.) it is important to get beneath the organic soil layer to the underlying soil below.
2. When the holes have been drilled, take a 12-inch length of 1”-diameter metal pipe and lower it into the sample hole, being careful not to touch the inside of the pipe. Any portion of pipe above grade is cut flush with the ground surface, using the pipe cutter. With the tapping dowel and a hammer, push or tap the pipe one inch into the base of the drilled hole (see **attached figure**).
3. Remove one of the Samplers (a glass vial containing four *hydrophobic* adsorbent cartridges) and unwind the retrieval wire wrapped around it. Holding the capped end of the vial in one hand, pull the wire tight (to straighten it) with the other hand. Remove the solid cap on the Sampler Vial and replace it with a Sampling Cap (a one-hole cap with a screen meshing insert). Place the solid cap in the Field Kit.

**Note:** At each sampling location, verify that the (black) sampling cap is on the vial before installing the Sampler.

4. Lower the Sampler, open-end down, into the metal pipe approximately four inches so that the retrieval wire sticks out of the hole. Cover the open end of the pipe with a balled up **wad** of aluminum foil, pressing it tightly on top of the pipe with the tapping dowel. Next, cover the hole to grade with local soils or sand, leaving the end of the wire exposed above the surface of the ground. Using the hammer, collapse the soils above the Sampler. **Coil the wire and lay it flat on the ground surface.** Place the solid cap in the Cap Storage Container. Clearly mark the sample location with a pin flag or wooden stake.
5. Close the Field Kit, and on the Field Deployment Report record: (a) sample-point number; (b) date/time of emplacement (to nearest minute); and (c) other relevant information (*e.g.*, soil type, vegetation, proximity to potential source areas). Mark the sample location and take detailed notes (*i.e.*, compass bearings and distances from fixed reference points).
6. Move to next location.

Concrete, Asphalt, or Gravel Covered Areas:

1. At each survey point, drill a 1¼"- to 1½"-diameter hole through the asphalt/concrete/gravel to bare soil using a rotary hammer drill or comparable equipment. This hole should be approximately 12 inches deep. **Note:** When one person is performing fieldwork, it is often more efficient to drill all sample-point holes before beginning Sampler deployment.
2. When the hole through concrete/asphalt/gravel has been completed, using the ½" drill bit, extend the hole to a three foot depth. Next, take a 12-inch length of 1"-diameter metal pipe and lower it into the sample hole, being careful not to touch the inside of the pipe. Any portion of pipe above grade is cut flush with the ground surface, using the pipe cutter. With the tapping dowel and a hammer, push or tap the pipe one inch into the base of the drilled hole (see **attached figure**).
3. Remove one of the Samplers (a glass vial containing four **hydrophobic** adsorbent cartridges) and unwind the retrieval wire approximately six inches from the sampler, so that a coil of wire remains at the end. Remove the solid cap on the Sampler Vial and replace it with a Sampling Cap (a one-hole cap with a screen meshing insert). Place the solid cap in the Field Kit.

**Note:** At each sampling location, verify that the (black) sampling cap is on the vial before installing the Sampler.

4. Lower the Sampler, open-end down, into the metal pipe approximately four inches.

If sampling through asphalt or concrete, bend the end of the wire over the top of the pipe so that the coil of wire hangs over the top and outside of the pipe. Next, plug the top of the hole with a wad of aluminum foil. Using the tapping dowel, push down the aluminum foil so it forms a seal on the metal pipe and rests ¼" below the surfacing. Cover the hole to grade with a ¼" **thick** concrete patch. [**Note:** A ¼" thick patch is all that is required. If it is thicker it will be difficult to remove during retrieval.] Next, place the solid cap in the Cap Storage Container.

If sampling through gravel, extend the retrieval wire out of the pipe and plug the pipe with a wad of aluminum foil. Using the tapping dowel, push down the aluminum foil so it forms a seal on the metal pipe. Bend the wire over the aluminum foil plug and while the wire is extended out of the hole, cover the aluminum foil with local soil or sand. **Coil the wire and lay it flat on the ground surface.** Next, place the solid cap in the Cap Storage Container.

If a hole deeper than 12 inches is created, it will be necessary to use more than one wad of aluminum foil. In these situations, extend the wire out of the pipe. While holding onto the wire, plug the top of the pipe and hole loosely with as many wads as needed. Before inserting the last wad of foil, bend the wire so it rests below the uppermost wad of foil. This will make it easy to retrieve the Sampler during retrieval.

5. Close the Field Kit, and on the Field Deployment Report record: (a) sample-point number; (b) date and time of emplacement (to nearest minute); (c) type of surfacing and approximate thickness; and (d) other relevant information (*e.g.*, surfacing material, proximity to potential source areas). Be sure to mark the sample location and take detailed notes (*i.e.*, compass bearings and distances from fixed reference points).
6. Move to next location.

C. SAMPLER RETRIEVAL:

**Prior to retrieving samples, seal each Trip Blank in a 3"x4" Sampler Bag, and place the bagged Trip Blank in a separate larger bag marked "Return Shipment Bag." One trip blank should be included with each Return Shipment Bag. Stow the sampler blocks, with the Transport vials and extra samplers, in the lower compartment of the kit. The sampler blocks are to be returned to BEACON's lab along with the samples.**

**Note:** Each Sampler contains two sets of adsorbent cartridges. BEACON will analyze one set per Sampler; however, the second set in each Sampler can be analyzed as a field sample duplicate. RMT will note at which locations, if any, duplicates are to be analyzed by writing separate entries corresponding to the sample location followed by the letter "D" (*i.e.*, 3, 3-D, 4, 4-D) on the Chain-of-Custody Form. It is not necessary to alter the deployment pattern to have the duplicate samples analyzed. There is an additional per sample charge for analysis of any duplicates.

Vegetation or Bare Soils:

1. At each sample location open the Field Kit and place it and the wire cutters within easy reach. Remove a square of gauze cloth and place it and a clean towel on the open Kit. Remove a solid cap from the Cap Storage Container and place it on the Kit, also.
2. Remove the aluminum foil plug, using vise grips and the scratch awl, if necessary, and retrieve the Sampler from the hole.
3. Holding the Sampler upright, clean the sides of the vial with the clean towel (especially close to the Sampling Cap). Remove the Sampling Cap, cut the wire from the vial with the wire cutters, and clean the vial threads completely with the gauze cloth.  
**[Note: Completely remove the wire to ensure the cap fits tight on the vial and no soil is returned in the field kit.]**

4. Firmly screw the solid cap on the Sampler Vial and clean the vial completely with the gauze cloth. With a **ballpoint pen** record the sample number, corresponding to the sample location, on the cap's label. **[Note: Do not use a Sharpie marker.]**
5. Return the sampling cap to the Sampling Cap container. Place the sealed and labeled Sampler Vial in the smaller 3" x 4" plastic Sampler Bag. Then place the individually bagged and labeled sampler into the larger bag labeled "Return Shipment Bag."

**Note:** Each sampler must be individually bagged and placed in a Return Shipment Bag, with approximately 40 samplers and one trip blank per Return Shipment Bag.

6. On the Field Deployment Report, record: (a) date and time of retrieval (to nearest minute); and (b) any other relevant information.
7. After all samples have been retrieved, verify that the caps on each Sampler are sealed tightly and that the seals on the Sampler Bags are closed. Verify that all Samplers are stored in the Return Shipment Bag, which contains an adsorbent pak. Seal the Return Shipment Bag and place it in the upper tray of the Field Kit, and place the provided tools and materials in the lower compartment of the Field Kit.

**Note: Please do not return the sampling caps, used pipe, or the wire with the Field Kit as they could bias the samplers. Return *all* the other materials and equipment (blocks, extra samplers, tools, containers, *etc.*).**

Asphalt, Concrete, or Gravel:

1. At each sample point covered by gravel, clear away the soil or sand to expose the aluminum-foil plug. For those locations covered by asphalt or concrete, use a small chisel and hammer to remove the concrete patch to expose the aluminum foil.
2. Next, open the Field Kit and place it and the wire cutters within easy reach. Remove a square of gauze cloth and place it and a clean towel on the open Kit. Remove a solid cap from the Cap Storage Container and place it on the Kit, also.
3. While securely holding onto the retrieval wire, remove the aluminum-foil plug, using the scratch awl, as necessary. Holding the Sampler upright, clean the sides of the vial with the clean towel (especially close to the Sampling Cap). Remove the Sampling Cap, cut all the wire from the vial with the wire cutters, and clean the vial threads completely with gauze cloth.

**[Note: Completely remove the wire to ensure the cap fits tight on the vial and no soil is returned in the field kit.]**

4. Firmly screw the solid cap on the Sampler Vial and clean the vial completely with the gauze cloth. With a **ballpoint pen** record the sample number, corresponding to the sample location, on the cap's label. **[Note: Do not use a Sharpie marker.]**
5. Return the sampling cap to the Sampling Cap container. Place the sealed and labeled Sampler Vial in the smaller 3" x 4" plastic Sampler Bag. Then place the individually bagged and labeled sampler into the larger bag labeled "Return Shipment Bag."

**Note:** Each sampler must be individually bagged and placed in a Return Shipment Bag, with approximately 40 samplers and one trip blank per Return Shipment Bag.

6. On the Field Deployment Report, record: (a) date and time of retrieval (to nearest minute); and (b) any other relevant information. Return the sampling cap to the Sampling Cap container.
7. After all samples have been retrieved, verify that the caps on each Sampler are sealed tightly and that the seals on the Sampler Bags are closed. Verify that all Samplers are stored in the Return Shipment Bag, which contains an adsorbent pak. Seal the Return Shipment Bag and place it in the upper tray of the Field Kit, and place the provided tools and materials in the lower compartment of the Field Kit.

**Note: Please do not return the sampling caps, used pipe, or the wire with the Field Kit as they could bias the samplers. Return *all* the other materials and equipment (blocks, extra samplers, tools, containers, *etc.*).**

8. Fill sampling holes to grade with an asphalt cold patch or cement.

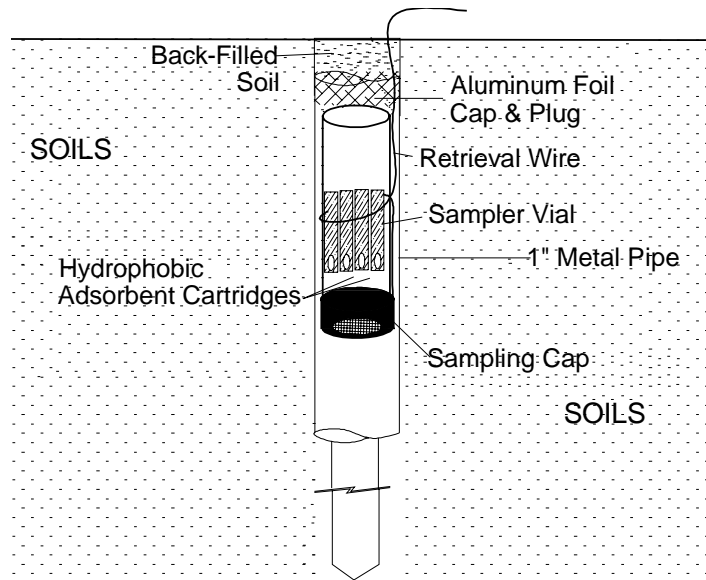
**IV. Forms**

The Field Kit also contains a **Chain-of-Custody Form** and a **Field Deployment Report**.

- A. The Chain-of-Custody Form is to be completed in accordance with **Section I**.
- B. The Field Deployment Report is to be filled out during the Survey as indicated in **Section III**.

# BEACON'S PASSIVE SOIL-GAS SAMPLER

## DEPLOYMENT THROUGH SOILS



## DEPLOYMENT THROUGH AN ASPHALT/CONCRETE CAP

