Memorandum

To:	Peter Ramanauskas/EPA	Ref. No.:	017322
From:	Thomas Kinney/MC/ds/35 TK	Date:	8/20/2015
cc:	Dave Favero/RACER; Grant Trigger/RACER		
Re:	**PCB Pre-Excavation Sampling Plan**		

1. Introduction

GHD Services Inc. (GHD) is providing this summary in regard to the PCB soil impacted area in the southern portion of the Site on behalf of Revitalizing Auto Communities Environmental Response (RACER) Trust at the former PCC-Validation (Site) facility located in Pontiac, Michigan. The PCB soil impacted area refers to the approximately 1,600 ft^2 area in the southern portion of former Plant 3. This area is commonly referred to as AOI-20 and is associated with former transformers and/or substations historically located throughout the Site. See Figure 1 for a site map that illustrates the southern portion of former Plant 3.

2. Background

The PCB soil impacts were first discovered during a 2009 Phase II Environmental Site Assessment (ESA) at a depth of 12-14 feet (ft) below ground surface (bgs) at BH72-08 (located in the southern portion of former Plant 3). The PCB impacts at BH72-08 were delineated to below 1 part per million (ppm) by soil samples collected in 2012 from borings BH102-12, BH103-12, BH104-12, BH105-12 and BH106-12. In 2014 SME collected soil samples near BH72-08 on behalf of the purchaser (M1 Concourse, LLC) of the PCC-Validation property. Soil borings were installed near and around BH72-08 and PCBs were detected in certain soil samples above 100 ppm. SME conducted a second round of soil borings and sampling in 2015 to further delineate the impacts discovered in 2014. Although helpful, the delineation borings were inadequate to fully delineate impacts for purposes of excavation. See Attachment 1 which provides GHD and SME's soil data. The following sections provide a scope of work to delineate PCB impacts for purposes of excavation as requested by the EPA in a meeting on July 28, 2015.

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3. PCB Delineation Scope of Work

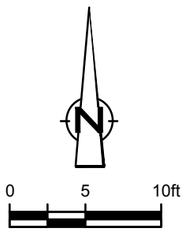
The following scope of work will provide adequate data to conduct future excavation of PCB impacts exceeding 100 ppm:

- Anticipate a maximum of 1 day of drilling.
- Survey soil boring locations prior to drilling.
- Install three soil borings, one each 5 feet to the north, east, and west of SB62-14.
- Collect soil samples at 2-foot intervals (0-2, 2-4, 4-6, 6-8, 8-10 and 10-12) to 12 feet bgs.
- Install one soil boring approximately 1 foot from SB62-14 and samples at 0-2, 2-4, 4-6 feet bgs.
- Utilize field test kits to analyze each 2-foot interval to 50 ppm (each sample will also be submitted for laboratory analysis for PCBs).
- If two or more consecutive 2-foot intervals exceed the field test kit threshold of 50 ppm, step out 5 feet in same direction and install a step-out boring (as permitted by time). Collect samples and follow same protocols as described previously.
- Assuming lab results indicate all sample intervals at delineation borings are below 100 ppm, no confirmation sampling will be completed during excavation. If shallow intervals from the delineation borings and the boring adjacent to SB62-14 have PCB levels below 100 ppm soils will be placed back into excavation (based on sampling from drilling program described above). Soil excavated above 100 ppm will be sent for proper off-Site disposal.

4. Assumptions and Estimated Costs

- Assume no groundwater sampling.
- Assume use of colorimeter Immunoassay method or CHLOR-N-SOIL® PCB screening kit (or other as deemed appropriate) for field testing of PCBs to 50 ppm (see Attachment 2 for details).
- Assume we only investigate SB62-14. We will leave impacts (of PCBs greater than 100 ppm) at SB71-15 in-place.
- Survey costs ~ $500.
- Anticipate 1 day of drilling at approximately $2,800 per day (including GHD oversight, logging and sampling).
- PCB field kits at approximately $10/kit, anticipate 75 kits + use of colorimeter ~ $1,000.
- PCB laboratory analysis (21-27 soil samples + QA/QC at $45/sample) approximately $1,215.
- **Total ~ $5,515**

Encl: Figure 1 – Proposed Soil Boring Locations
Attachment 1 - SME's 2014 PCB Assessment Overview Diagram
Attachment 2 – PCB Field Kit Methodology and Information



BH-102-12

SB43-14

SB57-14

SB56-14

SB54-14

SB59-14

SB42-14

SB72-15

SB40-14

SB55-14

SB58-14

SB39-14

BH-103-12

BH-105-12

BH-106-12

SB60-14

SB70-15

SB71-15

SB61-14

SB73-15

SB62-14

SB66-15

SB68-15

SB69-15

SB41-14

SB67-15

SB74-15

BH-104-12

LEGEND

SB67-15 SME BORING LOCATION

BH105-12 GHD BORING LOCATION

PROPOSED GHD BORING LOCATION

FORMER SITE STRUCTURE

NOTE: INFORMATION BASES ON SME 5-29-2015 DRAWING

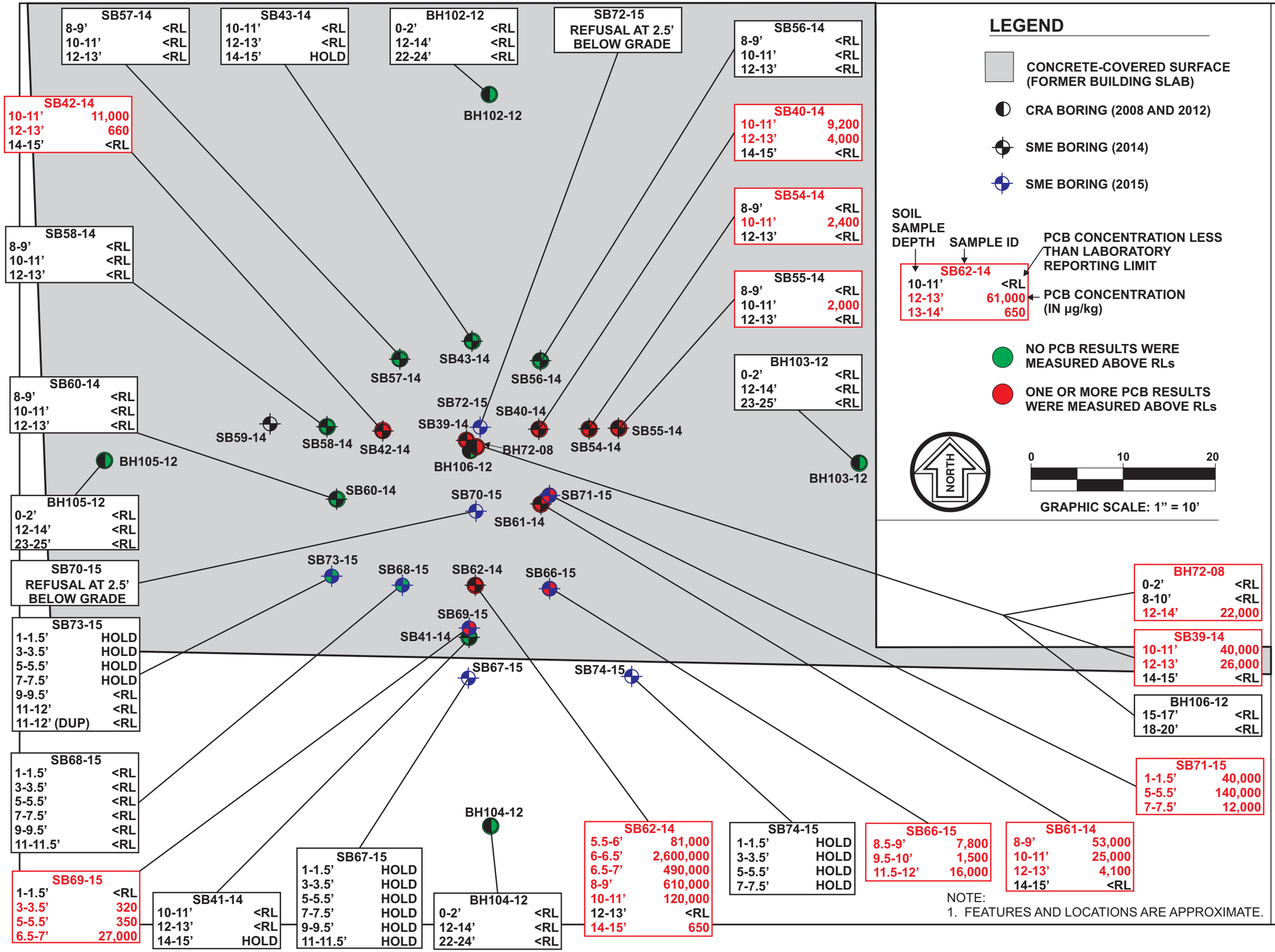
figure 1

PROPOSED SOIL BORING LOCATIONS
PCC-VALIDATION
Pontiac, Michigan

017322-T03(MEMO035)GN-DE001 AUG 20/2015

Attachment 1
SME's 2014 PCB Assessment Overview Diagram

DRAFT



LEGEND

- CONCRETE-COVERED SURFACE (FORMER BUILDING SLAB)
- CRA BORING (2008 AND 2012)
- SME BORING (2014)
- SME BORING (2015)

SOIL SAMPLE DEPTH / SAMPLE ID

SB62-14
10-11' <RL
12-13' 61,000
13-14' 650

PCB CONCENTRATION LESS THAN LABORATORY REPORTING LIMIT

PCB CONCENTRATION (IN µg/kg)

- NO PCB RESULTS WERE MEASURED ABOVE RLs
- ONE OR MORE PCB RESULTS WERE MEASURED ABOVE RLs

NORTH

0 10 20

GRAPHIC SCALE: 1" = 10'

NOTE:
1. FEATURES AND LOCATIONS ARE APPROXIMATE.

No.	Revision Date

PCB ASSESSMENT OVERVIEW DIAGRAM
FORMER PONTIAC VALIDATION CENTER
PARCEL A
PONTIAC, MICHIGAN

Date	5-29-2015
Drawn By	PAG
Designed By	JWH
Scale	1" = 10'
Project	066864.01.004

Michigan
Indiana
Ohio

sme
www.sme-usa.com

Attachment 2
PCB Field Kit Methodology and Information

INSTRUCTIONS FOR

CLOR-N-SOIL®

PCB Screening Kit

Test kit for determining PCB contamination in soil

EACH KIT CONTAINS:

1. Tube #1 - An empty plastic test tube with a white cap.
2. Tube #2 - A plastic test tube with a black dispensing cap containing a gray, yellow-dotted ampule (top) and a blue-dotted ampule (bottom).
3. Tube #3 - A brown-capped plastic test tube containing 7 ml of buffer solution, a brown-dotted ampule (bottom) and a red-green ampule (top).
4. A portable scale for weighing the soil sample.
5. An aluminum soil scoop.
6. A glass vial containing extraction solvent.
7. A 10cc polypropylene syringe.
8. A foil bag containing a drying column.
9. A plastic pipette.
10. A glass ampule contained in a cardboard sleeve and plastic tube designated as "Disposal Ampule".

READ CAUTION AND INFORMATION SECTIONS ON BACK BEFORE PERFORMING TEST. WEAR RUBBER GLOVES AND SAFETY GLASSES.

DIRECTIONS

1. SAMPLE PREPARATION Remove the white cap from the empty test tube (Tube #1) and attach the alligator clip from the scale to the rim of the test tube. Use the aluminum scoop to add enough soil sample to the plastic test tube until the scale reads 16 grams, resulting in a total of 10 grams of soil in the tube. Disconnect the scale from the test tube.

2. SAMPLE EXTRACTION Remove the cap from the glass vial containing the extraction solvent and pour the entire contents into Tube #1 containing the measured soil sample. Replace the white cap tightly on Tube #1. Mix thoroughly, breaking any soil lumps by squeezing the sides of the tube and continue to shake vigorously for one minute. Tap the bottom of the tube on any hard surface to compact the soil sample (this may not be necessary with all soil types). Allow the tube to settle for two minutes.

3. While the soil is settling, remove the drying column from the foil bag by poking the tip of the column through the bag (do not open the bag ahead of time). Remove the plunger from the syringe barrel, remove the red cap plug from the drying column and attach the large end of the blue drying column snugly to the syringe tip making sure the drying column fits tightly. Remove the black dispensing cap from Tube #2 and insert the blue drying column partially into the tube so the syringe body remains upright and vertical.

4. Using the plastic pipette, transfer as much of the extraction solvent as possible from above the soil layer in Tube #1 to the syringe barrel (a minimum of 7cc required). Do not remove any of the soil in the transfer, as it may clog the column assembly. If two layers are observed in the liquid phase, do not transfer any of the bottom (water) layer as it will interfere with the test results. Replace the plunger into the syringe barrel. Push the solvent through the blue drying column by applying enough pressure to produce a steady drip filtering through the column. Fill Tube #2 up to the 5 ml line with the filtered solvent. (It should take approximately one minute to filter the 5 ml of solvent). Pull back slowly on the syringe plunger to stop the flow of solvent through the column. Remove the syringe-column assembly from Tube #2 and replace the black dispensing cap. Replace the white cap on Tube #1 containing the soil sample.

5. REACTION Break the bottom (blue-dot) ampule in Tube #2 by compressing the sides of the tube. Shake for 10 seconds. Break the top (gray) ampule and shake vigorously for 10 seconds. Allow the reaction to proceed for an additional 50 seconds (total of one minute), while shaking intermittently several times.

6. EXTRACTION Remove the black dispensing cap from Tube #2 and the brown cap from Tube #3. Pour the clear buffer solution from Tube #3 (brown cap) into Tube #2. Replace the black cap tightly on Tube #2 and shake vigorously for about 10 seconds. Vent the tube carefully by partially unscrewing the black dispensing cap. Close securely and shake well for an additional 10 seconds. Vent again, tighten cap and stand tube upside down on its cap. The extract mixture should no longer appear gray. Allow the phases to separate for a full two minutes.

7. ANALYSIS Position Tube #2 over the top of Tube#3 and open nozzle on the black dispensing cap. Be sure to point the nozzle away from the operator while opening it and check that the nozzle is open completely before dispersing the clear solution. Dispense 5 ml of the clear solution into Tube #3 (up to the 5 ml line) by squeezing the sides of Tube #2. Close the nozzle on the dispensing cap on Tube #2. Replace the brown cap on Tube #3. Break the bottom (brown-dot) ampule and shake for 10 seconds. Break the top (red-green) ampule and shake for 10 seconds.

8. RESULTS Observe the resultant color immediately and compare to the color chart for chlorine determination. If the solution appears purple, the soil sample contains less 50 ppm PCB. If it solution appears yellow or colorless,

it MAY contain more than 50 ppm PCB and should be tested further by a PCB specific laboratory method. Disregard any color that may develop in a thin layer of oil that might form on top of the solution.

9. DISPOSAL Open the "Disposal Ampule" container and drop the ampule into Tube #3. Replace the cap on the test tube. Crush the ampule by squeezing the sides of the tube. Shake for 5 seconds. This reagent immobilizes the mercury so that the kit passes the EPA's TCLP test. See caution section below for additional information on disposal.

SUGGESTIONS FOR USING THE CLOR-N-SOIL® PCB TEST KIT

- The kit should be examined upon opening to see that all of the components are present and that all the ampules (5) are in place and not leaking. The liquid in Tube #3 (brown cap) should be approximately ½ inch above the 5 ml line and the tube should not be leaking. The ampules are not intended to be completely full.

- Perform the test in a warm, dry area with adequate light. In cold weather, a truck cab is sufficient. If a warm area is not available, Step 5 should be performed while warming Tube #2 in palm of hand.

- Never touch the ampules, the holder inside the tube, or the pipette tip, as it may contaminate the test.

- When weighing out the soil sample, suspend the scale freely by holding onto the metal ring at the top of the scale. The scale reads ounces on one side and grams on the other. Make sure you are reading on the GRAM side.

- Make sure that all soil lumps are completely crushed to ensure full extraction of PCB.

- When pushing the extract through the drying column, do not force it through too quickly as some contaminates may pass through.

- When inserting the pipette into the plastic test tube, insert it all the way to the 5 ml line. This prevents extract from getting on the tube walls and ampule holder, resulting in too much extract in the tube.

- Always crush the colorless ampule in each tube first. If this sequence has not been followed, stop the test immediately and start over using another complete kit. When an incorrect testing sequence is followed, a false negative may result which may allow a contaminated sample to pass without detection.

- In Step 6, tip Tube #3 to an angle of only 45^{o} to prevent the ampule holder from sliding out.

CAUTION

- ! When crushing the glass ampules, press firmly in the center of the glass ampule **ONCE**. Never attempt to re-crush broken glass as it may come through the plastic and cut fingers.
- ! In case of accidental breakage or spillage onto skin or clothing, wash immediately with large amounts of water. All the ampules are poisonous and should not be taken internally.
- ! Do not carry kits on passenger aircraft.
- ! The gray ampule in the black-capped test tube contains metallic sodium. Metallic sodium is a flammable solid and is water reactive.
- ! Wear rubber gloves and safety glasses while performing test.
- ! Dispose of used kits properly. Tube #1 and #2 may contain residual PCB's and should be treated as PCB waste if the test results is positive. The mercury in Tube #3 is made insoluble by the disposal ampule and used kits will pass the USEPA TCLP test for land disposal. More stringent state and local regulations may apply. Contact Dexsil if you have any specific questions concerning disposal procedure.
- ! Read the Material Safety Data Sheet before performing the test.
- ! Keep Out of Reach of Children.

MANUFACTURER'S WARRANTY

This kit is warranted to be free of defects in material and workmanship until the expiration date stamped on the box. Manufacturer's sole and exclusive liability under this warranty shall be limited to replacement of any kit that is proven to be defective. Manufacturer shall not be liable for any incidental or consequential damages.

Reliable test results are highly dependent upon the care with which the directions are followed and, consequently, cannot be guaranteed.

This kit is manufactured by **DEXSIL®** Corporation
One Hamden Park Drive, Hamden, Connecticut 06517
(203) 288-3509 FAX: (203) 248-6523
http: ((www.dexsil.com

„ Printed on recycled paper Revision 2, 5/06

Polychlorinated Biphenyls (PCB) in Soil

DOC316.53.01469

Immunoassay[1]

Method 10050

Scope and application: For soil.

[1] This test is semi-quantitative. Results are shown as more or less than the threshold value used.

Test preparation

Before starting

This method analyzes for PCBs in soil samples. In this procedure, the user adds sample extracts, calibrators and reagents to cuvettes that are layered with PCB-specific antibodies. The color that develops is measured and compared with the color measurements of the calibrators. The test requires approximately 20 minutes. A maximum of 10 tests can be prepared at the same time. This method provides semi-quantitative screening based on thresholds for PCB in the concentrations 1, 5 or 10 ppm and/or 50 ppm as Aroclor 1248.
The Immunoassay instruments give a reading in terms of absorbance. Use the absorbance reading to compare samples to the calibrators.
There are two protocols for this procedure: The first is for levels 1 ppm and 5 ppm and the second is for 10 ppm and 50 ppm. Each protocol uses a different quantity of calibrator and sample extracts. Refer to PCB protocols on page 6.
Before the procedure starts, read the full procedure. Identify and prepare all the necessary reagents, cuvettes and other apparatus, then start the procedure.
Timing is very important in this procedure. Follow the instructions carefully.
It is very important to use a consistent technique to mix the solution in the cuvettes. Refer to Use of the 1-cm MicroCuvette rack on page 6. If the cuvettes are individually mixed, the results can be less consistent.
The cuvette rack can be inverted with the cuvettes in the rack. This lets the user prepare many samples at the same time. The cuvettes stay in the rack until the results are read in the instrument.
Be careful with the cuvettes. A scratch on the inner or outer cuvette surfaces can cause incorrect results. Carefully clean the outer surfaces with a clean, absorbent cloth or tissue before use.
Each reagent set has 20 antibody cuvettes. Use one antibody cuvette for each calibrator and each sample. Cuvettes are not reusable.
Antibody cuvettes and enzyme conjugate are made in matched lots. Do not mix reagent lots.
Keep the color developing solution out of direct sunlight to prevent deterioration.
The recommended temperature for reagent storage is 4 °C (39.2 °F). Let the reagent temperature increase to room temperature before analysis.
The Soil Extractant contains methyl alcohol, which is poisonous and flammable. Review the Safety Data Sheets (MSDS/SDS) for the chemicals that are used. Use the recommended personal protective equipment.
Use protective nitrile gloves for this procedure.
Dispose of reacted solutions according to local, state and federal regulations. Refer to the Safety Data Sheets for disposal information for unused reagents. Refer to the environmental, health and safety staff for your facility and/or local regulatory agencies for further disposal information.

Items to collect

Description	Quantity
PCB Reagent Set	1
Analytical balance	1
Caps, flip spout	1
Cylinder, graduated 10-mL	1

Items to collect (continued)

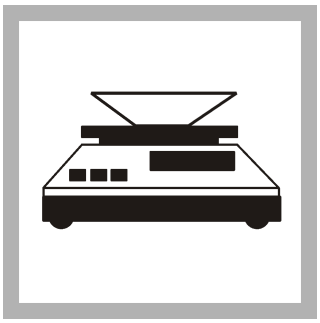
Description	Quantity
Marker, laboratory	1
Pipet, TenSette, 0.1–1.0 mL	1
Pipet tips, for TenSette Pipet, 0.1–1.0-mL	1
Rack, for 1-cm Micro Cuvettes	1
Scoop, 5 g	1
Soil extraction kit	varies
Water, deionized	varies
Wipes, disposable	1
Wiretrol pipet	1

Refer to Consumables and replacement items on page 8 for order information.

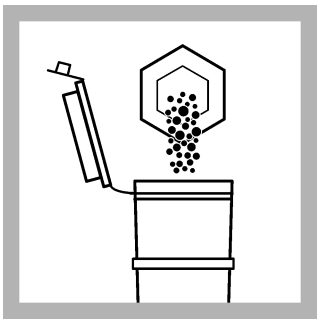
Sample collection

- Analyze the samples as soon as possible for best results.
- If sample storage is necessary, collect the samples in glass or Teflon® containers. Clean the containers with soap and water, then rinse the containers with methanol. Use Teflon-lined caps for the containers. If Teflon-lined caps are not available, use aluminum foil as a substitute cap liner. Rinse the aluminum foil with methanol before use.

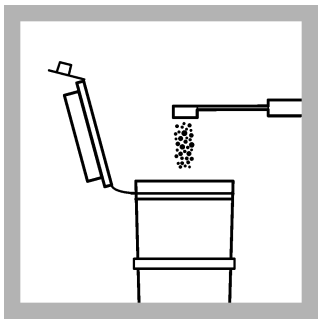
Soil extraction procedure



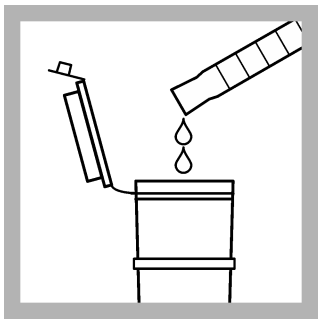
1. Weigh 5.0 g of soil in the plastic weighing boat.



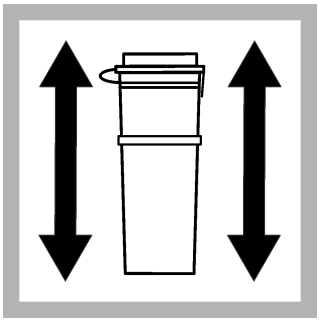
2. Carefully pour the soil into an extraction vial.



3. Use the 5-gram scoop to add one scoop of sodium sulfate to the extraction vial.

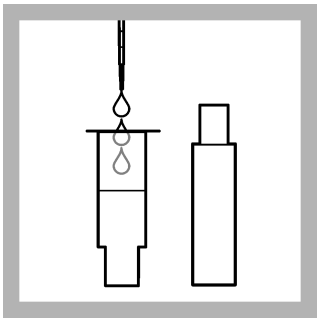


4. Use the graduated cylinder to add 10 mL of Soil Extractant into the extraction vial.

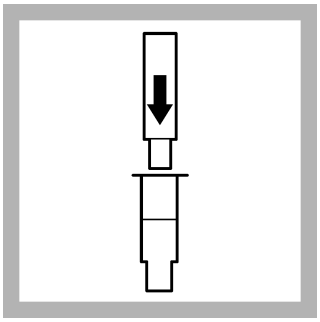


5. Put the cap on the extraction vial tightly. Shake vigorously for 1 minute.

6. Let the particles settle for a minimum of 1 minute. Carefully open the extraction vial.



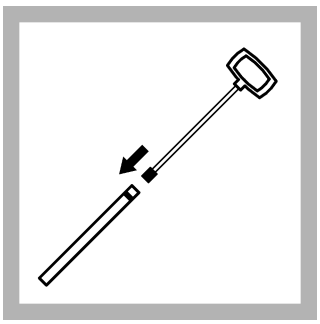
7. Use the disposable pipet to remove 1.0 to 1.5 mL from the top of the liquid layer. Add the removed liquid to the filtration barrel. Do not use more than 1.5 mL. The pipet can measure in 0.25-mL increments.



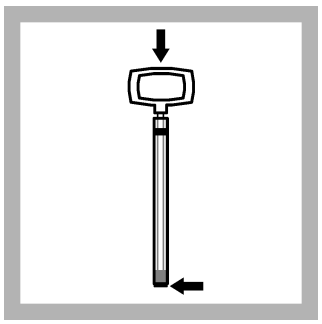
8. Put the filtration plunger into the filtration barrel. Set the filtration assembly on a table or flat surface. Push firmly on the plunger until the sample extract is forced upward into the center of the plunger.
Use the resulting filtrate for the immunoassay procedure.

Use of the Wiretrol Pipet

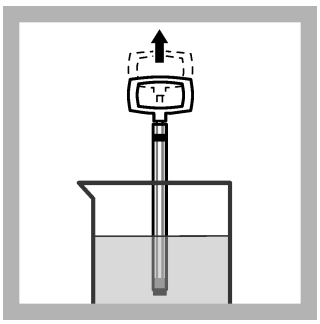
The Wiretrol Pipet accurately measures small quantities of liquids. The Wiretrol Pipet has two parts: a Teflon®-tipped plunger and a calibrated capillary tube. The plunger can be used many times. Discard the capillary tubes after one use.



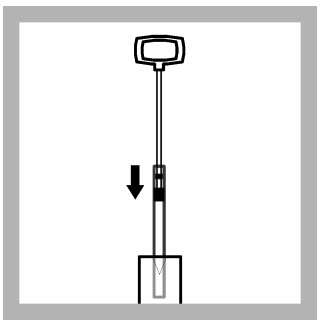
1. Make sure that the plunger tip is wet with the liquid. Carefully insert the plunger tip into the end of the capillary tube with the colored band.



2. Push the plunger tip to the other end of the capillary tube. Stop when the plunger tip barely extends beyond the end of the capillary tube.

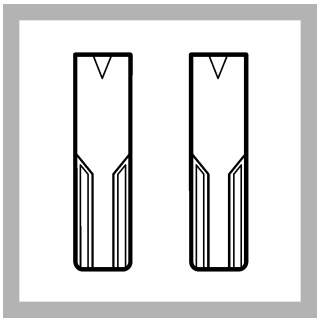


3. Insert the capillary tube below the surface of the liquid. Slowly and smoothly, pull the plunger up until the bottom of the plunger tip reaches the applicable volume line. Touch the end of the tube to the side of the vessel to release drops that remain on the capillary tube tip.

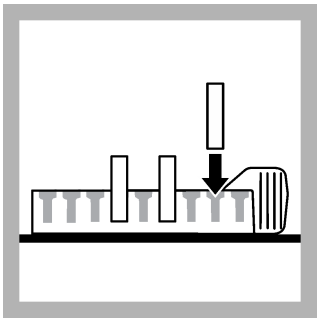


4. To release the liquid, insert the tip of the capillary tube **below the surface of the receiving solution**, and push the plunger downward in one smooth motion. Change capillary tubes for each calibrator and sample.

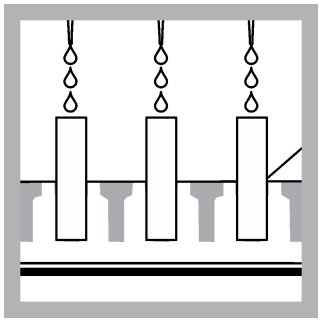
Immunoassay procedure



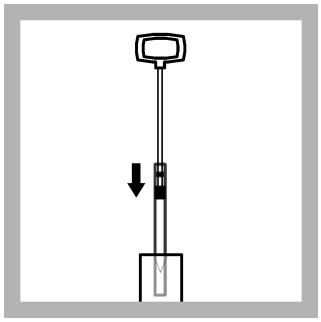
1. Put marks on the cuvettes to identify the samples and calibrators. Select the calibrator concentrations that are applicable to the expected sample concentration.



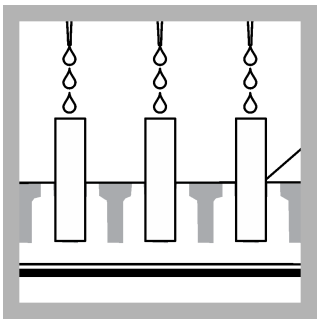
2. Insert the cuvettes into the rack. Make sure that the cuvettes are secure. Do not use force to put them into position because the cuvettes can spill or can be difficult to remove.



3. Use a pipet to add 0.5 mL of Diluent Solution into each cuvette. The same pipette tip can be used for this step.

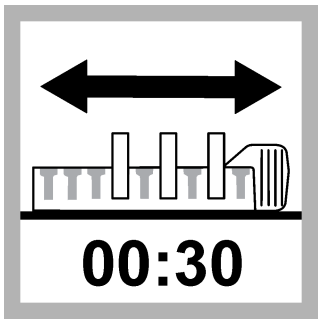


4. Use a Wiretrol pipet to add the correct volume of calibrator or sample extract into each cuvette. Use a separate capillary tube for each solution. Refer to PCB protocols on page 6.
Have the necessary apparatus ready for this step and the next four steps. Do not wait—do these steps quickly.

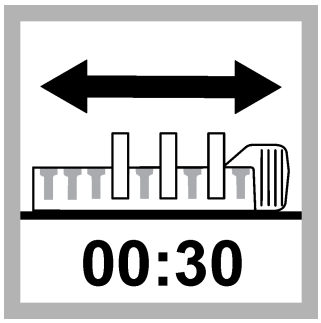


5. Immediately use a pipet to add 0.5 mL of atrazine Enzyme Conjugate into each calibrator and sample cuvette. The same pipette tip can be used for this step.

6. Set and start a timer for 10 minutes. A 10-minute reaction time starts.

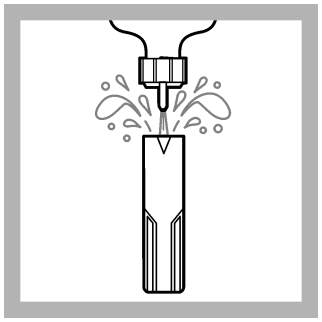


7. Immediately mix the cuvettes for 30 seconds. Refer to Use of the 1-cm MicroCuvette rack on page 6 for the correct mixing procedure.

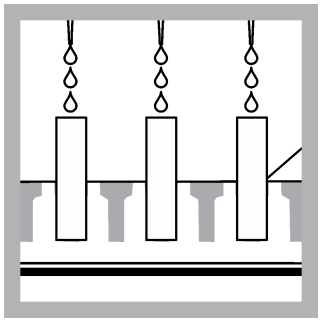


8. After 5 minutes, mix the contents of the rack a second time for 30 seconds.

9. At the end of the 10-minute reaction period, discard the contents of all the cuvettes into a waste container for disposal.

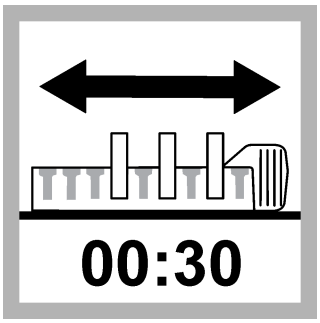


10. Fully rinse each cuvette with deionized water four times. Discard the contents into the waste container for disposal. Turn the cuvettes and rack upside down on a paper towel to dry. Carefully tap the cuvettes on the towel to remove the liquid.

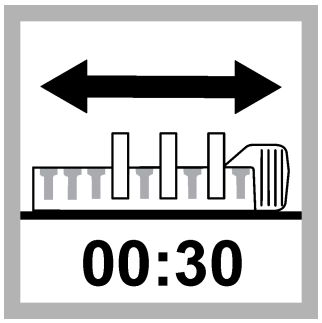


11. Start color development: Timing is very important. Make sure that the cuvettes are still in position in the rack. Use the pipet to add 0.5 mL of Color Developing Solution into each Antibody Cuvette. Use a new pipette tip for each cuvette.

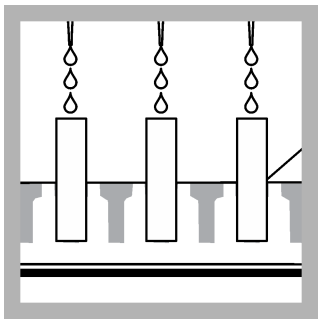
12. Set and start a timer for 5 minutes. A 5-minute reaction time starts.



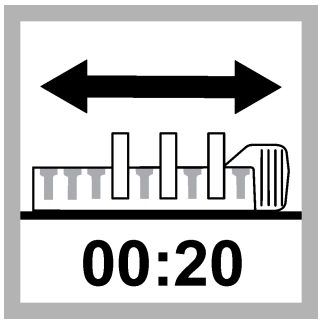
13. Immediately mix the cuvettes for 30 seconds.



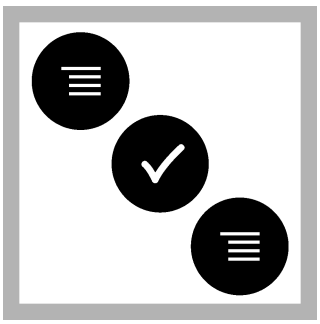
14. After 2.5 minutes, mix the cuvettes for 30 seconds. The solutions in some or all of the cuvettes change to blue.



15. When the timer expires, use a pipette to add 0.5 mL of Stop Solution into each cuvette with the same pipette tip. Consistent technique is very important. Add the solution in the same sequence that was used for the Color Developing Solution addition.

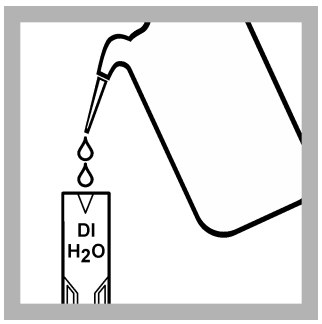


16. Slide the rack back and forth for 20 seconds. The blue solution color changes to yellow.

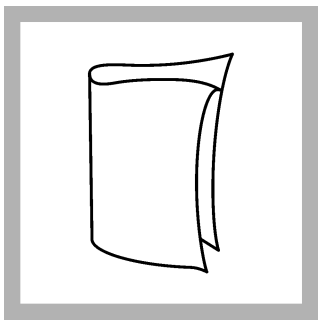


17. Set the instrument to channel 1 or channel 2. Refer to the instrument documentation.

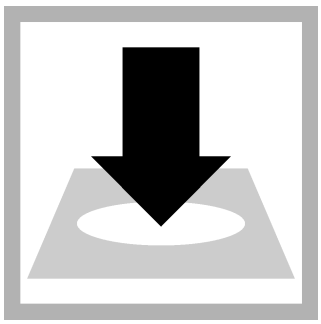
Make sure that the channel selected does not have a user-entered calibration.



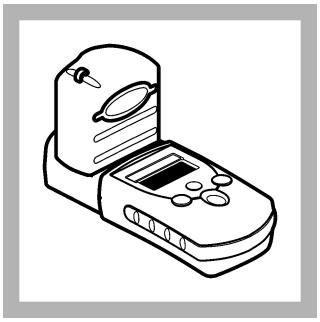
18. Put a mark on a zeroing cuvette to identify it as the blank. Fill the cuvette with deionized water.



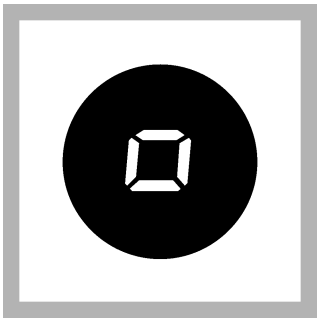
19. Clean all of the cuvettes.



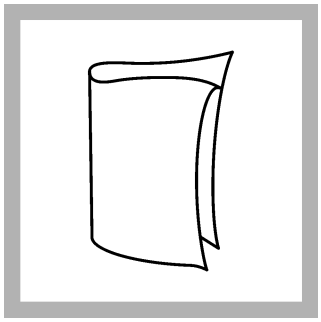
20. Insert the blank into the cell holder. Point the arrow mark on the cuvette toward the keypad.



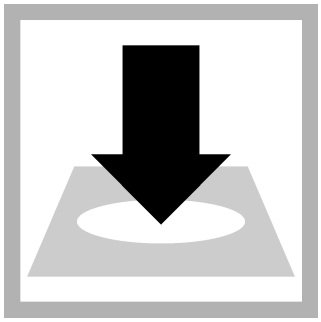
21. Install the instrument cap over the cell holder.



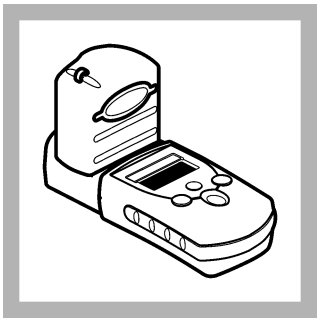
22. Push **ZERO**. The display shows “0.000”.



23. Clean the cuvette that contains the first calibrator.

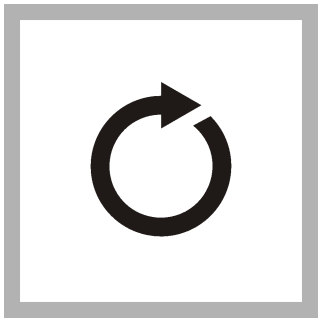


24. Insert the first calibrator into the cell holder. Point the arrow mark on the cuvette toward the keypad.



25. Install the instrument cap over the cell holder.

26. Push READ. Results show in absorbance units. Record the results.



27. Read the absorbance values of the remaining calibrators and samples. Record the results. Refer to Interpret and report the results on page 7.

PCB protocols

There are two PCB protocols in this procedure, one is for levels of 1 to 5 ppm and the other is for 10 to 50 ppm. Each test procedure uses a different volume of calibrator and sample extract. Refer to Table 1.

Table 1 PCB protocols

Range (as Arochlor 1248)	Volume of calibrator and sample extract
1 to 5 ppm	50 µL
10 to 50 ppm	10 µL

To do a test procedure across ranges, such as 1 and 50 ppm, do a test of the lower concentration first. If the result is positive, then do a test procedure at the higher level. If the result of the lower concentration is negative, the higher range test will be negative. It is not necessary to do a higher range test.

Use the same filtered extract if the cap is tightly closed between assays. Do not wait more than 30 minutes between the assays.

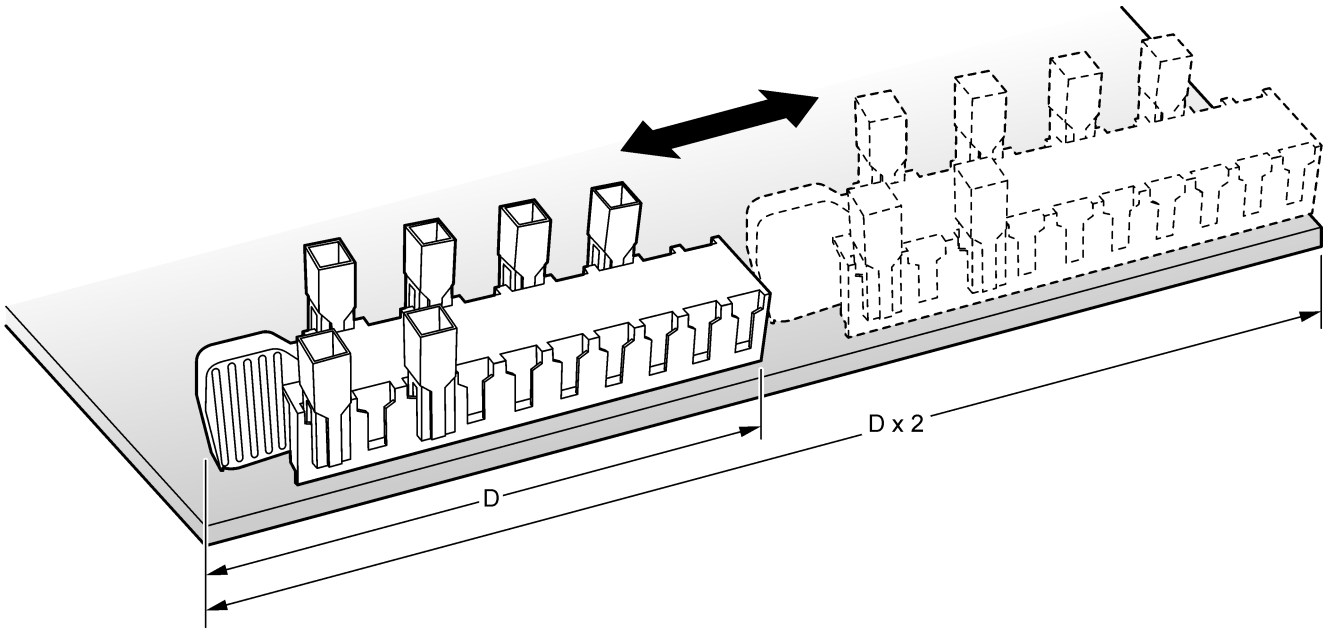
Use of the 1-cm MicroCuvette rack

Use the MicroCuvette rack to get accurate and precise results for the immunoassay procedure during the analysis of several samples at a time. Refer to Figure 1.

Insert the cuvettes in the rack—Use the MicroCuvette rack to securely hold cuvettes that are set in the rack. Before the procedure starts, identify each cuvette with a sample or a calibrator number. Correctly insert the cuvettes in the rack. Do not force the cuvettes into the rack because the sample can spill or the cuvettes can be difficult to remove. The cuvettes must stay in position if the rack is inverted and carefully tapped.

Mix the sample—Put the rack on a hard, flat surface that is at least twice the length of the rack. Refer to Figure 1. Hold one end of the rack, then vigorously slide the rack back and forth along its axis for 30 seconds. The rack moves through a distance equal to its own length in each direction.

Figure 1 MicroCuvette rack



Interpret and report the results

There is an inverse relationship between the concentration of PCB and the absorbance reading. In other words, the higher the reading, the lower the concentration of PCB. Refer to Table 2.

Table 2 Relative PCB concentration

If the sample absorbance reading is...	then the sample concentration is...
Smaller than the calibrator reading	Larger than the calibrator reading
Larger than the calibrator reading	Smaller than the calibrator reading

For example, if the readings are:

- 1 ppb PCB Calibrator: 0.775 Abs
- 5 ppb PCB Calibrator: 0.430 Abs
    - Sample 1: 0.200 Abs
    - Sample 2: 0.600 Abs
    - Sample 3: 0.900 Abs

The interpretation for a sample:

Sample 1: The sample concentration of PCB is larger than 1 and 5 ppm as Aroclor 1248.

Sample 2: The sample concentration of PCB is between 1 and 5 ppm as Aroclor 1248.

Sample 3: The sample concentration of PCB is smaller than 5 and 1 ppm as Aroclor 1248.

Reagent storage and handling

1. Always wear gloves and eyewear for protection.
2. For long-term storage, make sure that the reagents are not in direct sunlight. Keep the reagent set at 4 °C (39.2 °F) when not in use. Warm the reagents to room temperature before use.

3. When not in use, seal the foil pouch that contains the antibody cuvettes.
4. If the Stop Solution is in contact with the eyes, rinse fully for 15 minutes with cold water and get immediate medical help.

Sensitivity

The PCB immunoassay cannot identify specific Arochlors. The PCB immunoassay reacts with different compounds at different sensitivity levels. Refer to Table 3 and Table 4.

Table 3 Various PCBs in soil

Arcochlor Compound	Concentration (ppm) to give positive results at:			
	1 ppm	5 ppm	10 ppm	50 ppm
1248	1	5	10	50
1016	2	9	20	67
1242	1.2	6	14	50
1254	1.4	4.6	11	28
1260	1.1	4.9	11	38

Table 4 Compounds not detectable at 1000 ppm

Biphenyl	2,4,6-trichlorophenyl	1,3-dichlorobenzene
2,4-dichlorophenyl	pentachlorophenol	1,4-dichlorobenzene
2,4,5-trichlorphenyl	1,2-dichlorobenzene	1,2,4-trichlorobenzene

Summary of method

Immunoassay tests use antigen/antibody reactions to detect specific organic compounds in water and soil. The walls of plastic cuvettes are layered with antibodies that are specific for atrazine. The antibodies selectively remove PCBs from complex sample matrices. A prepared sample and a reagent with enzyme-conjugate molecules (analyte molecules attached to molecules of an enzyme) are added to the Antibody Cuvettes. During incubation, enzyme-conjugate molecules and PCBs compete for binding sites on the antibodies. Samples with higher levels of analyte have more antibody sites occupied by the analyte and fewer antibody sites occupied by the enzyme-conjugate molecules.

After incubation, the sample and unbound enzyme conjugate are rinsed from the cuvette and a color-development reagent is added. The enzyme in the conjugate catalyzes the development of color. Thus, there is an inverse relationship between color intensity and the amount of PCB in the sample. The resulting color is then compared with a calibrator to determine if the analyte concentration in the sample is larger or smaller than the threshold levels. The PCB concentration is inversely proportional to the color development—the lighter the color, the higher the PCB concentration. The test results are measured at 450 nm.

The method reacts with all PCBs and cannot identify samples with specific PCBs in a mixture.

Consumables and replacement items

Required reagents

Description	Quantity/Test	Unit	Item no.
Soil Extraction Kit	1	each	2775100
PCB Reagent Set	1	20 cuvettes	2773500
Water, deionized	varies	500 mL	27248

Required apparatus

Description	Quantity/Test	Unit	Item no.
Balance, portable, 300 g capacity	1	each	2796900
Caps, flip spout (for 500-mL deionized water bottle)	1	2/pkg	2581802
Graduated cylinder, 10-mL	1	each	108138
Marker, laboratory	1	each	2092000
Gloves, nitrile, medium	1	100/pkg	2550502
Pipet, TenSette®, 0.1–1.0 mL	1	each	1970001
Pipet Tips, for TenSette® Pipet, 0.1–1.0 mL	2	50/pkg	2185696
Pipet, Wiretrol®, 10–50 µL	1	each	2852200
Pipet, Wiretrol®, 50–1000 µL	1	each	2568905
Rack, for 1-cm Micro Cuvettes	1	each	4879900
Safety goggles, vented	1	each	2550700
Wipes, disposable	1	280/pkg	2097000
Soil scoop, 5-g, 4.25-cc	1	20/pkg	2657205
Timer, talking	1	each	2764400
Soil extraction refill kit, for 2775100, includes:	1	each	2775200
Dropper, LDPE, 0.5 and 1.0-mL	1	20/pkg	2124720
Filter and barrel assembly	1	20/pkg	2567620
Sodium sulfate, anhydrous	1	250 g	709929
Soil extraction solution	1	200 mL	2567729
Soil sample container	1	20/pkg	2592920
Weighing boat, 8.9-cm square	1	20/pkg	2179020
Spatula, disposable	1	2/pkg	2569320

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