ON-SITE QUALITY CONTROL/QUALITY ASSURANCE RECOMMENDATIONS
SDI EnSys® 12 TEST SYSTEM

Please read the following before proceeding with field testing.

PRIOR TO TESTING SAMPLES

Carefully follow the instructions in the User's Guide included with every test kit. This is the key element in obtaining accurate results. In addition, store your unused test kits at room temperature and do not use them past their expiration date (see label on each test kit).

INTERNAL TEST QC

Two standards are analyzed with each sample to provide internal test system quality control. With both standards inserted in the photometer, a valid test is indicated when the magnitude of the displayed number (irrespective of the sign, + or -) is less than the value given in the User's Guide. Test runs resulting in a greater number should be repeated to ensure valid conclusions.

QA/QC

The validity of field test results can be substantially enhanced by employing a modest, but effective QA/QC plan. SDI recommends that you structure your QA/QC plan with the elements detailed below. These have been developed based on the data quality principles established by the U.S. Environmental Protection Agency.

A. **Sample Documentation**
   1. Location, depth
   2. Time and date of collection and field analysis

B. **Field analysis documentation** - provide raw data, calibration, any calculations, and final results of fieldanalysis for all samples screened (including QC samples)

C. **Method calibration** - this is an integral part of SDI's EnSys immunoassay tests; a duplicate calibration is performed for each set of samples tested (see the instructions in the User's Guide)

D. **Method blank** - analyze methanol from the extraction jar.

E. **Site-specific matrix background field analysis** - collect and field analyze uncontaminated sample from site matrix to document matrix effect

F. **Duplicate sample field analysis** - field analyze duplicate sample to document method repeatability; at least one of every 20 samples should be analyzed in duplicate

G. **Confirmation of field analysis** - provide confirmation of the quantitation of the analyte via an EPA-approved method different from the field method on at least 10% of the samples; choose at least two representative samples testing above the action level; provide chain of custody and documentation such as gas chromatograms, mass spectra, etc.

H. **Performance evaluation sample field analysis (optional, but strongly recommended)** - field analyze performance evaluation sample daily to document method/operator performance

I. **Matrix spike field analysis (optional)** - field analyze matrix spike to document matrix effect on analyte measurement

FURTHER QUESTIONS?

SDI's technical support personnel are always prepared to discuss your quality needs to help you meet your data quality objectives. (1-800-544-8881)

REPEATER PIPET & MECHANICAL PIPET

READ ALL INSTRUCTIONS BEFORE PROCEEDING WITH THE TEST

HOW TO OPERATE THE REPEATER PIPET

To Set Or Adjust Volume

To determine the pipetting volume, the dial setting (1-5) is multiplied by the minimum pipetting volume of the tip.

To Assemble Pipet Tip

Slide filling lever down until it stops. Then raise the locking clamp and insert the tip until it clicks into position. Be sure the tip plunger is fully inserted into the barrel before lowering the locking clamp to affix the tip in place.

To Fill Tip

With tip mounted in position on pipet, immerse end of tip into solution. Slide filling lever upward slowly.

To Dispense Sample

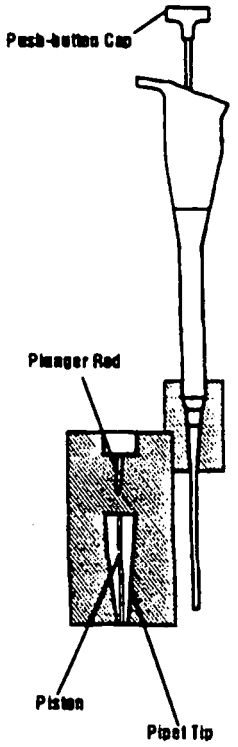
Check the volume selection dial to ensure pipetting volume. Place tip inside test tube so that tip touches the inner wall of tube. Completely depress the pipetting lever.

To Eject Tip

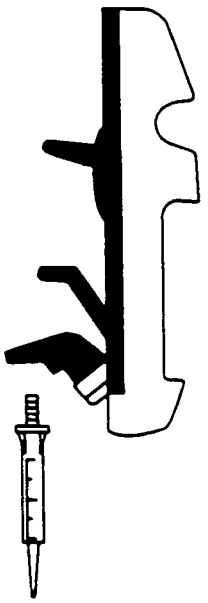
Empty tip of any remaining solution into appropriate container. Raise locking clamp upward, and remove the tip.

For additional information regarding operation and use of repeater, please refer to your Repeater pipet manual.

Mechanical Pipet



Repeater Pipet



HOW TO OPERATE THE MECHANICAL PIPET

To Set Or Adjust Volume

Remove push-button cap and use it to loosen volume lock screw. Turn lower part of push-button to adjust volume up or down. Meter should read "060". Tighten volume lock screw and replace push-button cap.

To Assemble Pipet Tip

Slide larger mounting end of pipet tip onto end of pipet. Holding tip in place, press push-button until plunger rod enters pipet tip. **Ensure no gap exists between piston and plunger rod.**

To Withdraw Sample

With tip mounted in position on pipet, press push-button to first stop and hold it.

Place tip at bottom of liquid sample and slowly release push-button to withdraw measured sample. Ensure that no bubbles exist in liquid portion of sample. If bubbles exist, dispense sample and re-withdraw sample.

To Dispense Sample

Place tip into dispensing vessel (immersing end of the tip if vessel contains liquid) and slowly press push-button to first stop. (Do not push to second stop or tip will eject).

Remove tip from vessel and release push-button.

To Eject Tip

Press push-button to second stop. Tip is ejected.

For additional information regarding operation and use of pipet, please refer to your pipet manual.

QUALITY CONTROL

READ ALL INSTRUCTIONS BEFORE PROCEEDING WITH THE TEST

System Description

Each SDI PCB Ensys® Soil 12 Test Case contains enough material to perform 12 test samples, each at two detection levels.

The SDI PCB EnSys Soil Test is divided into four phases. The instructions and notes should be reviewed before proceeding with each phase.

Hotline Assistance

If you need assistance or are missing necessary Test System materials, call toll free: 1-800-544-8881.

Validation and Warranty Information

Product claims are based on validation studies carried out under controlled conditions. Data has been collected in accordance with valid statistical methods and the product has undergone quality control tests of each manufactured lot.

PCB-free soil and soil containing 1 ppm or greater of PCBs were tested with the SDI EnSys PCB analytical method. The method correctly identified 95% of these samples. A sample that has developed less color than the standard is interpreted as positive. It contains PCBs. A sample that has developed more color than the standard is interpreted as negative. It contains less than 1 ppm PCBs.

SDI does not guarantee that the results with the PCB EnSys Soil 12 Test System will always agree with instrument-based analytical laboratory methods. All analytical methods, both field and laboratory, need to be subject to the appropriate quality control procedures.

How It Works

Standards. Samples, and color-change reagents are added to test tubes, coated with a chemical specific to PCBs. The concentration of PCBs in an unknown **Sample** is determined by comparing its color intensity with that of a **Standard**.

Note: PCB concentration is inversely proportional to color intensity: the lighter the color development of the sample, the higher the concentration of PCBs.

Quality Control

Standard precautions for maintaining quality control:

- Do not use reagents or test tubes from one Test System with reagents or test tubes from another Test System.
- Do not use the Test System after any portion has passed its expiration date.
- Do not attempt the test using more than 12 antibody coated tubes (two of which are Standards) at the same time.
- Do not exceed incubation periods prescribed by the specific steps.
- Always follow the procedure in this user's guide.
- Use EPA Method 8080 or Code of Federal Regulations Title 40, Part 136, Appendix A, Method 680 to confirm results.

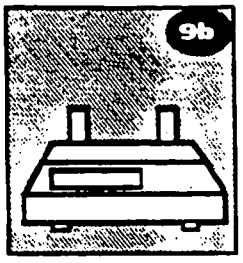
Storage and Handling Precautions

- Wear protective gloves and eyewear.
- Store kit at room temperature and out of direct sunlight (less than 80°F).
- Keep aluminized pouch (containing unused antibody coated tubes) sealed when not in use.
- If Stop Solution or liquid from the extraction jar comes into contact with eyes, wash thoroughly with cold water and seek immediate medical attention.
- Standard Solution contains PCBs. Test samples may contain PCBs. Handle with care.

PHASE 4 ANALYSIS OF RESULTS

READ ALL INSTRUCTIONS BEFORE PROCEEDING WITH THE TEST

SELECT STANDARD



9a. Wipe outside of all antibody coated tubes.

9b. Place both Standard tubes in photometer.

9c. Switch tubes until the photometer reading is negative or zero. Record reading.

If reading is greater than - 0.3 in magnitude (reading is less than or lower than - 0.3), results are outside QC limits. Retest the sample(s). (See QC Example)

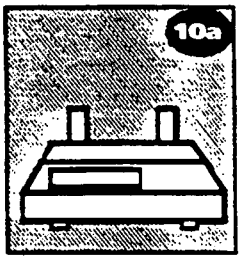
9d. Remove and discard tube in right well. The tube in the left well is the conservative standard.

QC Check Example:

If the photometer reading (with both Standard tubes) is **-0.34 or 0.34**, results are outside the QC limits, and the samples should be retested.

If the photometer reading (with both Standard tubes) is **-0.27 or 0.27**, results are within the QClimits, and testing may proceed.

MEASURE SAMPLE



10a. Place 1 ppm tube in right well of photometer and record reading.

If photometer reading is negative or zero, PCBs are present.

If photometer reading is positive, concentration of PCBs is less than 1 ppm.

10b. Place 10 ppm tube in right well of photometer and record reading.

If photometer reading is negative or zero, PCBs are present.

If photometer reading is positive, concentration of PCBs is less than 10 ppm.

PHASE 3 THE IMMUNOASSAY

READ ALL INSTRUCTIONS BEFORE PROCEEDING WITH THE TEST

COLOR DEVELOPMENT

8a. Set the Eppendorf Repeater on **2**, assemble the "A" tip and fill with Substrate A (TMB, yellow label).

8b. Dispense once (200 µL) into each antibody coated tube.

8c. Set timer for exactly 2 1/2 minutes.

8d. Assemble "B" tip, fill with Substrate B, start timer, and dispense once (200 µL H_2O_2, green label) into each antibody coated tube.

8e. Shake all tubes for 5 seconds. Solution will turn blue in some or all antibody coated tubes.

8f. Assemble "Stop" tip, fill with Stop Solution (red label), and stop reaction at end of 2 1/2 minutes by dispensing once (200 µL) into each antibody coated tube.

AROCLOR SENSITIVITY

Aroclor	Lowest Detection Level
1248	1.0 ppm
1254	0.5 ppm
1260	0.5 ppm
1242	2.0 ppm
1232	4.0 ppm
1016	4.0 ppm

51

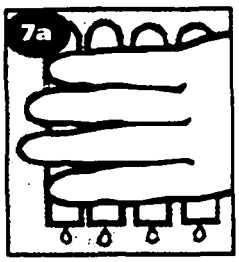
PHASE 3 THE IMMUNOASSAY

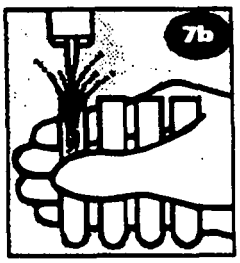
READ ALL INSTRUCTIONS BEFORE PROCEEDING WITH THE TEST

READ BEFORE PROCEEDING
WASH PROCEDURE

- An accurate test requires a vigorous wash accomplished by directing a strong stream into the antibody coated tubes.
- The wash solution is a harmless, dilute solution of detergent.

WASH



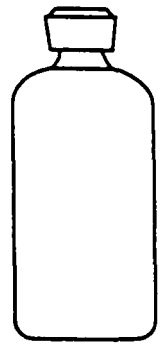


7a After the 5 minute incubation, empty antibody coated tubes into liquid waste container.

7b Wash antibody coated tubes by vigorously filling and emptying a total of 4 times.

7c Tap antibody coated tubes upside down on paper towels to remove excess liquid. Residual foam in the tubes will not interfere with test results.

Note: When running up to 12 antibody coated tubes, tubes can be washed in two groups - one group immediately following the other group.



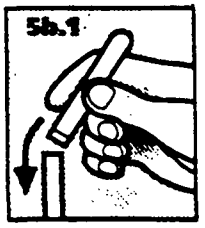
Wash bottle

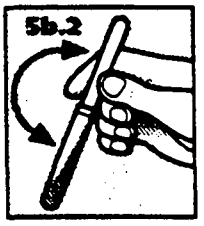
SD

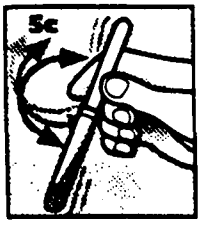
PHASE 3 THE IMMUNOASSAY

READ ALL INSTRUCTIONS BEFORE PROCEEDING WITH THE TEST

TRANSFER FROM DILUTION TUBE TO ANTIBODY COATED TUBE







5a. Set timer for 10 minutes

5b. Working left to right in the workstation:

1. Fit all antibody coated tubes firmly on top of all corresponding glass buffer tubes.

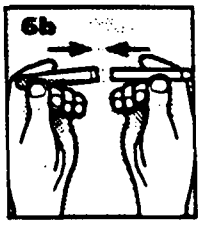
2. Start timer and immediately invert all connected tube pairs so that the liquid is poured into the antibody coated tubes. Return the tube pairs to the appropriate workstation row making sure the larger (antibody coated) tube is on the bottom.

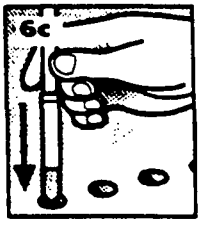
5c. Invert all tube pairs several more times making sure the pair is returned to the workstation with the larger (antibody coated) tube on the bottom.

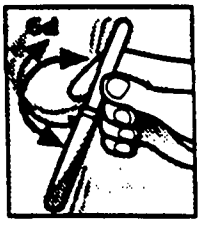
5d. Disconnect and discard the smaller (dilution) tubes. It is not important to worry about drops of liquid adhering to lips of tubes.

5e. Place conjugate tubes behind antibody tubes in workstation. Remove grey caps and discard.

TRANSFER OF CONJUGATE TO ANTIBODY COATED TUBES







AFTER 10 MINUTES, IMMEDIATELY:

6a. Set timer for 5 minutes.

6b. Working left to right in the workstation:

Start timer and immediately:

Dissolve the conjugate pellets by horizontally connecting the antibody coated tubes and conjugate tubes and **tilt the liquid up to pour it onto the conjugate.**

6c. Return the connected tubes to the appropriate workstation row making sure **the larger (antibody coated) tube is on the bottom. It is important that this step is completed within one minute for all tubes.**

6d. In order to adequately mix solution, **invert** all connected tube pairs **several more times** making sure that the pair is returned to t workstation with the larger (antibody coated) tube on the bo m.

6e. Disconnect and discard the conjugate tubes. It is not important to worry about the loss of liquid adhering to lip of tubes.

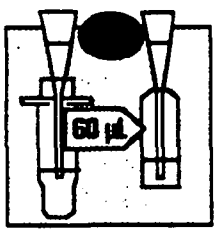
PHASE 2 SAMPLE & STANDARD PREPARATION

READ ALL INSTRUCTIONS BEFORE PROCEEDING WITH THE TEST

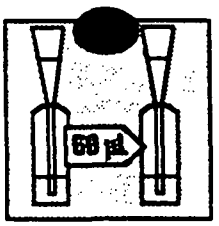
READ BEFORE PROCEEDING

- Label the plastic antibody coated tubes with a permament marking pen.
- When using the mechanical pipet always withdraw and dispense below the liquid level.
- "Shake tubes" means to thoroughly mix the contents with special care not to spill or splash.

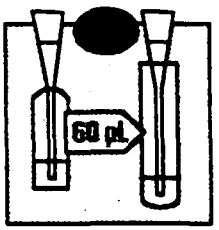
DILUTE SAMPLES AND STANDARDS

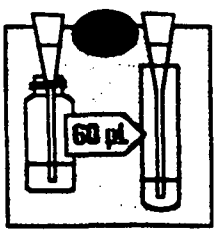


1 ppm



1 ppm 10 ppm





PCB Standard

4a. Set the Eppendorf Repeater on 4, assemble the "Buffer" tip and fill with Buffer.

4b. Dispense 1 mL of Buffer into each glass buffer tube.

4c. Open 1 and 10 ppm dilution ampules by slipping ampule cracker over top, and then breaking top at scored neck.

4d. Withdraw 60 µL of filtered sample using mechanical pipet and dispense below the liquid level in "1 ppm" dilution ampule. Gently shake ampule from side to side for 5 seconds to mix thoroughly.

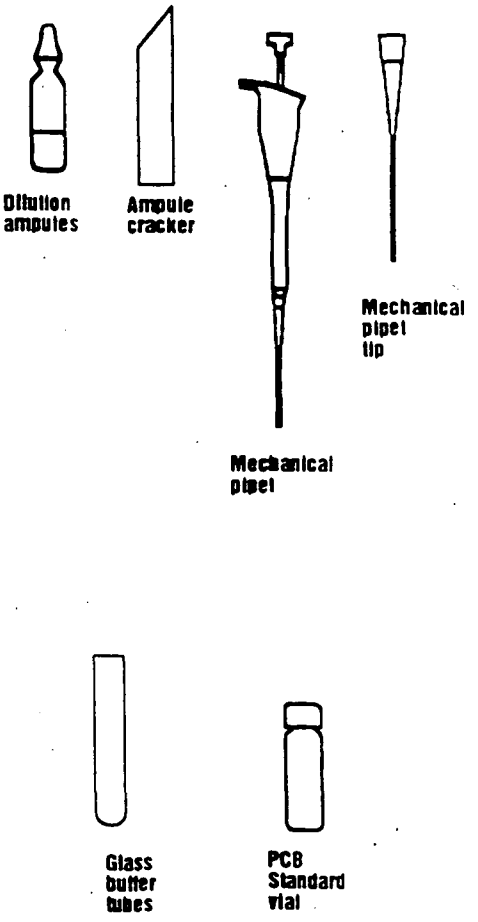
4e. Withdraw 60 µL from the "1 ppm" dilution ampule using mechanical pipet and dispense below the liquid level in "10 ppm" dilution ampule. Gently shake ampule from side to side for 5 seconds to mix thoroughly.

4f. Transfer 60 µL from each dilution ampule into glass buffer tubes. Always wipe tip after dispensing into buffer tube.

4g. Change pipet tip and repeat **4d - 4f** for each sample.

4h. Assemble new pipet tip on mechanical pipet and transfer 60 µL from Standard vial into two glass buffer tubes. Immediately replace cap on PCB Standard vial.

4i. Shake all glass buffer tubes for 5 seconds.



READ TO AVOID COSTLY MISTAKES

READ ALL INSTRUCTIONS BEFORE PROCEEDING WITH THE TEST

SAMPLE DILUTION PROGRAM

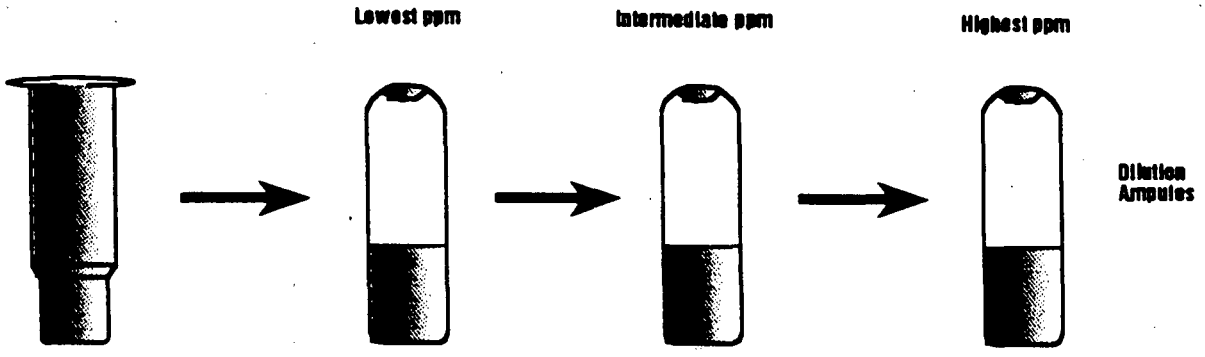
1. The sample dilution procedure on the next page is for standard detection levels. The following diagram represents the sample dilution procedure for all other detection levels.

2. Your kit may include extra dilution ampules to reach high detection levels.

3. **EVERY AMPULE PROVIDED MUST BE USED!**

If there are any questions concerning the dilution procedure please call SDI Technical Services before running the samples to help avoid costly mistakes. (1-800-544-8881)

EXAMPLE:



NOTE: Your Kit may include additional ampules in order to achieve your test levels. Always transfer filtered sample to the dilution ampule labeled with the lowest PPM level and then transfer from this ampule to the next higher level dilution tube.

PHASE 1 EXTRACTION & PREPARATION OF THE SAMPLE

READ ALL INSTRUCTIONS BEFORE PROCEEDING WITH THE TEST

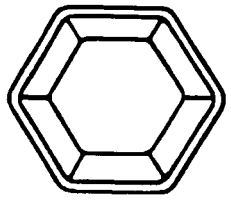
WEIGH SAMPLE

1a. Place unused weigh boat on pan balance.

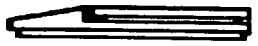
1b. Press ON/MEMORY button on pan balance. Balance will beep and display 0.0.

1c. Weigh out 10 ± 0.1 grams of soil.

1d. If balance turns off prior to completing weighing, use empty weigh boat to retare, then continue.



Weigh Boat



Pan balance

Wooden spatula

EXTRACT PCBS

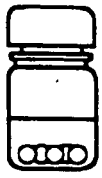
2a. Uncap extraction jar and place on a flat surface. Without contacting solvent puncture foil seal with ampule cracker or sharp object. Peel the remainder of the seal off extraction jar.

2b. Using wooden spatula, transfer 10 grams of soil from weigh boat into extraction jar.

2c. Recap extraction jar tightly and shake **vigorously** for one minute.

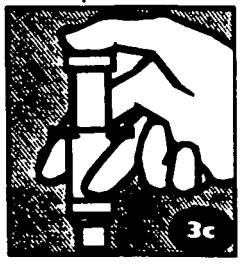
2d. Allow to settle for one minute.

Repeat steps 1a - 2c for each sample to be tested.



Extraction jar

FILTER SAMPLE



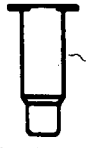
3a. Disassemble filtration plunger from filtration barrel.

3b. Insert bulb pipet into top (liquid) layer in extraction jar and draw up sample. Transfer **at least** ½ bulb capacity into filtration barrel. **Do not use more than one full bulb.**

3c. Press plunger firmly into barrel until adequate filtered sample is available (place on table and press if necessary).

Repeat steps **3a - 3c** for each sample to be tested.

Filtration plunger



Filtration barrel

Bulb pipet

TEST PREPARATION

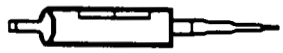
READ ALL INSTRUCTIONS BEFORE PROCEEDING WITH THE TEST

READ BEFORE PROCEEDING

- Do not attempt to run more than 12 tubes, two of which must be standards.
- Items that you will need that are not provided in the test kit include: a permanent marking pen, laboratory tissue (or paper towels), a liquid waste container, and disposable gloves.
- This User's Guide was written for analyzing soil samples for PCBs at 1 and 10 ppm. See table on page 10 for sensitivity to various Aroclors.

TEST PREPARATION

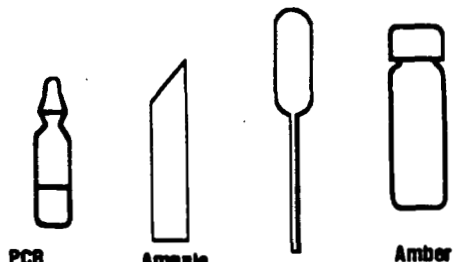
- Label all Eppendorf repeater tips. Tips can be reused for future analyses. Label the first 5mL tip "A", the second 5mL tip "B" and the third 5mL tip "Stop".
- Label the 12.5 mL tip "Buffer".



Eppendorf Tip

STANDARD PREPARATION

- Open PCB Standard ampule by slipping ampule cracker over top, and then breaking tip at scored neck. Transfer solution to empty vial with Bulb Pipets.
- Label vial with current date. Standard is usable for 2 weeks. Always cap tightly when finished using standard.



PCB Standard | Ampule cracker | Bulb pipet | Amber vial

TROUBLESHOOTING GUIDE

READ ALL INSTRUCTIONS BEFORE PROCEEDING WITH THE TEST

WASH STEP

Lack of vigorous washing may result in false positives or negatives depending on whether the wash error was committed on standard or sample tubes. Solution: Make sure to wash four times vigorously, washing the whole set of 12 tubes at once.

PIPET CALIBRATION

An out-of-calibration pipet may result in false positives or negatives depending on whether the amount is greater or less than the specified transfer volume. *Solution:* Check the calibration at least daily and after any extreme mechanical shock (such as dropping). An indication that the pipet is out of calibration is if the gold barrel is loose and will turn. (When set on 30 µl there should be about a 1/4 of an inch between the white plunger and the end of the clear pipet tip.)

AIR BUBBLES IN THE PIPET

The presence of air bubbles in the pipet tip when transferring extracts may result in false positives or negatives depending on whether the error was committed on standard or sample tubes. *Solution:* Quickly examine the pipet tip each time an aliquot is withdrawn and go back to the source and take another aliquot to displace the bubble if necessary.

MIXING

Lack of thorough mixing, when instructed, can cause inconsistent results. *Solution:* Observe the times in the instructions and mix with sufficient force to ensure that the liquid is homogenous.

TIMING

It is important to follow the timing steps in the instructions carefully. The incubation step in the antibody tubes can vary a bit without harm to the tests. The color development step timing is critical and should be no less than 2 minutes and no greater than 3 minutes.

WIPING THE TUBES

Wiping of the tubes should be done before they are read in the spectrophotometer because smudges and fingerprints on the tubes can give potentially false negative readings.

MIXING LOT #'S

Never mix lots! Each kit's components are matched for optimal performance and may give inaccurate results with the components from other kits with different lot #'s. Also, NEVER mix components from different types of kits (ex: Petro kit buffer can not be used with a PAH kit).

STORAGE AND OPERATING TEMPERATURES

Temperature requirements are very important and should be strictly adhered to. This test kit should be stored at less than 80 F/27°C and operated between 40 F - 4 C and 90 F/32 C.

SHELF-LIFE

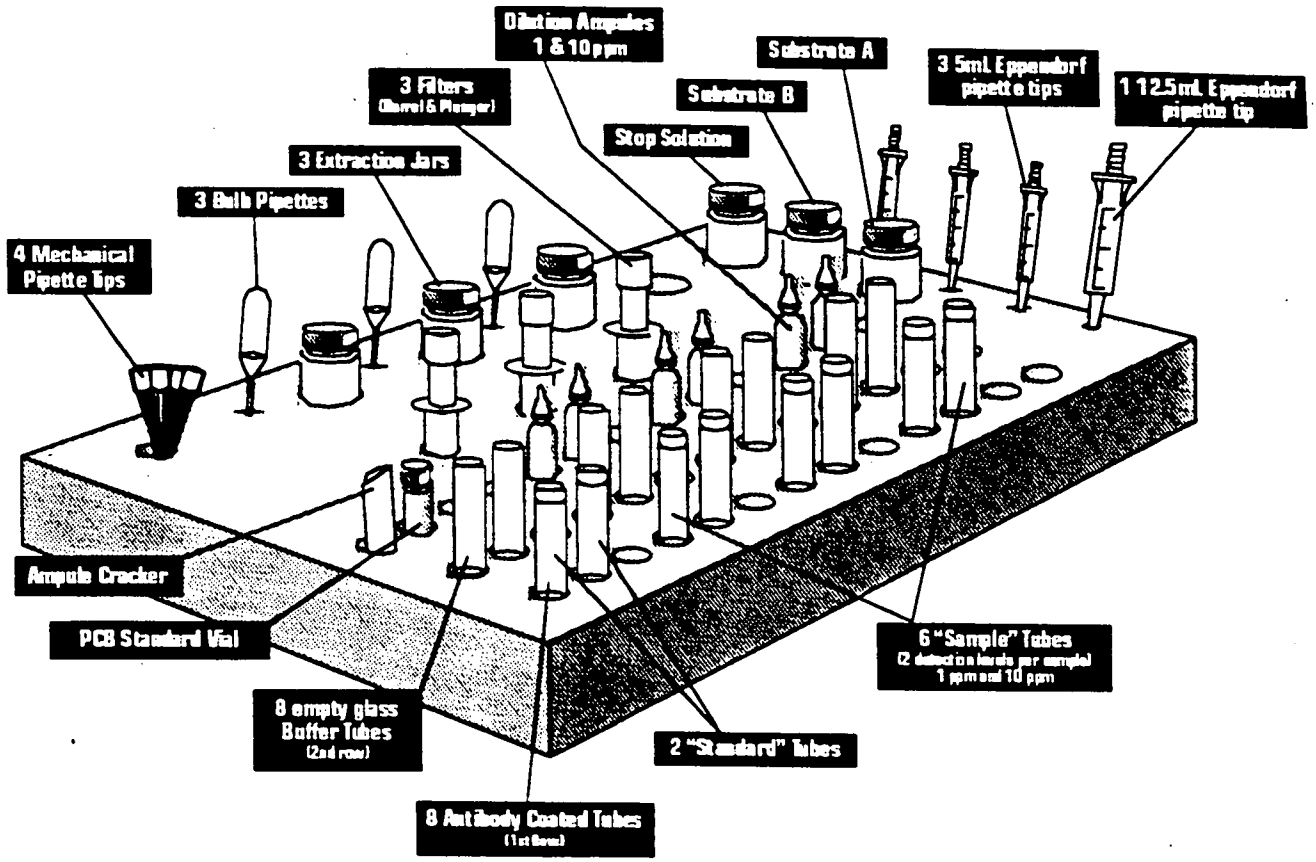
Each kit label contains the kit expiration date. To achieve accurate results, kits must be used prior to expiration.

WORKSTATION SET-UP

READ ALL INSTRUCTIONS BEFORE PROCEEDING WITH THE TEST

WORKSTATION SET-UP

- Mechanical pipet tips
- Filter barrels & plungers
- Ampule cracker
- Glass PCB buffer tubes
- Substrate A
- Eppendorf pipet tips
- Bulb pipets
- PCB standard
- Antibody coated tubes
- Substrate B
- Extraction jars
- 1 & 10 ppm dilution ampules
- Stop Solution



Workstation shows components for 3 samples tested at 2 levels

STRATEGIC DIAGNOSTICS INC.

PCB EnSys® 12T SOIL TEST SYSTEM

7020301

RAPID IMMUNOASSAY SCREEN

User's Guide

IMPORTANT NOTICE

This method correctly identifies 95% of samples that are PCB-free and those containing 1 ppm or greater of PCBs. A sample that develops less color than the standard is interpreted as positive. It contains PCBs. A sample that develops more color than the standard is interpreted as negative. It contains less than 1 ppm PCBs.

This test system should be used only under the supervision of a technically qualified individual who is capable of understanding any potential health and environmental risks of this product as identified in the product literature. The components must only be used for the analysis of soil samples for the presence of polychlorinated biphenyls. After use, the kits must be disposed of in accordance with applicable federal and local regulations.

DILUTION

EnviroGard - Use the filtered extract as "SAMPLE" in the User's Guide Procedure.

EnSys - If the instructions start with Phase 1 *Extraction and Preparation of the Sample* in the User's Guide, skip to Phase 2 *Sample and Standard Preparation* and follow the remainder of the assay procedure and data interpretation. If the instructions start at Phase 1 *Sample & Standard Preparation*, continue with the instructions, as written.

Note: Kit may contain additional ampules in order to achieve your test levels. Always transfer filtered sample to the dilution ampule labeled with the lowest PPM level and then transfer from this ampule to the next higher level dilution ampule.

RaPID Assay - Dilute the filtered extract into the appropriate Extract Diluent as described below or follow customized dilution procedure provided by the SDI Technical Services Department.

RaPID Assay Dilution

Contaminant	Extract Volume (µL)	Extract Diluent (mL)	Test Range (µg/100cm²)
PCB	25	25	5 to 100 (Aroclor 1254)

Assistance

For ordering or technical assistance contact:
Strategic Diagnostics Inc.
111 Pencader Drive
Newark, Delaware 19702-3322

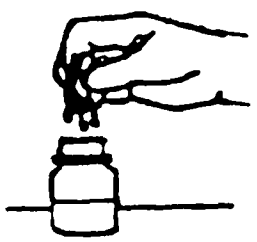
(800)544-8881
(302)456-6789
Fax(302)456-6782
www.sdix.com
techservice@sdix.com

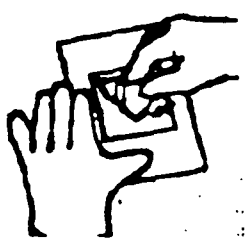
dl

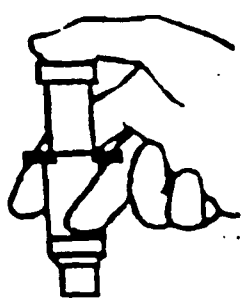
RaPID Assay Dilution

Contaminant	Extract Volume (uL)	Extract Diluent (mL)	Test Range (ppm)
PCB	25	25	0.5 to 10.0 (Aroclor 1254)
PAH	250	12.25	0.2 to 5.0 (Phenanthrene)
caPAH	200	9.8	0.01 to 0.5 (Benzo[a]pyrene
BTEX/TPH	500	4.5	0.9 to 30 (Total BTEX)
Pentachlorophenol	50	25	0.1 to 10.0 (PCP)
TNT	50	25	0.25 to 5.0 (TNT)
Cyclodienes	250	12.5	0.1 to 2.0 (Dieldrin)

Wipe Extraction Procedure







WIPE SAMPLE

1. Wearing the protective gloves provided, uncap the extraction jar.
2. Using an ampule cracker, open solvent ampule and pour the entire contents into the extraction jar.
3. Soak gauze pad in extraction jar containing solvent.
4. Remove gauze wipe from solvent and squeeze excess from pad back into extraction jar.
5. Hold clean template on surface to be wiped.
6. Wipe entire exposed area for 15-20 seconds. Wipe should be damp when finished.
7. Place wipe back into same extraction jar and cap tightly.
8. Remove and discard protective gloves.
9. Repeat steps 1-8 for each sample to be tested.

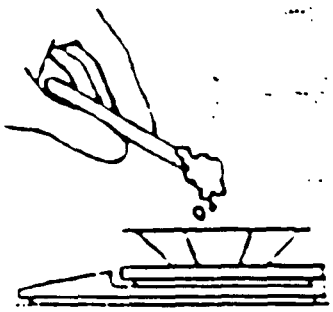
EXTRACTION

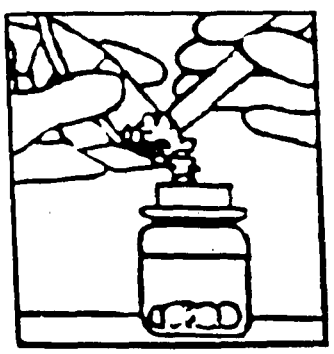
1. Shake each jar vigorously for one (1) minute.
2. Repeat step 1 for each sample to be tested.

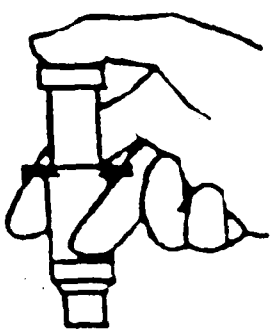
FILTRATION

1. Disassemble filtration plunger from filtration barrel.
2. Insert bulb pipet into top (liquid) layer in extraction jar and draw up sample. Transfer at least ½ bulb capacity into the filtration barrel. *Do not use more than one full bulb.*
3. Press plunger firmly into barrel until adequate filtered sample is available or unit snaps together. Place on flat surface.
4. Repeat steps 1-3 for each sample to be tested.

Soil Extraction Procedure







WEIGH SAMPLE

1. Place unused weigh canoe on pan balance.
2. Press ON/MEMORY button on pan balance. Balance will beep and display 0.0.
3. Weigh out 10 ± 0.1 grams of sample using the wooden spatula.
4. If balanced turns off prior to completing weighing, use empty weigh canoe to re-tare then continue.
5. Repeat steps 1-4 for each sample to be tested.

EXTRACTION

1. Uncap extraction jar and place on flat surface. Using a wooden spatula, transfer 10 grams of sample from the weigh boat into the extraction jar.
2. Open solvent ampule and pour the entire contents into the extraction jar.
3. Recap the extraction jar and shake vigorously for one (1) minute.
4. Allow to settle for one (1) minute or until a clear solvent layer is observed above the sample.
5. Repeat steps 1-4 for each sample to be tested.

FILTRATION

1. Insert bulb pipet into top (liquid) layer in extraction jar and draw up sample. Transfer at least ½ bulb capacity into the filtration barrel. *Do not use more than one full bulb.*
2. Press plunger firmly into barrel until adequate filtered sample is available or unit snaps together. Place on flat surface.
3. Repeat steps 1-3 for each sample to be tested.

DILUTION

EnviroGard - Use the filtered extract as "SAMPLE" in the User's Guide Procedure.

EnSys - If the instructions start with Phase 1 *Extraction and Preparation of the Sample* in the User's Guide, skip to Phase 2 *Sample and Standard Preparation* and follow the remainder of the assay procedure and data interpretation. If the instructions start at Phase 1 *Sample & Standard Preparation*, continue with the instructions, as written.

Note: Kit may contain additional ampules in order to achieve your test levels. Always transfer filtered sample to the dilution ampule labeled with the lowest PPM level and then transfer from this ampule to the next higher level dilution ampule.

RaPID Assay - Dilute the filtered extract into the appropriate Extract Diluent as described below or follow customized dilution procedure provided by the SDI Technical Services Department.

Sample Dilution

RaPID Assay Test Systems

- BTEX Extract Diluent: 12 vials containing 4.5 mL each (Item #I00654).
- PCB Extract Diluent: 12 vials containing 25 mL each. One (1) 25 µL disposable pipet with 12 tips (Item #I00538).
- Pentachlorophenol Extract Diluent: 12 vials containing 25 mL each. One (1) 50 µL disposable pipet with 12 tips (Item #I00479).
- PAH Extract Diluent: 12 vials containing 12.25 mL each (Item #I00623).
- Carcinogenic PAHs Extract Diluent: 12 vials containing 9.8 mL each (Item #I00798).
- TNT Extract Diluent: 12 vials containing 25 mL each. One (1) 50 µL disposable pipet with 12 tips (Item #I00745).
- Cyclodienes Extract Diluent: 12 vials containing 12.25 mL each (Item #I01024).

EnSys Soil Test Systems

- Dilution ampules provided dependent upon detection levels of interest.

EnviroGard Soil Test Systems

- No additional dilution materials required.

Reagent Storage and Stability

Store all reagents and components in a dry well ventilated area at 2-30°C.
Reagents may be used until the expiration date shown on the vials.
Consult local, state and federal regulations for proper disposal of all reagents.

Materials Not Provided

In addition to the materials provided, the following items will be necessary for the procedure:

- stopwatch or clock with second hand
- permanent marking pen
- protective gloves
- digital balance (available from SDI, Item # A00131)

Sample Information

This kit was validated for use with soil samples. Other types of sample matrices and solid wastes may require different procedures to efficiently extract compounds of interest. Contact SDI's Technical Services Department for application guidance.

Procedural Notes and Precautions

Do not use any reagent beyond its stated shelf life.

Continuous agitation of the soil sample in the presence of the extraction solution for the prescribed time is important for good extraction efficiency. Use of a timer or stopwatch to assure adequate shaking time is recommended.

Avoid contact of extraction solution (methanol) with skin and mucous membranes. If this reagent comes in contact with skin wash with water.

Limitations

The Sample Extraction Kit, when used in conjunction with the appropriate test kit, will provide screening results. Results may need to be confirmed by a non-immunological method.

Extraction Solution - 90% Methanol

per kit: 12 ampules containing 20 mL each for use with:

- EnviroGard Chlordane in Soil test Kit (Item # 7311000)
- EnviroGard Toxaphene in Soil test Kit (Item # 7420000)
- EnviroGard Lindane in Soil Test Kit (Item # 7630000)

Extraction Solution - 75% Methanol

per kit: 12 ampules containing 10 mL each for use with:

- BTEX RaPID Assay (Item # A00161 and A00162)

Extraction Solution - 75% Methanol with Sodium Hydroxide

per kit: 12 ampules containing 20 mL each for use with:

- Pentachlorophenol RaPID Assay (Item # A00110 and A00111)

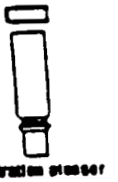
Extraction Solution - 100% Methanol with Surfactant

per kit: 12 ampules containing 10 mL each for use with:

- Cyclodienes RaPID Assay (Item # A00216)

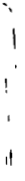
Description of Contents

Filtration barrel



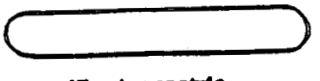
Filtration plunger

Weigh boat



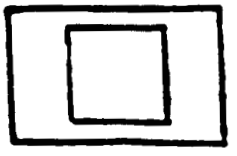
Sale sleeve

Extraction jar



Wooden spatula

Ampule Cracker



Template

Filter Modules

per kit: 12 filter plungers and barrels

Wooden Spatulas

per kit: 12 each (not in PCB Wipe Kit)

Weigh Canoes

per kit: 12 each (not in PCB Wipe Kit)

Disposable Transfer Pipettes

per kit : 12 each

Extraction Jars

per kit: 12 each with 3 bearings per jar (no bearings in PCB Wipe Kit)

Ampule Crackers

per kit: 3 each

Wipe Template

per kit: 12 each 10 cm by 10 cm plastic templates (PCB Wipe Kit only)

Gauze Wipes

per kit: 12 each (PCB Wipe Kit only)

Protective Gloves

per kit: 24 each (PCB Wipe Kit Only)

Strategic Diagnostics Inc.

Sample Extraction Kit User's Guide

Intended Use

For use in conjunction with the appropriate immunoassay test kit. Each Sample Extraction Kit Contains materials to process twelve (12) soil or wipe samples.

Principle

The reagents contained in the Sample Extraction Kit have been optimized for fast, efficient removal of compounds from soil or surfaces and convenient preparation of the sample for immunoassay testing at levels of interest to the investigator. The system allows for reliable, convenient and cost effective determinations at the field testing or remediation site.

Customer Support

If there are any questions regarding this procedure, please call the SDI Technical Services Department at 1-800-544-8881 or (302)-456-6789, before running samples to avoid costly mistakes.

Extraction Solvents

Extraction Solution - 100% Methanol

per kit: 12 ampules containing 20 mL each for use with:

- EnSys® PCB Soil and Wipe Test Systems (Item # 7020301, 7020601, 7021301 or 7021201)
- EnSys Petro Soil Test Systems (Item # 7042301 and 7043001)
- EnSys PAH Soil Test Systems (Item # 7061301 and 7060501)
- EnSys Penta Soil Test Systems (Item # 7000301)
- PCB RaPID Assay™ (Item # A00133 and A00134)
- PAH RaPID Assay (Item # A00156 and A00157)
- Carcinogenic PAHs RaPID Assay (Item # A00200 and A00201)
- TNT RaPID Assay (Item # A00186)

Extraction Solution - 100% Methanol

per kit: 12 ampules containing 10 mL each for use with:

- EnviroGard™ PCB in Soil and Wipe Test Kits (Item # 7020800, 7021600, 7021500 and 7021600)
- EnviroGard PAH in Soil Test Kit (Item # 7060600)
- EnviroGard Petroleum Hydrocarbons (BTEX) in Soil Test Kits (Item # 7004000)
- EnviroGard Petroleum Hydrocarbons (TPH) in Soil Test Kits (Item # 7042000)
- EnviroGard DDT in Soil Test Kits (Item # 7310000)

TABLE 11 (cont.)

ID	Matrix	GC Results Unspiked ppm	Immunoassay Result		Interp.
			Unspiked ppm	Spiked (5 ppm 1248)	
097	Waste tramp oil	<5	<5	≥5	
098	Waste transmission fluid	<5	<5	≥5	
099	Xylene	<5	≥5	≥5	FP
100	Not Recorded	<5	<5	NR	
No. of False Positive Results		6/99			
Rate		6.1%			
No. of False Negative Results				0/98	
Rate				0.0%	

[a] Trial 2 data

[b] NR = not run

TABLE 11 (cont.)

ID	Matrix	GC Results Unspiked ppm	Immunoassay Result		Interp.
			Unspiked ppm	Spiked (5 ppm 1248)	
064	Used n-butylacetate	<5	<5	≥5	
065	Used oil + freon	<5	<5	≥5	
066	Used oil + freon	<5	<5	≥5	
067	Used oils	<5	<5	≥5	
068	Used petroleum	<5	<5	≥5	
069	Used petroleum	<5	<5	≥5	
070	Used synthetic oil	<5	<5	≥5	
071	Varnish + stain	<5	<5	≥5	
072	Varsol	<5	<5	≥5	
073	Waste coolant + oil	<5	<5	≥5	
074	Waste ink + solvent	<5	<5	≥5	
075	Waste naphtha	<5	<5	≥5	
076	Waste oil	<5	<5	≥5	
077	Waste oil	<5	<5	≥5	
078	Waste oil	<5	<5	≥5	
079	Waste oil	<5	<5	≥5	
080	Waste oil	<5	<5	≥5	
081	Waste oil	<5	<5	≥5	
082	Waste oil	<5	<5	≥5	
083	Waste oil	<5	<5	≥5	
084	Waste oil	<5	<5	≥5	
085	Waste oil + kerosene	<5	<5	≥5	
086	Waste oil + gas	<5	<5	≥5	
087	Waste paint	<5	<5	≥5	
088	Waste paint	<5	<5	≥5	
089	Waste paint	<5	<5	≥5	
090	Waste paint	<5	<5	≥5	
091	Waste paint	<5	<5	≥5	
092	Waste paint	<5	<5	≥5	FP
093	Waste SC-49 solvent	<5	<5	≥5	
094	Waste solvent	<5	<5	≥5	
095	Waste stoddard	<5	<5	≥5	
096	Waste toner	<5	<5	≥5	

TABLE 11 (cont.)

ID	Matrix	GC Results Unspiked ppm	Immunoassay Result		Interp.
			Unspiked ppm	Spiked (5 ppm 1248)	
032	Oil	<5	<5	≥5	
033	Oil	<5	<5	≥5	
034	Oil + 1,1,1-trichloroethane	<5	<5	≥5	
035	Oil sludge	<5	≥5	≥5	FP
036	Oil + freon	<5	<5	≥5	
037	Oil + mineral spirits	<5	<5	≥5	
038	Oil + scum solution	<5	<5	≥5	
039	Oily water	<5	<5	≥5	
040	Paint thinner	<5	<5	≥5	
041	Paint thinner	<5	<5	≥5	
042	Paint thinner	<5	<5	≥5	
043	Paint waste	<5	<5	≥5	
044	Paint waste + thinner	<5	<5	≥5	
045	Perce + oil	<5	<5	≥5	
046	Petroleum distillates	<5	≥5	≥5	FP
047	Petroleum naphtha	<5	<5	≥5	
048	Pumping oil	<5	<5	≥5	
049	RAC-1 SKOS	<5	<5	≥5	
050	Sk oil	NR	<5	≥5	
051	Sk oil	<5	<5	≥5	
052	Smog Hog	<5	<5	≥5	
053	Toluene + hexane	<5	<5	≥5	
054	Toluene + stain	<5	<5	≥5	
055	1,1,1-Trichloroethane	<5	≥5	≥5	FP
056	1,1,1-Trichloroethane	<5	<5	≥5	
057	1,1,1-Trichloroethane	<5	<5	≥5	
058	1,1,1-Trichloroethane	<5	<5	≥5	
059	1,1,1-TCE + methanol	<5	<5	≥5	
060	Trichloroethylene	<5	<5	≥5	
061	Trichloroethylene	<5	<5	≥5	
062	Trichloroethylene	<5	<5	≥5	
063	Turpentine	<5	<5	≥5	

TABLE 11

Correlation of PCB RISc™ Liquid Waste Test and Method 8082 Results
Using Spiked and Unspiked Liquid Waste Field Samples

ID	Matrix	GC Results Unspiked ppm	Immunoassay Result		Interp.
			Unspiked ppm	Spiked (5 ppm 1248)	
001	Aromatic solvent	<5	<5	≥5	
002	Aviation gas	<5	<5	≥5	
003	Chiller oil	<5	<5	≥5	
004	Compressor oil	<5	<5	≥5	
005	Coolant + water	<5	<5	≥5	
006	Coolant oil	NR[b]	NR	≥5	
007	Coolant oil	NR	<5	≥5	
008	Cutting oil	<5	<5	≥5	
009	Cutting oil	<5	<5	≥5	
010	Degreaser still bottom	<5	<5	≥5	
011	Dope oil	<5	<5	≥5	
012	Draw Lube oil	<5	<5	≥5	
013	Fleet crankcase oil	<5	<5	≥5	
014	Floor sealer	<5	<5	≥5	
015	Fuel oil	<5	<5	≥5	
016	Hi-BTU oil	<5	<5	≥5	
017	Honing oil	<5	<5	≥5	
018	Hydraulic oil	<5	<5	≥5	
019	Hydraulic oil	<5	<5	≥5	
020	Hydraulic oil	<5	<5	≥5	
021	Machine oil	NR	<5	NR	
022	Mineral oil	<5	<5	≥5	
023	Mineral spirits	<5	<5	≥5	
024	Mineral spirits + ink	<5	≥5	≥5	FP
025	Mixed flammables	<5	<5	≥5	
026	Mixed solvents	<5	<5	≥5	
027	Naphtha	<5	<5	≥5	
028	Oil	<5	<5	≥5	
029	Oil	<5	<5	≥5	
030	Oil	<5	<5	≥5	
031	Oil	<5	<5	≥5	

TABLE 10 (cont.)

Sample ID	Sample Matrix	GC Results		IA Results	
		Aroclor	Conc. ppm	Test Results	Corr. with GC Results
407	Waste Oil	ND	ND	≥5	FP[d]
408	Waste Oil	ND	ND	<5	yes
409	Waste Oil	ND	ND	<5	yes
410	Waste Oil	ND	ND	<5	yes
411	Waste Oil	ND	ND	<5	yes
412	Waste Oil	ND	ND	<5	yes
413	Waste Oil	ND	ND	<5	yes
414	Waste Oil	ND	ND	<5	yes
415	Waste Oil	ND	ND	<5	yes
416	Waste Oil	PCB	50	>5	yes
417	Waste Oil	ND	ND	<5	yes
418	Waste Oil	ND	ND	<5	yes
419	Waste Oil	ND	ND	<5	yes
420	Waste Oil	ND	ND	<5	yes
421	Waste Oil	ND	ND	<5	yes
422	Waste Oil	ND	ND	<5	yes
423	Waste Oil	ND	ND	<5	yes
424	Waste Oil	ND	ND	<5	yes
425	Waste Oil	ND	ND	<5	yes
Number of False Positive Results				1/32	
Rate				3.1%	
Number of False Negative Results				0/18	
Rate				0.0%	

[a] Trial 1 data

[b] ND = Not Detectable

[c] PCB = Aroclor was not determined

[d] FP = False positive

TABLE 10

Comparison of PCB RISc™ Liquid Waste Test with Method 8082

Sample ID	Sample Matrix	GC Results		IA Results	
		Aroclor	Conc. ppm	Test Results	Corr. with GC Results
302	Condensate	ND[b]	ND	<5	yes
303	Condensate	ND	ND	<5	yes
304	Condensate	1242	25	≥5	yes
306	Condensate	1242	5	≥5	yes
307	Condensate	1242	<10	<5	yes
308	Condensate	1242	58	≥5	yes
310	Condensate	1254	25	≥5	yes
311	Condensate	1242	200	≥5	yes
331	Transformer Oil	1260	183	≥5	yes
380	Transformer Oil	PCB[c]	20	≥5	yes
381	Transformer Oil	PCB	38	≥5	yes
382	Transformer Oil	PCB	163	≥5	yes
383	Transformer Oil	PCB	176	≥5	yes
384	Transformer Oil	PCB	336	≥5	yes
385	Transformer Oil	PCB	6400	≥5	yes
387	Coolant	PCB	10	≥5	yes
388	2,4-D Rinse Water	1254	<10	<5	yes
389	Waste Solvent	1242	29	≥5	yes
390	Herbicide	ND	<2	<5	yes
391	Paint/Solvent	1254	9	≥5	yes
394	Waste Solvent	1242/1260	11/17	≥5	yes
395	Waste Solvent	1242/1260	2/2	<5	yes
396	Waste Oil	1260	323	≥5	yes
398	Chlor. Solvent	ND	<5	<5	yes
399	Paint	ND	<50	<5	yes
400	Pump Oil	ND	<50	<5	yes
401	Waste Solvent	ND	<35	<5	yes
402	Herbicide	ND	<50	<5	yes
403	Paint/Solvent	ND	<5	<5	yes
404	Printing Solvent	ND	<5	<5	yes
405	Waste Solvent	ND	<50	<5	yes

TABLE 8

Intraassay Precision of the PCB RISc™ Liquid Waste Test System

PCB 1248 Spike Concentration (ppm)	Signal %RSD (OD_{450nm}) N=44 (11 data sets)	Statistical Percentage of False Results Compared to Standards
0	6.4%	<0.02%
0.2	5.9%	4.1%
5	7.9%	1.4%

TABLE 9

Interassay Precision of the PCB RISc™ Liquid Waste Test System

PCB 1248 Spike Concentration (ppm)	Signal %RSD (OD_{450nm}) N=44 (11 data sets)
0	6.4%
0.2	8.3%
5	8.5%

TABLE 7(cont.)

Sample	D TECH™ (ppm)	GC (8082) (ppm)	Agreement[a] Y, FN, FP
W1A	4.0-15	9.1	Y
W2A	4.0-15	11	Y
W3A	1.0-4.0	2.8	Y
W4A	4.0-15	13	Y
W5A	>50	29	FP
W6A	>50	1200	Y
W7A	>50	57	Y
W8A	4.0-15	18	Y
W9A	1.0-4.0	1.3	Y
W10A	0.5-1.0	0.44	Y
W11A	15-50	120	FN
W12A	15-50	48	Y
W13A	15-50	19	Y
W14A	4.0-15	2.7	Y
W15A	1.0-4.0	1.3	Y
W16A	1.0-4.0	0.3	FP
W17A	4.0-15	1.4	FP
W18A	1.0-4.0	2.2	Y
W19A	4.0-15	8.2	Y
W20A	>50	9.3	FP
W21A	>50	110	Y
W22A	1.0-4.0	0.6	Y
W23A	>50	46	Y

[a] Y=Yes, FN=False Negative, FP=False Positive

TABLE 7(cont.)

Sample	D TECH™ (ppm)	GC (8082) (ppm)	Agreement[a] Y, FN, FP
G1	15-50	18	Y
G2	4.0-15	11	Y
G3	1.0-4.0	3.4	Y
G4	15-50	6.5	FP
G5	<0.5	0.01	Y
G6	1.0-4.0	1.4	Y
G7	1.0-4.0	0.30	FP
G8	15-50	7.5	FP
G9	4.0-15	33	FN
G10	15-50	8	FP
G11	4.0-15	11	Y
G12	4.0-15	24	FN
G13	4.0-15	4.3	Y
G14	0.5-1.0	1.3	Y
G15	<0.5	0.01	Y
G16	1.0-4.0	3.2	Y
G17	4.0-15	18	Y
G18	4.0-15	4.6	Y
G19	1.0-4.0	2.3	Y
G20	>50	37	FP

[a] Y=Yes, FN=False Negative, FP=False Positive

TABLE 7 (cont.)

Sample	D TECH™ (ppm)	GC (8082) (ppm)	Agreement[a] Y, FN, FP
J25	0.5-1.0	0.12	FP
J26	<0.5	0.01	Y
J27	1.0-4.0	1.8	Y
J28	<0.5	0.18	Y
J29	0.5-1.0	0.54	Y
J30	>50	21	FP
J31	4.0-15	13	Y
J32	0.5-1.0	0.72	Y
J33	0.5-1.0	0.32	Y
J34	1.0-4.0	0.36	FP
J35	1.0-4.0	0.26	FP
J36	>50	70	Y
J37	<0.5	0.12	Y
J38	0.5-1.0	0.81	Y
J39	0.5-1.0	0.33	Y
J40	<0.5	0.19	Y
J41	<0.5	0.01	Y
J42	1.0-4.0	0.43	FP
J43	1.0-4.0	0.31	FP
J44	15-50	503.4	FN
J45	15-50	5.6	FP
J46	<0.5	0.02	Y
J47	<0.5	0.22	Y

[a] Y=Yes, FN=False Negative, FP=False Positive

TABLE 7

Comparison of D TECH™ PCB Test Kit with GC

Sample	D TECH™ (ppm)	GC (8082) (ppm)	Agreement[a] Y, FN, FP
J1	4.0-15	5.0	Y
J2	>50	147	Y
J3	15-50	54	Y
J5	15-50	160	FN
J6	>50	1200	Y
J7	4.0-15	12	Y
J8	4.0-15	28	FN
J9	>50	463	Y
J10	>50	1760	Y
J11	>50	28	FP
J12	15-50	17	Y
J13	>50	1300	Y
J14	>50	186	Y
J15	15-50	31	Y
J16	15-50	36	Y
J17	>50	31	FP
J18	>50	130	Y
J19	>50	1310	Y
J20	>50	2620	Y
J21	>50	111000	Y
J22	1.0-4.0	0.01	FP
J23	1.0-4.0	0.60	Y
J24	<0.5	0.10	Y

[a] Y=Yes, FN=False Negative, FP=False Positive

TABLE 6

EnviroGard™ PCB Kit Field Performance Summary

Specificity:	[1-(Reported Positives/True Negatives)] = [1-(37/109)] = 66%
Note 1:	8 of the 37 reported positive samples had PCB contamination levels between 5 and 10 mg/kg. Soils in this range should test "positive" because the assay calibrator is 5 mg/kg Aroclor 1248. A positive assay bias is necessary to prevent false negative results. Eliminating these samples from the calculations produces a Specificity of: [1-(Reported Positives/True Negatives)] = [1-(29/101)] = 71%
Note 2:	The distribution of false positives is not random ($p < 0.05$), with a clustering at the beginning of the sample set. This observation was included in *Developers Comments* which were added to the final draft of the Technical Evaluation Report. One explanation for the higher frequency of false positive results at the beginning is inexperience of the operator with the method. If the first 20 samples are eliminated from the Specificity analysis, the following result is obtained: [1-(Reported Positives/True Negatives)] = [1-(20/86)] = 77% In the SITE demonstration, the PCB Immunoassay had a 77% positive predictive value.
Sensitivity:	[1-(Reported Negatives/True Positives)] = [1-(0/31)] = 100% In the SITE demonstration, the PCB Immunoassay had a 100% negative predictive value.

TABLE 5 (cont.)

Sample Number	Screening Result[c,d]	GC Result[c] [8082]	Agreement[e] Y, FN, FP
100	>10	177	Y
100D	>10	167	Y
101	>10	1.21	FP
102	>10	293	Y
102D	>10	177	Y
103	>10	40.3	Y
104	>10	7.66	FP[g]
105	<10	0.21	Y
106	<10	2.50	Y
107	>10	14.1	Y
108	>10	3.84	FP
109	<10	ND[f]	Y
109D	<10	ND[f]	Y
110	<10	ND[f]	Y
111	<10	ND[f]	Y
112	>10	315	Y
113	>10	14.9	Y
114	>10	66.3	Y

[c] mg/kg (ppm)

[d] Screening Calibrator is 5 mg/kg Aroclor 1248

[e] Y=Yes, FN=False Negative, FP=False Positive

[f] ND = Not Detectable

[g] Expected Result Based on Calibrator Concentration

TABLE 5 (cont.)

Sample Number	Screening Result[c,d]	GC Result[c] [8082]	Agreement[e] Y, FN, FP
084D	>10	1.08	FP
085	>10	428	Y
085D	>10	465	Y
086	<10	1.42	Y
086D	<10	1.25	Y
087	<10	0.08	Y
087D	<10	ND[f]	Y
088	>10	2.70	FP
088D	>10	1.77	FP
089	>10	45.0	Y
090	<10	1.01	Y
090D	<10	1.40	Y
091	>10	1630	Y
091D	>10	1704	Y
092	<10	1.21	Y
092D	<10	ND[f]	Y
093	<10	0.30	Y
094	<10	0.36	Y
095	>10	17.5	Y
095D	>10	31.2	Y
096	<10	0.06	Y
097	<10	1.23	Y
097D	<10	0.29	Y
098	>10	1.17	FP
098D	>10	0.83	FP
099	<10	ND[f]	Y

TABLE 5 (cont.)

Sample Number	Screening Result[c,d]	GC Result[c] [8082]	Agreement[e] Y, FN, FP
064	>10	19.0	Y
065	>10	3.08	FP
066	<10	1.98	Y
067	<10	0.08	Y
068	<10	0.50	Y
069	<10	ND[f]	Y
069D	<10	ND[f]	Y
070	<10	ND[f]	Y
071	<10	0.05	Y
071D	<10	ND[f]	Y
072	<10	0.04	Y
073	>10	15.8	Y
074	>10	13.3	Y
075	>10	23.0	Y
076	>10	46.7	Y
077	<10	ND[f]	Y
078	>10	2.27	FP
079	>10	42.8	Y
080	<10	3.77	Y
081	<10	0.69	Y
081D	<10	0.45	Y
082	<10	ND[f]	Y
082D	<10	0.24	Y
083	<10	0.48	Y
083D	<10	0.41	Y
084	>10	1.16	FP

TABLE 5 (cont.)

Sample Number	Screening Result[c,d]	GC Result[c] [8082]	Agreement[e] Y, FN, FP
044	<10	0.59	Y
045	<10	ND[f]	Y
046	<10	ND[f]	Y
046D	<10	ND[f]	Y
047	<10	0.09	Y
047D	<10	0.10	Y
048	<10	ND[d]	Y
049	<10	ND[d]	Y
050	>10	3.60	FP
050D	>10	4.41	FP
051	<10	ND[f]	Y
052	>10	4.21	FP
053	<10	0.96	Y
054	<10	0.52	Y
055	<10	2.40	Y
056	<10	0.51	Y
057	<10	ND[f]	Y
058	<10	0.69	Y
059	>10	7.86	FP[g]
060	>10	0.62	FP
060D	<10	0.58	Y
061	>10	580	Y
062	>10	2.35	FP
063	<10	0.09	Y
063D	<10	0.15	Y

TABLE 5 (cont.)

Sample Number	Screening Result[c,d]	GC Result[c] [8082]	Agreement[e] Y, FN, FP
024D	<10	0.05	Y
025	>10	11.7	Y
026	<10	1.96	Y
027	<10	0.06	Y
028	<10	0.22	Y
028D	<10	0.22	Y
029	<10	0.23	Y
030	<10	1.15	Y
031	<10	0.26	Y
032	>10	47.6	Y
033	>10	6.00	FP[g]
034	>10	34.0	Y
035	<10	ND[f]	Y
035D	<10	ND[f]	Y
036	>10	816	Y
037	<10	0.06	Y
037D	<10	0.04	Y
038	>10	1030	Y
039	<10	0.68	Y
040	>10	4.25	FP
041	<10	ND[f]	Y
042	>10	0.52	FP
042D	>10	0.47	FP
043	>10	1.69	FP
043D	>10	1.74	FP

TABLE 5

Comparison of EnviroGard™ PCB Kit with GC

Sample Number	Screening Result[c,d]	GC Result[c] [8082]	Agreement[e] Y, FN, FP
001	>10	5.98	FP[g]
002	>10	1.27	FP
003	<10	0.11	Y
004	>10	6.71	FP[g]
005	>10	1.37	FP
006	>10	0.68	FP
007	>10	0.55	FP
008	>10	2.00	FP
009	>10	1.30	FP
010	>10	0.17	FP
011	>10	1.15	FP
012	<10	ND[f]	Y
013	<10	1.13	Y
014	<10	0.18	Y
015	>10	9.13	FP[g]
015	>10	9.84	FP[g]
016	>10	2110	Y
017	>10	2.55	FP
018	>10	45.4	Y
019	>10	6.70	FP[g]
020	<10	0.07	Y
021	<10	0.06	Y
022	<10	0.54	Y
022	<10	0.72	Y
023	>10	20.8	Y
024	<10	0.06	Y

TABLE 4 (cont.)

Sample ID	Screening Test Results	GC Results (Method 8082)	Agreement[a] Y, FP, FN
247	5-50	18 ppm	Y
148	>50	18-34 ppm	FP
205	5-50	20 ppm	Y
162	5-50	20.4 ppm	Y
175	5-50	21.2 ppm	Y
176	5-50	21.6 ppm	Y
197	5-50	32 ppm	Y
243	5-50	32 ppm	Y
252	5-50	32 ppm	Y
178	5-50	43.7 ppm	Y
201	5-50	43 ppm	Y
254	5-50, >50	56 ppm	Y
238	>50	46-60 ppm	Y
248	5-50	44-60 ppm	Y
250	>50	68 ppm	Y
242	5-50	30-69 ppm	Y
256	>50	73 ppm	Y
249	>50	96 ppm	Y
245	>50	102 ppm	Y
241	5-50	154 ppm	FN
246	>50	154 ppm	Y
261	>50	204 ppm	Y
240	>50	251 ppm	Y
267	>50	339 ppm	Y
239	>50	460 ppm	Y
104	>50	200-3772 ppm	Y
108	>50	531-1450 ppm	Y

[a] Y=Yes, FN=False Negative, FP=False Positive

TABLE 4

Comparison of PCB RISc™ Test Kit with GC

Sample ID	Screening Test Results	GC Results (Method 8082)	Agreement[a] Y, FP, FN
101	<5 ppm	<0.5 ppm	Y
284	<5 ppm	<0.5 ppm	Y
292	<5 ppm	<0.5 ppm	Y
199	<5 ppm	0.5 ppm	Y
264	<5 ppm	1 ppm	Y
257	<5 ppm	1.8 ppm	Y
259	<5 ppm	4 ppm	Y
265	<5 ppm	4.5 ppm	Y
200	<5 ppm	5 ppm	Y
170	5-50	5.8 ppm	Y
198	<5 ppm	2.2-5.8 ppm	Y
172	5-50	6.2 ppm	Y
169	5-50	7.2 ppm	Y
171	5-50	7.2 ppm	Y
202	<5 ppm, 5-50	1.3-7.2 ppm	Y
163	5-50	8.7 ppm	Y
165	5-50	9 ppm	Y
168	5-50	9 ppm	Y
166	5-50	9.3 ppm	Y
164	5-50	11.9 ppm	Y
204	5-50	12.8 ppm	Y
253	5-50	13 ppm	Y
203	5-50	13.5 ppm	Y
258	5-50	15 ppm	Y
106	5-50	15-19 ppm	Y
161	5-50	15.3 ppm	Y
167	5-50	16.2 ppm	Y

TABLE 2

ESTIMATED ERROR RATES FOR 5 PPM DILUTION[a]

True Value (ppm)	0	1	2	3	4	5	6	7	8	9	10	20
Estimated Rate of False Positives (%)	1.3	13.2	39.2	65.2	82.3	.	.	.	.	.	.	.
Estimated Rate of False Negatives (%)	.	.	.	.	.	8.5	4.1	2.0	1.0	0.5	0.3	<0.1

TABLE 3

ESTIMATED ERROR RATES FOR 50 PPM DILUTION[a]

True Value (ppm)	0	5	10	15	20	30	40	50	60	70	80	100
Estimated Rate of False Positives (%)	1.0	7.9	24.5	46.0	65.0	87.3	95.6	.	.	.	.	.
Estimated Rate of False Negatives (%)	.	.	.	.	.	.	.	1.7	0.7	0.3	0.2	<0.1

(a) PCB RISc™ test kit

TABLE 1D

CROSS REACTIVITY OF DIFFERENT COMPOUNDS[a]

Compound	% Cross-Reactivity	Soil Equivalent Concentration (ppm) Required to Yield a Positive Result
1-Chloronaphthalene	0.05%	10,000
1,2,4-Trichlorobenzene	0.05%	10,000
2,4-Dichloro-1-naphthol	<0.20%	>10,000
Bifenox	<0.10%	500
Pentachlorobenzene	<0.05%	>10,000
2,5-Dichloroaniline	<0.05%	>10,000
Hexachlorobenzene	<0.05%	>10,000
Dichlorofenthion	0.05%	10,000
Tetradifon	<0.10%	125

(a) PCB RISc™ Liquid Waste Test System, Ensys, Inc.

TABLE 1C

CROSS REACTIVITY OF DIFFERENT COMPOUNDS[a]

Compound	MDL[b] (ppm)	IC 50[c] (ppm)	% Cross Reactivity[d]
Aroclor 1016	5.7	83	12
Aroclor 1221	25.5	300	3
Aroclor 1232	9.0	105	10
Aroclor 1242	1.5	31	32
Aroclor 1248	0.8	24	42
Aroclor 1254	0.5	10	100
Aroclor 1260	0.75	10	100
Aroclor 1262	0.5	10	100
Aroclor 1268	3.8	40	25

METHOD: The compounds listed were assayed at various concentrations and compared against an inhibition curve generated using Aroclor 1254. The concentration of the compound required to elicit a positive response at the MDL as well as the concentration required to yield 50% inhibition compared to the standard curve were determined.

[a] D TECH™ PCB test kit

[b] The Minimum Detection Limit (MDL) is defined as the lowest concentration of compound that yields a positive test result.

[c] The IC_{50} is defined as the concentration of compound required to produce a test response equivalent to 50% of the maximum response.

[d] % Cross reactivity is determined by dividing the equivalent Aroclor 1254 concentration by the actual compound concentration at IC_{50}.

TABLE 1B

CROSS REACTIVITY OF DIFFERENT COMPOUNDS[a]

Compound	% Cross Reactivity
Aroclor 1248	100
Aroclor 1242	50
Aroclor 1254	90
Aroclor 1260	50
1,2-, 1,3-, & 1,4-Dichlorobenzene	<0.5
1,2,4-Trichlorobenzene	<0.5
biphenyl	<0.5
2,4-dichlorophenol	<0.5
2,5-dichlorophenol	<0.5
2,4,5-trichlorophenol	<0.5
2,4,6-trichlorophenol	<0.5
Pentachlorophenol	<0.5

[a] EnviroGard PCB Test Kits (Millipore Corporation)

TABLE 1A

CROSS REACTIVITY OF DIFFERENT COMPOUNDS[a]

Compound	Soil Equivalent Concentration (ppm) Required to Yield a Positive Result
1-Chloronaphthalene	10,000
1,2,4-Trichlorobenzene	10,000
2,4-Dichlorophenyl-benzenesulfonate	1,000
2,4-Dichloro-1-naphthol	>10,000
Bifenox	500
Diesel fuel	>10,000
Pentachlorobenzene	>10,000
2,5-Dichloroaniline	>10,000
Hexachlorobenzene	>10,000
Gasoline	>10,000
Dichlorofenthion	10,000
Tetradifon	125

(a) PCB RISc™ test kit, Ensys, Inc. publication

3. R.W. Counts, R.R. Smith, J.H. Stewart, and R.A. Jenkins, "Evaluation of PCB Rapid Immunoassay Screen Test System", Oak Ridge National Laboratory, Oak Ridge, TN 37831, April 1992, unpublished

4. EnviroGard PCB in Soil Package Insert, Millipore Corp. 2/93.

5. Technical Evaluation Report on the Demonstration of PCB Field Screening Technologies, SITE Program. EPA Contract Number 68-CO-0047. 2/93.

6. D TECH™ PCB Users Guide , SDI/Em Sciences

7. Melby, J.M., B.S. Finlin, A.B. McQuillin, H.G. Rovira, J.W. Stave, "PCB Analysis by Enzyme Immunoassay", Strategic Diagnostics Incorporated, Newark, Delaware, 1993

8. Melby, J.M., B.S. Finlin, A.B. McQuillin, H.G. Rovira, "Competitive Enzyme Immunoassay (EIA) Field Screening System for the Detection of PCB", 1993 PCB Seminar, EPRI, September 1993

9. T.A. Bellar and J.J Lichtenberg. The Analysis of Polychloringated Biphenyls in Transformer Fluid and Waste Oils. U.S. EPA Research and Development, EPA/EMSL-ORD, Cincinnati, Ohio (June 24, 1980). Revised June 1981, EPA 600/4-81-045.

10. PCB RISc™ Liquid Waste Test System, User's Guide, EnSys Environmental Products, Inc.

9.0 METHOD PERFORMANCE

9.1 A study was conducted with the PCB RISc™ test kit using fourteen standard soils and three soil samples whose PCB concentration had been established by Method 8082. Replicates were performed on seven of the standard soils and on one of the soil samples for a total of 25 separate analyses. Each of two different analysts ran the 25 analyses. Results indicated that "<" assignments are accurate with almost 99% certainty at the 50 ppm level while ">" assignments can be up to about 96% inaccurate as the sample concentration approaches that of the testing level. Corresponding certainties at the 5 ppm level are 92% and 82% respectively. Tables 2 and 3 summarize these results.

9.2 Table 4 presents method precision data generated using the PCB RISc™ test kit, comparing immunoassay test results with results obtained using Method 8082.

9.3 Method precision was determined with the EnviroGard PCB in Soil test kit by assaying 4 different soils (previously determined to contain 5.04, 9.78, 11.8, and 25.1 mg/kg by Method 8082), at three different sites, using three different lots of assay kits, three times a day for 9 days. A total of 81 analyses were performed for each soil. Error attributable to site, lot, date, and operator were determined. Separately, the relative reactivity of Aroclors 1242, 1248, 1254, and 1260 were determined. Based on Aroclor heterogeneity, and method imprecision, concentrations of Aroclor 1248 were selected that would result in greater than 99% confidence for negative interpretation. A study was conducted (Superfund SITE demonstration) on 114 field samples whose PCB concentration were also determined by Method 8082. 32 of the field samples were collected in duplicate (as coded field duplicates) and assayed by standard and immunoassay methods. The results for all 146 samples are summarized in Tables 5 and 6.

9.4 Grab samples were obtained from sites in Pennsylvania, Iowa and Illinois using a stainless steel trowel. Each sample was homogenized by placing approximately six cubic inches in a stainless steel bucket and mixing with the trowel for approximately two minutes. The soils was aliquotted into 2 six ounce glass bottles. The samples were tested on site using the D TECH PCB test kit, and sent to an analytical laboratory for analysis by Method 8082. These data are compared in Table 7.

9.5 Tables 8 and 9 present data on the inter- and intra-assay precision of the PCB RISc™ Liquid Waste Test System. The data were generated using 11 samples, each spiked at 0, 0.2 and 5 ppm, and assayed 4 times.

9.6 Tables 10 and 11 provide data from application of the PCB RISc™ Liquid Waste Test System to a series of liquid waste samples whose PCB concentration had been established by Method 8082.

10.0 REFERENCES

1. J.P. Mapes, T.N. Stewart, K.D. McKenzie, L.R. McClelland, R.L. Mudd, W.B. Manning, W.B. Studabaker, and S.B. Friedman, "PCB-RISc™ - An On-Site Immunoassay for Detecting PCB in Soil", Bull. Environ. Contam. Toxicol. (1993) 50:219-225.

2. PCB RISc™ Users Guide, Ensys Inc.

4.0 APPARATUS AND MATERIALS

4.1 Immunoassay test kit: PCB RISc™ (EnSys, Inc.), EnviroGard™ PCB in Soil (Millipore, Inc.), D TECH ™ PCB test (Strategic Diagnostics Inc.), PCB RISc™ Liquid Waste Test System (EnSys, Inc.), or equivalent.

4.2 Each commercially available test kit will supply or specify the apparatus and materials necessary for successful completion of the test.

5.0 REAGENTS

Each commercially available test kit will supply or specify the reagents necessary for successful completion of the test.

6.0 SAMPLE COLLECTION, PRESERVATION, AND HANDLING

6.1 See the introductory material to this chapter, Organic Analytes, Section 4.1. Also refer to Reference 9 for the collection and handling of non-aqueous waste liquids.

6.2 Samples may be contaminated, and should therefore be considered hazardous and handled accordingly.

7.0 PROCEDURE

7.1 Follow the manufacturer's instructions for the test kit being used.

7.2 Those test kits used must meet or exceed the performance specifications indicated in Tables 2-11.

8.0 QUALITY CONTROL

8.1 Follow the manufacturer's instructions for the test kit being used for quality control procedures specific to the test kit used. Additionally, guidance provided in Method 4000 and Chapter One should be followed.

8.2 Use of replicate analyses, particularly when results indicate concentrations near the action level, is recommended to refine information gathered with the kit.

8.3 Do not use test kits past their expiration date.

8.4 Do not use tubes or reagents designated for use with other test kits.

8.5 Use the test kits within their specified storage temperature and operating temperature limits.

8.6 Method 4020 is intended for field or laboratory use. The appropriate level of quality assurance should accompany the application of this method to document data quality.

METHOD 4020

SCREENING FOR POLYCHLORINATED BIPHENYLS BY IMMUNOASSAY

1.0 SCOPE AND APPLICATION

1.1 Method 4020 is a procedure for screening soils and non-aqueous waste liquids to determine when total polychlorinated biphenyls (PCBs) are present at concentrations above 5, 10 or 50 mg/kg. Method 4020 provides an estimate for the concentration of PCBs by comparison with a standard.

1.2 Using the test kit from which this method was developed, 95% of soil samples containing 0.625 ppm or less of PCBs will produce a negative result in the 5 ppm test configuration. Using another commercially available test kit, 97% of soil samples containing 0.25 ppm or less of PCBs will produce a negative result in the assay and greater than 99% of the samples containing 1.0 ppm or more will produce a positive result. Tables 2-5, 7, 10, and 11 present false positive and false negative data generated from commercially available test kits. Using a test kit commercially available for screening non-aqueous waste liquids, >95% of samples containing 0.2-0.5 ppm or less of PCB will produce a negative result.

1.3 In cases where the exact concentrations of PCBs are required, quantitative techniques (i.e., Method 8082) should be used.

1.4 This method is restricted to use by or under the supervision of trained analysts. Each analyst must demonstrate the ability to generate acceptable results with this method.

2.0 SUMMARY OF METHOD

2.1 Test kits are commercially available for this method. The manufacturer's directions should be followed.

2.2 In general, the method is performed using a sample extract. Sample and an enzyme conjugate reagent are added to immobilized antibody. The enzyme conjugate "competes" with PCB present in the sample for binding to immobilized anti-PCB antibody.

2.3 The test is interpreted by comparing the response produced by testing a sample to the response produced by testing standard(s) simultaneously.

3.0 INTERFERENCES

Chemically similar compounds and compounds which might be expected to be found in conjunction with PCB contamination were tested to determine the concentration required to produce a positive test result. These data are shown in Tables 1A, 1B, 1C, and 1D.

Documentation

Attachment 1 includes a copy of the USEPA's SW-846 4020 method. In addition, a copy of the procedure applicable to the purchased kit is also attached.

Attachment 2 includes a copy of the analyst's immunoassay training certificate as well as a copy of the training certificate for the individual responsible for QA/QC oversight.

Attachment 3 includes a copy of the performance samples' certified PCB concentration.

Attachment 4 includes a copy of the performance sample vendor's A2LA accreditation.

Attachment 5 includes a copy of results for the control samples analyze for each batch of samples. A total of four (4) control samples were analyzed for two batches. Batch 1 consisted of two (2) performance samples and Batch 2 consisted of four (4) environmental samples. The resultant QC frequency was 66 %, exceeding typical USEPA QA Level III requirements for four (4) samples (minimum 20 %) for each batch.

Results

Figure 1 (attached) is a not-to-scale sketch map of Building 729's roof, showing where each of the four (4) asphalt samples were obtained. On-going project preparation activities had scabbled asphalt from several areas of the roof; this scabbled asphalt was sampled using grab methods and samples placed in a clean, labeled polyethylene baggie.

Attachment 6 presents the analyst's results.

The analyst was successful in reproducing results expected on the performance samples, with one sample yielding a "Non Detect" (ND) result and the other yielding a "Detect" result. The analyst noted that the low – concentration PCB sample apparently had PCBs present, but at a concentration less than the method detection limit.

All four asphalt samples tested yielded a "Non Detect" result, with no evidence of PCBs above the immunoassay's method detection limit.

Conclusions

It is concluded that Building 729 does not harbor PCB bulk product wastes.

Approach

There were three possible approaches for the sampling and analysis of Building 729 materials:

1. Sampling and analysis on – site at RFETS' chemical laboratory, or
2. Sampling and analysis off – site at a subcontractor's laboratory, or
3. Sampling and analysis on – site using portable field analysis kits.

Options 1 and 2 had the potential to impose time delays on the initiation of Building 729 demolition. Option 3 had the potential to yield defensible analytical data within a few hours of sample collection. Therefore, Option 3 was selected.

To achieve the goal of 'defensible' analytical data, Option 3 was limited as follows:

- Only USEPA SW – 846 methods could be used, and
- The on – site analyst and Quality Assurance / Quality Control (QA/QC) oversight must have had formal training in application of the technique, and
- The on – site analyst must generate expected results on blind performance samples, and
- Blind performance samples must be obtained from supplier accredited or registered to a consensus QA standard, such as ISO 25 or ISO 9000, and
- QC control samples must be analyzed with each batch (performance and environmental) of samples tested.

Before mobilization, it was required that realization of each of these six limitations be documented for the project record.

Strategic Diagnostics Inc.'s *Ensys* kits were selected for use, given that the method was originally used in the development of the USEPA SW-846 4020 method, and the method requires generation of control samples for each sample batch. The *Ensys* control samples are designed to alert the analyst as to whether analytical technique was correct.

Analytical sensitivity was pre-selected to be 50 mg/kg. Although the method had the potential to detect PCBs at a concentration less than 50 mg/kg, asphalt materials have the potential to yield cross – reactive false positive interferences. In addition, 50 mg/kg is the regulatory threshold separating PCB bulk product materials from materials not subject to Toxic Substance Control Act (TSCA) 40 CFR § 761 Subpart D disposal restrictions. Dilution sample clean-up, as outlined in SW – 846 Method 3580, was performed to achieve the needed sensitivity while minimizing the possibility of cross – reactivity induced false positive results.

Environmental Resource Associations was selected as the ISO 9001 registered (American Association for Laboratory Accreditation as registrar) vendor for the performance samples. The performance samples consisted of one soil sample with a PCB 1254 concentration of 23.1 mg/kg dry weight, and one soil sample with a PCB concentration of 98.7 mg/kg dry weight. These concentrations were available in off – the – shelf certified samples, and were selected to bracket the 50 mg/kg sensitivity of the 4020 method.

Results of Field Analyses for PCBs

Building 729

Executive Summary

Rocky Mountain Remediation Services L.L.C. (RMRS) mobilized to determine whether Building 729's roofing asphalt contained PCBs in quantities sufficient to require characterization as a polychlorinated biphenyl (PCB) bulk product waste. RMRS subcontracted with S. M. Stoller Corporation to perform immunoassay tests as specified in the Environmental Protection Agency (EPA)'s SW – 846 Method 4020.

The 4020 analyses did not detect PCBs at a detection level of 50 mg/kg.

QA/QC requirements were addressed by the analysis of blind performance standards; the S. M. Stoller analyst produced results within specifications.

Introduction

RMRS recently initiated demolition activities for Rocky Flats Environmental Site's 779 Cluster. The first building in this Cluster scheduled for demolition was Building 729. Building 729 housed filter plenums for 779 Cluster; demolition stripout operations removed these materials as well as any other hardware harboring radiological or chemical contamination. Only a shell consisting of walls, floor, and ceiling were slated for demolition and off – off site disposal as sanitary waste.

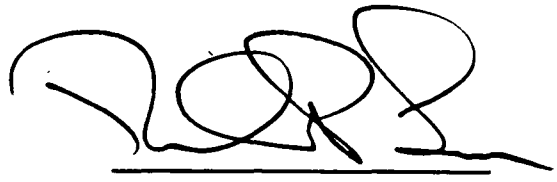
Although Building 729 had been tested for the presence of PCB bearing paints (PCBs were not detected), the possibility that PCB bulk product materials could be present in the building's roofing materials could not be dismissed using process knowledge alone. The USEPA, in 40 CFR § 761.3, recognizes that PCBs derived from contaminated recycled feedstock have historically been introduced into asphalt materials. 40 CFR § 761.3 precludes asphalt containing detectable levels of PCBs from introduction into commerce. However, PCBs may exist in recycled asphalt materials that were manufactured prior to promulgation of this regulation. Therefore, sampling and analysis using accredited techniques was required prior to shipment of Building 729 debris for disposal.

3

Results of Field Analyses for PCBs

Building 729

June 16, 1999



Richard Lesser

Senior Principal Engineer

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000104644

RMRS
Rocky Mountain
Remediation Services, L.L.C.
. . . protecting the environment
Rocky Flats Environmental Technology Site
P.O. Box 464
Golden, Colorado 80402-0464
Phone: (303) 966-7000

CORRES. CONTROL		
LTR. NO.		
K-H Corres. #		
Originator Ltr Log #		
TAH-049-99		
DIST.	LTR	ENC
BODEY, E. D.		
CARMEAN, C.H.		
CRAWFORD, A.C.		
FINDLEY, M.E.		
FITZ, R.C.		
GUINN, L.A.		
HUGHES, F. P.		
KASEN, J. A.		
KORENKO, M. K.		
LAW, J. E.		
MILLS, S. H.		
OVERLID, T. W.		
PATTERSON, J.W.		
SUTTON, S. R.		
TRICE, K. D.		
WHEELER, M.		
WOLF, K. Z.	X	
WOLF, H. C.		
HOPKINS, T. A.	X	
KIDD, D. L.	X	X
LESSER, R. P.	X	X
URBAN, D. L.	X	
ZBRYK, K. O.	X	X
ADMIN RECORD	X	X
RMRS RECORDS	X	X
TRAFFIC		
PATS/T130G		
CLASSIFICATION:		
UCNI		
UNCLASSIFIED		
CONFIDENTIAL		
SECRET		
AUTHORIZED CLASSIFIER SIGNATURE:		
Date:		
IN REPLY TO RF CC NO.:		
ACTION ITEM STATUS:		
q PARTIAL/OPEN		
q CLOSED		
LTR APPROVALS:		
ORIG. & TYPIST INITIALS:		
RPL:dlu		
RF-46469(Rev.1/99)		

June 16, 1999

Virgene Ideker
Analytical Services
Enviromental Systems and Stewardship
Kaiser-Hill Company L.L.C.
Building T130C

TRANSMITTAL OF THE BUILDING 729 IMMUNOASSAY ANALYTICAL RESULTS – TAH-049-99

Enclosed please find the June 16, 1999, "Results of Field Analyses for PCBs, Building 729" written by RMRS' Environmental Compliance.

The analytical results indicated that PCB bulk product wastes were not present in the building's roofing materials.

If you have any questions, please do not hesitate to contact Richard Lesser at (303) 966 - 2298.

Ted Hopkins, Manager
Environmental Compliance

RPL:dlu

Enclosure:
As Stated

cc:
Karen North **w/o enclosure**

1/71

Data for SDI PCB EnSys® 12T Soil Test

Operator: _____ Date: _____ Location: _____

Sample ID	ΔOD Standards	OD sample ____ ppm	Interpretation	OD sample ____ ppm	Interpretation	Comments

CERTIFICATE OF TRAINING

This certifies that

Ralph Rupp, USPCI

Has successfully completed 8 hours of

EnSys Field Method Certification Training

including USEPA SW-846 Immunoassay Analytical Methods 4010, 4020, & 4030
for use at Hazardous Waste Contaminated Sites
prepared and conducted by EnSys Environmental Products, Inc.

Boulder, CO
Location of Training

8/25/93
Date Training Completed

Kevin Nesbitt
Lead Instructor/EnSys
Certificate #666

10/8/93
Date Issued

ENVIRONMENTAL
RESOURCE ASSOCIATES
ARVADA, COLORADO 1-800-372-0122

Certification

PCBs in Soil

Quality Control Standards

Catalog No. PS-95

Lot No. 9506

Parameter	Certified Value	Performance Acceptance Limits™
	mg/Kg	mg/Kg
Aroclor 1254 LOW	23.1	10.6 - 28.1

PCBs in Soil Lot No. 9506

The ***Certified Value*** is equal to 100% of the parameters in the indicated standard.

The ***Performance Acceptance Limits (PALs™)*** are listed as a guideline for acceptable analytical result given the limitations of the USEPA methodologies commonly used to determine this parameter and closely approximate the 95% confidence interval. The PALs™ are based on data generated by your peer laboratories in ERA's InterLaB™ program using the same sample you are analyzing and data from USEPA methods, WP, WS and CLP interlaboratory studies. If your result falls outside of the PAL™, ERA recommends that you investigate potential sources of error in your preparation and/or analytical procedures. For further technical assistance, call ERA at 1-800-372-0122.

ENVIRONMENTAL
RESOURCE ASSOCIATES
ARVADA, COLORADO 1-800-372-0122

Analytical Verification Summary

PCBs in Soil

Quality Control Standards

Catalog No. PS-95

Lot No. 9506

Parameter	Certified Value	Mean Recovery	Mean Recovery (%)	n
	mg/Kg	mg/Kg		
Aroclor 1254 LOW	23.1	19.1	82.6%	17

1) The Interlaboratory Analytical Data Summary illustrates typical recoveries obtained by laboratories using EPA methodologies.

PCBs in Soil Lot No. 9506

ENVIRONMENTAL
RESOURCE ASSOCIATES
ARVADA, COLORADO 1-800-372-0122

Analytical Verification Summary

PCBs in Soil

Quality Control Standards

Catalog No. PS-96

Lot No. 9604

Parameter	Certified Value	Mean Recovery	Mean Recovery (%)	n
	mg/Kg	mg/Kg		
Aroclor 1254 High	98.7	75.4	76.4%	18

(1) The Interlaboratory Analytical Data Summary illustrates typical recoveries obtained by laboratories using EPA methodologies.

PCBs in Soil Lot No. 9604

ENVIRONMENTAL
RESOURCE ASSOCIATES
ARVADA, COLORADO 1-800-372-0122

Certification

PCBs in Soil

Quality Control Standards

Catalog No. PS-96

Lot No. 9604

Parameter	Certified Value	Performance Acceptance Limits™
	mg/Kg	mg/Kg
Aroclor 1254 High	98.7	44.1 - 119

The ***Certified Value*** is equal to 100% of the parameters in the indicated standard.

The ***Performance Acceptance Limits (PALs™)*** are listed as a guideline for acceptable analytical result given the limitations of the USEPA methodologies commonly used to determine this parameter and closely approximate the 95% confidence interval. The PALs™ are based on data generated by your peer laboratories in ERA's InterLaB™ program using the same sample you are analyzing and data from USEPA methods, WP, WS and CLP interlaboratory studies. If your result falls outside of the PAL™, ERA recommends that you investigate potential sources of error in your preparation and/or analytical procedures. For further technical assistance, call ERA at 1-800-372-0122.

THE AMERICAN ASSOCIATION
FOR LABORATORY ACCREDITATION

ISO 9001 REGISTERED QUALITY SYSTEM

Through the Registration Panel of its Accreditation Council,
A2LA has registered the Quality System of

Environmental Resource Associates, Inc.
of Arvada, CO

This quality system meets the requirements of the ANSI/ASQC Q9001 (ISO 9001) standard for the design, development, production and distribution of inorganic (SIC 281) and organic (SIC 286) synthetic reference materials including quality control samples, and performance evaluation samples formulated to internal and custom designed specifications.

Presented this 8th day of October, 1996.

President
For the Accreditation Council
Certificate Number R-006
Valid to September 30, 1998

Revised 06/22/98

Data for SDI PCB EnSys® 12T Soil Test

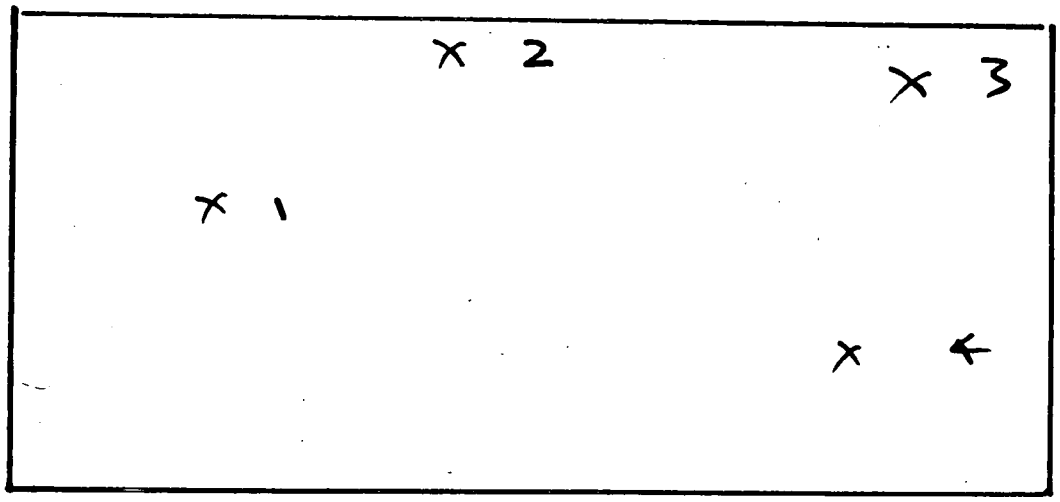
Operator: R. Rupp / S.M. Stoller Date: 5/20/99 Location: Bldg. 779

Sample ID	ΔOD Standards	OD sample ____ ppm	Interpretation	OD sample ____ ppm	Interpretation	Comments
Ref PS959506(1)	-0.06	~~+0.01~~ ~~-0.04~~	<50ppm PCB			
Ref PS969604(1)	-0.06	-0.80	>50ppm PCB			
samples						
1	-0.15	+1.00	<50ppm PCB			
2	-0.15	+0.97	<50ppm PCB			
3	-0.15	+0.81	<50ppm PCB			
4	-0.15	+0.34	<50ppm PCB			
			Ralph E Rupp			
			S.M. Stoller Corp.			
			5-20-99 @1557			

Data for SDI PCB EnSys® 12T Soil Test

Operator: R. Rupp / S.M. Stoller Date: 5/20/99 Location: Bldg. 779

Sample ID	ΔOD Standards	OD sample ____ ppm	Interpretation	OD sample ____ ppm	Interpretation	Comments
Ref PS959506(1)	0.06	~~±0.01~~ ~~-0.04~~	<50ppm PCB			
Ref PS969604(1)	0.06	-0.80	>50ppm PCB			
samples						
1	-0.15	+1.00	<50ppm PCB			
2	-0.15	+0.97	<50ppm PCB			
3	-0.15	+0.81	<50ppm PCB			
4	-0.15	+0.34	<50ppm PCB			
			Ralph E Rupp			
			S.M. Stoller Corp.			
			5.20.99	@1557		



Bldg 729
Locations approximate
Not to scale

11/11