



## Site Characterization and Monitoring Technologies Technology Profile

### ◆ Field Analytical PCB Measurements ◆

#### Technology Description

Polychlorinated biphenyls (PCB) are mixtures of synthetic organic chemicals with the same basic chemical structure and similar physical properties ranging from oily liquids to waxy solids. As a result of their non-flammability and chemical stability, PCBs were used in hundreds of industrial and commercial applications and more than 1.5 billion pounds of PCBs were manufactured in the United States prior to cessation of production in 1977. EPA regulations specify that soil, oil or other residues with PCB concentrations equal to or greater than 50 parts per million require special handling and disposal. The operational principles of field technologies for PCB measurement are varied and include immunoassay techniques, gas chromatography, and dechlorination followed by specific ion electrode measurements. The performance factors of eight field technologies have been verified for detecting and quantifying PCBs in soils and solvent extracts, and one technology (L2000DX Analyzer, Dexsil Corporation) has been verified for its ability to quantify PCBs in transformer oils. Vendor information is given below.

Technology	Vendor	Contact	Address and Web Information
L2000 PCB/Chloride Analyzer L2000DX †	Dexsil Corporation	Ted Lynn 203-288-3509 tblynn@dexsil.com	One Hamden Park Drive Hamden, CT 06517 www.dexsil.com
4100 Vapor Detector	Electronic Sensor Technology	Ed Staples 805-480-1994 est@estcal.com	1077 Business Center Circle Newbury Park, CA 91320 www.estcal.com
PCB in Soil Tube Assay	EnviroLogix Inc.	Mark Dixon 207-797-0300 mark.dixon@envirologix.com	55 Industrial Way Portland, ME 04103 www.envirologix.com
PCB Immunoassay Kit	Hach Company	James Welch 970-669-3050 jwelch@hach.com	5600 Lindbergh Drive Loveland, CO 80539 www.hach.com
DELFLIA PCB Assay	Hybrizyme	Randy Allen 919-783-9595 rallen@hybrizyme.com	2801 Blue Ridge Road Raleigh, NC 27607 www.hybrizyme.com
D TECH PCB Test Kit EnviroGard PCB Test Kit RaPID Assay System for PCB Analysis	Strategic Diagnostics Inc.	Tim Lawruk 302-456-6789 tlawruk@sdix.com	111 Pencader Drive Newark, DE 19702 www.sdix.com

† The performance of this technology was verified for quantifying PCBs in transformer oils.



Additional PCB Analyzers can be verified for other interested vendors.

## **General Market Information**

### **How much does it cost to purchase PCB detection technologies?**

The capital costs of the equipment necessary to analyze soil, extract, or transformer oil samples for PCBs vary widely and have changed since the verification tests. The reader should contact the vendor for current pricing. In general, the costs of analyzing PCB samples using any of these techniques is in the range of \$20 to \$60 per sample.

### **Who would use or purchase such technologies?**

Field portable analytical technologies for PCBs can be used to detect, and in some cases, quantify, the presence of PCBs in soil, in surface wipe samples, and/or transformer oils. Customers for these technologies include consulting engineers, commercial laboratories, utility companies, and state and Federal regulatory personnel. Also, those involved in the evaluation of Brownfields may be particularly interested in these field instruments.

## **Verification Test Description**

The verification objectives were to obtain performance information using environmental and quality control samples, to compare the field results to the conventional fixed-laboratory analyses (EPA SW-846 Method 8082 for soils and solvent extracts; EPA Method 600/4-81-045 for transformer oils), and to report on the logistical operation of the technology. Test samples included spikes, blanks, and environmental samples. For each sample, replicates of four were imbedded in the experimental design. Actual environmental soil samples, collected from sites in Ohio, Kentucky, and Tennessee, ranged in concentration from 0.1 to 700 parts per million (ppm). The samples were obtained from waste containers at storage repositories from three Department of Energy facilities. Many of the soils contained interfering compounds, such as oils, fuels, and other chlorinated compounds. Spiked extract samples, used to simulate surface wipe samples, were evaluated at concentrations ranging from 0 to 100 µg/mL. Oil samples were collected from active and in-active transformers on the ORNL reservation, and ranged in concentration from 0 to 300 ppm. In all, the experimental design included 208 soil samples, 24 extract samples, and 152 oil samples. The verification test plan can be found at [http://www.epa.gov/etv/test\\_plan.htm#02](http://www.epa.gov/etv/test_plan.htm#02).

## **Technology Performance Factors**

The results of the verification tests can be downloaded from our web site at [www.epa.gov/etv](http://www.epa.gov/etv). The following is a list of performance factors that are discussed in the verification reports.

- ✓ Precision
- ✓ Accuracy
- ✓ Sample Throughput
- ✓ Ease of Use
- ✓ Completeness
- ✓ False Positive/False Negative Results
- ✓ Comparability with Fixed-Laboratory Method
- ✓ Applicability to Regulatory Decision-Making
- ✓ Cost

## **For More Information**

Roger Jenkins  
Oak Ridge National Laboratory  
PO Box 2008  
Building 4500S, MS-6120  
Oak Ridge, TN 37831-6120  
865-574-4871  
[jenkinsra@ornl.gov](mailto:jenkinsra@ornl.gov)

Eric Koglin  
U.S. Environmental Protection Agency  
National Exposure Research Laboratory  
PO Box 93478  
Las Vegas, NV 89193-3478  
702-798-2432  
[koglin.eric@epa.gov](mailto:koglin.eric@epa.gov)

