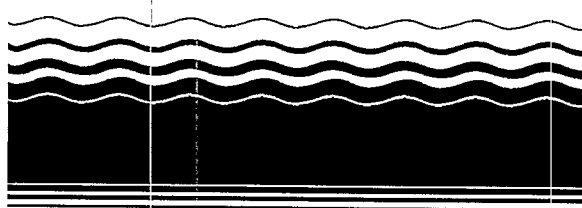




SITE

**SUPERFUND INNOVATIVE
TECHNOLOGY EVALUATION**



Demonstration Bulletin

HNU - Hanby PCP Immunoassay Test Kit

HNU - Systems, Inc.

Technology Description: The HNU-Hanby test kit rapidly analyzes for petroleum hydrocarbons in soil and water samples. The test kit can be used to estimate pentachlorophenol (PCP) concentrations in samples when the carrier solvent is a petroleum hydrocarbon. The test kit estimates PCP concentrations in soil samples indirectly by measuring petroleum hydrocarbon carrier solvent for the PCP. The carrier solvent concentration to PCP concentration ratio must be constant for the test kit results to be usable.

To quantify the PCP results, site specific split samples are used for confirmatory laboratory determination of PCP concentrations using EPA approved methods. The confirmatory laboratory results and test kit results can generate calibration data by correlating the two sets of data. As the number of samples and data points increase, the accuracy of the test kit results should improve.

The test kit uses the Friedel-Crafts alkylation reaction to detect aromatics and petroleum in soil and water samples. An electrophile is formed by the reaction of a Lewis acid catalyst, such as aluminum chloride, with an alkyl halide. Electro-ophile aromatic substitution products are generally very large molecules with a high degree of electron dislocation that causes intense coloring. When testing, the sample's color is compared to site specific color standards for a semiquantitative assessment of PCP concentrations. Alternatively, the color change can be read by a reflective photometer. The reflective photometer used with calibration charts can provide quantitative results for PCP, if the carrier to PCP ratio is consistent.

Waste Applicability: The Hanby test kit measures PCP carriers that contain aromatic and petroleum hydrocarbons in soils. The method assumes a consistent ratio of PCP to carrier solvent. The method indirectly measures PCP concentrations with carrier solvents at a detection level of 1.0 parts/mil for aromatic compounds.

Demonstration Results: The HNU-Hanby PCP test kit was used to screen and quantify PCP contamination in soils for a SITE demonstration. The screening kit was demonstrated in Morrisville, NC in August 1993, with samples collected from a site in Winona, MO.

The method was found to produce Level 1 quality data during the demonstration. When PCP was present the test kit always detected the PCP. However, this result may be attributed to the abundance of petroleum carriers in the samples.

HNU Systems recently introduced a similar method that could measure PCP more directly by detecting chlorinated compounds in soil and water. This method works on the same principle as the method to detect aromatic compounds, only the method is conducted in reverse. The chlorinated compounds are originally present in the soil or water and an aromatic compound is introduced as a catalyst to allow the Friedel-Crafts reaction to proceed. The new method is also a colorimetric method.

An Innovative Technology Evaluation Report (ITER) describing the complete demonstration will be available in late 1995.

Acknowledgment: This Bulletin was prepared by the U.S. Environmental Protection Agency, Office of Research and Development, National Risk Management Research Laboratory, Cincinnati, OH 45268.

For Further Information:

EPA Project Manager:
Jeanette Van Emon
U.S. EPA
944 East Harmon
P.O. Box 93478
Las Vegas, NV 89193-3478
702-798-2154



United States
Environmental Protection Agency
National Risk Management Research Laboratory (G-72)
Cincinnati, OH 45268

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