

Passive Polyethylene Sampling of Sediments

PROBLEM

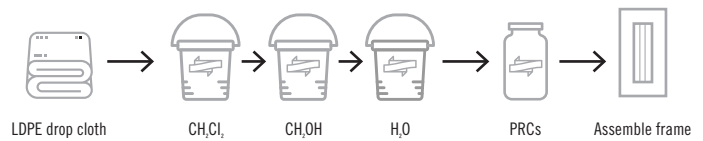
Using sediment concentrations alone to track hydrophobic contaminants is inaccurate and can exaggerate levels by a factor of 5 to 10.

ASSESSMENT

Researchers from MIT developed and assessed an alternative sampling technique to measure contamination levels in aquatic environments.

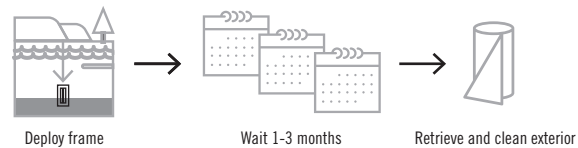
Step 1: PREPARE

1. Clean polyethylene (PE) sheet (standard drop cloth) using organic solvents & water.
2. Load PE with performance reference compounds (PRCs).
3. Mount in aluminum frame.



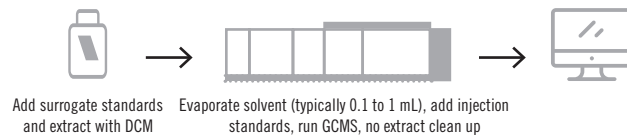
Step 2: DEPLOY

1. Deploy in sediment for 1 to 3 months leaving some PE exposed to bottom water.
2. Recover and wipe PE exterior clean of sediment and biofilm growth.



Step 3: ANALYZE

1. Extract with Dichloromethane (DCM).
2. Analyze (e.g. Gas Chromatography-Mass Spectrometry (GCMS)).



RESULTS

More accurate than sediment-based approach.

- Provided better data for contamination models.

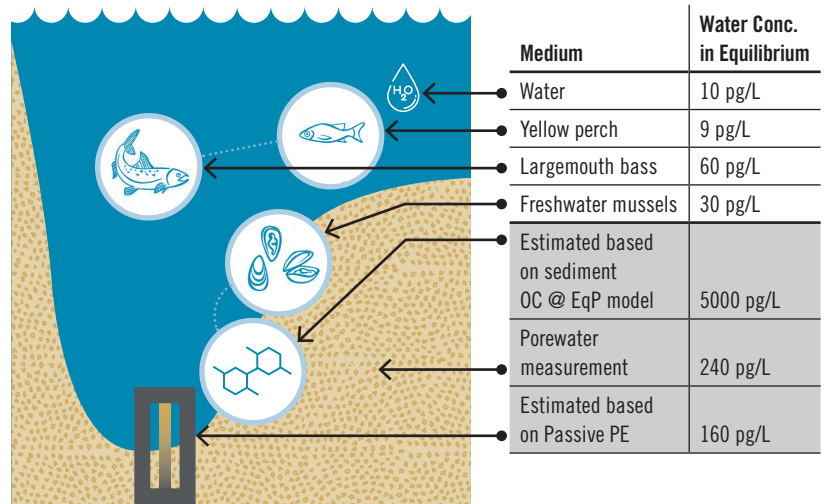
Effective for site mapping.

- More accurately determined mobility and bioavailability in sediments for effective site mapping.

Reduced waste.

- Reduced monitoring-generated waste. Only a small piece of plastic is discarded after passive PE sampling.
- Comparable in expense to current methods and applicable to most if not all aquatic DoD contamination sites.
- Regulatory acceptance growing but sediment analysis is still occasionally required.

CONCENTRATIONS OF PCB 52 IN DIFFERENT MEDIA Passive PE more accurately predicted contaminant levels in fish



MORE INFO

The full report, standard operating procedures and online calculator are available on the SERDP-ESTCP website

<https://www.serdp-estcp.org/Program-Areas/Environmental-Restoration/Contaminated-Sediments/ER-200915/ER-200915>