A.1 Technology Name

Polymeric Sampling Devices (PDMS)

A.1.1 Source

Lampert, David J., Xiaoxia Lu, and Danny D. Reible. 2013. Long-Term PAH Monitoring Results from the Anacostia River Active Capping Demonstration Using Polydimethylsiloxane (PDMS) Fibers. Environmental Science. Processes & Impacts 15(3): 554–62. https://doi.org/10.1039/c3em30826j.

A.1.2 Summary

Media:	Porewater
Study Type:	In-situ
Technology:	Polydimethylsiloxane (PDMS)
Peer Reviewed:	Yes
Publication Date:	March 2013

A.1.3 Site Description

- The study investigates the effectiveness of capping for contaminated sediment remediation at the Naval shipyard in the Anacostia River, Washington DC. The site had four different caps placed in 2004, each covering approximately 1,000 m².
  - Cap 1: 30 cm of sand
  - Cap 2: 10 cm of AquaBlok™ + 15 cm of sand
  - Cap 3: 15 cm of apatite + 15 cm of sand
  - Cap 4: 2.5 cm of coke (in mat) + 15 cm of sand
- Site monitoring consisted of bulk solid analysis of segmented cores, in-situ passive sampling with PDMS fibers, and bioaccumulation studies with caged organisms (*Lumbriculus variegatus*, a tubificid oligochaete).
- Porewater concentration profiles measured by PDMS were used to evaluate PAH migration through the caps and bioavailability.
- PDMS samplers were deployed for 28 days. Non-equilibrium correction was not made.

A.1.4 Remedial Phase

Feasibility Study (Field Demonstration)

A.1.5 Outcome

The study concluded that while solid-phase concentration data suggested no significant contaminant migration within the caps, the limited sorption capacity of the sandy material made this a less reliable measure. Instead, porewater profiling provided a more accurate picture, revealing significant concentrations throughout the caps due to contaminant migration. This observation was consistent with transport dynamics at the site (groundwater upwelling and tidal mixing). Through 66 months of sampling, it was evident that the performance of the active caps was not significantly better than the traditional sand cap. The surface re-contamination and tidal pumping effects negated any potential benefits of the improved containment of the active

materials. The surficial (0-15 cm) porewater concentrations in all the sand caps were approximately 70 to 80% lower than in the uncapped area 66 months after sand placement. Porewater data was more strongly correlated with bioaccumulation data than solid-phase concentrations.