



Puget Sound

Polymeric Sampling Devices—Polydimethylsiloxane (PDMS)-coated Solid-phase Microextraction (SPME)

Summary

Media:	Sediment pore water
Study Type:	Other
Technology:	Equilibration
Peer Reviewed:	Yes
Publication Date:	February 2022

Study Description

- This case study addresses a tidally influenced shoreline in Puget Sound (West Seattle, Washington) with creosote-related impacts.
- Long-term monitoring of a sand/gravel cap remedy that was placed in 2005 to prevent migration of PAHs to overlying water is ongoing in conjunction with monitoring a slurry wall to prevent further migration.
- Solid-phase microextraction (SPME) devices using a polydimethylsiloxane (PDMS) sorbent were deployed with performance reference compounds (PRCs) used to evaluate equilibration of target compounds and estimate mass-transfer coefficient for estimating groundwater upwelling velocities.
- Passive sampling was conducted in 2010 and 2018; this study primarily focused on 2018 data collected from 24 monitoring locations, with depth-discrete sample results.
- Remedy effectiveness was evaluated with respect to pore water concentrations near sediment-water interface and as compared to previous sampling results.

Remedial Phase

Remedy has been in place for more than 15 years and is in long-term monitoring/evaluation. Passive sampling was previously deployed at the site in 2010 as well.

Outcome

Pore water PAH concentrations remain relatively low, with higher concentrations detected in the lower portion of pore water samplers. Sample results were also used to estimate groundwater upwelling velocity across the cap and for updating a model for PAH migration into the cap.

The authors concluded: “This work shows the ability to determine the groundwater upwelling velocity and contaminant flux using the rate of equilibration of performance reference compounds. The approach to estimation of the groundwater upwelling velocity is a novel use of the PRCs that can be employed at other locations.”

Case Study Reference

Smith, A.V.; Shen, X.; Garza-Rubalcava, U.; Gardiner, W.; Reible, D. 2022. In Situ Passive Sampling to Monitor Long Term Cap Effectiveness at a Tidally Influenced Shoreline. *Toxics* 10: 106. <https://doi.org/10.3390/toxics10030106>