SiREM
Leading Science · Lasting Solutions

SP3™

Case Study

Client:
Geosyntec Consultants

Site Location:
Southern California

Project Duration:
September-December 2017

Services Provided:
- Activated carbon amendment dosing laboratory study
- *Ex-Situ* Passive Sampling

"Based on the treatability study results a 3% dose of activated carbon was selected for the field application saving $375,000 in excess activated carbon use."

Activated Carbon Dosing Study for PCBs in Sediment

Project Highlights

- Laboratory treatability study completed to assess activated carbon (AC) dosing for an active cap at marine sediment PCB site.
- The study results highlighted the most cost-effective dose of AC able to decrease porewater PCB concentrations by >75%.
- Client saved $375,000 in AC costs by implementing optimized design.

Problem Definition

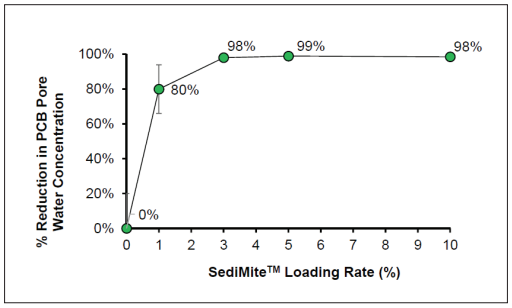
This project assessed the remediation of marine sediment adjacent to a historical storm drain outfall at an aeronautical manufacturing site. Following completion of upland remediation activities, PCB impacts were identified in near-shore sediments adjacent to a former storm drain outfall. The objective was to design, permit, and implement a cost-effective remedial action to address these residual impacts, resulting in a bioavailable PCB concentration for the outfall area equivalent to reference conditions.

Solution/Approach

AC was selected as the remedial option to sorb freely-dissolved PCBs in a bay shoreline area. A literature review determined the activated carbon dosing required to reduce the bioavailability of PCBs by 75% or greater was between 1% to 10%. To optimize AC dosing and minimize costs, a bench-scale study was performed to collect site-specific data on the sorption ability of AC for PCBs in sediment porewater. Reactors were constructed with Site sediment and water combined with 1%, 3%, 5% and 10% AC and clean silica sand. After an initial equilibration period, an SP3™ passive sampler was deployed for 31 days to assess the porewater PCB concentration in each reactor.

Notable Results

Results indicated that even at doses as low as 1% and 3% AC the PCB concentrations were reduced in porewater by more than the 75%. The SP3™ provided data as the freely dissolved concentration of PCBs, informing the relative reduction in bioavailability and toxicity. This study provided critical data for the project team to confidently recommend the most cost effective dosage of AC for the sediment cap. When compared to a 10% application rate, the cap amendment costs were decreased by $375,000, an amount that offset study costs by an order of magnitude.



SiREM
CASE STUDY

Client
Geosyntec Consultants , Inc.

Site Location
North Harbor,
San Diego, CA

Project Duration
December 2018 –
January 2019

Services Provided
- *In situ* SP3™ Passive Sampling

SP3™ Passive Sampling aids in Remediation Design and Post-Remedial Monitoring Leading to "No Further Action"

Project Highlights

- A localized area of sediment in San Diego Bay (San Diego, California) impacted with PCBs was identified at the outfall of a 30-inch Storm Water Conveyance System. Bench Scale Treatability testing involving *ex situ* passive sampling determined that the most economical remedy was the combination of direct removal, enhanced monitored natural recovery (EMNR) with carbon addition and stabilization.
- A 6-inch EMNR layer of sand amended with 3% activated carbon (optimized from a SiREM bench scale study) was placed over the site evenly which was followed by *in situ* pore water monitoring by SP3™ passive samplers.
- Total PCB pore water concentrations at the site were approximately 10- to 20- times lower than those measured prior to remediation, demonstrating success of the remedy and leading to a "No Further Action" decision from the regulatory authority (California Regional Water Quality Control Board).

Problem Definition

A localized area of sediment impacted with PCBs was identified offshore of a 30-inch storm water outfall that historically drained portions of an industrial facility, an airport, and US Coast Guard facilities. Bench scale treatability studies determined the optimal remedy combining direct removal, EMNR containing 3% activated carbon and stabilization of residual sediment along the shoreline. The carbon-amended sand EMNR remedy was placed over the target area with the goal of reduction of the bioavailability of residue PCBs. Post remediation monitoring was required to determine the effectiveness of the EMNR and determine if remediation goals were achieved.

"The combination of SP3™ passive sampling to determine freely dissolved and bioavailable PCBs in porewater along with sediment grab samples and benthic community analysis monitoring determined that the remedy was successful and that no further action was required at the site."

Solution

An *in situ* passive sampling program was undertaken to determine dissolved pore water concentrations (C_{free}) of PCBs post-remedy. SP3™ passive samplers were deployed for 44 days in 10 locations using SiREM's push pole deployment device. This approach allows deployment of SP3™s from a vessel without the aid of SCUBA divers, lowering field costs and improving efficiency. After retrieval, the samplers were extracted and analyzed by EPA 1668A method for PCB congeners and freely dissolved concentrations (C_{free}) in pore water were determined.

Notable Results

- Significant reductions (approximately 10- to 20-fold) in freely-dissolved and bioavailable PCBs in porewater in comparison to those measured prior to remediation – SP3™ samplers provided the key line of evidence in demonstrating the success of this innovative sediment remediation approach.
- The regulatory authority (California Regional Water Quality Control Board) granted NO FURTHER ACTION at the site!