Parcel F Carbon Amendment Placement Pilot Study, Hunters Point Naval Shipyard, San Francisco, California

Presented By

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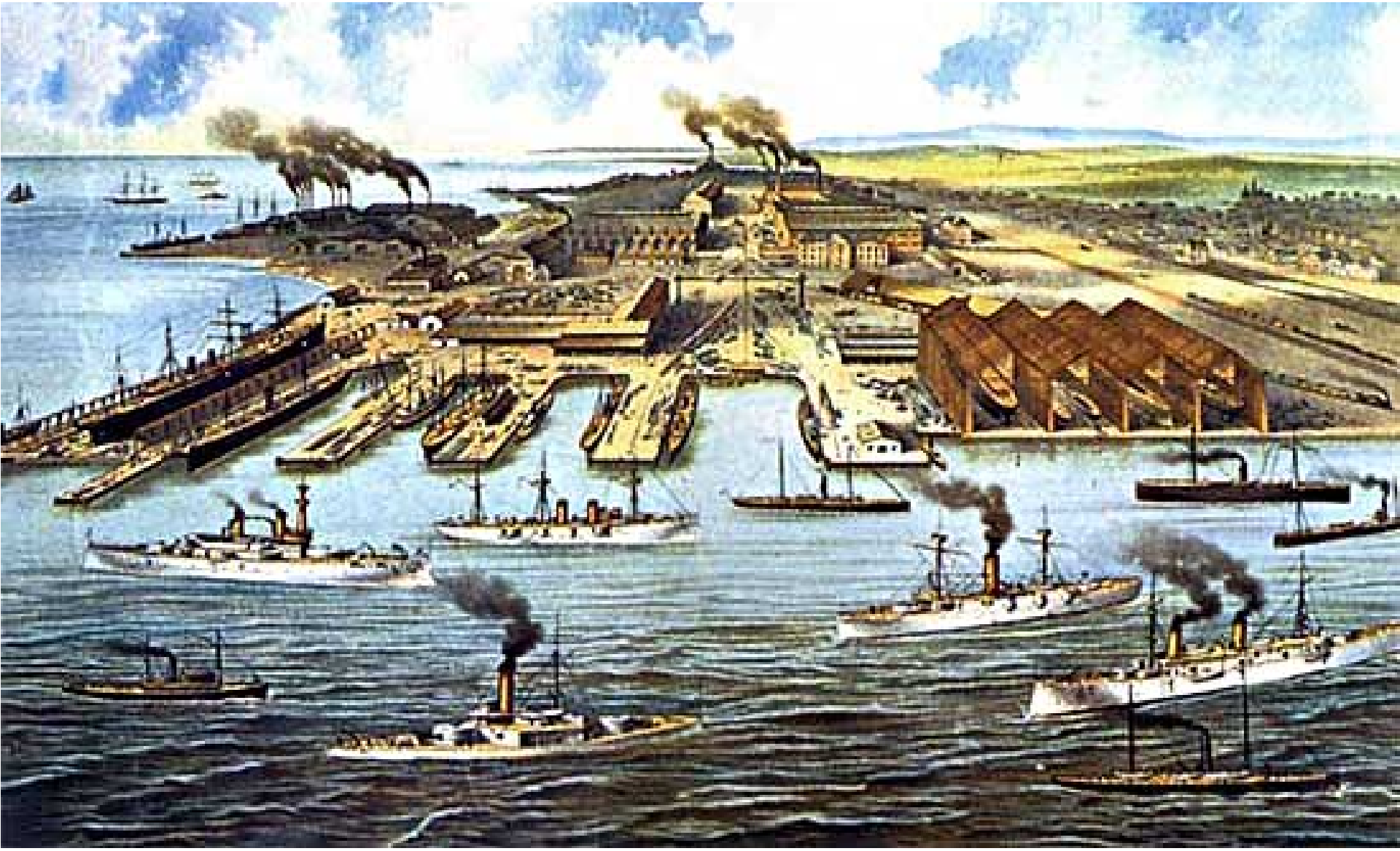
Objective

Present an overview of the carbon amendment placement study at Parcel F, South Basin at Hunters Point Naval Shipyard

- History of Hunters Point
- Discussion of Carbon Placement
    - Brief summary of activities
    - 2015 Pilot Study Highlights
    - Lessons learned/key take away notes
- Discussion of characterization & monitoring events
    - Brief summary of activities
    - Lessons learned/key take away notes

Bayview - Hunters Point

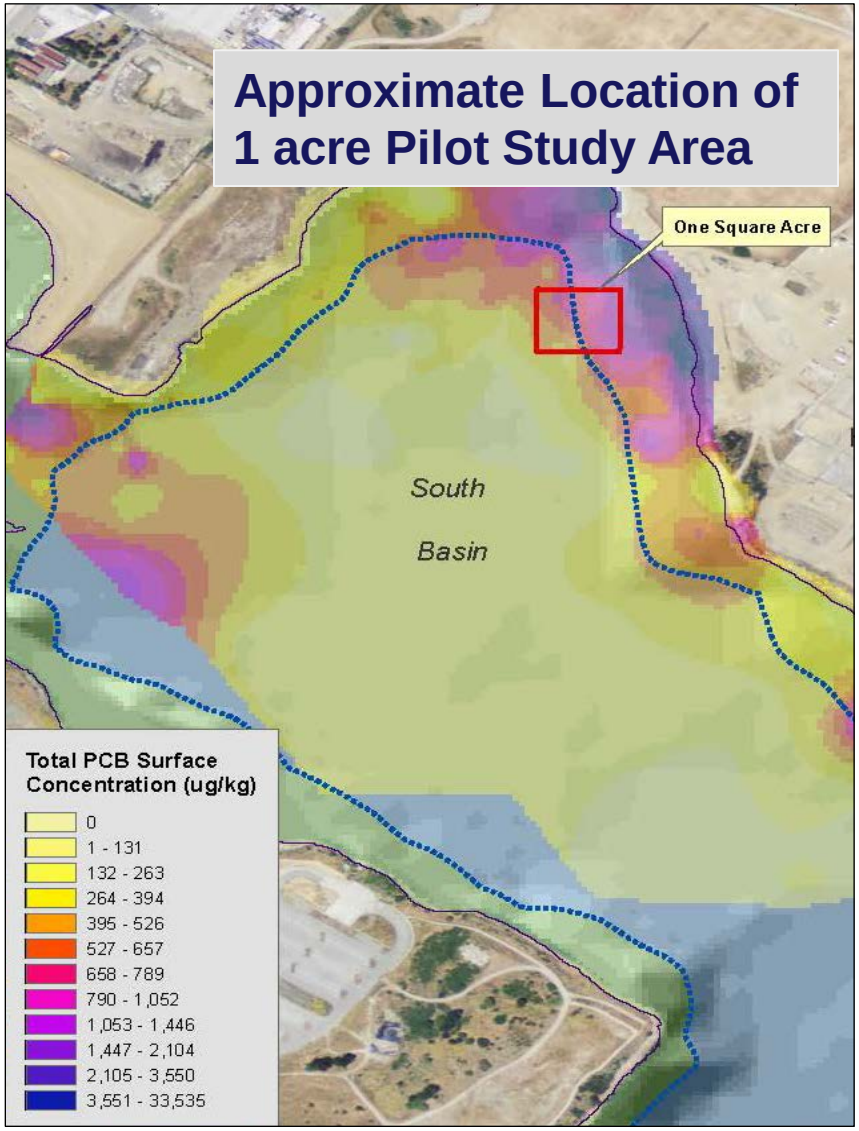


Hunters Point Shipyard

- **Shipbuilding became integral to Bayview-Hunters Point in 1867 with the construction of the first permanent dry dock on the Pacific coast.**
- **The Dry Docks were greatly expanded in the 1920's and capable of housing the largest ships that could pass through the locks of the Panama Canal.**
- **World War I increased the contracts for building Naval vessels, and in 1940 the United States Navy purchased a section of property to develop the San Francisco Naval Shipyard**
- **BRAC closure of the Naval Shipyard occurred in 1994**

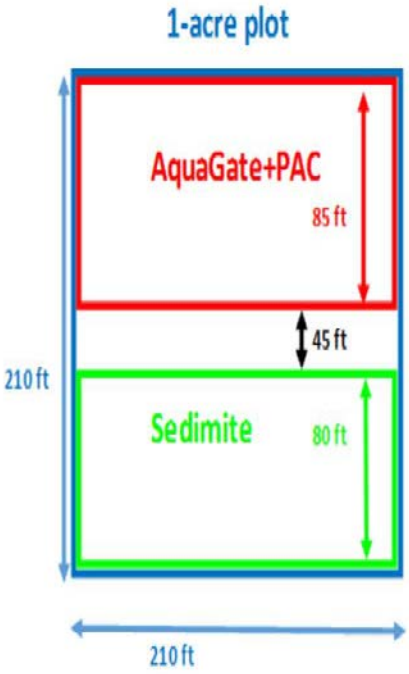
Carbon Amendment Demonstration Pilot Study Primary Objectives

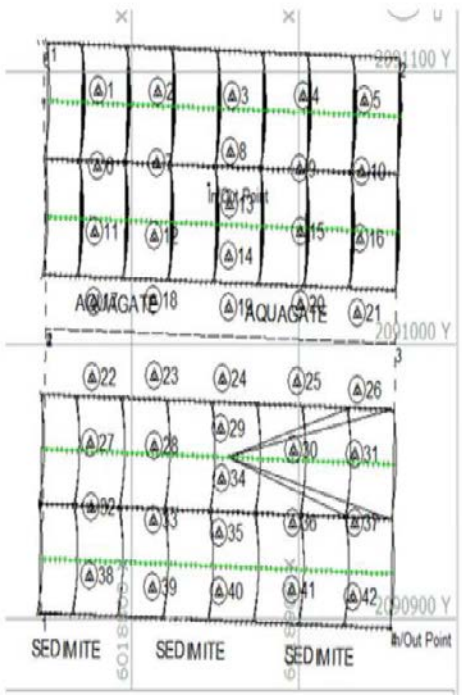
- Evaluate effectiveness of carbon amendments for treatment of PCB contaminated sediments
- Evaluate physical stability of the carbon amendments in subtidal and intertidal environments
- Evaluate the use of passive samplers as a tool for long-term performance monitoring
- Demonstrate added value of combine physical, chemical, and biological monitoring



Carbon Amendment Placement

- Two different carbon amendments for evaluation (AquaGate® and SediMite™)
- Each amendment to be dispersed uniformly throughout a target half-acre plot





- Monitoring the carbon amendment during placement maintained the thin layers that were specified in the bench scale laboratory testing.
- The average thickness of carbon placed; approximately 2 inches for AquaGate® and 1 inch for SediMite™

Carbon Amendment Placement

- Amendment was deployed via a barge mounted telebelt conveyor system fitted with a custom fabricated diffuser.
- Tracking of amendment placement was accomplished using DGPS mounted above the discharge end of the telebelt's boom.

- Placement was performed at night to take advantage of the highest tide conditions.
- Over time the amendments will be worked into the sediment via bioturbation (no mechanical mixing was performed)

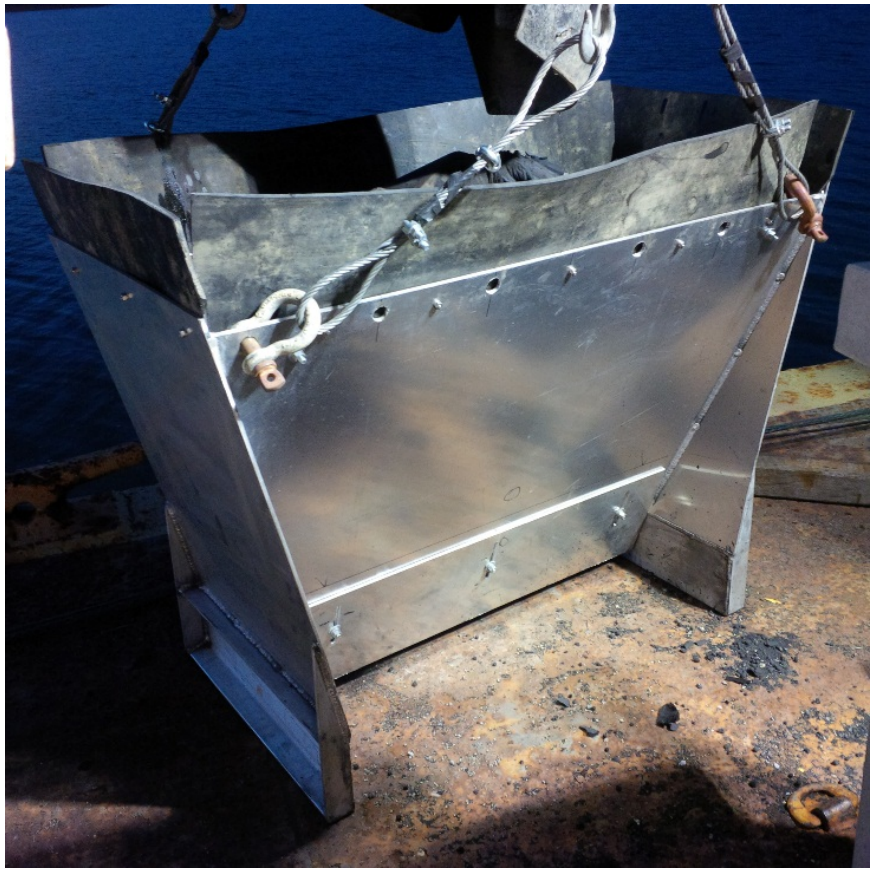
Carbon Amendment Placement

2015 Pilot Study Highlights

- Demonstration of two commercially available activated carbon amendments applied to contaminated sediments in a tidal environment.
- Demonstration of full-scale construction parameters for physical construction endpoints (e.g., initial placement, distribution, mixing and stability)
- Results can be be used to guide future remediation work at Hunters Point

Lessons Learned from Carbon Amendment Placement

- Full scale equipment requires high tide conditions to place amendments in shallow tidal and sub-tidal mudflats. This limits placement operations between 4 and 6 hours, per day.
- Skilled equipment operators utilizing computerized positioning equipment are required for optimum placement results.
- The specialized diffuser used at the end of the telebelt delivery system was critical to the successful placement of the required thicknesses.

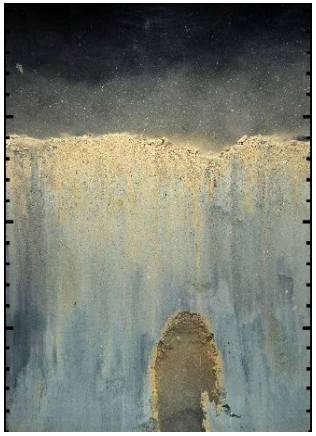


Overview of Characterization and Monitoring Events

- **Baseline Characterization (1 event):**
  To establish pre-amendment placement bioavailability and ecological conditions
- **Initial Placement Monitoring (1 event):**
  Within 1 month of placement, physical monitoring will be used to verify the amendments have been placed as expected within the study area
- **Post-Placement Monitoring (3 events):**
  Physical, biological, and chemical measurements will be conducted at 6, 12 and 24 months after placement to document amendment mixing, contaminant bioavailability, and ecological health


Sediment Profile Imaging

Overview of Characterization and Monitoring Events

Monitoring Event	Plot 1 (AquaGate)	Plot 2 (SediMite)	Reference Area
Baseline	 Station 06	 Station 32	 Station 48A
Post-placement	 Station 06	 Station 32	 Station 48A

Overview of Characterization and Monitoring Events

- To determine placement, stability, and performance of activated carbon amendments the pilot study includes monitoring for 18-months (3 sampling events, separated by 6-months)

- Monitoring includes:
  - **Chemical** –Sediment, pore water using passive samplers, and clam tissue samples for bioaccumulation study,
  - **Physical** – SPI survey, hydrodynamic monitoring, sediment samples
  - **Biological** – Benthic community analysis supplemented by SPI

Lessons Learned for Characterization and Monitoring Events

- Clam species used for *in situ* bioaccumulation study during baseline event had high mortality rate - choose a hearty clam species that can handle being transported and kept alive prior to placement
- Include both *ex situ* bench scale and *in situ* clam bioaccumulation studies to assess bioaccumulation study

QUESTIONS?