

Addressing Dredging Challenges Through the
Use of Barrier and Treatment Designs:
Shorelines and Control of Contaminant Migration



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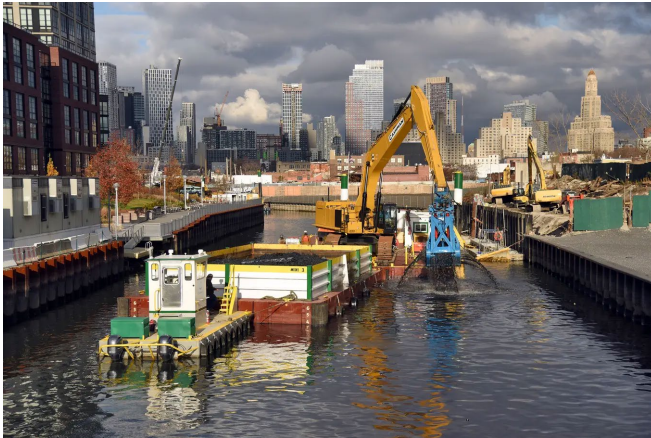


Presentation Outline

- I. Introduction – Challenges
- II. Materials Technology – Barrier & Treatment
- III. Solutions – Case Studies:
 - Upland Seep at Sheet Pile Wall
 - Addressing Residual Contaminated Sediment Along Shoreline
 - Upland Cut-Off Wall to Intercept Groundwater Contamination
- IV. Summary

Challenges Associated with Shoreline Dredging

Dredging Along a Bulkhead



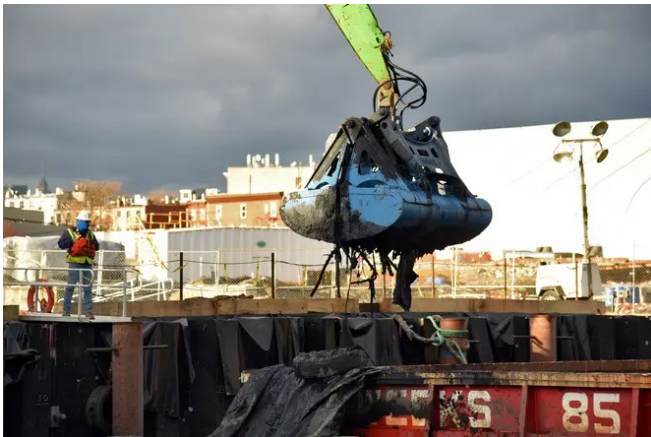
Piers and Obstructions



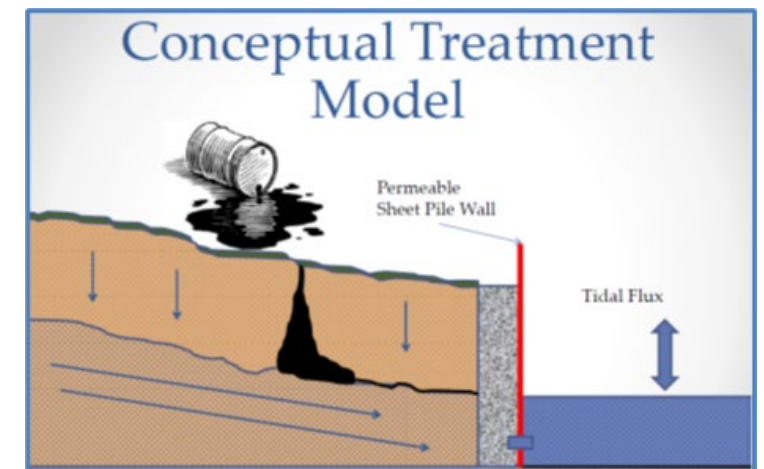
Upland Seepage & Ebullition



Debris Along Shoreline



Shoreline Slope Stability



Materials Technology – Barrier & Treatment

Powder Coated Aggregate Particles Provide Uniform Delivery of High-Value/Low-Volume Materials to Address Sediment Contamination & Upland Seep Zones



Powder coating

+



Aggregate core

=



AquaBlok/AquaGate “Composite Particle”

Two Types of Materials – Enable Both Remediation and Geotechnical Sealing

AquaBlok[®]

For Both Remediation & Geotechnical Sealing

- Low Permeability Sequestration Material
- Variable Particle Size & Densities
- High Shear Strength (Erosion Resistance)
- Proven Long-term Performance (Superfund Sites)

AquaGATE⁺

For Remediation Applications

- Permeable (Variable)
- Powdered Treatment Amendments
 - Generally Increased Sorption Rate/Reduced Resident Time
 - Higher Surface area
 - Uniform Distribution at Low Levels
 - Targeted Placement within a Composite Cap

AquaBlok® For Contaminant Sequestration/Isolation



Sealing Bulkhead Wall to Limit Upland Residual Contaminant Migration



Limiting Residual Upland NAPL



Bank Stabilization



Blended Barrier for River MGP Sediment Remediation



Emergency Response - Derailment



Seal Slope Seepage

AquaGATE⁺ For Permeable Amendment Delivery



- PCBs
- Dissolved Phase
- VOCs

AquaGate+PAC



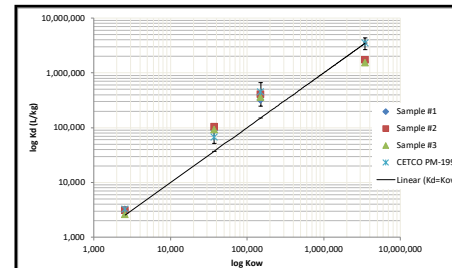
- Petroleum
- NAPL
- Coal Tar

+ORGANOCLAY



- PFAS
- PAHs
- Soil Fixation

AquaGate+RemBind



AquaGATE⁺
PAC

AquaGATE⁺
ORGANOCLAY

AquaGATE⁺
RemBind

AquaGATE⁺
Provect-IRM

AquaGATE⁺
ALUM

AquaGATE⁺
ZVI

stream
SORB



Solutions – Case Studies:

- I. *Upland Seep at Sheet Pile Wall*
- II. Addressing Residual Contaminated Sediment Along Shoreline
- III. Upland Cut-Off Wall to Intercept Groundwater Contamination

Upland Seep at Sheet Pile Wall: Low- Permeability Capping at Bulkhead Limits Residual Contamination Impacts



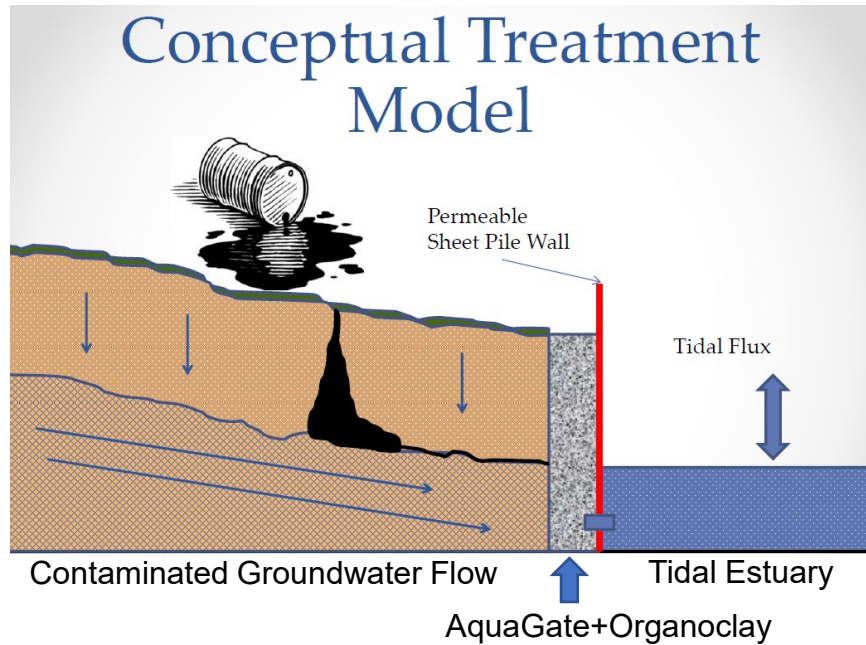
Historic Rail Yard Along
Lake Shore:
Limited Ability to Remove
Upland Contaminants Due to
Current Site Operations



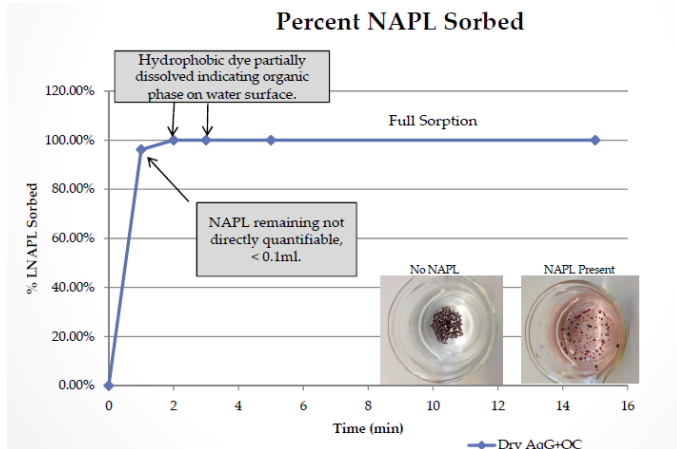
AquaBlok Placed to
Address Seepage along
Bulkhead and In Sediment

Left: Cores taken to
confirm layer thickness

Upland Seep at Sheet Pile Wall: Permeable Reactive Barrier (PRB) Material at Bulkhead Limits Residual Contamination Impacts



- Site Overview:
1. New Bulkhead Installed Outside of Existing Wall
 2. Material Installed Between Walls to Establish PRB



Lab Testing Performed to Confirm Permeability at Fully Saturated State (University of New Hampshire)

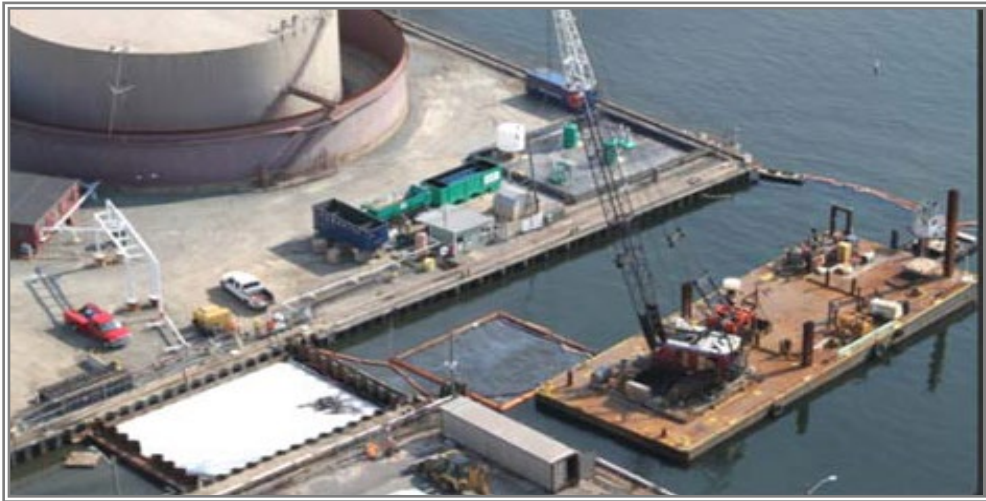




Solutions – Case Studies:

- I. Upland Seep at Sheet Pile Wall
- II. *Addressing Residual Contaminated Sediment Along Shoreline*
- III. Upland Cut-Off Wall to Intercept Groundwater Contamination

Addressing Residual at a Shoreline: Low- Permeability Capping Limits Residual Contamination Impacts



- **Setting/Purpose:** MPG Site Waterfront Slip - provide cap after partial removal from sediments.
- **Contaminant(s) of Concern:** Coal Tar associated with historic MGP site.
- **AquaBlok Cap Design/Site Area:** Multi-layer comprising six-inch layer of AquaBlok 3070SW#8 saltwater formulation followed a graded aggregate for armoring protection.



Material Placed with Level Cut
Environmental Clamshell Lab Testing
Performed to Confirm Permeability
at Fully Saturated State (University
of New Hampshire)



Site Location: **U.S. EPA Region 1**
NSTAR – New Bedford Harbor, MA

Addressing Residual at a Shoreline: Low- Permeability Capping Limits Residual Contamination Impacts

NAPL Trapping Cap* Design for Control of Seep & Ebullition



Site Location: *U.S. EPA Region 5*
MGP Impacted River – Ann Arbor, MI

* NAPL Trapping Cap is Patented and was designed by RMT/TRC

Project Status:
Completed 2012

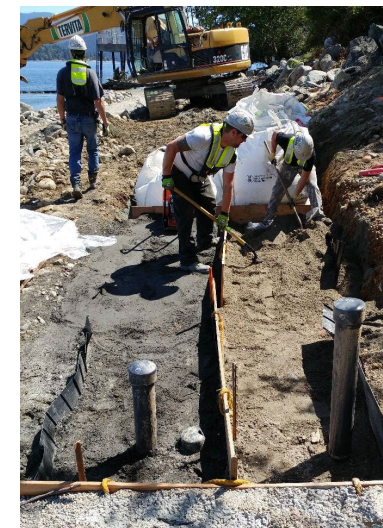
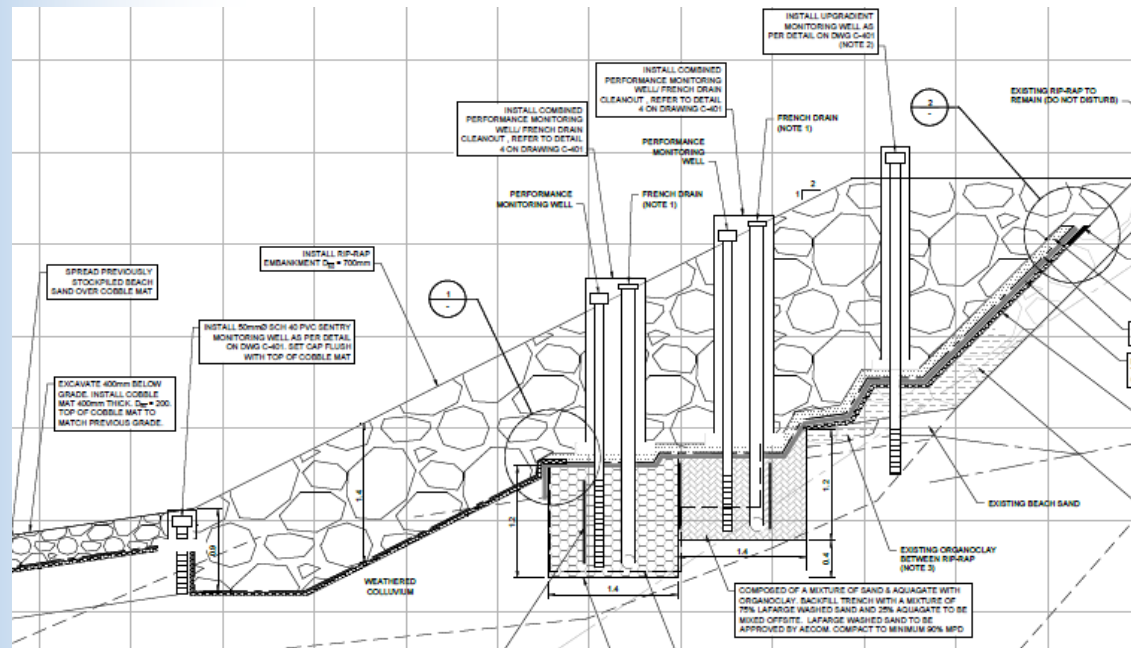


Solutions – Case Studies:

- I. Upland Seep at Sheet Pile Wall
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- III. *Upland Cut-Off Wall to Intercept Groundwater Contamination*

Upland Cut-Off Wall to Intercept Groundwater Contamination

Passive Shoreline PRB to Address NAPL & Dissolved-Phase PAHs in Groundwater



Products Utilized:

- AquaGate+Organoclay
- AquaGate+PAC
- AquaBlok 2080FW

Project Location:
Vancouver, BC

Upland Cut-Off Wall to Intercept Groundwater Contamination

Materials Addressed Metals & Dissolved Phase PAHs in Groundwater Entering Stream

Products Utilized:

- AquaGate+Organoclay
- AquaGate+Provect-IRM
- AquaBlok 2080FW

Project Location: *U.S. EPA Region 7*
Confidential Client, Kansas



Summary

1. Dredging challenges on shorelines and for control of upland migration of contamination can be effectively addressed through the use of barrier and treatment designs.
2. AquaBlok has developed and successfully applied a wide-range of materials to assist in implementation of the most recent technical innovations in contaminated sediment remediation.
3. Lessons learned include the need to Analyze and Understand Design Objectives and determine Placement Approaches to mitigate long-term impacts on the remedy.

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