



Combined Remediation Approaches:

Case Studies of '*Dredge & Cap*' Applications

April 19, 2013

2013 Midwest Chapter Meeting



*** Composite Aggregate
Delivery Technology**



www.aquablokinfo.com

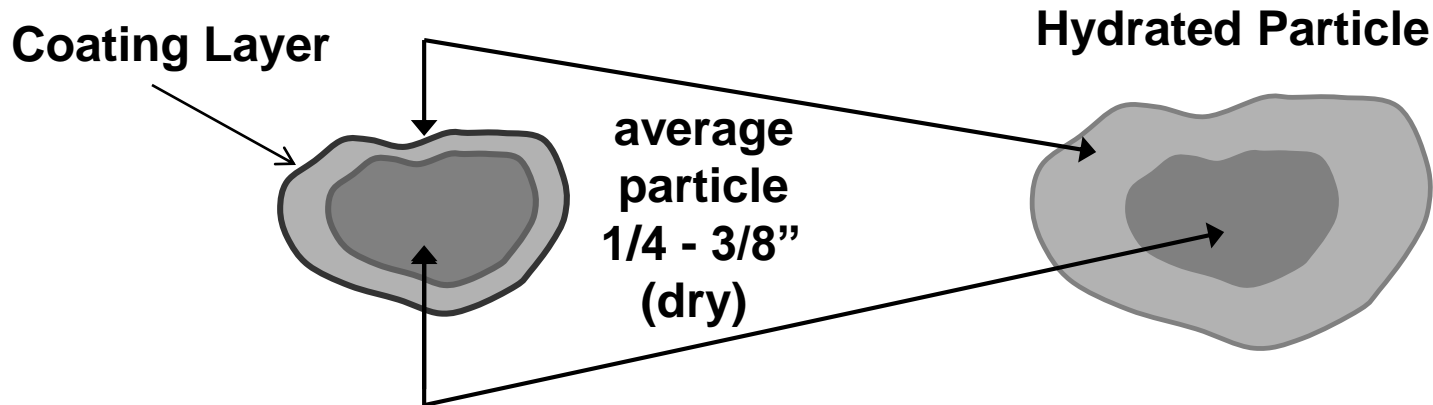
Presentation Overview

- I. AquaBlok Technology Overview
- II. Dredge/Cap Approach - Advantages
- III. Case Studies
- IV. Summary/Q & A

The AquaBlok Particle

Allows fine-grained (i.e. powdered) materials to be applied uniformly and efficiently

The coating layer can consist of sodium bentonite, minerals, treatment agents, organics, seeds, etc.



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Low-Permeability for Sub-Aqueous Capping & Lining



Applied *through*
standing water
or in the dry



Metals/DDT



Refinery/PAH Sites



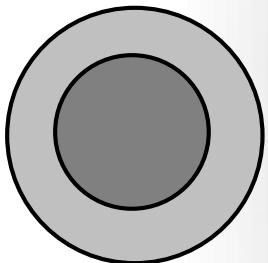
PAH / PCBs



MGP Sites

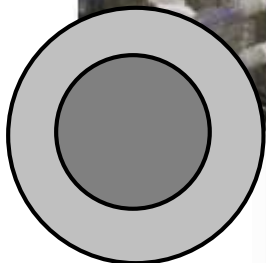
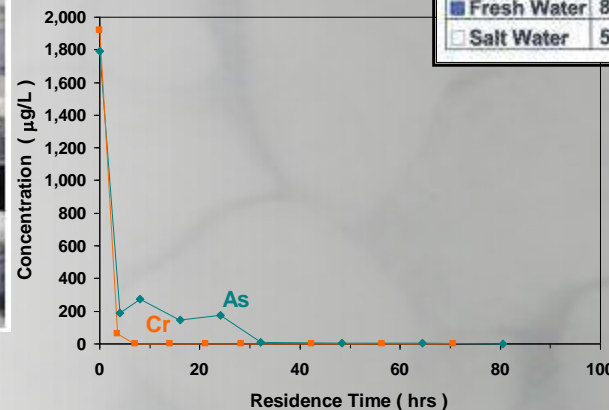
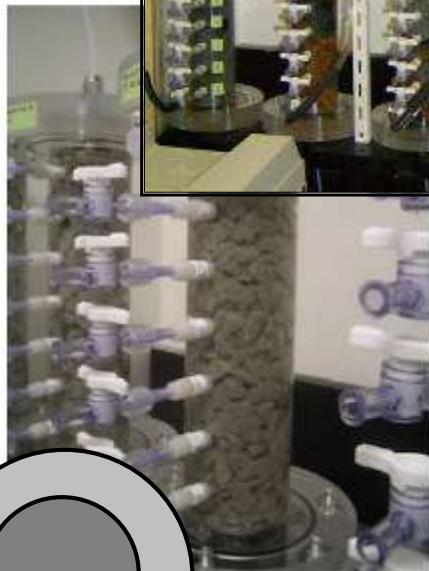
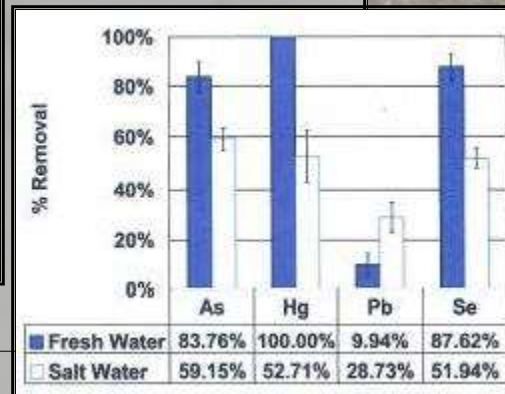


Landfill Cap



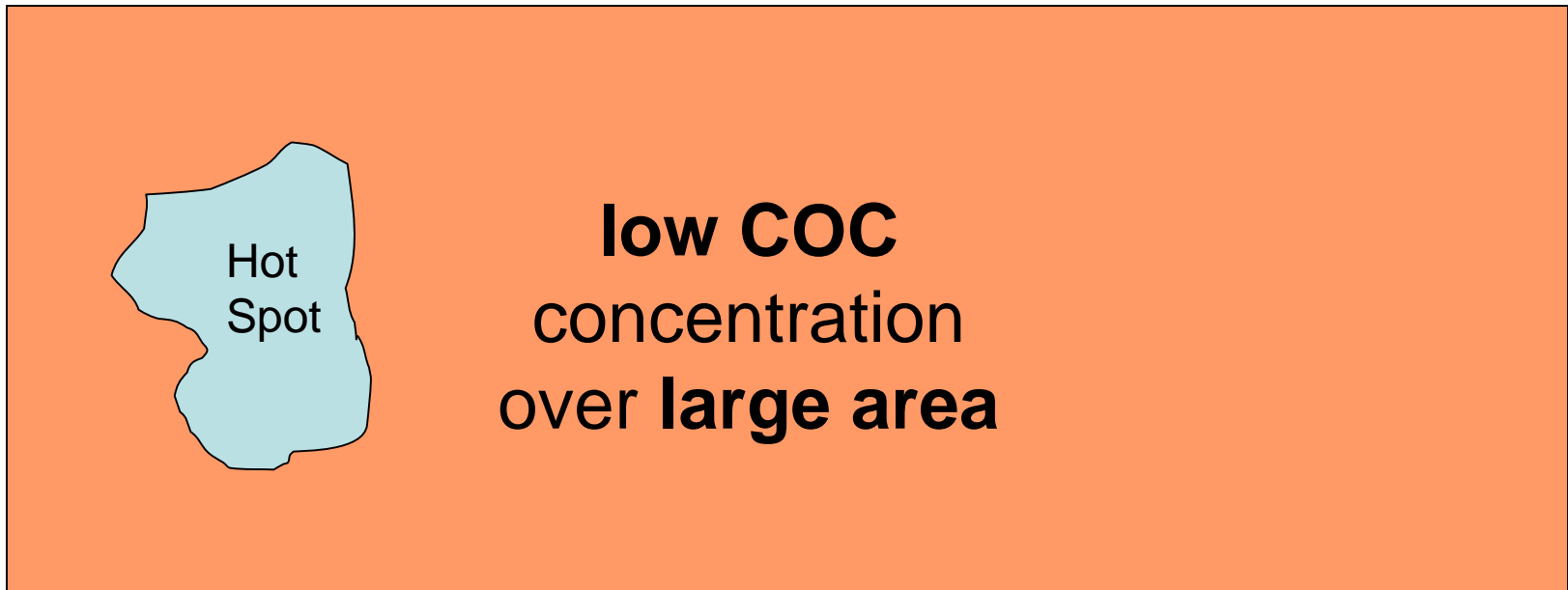


Permeable Materials for In-Situ Treatment & Remediation Applications



Value-Added Application Strategy:

Post-Dredging Sediment Capping - An Alternative to Chasing Low / Unrealistic Residual Contamination Targets



Minimize Contractor Risk, Allows Uniform Food-chain Risk Assessment, and Minimizes Verification Sampling Deployment and/or Remobilization

■ Dredge and Cap Approach

- Meeting Risk Assessment Goals & Clean Up Goals
 - “Clean” cap reduces RAG’s
 - “Clean” cap meets CUG’s
- Lower Permeability Material –
 - Allows higher concentrations to be left in place
 - Better protection from a thinner cap
 - Effectively ‘captures’ dredge residuals - limits risk of residuals mixing with granular cap material
 - Reduced Armor Requirement
- Lower Exposure Limits Realized by Cleaner Cap
 - “Clean” surface results in lower risk per surface area
 - Potential for reduction in overall remediation area

Demonstrating Compliance in a Dynamic Environment

***Split-core from Section A
(2.5 yrs after placement)***

New sediment
Deposits

AquaBlok Clean Cap Layer

Discrete boundary

Contaminated Sediment





Case Studies

Dredge and Cap Approach at Contamination Sites



Site Location: *U.S. EPA Region 1*
Maine MGP Site

Tidal River Dredge/Cap – Penobscot River

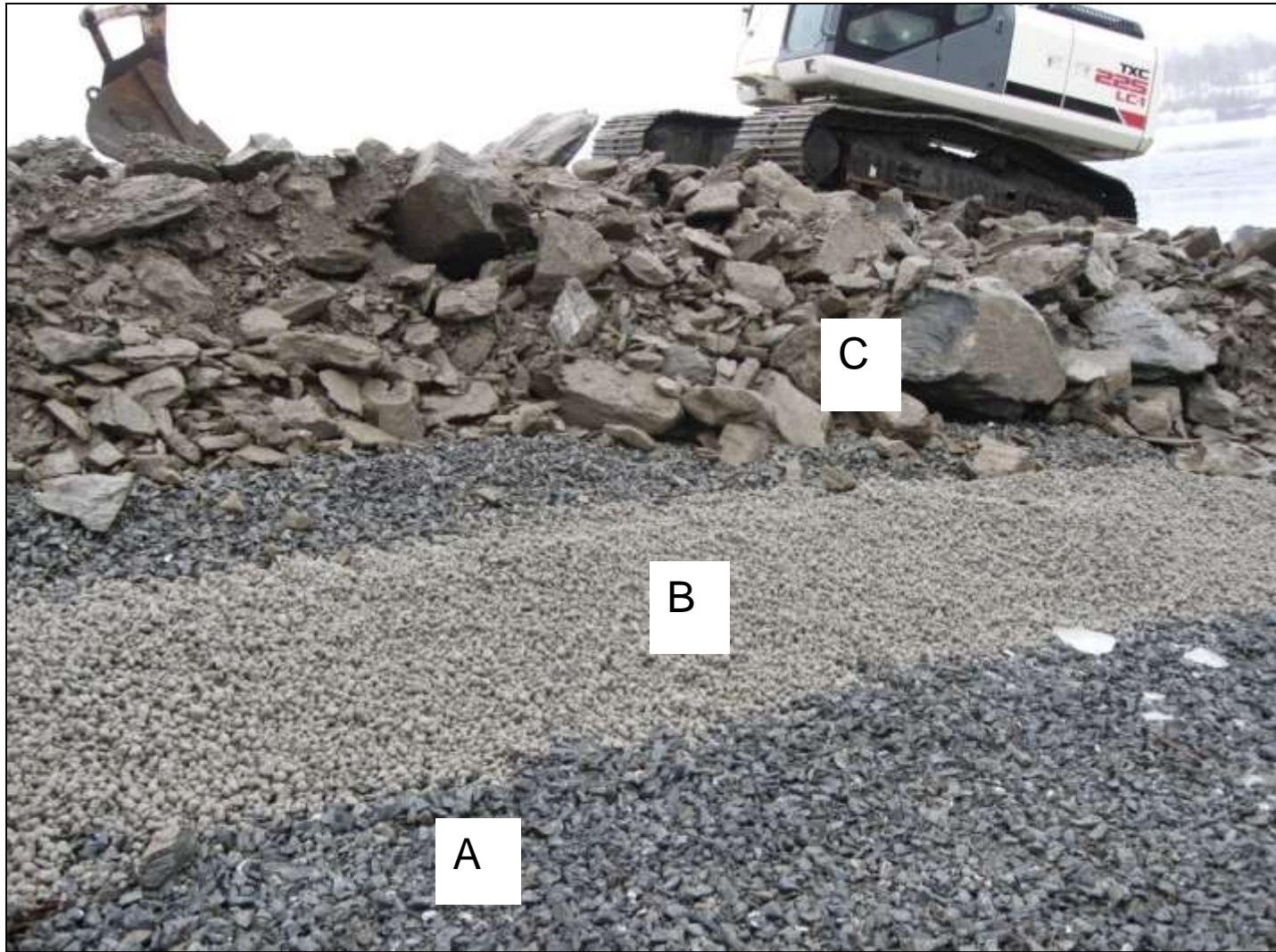


Bangor Gas Works – MGP Site

Dredging – Upper Layer of Organic Sediment

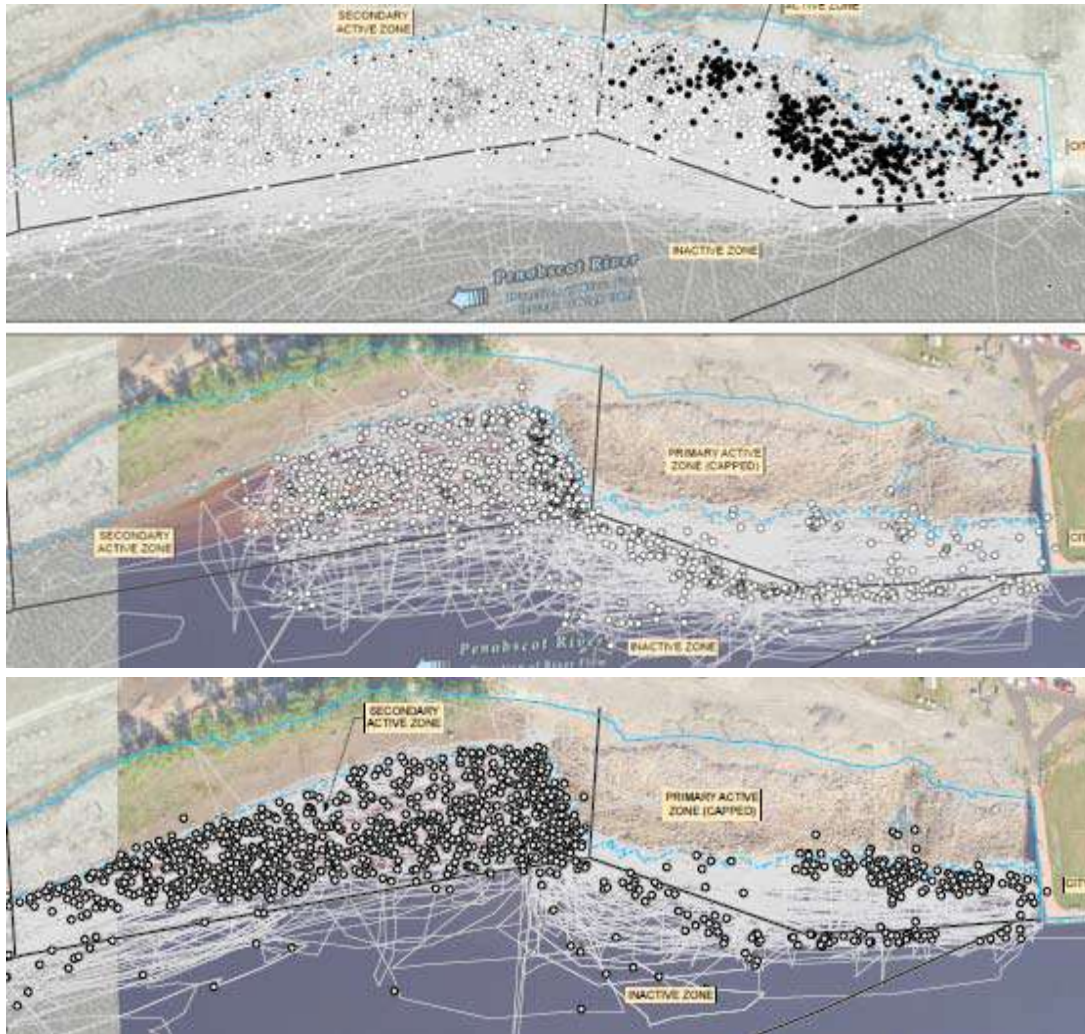


Cap Construction – Composite Layer Approach



A - Gas Transmission Layer, B – AquaBlok Layer, C - Armor Layer

Results – Reduction in Gas Production



**Gas Ebullition and
NAPL Migration
Before and
2008 After Capping
(No Sheen)**

Note - Gas generation
in Capped Area
Eliminated - New
Gas is being
generated from
deposition of organic
Matter on top of cap
post-construction

Current Status – Use of Park Location



Bangor Maine –
American Folk Festival



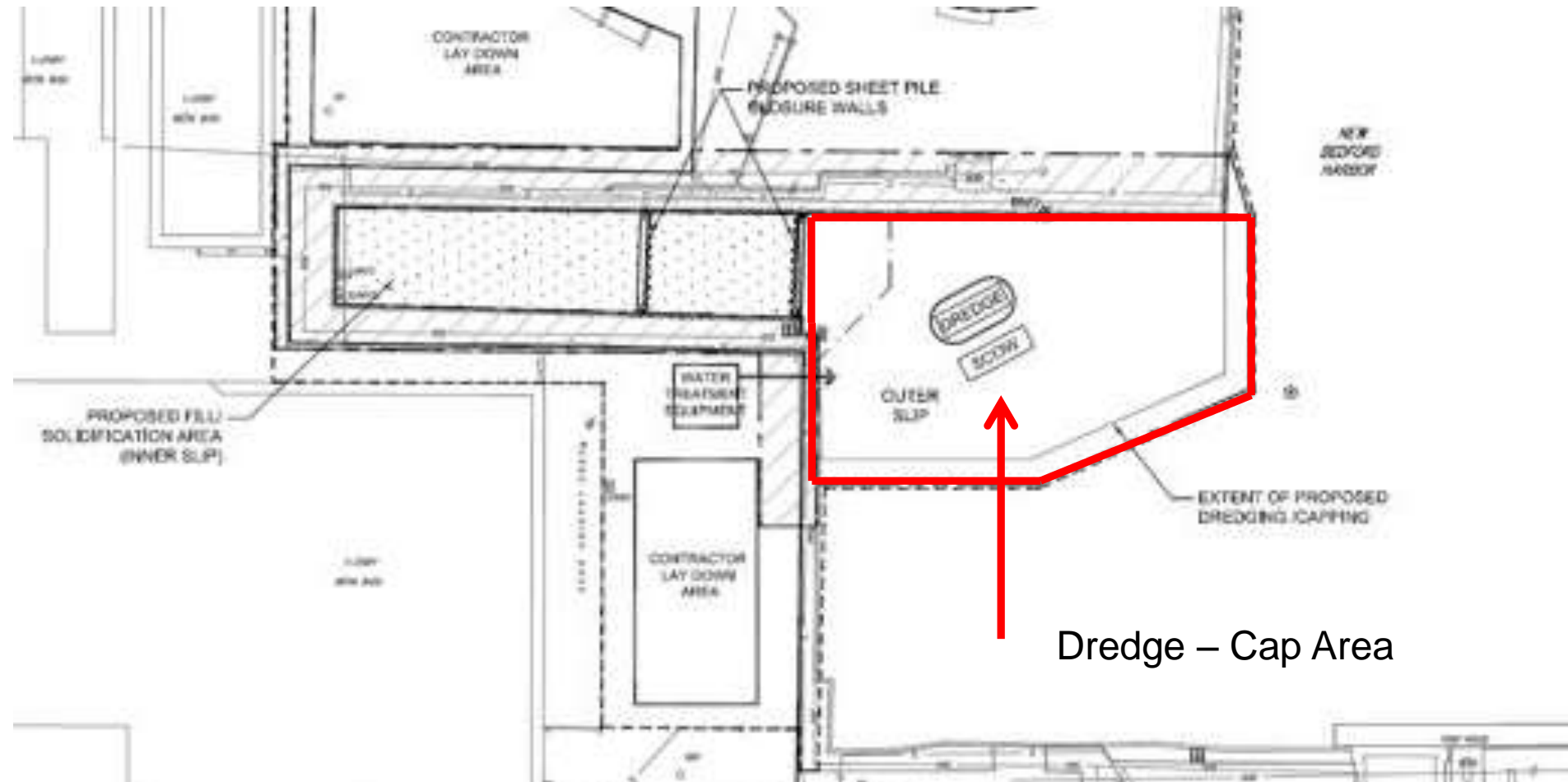
Site Location: *U.S. EPA Region 1*

NSTAR – New Bedford Harbor, MA

- **Setting/Purpose:** MPG Site – Slip. Low permeability encapsulation of residual contaminants in sediments following excavation - provide seal against bulkhead.
- **Contaminant(s) of Concern:** Coal Tar associated with historic MGP site.
- **AquaBlok Cap Design/Site Area:** Multi-layer comprising a sand consolidation layer followed by a six inch layer of AquaBlok 3070SW#8 saltwater formulation AquaBlok. A graded aggregate for armoring protection was placed over the AquaBlok.
- **Method of AquaBlok Placement:** Barge-based excavator



Dredging – Upper Layer of Sediment



Dredging – Capping Summary



Dredging – Capping Summary:

- 1,350 cubic yards dredged
- 18,000 ft² dredge area
- 190 - eight foot diameter ISS columns
- 427 ton of AquaBlok

Cap Composition:

- Benthic Sand – 12 inches
- Stone Armor – 3 inches
- Gravel – 3 inches
- AquaBlok – 6 inches
- Sand Fill – thickness varies



Site Location: *U.S. EPA Region 4*

Chattanooga Creek, Chattanooga, Tennessee

Isolation of Mobile DNAPL Minimize Sheens in Creek

- **Setting/Purpose:** Freshwater creek and floodplain.
- **Contaminant(s) of Concern:** PAHs (polynuclear aromatic hydrocarbons). DNAPL.
- **AquaBlok Cap Design/Site Area:**
 - Layer of 3070FW Blended Barrier product was applied in 8" thickness in prepared creek bed
 - A 6" layer of native soil was applied over the cap.
- **Size:** Site area was comprised of a 2,000-foot segment of the creek which included an oxbow, for a total of over 175,000 SF



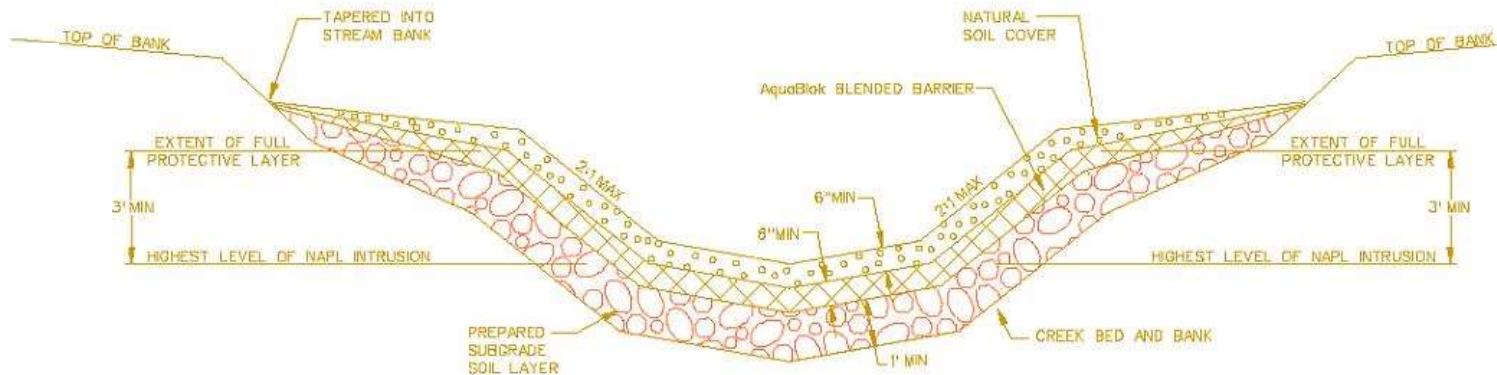
- **Placement:** Installation performed with excavator.



AquaBlok®
800-688-2649

Site Location: *U.S. EPA Region 4*

Chattanooga Creek, Chattanooga, Tennessee (Cont'd)



**TYPICAL MODIFIED RESTORATION
CHANNEL CROSS-SECTION**
NOT TO SCALE

Drawing by: Barge, Waggoner,
Sumner & Cannon

Creek Bed Excavation & Placement of Sacrificial Soil Layer



Completed Creek Section



Monitoring Events – November 2009/2010



Memorandum
Environmental and Water Resources Engineering
The University of Texas at Austin

From: Danny D. Reible
Date: September 20, 2011
Bettie Margaret Smith Chair of Environmental Health Engineering

Re: Report – Chattanooga Creek, TN 2010 sampling

“The conclusions of the sampling to-date is that the Chattanooga Creek remedy is effectively maintaining surface water concentrations below relevant surface water criteria. In addition, little change over the past 12 months has been noted in concentrations of PAHs in sediments or cap material suggesting that *no significant migration of contaminants is occurring up through cap material.*”



Handling/Installation Factors

Handling / Installation Advantages:

- Place directly through water column
- Self-compacts on bottom – hydration fills voids to create stable erosion resistant cap layer
- Conventional construction equipment used for placement
- Easy to confirm uniformity of installation (core samples)
- Handles like sand or gravel
- Can be manufactured on-site for significant cost savings



Summary – Q&A



As a Component of a Value-Added Remediation Strategy:

Post-Dredging Sediment Capping - An Alternative to Chasing Low / Unrealistic Residual Contamination Targets

Key Benefits to Lower Permeability or Adsorptive Material –

- Allows higher concentrations to be left in place
- Better protection from a thinner cap
- Effectively 'captures' dredge residuals - limits risk of residuals mixing with granular cap material
- Reduced Armor Requirement
- Addresses areas around piers and where debris exists
- Provides improved post-cap monitoring