

## TEST REPORT #12 HYDRAULIC CONDUCTIVITY OF A BLENDED BARRIER AQUABLOK FORMULATION

### Background

AquaBlok® is a patented, composite-aggregate technology resembling small stones and typically comprised of a dense aggregate core, clay or clay sized materials, and polymers (Figure 1). For typical formulations, AquaBlok's clay (sealant) component consists largely of bentonite clay. However, other clay minerals can be incorporated to meet project-specific needs.

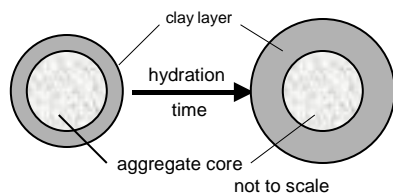


Figure 1. Configuration of Typical AquaBlok Particle.

AquaBlok particles expand when hydrated, with the degree of net vertical expansion determined largely by the formulation, application thickness, and salinity of hydrating water. When a mass of particles is hydrated, it coalesces into a continuous and relatively soft body of material. Once developed, the hydrated AquaBlok can act as an effective physical, hydraulic, and chemical barrier by virtue of its relatively cohesive and homogeneous character, low permeability to water, and chemically active (sorpitive) nature, which can be enhanced by the addition of reactive amendments.

### Typical Use of AquaBlok

For many projects, AquaBlok use generally involves applying dry masses of AquaBlok through the water and across the surface of contaminated sediments.

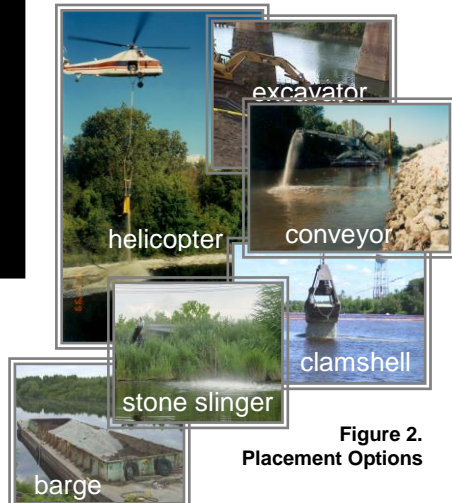


Figure 2. Placement Options

A variety of application methods have been implemented, such as: barges, clamshells, stone slingers, conveyors, and many more (Figure 2). The ease of placement and low permeability make AquaBlok a practical method for addressing contaminated sediments. A conventional AquaBlok cap consists entirely of AquaBlok particles and typically displays a permeability of approximately  $5 \times 10^{-9}$  cm/s.

### Blended Barrier Technology

A Blended Barrier cap is a cost-effective solution for:

- **situations where sediment contaminant levels are relatively low,**
- **for post-dredging capping of residual sediments.**

It has been established that mixing AquaBlok with readily available aggregates can create a "Blended Barrier" that does not significantly increase the permeability as compared to an AquaBlok only cap.



Figure 3. Permeability of Select Blended Barrier Formulations

AquaBlok Formulation	Aggregate Size	Resulting Blended Barrier Formulation <sup>1</sup>
#8 3070 FW	AASHTO #8	$2.32 \times 10^{-8}$
#8 3070 FW	AASHTO #57	$1.71 \times 10^{-8}$

1. Blended Barrier is comprised of 50% AquaBlok and 50% aggregate

This results in a very effective contaminated sediment cap for most applications that may be more cost effective than a standard AquaBlok only cap. Implementation of a Blended Barrier AquaBlok cap for lower budget applications, and/or in conjunction with dredging, can provide a barrier for contaminated residual sediment remaining in the uppermost biologically active layer of sediment, and help reestablish altered bottom contours.

Additionally, by varying AquaBlok and aggregate particle size, control over various properties of the cap can be obtained, thus creating a more versatile cap that can be easily engineered for project specific applications. Some examples of such caps are providing a low permeability layer at the sediment/cap interface with an armored layer at the cap/water interface, a geotechnically stable layer at the sediment cap interface with a

low permeability layer at the water cap interface, or a semi-permeable cap with pathways targeting contaminants to a treatment surface.

### Placement of a Blended Barrier Cap

Any of the previously noted placement methods are applicable for the placement of the "Blended Barrier" AquaBlok cap (Figure 2). For shallow water applications (<40 ft.), the mixing of AquaBlok and aggregate particles obtained from a local source is necessary prior to placement. For deep-water applications (>40 ft.) it may be necessary to utilize a modified placement method, alternating layers of AquaBlok and aggregate particles. When hydrated, the AquaBlok particles will infill the aggregate particles creating a relatively uniform barrier layer.

### An Application for Your Project

The innovation of Blended Barrier Technology creates a cost-effective, extremely versatile AquaBlok cap. Whether the goal is to create a barrier over contaminated sediments, reestablish bottom contours post-dredging, establish a contaminant free habitat for benthic organisms, create a semi-permeable reactive cap to treat contamination, or address the inflow of contaminated ground water into an aquatic system, an AquaBlok cap can be engineered for your unique application.



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Test reports also available on the website.

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