

AquaBlok® Installation Profile



Site Location: *US EPA Region 6*
Arkansas River – Tulsa, OK

Project Status: Completed Fall of 2012

Setting / Purpose: Freshwater river bank and sediments. Intermittent sheening (depending upon river level) has been observed at many locations along the river bank. Objective is to provide both adsorptive treatment materials in combination with a low-permeability cap to limit the migration of residual contaminants within the shoreline to the river. River bank stabilization was also accomplished with the design.



Contaminant(s) of Concern: DNAPL - PAHs (polynuclear aromatic hydrocarbons) from active refinery site.

AquaBlok Cap Design / Site Area: The site area comprised a number of different shoreline conditions and combinations of material. Both AquaBlok (low-permeability materials) and AquaGate® (permeable treatment materials) were incorporated into the design. Below is a summary description of some of the areas addressed together with photos of placement of materials.

Area A This segment consisted of approximately 1,200 feet of river bank with a steep slope (nearly 1 H :1 V) and a vertical drop from the crest of the slope to the river bank of approximately 30 feet. The river bank is heavily vegetated (estimated 30+ year old trees) and covered with demolition debris consisting of concrete, bricks, pipes, etc. In and amongst the demolition debris acid sludge has been observed in addition to river bank sheening. It was determined that Area A would receive a Horizontal Funnel & Gate capping system that consists of a permeable treatment system. No sub-base preparation would be performed, other than the removal of any woody debris, plants etc. from the shoreline capping area. Following this preparation, the AquaGate+Organoclay permeable treatment material would be placed along the base of the demo debris out into the river approximately 20 feet at an application rate of approximately 7 lb/SF directly over the existing sediment surface at a thickness of approximately 1 inches



Above – Demo Debris Area - Before



Above – Demo Debris Area - After

(+/- 0.5 inch). After placement of the permeable treatment layer, the low-permeability AquaBlok layer would be placed directly over the AquaGate+Organoclay with the material working back up the shoreline slope. Placement of the AquaBlok continued beyond the organoclay layer up over the existing demo debris. The application rate is estimated to be approximately 40 lb/SF to achieve a nominal 5 inch dry thickness (+/- 1.0 inch), which will swell when hydrated to achieve a final layer thickness greater than 6 inches.

Area B LNAPL: Approximately 400 feet downstream (west) of the river bank improvement project (just described) consists of a tiered slope that contains an intermediate access road. The access road is approximately 11 feet above the water level and slopes down at approximately 1.5 H : 1V to the river. In this area sheening has been observed from the river bank and also from the river bottom sand further away from the river bank (approximately 10-40 feet beyond the toe of the river bank slope). This sheening and petroleum (rainbow) staining may be indication that an LNAPL plume has reached the riverbank.



Above – Placement of AquaGate+Organoclay



Above – Close-up of Telebelt Material Placement



Above – View of Telebelt During Armor Stone Placement

It was determined that Area B would receive a Horizontal Funnel & Gate capping system of essentially the same construction as Area A above. No sub-base preparation would be performed. AquaGate+Organoclay permeable treatment material was placed along the base of the rip rap zone out into the river approximately 50 feet at an application rate of approximately 7 lb/SF directly over the existing sediment surface at a thickness of approximately 1 inches (+/- 0.5 inch). After placement of the AquaGate, a low-permeability AquaBlok layer was placed directly over the AquaGate with the material working back up the shoreline slope. The application rate is estimated to be approximately 40 lb/SF to achieve a nominal 5 inch dry thickness (+/- 1.0 inch), which will swell when hydrated to achieve a final layer thickness greater than 6 inches.

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Area C Rip Rap & LNAPL: Approximately 4-5 years ago a remediation project was completed in this area that included a river bank improvement (installation of clay, geotextile, and nominal 12-18 inch rip rap) along approximately 1,300 lineal feet of river bank. It has been determined that this approach failed as the result of observed sheening along a portion of the river bank. Sheening was observed at the toe of the slope and also emanating from the river bed sand approximately 10-20 feet beyond the toe of the slope. Some sheening was observed on the slope amongst the rip rap. This area is open and easily accessible, so it was determined that two approaches would be employed at this location. First, a layer of rip rap was removed and a layer of low permeability AquaBlok was placed along the slope of the shoreline as a means to cut-off seepage through the GCL and existing rip rap. Secondly, an attempt was made to place AquaBlok directly over and between the openings in the rip rap to determine if it would be possible to provide a low permeability barrier to prevent seepage without removal of the rip rap.



Left – Placement of AquaBlok Over Rip Rap
Below – Using Blower to Distribute AquaBlok



Current Status: Since the completion of installation of each of the above river segments, no visible sheen has been reported by the facility. Efforts are underway to perform further monitoring of the capping zones, but the areas addressed are considered to be successful in accomplishing the objectives outlined by the engineer and site owner.

