GENERAL SITE INFORMATION, CHARACTERISTICS, AND STATUS

Project Name	***OTTAWA RIVER - PROJECT 1 (Capping with AquaBlok™)***	***ProjectID:*** 05-19
Last Updated:	04/23/02	

City:	Toledo
County:	Lucas
State:	OH
Country:	USA
Bodies of Water:	Ottawa River; Maumee Bay; Lake Erie
US EPA Region:	V
Status (Active, Complete, or Monitoring Only):	Complete
Date On NPL:	N/A
ROD/ESD Date:	N/A
Operable Unit:	N/A
Areas of Concern (length or acres):	The AquaBlok™ application was studied across three contiguous areas totaling approximately 2.5 acres in the Ottawa River, at approximately River Mile 6. The 2.5-acre area was selected because it is the headwaters of a 5-mile stretch of contaminated river ("starting at the top"), because of its convenient access, and because it is located directly adjacent to the now-remediated Unnamed Tributary (Project ID 05-21).
Other Characteristics of Water Body:	The Ottawa River, in northwestern Ohio, flows into Maumee Bay at the far west end of Lake Erie. The 2.5-acre test area comprises a 0.2 mile long stretch of the river. The cofferdam installed at the mouth of the Unnamed Tributary will remain in place and abuts the central section of the test area. In this area of the river, average mid-depth flow rates are 0.3-0.6 fps with maximum instantaneous peak flows of 6-8 fps having been reported. Water depth in the middle of the river is typically 8-9 feet. The Ottawa River has a "drowned mouth" which creates estuarine conditions characterized by relatively rapid and significant changes in water levels as well as flow directions. Sediments are predominantly fine-grained (silts and clays). Net deposition reportedly occurs in this stretch of the river.
Contaminants of Concern:	PCBs, PAHs, heavy metals
Source of Contamination:	A variety of industrial facilities and landfills along the lower portion of the Ottawa River.
Contaminated Area Physical Characteristics:	Chemical analytical data from the Ohio EPA, collected in Fall 1998, indicate detectable or elevated levels of PCBs, RCRA metals, and phthalates in project-area sediments.
Type of Regulatory Action:	Final. Demonstration project, funded by a grant.
Overall Status Summary:	The demonstration project was funded by a grant from the Ohio Lake Erie Commission to the City of Toledo. The project consisted of installing sediment caps (barriers) in three contiguous sections totaling approximately 2.5 acres in the Ottawa River, just outside the mouth of the now-remediated Unnamed Tributary. The principal material used in cap construction was the AquaBlok™ composite aggregate particle system. AquaBlok™ is a clay mineral-based technology developed for in-situ capping of contaminated sediments. When deployed through the water column, AquaBlok™ settles across the sediment surface, hydrates and expands, and ultimately transforms from a layer of discrete particles into a homogeneous and cohesive, erosion-resistant mass atop the sediments. The plan included installation of a different cap design within each of the three river sections: the first cap comprising only AquaBlok™, the second cap comprising AquaBlok™ plus a geotextile, and the third cap comprising AquaBlok™, geotextile, and a protective surface layer of rock (one-inch diameter stone); total cap thicknesses were typically to range from about 5 to 8 inches, depending on cap design.

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Based on pre-capping field observations, the different cap designs would be exposed to spatially and temporally variable currents, scour patterns, bankslope conditions, and sediment thicknesses. For demonstration purposes, different air-, barge-, and shore-based cap deployment methods were to be used; air-based application would occur using a helicopter while barge- and/or shore-based applications would be performed using a telescoping conveyor system or clamshell bucket. A USACE permit was issued to the City of Toledo to conduct the project, which, after several delays, was set for early September 1999 (following collection of pre-capping benthic data by Ohio EPA). The estimated cost of the project was $230,000.

Application of the AquaBlok™ capping system to the Ottawa River was subsequently performed over a 3-week period in September 1999. Three sections of the river, designated as Sections A, B, and C, were capped, each using a unique cap design as described above. Three methods of application were used to apply the AquaBlok™ and armoring stone: (1) a conveyor (or telebelt), using both barge-and shore-based deployment methods; (2) a helicopter equipped with specially designed drop bags; and (3) a shore-based dragline (AquaBlok™ only) method. The target application rate for AquaBlok™ was 8.5 lbs per square foot of sediment surface area for an anticipated hydrated cap thickness of 5 to 6 inches.

Evaluation of the cap following installation included obtaining river-bottom elevations and comparing them with pre-application elevations at 297 survey points along 13 cross-river transects to verify the application thickness of the cap materials. In Sections A and B, 28 of 187 survey points exhibited a net negative change in river-bottom elevation, ranging from -1.34 feet to -0.01 feet (the most highly negative numbers being attributable to barge bottom dragging). The average cap thickness exhibited by the remaining 159 survey points was 4.9 inches. None of the 110 survey points measured in Section C exhibited a net negative change in elevation, and exhibited an average cap thickness of 5.7 inches. Manual probing of the capped areas using a piece of conduit indicated that AquaBlok™ was present at 91% of the 187 survey locations in Sections A and B, and at 98% of the 110 survey locations in Section C. In addition, river-bottom core samples were collected from Sections A and B in November 1999 to assist in post-capping evaluations. Forty-eight core samples were collected from 9 transect locations that reportedly showed little mixing of AquaBlok™ and sediment at their respective interface, a favorable outcome. Unit costs for each method of application, excluding peripheral and post-monitoring costs, are reportedly: shore-based conveyer: $0.80 per ft^2; barge-based conveyer: $1.04 per ft^2; shore-based drag line: $0.89 per ft^2; and helicopter: $1.20 per ft^2.

A monitoring program was performed for all three application areas that continued over a one-year period to evaluate and compare the integrity of the three cap designs. As described in Reference A-798:

“Survey results summarized for cap Sections A and B tend to indicate that estimated cap thickness one year after cap construction is slightly less than that estimated shortly after construction, and also somewhat below the targeted cap-thickness range for these sections. Qualitative probing across these cap sections indicated that AquaBlok™ was present within 103 of the 146 locations tested. Collectively, these results seem to imply some erosional loss of capping materials from some localized areas, particularly portions of Sections A and B that may be most influenced by high-flow conditions related to periodic discharges from the canal and/or culvert located at the west end of Section A.”

“In apparent contrast to results for cap Sections A and B, survey results for Section C tend to indicate that estimated cap thickness one year after cap construction remains more-or-less consistent with that estimated shortly after construction, and also comparable with the targeted

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cap-thickness range for this section; average cap thickness for Section C also remains greater than that for Sections A and B, as expected. Additionally, qualitative probing across Section C indicates the continued presence of stone and/or AquaBlok™ in all but one of the 59 survey locations probed. Collectively, these results indicate that: periodic high flow from the distal canal and culvert have minimal effect on this downstream cap section, the presence of the surficial stone layer minimized potential erosional losses from Section C, or both."

Studies are continuing to assess benthic colonization in the test areas over time. Post-capping macroinvertebrate data were collected in 2001 and will be collected again in 2004 for comparison with pre-capping benthic data.

Remedial Action Planned:	☑
Risk Assessment:	☐
Remedial Action Implemented:	☑
Status of Dredging	☐
PRPs:	☑
Contacts:	☑
References:	☑
Modeling:	☐
Fishing Advisory:	☑

Key Conditions: capping, Great Lakes AOC, pilot/demonstration test

REMEDIAL ACTION PLANNED

Project Name	***OTTAWA RIVER - PROJECT 1 (Capping with AquaBlok™)***	***ProjectID:*** 05-19
Last Updated:	01/11/00	

Target Sediment Cleanup Standards (TSCS): TSCSs have not been established for this project. Remediation is being undertaken as part of a demonstration project for an innovative type of sediment cap (AquaBlok™). The area selected for this study was based on existing hydrologic data for the study area and the presence of adjacent/upstream landfills and industrial activities.

How TSCS Established: N/A

Target Bank and Floodplain Cleanup Levels (if applicable): N/A

Other Target: N/A

Environmental Sample Data References:

- ***Sediment:***
- ***Water:***
- ***Fish:***

Estimated Target Volume: Sediment removal will not be performed as part of this demonstration project. Capping of three contiguous acres in the Ottawa River will be accomplished with AquaBlok™. Hydrated thicknesses in the 4 to 6 inch range and application rates of 14-16 pounds per square foot are anticipated.

Planned Disposal Method: N/A

Estimated Calendar Time to Implement Remedy: Anticipated to start in mid-June 1999; revised to early September 1999.

Estimated Time to Implement Remedy: 3-6 days

Estimated Cost to Implement Remedy: $230,000. In addition to costs for capping materials and installation, this estimate includes costs for pre-capping field investigations; bench-scale laboratory studies; preparation of plans for cap design, installation verification and field QC, and long-term cap monitoring; project reporting; and information dissemination. Furthermore, costs for this demonstration project are expected to be higher than for typical remedial projects in that this field demonstration incorporates multiple techniques for cap deployment as well as variable cap designs incorporating not only AquaBlok™, but also geotextile and stone capping components.

Stated Remedial Action Objectives (and Source): Demonstration project to ascertain the effectiveness of various methods of application and placement of AquaBlok™ in a riverine environment and the long-term effectiveness of AquaBlok™ to isolate contaminated sediments from the river system.

Measures of Success to be Used: The primary goal of the project is to assess the relative effectiveness of AquaBlok™ and AquaBlok™-based sediment caps in physically stabilizing or isolating contaminated sediments occurring in a riverine environment that may be subjected to ice thaws, heavy rainfall events, lake seiches, and cyclic inundation and exposure of channel sideslopes. Observations and field data will be evaluated over a twelve month period to confirm/correct empirical laboratory data as it relates to hypotheses of geotechnical and physical performance parameters. During this period, data relating to installation time frames, techniques, and costs will also be reviewed and extrapolated to provide relative cost estimates for larger projects. Projections will be made of the relative longevity/functionality of the material to determine relative maintenance periods and levels of effort necessary to maintain the barrier system effectiveness.

Sediment isolation/stabilization by capping, as well as benthic colonization of capped areas, will continue to be monitored over a five-year period. Positive results for long-term isolation/stabilization monitoring will include evidence of continued cap presence atop sediments across the demonstration area, as determined using indirect (elevational) and direct (coring) monitoring techniques. Further, macroinvertebrate community establishment above the encapsulated sediments over the five-year period will be characterized through comparing data collected from the capping area prior to cap installation to data collected from capped areas, and to data collected from an adjacent control area over time.

Planned Monitoring and Restoration: See "Measures of Success to be Used"

Agency Position on Sediment Removal (and Source):

REMEDIAL ACTION IMPLEMENTED

Project Name:	***OTTAWA RIVER - PROJECT 1 (Capping with AquaBlok™)***	***ProjectID:***	05-19
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Physical Target: Approximate 2.5-acre area in Ottawa River.

Goals: (Source: Reference M-189)
"The primary goal was to assess the relative effectiveness of AquaBlok™ and AquaBlok™-based sediment caps in physically stabilizing, or isolating, impacted sediments occurring in a riverine environment representative of many Great Lakes tributaries. It was also anticipated that significant knowledge would be gained pertaining to the utilization of different application techniques to accomplish product deployment, the adequacy of each technique in constructing targeted sediment-cap designs, and generalized unit costs associated for cap construction using each technique."

Primary Contractor: Hull & Associates, Inc. (Engineering/Environmental Consulting)

Other Contractors:

Generic Remediation Method: Capping

Equipment: Putzmeister Telebelt TB-105 on a barge (Telebelt capable of extending to 105' and swing 180 degrees side-to-side; helicopter equipped with specially-designed drop bags; dragline; rock box and barge; barge-mounted backhoe to load Telebelt hopper from barge-mounted rock box; misc. ground support equipment to transport, handle, and load AquaBlok™ and stone into barge-mounted rock box and helicopter drop bags.

Material Handling: Material handling procedures required for AquaBlok™ and armoring stone (Section C only) application using the barge-mounted Telebelt, in series, were: 1) delivery by dump truck; 2) using a crane to load AquaBlok™ on to a barge-mounted rock box for transport to the application barge; 3) transport of material in the rock box to the application barge (with mounted Telebelt); and 4) unloading of material from the rock box to the Telebelt hopper using a barge-mounted backhoe. Grids were used to establish areas of known size and the rock box (used to transport AquaBlok™ to the application barge) was loaded with sufficient AquaBlok™ to cover a selected grid area. The weight of the material loaded into the rock box was estimated from the increase in barge draft as the box was being loaded. Uniformity of application over each grid area was completely dependent on the skill of the Telebelt operator. The placement rate of AquaBlok™ using the large-mounted Telebelt is estimated at 8 tons/15 minutes. Assuming a density of 1.03 ton/cy for AquaBlok™, approximately 4.5 hours of deployment for each 8-hour shift, three shifts per day, the maximum daily application rate is estimated at 420 cy/day. The Telebelt was also used as a land-based unit to apply materials to the test area. The Telebelt was used to apply ~364 tons of AquaBlok™ across Sections A and B and nearshore areas of Section C and ~113 tons of armoring stone in Section C.

The primary method of application of AquaBlok™ to Section C was by helicopter (rented at $700.00 per day) and was performed seemingly haphazardly. Specially-designed drop bags capable of holding up to 3,900 pounds (maximum payload capacity of the helicopter) each of AquaBlok™ were attached to the helicopter for transport and release of AquaBlok™ pellets over the designated target area. Application was accomplished by opening the bottom of a single bag during a fly-by from ~40' above the river surface (measured to bottom of bag) and allowing the material to shower the river along linear-shaped, "swimming lane"-like transects parallel to the river flow. This process was repeated until sufficient AquaBlok™ was deposited to meet the specified application density of 8.5 pounds per ft^2. The helicopter was used to apply ~82 tons of AquaBlok™ and ~93 tons of armoring stone over the middle half-acre portion of Section C.

The Telebelt operator and helicopter pilot had previously "practiced" application of the AquaBlok™ at an existing nearby landfill prior to the start of the demonstration project. The "practice" was used to verify the required application rate over a predefined area using the Telebelt

	and the flight speed and drop height necessary (helicopter) to achieve the specified application density of 8.5 lb. per ft² of AquaBlok™. A land-based dragline (clamshell bucket) was used to apply ~15 tons of AquaBlok™ to a one-tenth acre portion of Sections A and B. The armoring stone applied to Section C was Ohio Dept. of Transportation #4 aggregate.
Volume Removed:	N/A
Calendar Time:	September 1999
Time To Implement:	3 weeks
Total Cost:	Unit costs for cap construction, including material costs, are as follows: shore-based conveyor: $0.80 per ft²; shore-based dragline: $0.89 per ft²; barge-based conveyor: $1.04 per ft²; and helicopter: $1.20 per ft². These costs do not include costs associated with project planning and management, preliminary laboratory studies, cap design, permitting, QC monitoring during cap construction and during long-term performance monitoring, and cap maintenance.
Dredging Cost:	N/A
Disposal of Sediment:	N/A
Volume of Water:	N/A
Method of Water Treatment:	N/A
Water Discharge Limit:	N/A
Air Monitoring During Remediation:	Not conducted
Water Monitoring During Remediation:	Not conducted
Outcome:	Application results for both AquaBlok™ and armoring stone are as follows (Source: Reference M-189): AquaBlok™: • Telebelt: Quantity applied = 364 tons; Area covered = 1.92 acres; Average application rate = 8.7 lbs/ft². • Helicopter: Quantity applied = 82 tons; Area covered = 0.46 acres; Average application rate = 8.2 lbs/ft². • Dragline: Quantity applied = 15 tons; Area covered = 0.087 acres; Average application rate = 7.9 lbs/ft². Stone: • Telebelt: Quantity applied = 113 tons; Area covered = 0.46 acres; Average application rate = 11.3 lbs/ft². • Helicopter: Quantity applied = 93 tons; Area covered = 0.35 acres; Average application rate = 12.2 lbs/ft².

From Reference M-189:
"Following cap construction, river-bottom elevations were determined at a total of 297 points along 13 cross-river transects (at approximately five-foot intervals) which are situated across and at the borders of all three capping sections. Elevational surveys were conducted using a footed probe and standard station-survey methods. Post-cap survey data were then quantitatively compared to river-bottom elevations determined in the same locations just prior to cap installation in order to determine net elevation increases at each surveyed location, thus providing an indication of hydrated cap thickness. To establish the degree of vertical error that could be associated with such a comparison of survey measurements, pre- and post-cap surveys were also conducted at a total of 17 points along a "control" transect outside of the capping area. Survey results for transects across capping Sections A and B and across capping Section C are as follows:"

- Sections A and B: Total Number of Survey Points = 159; Mean Elevation Increase (cap thickness) = 4.9 inches; Standard Deviation = 2.9 inches; 99% Confidence Interval About Mean = 4.3 to 5.5 inches; and Targeted Cap Thickness = 5 to 6 inches. (Note: A total of 187 transect points were surveyed across Sections A and B. However, 28 of the points indicated a net negative change in river bottom elevation and were excluded from these calculations.)

- Section C: Total Number of Survey Points = 110; Mean Elevation Increase (cap thickness) = 5.7 inches; Standard Deviation = 2.8 inches; 99% Confidence Interval About Mean = 5.0 to 6.4 inches; and Targeted Cap Thickness = 5 to 8 inches.

From Reference M-189:
"Survey results were corroborated by probing the capped river-bottom with a conduit within each surveyed location to qualitatively establish the presence of AquaBlok™ and/or stone capping material. Qualitative probing across Sections A and B indicated that AquaBlok™ was present within all but 17 of the 187 survey locations (including the majority of the river-bottom areas presumably impacted by the barge), whereas stone and/or AquaBlok™ were present within all but two of the 110 survey locations across Section C."

In addition, 44 river-bottom core samples were collected with assistance from the faculty of the University of Toledo. The core samples were taken from across Sections A and B to assist with post-capping assessments of cap thickness and physical mixing at the cap/sediment interface. Forty-one of the 44 core samples retrieved from Sections A and B contained measurable AquaBlok™. An evaluation of the measured thickness of recovered AquaBlok™ from the sediment coring study indicated the mean thickness of the 41 recovered cap samples, adjusted for compression, was 4.0 inches. This compares to the targeted constructed cap thickness of 5 to 6 inches. From Reference A-798, “Considered collectively, these statistical data tend to indicate that cap thicknesses across Sections A and B measured shortly after construction were slightly below the typical targeted cap thickness range of 5 to 6 inches.”

Restoration and Post-Monitoring:

Monitoring of cap integrity will be performed by Hull & Associates for a minimum of one year. In addition, the recolonization of benthic communities on the cap surface will be monitored and compared to baseline pre-demonstration project levels by Ohio EPA.

Field investigations were conducted by Hull and Associates in October/November 2000, approximately 13 months after cap construction. The purpose of the investigation was to characterize cap conditions approximately one year after construction. Results of the survey-based cap thickness determination for Sections A and B showed a mean surveyed cap thickness of 3.9 inches, compared to 4.9 inches immediately after construction. According to Reference A-798, “. . . these results seem to imply some erosional loss of capping materials from some localized areas, particularly portions of Sections A and B that may be most influenced by high-flow conditions

related to periodic discharges from the canal and/or culvert located at the west end of Section A." The mean survey based cap thickness in Section C was determined to be 5.2 inches one year after construction, compared to 5.7 inches shortly after construction. Reference A-798 also states, ". . . these results indicate that: periodic high flow from the distal canal and culvert have minimal effect on this downstream cap section, the presence of the surficial stone layer minimizes potential erosional losses from Section C, or both." Sediment cores used to measure cap thickness also displayed slightly decreased cap thicknesses one year after construction. The mean core-based cap thickness was determined to be 3.6 inches (adjusted for compression) and 2.8 inches (not adjusted), compared to an adjusted mean cap thickness of 4.0 inches immediately after construction.

Site-Specific Difficulties:

- Some degree of downward AquaBlok™ hydration into the capped sediment surface likely occurred in all three targeted sections, which could explain average elevational increases occurring towards the low end of the targeted cap-thickness range. The surficial stone-layer component of the Section C cap may also have experienced some degree of settling into the underlying AquaBlok™ component (thus causing elevation changes).

- As described in Reference M-189: "28 out of the total 187 survey points across Sections A and B indicated a net negative change in river-bottom elevation, ranging from -1.34 feet to -0.01 feet (average of -0.33 feet); no such negative changes were observed at any of the 110 survey points across Section C. Although some of these negative values could reflect typical vertical error, most more highly negative values are likely due to the barge dragging the bottom in localized, shallower areas of Sections A and B during set-up stages of the Project (i.e., prior to cap construction). The water surface elevation of the Ottawa River during application was at a significant low relative to that during inception of the Project."

- No methods were used to control resuspension of sediments during the application of AquaBlok™. Resuspension of sediment was observed in the project video during application using both the Putzmeister Telebelt and helicopter methods.

- Low flow conditions in the river made maneuvering the barge loaded with the Telebelt to the location of the demonstration project difficult due to reduced channel width and water depth. Low flow conditions were most likely advantageous during application of AquaBlok™ by creating more stable barge conditions and lowering the potential for uncontrolled broadcasting of the material through the water column.

Monitoring Data References: N/A

- ***Sediment***
- ***Water:***
- ***Fish:***

POTENTIALLY RESPONSIBLE PARTIES

Project Name ***OTTAWA RIVER - PROJECT 1 (Capping with AquaBlok™)*** ***ProjectID:*** 05-19

PRP Name: **PRP INFORMATION NOT RELEASED** ***PRPID:***

Street Address:

City:

State:

KEY CONTACTS

Project Name ***OTTAWA RIVER - PROJECT 1 (Capping with AquaBlok™)*** ***ProjectID:*** 05-19

Last Name: **KEY CONTACT INFORMATION NOT RELEASED** ***Contact ID:***

First Name:

Title:

Company:

Address:

City:

State:

Postal Code:

Work Phone # : ***Other Phone #:***

Fax # :

Email Address:

Project Name ***OTTAWA RIVER - PROJECT 1 (Capping with AquaBlok™)*** ***ProjectID:*** 05-19

ReferenceID: 798

Reference Type:	A
Title:	***Summary Report of the Ottawa River Aquablok Application Demonstration***
Location:	AEM
Category:	Capping/Placement
Prepared by/Author:	Hull & Associates, Inc
Preparer/Author Address:	3401 Glendale Avenue, Suite 300 Toledo, OH 43614
Prepared For:	The City of Toledo, Toledo, OH 43604
Date Published:	December 2000
Key Words and Phrases:	

ReferenceID: 799

Reference Type:	A
Title:	***Pre-Capping Characterization of the Macroinvertebrate Community***
Location:	BBL
Category:	Capping/Placement
Prepared by/Author:	Hull & Associates, Inc.
Preparer/Author Address:	3401 Glendale Avenue, Suite 300 Toledo, OH 43614
Prepared For:	The City of Toledo, Toledo, OH 43604
Date Published:	March 2000
Key Words and Phrases:	

ReferenceID: 959

Reference Type:	A
Title:	***Fish Tissue Study of the Ottawa River 1999***
Location:	AEM
Category:	Fish/Biota
Prepared by/Author:	State of Ohio Environmental Protection Agency
Preparer/Author Address:	Division of Surface Water Lazarus Government Center 122 South Front Street Columbus , Ohio 43215
Prepared For:	State of Ohio Environmental Protection Agency Division of Emergency and Remedial Response
Date Published:	February 18, 2000
Key Words and Phrases:	

Project Name ***OTTAWA RIVER - PROJECT 1 (Capping with AquaBlok™)*** ***ProjectID:*** 05-19

Reference Type: A ***ReferenceID:*** 960

Title: ***Ottawa River Restoration Project - - Characterization of the Macroinvertebrate Community Two Years After Installation of Aquablok -Based Sediment Caps***

Location: AEM

Category: Monitoring, Post

Prepared by/Author: Hull & Associates, Inc.

Preparer/Author Address: Toledo, Ohio

Prepared For: The City of Toledo
One Government Center, Suite 1970
Toledo, Ohio 43604

Date Published: June 2002

Key Words and Phrases:

Reference Type: C ***ReferenceID:*** 9

Title: ***Ohio river tests remedy***

Location: AEM

Category: Site Update

Prepared by/Author:

Preparer/Author Address:

Prepared For: Superfund Week

Date Published: November 14, 1997

Key Words and Phrases:

Project Name ***OTTAWA RIVER - PROJECT 1 (Capping with AquaBlok™)*** ***ProjectID:*** 05-19

Reference Type: C ***ReferenceID:*** 268

Title: ***Evaluating a New In-Situ Capping Technology for Mitigating Contaminated Sediments***

Location: AEM

Category: Capping/Placement

Prepared by/Author: (1) J.H. Hull, (2) J.M. Jersak, (3) P.A. Pochop, and (4) J.L. Cummings

Preparer/Author Address: (1 and 2) Hull & Associates, Inc. (OH),
(3 and 4) National Wildlife Research Center (CO)

Prepared For: World Dredging Congress XV (Las Vegas)

Date Published: June 1998

Key Words and Phrases:

Reference Type: E ***ReferenceID:*** 132

Title: ***Sediment Management Seminar 2000 Proceedings (Reference E-121)***

Location: AEM

Category: Dredging: Remedial (Contaminated Sediments)

Prepared by/Author: Blasland, Bouck & Lee, Inc.

Preparer/Author Address: 6723 Towpath Road
P.O. Box 66
Syracuse, NY 13214

Prepared For: Attendees

Date Published: February 10-11, 2000

Key Words and Phrases:

Reference Type: K ***ReferenceID:*** 5

Title: ***Ottawa River AquaBlok Demonstration Capping Project***

Location: AEM

Category: Capping/Placement

Prepared by/Author: AquaBlok, Ltd.

Preparer/Author Address: Corporate / R & D Office
3401 Glendale Avenue, Suite 300
Toledo, OH 43614

Prepared For: General Distribution

Date Published: March 2, 2000

Key Words and Phrases:

Project Name ***OTTAWA RIVER - PROJECT 1 (Capping with AquaBlok™)*** ***ProjectID:*** 05-19

ReferenceID: 54

Reference Type:	L
Title:	***Memo re: Tour of AquaBlok Capping Demonstration Project on the Ottawa River***
Location:	AEM
Category:	Capping/Placement
Prepared by/Author:	AEM, Inc. (Hammaker)
Preparer/Author Address:	Malvern, PA 19355
Prepared For:	Distribution
Date Published:	October 5, 1999
Key Words and Phrases:	

ReferenceID: 116

Reference Type:	L
Title:	***Sediment Remediation Projects in the U.S. Using Capping or Burial***
Location:	AEM
Category:	Capping/Placement
Prepared by/Author:	AEM, Inc.
Preparer/Author Address:	
Prepared For:	Distribution
Date Published:	September 25, 2001
Key Words and Phrases:	

ReferenceID: 12

Reference Type:	M
Title:	***AquaBlok IN SITU Technology and the Possibility of a Field Visit***
Location:	AEM
Category:	Capping/Placement
Prepared by/Author:	Jersak, Joseph M.; Hull, John (Presenters)
Preparer/Author Address:	Hull & Associates, Inc.
Prepared For:	Remediation Technologies Development Forum on Sediments Remediation; Meeting Minutes
Date Published:	May 25, 1999
Key Words and Phrases:	

Project Name ***OTTAWA RIVER - PROJECT 1 (Capping with AquaBlok™)*** ***ProjectID:*** 05-19

Reference Type: M ***ReferenceID:*** 100

Title: ***Ottawa River Restoration Project: Implementation of Remedial Technique to Address PCB Contamination Adjacent to the Ottawa River***

Location: BBL

Category: Capping/Placement

Prepared by/Author: City of Toledo

Preparer/Author Address:

Prepared For: Lake Erie Protection Fund Grant Application

Date Published: June 20, 1997

Key Words and Phrases:

Reference Type: M ***ReferenceID:*** 168

Title: ***Examination of a New Remedial Technology for Capping Contaminated Sediments: Large-Scale Laboratory Evaluation of Sediment Mixing and Cap Resistance to Erosive Forces***

Location: AEM

Category: Capping/Placement

Prepared by/Author: (1) John H. Hull, (2) Joseph M. Jersak and (3) Blair J. McDonald

Preparer/Author Address: (1 and 2) Hull & Associates, Inc.
Toledo, OH
(3) University of Toledo
Toledo, OH

Prepared For: Remediation

Date Published: 1998 Summer

Key Words and Phrases:

Project Name ***OTTAWA RIVER - PROJECT 1 (Capping with AquaBlok™)*** ***ProjectID:*** 05-19

ReferenceID: 189

Reference Type:	M
Title:	***Interim Report of the Ottawa River AquaBlok™ Application Demonstration***
Location:	AEM
Category:	Capping/Placement
Prepared by/Author:	Hull & Associates, Inc.
Preparer/Author Address:	3401 Glendale Avenue, Suite 300 Toledo, OH 43614
Prepared For:	The City of Toledo
Date Published:	October 1999
Key Words and Phrases:	

ReferenceID: 191

Reference Type:	M
Title:	***Sediment Capping Demonstration Project on the Ottawa River: An Impacted Lake Erie Tributary***
Location:	AEM
Category:	Capping/Placement
Prepared by/Author:	J.H. Hull, P.B. Hotz, and J.M. Jersak
Preparer/Author Address:	Hull & Associates, Inc. 3401 Glendale Avenue, Suite 300 Toledo, OH 43614
Prepared For:	WEDA Midwest Chapter, presented to
Date Published:	January 19-21, 2000
Key Words and Phrases:	

Project Name ***OTTAWA RIVER - PROJECT 1 (Capping with AquaBlok™)*** ***ProjectID:*** 05-19

Advisory:	Ottawa River	***AdvisoryID:***	1046
Extent:	All waters (Lima)		
Pollutant:	PCBs (total)		
Species:	catfish-channel		
Population:	RGP		
Population Definition:	Restricted Consumption-General Population: Advises the general population to restrict the size of the organisms and/or the frequency of meals consumed.		
Advisory Type:	River	***Advisory Number:***	4825
Status (Active or Rescinded):	Active	***Date Rescinded:***	
Contact Name:	Robert Johnson	***Contact Number:***	614-644-6447

Advisory:	Ottawa River	***AdvisoryID:***	292
Extent:	I-475 North of Wildwood Preserve (Toledo) to Maumee Bay, Lake Erie (19 miles) [04-300]		
Pollutant:	PCBs (total)		
Species:	all fish		
Population:	NCGP		
Population Definition:	No Consumption-General Population: Advise against consumption by the general population.		
Advisory Type:	River	***Advisory Number:***	784
Status (Active or Rescinded):	Active	***Date Rescinded:***	
Contact Name:	Robert Johnson	***Contact Number:***	614-644-6447