

Mid-Atlantic Contaminated Sediment/Soils Symposium

Sampling, Testing, Remediation and Disposal Strategies



March 24, 2010

9:00 a.m. to 5:00 p.m.

Liberty House Restaurant

Jersey City, New Jersey

Hosted by:

Aqua Survey, Inc.

The Sediment Experts

Over the past 35 years Aqua Survey, Inc. has collected and tested thousands of sediment cores and has performed hundreds of sediment toxicology studies here in the region. Our team of professional mariners, geophysicists and environmental scientists are almost always the first to know when a client's sample has contaminant "issues." When we report this data to our clients or their representatives, we are often asked, "What are our options?" and then, "Do you have any idea how much they cost today?" This one-day symposium has been designed to answer these questions and others you may have.

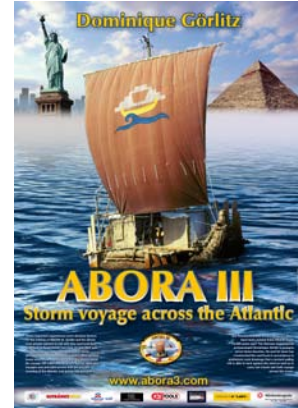


Symposium Agenda

Time	Presentations/Activities
7:30 a.m.	<i>Registration Opens</i>
8:00-9:00 a.m.	<i>Registration/Breakfast/Networking</i>
9:00-9:15 a.m.	Ken Hayes – Aqua Survey, Inc. Welcome and Introductions
9:15-9:40 a.m.	Eric Stern- U.S. EPA Region 2 Innovative Sediment Decontamination Processing/Management and their Application to Integrated Sustainable Systems
9:40-10:05 a.m.	Philip Spadaro – Arcadis U.S. Inc. A Survey of the Current Approaches to Contaminated Sediment Remediation in Various Countries
10:05-10:30 a.m.	Guy Pomphrey and Stany Pensaert – DEC/DEME Group How to Approach Complex Remediation Projects: Some European Examples
10:30-10:45 a.m.	Break – 15 minutes
10:45-11:10 a.m.	Ric Traver – CH2M Hill Treatment Methods for the Remediation of Contaminated Soils at the London Brownfield Redevelopment Site
11:10-11:35 a.m.	Bill Priore – GeoSyntec Consultants Robust Delineation of Contamination for Remedial Design Planning to Minimize Uncertainties for Project Execution
11:35-12:00 a.m.	Tom Fikslin – Delaware River Basin Commission The Role of Sediments in Managing PCBs in the Delaware Estuary
12:00-1:30 p.m.	Lunch - Dominique Görlitz – <i>guest speaker</i> Columbus – Did He Only Re-Discover America? ABORA III Delivers New Evidence For Prehistoric Atlantic Voyages
1:30-1:45 p.m.	Ken Hayes – Aqua Survey, Inc. Summary and Comments
1:45-2:10 p.m.	Bob Engler – Moffat & Nichol Contaminated Sediments/Soils: The Good, The Bad, and The Ugly
2:10-2:35 p.m.	Mary Sorensen – Environ Corporation Chromium in Estuarine Environments: Geochemical Influences on Toxicity
2:35-3:00 p.m.	Lyle Trumbull – O'Brien & Gere Engineers Investigation of the Ecological Risk Associated with the Groundwater /Sediment/Surface Water Interactions at a Mid-Atlantic Superfund Site
3:00-3:25 p.m.	Scott Douglas – NJDOT / Office of Marine Resources Beneficial Use of Dredged Material in New Jersey - a Decade of Experience with Contaminated Sediment and Site Remediation
3:25-3:40 p.m.	Break – 15 minutes
3:40-4:05 p.m.	Dennis Grubb – Schnabel Engineering Evaluating the Properties of Dredged Material-Steel Slag Fines (DM-SSF) Blends for the Maryland Port Administration
4:05-4:30 p.m.	Bill Potter – demaximis Contaminated Sediment Sites: Challenges in Working in An Urban River Setting
4:30-5:00 p.m.	Discussion – 30 minutes



Guest Luncheon Speaker:
– Dominique Görlitz



Dominique Görlitz and Ken Hayes enjoy the calm before the Abora 3 heads out into the Atlantic to begin its trans-Atlantic voyage.

- name:** Dominique Görlitz, project manager / expedition leader
profession: Botanist & experimental archeologist.
nationality: Chemnitz, Germany
age: 41
background: Experimental archeology, botanies and botanical geographer, currently concluding a Ph.D. at the University of Bonn on intercontinental seed-spreading in cooperation with the IPK Gatersleben.
sailing experience: Probably the most experienced reed-boats-man alive. Started sailing as a kid and has skippered a large number of boats apart from reed-boats.
web: www.abora3.com www.abora.eu
motivational quote: "I hope to collect the ultimate evidence that advanced navigation took place during pre-historic times."

Columbus – Did he only re-discover America?

ABORA III DELIVERS NEW EVIDENCE FOR PREHISTORIC ATLANTIC VOYAGES

The Message

Moving to every corner of the earth. Finding places. Arriving. Orientation and communication have secured our survival for all ages. The better we master both, the further we can travel. Today we live in a world without distances. The world is called a global village, because technology has transformed world travel into a mere stone's throw. But the global village community may be much older than we tend to believe. Perhaps the cornerstone to that global village was laid by people of the Stone Age? And have oceans really been barriers, or rather bridges between the continents?

The ABORA III Expedition

For that precise reason, a prehistoric yardarm sailboat was to cross the North Atlantic, something deemed impossible in our modern age, to prove that people of the stone ages could have mastered this voyage. As opposed to the Southern route, which Thor Heyerdahl chose for his famous East-

West expedition on RA II, the northern Gulf Stream is not supported by uniform winds and currents. ABORA III could only accomplish its mission by cruising against the wind in pursuit of its destination after leaving New York. And this had never been tried before!

The expedition travelled 2,410 nautical miles in the span of 56 days, the majority of those miles against the wind. From August on the expedition had to face low pressure systems of unusual frequency and intensity. Several heavy storms, two of them peaking at 10 bft, were ridden out well by the prehistoric sailing raft. A third one shook the ABORA III for three days 800 miles away from the Azores, and the stern was heavily damaged. The team subsequently cut this part of the boat loose and rebuilt the reed hull in the middle of the ocean. The helm bridge was redesigned and the mast trim adjusted according to ancient Egyptian temple images. Thus regaining manoeuvrability of the previously impaired ship, the expedition managed to travel another 220 miles under sail. But after three weeks of waiting in vain for the much-desired high pressure area, it was unlikely that the weather would improve within the two or three more weeks needed to reach the Azores. More likely, further heavy lows were lying ahead. For that reason the crew had to quit the experiment about 550 nautical miles away from the Azores. They have answered many important questions and already reached the expedition's goals. The results prove that a prehistoric sailboat offers the potential to cross the Atlantic in West-East direction. All experiences and the crew's observations point in that direction.

Transatlantic Voyages in Antiquity

Evidence is mounting through scientific research that the American twin continent was not exclusively populated along the Bering Strait as well as much earlier than previously thought as well. There are strong indications that Columbus wasn't the first visitor from the "Old World". Findings of substances and plant residues in Egyptian mummies which originate from the Americas are strongly suggesting that trade relations between both hemispheres existed in much earlier times. The newest DNA sequencing in domesticated crops proves that people have travelled back and forth on the Atlantic as early as 13.000 years ago. The nautical archaeologist and vegetation geographer Dominique Görlitz was able to gather new evidence with this expedition, suggesting that these trade routes had been established well before the alleged beginning of seafaring. Mobility, trade and communication – the exchange of goods and services has been the primary urge of mankind from the very beginning! This message is related to the historic understanding of our modern age through this expedition. And this enterprise can prove how the desire for adventure and travel, exploration and team spirit as well as scientific collaboration can form a true symbiosis.

Speaker Abstracts and Bios

Innovative Sediment Decontamination Processing/Management And their Application to Integrated Sustainable Systems

Eric A. Stern

U.S. Environmental Protection Agency – Region 2

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Since 1994, the U.S. Environmental Protection Agency, New York (EPA) and the New Jersey Department of Transportation (NJDOT) working in partnership with the U.S. Department of Energy – Brookhaven National Laboratory have designed and implemented a multi-faceted demonstration program to evaluate innovative ex-situ sediment decontamination technologies with beneficial use applications to manage dredged materials and contaminated sediments. The program focused on technologies that would have the capability to process sediments on a commercial-scale level (380,000 m³/yr utilizing an integrated *treatment train* approach. Over twenty different processes/companies have participated over the life-span of the program. Technologies were evaluated on their ability to treat complex and varied contamination (physical) concentrations, environmental and economic impacts, public acceptance, and beneficial use applications. Sediment taken from moderately contaminated navigation dredging projects as well as a more highly contaminated Superfund project from the Passaic River, NJ was evaluated. Beneficial use products included manufactured soil, construction-grade cement, lightweight aggregate, composite bricks, and geo-technical structural fill. EPA and its partners, has realized that the technologies demonstrated form the basis of a holistic, cross-program integrated management and recycling approach for contaminated sediments in general – thus the program needed to re-invent itself several times since its inception to encompass navigational dredged material and Superfund remediation sediments – from a long-term volume stream and cross-program applications. This is because on a commercial-scale level, ex-situ technologies need to be cost-competitive with other disposal/placement options of a contaminated sediment management plan such as stabilization/solidification, Confined Disposal Facilities (CDFs), Confined Aquatic Disposal Facilities (CADs), mine reclamation, landfills and geotubes. Sediment treatment should be integrated into all these options in order to be aligned with more sustainable, renewable - restoration approaches to contaminated sediment management. Nearly fifteen years in development, economic costing for sediment treatment have also become more closely aligned with other options today since through the evaluation of full-scale analytical and process engineering/design data contributed to a more rigorous economic analysis for commercialization and venture capital interest. Life Cycle Assessment as part of long-term sustainable approaches (and monitoring) needs to be considered in regard to long-term environmental benefits. Continuation in development of an integrated NY/NJ Regional Processing Facility with beneficial use applications for navigational dredged material/contaminated sediment should be considered especially in light of on-going and recently designated Superfund listings such as Gowanus Canal will require a different approach in determining integrated solutions to complex environmental problems - it will require an eco-behavioral understanding towards change.

Eric A. Stern – Career Biography

Eric A. Stern is an Environmental Scientist/Oceanographer with the United States Environmental Protection Agency (EPA), Region 2 (New York), Division of Environmental Protection and Planning – Dredging, Sediments and Ocean’s Team. His specialization is in contaminated sediments and dredged material assessment/management, integrated sediment decontamination innovative technology development, beneficial use of sediments, and Regional (urban) Sediment Management.

From 1986-1990, Stern was an Oceanographer for the U.S. Army Corps of Engineers, New York District Operations Division (USACE). He was the project manager for ocean monitoring, environmental assessment and management of the NY/NJ Dredged Material Ocean Disposal Site located in the coastal New York Bight Atlantic Ocean. His oversight and fieldwork activities included geophysical, biological, and chemical survey work and assessment, as well as design and implementation of technical studies related to the designation of a new ocean dredged material disposal site in the NY Bight. He was the USACE project manager for the Federal Interagency Dioxin Dredged Material Steering Committee, which was the first working group of its kind formed to evaluate and develop dioxin contaminated sediment guidelines for federal navigation projects — specifically the Kill van Kull / Newark Bay Federal Channel Deepening Project. While at the USACE, Stern was involved in dredged material evaluations and all aspects of contaminated sediment environmental management for the Port of NY/NJ. His expertise in sediment management was valued by other USACE Districts, Port Authorities, and EPA.

Since 1990 to present, Stern has worked for EPA Region 2. From 1990-1993 he held the position of Oceanographer managing both the Delaware Estuary Program and the Long Island Sound Study, both of regional environmental significance in the EPA National Estuary Program. In both of these programs, he focused on sediment cross-media toxic contamination. Since 1993, he has served as the Regional Contaminated Sediment Program Manager for EPA, where he directed, under authority of the federal Water Resources Development Act (WRDA), the *NY/NJ Harbor Sediment Decontamination Program*. The program is charged to demonstrate the environmental and economic feasibility of decontaminating dredged materials / contaminated sediments from the Port of NY/NJ with beneficial use end products on a commercial-scale level of at least 285,000 cubic meters/year. The WRDA Program involved a partnership with the New Jersey Department of Transportation Office of Maritime Resources (DOT), and the Department of Energy - Brookhaven National Laboratory. Together, EPA and the DOT sediment decontamination programs, obligated \$42 million regionally towards treatment technology development with beneficial use applications. The Program has seeded technical transfer to other ports/regions with contaminated sediment challenges such as Puget Sound, Port of Seattle - Washington, Port of Baltimore, Port of Bridgeport – Connecticut, Portland Harbor - Oregon, Hong Kong Harbor, Shanghai, Latvia, Norway, Krakow (Poland), and the Port of Venice (Italy). Stern is an active member of the European Union Sediment Network Research (SedNet) and was a participant/contributor to the SedNet Treatment/Remediation Workgroup. He has been a keynote and invited speaker on a global venue in the subject area of sediment treatment/sustainability and integrated sediment management.

In addition, Stern works closely with EPA Superfund and other EPA regions nationally as well as the USACE districts on contaminated sediment regional projects. Projects of significance include the Passaic River, NJ, Gowanus Canal, and Newtown Creek, NY. He works closely with the EPA Great Lakes National Program Office on sediment technology development and the development of regional sediment treatment processing centers.

Stern has a faculty appointment at Montclair State University, Montclair, NJ as a Research Associate Professor in the Graduate Department of Earth and Environmental Studies, and the Doctoral Program in Environmental Management. His applied interests includes integrated contaminated sediment management, urban and Regional Sediment Management, beneficial use applications of dredged material and post-treated contaminated sediments, sediment sustainability, development of integrated system approaches to managing contaminated sediments coupled with innovative decontamination treatment technologies (ex and in-situ) and multi-media waste to energy technologies with beneficial use applications.

A Survey of the Current Approaches to Contaminated Sediment Remediation in Various Countries

Philip A. Spadaro

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ABSTRACT

Contaminated sediment remediation is becoming more common throughout the world. Ongoing projects can be found in several European Countries, Israel, Brazil, Australia, and throughout North America. It is an appropriate time to reflect on the developments in this field and the variety of approaches currently in use around the world. In particular, we should consider the following:

- What are the various triggering circumstances for contaminated sediment remediation?
- What regulatory frameworks are in use or under consideration?
- What scientific approaches to evaluate risk are in use?
- What technologies are in active use or planning stages?
- Who is paying for the work?

Through this survey of approaches we can develop a snapshot of our current state of the industry and evaluate the need for and value of additional development of the approaches and technologies.

BIOGRAPHY

Mr. Spadaro advises industrial, municipal, and port authority clients on matters related to sediment cleanup and waterfront redevelopment in North America, South America, Europe, and the Middle East. He is a Senior Vice President and Chief Scientist for the Waterfront and Sediment Division of ARCADIS. He has more than 25 years of experience in sediment management, fate and transport of contaminants in estuarine, riverine, and marine aquatic environments, and in the siting, design, permitting, and construction of confined disposal facilities. His academic background is in environmental chemistry.

How to approach complex remediation projects: some European examples

Stany Pensaert and Guy Pomphrey

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Abstract

Large and complex remediation projects are often multidisciplinary and require the expertise mixture of scientific, technical, operational, regulatory and financial involvement. In order to prepare and design such projects in a way that the client's and authorities' requirements are fulfilled satisfactory, all the expertise should be involved from the beginning. In remediation projects this is translated into the 'early contractor involvement' principle, where the client prequalifies and invites a specialised contractor to participate in the design engineer team. This presentation will cover and illustrate some of these projects, as carried out in Europe.

Biography

As a metallurgical engineer, Stany Pensaert started fifteen years ago for DEC in the development of treatment plants for heavy metal contaminated groundwaters. After being involved in a variety of groundwater and soil remediation projects in Belgium, Nigeria and Gabon, he set up the research and development department within DEC NV – which was quite unique at the time for an environmental contracting company. Since ten years Stany is responsible for the R&D team comprising seven engineers and scientists now. This team gives technological and scientific support from tender to execution of complex soil remediation and sediment treatment projects worldwide.

Mr. Guy Pomphrey a Civil Engineer with more than 25 years of experience is the UK and Ireland Manager for DEC NV, one of Europe's leading Environmental Contractors. Part of DEME Group DEC is specialised in environmental dredging, dewatering and treatment of contaminated soil, sludges and sediments. Following a number of international assignments within the DEME Group Guy joined DEC in 2000 with the task of entering the UK and Irish markets. DEC are currently Tier 2 contractors operating the soil treatment facility on the southern part of the London 2012 Olympics site and the company is also leading the consortium cleaning up The Avenue Coking Works in Chesterfield which is sometimes named as Europe's most contaminated site. For the last few months Guy has been exploring the potential for DEC in the US and Canadian markets.

At the moment DEC NV is a European market leader in soil and groundwater remediation, soil treatment, sediment treatment and landfill construction.

Remedial Operations & Lessons-Learned for the Remediation of Contaminated Soils & Sediments

Ric Traver, PE

richard.traver@ch2m.com
CH2M HILL
Philadelphia, PA

Abstract

A highlighting of four challenging soil & sediment remedial projects focusing on innovative approaches and lessons learned for:

- Treatment Methods for the Remediation of 1,000,000 tons of Contaminated Soils at a Future London Sports Center
- Ashtabula Harbor - Dredging, Conveyance, CDF Construction, Dewatering, Weep Water, Treatment of 545,000 CY of PCB-contaminated sediments
- Tampa Waters Ave. – temporary parking lot Geotube dewatering of 14,820 CY sediments
- Lower Fox River Operable Unit 1 - Segmented Geotube dewatering of 100,000 CY of TSCA and non-TSCA PCB sediments

Biography

Richard Traver, PE – Principal Technologist – Sediment Management & Remediation
Ric Traver, brings 34 years of diversified experience in design, fabrication and operation of projects involving large scale contaminated sediment dredging/dewatering,

soil/sediment remediation and difficult bulk materials processing challenges. He has served as CH2M HILL's in-house principal technologist & Northeast Region Practice Lead for sediment management & remediation, as well as soils washing, in-situ soils flushing, thermal carbon regeneration, high temperature incineration and contaminated underwater response operations. . The early part of Ric's career, he served fourteen years with the USEPA Office of R&D (Edison, NJ) as the agency's Program Manager for Soil & Sediment Remediation along with the Storm & Combined Sewer Overflow remediation program.

**Robust Delineation of Contamination for Remedial Design
Planning to Minimize Uncertainties for Project Execution**

Howard L. Cumberland

Geosyntec Consultants
Director of Ports and Harbors, Western Region

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Abstract

The high cost of sediment remediation requires that characterization activities are sufficiently robust to accurately identify the horizontal and vertical extent of contamination or in some cases the impact of an unknown sediment characteristic. Accurate estimates of the volume for removal and location of the contaminants in the dredge prism are critical in determining the technology selected for remediation, costs, and schedule. The potential for project delays, scope and cost creep increase proportionally or exponentially with increasing uncertainty. It is important to understand the potential types of remedial alternatives that could meet the project goals and then structure additional investigations to assist with remedial technology selection and design. Project managers and clients tend to minimize additional investigations after the initial scoping investigation results are reviewed and move ahead to remedial design and implementation, typically before enough facts are known. This tendency to try to save money can place the project success in jeopardy because of uncertainty. Experience has shown that the highest chance of project failure lies in the execution of the remedial phase.

This presentation will provide examples of how additional delineation would have improved the volume estimation approaches, remedial technology selection, design and implementation. In the life-cycle of a sediment remedial project, the highest costs fall into remedial design and remedial implementation. These costs can rapidly escalate if the site conditions or the sediment characteristics are uncertain. Understanding the extent and sources of contamination, volumes and geotechnical properties of the sediment is crucial for project success.

Biography

Mr. Priore has over 23 years of experience in geological, hydrogeological, sedimentological, and natural resources areas. He has been focused in the contaminated sediment market for 18 years. He also has prior recent experience as the marine oversight construction and lead design manager on the Alcoa East (formerly Reynolds Metals Company) St. Lawrence River Remediation Project in Massena, New York. Mr. Priore has been responsible for high-level Consent Decree negotiations with stakeholders such as Federal and State regulators and tribal leaders on behalf of clients' contaminated sediment issues. He has provided management for the investigations, design and planning on multi-million dollar sediment remediation projects throughout the Great Lakes Region. Mr. Priore also served as National Technical Director for hazardous waste and sediment remediation for State and DOD clients with another engineering and consulting firm on the East Coast.

The Role of Sediments in Managing PCBs in the Delaware Estuary

Thomas J. Fikslin

Delaware River Basin Commission, West Trenton NJ 08628

Abstract

The principal approach to controlling the PCB contamination problem in the Delaware Estuary was the development of Total Maximum Daily Loads (TMDLs) for five water quality management zones established by the Commission. These TMDLs were developed by the staff of the Delaware River Basin Commission and established by the U.S. EPA Regions II and III in 2003 for Zones 2-5, and for Zone 6 (Delaware Bay) in 2006. In developing these TMDLs, sediments played an important role in several respects including interacting with ambient water through particle deposition and resuspension, mediating the response of the ambient water to load reductions, providing additional assimilative capacity for PCBs once water quality criterion is achieved, and providing a mechanism for removal of PCBs through dredging activities.

A water quality model of the Delaware Estuary for organic carbon and PCB homologs was developed to incorporate these roles and assess their relative importance in establishing the TMDLs. The model incorporates a single water column layer, three sediment layers, and three solid types: biotic carbon, particulate carbon and inorganic solids. Sediment processes incorporated in the model include settling, resuspension and pore water diffusion. Sediment cores were also collected in marshes fringing the estuary. These cores demonstrated similar temporal loading profiles, but indicated higher magnitudes in the urban Philadelphia region and lower magnitudes in Delaware Bay. The core data was useful in long-term hindcast simulations used in the model calibration.

The model demonstrated that sediments currently provide about ½ of the total PCBs in the water column with the remainder provided by external sources. In the absence of these external loads, it will take 20 to 30 years for the ambient water concentrations to reach the water quality criterion due to the continual contribution of PCBs from the sediments. This has ramifications for implementation of the TMDLs since reductions required of both point and non-point sources will

not result in reduced ambient water and fish tissue concentrations in a short time period. Alternative implementation strategies for hydrophobic pollutants like PCBs are needed.

Sediments also provide additional assimilative capacity to the TMDLs as a result of burial of PCBs in the sediments. In the TMDLs established for Zones 2-5, this additional assimilative capacity amounted to ~20% of the final TMDL. Finally, dredging and capture of PCB contaminated sediments as a result of maintenance dredging provides a significant loss mechanism. This loss was estimated to range from 27 to 140 kg/year in the development of the TMDLs for Zones 2-5.

Biography

Dr. Thomas J. Fikslin is the manager of the Modeling, Monitoring and Assessment Branch for the Delaware River Basin Commission. The Commission manages the water resources of the Delaware River Basin which spans the states of Delaware, New Jersey, New York and Pennsylvania. The branch is responsible for conducting and coordinating monitoring activities within the Basin, the development and application of hydrodynamic and water quality models, and the development and implementation of TMDLs for toxic and conventional pollutants. Prior to joining the Commission, Dr. Fikslin worked for the U.S. EPA Region II in the regional laboratory and NPDES program.

Contaminated Sediments/Soils: The Good, The Bad, and The Ugly

Bob Engler, PhD, M.ASCE

Moffat & Nichol

Abstract:

Contaminated sediments/soils assessment technologies, regulation/implementing guidance and remediation (cleanup) technologies are made up of a complex and tortuous pathway of requirements and actions to be taken. A half century of research and experience has resulted in phenomenal technology growth yet often crude implementation of problem fixes. Lack of understanding of cleanup volumes in relation to upward spiraling costs often shock the PRP's or regulated entities. Guilty until proven innocent is the hallmark of Superfund. Regulation "to death" is the "by word" for non-Superfund dredging. Common sense is often not very common. There is hope: Consistent regulations and implementation technology; consistent regulatory oversight by concerned agencies; meaningful cleanup end points; recognition that "nature" has a role; acceptance that all solutions can be imperfect.

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Biography

Dr. Engler, (Geochemist-Wetlands Soils and Sediments) was employed in 1973 by the USACE Waterways Experiment Station (WES), and served in numerous positions: researcher, Program Manager, upper-management supervisor, Senior Scientist (Environmental) and technical lead of several national R&D programs supporting the USACE Navigation Mission. While at WES he has made notable technical contributions that have advanced the state-of-the-art in the geochemistry of dredged material, flooded soils, wetlands, sediments, toxic substances, and aquatic disposal, or domestic/international regulatory criteria. He also represented the Corps on numerous Congressional hearings, National Academy teams, litigation teams, international treaties and interagency regulatory negotiations. He has received numerous awards including the Gallery of Distinguished Employees. Dr. Engler joined Moffatt & Nichol Jan 2006 and has worked on numerous environmental, dredging and contaminated sediments related projects. The projects ranged from harbor deepening to Super fund sediment cleanup activities. He has also served as an expert witness in Superfund and navigation dredging litigation. He represents clients from the private sector and governmental areas. He received the ASCE John G. Moffatt-Frank E. Nichol Harbor & Coastal Engineering Award.

Professional Affiliations:

International Navigation Association (PIANC) 1978-Present

PIANC International Environmental Commission, Chairman, 1994-2007

PIANC International Executive Committee, 1994-2007

PIANC US Section Vice President and Commissioner, 2008- present

Western Dredging Association (WEDA) 1980-present

American Society of Civil Engineers (ASCE) 1999-present

Coastal, Oceans, Ports and Rivers Institute (COPRI)

Waterways Committee, Dredging Subcommittee, Chairman

Chromium in Estuarine Environments: Geochemical Influences on Toxicity

Mary Sorensen*, Victor Magar, Linda Martell

Abstract

The current state of the science indicates that chromium speciation in sediment must be understood to support more accurate evaluations of potential ecological impacts. This presentation steps back to illustrate the understanding of chromium geochemistry and sample collection procedures that are needed to provide insight into identify chromium toxicity in estuarine environments. Results from field and experimental studies are used to illustrate that chromium occurs primarily in either trivalent [Cr(III)] or hexavalent [Cr(VI)] oxidations states, which exhibit widely differing geochemical and ecotoxicological properties. Evidence will be presented to demonstrate that Cr(VI) exhibits much greater solubility, mobility, bioavailability, and toxicity than Cr(III) in sediments and surface waters. Lines of evidence will be clearly explained showing that Cr (III) is relatively insoluble and immobile at environmentally relevant pH and how Cr(III) forms strong complexes with sediment minerals and organic ligands. Finally, several studies that illustrate the deficiency in using total chromium to assess risk based on the lack of correlation between total chromium and sediment toxicity will be described. In short, this presentation will show that understanding chromium geochemistry and toxicity can be almost as easy as understanding that ice will melt on hot pavement.

Biography

- Ms. Sorensen is a Senior Science Advisor at ENVIRON with 20 years of experience in ecology, ecological risk assessment, and sediment management.
- She has edited, authored, or co-authored 1 book, 2 book chapters, and approximately 20 peer reviewed manuscripts on ecological risk assessment and sediment management topics.
- She is the Vice-Chair of the Society of Environmental Toxicology and Chemistry's "*Ecological Risk Assessment Advisory Group*"
- She has been a leader on numerous large scale sediment management projects, including the Hackensack River (here in Jersey City, NJ), Baltimore Harbor (MD), Buffalo River (NY), Tittabawassee River (MI), and Saginaw River (MI)
- She is a Certified Ecologist and holds a MS in Environmental Biology from the Georgia Institute of Technology.

**Investigation of the Ecological Risk Associated with the
Groundwater/Sediment/Surface Water Interactions
in a creek at a Mid-Atlantic Superfund Site**

V. Lyle Trumbull, Stephen R. Scott and Christopher J. Kriegner,

O'Brien & Gere

The confidential Site was used for solvent recycling and fuel blending from 1962 to 1988 when the site was abandoned. Both LNAPLs and DNAPLs were released while the solvent recycling operation was active, resulting in contaminated groundwater and DNAPL seeps along the western bank of a creek. The portion of the creek directly adjacent to the Site was remediated in 1999 following the removal of 2,000 cubic yards of sediment and the construction of a creek liner and groundwater collection/treatment system. The potential discharge of VOCs to the downstream portion of the creek via bedrock groundwater was investigated using 28 passive-diffusion bags (PDB). PDB locations were selected using photolineation and in-stream profiling. The objective of this profiling was to identify temperature, conductivity, and/or pH anomalies that correspond to locations of groundwater discharge from bedrock fractures intercepting the stream channel. Except at two locations near the end of the creek liner, no VOCs were detected in the PDB samples. Twelve surface water and six sediment samples were collected from the creek in April 2006 to support development of an Ecological Risk Assessment (ERA). Ecological risk from direct contact to the surface water and sediment in the creek was evaluated by comparing the maximum detected concentrations from the downstream samples to USEPA Region 3 BTAG screening values. Only three sediment constituents (iron, manganese, and nickel) and three surface water constituents (aluminum, barium, and iron) had concentrations that exceeded BTAG values. Food chain calculations for the muskrat, mink, and belted kingfisher resulted in hazard quotients that were significantly greater than one for four metals (aluminum, iron, selenium, and thallium). The downstream sediment concentrations of aluminum and iron were less than the maximum upstream concentrations, indicating that the estimated risk from these constituents is probably not the result of Site-related activities. Selenium and thallium were not detected in downstream sediment or surface water and were only retained in the assessment because of their potential to bioaccumulate. AVS/SEM data indicated that the concentration of acid volatile sulfide was too small to impact the bioavailability of metal in creek sediment. The ERA concluded that no further evaluation of ecological risk at this Site is required. The USEPA concurred with this conclusion.

Biography

After completing his MS in biology at **Clarion University of Pennsylvania**, Lyle took a position with the **U.S. Army Corps of Engineers, Construction Engineering Lab** in Champaign, Illinois where he worked on land management issue at Ft. Leonard Wood, Ft. Sill, Camp Pendleton, Orchard Training Area, and Hohenfels Training Area. After five years with the Corps Lyle started his Ph.D. research on plant eco-physiology at the **University Of Illinois in Champaign-Urbana**. Lyle was **NSF Post Doctoral Fellow at Harvard University** where he studied the impacts of global change on plant populations.

Lyle escaped from academics in 1998 and has been consulting or Industry for the last 12 years. Prior to joining O'Brien & Gere was with Royal Dutch Shell in Houston where he was part of a team responsible for emergency response and NRD assessments. He currently responsible for NRDA and risk assessment services at O'Brien & Gere in Blue Bell, PA. He has conducted risk assessments involving affected sediment at many Sites in the southern and Mid-Atlantic portions of the U.S.

Beneficial use of dredged material in New Jersey – A decade of experience with contaminated sediment and site remediation

Scott Douglas

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Abstract

The State of NJ has taken the lead on beneficial use of contaminated dredged material nationwide. Since the closure of the Mud Dump in 1997, over 12 million cubic yards of dredged material unsuitable for ocean placement has been utilized on brownfields, landfills and abandoned mines. A special office at NJDEP was established to regulate dredging and beneficial use to ensure that this process has been protective of human health and the environment, and a regulatory and planning office was established in NJDOT to advocate for our maritime transportation system in NJ. Our success to date is measured by the more than a dozen sites around the NY/NJ Harbor that are no longer sources of contamination, but are once again a productive part of their communities. This paper will outline the process for dredging and beneficial use of dredged material in New Jersey, both from the perspective of the waterfront property owner and the contaminated site owner.

Biography

Mr. Douglas received his academic training at the University of VT, where he received a BS in Zoology and an MS in Environmental Toxicology. After receiving his MS in

1989, he moved to New Jersey and began working with New Jersey's contaminated sediments. He was first introduced to NY Harbor through the dredged material testing program while working at IT Corporation, and later Aqua Survey where he performed hundreds of toxicity and bioaccumulation assays. He was intimately involved with the dredging crisis, working with the Corps and Port Authority to implement the new testing methodology and develop the regional testing manual. He left the private sector in 1997 and became one of the original staff members of New Jersey's Office of Maritime Resources where he remains (for now). Mr. Douglas is responsible for dredged material management policy and planning for New Jersey.

**EVALUATING THE PROPERTIES OF
DREDGED MATERIAL-STEEL SLAG FINES (DM-SSF) BLENDS
FOR THE MARYLAND PORT ADMINISTRATION**

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Keywords: Beneficial use, recycling, dredged material, slags

ABSTRACT

In December 2008, the Maryland Port Administration issued its first award under its open solicitation for Request for Proposals No. 270025-S “Innovative Reuse of Dredged Material.” The program focuses on developing one or several large recycling opportunities to recycle upwards of 500,000 cubic yards of DM per year by 2023 to maintain the Cox Creek Dredged Material Containment Facility (DMCF) operations due to its limited capacity [6 million cubic yards (MCY)]. Under Maryland State law, dredged material (DM) from Baltimore Harbor can only be placed in a confined disposal facility (CDF) such as the Cox Creek DMCF. Recycling on such a large scale speaks to the need to develop a sustainable, high volume commercial outlet for DM, or to develop large scale markets in earthwork construction related to coal mine or quarry closure, landfill daily cover and/or general, embankment and structural fill applications in and around the greater Baltimore metropolitan area to minimize transportation costs.

However, the soft, fine-grained compressible nature of DM makes it generally undesirable for geotechnical applications other than compacted liner, barrier and caps/covers. However, when augmented with coarse(r) materials on the scale of sands/gravels, the blended materials can be quite competent if local inexpensive sources of coarse-grained materials close to the DM sources. Fortuitously, the Sparrows Point Steel Plant Complex is located in the Baltimore harbor almost directly across the

navigation channel from the Cox Creek DMCF. The steel mill produces steel slag fines (3/8-inch minus material) in comparable quantities to the DM. Because of its granular nature, hardness, mineralogy and residual lime content, the SSF materials appear to be well suited for soil stabilization, achieving geotechnical and environmental enhancement of DM using a single media. Accordingly, the presentation will provide an update as to the current status of this ongoing project which involves a combined laboratory and field demonstration project (Spring 2010).

Biography

Dr. Dennis G. Grubb, PE, is affiliated with the West Chester Office of Schnabel Engineering. He holds a joint appointment/consultancy in the Center for Environmental Systems at Stevens Institute of Technology in Hoboken.

Dr. Grubb has degrees in civil, environmental and geotechnical engineering from Drexel, Stanford and The University of California-Berkeley, respectively. Dr. Grubb has 20 years experience in the environmental remediation (organics and metals) and the beneficial use of industrial byproducts and recycled materials. Materials evaluated include soft soil and sludge-like materials of widely varying geochemical composition, quarry fines, dredged material, ash materials, crushed curbside collected glass, acid and alkaline mine tailings, iron-rich sludges, chromite ore processing residue, various slags, scrap tires, cement and lime kiln dusts, contaminated firing range soils, etc.

Expertise in this area includes: teaching, laboratory experimental design research and modeling studies, specifications development, full-scale project development, execution and management, contracting, construction and inspection, take-off estimates, peer review, expert testimony, and regulatory evaluation. Dr. Grubb has over 30 refereed journal publications in these areas.

Clients and sponsors include Maryland Port Administration, Lafarge, Dominion Power, PennDOT, US Corps of Engineers, National Science Foundation, DuPont, Pennsylvania Power & Light, and various mining and recycling companies.

Client Solutions include:

- Beneficial use of industrial byproducts and recycled materials, especially fine grained materials
- Harnessing material geochemistry for beneficial use applications
- Researching, developing and executing beneficial use applications
- Permitting beneficial use applications
- Materials management and testing programs
- Strategic Recycling Plans
- Waste Minimization
- Soil reinforcement of fine-grained materials (quarry fines, tailings, etc.)
- Stabilization & Solidification, including Mix Design

Contaminated Sediment Sites: Challenges Working In an Urban River Setting

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Abstract

The Lower Passaic River (LPR) Cooperating Parties Group is conducting a Remedial Investigation and Feasibility Study (RI/FS) in the Lower Passaic River Study Area (LPRSA). The 17.4 miles of the LPRSA Study Area runs through highly urbanized and populated portions of Newark and other urban centers within the LPRSA that present significant challenges to efficiently conducting in-water RI/FS field tasks and evaluating FS remedial options.

A significant percentage of the land adjacent to the LPR is highly developed including State Route 21 which was constructed along much of the river's west bank. Numerous bridges with vessel clearance restrictions span the river and tributaries within the LPRSA. Aging shoreline infrastructure and debris are commonly encountered in the LPRSA. These constraints which are characteristic of an urban river site limit land-side access to the LPR, reduce survey boat movement and may require special survey equipment. These characteristics have significantly increased time associated with execution of field work and resulted in increased costs to conduct the LPRSA RI.

The LPRSA FS will have to consider the LPR urban river characteristics as they potentially impact the implementability and duration of remedial options as required by the National Contingency Plan.

Biography

Willard (Bill) Potter: After graduation from the University of Virginia with a degree in Chemical Engineering, Bill started his 40 year environmental career at a new Federal Agency – US Environmental Protection Agency in the Region 3 Enforcement Division. He left EPA for employment with Allied Chemical (now Honeywell) in their Corporate HS&E Department. Over eleven years working primarily in RCRA and CERCLA programs, Bill represented Allied at many of the early Superfund Sites serving as Chairman of the PRP Technical Committees at ChemDyne and SCP/Carlstadt. He ultimately became the Corporate Director of Hazardous Waste programs. Bill moved onto consulting and joined de maximis 20 years ago and is a Corporate Director and manager of the Clinton, New Jersey Office. He has been a Project Coordinator and/or Supervising Professional at many high-profile New Jersey Superfund Sites including Chemsol, Helen Kramer Landfill, Sharkey Landfill, GEMS Landfill and the Woodland Township Sites. He has been a Project Coordinator for the Cooperating Parties Group conducting the RI/FS Study on the Lower Passaic River since 2004. Bill also represents de maximis on the Sediment Management Work Group.

3 Do's and 3 Don'ts

Eric Stern –

Do's

1. When addressing sediment management solutions, approach it from an integrated systems approach perspective. Sediment treatment can be part of a renewable CDF / beneficial use regional management plan. It is not all or nothing.
2. Consider dredged material as a resource - not as a waste stream that finds its way into landfills.
3. Sediment technology development needs to take into account a treatment train approach. When that first 3,000 cubic yard scow shows up at your front door and you say "wow" - that's not a good sign. Materials handling capabilities, treatment and post-treated beneficial use application is as critical as the technology "black box".

Don't

4. Don't believe when someone tells you "If it ain't broken - don't fix it". It probably is broken but you just don't quite know how to go about fixing it.
5. Don't mortgage the future. Move forward with sustainable long-term solutions for dredged material and contaminated sediment management.
6. Don't discount sediment treatment as too expensive. As technologies have advanced during 15 years of demonstrations (bench/pilot/full-scale) more discrete economic analysis (including capital construction costs) have been determined. This has caught up with other dredged material management alternatives that have steadily been increasing over time.

Do's and Don'ts

Do's

- Investigate the policy and practice each country and region in which you operate
- Adapt to and respect the native policy and practice
- Educate about the fundamentals if warranted

Don'ts

- Assume all of one continent (such as Europe) will have the same policy and practice
- Assume science and engineering are the most important things in the world
- Force a non-native perspective into a situation

Philip Spadaro – Arcadis U.S., Inc.

Stany Pensaert – DEC Environmental

DO:

involve specialised environmental contractors in the early design stages of a complex project

DON'T:

Reinvent wheels in complex remediation projects: the success of such projects is often determined by the execution method, hence the contractor's expertise.

Ric Traver – CH2M Hill

3 Do's

1. Plan ahead - solicit and utilize unbiased, peer-review evaluations of the proposed project from recognize experts in the field;
2. Three most important elements of a successful project - details, Details, DETAILS;
3. Be flexible – try to expect the unexpected – Murphy lurks everywhere;

3 Don'ts

1. Permitting and legal requirements – don't trivialize agency submittals, review lead times and public opinion;
2. Don't underestimate project contingencies (i.e., bad weather, more/less material than expected, differing feed characteristics, varying contaminant concentrations, etc.)
3. Don't trivialize initial feedstock preparation in bulk soil/sediment pretreatment steps such as debris separation (snag boats), coarse screening, crushing/shredding, and physical/chemical characterization of oversized material for potential non-hazardous wastes disposal alternatives;

William Priore – GeoSyntec Consultants

Do's

1. Thoroughly understand the nature and extent of contamination and sediment characteristics within the sediment prism. Evaluate the impact to downstream treatment processes.
2. Perform statistical sampling using adaptive management techniques to pin down potential uncertainties with respect to Primary and Secondary Contaminants of Concern (COCs) with respect to concentration and location within the dredge prism.
3. Do plan for the unexpected by developing a matrix of response actions to each of the identified potential upset conditions.

Don'ts

1. Don't let client or regulatory pressures prevent adequate characterization or testing. Focus on the minimization of uncertainty.
2. Don't be lulled into false sense of design security especially with respect to performance and schedule the best laid plans experience unforeseen events that have impacts to production during remedial execution.
3. Don't allow internal engineering pressure to select equipment that can potentially be at red line during the execution. Always insist on over capacity otherwise you will experience cost and schedule creep.

Tom Fikslin –

Regarding the Do's and Don't's:

Do's	Don'ts
Use Method 1668 and analyze for all 209 PCB congeners	Use Method 8082 for PCB Aroclors
Include sediment processes in models and TMDLs.	
Consider sediments as both a source and sink. When the TMDL condition is achieved, they will be in equilibrium with the water column.	Consider sediments only as a source

Bob Engler – Moffat & Nichol

DO:

- Risk based alternatives assessments.
- Bring in stakeholders at beginning.
- Know history of appropriate sediment remediation technologies or, you are doomed to repeat.

DO NOT:

- Arbitrarily choose a remedial alternative (e.g. Dredging)
- Use “state of the art” research technologies
- Create a “worse” situation

Mary Sorensen – Environ Corporation

Do's

1. Make sure that a clear understanding of geochemistry is a fundamental component of any evaluation or discussion of chromium in any environmental media – hexavalent chromium [Cr(VI)] matters, trivalent chromium [Cr(III)] does not.
2. Recognize that seminal studies in chromium geochemistry and ecological toxicity were conducted by the USEPA, USGS, and Johns Hopkins University. Make good use of the vast peer-reviewed knowledge to pull chromium off the list of chemicals of concern early in the remedial investigation process if possible.
3. Make sure that if you sample for chromium in sediments, you do so using the appropriate methods and sample handling procedures.

Don'ts

1. Don't underestimate the value of understanding chromium geochemistry in order to predict toxicity (if any) related to chromium.
2. Don't rely on bulk sediment quality benchmarks for chromium because the way they were derived tells us NOTHING about chromium toxicity.
3. Don't recreate the wheel. There has been so much work focused on Cr(VI) and Cr(III) in estuarine sediments that these concepts should now be as easy to explain as melting ice.

Lyle Trumbull – O'Brien & Gere Engineers

Do's

- Do consider measuring parameters that help predict the bioavailability of constituents (TOC, AVS/SEM, etc.).
- Do measure background or reference sediment concentrations during your investigation and do not skimp on sample size.
- For Passive Diffusion Bags, do protect PDBs in slotted PVC well screen, bury at least one ft below sediment, and mark location excessively.

Don't

- Don't leave PDB in the environment for longer than two weeks.
- Don't skimp on the analyses – make sure you get detection limits that are below the applicable standards.
- Don't forget to consider volume of PDBs vs. volume required for analytical tests.

Scott Douglas – NJDOT - OMR

Three Do's

1. Do make sure you work with the Office of Dredging and Sediment Technology at DEP and the USACE in either Phila or NY as soon as possible.
2. Do make sure you are familiar with the details of the Acceptable Use Determinations for the dredging, processing and placement sites.
3. Do plan on at least a year to obtain your permits and approvals.

Three Don'ts

1. Do not assume that either you or your consultant can develop an acceptable sampling plan without DEP/USACE assistance.
2. Do not have only one option for dredging or dm management.
3. Do not use "unproven" dredgers, processors, or AE/laboratories. NY/NJ Harbor sediments are tricky and require experience.

Dennis Grubb – Schnabel Engineering

DOs

- 1) Be honest and do your best to earn your client's trust. It pays to be their confidant and ambassador.
- 2) Do thorough research, development and operations work that will survive the tier 1 journal review process.
- 3) Do 2), and your client has a reasonable chance of attaining beneficial use.

DONTS:

- 1) Don't assume environmental regulators have an environmental or chemistry background.
- 2) Don't be surprised that "voluntary cleanup criteria" are neither reasonable nor negotiable.
- 3) Don't be surprised that beneficial use permits do not lead to greater beneficial use.

Bill Potter – demaximis

Do's:

- 1) Stress on-water safety measures;
- 2) Select on-water equipment based on river setting;
- 3) Include weather and equipment contingencies in schedule.

Don'ts:

- 1) Ignore weather conditions;
- 2) Rush on-water work;
- 3) Fail to document field activities.

We would like to thank all of the Symposium's presenters and helpers for their time and effort in making this an informative, persuasive and entertaining exchange of ideas. We greatly appreciated DEC/DEME Group's offer to financially support the meeting. With their assistance Aqua Survey has been able to offer this meeting without cost to all attendees. DEC's sponsorship has helped to make this an unforgettable meeting for all attendees.

