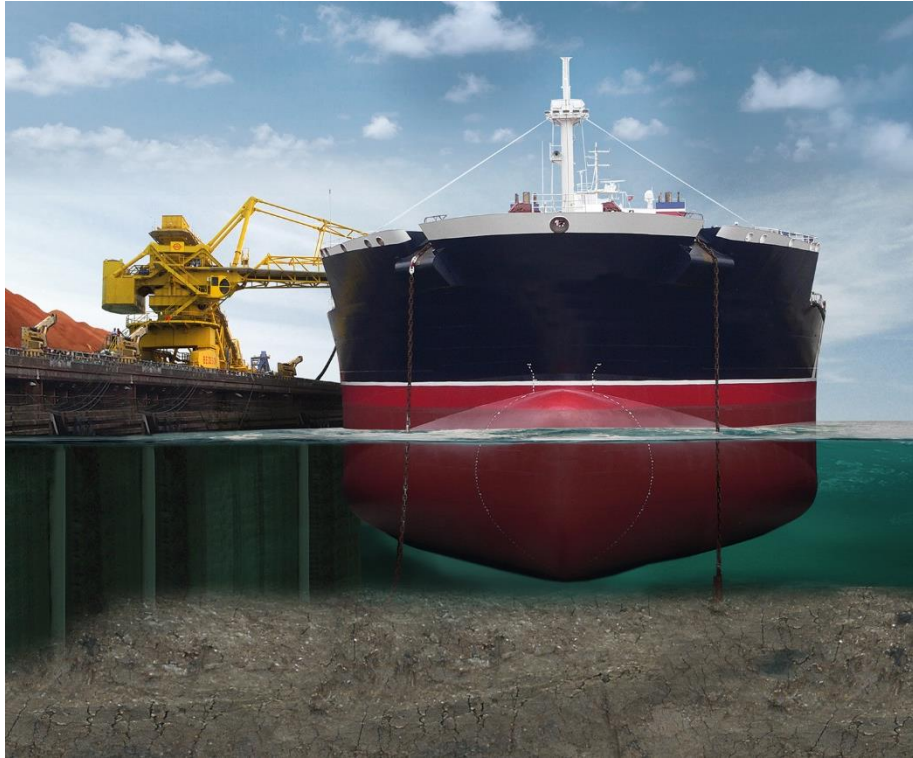


Active Geosynthetic Composites for Subaqueous Capping

Kristof Thimm, Romain Durand
HUESKER Synthetic



Alternatives

- # Dredge, dewater and dispose
- # Monitored Natural Remediation (MNR)
- # Enhanced monitored natural remediation (EMNR)
- # In-situ Capping



Dredger at a Harbor project in Germany



Capping project in USA

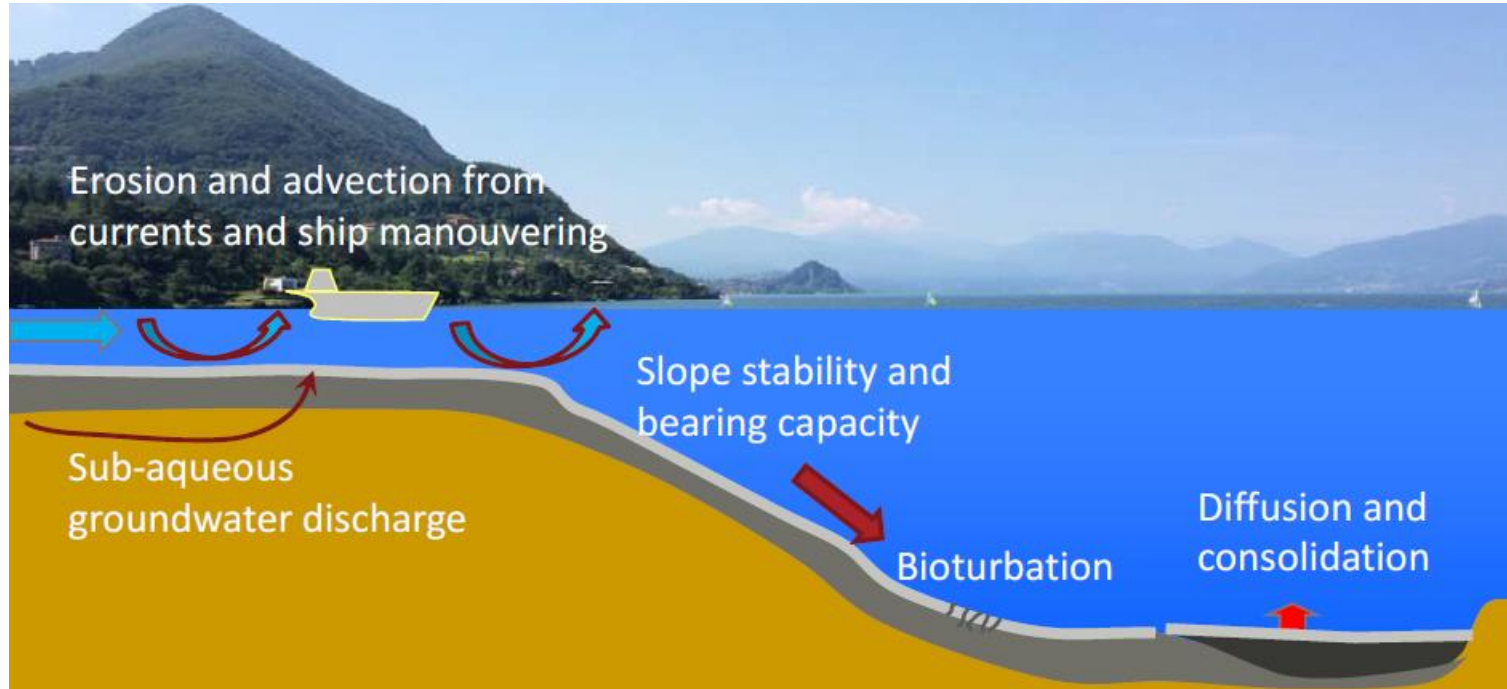
Decision making

- # Risk assessment
 - # Contaminant of concern (COC) and its effects
 - # Concentration of COC
 - # Possible pathways
 - # Likelihood of accident-caused release
 - # ...
- # Impact of remediation on the surrounding areas
- # Cost of different remediation approaches

Why capping?

- # Cost and risks of removal, treatment and disposal
- # Ability to rapidly implement and obtain immediate risk reduction
- # Ability to sustain long-term risk reduction under appropriate conditions
- # Generally minimal impact on waterway and function
- # In-situ management option
- # Relatively low cost

Capping



Source: D. Reible, E. Eek

Thick Sand Cap

No Application of Adsorptive Material

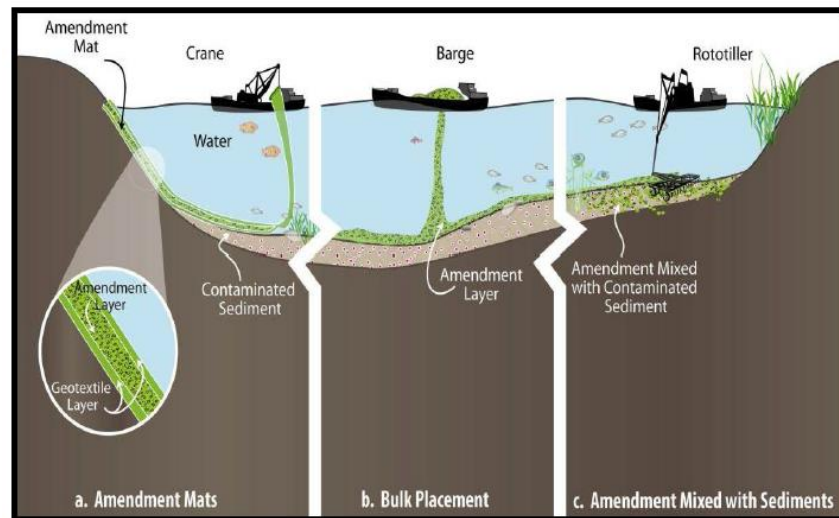
Sand caps have effectively contained the Contaminants of Concern (CoC) and prevented exposure of the benthic and pelagic communities. But their large thickness can reduce hydraulic capacity, flood storage and navigable depth of the water body

Contaminated
Sediment

Use of Amendments for In Situ Remediation at Superfund Sediment Sites

OSWER Directive 9200.2-128FS

April 2013



In-Situ Capping with Geo-Composites



Advantages

- # Constant active layer thickness across the whole installation area
 - # Independent from inclinations or currents
- # Easy installation
- # Geotextiles provide protection for the active layer and act as additional filtration layers
- # Reduces the needed cap thickness which results in a lower impact on navigable depth and hydraulic flow patterns

Prof. Danny Reible Texas Tech

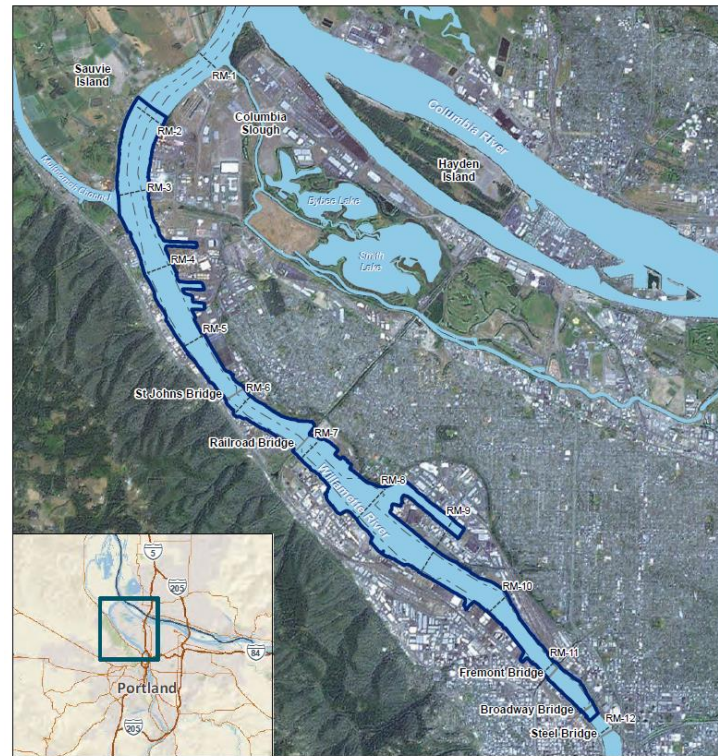


TEXAS TECH UNIVERSITY™

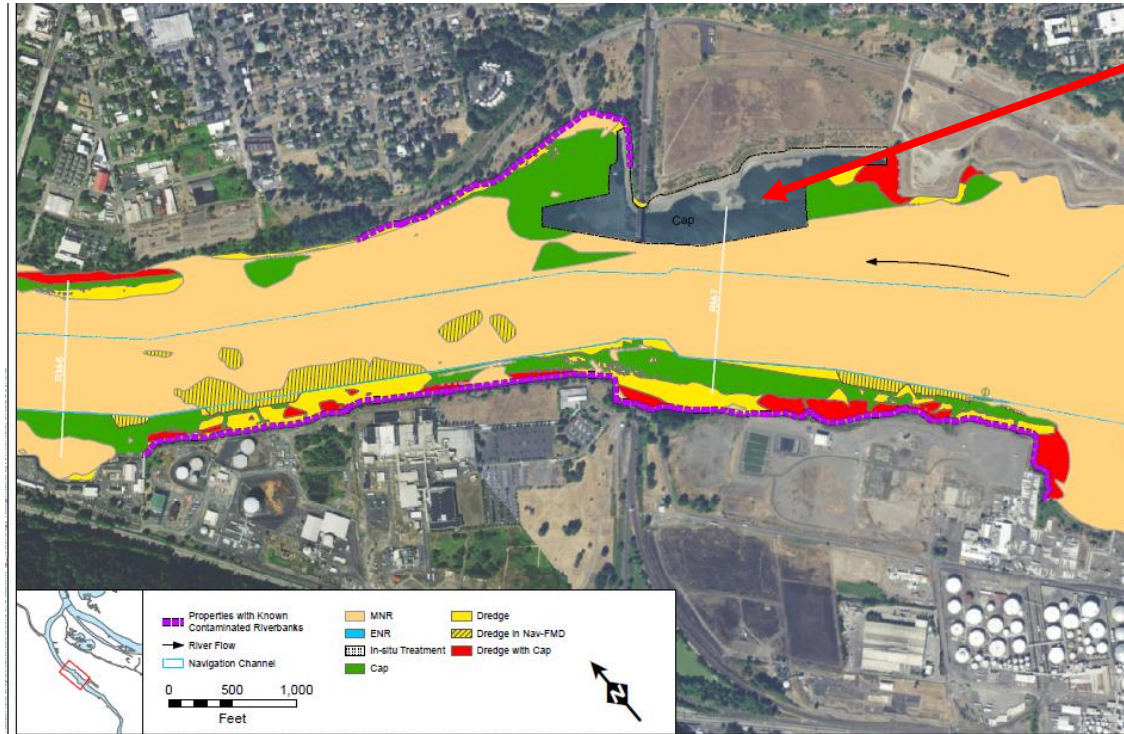
- # CapSim – Numerical Model
 - # Multiple Species and Reactions
 - # Bioturbation, Decay, Consolidation, Upwelling
 - # Deposition, Linear and Nonlinear Sorption
- # Calculates arbitrary number of layers
 - # Pore water concentration
 - # Total sediment concentration
 - # Flux
- # <https://www.depts.ttu.edu/ceweb/groups/reiblesgroup/downloads.html>

Remediation project over the next 10 years

- # US EPA Superfund Site
- # Record of decision was released in January 2017
- # Almost 16 km of River
- # Industrial sites along the river mostly steel and oil and gas industry
- # Estimated costs 1.1 billion USD

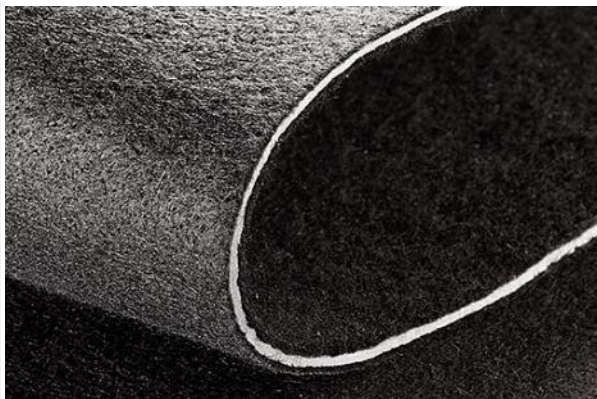


Planned Remediation RM-6 and 7



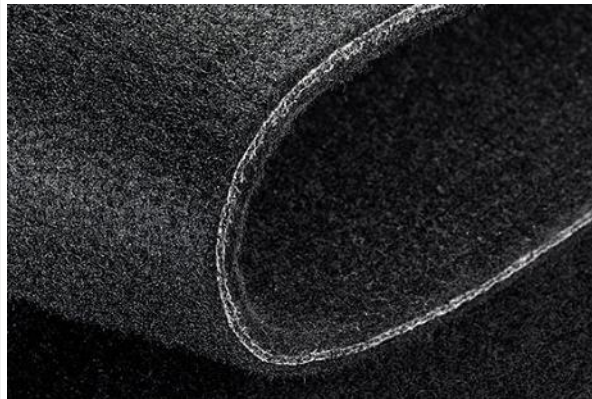
McCormick &
Baxter Creosoting
plant

Tektoseal Active AS



Absorption agent for petrochemical products – oil, diesel, petrol and kerosene etc.

Tektoseal Active AC



Multi-purpose contaminant adsorption agent for VOC, TBT, PAH, etc.

Tektoseal Active CP



Long-term binding of heavy metals and radioactive substances – Pb, Cd, U, Pu, etc.

- # Capping can be an additional tool in the tool box for remediating contaminated sediments
- # Different cap designs have already been used in different projects in the USA and Norway
- # Active Materials can reduce the cap thickness
- # Active Geo-composites can further reduce installation work and ensure a constant active layer across the whole installation area

Questions?



- **Region 10, U.S. Environmental Protection Agency Region.** *RECORD OF DECISION - Portland Harbor Superfund Site* . 2017.
- **Office of Superfund Remediation and Technology Innovation.** *Use of Amendments for In Situ Remediation at Superfund Sites*. s.l. : United States Environmental Protection Agency, 2013.
- **Reible, Prof. Danny.** Reible Research Group. <https://www.depts.ttu.edu/cweb/groups/reiblesgroup/downloads.html>. [Online] Texas Tech University, 1. February 2017.
- *Innovative Systems for dredging, dewatering or for in-situ Capping of contaminated sediments.* **James T. Olsta, Jerald W. Darlington.** Proceedings of the Annual International Conference on Soils, Sediments, Water and Energy : s.n., 2010.
- **Eek, Espen; Reible, Prof. Danny;** Capping Design: The Art of Designing Isolation Layers to Reduce Environmental Risk associated with Contaminated Sediments