

Active Geosynthetic Composites for Subaqueous Capping

Initial Situation

Contaminated Harbour Bottoms

Marine ports are always significant sources of environmental pollution due to the fact that their activities are associated with a particular contamination of aquatic areas and bottom sediments [1]. Contaminants get into the aquatic environment through shipping traffic, loading, repairs, and dredging, as well as rainwater runoff, effluent discharge, dust, etc. [2-4].

- **TBT** (Tributyl Tin compounds - anti-fouling agent not used today anymore),
- **Heavy metals** (Cu, Zn, Ni, Pb, Cr, Cd, and Hg)
- **PAH** (Polyaromatic Hydrocarbons)
- **PCB** (Polychlorinated Biphenyls)

Around the world the sediments in harbours have been analysed and the remediation projects have started (i.e. Bosten, Oslo, Trondheim, Hamilton harbour).



Contaminated Waterbody Beds

Old industrial sites that are out of service have already been recognized as potential threat to the environment. This resulted from a lack of knowledge and a lack of regulations regarding harmful substances in the past. Due to the need of water for the industrial processes many of these sites are located close to rivers and lakes which resulted in a steady long term contamination of the waterbodies' sediments.

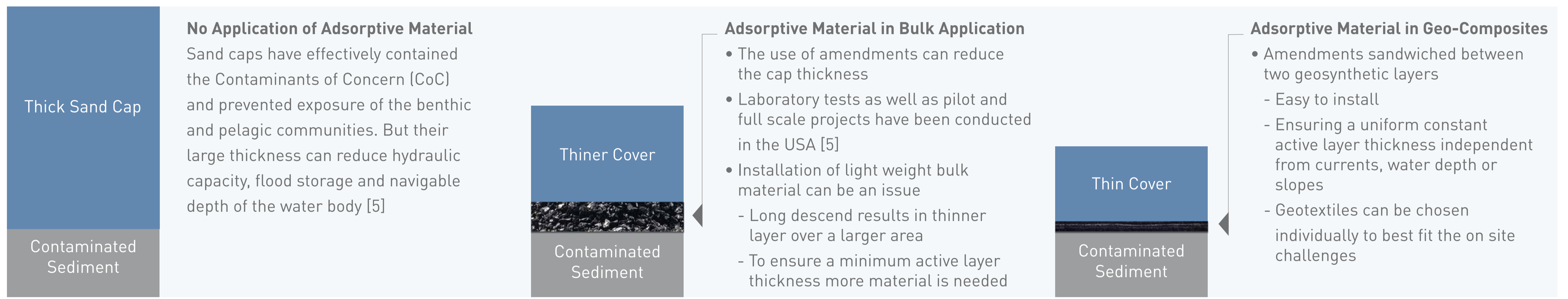
Usual contaminants are:

- **PAH** (Polyaromatic Hydrocarbons)
- **Creosote**
- **NAPL** (Non Aqueous Phase Liquids)
- **Heavy metals** (Zn, Mn, Cd, Co, Cu, Ni etc.)

Example sites are former wood treatment plants, gas plants, mining operations and paper mills. [5][6]



Sand Cap versus Active Cap



In-Situ Capping



Active Geo-Composites consist of an amendment, or multiple amendments, sandwiched between two geosynthetic layers. These Geo-Composites allow accurate placement of amendments with low densities that could otherwise become suspended during placement.

- Synthetic geotextiles also provide a bioturbation barrier, prevent mixing of amendments with underlying sediments, allow more uniform application and erosion protection
- Some amendments enclosed in the geotextiles are buoyant. To ensure proper installation it is possible to use geotextiles with a higher specific gravity or mix a fraction of sand with the amendments to create a mat that is easier to sink
- Only a thin additional cap is needed on top

Conclusion:

The use of amendments to reduce bioavailability of contaminants is a new option for in situ sediment remediation. This technology can improve risk reduction and cost-effectiveness of remedies at sediment sites. Amended caps can reduce the total thickness of the cap and can particularly be useful as an additional or substitutive technology in the toolbox of contaminated site remediation. The large variety of different amendments enables broad application on different on-site specific situations.

Active Geo-Composites – Tektoseal Active

HUESKER's Tektoseal Active is a highly innovative product concept that sets new benchmarks in eco-efficient construction and environmental measures for groundwater protection and contaminated site remediation.

The Active Geo-Composites products are available in a variety of forms. Specifically for groundwater protection, we offer numerous barrier and filter products for applications involving contaminated surface water and leachate.

Tektoseal Active delivers a reliable geosynthetic decontamination solution in cases where it is not feasible to relocate the polluted material.

Benefits Geo-Composites

- Efficient contaminant absorption at point of infiltration
- Straightforward installation and removal on land and in water
- Bond with geotextiles adds mechanical stability to active granular layer
- Stable, constant layer thickness over entire installed area
- Tailored solutions through combination of active substances



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.