Oil spill combat by using lignite, textiles and microbiology

S. Kowalski, A. Jonas & J. Rethmeier

*eco.carbon GmbH, Germany*

**Abstract**

To remove oil from water as well as to protect the soil from leakages of machines, the eco.carbon GmbH has developed oil binder mats on the base of lignite (brown coal), which are covered by a specially equipped textile. This textile is oil-permeable but water-repellent.

The selective uptake of oil from water and the high oil-adsorption capacity makes the floatable type Aqua oil binder mat an effective measure to combat oil spills on waters and oceans. An additional advantage is the easy laying out and bringing in of the oil binder mats.

The type Terra guarantees an effective and continual protection of the subsoil against oil-contaminations. This mat is passable and trafficable. Also available is a type Terra bioactive mat containing microorganisms. In this case the bounded oil in the mat is degraded by bacteria.

All these oil-adsorbing mats are designed to bind more oil than their own weight and no release of the once uptaken oil occurred even under compressive load.

**Introduction**

Ship damages, the operation of pipelines, the production and the loading of oil, as well as tanking on the water are again and again the reason that larger amounts of oil reach the oceans and inland waters. The economical and ecological damages caused by this are serious. Conventional combatting methods such as chemical / biological treatment, combustion or skimming of the oil slick are either environmentally noxious, expensive, slow, or only limitedly applicable depending on weather and currents.
Also on land for example on parking areas for motor vehicles, building machines, or motor railcars, it frequently comes to oil leakages causing a pollution of the soil. Because of economical reasons, it is often impossible to carry out constructional alterations or to place oilsumps beneath the vehicles as preventing measures.

Composition of the oil binder mat

The eco.carbon® oil binder mat Aqua is a single-layer mat, filled with lignite granules. The coat of the mat consists of a special textile which is oil-permeable but water-repellent. The mat surface is structured with furrows in order to guarantee a well-proportioned distribution of the lignite granule and, by that, a stable position on the water and a larger surface of contact to the oil (Figure 1).

The eco.carbon® oil binder mat Terra / Terra bioactive is a double layer mat filled with a material based on granulated brown coal. The filling of the Terra bioactive version additionally contains natural microorganisms which break down the oil bound in the mat. The upper side of the mat consists of a special textile which is oil-permeable but water-repellent. The lower side of the mat consists of a durable PU-coated material. This material functions as barrier layer to protect the mat for damages and to guarantee a reliable protection of the soil. The mat surface is structured with furrows, so that water (e.g. rainfalls) is drained off rapidly (Figure 2). The mats can be connected to bigger plains. The uptake of the eco.carbon® oil binder mat Terra amounts up to 12 l oil per m².

Figure 1: Oil binder mat Aqua

Figure 2: Oil binder mat Terra
Mode of operation

The oil binder mats Aqua are placed on the surface of the oil-polluted water, where they absorb the oil very rapidly (Figure 3). The floating mats can then be recovered easily. The special properties of the filling bind the oil firmly into the mat. No oil escapes from the mat during the recovery or handling of the oil-filled binder mat, and any further pollution of equipment or the shoreline is thus avoided.

Figure 3: Laboratory demonstration shows the oil binding process using eco.carbon technology

Application

Eco.carbon® oil binder mats are already used in different fields.

General practice of the oil binder mats Aqua was tested by the Technisches Hilfswerk (THW). This examination included a checkup of the ability of the mat to float, the recovery and handling. Therefore single mats (1,20 m * 0,80 m) and linked mats (10 m * 1,20 m) were used on the river Spree in Berlin (Figure 4).

The company Oiltanking uses the oil binder mats Aqua to protect the river from oil during refueling of oil or diesel from ships to oil tanks (Figure 5).

The Deutsche Bahn AG tests the oil binder mat Terra on a site of a railway yard. The aim is to substitute the presently used collecting vessels by eco.carbon® oil binder mats Terra (Figure 6).
Figure 4: Practical test on the Spree

Figure 5: Protection of water

Figure 6: Railway yard