

Introducing E-MOP, a New Paradigm in Oil Spill Remediation

Crude oil spills are one of the most devastating environmental threats to our coasts, waterways and oceans. According to the U.S. Department of Energy, 1.3 million gallons of petroleum spill into U.S. waters alone from vessels and pipelines in a typical year. Major accidents such as 2010's Deepwater Horizon effect catastrophic and lasting impacts on our waterways and oceans, marine life and local economies. Almost a decade and many billions of dollars later, the recovery effort continues.



Major Oil Spills Worldwide



Image of a Large-Scale Spill

E-MOP™ Electromagnetic Oil Spill Remediation Technology from Natural Science, LLC tackles this intractable remediation problem by uniting electromagnetic forces and innovative engineering to revolutionize the response to the global environmental threats from oil spills. With E-MOP, spilled oil is seeded with micron-sized magnetite particles which preferentially target and bond to oil, creating a magnetizable mixture. An innovative electromagnetic boom and magnetic ramp create magnetic fields that direct the mixture along the boom, up the ramp and into a collection tank. Oil is separated from the water with an efficiency greater than 97% in a process that is environmentally benign.

In addition to large- and small-scale oil spill applications, the technology can be used in industrial applications to filter and remove flocculant from water at treatment plants, process and reclaim “produced” water associated with fracking and oil refinery processes, and clean daily spills in harbors, ports, and laboratories.

INSIDE E-MOP

E-MOP works both on water, where some of the most difficult and damaging spills occur, and on land, where the effects and the cleanup process present a different set of challenges. Read on for a closer look.

The Seeding Process

Micron-sized magnetite (Fe_3O_4) particles are first dispersed in the oil spill with a pressure-controlled nozzle in the seeding process. These particles form a unique and preferential bond with oil. Once seeded, the mixture of oil and magnetite is susceptible to magnetic forces.



E-boom module

The Electromagnetic Boom

The electromagnetic boom (e-boom) consists of solenoidal (doughnut-shaped) magnets that are coupled together in groups of six to form a module. Each magnet is pulsed by a time-dependent electrical current. Pulses progress axially as magnets are sequenced on and off, generating a magnetic “pulsetrain” that attracts and moves the magnetized mixture (oil and magnetite) towards the magnetic ramp.

The Magnetic Ramp

The magnetic ramp lifts the oil mixture out of the water thus separating the magnetized oil/magnetite mixture from the water. The Magnetic ramp features a moving conveyor belt as well as a moving permanent magnet system. Due to the angle of inclination of the ramp system, the belt speed, and the magnetic force at the belt, water slides off the belt system while the magnetized oil is delivered to a tank at a 97% oil-to-water efficiency rate.



Electromagnetic boom and magnetic ramp

The Separated Oil

The oil and magnetite mixture is scraped from the end of the belt and collected in a tank. At this stage, a specialized magnet system can be employed to remove the magnetite from the oil allowing the magnetite to be reused, while the oil is disposed of in some manner. This completes the process of removing spilled oil in an efficient and environmentally friendly manner.

THE E-MOP DIFFERENCE

Electromagnetic remediation provides a novel and disruptive approach to the traditional methods presently used to combat spills and environmental damage. The usual remedies—skimmers, sorbents, dispersants, burning, bioremediation—do not have an efficient way of removing the oil from the surface, cannot remove oil that is beneath the surface, often use harmful chemicals or create noxious fumes, and are time-consuming and costly.

Electromagnetic remediation can be deployed for both water- and land-based needs and can scale efficiently to remediation needs of any size and complexity. It is safe, environmentally friendly, and efficient, making it the most versatile, flexible, and effective solution in the market—a true game-changer for oil spill remediation.

LEARN MORE

Contact **Natural Science, LLC** today at **630 520 2345** to learn how E-MOP™ Electromagnetic Oil Spill Remediation Technology can be deployed in your environment to address an urgent need or become integrated into your long-term contingency planning.