

United States Navy

United States Navy Denix System

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Abstract Title: **Oil Spill Eater II (OSE II)
The Permanent
Environmental Clean Up
Solution**

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Description:

OSE II accelerates mother nature's own process to remediate spills.

OSEI Corporation produces, and extracts biosurfactants in one section of our manufacturing facility from bacteria. We also produce over 50 different types of enzymes during the four (4) and a half day that is required to manufacture a batch of OSE II. So, when OSE II is applied to a spill there is immediately enough biosurfactants to detoxify (emulsify and solubilize) the spill in minutes instead of waiting years for indigenous bacteria to produce enough biosurfactants to affect the spill. This allows in a short time for the enzymes to form digestive binding sites in which the bacteria will use as a pathway to digest the spill. There are also constituents in OSE II to rapidly colonize enormous amounts of indigenous bacteria. These bacteria then utilize the detoxified hydrocarbons as a food source converting the hydrocarbons to CO_2 and water.

Scientific/Technical Merits and Objectives:

OSE II is designed to accelerate mother nature's own process for remediating spills. When there is a hydrocarbon-based spill, all living organisms that are in direct contact either die or are adversely affected. The bacteria that are proximal but not in direct contact of a hydrocarbon-based spill, react in several ways. These bacteria first release biosurfactants, and enzymes. Biosurfactants attack the molecular structure of the hydrocarbon (emulsify and solubilize) the hydrocarbons. This breakdown of hydrocarbon structure detoxifies the hydrocarbons so they can be utilized as a food source. The enzymes form digestive binding sites to offer up pathways into digesting the broken-down hydrocarbons. The indigenous bacteria then digest the hydrocarbons to CO_2 , and water. This takes an enormous amount of time for bacteria to release enough biosurfactants, and enzymes to affect a spill. OSE II has a bio tank where bacteria produce biosurfactants around the clock. These biosurfactants are then combined with other constituents that have produced over 50 types of enzymes and have constituents that rapidly colonize enormous numbers of indigenous bacteria.

When OSE II is applied to hydrocarbon-based spills there are enough biosurfactants, and enzymes that immediately attack the molecular structure of the hydrocarbons, so in minutes the spill is detoxified (emulsified, and solubilized). The enzymes then attach forming digestive binding sites on the detoxified hydrocarbons. During this process the other constituents contained in OSE II matrices then colonize enormous numbers of bacteria. Once the bacteria consume the food source in OSE II, they will then convert to detoxified hydrocarbons and digest it to Co₂, and water until the entire spill has been consumed.

OSEI Corporation has also developed the engineering required for OSE II, so that we can tell you how much OSE II to apply to a given hydrocarbon spill. So, for any given gallon/liter, or cubic yard/cubic meter of soil there is a calculable number for how much OSE II is required.

The science is sound for OSE II and the engineering is complete as well.

Capabilities, Experience, Personnel, & Techniques:

OSEI Corporation has been in business since 1989. Since this time OSE II has cleaned up thousands, and thousands of spills domestically, and overseas. OSE II has successful clean ups with the U.S. marines at 29 palms in which they won an environmental award of excellence. All five branches of the U.S. military have utilized OSE II for over 15 years. OSE II has been extensively tested by the Naval Research Lab in Key West Florida: Mr. Jan Berg stated that OSE II not only worked great as a deck cleaner but also bioremediated hydrocarbons to Co₂, and water. OSE II has also been extensively reviewed by the Navy Environmental Health Center in Norfolk, Virginia. Mr. Jerry Drewer was the contact for OSE II's review.

OSE II has been used on in-situ, and ex-situ soil spills. OSE II has been used on numerous underground spills, some under buildings where groundwater was contaminated. OSE II has been used on ocean, and freshwater spills. The Navy at Point Loma fuel farm uses OSE II to clean up their spills at the fueling dock

with whales, and dolphins, in the area without adversely affecting them. OSEI Corporation has written numerous step by step procedures for utilizing OSE II for all types of clean ups. The OSEI Corporation requires a responsible party to give us the site's characteristics, including all the parameters associated with the site including the type of contaminant. Once we receive this information, we can supply you with an engineered step-by-step procedure to utilize OSE II including how much OSE II will be needed and the cost of OSE II for this project. OSE II has been used on refineries, in bilges, decks, in cargo hulls, on pig out material, pipeline clean outs, waste and water treatment plants, on waste water pumping stations, grease traps, on all types of water spills, in marshes, and estuaries, on open ocean spills, on intertidal zones, in creeks, and rivers, on lakes, on concrete, and asphalt, in storm drains, drilling mud, on soil, and gravel, injected in aquifers, maintenance shops, fuel farms, oil water separators, and used to clean up sea lions, and birds. OSE II is also used by airports, and fireman. A side benefit of using OSE II is that on flat surface spills of fuel, OSE II will render fuels non- flammable. This a safety product in conjunction with all types of fuels. The Athens International Airport had a truck turn over and spill 32,000 liters of jet fuel. OSE II was used to render the fuel non-flammable, then the fuel was digested to Co₂ and water. OSEI Corporation has over 150 employees worldwide to handle all types of spills.

Critical in Achieving Objective:

OSEI Corporation is headed up by Rear Admiral Lively who graduated from the Coast Guard Academy with a double E in engineering. Steven Pedigo has a background in biochemistry from Southern Methodist University. There are personnel capable of performing site assessments, as well as remediation requirements, and procedures, for all types of spills. There are design staff to handle clean ups associated with all types of structures above ground, and underground, including under structures. We have capabilities of plume modeling, and plume remediation as well. We have personnel that design remediation plans for tank clean outs, and fuel farm contamination. There are personnel that can determine spill trajectory and can write remediation procedures. There are personnel that handle marshes, estuaries, and sensitive habitat spills that take in more intrinsic information before designing a remediation procedure.

OSEI Corporation has over 15 years of remediation of numerous types of spills in almost every scenario that is associated with hydrocarbon drilling production,

transportation, and end use.

Once OSEI Corporation is involved in a spill event, or contamination project the first objective is to define as many parameters as possible. Then we take into account special circumstances. The remedial action plan is designed to ensure that OSE II is applied in such a manner that OSE II mixed with water has access to all the contaminant at a 1 to 1 ratio. This is difficult to obtain at times, but with over 15 years of experience we have developed techniques to overcome most of the hurdles associated with contaminant clean up.

The overriding objective in regard to utilizing OSE II is to get bioremediation started. Getting it started is the most difficult step. Once bioremediation has started it will continue until the ultimate objective of converting all of the contaminant to CO_2 , and water is completed. The only way for bioremediation to be interrupted once started is to add more contaminant, and or deplete the sites oxygen. OSEI Corporation is very adept at overcoming any oxygen depletion problems. Oxygen demand problems are easily overcome.

Engineering a site clean-up with OSE II is easily defined since the product is based on sound science, and is engineered to be mixed, and applied at a definite rate, which also allows the cost to be defined as well.

Estimated Cost:

The OSEI Corporation after thousands, and thousands of clean ups, will answer this by discussing actual clean ups below.

The Navy uses OSE II at the Point Loma Fuel Farm in San Diego California. They procured OSE II and have it easily accessed. They also have an eductor system on the dock, and they have a 2 and a half gallon pump up hand sprayer. When there is a spill, they either educt the spill at 2% or they fill the pump-up hand sprayer with water, and 9 ounces of OSE II. The personnel then use the sprayer or eductor, and apply OSE II to all the spill. There are no special permits since OSE II is listed on the EPA NCP list (National Contingency Plan for spills list). However the Navy assessed the cost of using OSE II compared to conventional methods. For every gallon spilled using the conventional method it cost 90.00\$ U.S. When utilizing OSE II for each gallon spilled it cost 12.00\$ U.S. with 11.00\$

of this cost being labor, and 1.00\$ cost for OSE II for each gallon spilled. The cost to bring in a contractor was 6,500.00\$ for the average spill of 25 gallons. OSE II was a faster, more complete means of addressing all the spill, and by rendering fuels non- flammable is safer. Utilizing OSE II means having less flammable material on board a ship. OSE II will also address spills that go overboard and allow you to keep inside your booms clean while in port or docked.

Steven Pedigo

CEO OSEI Corporation

