



P.O. Box 515429  
Dallas, Texas 75075  
Ph: (972) 669-3390  
Fax: (469) 241-0896  
Email: [oseicorp@msn.com](mailto:oseicorp@msn.com)  
Web: [www.osei.us](http://www.osei.us)

## **Oil Spill Eater II's Irrefutable Science An Address of Common Questions**

### **Enzyme-Based Bioremediation Oil Spill Removal Process**

Oil Spill Eater II (OSE II) is a unique first response bioremediation agent, safe and effective on all types of oil and environments and, does not contain microbes of any kind. OSE II breaks down the molecular structure of hydrocarbons through the effects of bio surfactants, followed by over 156 types of enzymes developing protein binding sites and acting as a catalyst, while enhancing indigenous bacteria to rapidly colonize. Once OSE II's matrices and in particular, its nutrient portions, are depleted the enhanced bacteria convert over to the detoxified hydrocarbons as a food source via the enzymatic catalyst, digesting the hydrocarbons and hydrocarbon based material to CO<sub>2</sub> and water.

Using OSE II, this hydrocarbon remediation cycle takes place in 14 to 30 days on most crude oils, and for very heavy long chained hydrocarbons, it can take up to 60 days from the time the remediation starts until full digestion of the hydrocarbons is complete.

Upon application of OSE II to an oil spill, several actions begin in a matter of minutes:

- a) the molecular structure of the hydrocarbons are broken down and therefore detoxified,
- b) the hydrocarbons are emulsified, then solubilized, which also causes hydrocarbons to float (when a spill is on water), or causes hydraulic lift producing a separation from other matter including plants, birds, etc.
- c) flammability of the hydrocarbons is significantly diminished, and
- d) adhesion properties are reduced to the point they will no longer adhere.

In other words, OSE II significantly reduces an oil spill's impact on the environment in a matter of minutes.

See video link <http://osei.us/archives/1135> for observations of what occurs when OSE II is applied to water or a sandy shoreline which can be instantly observed at the 9:40 time notation point on the video.

As the process continues, the bacteria deplete the OSE II matrices/nutrients and begin to convert over to the hydrocarbons as a food source, digesting the oil. The end point of the digestion process is merely a conversion of broken down detoxified hydrocarbons including all the attached OSE II matrices (which include its bio surfactants, enzymes and nutrients) to CO<sub>2</sub> and water. And, there are no intermediary constituents.

The fact OSE II converts hydrocarbons to CO<sub>2</sub> and water has been substantiated by National Contingency Plan eligibility tests conducted by the US Environmental Protection Agency, on four separate occasions that we know of. The test reports showed that all 4 tests were within 10% of each others efficacy results, even despite the fact that one test was performed fifteen years after the first three previous tests. Further these tests and many conducted by independent labs, government agencies and oil companies in other countries show all results consistent with US EPA's extremely thorough OSE II efficacy tests.

One such US EPA NCP test (see link

<http://www.epa.gov/emergencies/content/ncp/products/oseater.htm> ), was conducted with a control, and measures 54 analytes, or separate compounds of crude oil, to absolutely determine across the full spectrum of individual analytes if they are remediating, or mass is reducing. The tests are performed in triplicate, at 4 different times, day 0, 7, 14, and 28. These tests absolutely substantiate that OSE II is converts oil to CO<sub>2</sub> and water.

## **LONG TERM STUDIES NOT REQUIRED**

The notion that a long term study of “after effects” of OSE II is needed to determine long term environmental impacts is nullified and pointless once the conversion of hydrocarbons to CO<sub>2</sub> and water is complete. Because the hydrocarbons are removed from the environment, whether it be ocean, fresh water, estuarine, or soil environment; the biodegradable and organic ingredients of OSE II are no longer present after the process is complete. Monitoring protocols however have been developed and are prescribed for all types of environments as a matter of best practice.

The conventional call for *long term studies* are derived from the use of chemical dispersants, since they have proven to disperse and sink oil into the water column with still unknown effects, although we do know that portions of the oil form into plumes or tar balls which also end up on shorelines and or remain on the seabed.

Dispersants have proven to contain constituents that prevent or slow the degradation of hydrocarbons by indigenous bacteria. Dispersants have demonstrated a tendency to exacerbate the toxicity of the oil, cause oil to persist in the environment, as well as facilitate ingestion by marine organisms and life, again with as yet unknown effects, hence long term studies are required.

## **TOXICITY LEVELS=INSIGNIFICANT**

In terms of concerns over toxicity to marine species, OSE II has had over 18 toxicity tests performed on it, some by the US EPA, Environment Canada, and in accordance with other country's requirements. The average LC or LD 50 is 5000 and above, keep in mind the US EPA

has established anything above 100 to be virtually non toxic. See test at link <http://osei.us/wp-content/uploads/18-Toxicity-test-with-4-2012-Log0.pdf> page 25.

To address possible concern over intermediaries, the US EPA had Western University of Florida perform a toxicity test on OSE II, used in a simulated open water test. The toxicity tests were performed on two different species over a 7 day time period. The 24 hour toxicity test on both species showed, an LC 50 of over 6000, the 48 hour LC 50 on the same species is 5970, the 96 hour LC 50 is 5700, and the 7 day LC50 is 2500. These toxicity tests tell that when OSE II is applied to oil, there is virtually no intermediate toxicity. In a second [and completely separate] species toxicity test, LC 50's were 8839 for the 48 hour and the 96 hour test. These tests suggest there are no intermediate toxicity concerns even during the time frame hydrocarbons are being remediated to CO2 and water.

A good example of long term and repeated use having no toxic effects is with an end user in Bakersfield California who has used OSE II to remove oil dust (from oil fields nearby) on a monthly basis from a 2600 gallon Koi fish pond, with abundant vegetation surrounding the edges of the pond. See video link at <http://osei.us/archives/1150>. This clearly demonstrates the application of OSE II to the oil dust on the surface of the water. The fish come up and appear to ingest some of the OSE II and swim through it several times, without harm. This application of OSE II has been done routinely for over two and a half years, without any harm to the Koi fish, in fact the Koi are thriving and growing as well as the plants and vegetation surrounding the pond.

The U.S. Occupational Safety and Health Administration (OSHA) has reviewed OSE II and determined there is no toxicological concern for humans in regards to OSE II see link [http://osei.us/tech-library-pdfs/2011/9-OSEI%20Manual\\_OSHA.pdf](http://osei.us/tech-library-pdfs/2011/9-OSEI%20Manual_OSHA.pdf)

OSEI Corporation demonstration videos generally show it to be harmless when you see persons pouring OSE II over their hands. These types of demonstrations have been carried out repeatedly since 1989 thousands of times without any harm coming to the OSEI associates being exposed to the product.

## SUMMARY

In summary, OSE II has an absolute pass score on its repeated efficacy tests with over 26,000 successful cleanups on its record since 1989 on fresh, brackish and salt water spills as well as spills in sensitive habitats, on soil, underground, on ground water and concrete, permanently removing the spills by converting them to CO2 and water.

Being that OSE II is classified as an *Enzyme Additive Category Bioremediation Agent* on the US NCP Product Schedule (meaning it contains no microbes) qualifies it as a first response tool on fresh and ocean navigable waters while other categories are not recommended as such. To understand why it is different than other types, see Bioremediation Fact Sheet at:

[http://osei.us/wp-content/uploads/TYPES-OF-BIOREMEDIATION-THREE-MODES\\_OSEI\\_Updated.pdf](http://osei.us/wp-content/uploads/TYPES-OF-BIOREMEDIATION-THREE-MODES_OSEI_Updated.pdf)

There are very few, if any oil spill cleanup products that have over 18 toxicity tests, acute, chronic and long term tests except OSE II which irrefutably document it as virtually non toxic. The OSHA letter shows, there are no toxicological concerns for responders, or humans. OSE II removes oil from the environment, which OSE II does by converting oil to CO<sub>2</sub> and water with no toxicity trade-offs or secondary clean up requirements. OSE II's own matrix is non toxic as tests prove, and is 100% biodegradable as actual clean ups have proven for 24 years.

OSE II emulates natures own process, it merely speeds the natural process up, to accomplish in a few days or weeks, what mother nature may take decades to achieve. OSE II reduces the time toxic hydrocarbons are able to persist and remain present in any given environment to adversely affect it.

Steven Pedigo,  
Spill Response Expert

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