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OSEI Refinery Information

The OSEI Corporation has been in business since 1989, cleaning up refined and unrefined product, oil/fuel and hydrocarbon based material effectively and economically, as well as safely. OSE II is a first response bioremediation product that rapidly reduces hydrocarbons toxicity, adhesion properties, flammability, vapors, and causes hydrocarbons to float on water preventing their migration into the water column or ground water. The result of the use of OSE II on over 20,000 spills, along with hundreds of tests is CO₂ and water.

OSE II does not require secondary clean up, or the hauling off of anything, soil and water can be reclaimed and reused after OSE II has remediated the hydrocarbons from them. OSE II has been used on refineries like Sommerset refinery in Kentucky for over 15 years as well as refineries overseas.

OSEI Corporation has a first response safe effective bioremediation product that converts hydrocarbons to CO₂ and water permanently removing the hydrocarbons from the environment. Oil Spill Eater can be used anywhere hydrocarbons, or hydrocarbon based material is extracted, transported refined, stored, or utilized as a fuel or in the manufacturing process.

Oil Spill Eater II (OSE II) is used in refineries for oily process water clean up, lagoons, pipelines, storage areas where a leak may form or a valve may fail, as well as in the storage tank when the sludge needs to be cleaned from the tank.

OSE II reduces and eliminates the flammability of hydrocarbons refined and unrefined, so there is an upside safety benefit for the refinery and workers alike. OSE II is so safe you can handle it without any adverse effects to the workers, or responders. You do not need chemical suits, or respirators to utilize OSE II in fact minutes after applying OSE II the fumes from hydrocarbons lessens allowing for a safer work place area.

OSE II – SAFE AND RELIABLE BIOREMEDIATION FOR OIL SPILLS SCIENTIFIC TESTING, THIRD PARTY ENDORSEMENTS

Since 1989, OSEI Corporation has effectively cleaned up more than 20,000 spills as a first response method* for cleaning up oil spills. The product, ***Oil Spill Eater II***™ (OSEII) has been

independently and rigorously tested in scientific settings the world over. It is distributed in over 35 Nations and is listed on the US EPA's National Contingency Plan for Oil Spills (NCP); OSE II is listed in the U.S. Defense Logistics supply chain and the Navy DENIX system as BAA Book 18 number 14.

Shoring up Mother Nature's own remedies, ***Oil Spill Eater II*** is the world's most environmentally safe and cost effective bioremediation process for the mitigation of hazardous waste, spills and contamination--virtually anywhere and of any size. It is environmentally safe because it uses nature's own bioremediation processes to effectively eradicate hazardous materials. (See What **OSE II is NOT**).

*A First Response designated product means it can be used on fresh oil as an immediate clean up response method as opposed to being designed for use on weathered oil or chemicals. OSE II can also be used on weathered spills.

THE PROCESS

When OSE II is applied to a spill:

- the biosurfactants attack the molecular structure of the Hydrocarbon, by breaking the spill into small particles, then the oil is solubilized which increases the oil/water interface--all in approximately 30 minutes.
- during this process the OSE II enzymes form protein binding sites act as catalysts to induce the enhanced bacteria to utilize the broken down hydrocarbon as a food source.
- once these reactions have taken place, several conditions become evident:
 - a. the oil is broken up, adhesion properties are diminished (which causes oil to release from marsh grass, vessels, BIRDS, marine species, beaches and more)
 - b. the fire hazard is reduced (which protects responders & ports)
 - c. the oil is caused to float (which prevents secondary contaminated areas and water column oxygen depletion) and most importantly
 - d. the oil is detoxified so it can be used as a food source at which point the oil is digested to an end point of CO₂ and water;
 - e. And finally, the enhanced bacteria die off to pre spill background levels.
- While these reactions are occurring OSE II's nutrient system is rapidly colonizing indigenous bacteria (OSE II does not introduce non indigenous bacteria into any eco system).
- Once the indigenous bacteria run out of the OSE II nutrients the bacteria then utilize the only food source left, the detoxified oil.
- There are also constituents in OSE II that once mixed and activated by natural water cause OSE II constituents to molecularly adhere to hydrocarbons. Hence, no matter where the current or tidal action pushes the oil, OSE II will stay with it.

EFFICACY TESTS, SCIENTIFIC STUDIES

OSE II can be used on the surface, below the surface, on the ocean floor, in marshes, estuaries, sand or soil beaches on rocks, in bays, ports and harbors. Ample case studies are available to prove it's workability in all mediums. OSE II is virtually non-toxic and extremely

effective in breaking down oil. We suggest you go to OSEI Corporation's [Technical Library](#) to view the following:

(to view documentation and actual test reports, click the blue links below)

Salt Water Efficacy Tests:

- U.S. EPA / NETAC 21 Day & 28 Day Bioremediation Test - Biodegraded Alaskan Crude 98% in 21/28 days. (pg 25-35)
- U.S. Respirosity Test – EPA determined OSE II to reduce hydrocarbons by 98% and aromatics by 85% which was better than any other product tested. (pg 41-44)
- University of Alaska (Dr. Brown) PAH Test – Demonstrates that OSE II with mineral nutrients and hydrocarbons is **300%** more effective than without OSE II. (pg 45-49)
- Mega Borg Ship Spill in Gulf (South African Crude Oil) Test – In 216 hours OSE II lowered TPH from 100,070 ppm to 516 ppm for a 99.5% reduction. (pg 50-52)
- BETX Bioremediation Test- OSE II can even work well on Benzene, Ethyl Benzene, Toulene and Xylene ratios demonstrate the potential to biodegrade as much as 98%. (pg 53-56)

Fresh Water Efficacy Tests:

- Chevron Crude Oil Bioremediation Test- OSEII on Chevron Crude in 24 days reduced 95,200 ppm to 690 ppm or 99.8% effective on biodegrading this oil.

Soil Efficacy Tests:

- U.S. Marine Corps Base 29 Palms California (Cleanup Won Environmental Award) (pg 1-5)

Salt Water Species Marine Toxicity Tests

- U.S. EPA / NETAC Mysid Toxicity Test (this test was run twice) – LC50 Test, at 96 hours OSE II greater than 2100 mg/L.
- Both Mummichog and Artemia Salina Toxicity Test – LC50 Test, at 48 hours OSE II is 5285 mg/L. (pg 14-23)

Fresh Water Species Marine Toxicity Tests:

- Rainbow Trout Toxicity Test by Environment Canada-Toxicity tests state 1000 mg/L or less is toxic. Anything higher is acceptable and considered non-toxic. OSE II, test result 10,000 mg/L = non-toxic.

Beneficial Environment Effects:

- Biological Oxygen Demand for OSE II –OSE II has minimal impact on BOD, less than 7%.
- Dispersant Swirling Flask Test - Proves OSE II causes oil to float

PRODUCT DEMONSTRATIONS, STATE OFFICIALS

For a product overview from TV News and demonstrations see:

- [WLOX News](#) OSEI Corp and Oil Spill Eater II are demonstrated for all the Senators and members of Mississippi DEQ. The product shows how quickly Oil Spill Eater II. Can work to begin breaking down an Oil Spill.

- After seeing this demonstration, [Senator Tommy Gollott](#) of Mississippi sent a [formal request](#) to the Coast Guard and EPA response team members requesting the use of OSE II.
- [Department of Environmental Quality ALABAMA Demonstration](#):
 - DEQ Rep Contacted the Navy to verify they use OSE II
 - “This meets the criteria that the State of Alabama is looking for because it’s not adding a ‘superbug’ it is a simple process, there is no magic” Alabama DEQ Rep.
 - After demo, Senator Hank Erwin sent [formal request](#) to use OSE II to EPA.
- [Demonstration Video](#) on DWH Oil on private property.

OTHER ENDORSEMENTS

- Mr. Nick Nichols of the EPA oil program, and Debra Dietrich of the EPA Headquarters and Mr. Robinson EPA, Region 9 all have first-hand knowledge of OSE II being used in San Diego Bay by the U.S. Navy for over 100 spills, over a 3 ½ year period with no adverse effects to the whales, dolphins and other ocean ecology. OSEI Corp and OSE II are trusted and used by all 5 bodies of the U.S. Military.
- The EPA/Regional Response Team 6 had a success with OSE II on the [Osage Indian Reservation](#).
- BP has used OSE II in [Trinidad and Tobago](#) and a refinery in Greece.
- OSE II has been extensively reviewed by the Navy Environmental Health Center in Norfolk, Virginia. Mr. Jerry Drewer was our Contact: (757) 363-5540. OSE II has also been extensively tested by the Naval Research Lab in Key West, Florida: Our contact was Mr. Jan Berge (305) 293-4216.

Sommerset Refinery in the US, state of Kentucky pictures Link
<http://osei.us/photoalbums/sommerset-refinery>



Sample protocols for other refineries below

Pakistan Zamzama Gas Plant

Pit ZAM 07 A

I. Parameters of contaminated site: The site is at the Zamzama Gas Plant In Pakistan. The area of contamination is contained in a sludge pits numbered 06 and 07. This procedure will cover the pit denoted Zam 06. This pit contains 895 m³ of cuttings/mud. We have been directed that all free floating oil has been removed.

II. Calculations: 895 m³ (145 m³ of oil based mud, and 750 m³ of water based mud) X 2.3L equals 2058.5L of OSE II mixed with 205,850 liters of fresh water to mix with OSE II for the 50 to 1 ratio to ensure saturation of the cuttings/mud.

A 2058.5L of OSE II equals, (2058.5 X 0.246172052637296) 543.80 gallons of OSE II or 543.80 divided by 55 (number of gallons in a drum of OSE II) equals 9.80, or 9 drums of OSE II and 44 gallons, since OSE II. Therefore you would take 10, 55, gallon drums of OSE II since the shipping price would be less than purchasing 9 drums and 10, 5 gallon cases of OSE II.

B. NOTE; There are two procedures to address the cuttings in Zam 07. One procedure is to remove the cuttings from the pit and spread it out on plastic, and the other method is to clean up the cuttings in the pit In situ. This procedure, Procedure A, removing the cuttings, and placing them on plastic will be addressed first.

III. Materials needed:

1. 1790 is the actual area needed however to simplify application we will use 2,000 square meters of area to spread out the cuttings/mud
 2. 10, 55 gallon drums of OSE II
- P2 Zamzama Gas Plant Pit ZAM 06 A
3. Enough plastic to cover 2000 square meters
 4. 400, 1 meter wooden stakes
 5. Enough string to form a grid with the wooden stakes
 6. An inexpensive soil, or lawn moisture meter
 7. Excavation machine to build a berm around treatment area, and to relocate cuttings/mud from the pit to the plastic
 8. A water tank truck that can suck up water, and discharge water, with the ability to mix OSE II with the water in the water tank truck. The tank should hold, either 50,000 liters of water. The water tank/truck will need a flow meter or you will need to be able to calculate number of liters per minute discharge rate. The tank will need a minimum length of hose to be 10 meters
 9. A source to collect 205,850 liters of water
 10. A machine to till the cuttings/mud
 11. 10 laboratory jars with sealed caps
 12. Markers to designate sealed laboratory jars
 13. Ice chest to store samples while being transported to the laboratory
 14. a small hand shovel or soil extraction device to extract samples of cuttings
 15. Soil marking paint for berm area
 16. Long tape measure
 17. Duct tape

18. A long handle paddle

IV. Procedure:

1. Using wooden stakes mark out a line 2,000 meters apart.
2. Take marking paint and spray approximately a 50 centimeter line every 5 meters. Make a right or left 90 degree turn and set another stake 2,000 meters from the first corner stake. Then spray approximately a 50 centimeter line every 5 meters, then turn right again and set another stake 2,000 meters from the second corner stake. spray approximately a 50 centimeter line every 5 meters. Then turn right 90 degrees again and the fourth stake will already be there completing the square. spray approximately a 50 centimeter line every 5 meters.
3. Using the excavation machine place the clean dirt up next to the painted marked line, build the soil up at least 60 cm in height.
4. Rollout the poly-ethylene plastic starting at one end covering up the berm, on one side. Place a stake every 20 meters through the outside edge of the poly to keep it in place and for application purposes later. Make sure when you roll out the rest of the plastic it overlaps, and you can use duct tape in spots to make sure the plastic stays in place. Make sure you overlap the plastic by at least 40cm for a good seal.
5. Using the excavation machine place the 895 m³ of cuttings/mud onto the plastic and spread the cuttings to a depth of approximately 50 cm.
6. Roll out the string from one stake to the stake directly across from it and tie off the string on both stakes. Do this until the string has formed a 20 m² X 20 m² grids for the entire treatment area.
7. Note: each grid will contain 20m² X 20 m² X 50 cm of cuttings/mud. Each grid will have approximately 200 cubic meters of cuttings/mud. Each grid will receive. 200 m³ X 2.3 liters of OSE II mixed, or 460 liters of OSE II, with 100 liters of water for each liter of OSE II for a total of 46,000 liters of OSE II mixed with water. You can use more than one truck to expedite the OSE II and water application.
8. The tank will extract 45540 liters of water from a fresh water source, and then 460 liters of OSE II will be added to the water tank and mixed with the long handle paddle.
9. The OSE and water mixture tank will be staged in such a place so the hose will cover the entire grid. OSE II will then be applied as evenly as possible through out the grid. Repeat steps 7, 8, and 9 until all the grids have had OSE II applied to them
Note the extra OSE II from 9 drums 44 gallons to 10 drums will be used to make up for the extra grid area using the 2,000 m² instead of 1790 m². This makes application and calculation on the job easier.

V. Test requirements

1. Based on the contaminant levels and the type of contaminant you should extract the first samples from the soil 15 days after the application of OSE II. Extract samples from 10 different sampling areas, mark the areas with a stake, mix the samples to form a composite sample, seal the lids, place on ice in the ice chest, and transport to the lab for analysis.
2. repeat the steps in 1 above on day 30
3. If needed repeat the steps from one above on day 45
4. Once the site is deemed clean reuse the now very fertile soil anywhere

VI. Site maintenance:

1. Two days after applying OSE II to the cuttings/mud use lawn moisture meter and measure the water/moisture level of the soil in several places. If the moisture level is below 30% add enough fresh water from the same place water was used to mix with OSE II and bring the moisture level up to 30%.
2. Twice a week use tilling machine to till or turn the cuttings/mud over.
3. On the same days the cuttings/mud is tilled measure the cuttings/mud moisture level with the lawn moisture meter. If the level falls below a 30% moisture level add the same fresh water used to mix OSE II to the cuttings/mud. Measure the moisture in several areas to make sure the cuttings/mud is saturated with water. You cannot add too much water, however you do not want to overflow the berms. Rain is good for remediation as well

VII. Observations:

1. Make note of any changes in color after applying OSE II, any odor changes, and any other pertinent visual observations, especially any noticeable changes.
2. Each time the cuttings/mud is tilled and or water added make notes of any observations.

VIII. Expected results/Conclusion:

1. Based on the levels and types of contaminants the levels of the hydrocarbons will be close to the acceptable range by day 30. The cuttings/mud will be rich garden compost upon completion of the clean up.

Engineered by Wilfred Aghoghovbia
Steven Pedigo

Iraq, Reliance Exploration and production Refinery clean up

I. Parameters of contaminated site:

Contaminated site has a pit 36m x 34m X 2.5m with oily sludge located in Kurdistan N. Iraq owned by Reliance Exploration and Production DMCC. The pit contains oily water/oily sludge/soft soil cuttings/ hard cuttings with sludge, with a volume of 1000m³. The pit is lined with a Geo membrane and is intact. There are no power outlets.

II. Calculations:

The 1000m³ of sludge/soil. The pit has a total volume potential of 36m X 34m X 2.5m equals 3,060,000 liters of liquid volume.

1. The sediment/sludge/cuttings volume of 1000m³ will require (2.3 liters of OSE II per 1m³ of soil) 1000 X 2.3 equals 2,300 liters of OSE II for the sludge/drilling mud/cuttings.
 - A. The required OSE II is: 2,300 liters equals 607.6 gallons, or 11.04 drums, or 11, 55 gallon drums and 1, 5 gallon case.
 - B. 11 drums
 - C. 1, 5 gallon case
 - D Total cost of OSE II
2. You will need 115,000 liters of water initially drawn from a fresh water source, no tap water.
 - A. The total volume of OSE II and water to apply will be 117,300 liters.
 - B. For a 25,000 liter truck/tank you will need to refill it 4.69 times.

III. Materials needed:

Note; the area in the pit that is 36m X 34m will be used to spread the 1000m³ of sludge and sediment as evenly as possible.

1. OSE II 11, 55 gallon drums and 1, 5 gallon case.
2. 30 wooden stakes just to anchor the string for a grid purposes.
3. 300 meters minimum of string to tie to the stakes.
2. A water tank truck that can suck up water, and discharge water, with the ability to mix OSE II with the water, in the water tank truck. The tank should hold, 25,000 to 50,000 liters of liquid. The water tank/truck will need a flow meter on the hose or on the nozzle, or you will need to be able to calculate number of liters per minute discharge rate. The tank will need a minimum length of hose to be 20 meters and the spray will 18m, or you will have to get into the pit to apply OSE II.
3. A source to collect 115,000 liters of water initially.
4. A means to spread soil out as evenly as possible, a small front end loader that can go into the pit, or a large backhoe that can spread soil from the sides of the pit.
5. A machine to till or turnover the soil.
6. Soil lawn moisture meter
7. small spade to collect soil samples.
8. 60 polyethylene bags that will hold 500gm each, and 6 bags that will hold 2500gm.
9. label for bags to designate where sample came from and the date collected.
10. Long tape measure
11. Long handle paddle to mix OSE II in tank.
- 12, Ice chest to carry samples to the lab: you will need to place ice in the chest thirty minutes minimum before extracting samples.
13. Pad and pen or pencil.

IV. Procedure: The equipment should be staged at the site at least 24 hours before starting the project.

1. Spread the mud/sludge/cuttings to a as evenly as possible over the entire 36m X 34m area in the pit. Once the soil is spread use the stake layout document for test extractions to set the 9 stakes no farther than 10 m apart per the specifications in the bid request. This is where the samples for test extractions will be carried out. See stake extraction layout document attached. Number each stake once they are laid out.
2. A. extract 400gm samples from each of the 9 designated areas next to the stakes from 25cm below the surface of the mud, and place into sterilized polyethylene bags.
B. Take 200 gm from each bag and mix it together in a single bag and stirr the mixture until it is homogeneous, there will be a total of 1800gm in the bag.
C. Then put the bag on ice in the ice chest and take to the laboratory, and have an EPA 8527 TPH (Total Parts Hydrocarbon) test performed or an EPA modified 8015 TPH test performed or whatever is required.
- 3.. Use the grid layout with strings document to lay out the string with stakes tied to each end to anchor them, and push them into the ground on the outside of the pit.
- 4.. You will have made a grid of 34m X 12m to help with the actual application of OSE II.
5. We will designate for now a 25,000 liter truck/tank, this can be adjusted once we know the actual size of the truck/tank. You will extract 24,500 liters of fresh water into the

- truck/tank. This water must be fresh water from a well, creek, river or lake. You will then add 500 liters of OSE II into the tank, and stir the tank with the long handle paddle.
6. Each 34m X 12m grid will contain 333.3m³ of mud, so each grid will receive 1liters of the OSE II and water mixture from the tank. So when the flow meter on the hose or nozzle reads 105 liters, you will move to the next grid, and apply a 105 liters to that grid until you have finished. You will repeat this until the truck/tank is empty, and then refill the truck/tank with another 24500 liters of fresh water, and 500 liters of OSE II. Spray as evenly across the grid as possible starting in the middle and working out to each side. This will be repeated 4 times.
 7. The last time the truck/tank will be filled, it will require 15,000 liters of fresh water and 300 liters of OSE II. Spray as evenly as possible across the grid.
 8. Pull the strings up, you will no longer need them.

V. Test requirements;

1. On Day 0 once the mud/cuttings/ sludge is spread out .

- A. extract 400gm samples from each of the 8 designated areas near each stake from 25cm below the surface of the mud, and place into sterilize polyethylene bags.
- B. Take 200 gm from each bag and mix it together in a single bag and till the mixture is homogeneous, there will be a total of 3200 gm in the bag.
- C. Then put the bag on ice in the ice chest and take to the laboratory, and have an EPA 8527 TPH (Total Parts Hydrocarbon) test performed or an EPA modified 8015 TPH test performed.

2. On Day 15

- A. extract 400gm samples from each of the 9 designated areas near each stake from 25cm below the surface of the mud, and place into sterilize polyethylene bags.
- B. Take 200 gm from each bag and mix it together in a single bag and till the mixture is homogeneous, there will be a total of 3200 gm in the bag.
- C. Then put the bag on ice in the ice chest and take to the laboratory, and have an EPA 8527 TPH (Total Parts Hydrocarbon) test performed or an EPA modified 8015 TPH test performed.

3. On Day 30

- A. extract 400gm samples from each of the 8 designated areas near each stake from 25cm below the surface of the mud, and place into sterilize polyethylene bags.
- B. Take 200 gm from each bag and mix it together in a single bag and till the mixture is homogeneous, there will be a total of 3200 gm in the bag.
- C. Then put the bag on ice in the ice chest and take to the laboratory, and have an EPA 8527 TPH (Total Parts Hydrocarbon) test performed or an EPA modified 8015 TPH test performed.

4. On day 45

- A. extract 400gm samples from each of the 8 designated areas near each stake from 25cm below the surface of the mud, and place into sterilize polyethylene bags.
- B. Take 200 gm from each bag and mix it together in a single bag and till the mixture is homogeneous, there will be a total of 3200 gm in the bag.
- C. Then put the bag on ice in the ice chest and take to the laboratory, and have an EPA 8527 TPH (Total Parts Hydrocarbon) test performed or an EPA modified 8015 TPH test performed.

5. On day 60

A. extract 400gm samples from each of the 8 designated areas near each stake from 25cm below the surface of the mud, and place into sterilize polyethylene bags.

B. Take 200 gm from each bag and mix it together in a single bag and till the mixture is homogeneous, there will be a total of 3200 gm in the bag.

C. Then put the bag on ice in the ice chest and take to the laboratory, and have an EPA 8527 TPH (Total Parts Hydrocarbon) test performed or an EPA modified 8015 TPH test performed.

6. On Day 75 IF NEEDED

A. extract 400gm samples from each of the 8 designated areas near each stake from 25cm below the surface of the mud, and place into sterilize polyethylene bags.

B. Take 200 gm from each bag and mix it together in a single bag and till the mixture is homogeneous, there will be a total of 3200 gm in the bag.

C. Then put the bag on ice in the ice chest and take to the laboratory, and have an EPA 8527 TPH (Total Parts Hydrocarbon) test performed or an EPA modified 8015 TPH test performed.

VI. Site maintenance:

1. Twice a week you will need to go to the site and till or turnover the mud, and add water to maintain the 30 % moisture. This will be determined by sticking the moisture meter into the soil at least 10 cm under the surface in several spots in the pit. You do not have to maintain this exactly, more water is good, even if you have a slight layer of water that sets on the surface, you just want to prevent the moisture level from going below 30% if possible. Rain is acceptable.

VII. Observations

1. You will write down the observations noting all the parameters of the site before you start including smells. You will do this after each step in the procedure, and after each time you visit the site and perform tilling/turning over the soil, and or, adding water for moisture level..

VIII. Expected results/Conclusion

1. The drilling mud/cuttings/sludge should be remediated in 30 to 45 days, and at the most 60 days.

IX. Labor

1. You could get away with 2 laborers, however 3 would be more than enough on the in initial day. The twice a week maintenance could be handled by one person, however if there are two and an accident occurs then there would be someone there to call for help!

Protocol performed by Chace Smith, and Robert Pedigo

If you are interested in OSE II let us know, or if you have a project that needs addressed send us the all the parameters and we will develop a step by step protocol to remediate your refinery contaminant.

Steven Pedigo

