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OSE II's Comprehensive Oil/Fuel, Hydrocarbon based material Response Plan

OSE II FIRST RESPONSE BIOREMEDIATION TYPE ENZYME ADDITIVE

Oil Spill Eater II A First-Response

Proven

Bioremediation Response For Oil/Fuel/Hydrocarbon Based Material

September 2026

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Important Note: **The following material has been compiled based on and for the *Regional Response Team IV Bioremediation Response Plan and adapted to an international spill plan as well*. The original material published on RRT IV's website as part of their Regional Response Plan, represents a comprehensive outline of assessment steps to be taken by Global Authorities and US FOSCs considering the use of OSE II a First Response Bioremediation Agent on any given spill, environment and given oil/hydrocarbon type.**

The RRT IV now Global plan is a model used to develop a comprehensive plan for OSE II. Having a separate *EA Type* OSE II a First Response plan is critical since Microbial Culture Additive (MC) and Nutrient Additive (NA) based agents have restricted and limited uses, especially on water ways and ocean environments while OSE II/*EA Type* has a broad applicability and track-record of effectiveness for use on US, and International navigable waters, in almost every conceivable scenario hydrocarbons can be spilled or released.

OSE II *EA Type* -First Response Bioremediation and its modes of action must be considered and assessed separately from the MC and NA listed bioremediation methods, since these agents while being Bioremediation have a completely different mode of action and are not used as first response agents due to their limitations. The OSE II First Response *EA Type* plan below fulfills all requirements set forth in NRT/RRT IV US Clean Water Act/OPAH 90 and Global requirements, for Plan models but is revised and modified for OSE II methodology for easier reference by FOSCs, Global Authorities, and Responsible Parties.

I. INTRODUCTION

First Response Bioremediation OSE II (Category EA) as a first response tool has been utilized, since 1989 starting on the Exxon Valdez spill, and is a form of oil/hydrocarbon-based material clean-up, which follows nature's own process, where the three phases of OSE II chemically alter and breakdown organic molecules into other substances, and utilize indigenous enhanced bacteria to finally digest hydrocarbons to CO2 and water - in order. The basis for this process is: microorganisms require minerals and sources of carbon, as well as water and other elements, to survive and function.

The most difficult part of bioremediation is getting the process started especially with light end or halogenated hydrocarbons as well as fuels and solvents whose toxicity is formidable. The first two phases of OSE II facilitate the molecular structure breakdown of the light end or halogenated hydrocarbons as well as fuels and solvents, followed by catalysts/enzymes that speed up the break-down of the molecular structures of hydrocarbons, which detoxifies the hydrocarbons, causes the hydrocarbons to float, protecting the water column and it inhabitants, eliminates the adhesion properties of the hydrocarbons, eliminates the flammability of hydrocarbons, and destroys the noxious smells associated with hydrocarbons; however once the process starts there is nothing that should stop the entire spill from being consumed as a food source for enhanced indigenous microorganisms, converting the spill completely to CO2 and water, unless more contaminant should enter the spill area.

OSE II's advances in this field, leaving any toxic compound for nature carries a risk of adverse effects on living organisms, marine and other life, which can be avoided with OSE II. The time frames of nature's process can be anywhere form 5 – 30 years or more in the case of the Exxon Valdez spill, necessitating enhanced bioremediation, by OSE II, which accelerates natural biodegradation processes by applying specially chosen enzymes, biosurfactants, and nutrients to spilled or released substances.

The three main types of Bioremediations identified/classified on the US EPA Product Schedule, and each having very distinct differences in their mode of action/s and applicability in a given environment, the definitions category EA/OSE II and as the only, first response bioremediation product/process, that will be discussed and utilized in this response plan.

1 Example: OSE II, has been successfully utilized on over 95,000 spills since 1989, tested by the US EPA, and BP for the Deepwater Horizon spill, the Exxon Valdez spill by Exxon and the University of Alaska Fairbanks and compared to Corexit dispersants and skimmers as well as by DOI in June 2011

II. Purpose

The paramount purpose of this document is to define and allow all Global Authorities, US NRT/RRT's members, Responsible Parties, and End users, as well as all the oil spill response community to understand why spills are cleaned up, and Why OSE II is the (BAT) Best Available Technology.

Oil/Hydrocarbon based spills are cleaned up to reduce the toxicity of the spill to the environment, so that living organisms can survive, including single celled organisms. By accomplishing this task, then marine species, humans, and natural resources are protected in accordance with the Clean Water Act and OPA 90, and Global requirements.

This document has a fourfold purpose:

1. To define How OSE II remediates the broad spectrum of hydrocarbons or hydrocarbon-based materials including halogenated hydrocarbons and pesticides.

2. To outline a process by which Global Authorities, Responsible Parties, End users, or US Federal On-Scene Coordinators (OSCs) in all RRT's may access use of OSE II or authorization/pre-approve use of OSE II, category EA first response bioremediation for spills of oil or hazardous substances (the spill site or authorization procedures presented are consistent with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), and Global regulations.

3. To outline the types of information necessary to show OSE II a first response Bioremediation Category EA proven product/process is feasible, provide as much of this information in advance as possible, and outline a mechanism for capturing information on OSE II a First Response bioremediation agent for use and future decision making; and,

4. To describe how to implement OSE II category EA first response bioremediation activity and determination of its effectiveness.

This document is to show there is a proven, non-toxic to marine species, safe for responders/humans, means to permanently remove oil/hydrocarbon based material or halogenated hydrocarbon/pesticide spills from the environment in accordance with the Clean Water act and OPA 90 and Global requirements including the IMO regulations where IMO protocols ban chemicals that sink oil into toxic subsurface plumes. This document will show that OSE II is a clean-up product/process that that meets all Global, and state and federal and regulations in the US, will allow FOSC's and all the RRT members to meet their job descriptions as well as the EPA Charter/mission and the EPA's delegated charge from the President of the United-states to protect the US natural resources and the health safety and welfare of its people.

This response plan includes all the necessary information to pre-plan and adjust in emergencies response areas of priority, and to bring a spill to a clean-up, with OSE II, that is acceptable to the public (permanent removal of hydrocarbons or hydrocarbon based material from the environment), that minimizes damages and prevents further contamination of secondary, tertiary or quaternary areas, while protecting natural resources, humans, wildlife as well as all marine species. Appendix C shows a-number of spills that have been successfully cleaned up with OSE II.

III. CATEGORY OSE II TYPE ENZYME ADDITIVE (EA)

As covered by Global requirements, NRT and RRT guidance addresses the (MC) and (NA) bioremediation types extensively in the 2001 *Guidelines for the Bioremediation of Marine Shorelines and Freshwater Wetlands*[i] it does not sufficiently detail the mode of action of first Response OSE II *Bioremediation Type EA*.[ii] Below is data to remedy this.

OSE II ENZYMATIC AGENT DEFINITION:

Biocatalysts designed to enhance the emulsification and/or solubilization of oil/hydrocarbons/hydrocarbon-based material, to make it more available to indigenous microorganisms as a source of food or energy (The US EPA, Coast Guard, NOAA, DOI have all stated publicly this first action is acceptable and preferred). OSE II is a liquid concentrate, whose matrix is mixed with biosurfactants, enzymes and nutrients that are manufactured through fermentation. OSE II is the type of agent that enhances biodegradation by indigenous microorganisms, converting hydrocarbons or hydrocarbon-based material to a safe end point of CO2 and water, **permanently removing hydrocarbons from the environment (the publics expected response action).**

OSE II TYPE MODE OF ACTION:

Enzyme Additive mode of action is applicable in open/moving water (fresh, salt and brackish), marsh/estuaries/wetlands, shoreline, soil and contained environments. When applied, the non-toxic converters and biosurfactants in OSE II eliminates the classic appearance of an oil spill by emulsifying and solubilizing the molecular hydrocarbon structure and eliminating the adhesion properties and the toxicity of crude oil. This usually takes place within the first 5 - 30 minutes (depending on temperature). The broken-down molecular structure of the oil is now detoxified and is caused to float by OSE II near the surface, thereby eliminating a secondary impact to the water column and seabed.

With the toxicity and adhesion properties eliminated, wildlife that may encounter the broken-down hydrocarbons, they will not become coated in oil, and oil adherence to marsh, shorelines, sands, and manmade structures is eliminated. The flammability is eliminated in a short time (depending on temperature) as well protecting ports, harbors vessels, and drilling rigs from the potential explosion hazards associated with fuel spills.

A further action of OSE II, (there are numerous enzymes contained in the product's matrices) is that the enzymes then attach themselves to the hydrocarbons with the biosurfactants, developing protein binding sites, that act as a catalyst to speed up the bioremediation process by inducing enhanced indigenous bacteria to utilize the detoxified oil/hydrocarbons or hydrocarbon-based material as a food source. The OSE II EA category also contains properties that cause all the constituents to remain in contact with the spilled oil/hydrocarbons in moving waters through molecular ions, and cations.

Over the next few hours or days (again, depending on temperature), non-toxic nutrients in OSE II rapidly colonize indigenous bacteria to large numbers. The colonized bacteria consume the detoxified hydrocarbon emulsion, digesting the spill to CO_2 and water, thereby permanently removing the oil/hydrocarbons or hydrocarbon-based material from the environment, and resulting in final water clean-up/removal. Without OSE II"s assistance, this natural process may take up to 20 years based on Ixtoc and the Valdez spills over 36 years studies have proven.

SHORELINES/MARSHES/ESTUARIES/WETLANDS:

When a spill has already made land fall or contaminated a shoreline/marsh/estuary, or wetland, OSE II can be applied to lift the spill off the marsh grass, plants, trees (or sandy, grass covered, rocky, or any type of make-up of beaches and shorelines), limiting the time the spill can adversely impact these areas. The use of OSE II does not deplete the O2 from water, since the spill is held on the surface utilizing predominantly atmospheric O2. If there is any type of O2 concern it is easy to add plastic perforated tubes by drones, to supply and required aeration.
With OSE II there are no tradeoffs or deleterious effects with this response method.

There is no limited window of opportunity for the application of OSE II as is the case with dispersants; it can and has been used on contaminated a shoreline/marsh, estuaries, or wetlands, in open (salt) water and, moving fresh water in rivers and soil. It is effective as a first response tool and/or when applied days or months after a spill. OSE II can and has been applied to oil that is lying on the seabed floor as long as OSE II can be brought into contact with the oil, which will eventually lift it to the surface returning the seabed to pre-spill conditions, and causing the benthic layer to restore quickly.

As of the date of this writing, there is only one product on a list that falls under this OSE II First Response Bioremediation Agent (OIL SPILL EATER II), therefore all modes of action descriptions above are related to this single EA product of its kind in existence. Any newly added EA type product/s would require review and validation as fitting in this category. To see OSE II's mode of action, see Emulating Mother Nature in layman's terms at this link https://www.osei.us/tech-library-pdfs/2011/4-OSEI%20Manual_EmulatingNature.pdf

IV. APPLICABLE REGULATIONS PLUS IMO/MARPOL REGULATIONS

Legislation at the Global (treaties), US federal and state levels can have impact on the use of OSE II a first response bioremediation as the Global community and US/states have shown the propensity to use OSE II category EA. Existing regulations and policies that govern the use of First response bioremediation category EA in response to spills are/can have differences generally affected by temperature and or topographical variances in regards to various areas of the world and within Global, US, RRT's but in actuality are all similar (**the first general expectation is non-toxic to humans, non-toxic to marine species, and remove's the contaminant permanently from the environment**). The IMO/MARPOL Global protocols have now banned chemicals that sink oil into subsurface plumes, where OSE II's ability to cause hydrocarbons or hydrocarbon-based chemicals to float until digested to CO2 and water is one of the many ways OSE II meets these standards. The current US policies, some were based on incorrect, and or incomplete information submitted by Al Venosa of the EPA, which were then promulgated into guidance documents which are being changed, were incorrect and or incomplete, this plan corrects and fills in the incomplete/incorrect information. Therefore, the existing regulations and policies in this plan show OSE II meets and exceeds all Global and US Regulations, for changes to conform with the true and complete available up to date information.

The US Clean Water Act states that whatever is used on a spill response must remove the oil/hydrocarbons from the environment, and a Pollutant cannot be applied to a pollutant. OSE II absolutely has proven that OSE II removes oil from the environment and has been verified by the US EPA and the US military as and over 95,000 cleans ups removing oil from the environment see appendix C below. And this link https://www.osei.us/clean-ups
The Clean Water Act also states a pollutant cannot be applied to a pollutant, which means anything added to the oil cannot increase the oils toxicity, OSE II has 51 toxicity tests, that show it is non-toxic, and even a few that shows OSE II reduces the toxicity, in a short time. Also Three Universities performed testing on OSE II to show OSE II reduces the toxicity of the oil, and also restores the Benthic layer, proving OSE II meets the CWA see link https://www.osei.us/wp-content/uploads/Republic-of-Korea-Shoreline-Clean-with-recommendations-from-ITOPF-for-shoreline-clean-ups-2022.pdf

The IMO/MARPOL has now written regulations stating that Open-Ocean Safety: IMO protocols ban chemicals that sink oil into toxic subsurface plumes. OSE II keep treated hydrocarbons floating at the surface until native microbes' complete digestion, protecting deep-sea ecosystems and fishing grounds. See link https://www.osei.us/wp-content/uploads/OSE-II-IMO-MARPOL-FINAL-MASTER-Cover-letter-compliance-protocols-and-brochures-9-3-26-ZXZX-2-wiwaov.pdf
See link to dispersant test with OSE II that shows OSE II has zero effectiveness to sink oil, and in fact produced a negative number which shows OSE II causes hydraulic lift of hydrocarbons on water, soil and concrete. https://www.osei.us/Tech%20Manual/OSEII_Beneficial_env_effects_use_and_app_tests.pdf pages 126-128

V. ROLES AND RESPONSIBILITIES

This section discusses issues relevant to managing the response to a spill, with particular emphasis to managing OSE II first response bioremediation activities, which will show why it supersedes all other responses.

On-Scene Spill Authority or US On-Scene Coordinator (OSC)

The Global community have some precedence for Government Authority designated for spills, sometimes being the responsible party/spiller, or Person of Authority, in the US it is as per 40 CFR Section 300.120, USCG and EPA provide pre-designated OSCs that have overall responsibility for oil spill responses in the coastal and inland zones respectively. When using OSE II category EA bioremediation as a first response tool, the authority or US OSC shall be responsible for ensuring that the requirements set forth in this plan are properly followed and implemented. This includes notification, planning, documentation and monitoring of all OSE II Category EA bioremediation activities. Thus, the Global authority or US OSC, in conjunction with contractors or a responsible party/s, will be directly involved in the cleanup effort, as well as OSEI Corporation distributors and or OSEI Corporation headquarters personnel. OSEI corporation is a certified OSRO with the US Coast Guard (oil Spill Response Organization) see link https://www.osei.us/wp-content/uploads/ose-ii-osro-974.pdf

Federal Agencies

Various Global Government authorities with experience utilizing OSE II, as well as non-experienced Global officials, and the US Environmental Protection Agency - EPA, with their knowledge of (OSE II) First Response bioremediation, (through direct efficacy and Toxicity testing with NOAA and Coast Guard verifying the Navy at Point Loma fuel farm in San Diego Bay, where they verified OSE II being used on over 200 spills in 3.5 years, where there were whales and Dolphins around, and never showed any harm, as well as knowing about the 550,000 liter Nigerian spill, where OSE II alone, cleaned up the spill in 3.5 weeks with no natural resource damages, and other spills included in this plan, these officials may lend themselves to the OSC as a technical-advisors. This knowledge includes information on the ability of (OSE II) treatment techniques to degrade oil, its relative toxicity to a habitat and the expected rate of degradation.
Global officials who have experience with OSE II will understand the benefits of OSE II, and even in-experienced officials can be educated within in a few hours, where they can help with decisions as well. Typically, EPA, and NOAA provides the Scientific Support Coordinator for inland zone spills. In addition, EPA maintains laboratory facilities that may be used to run (OSE II) bioremediation related analyses. See Appendix C Hebie Spirit Clean up, and Navy Point Loma clean ups

Global authorities, government, or authorities in the US, the US Coast Guard - The USCG

supplies expertise in oil spill response technology and incident command. During Response support, through manpower or equipment, can be provided by the contractors or Strike Teams and the National Strike Force Coordination Center. Additionally, the USCG can assist with cost tracking and funding support from the Oil Pollution Trust Fund, since they provide some funding for oil spills in US navigable waters, especially for Orphan spills. Global Authorities can utilize their experts to work with the OSEI Corporation, distributors or personnel to make sure their requirements are met as well.

1 (With a working knowledge of OSE II, Type EA, the USCG has recommended action with this agent type numerous times and has used it at their own facilities.) see link http://www.osei.us/pdf%20files/Coast%20Guard%20BP%20spill%20approval%201.pdf

The US Coast Guard also has a fiduciary responsibility to use US taxpayer's funds, on the safest for humans, non-toxic to marine species, most efficient means to permanently remove oil from the environment, protecting as much of the US natural resources as possible, and most economical means, which OSE II meets, and exceeds over all other products and processes, as this is proven.

Universities and research institutes Globally, as well as the National Oceanographic and Atmospheric Administration - NOAA/HAZMAT provides Scientific Support Coordinators (SSCs) at times as part of their support teams. The Universities and Research Institutes, or SSC provides scientific advice to support the Global response, in the US, Federal OSCs in operational decisions that will protect the environment effectively, mitigate collateral harm, and facilitate environmental recovery.
The NOAA/HAZMAT Scientific Support Team has extensive expertise in all scientific aspects of spill response and mitigation, experience with oil spill response with OSE II, bioremediation in both operational and experimental use. Various Universities and NOAA have expertise in biology, geomorphology, chemistry, and physical and coastal processes and can be quickly informed with OSE II, so they can support and assist in the use of OSE II bioremediation as a first response technique and in its proper application.
Various Universities can provide expertise as well as, NOAA/HAZMAT also provides the Department of Commerce RRT member. The DOC RRT member provides advice and access to NOAA and DOC resources and expertise and serves as the point of contact for DOC/NOAA trustee issues. NOAA officials from previous statements have become more familiar with the types of bioremediations based on their assertions regarding category EA/OSEII see link after the next paragraph below

NOAA officials have also witnessed first-hand the successful testing and demonstration of OSE II at Mo Hang Port South Korea see link see specifically pictures 38, and 39 for NOAA officials. https://www.osei.us/wp-content/uploads/South-Korea-Hebie-Spirit-Clean-complete-pictures-and-captions-XX.pdf
Other Global Departments as well as the Department of Interior - DOI has direct jurisdiction for the protection of resources on its own lands, as well as trustee responsibilities for certain natural resources, regardless of location. They can provide

information concerning the lands and resources related to geology, hydrology, minerals, fish and wildlife, cultural resources and recreation resources.

The DOI natural resource trusteeship also includes migratory birds, anadromous fish and endangered or threatened species and their critical habitats. The DOI performed a comparison test of OSE II as well as both Corexit 9527 and Corexit 9500, and with mechanical/skimmer clean-up. Their test proved that neither Corexit removed oil from the environment (per the clean water act requirement) and that mechanical/skimmers clean-up could only perform as it has historically with a 2 to 8% removal, while OSE II removed 67% of the oil in the short time frame of the demonstration in cold temperatures, a few more days and OSE II would have removed up to 100% of the hydrocarbons as was extrapolated, DOI has clearly proven what the most effective response is OSE II! See link http://osei.us/pdf%20files/OSEI-Summary-of-Department-of-Interior.pdf

State and Local Agencies

Global countries, have states and smaller jurisdictions as does the US with 50 States, and where local agencies have a distinct role and perspective during a response that impacts their own resources. Typically, these agencies/entities can provide valuable information on the latest regulations, guidelines, water resource conditions, environmentally sensitive areas, and public concerns. Therefore, any response effort should be carefully coordinated with impacted smaller jurisdictions and or State and local agencies. See OSE II and RRT association for all the State requests for the BP Macondo spill, of OSE II in appendix C below.

Responsible Parties (RP)

The RP will have first-hand information concerning the spilled material, the RP may request Global Authorities or in the US, the OSC approval for the use of OSE II or the application of OSE II a first response bioremediation agent. The RP can initiate an OSE II activity after Global officials of the area, or in the US, a request to use OSE II is agreed to by the OSC following concurrence from the RRT and consultation with the impacted natural resource trustees.

The OSC's request, on behalf of the RP, shall be accompanied by a completed OSE II Use Form, or may be already approved through Spill Counter Measure plans. Maximum cooperation and participation should be expected from the RP throughout the entire response and OSE II activity, since they are making the choice for the response, unless the RP has not been determined, then the Global Authority will make the decision to utilize OSE II. BP requested the use of OSE II for the BP Macondo spill see links http://osei.us/wp-content/uploads/Goetzee-BP-request-for-the-use-of-OSE-II-inclusion-statement-for-EPA-letter-of-may-2012.pdf

VI. DECISION TOOLS

All oil/fuel/hydrocarbons/hydrocarbon-based material spills are candidates for first response OSE II bioremediation application, as well as all the different types of spill characteristics and environmental sensitivities of the spill location, as OSE II has already been used numerous times in almost every conceivable scenario, where hydrocarbons can be spilled or released.

The spill itself is the problem, therefore accessing a safe non-toxic solution that permanently removes a spill from the environment is the standard that is expected to be met Globally. This plan assists Global Authorities as well as US OSCs and the RRT in OSE II's application, however the plan, pre-planning and understanding before a spill occurs how to handle the spill based on experience and priorities is easily developed with OSE II due to the OSEI Corporations writing engineered protocols on thousands and thousands of spills, then carrying out the site assessment, understanding what is required to be dealt with, then developing the response action with OSE II, and is put in writing.

All spills for first response OSE II bioremediation application and the pre planning (has been already developed) documentation should be carried out long before spills occur if possible, since this is the responsibility of Responsible parties Globally and with some governments, as well as all the US RRT members: A diagram outlining (1) how, OSE II meets the Clean Water act/OPA 90 and Global requirements, (2) the fact that OSE II is safe and will not compromise responders or human health, (3) OSE II is non-toxic to marine species, (4) OSE II has proven through extensive third party and US EPA testing and experience with thousands of real world spill clean-ups convert oil/hydrocarbon based material to CO2 and water on over 95,000 spills as of the end of 2026.

(5) How OSE II does not allow contamination of the water column/seabed and does not deplete O2 (6) there is a form for obtaining approval before and during a spill, for OSE II or country approval (7) OSE II first response bioremediation use form, which is accessible through the OSEI Corporation for each spill, that can be filled out and added to a spill countermeasure plan or presented separately. The form is provided in Appendix B

NOTE: Once there is a spill event, if a pre- spill counter measure Plan has not already been filled out, these steps need to be accomplished. The Responsible party, official or person of authority needs to:
Contact the OSEI Corporation, 24/7 phone number Us 1, (972) 669 3390, or Griffin Pedigo Us 1 (214) 563-4129 or

Robert Pedigo US 1 (469) 223-7452

1. **Relay the spill details as per the incident characteristics below, email or whats-app text or other medium**
2. **The OSEI Corporation will activate our personnel and or contact our closest distributor, start writing a use Authorization form, write why OSE II is feasible, as well as an initial response to the site characteristics form.**
3. **Once we know we have the clean-up, the rest of the plans will be initiated**

OSE II Bioremediation Use Authorization Form

OSE II first response Bioremediation Use Authorization Form that specifies the minimum information requirements necessary to support decisions regarding the use of OSE II first response bioremediation for all spills, is included in Appendix B of this plan. This document as presented covers all the information regarding utilizing OSE II, **the only items to fill out during a spill event, is the details of the spill incident,** OSE II first response bioremediation details, OSE II first response bioremediation Work plan and monitoring plan. Once the form has been completed when the full scope of spill incident has been determined, it should provide pertinent information needed to address 100% of a spill.

A completed form should be transmitted to the Responsible Party, Global officials and the US RRT for notification purposes to proceed to understand the full scope of the spill and the response with OSE II" s first response bioremediation application plan. The RRT shall have already. approved the use of OSE II a first response's bioremediation allowing the Global Authorities or the US FOSC to address the spill immediately with OSE II.

The Global community can easily be appraised of the prior approval of OSE II, or US OSC can easily verify the fact category EA/Oil Spill Eater II is on the NCP list at B#53 on the EPA web site. In other countries Globally, the approval can be accessed, and in countries where there is no approval process, the standard to meet for the clean-up can be acknowledged. Any approval and spill counter measure plan should be presented with the application form in appendix B.

DIAGRAM 1: STEPS TO TAKE AND QUESTIONS TO CONSIDER DURING DECISION PROCESS FOR

USE OF OSE II

DIAGRAM KEY

NA = Nutrient/Fertilizer Additive, LTD Limited use
MC = Microbial Agents, LTD limited use
EA = OSE II Enzyme Additive no limits known
TBD – To Be Determined
LTD – Limited potential use

QUESTION		INFORMATION
IDENTIFY SPILLED POLLUTANT **A) HYDROCARBON-BASED?** **B) FRESH SPILL?** **C) WEATHERED?**		Yes _____ No _____ Yes _____ No _____ Yes _____ No _____
1. WILL OSE II BIOREMEDIATION EFFECTIVELY ADDRESS THIS POLLUTANT? Yesd		**OSE II EA Type**: Effective on both fresh and weathered hydrocarbons as well as halogenated Hydrocarbons/Petrochemicals
2. DO REGULATIONS PERMIT USE OF OSE II BIOREMEDIATION? YES		Product must be on the US NCP List or Global Countries approved list, or can meet established standards to be considered for use in Global countries that do not have an approval process. US (National Oil and Hazardous Substances Pollution Contingency Plan, Product Schedule) Or have an already approved Spill Countermeasure plan
3. DO HYDRODYNAMICS OF SPILL AREA ALLOW FOR AN EFFECTIVE USE OF OSE II BIOREMEDIATION?Yes		Any area that can be accessed through spraying or injecting of liquid can be accessed for OSE II Category EA. In Sensitive Marshes, Estuaries and Shorelines where dispersants cannot be applied, OSE II EA Type can be even applied by drones, and has been applied by drones.
4. COMPARE CLEANUP ENDPOINTS AND TIMELINES,	EA	**OSE II EA Type**: Defined endpoint: All hydrocarbons that have come in contact with Type are converted to CO2 and water. Defined Timeline: All hydrocarbons that have come in contact with OSE II, EA Type, converted to endpoint in a few days weeks of CO2 and H2O OSE II EA Category is on the NCP Product

nothing compares to OSE II, end point will generally be 80to 99% shoreline and open water	Schedule under B53, and is approved by numerous countries, and Responsible parties By law, any product used for oil or hazardous substance spill cleanup on U.S. navigable waters must be on the NCP Product Schedule or it will have to approved on an emergency basis. See link for Global Country Approvals. https://www.osei.us/published Can area be accessed by land, boat, and/or air?
5. VERIFY BIOREMEDIATION IS ON THE NCP PRODUCT or Global approved lists, SCHEDULE	Work with The OSEI Corporation/manufacturer to define what amounts of product in what concentrations are appropriate to address each spill. OSE II mixing and application instructions are accessible at www.OSEI.us click on technical library see link https://www.osei.us/tech-library-pdfs/2011/22-OSEI.20Manual_CleanupProcedures(CompleteSet).pdf
6. MAP OUT IMPACTED AREAS AND DEFINE OSE II BIOREMEDIATION APPROACH	A) Does manufacturer have adequate stockpiles and production capabilities to immediately address the spill? Yes, and generally, more than any other product in the world. See warehouse
7. IS THE NECESSARY INFRASTRUCTURE IN PLACE TO PERFORM THE REMEDIATION AND MONITOR RESULTS? Yes	B) Can the necessary shipping, storage, and transport to spill site be coordinated quickly? Yes, OSE II has been supplied Globablly since 1990, and has the capability of getting drums shipped by air if required. See video at the 2:43 mark to 4:12 mark see link https://www.youtube.com/watch?v=Mzc1lPAsi6k C) Can the necessary equipment for product application be quickly obtained, if it is not Already on site? Yes any water truck, pressure sprayer, water going vessel with fire-fighting equipment or with liquid storage tanks that have pump in and pump out capabilities can be used to apply OSE II as well as any dispersant application system by air or by water can be utilized D) Set up before, during and after testing of relevant field samplings to ensure full removal of toxicity is achieved. Establish pattern of extractions, establish GPS coordinates for the extraction sites and pull samples, take to the lab **For US spills, that require** A completed

8. OBTAIN RRT APPROVAL THROUGH SUBMISSION OF THE OSE II First Response BIOREMEDIATION USE AUTHORIZATION FORM (in Appendix B) **9. If the possibility of use is denied PROVIDE DETAILED WRITTEN RRT REQUEST DENIAL TO MANUFACTURER OF OSE II the First Response BIOREMEDIATION PRODUCT TO VERIFY THAT DENIAL IS BASED ON ACCURATE SCIENCE.**	authorization form should be transmitted to the RRT for the required authorization to proceed with OSE II bioremediation treatment. The-RRT shall approve the use of OSE II a First response bioremediation category EA product within *24 hours* of receiving a completed form from an OSC, smaller spills where the RRT is not required to fill out forms, the Coast Guard just utilizes the BAT (best available technology). If the use of Bioremediation is denied, RRT must give written detailed reasons for denial of request.	

VII. FEASIBILITY ASSESSMENT CRITERIA

The feasibility through testing and use in the US and Globally and by RRT's has already been accomplished for Category EA/OSE II First Resppnse Bioremediation. OSE II has been used in all the scenarios presented in this plan. The implementation is easily addressed by utilizing dispersant spray apparatus already in place. See test at this link for the largest spill in the world Coast Guard letter https://www.osei.us/wp-content/uploads/CoastGuard_BP_Macondo_Spill.pdf BP request to use OSE II link https://www.osei.us/wp-content/uploads/BP-request-OSE-II-demonstration-for-Gulf-spill-1.pdf and the extreme test that proved OSE II not only remediated the oil, OSE II also remediated the toxic dispersant applied to the oil see link. https://www.osei.us/pdf%20files/osei_sum.pdf

1.OSE II, First Response BIOREMEDIATION (ENZYME ADDITIVE)
OSE II is the only first-response bioremediation methodology. It is effective on fuels, fresh oil, medium weight oil, heavy oils (bunker C and ANS), and weathered heavy oils. See link: see link on waste oil application as to how fast OSE II works see link https://www.youtube.com/watch?v=7UdhBKUCkhE and Heavy in emulsion demonstration by US EPA RRT VII http://www.osei.us/pdf%20files/RRT%20plus%20testing.pdf. Also see this link https://www.osei.us/heavy-in-emulsion-oil-efficacy-tests-clean-ups and heavy sludge remediation for major oil company see link https://www.osei.us/wp-content/uploads/Australia-Sludge-demonstration-for-a-major-oil-company-summary-lab-tests-and-protoocol.pdf as well as halogenated hydrocarbons/hazardous materials see link https://www.osei.us/wp-content/uploads/Halogenated-hydrocarbons-remediation-with-OSE-II-XXZZ.pdf also see Appendix C

OSE II a first Response tool has been utilized on the full scope of hydrocarbon potential as well as hydrocarbon-based hazardous chemicals including Halogenated hydrocarbons and Pesticides. The effectiveness of OSE II is not constrained by the varying characteristics of different types of oil. It can be utilized on gasoline/fuels if they pose an explosion hazard, in a populated area, port, or harbor, including oil rigs. See Appendix C

OSE II swiftly breaks the oil up into small particles, making it difficult to see. At the same time, it changes the density of oils, preventing oil from sinking into the water column and thereby preventing the contamination of secondary, tertiary, and quaternary areas. This action prevents migration of the spill to more sensitive areas. The entire extent of the hydrocarbon material is expected to remediate 100%, especially the most persistent toxic components of the hydrocarbons in the PAH range, which has been demonstrated through testing and cleanup experience since 1989. See Appendix C

OSE II can be used along with mechanical cleanup, if desired, however, mechanical cleanup is comparatively limited and costly. The DOI proved OSE II to be significantly

superior in results (through performing test comparisons of OSE II, mechanical cleanup, and Corexits 9500 and 9527a). See link: http://osei.us/pdf%20files/OSEI-Summary-of-Department-of-Interior.pdf and see Appendix C

.

A. Incident Characteristics

OSE II has cleaned up all types of oils/hydrocarbon-based materials with testing and clean-ups and has been documented as doing so by even the EPA, DOI and other RRT members. OSE II will provide a more effective response and allow the matrix to be upgraded to be able to provide complete more effective general guidelines regarding the use of OSE II, a first response bioremediation tool in different habitats based primarily on concerns for preserving habitats and minimizing harm to the indigenous flora and fauna. See Appendix C

B. Characteristics of Spilled Oil

, OSE II has been historically tested and used on all types of hydrocarbons, light, medium, heavy, as well as heavy in emulsion oil, halogenated hydrocarbons and even Organo halogenated chemicals. OSE II can be used on all types of oil as shown and proven through previous testing and clean up experience, even heavy in emulsion oil as EPA RRTVII has proven.
see link http://www.osei.us/pdf%20files/RRT%20plus%20testing.pdf .
The extent to which the remaining chemical constituents of the spilled oil (which characterize that oil) are expected to be biodegradable is now understood and realized by the Global Authorities and the US RRT before a spill event occurs with this plan and its citations. The entire extent of the hydrocarbon material expected to remediate is 100% especially the most persistent toxic components of the hydrocarbons in the PAH range and has been proven through previous testing and clean up experience with OSE II. See Appendix C

OSE II is a first response bioremediation and can replace historical responses that do not remove oil from the environment as the clean water act requires, and OSE II can be used alongside mechanical clean-up, which is limited and costly if that is desired. The DOI proved category EA/OSE II is superior to dispersants and mechanical clean ups which were historically used, and proven very ineffective.
See link http://osei.us/pdf%20files/OSEI-Summary-of-Department-of-Interior.pdf

When used on diesel-type and medium oils that do not have large amounts of high molecular weight, slowly degrading components, OSE II a first response bioremediation is even more effective as well. On thick oil residues it is effective. *(to further assist in making this determination see Appendix C,* COMPILATION OF DOCUMENTATION AND USE OF OSE II WITH EPA/RRT's*.)* : OSE II can be used on fuels/solvents and petro chemicals and if they pose a fire hazard OSE II can be used to eliminate the fire hazard. See link with

category EA/OSE II and a fire departments flammability test. http://osei.us/gas.pdf and link http://osei.us/photoalbums/690-2 Chief Shan English observed the tests.
OSE II has been utilized on fuels, fresh oil, medium weight oil, heavy oils (bunker C and ANS) and weathered heavy in emulsion oils, therefore can be utilized on the full scope of hydrocarbon materials as well as hydrocarbon based hazardous chemicals including PCBs. OSE II use is not constrained by the characteristics of the oil. OSE II can be utilized on gasoline/fuels especially if they pose an explosion hazard, in a populated area, port, or harbor, including oil rigs. OSE II's ability to rapidly change the density of even heavy oils prevents oils from sinking into the water column preventing the oil spill from contaminating secondary, tertiary, and quaternary areas. The oil is broken into small particles, so it becomes difficult to observe, however the original area of contamination is the only area effected, preventing migration of the spill to more sensitive areas. See Appendix C

The information below for oil characteristics is for OSE II

Group I: Very Light Refined Products *(gasoline, naptha, solvents)*

a. very volatile and highly flammable
b. complete removal by evaporation likely
c. high acute toxicity to biota
d. can cause severe impacts to water-column and intertidal resources
e. specific gravity less than 0.80
f. will penetrate substrate, causing subsurface contamination
g. **OSE II** can be and is used on this group 1, and its use would diminish a fire hazard and protect ports/harbors, and structures near a potential fire hazard. See Appendix C

Group II: Diesel-like Products and Light Crude Oils *(no.2 jet fuel oil, jet fuel, kerosene, marine diesel, West Texas Crude, Alberta Crude)*

a. moderately volatile; persists in environment for an increasing period, as Aweight@ of material increases
b. light fractions will evaporate to no residue
c. crude oils leave residue after evaporation
d. moderate to high toxicity to biota
e. can form stable emulsions
f. tend to penetrate substrate; fresh spills are not adhesive
g. specific gravity of 0.80-0.85; API gravity of 35-45
h. **OSE II first response bioremediation is effective on lower molecular weight oils, with faster degrading components; aromatic portions less susceptible**

i. **to degradation and has proven** this in numerous clean ups and can be used on Group II. See Appendix C

Group III: Medium-grade Crude Oils and Intermediate Products *(North Slope crude, South Louisiana crude, no. 4 fuel oil, lube oils)*

a. moderately volatile
b. up to one third will evaporate in the first 24 hours
c. moderate to high viscosity
d. specific gravity of 0.85-0.95; API gravity of 17.5-35
e. variable acute toxicity, depending on amount of light fraction
f. can form stable emulsions
g. variable substrate penetration and adhesion
h. **OSE II** first response **bioremediation is effective on lower molecular weight oils, with faster degrading components** OSE II can remediate the entire hydrocarbon structures and has proven this in numerous clean ups and can be used for Group III clean ups. See Appendix C

Group IV: Heavy Crude Oils and Residual Products *(Venezuela crude, San Joaquin Valley crude, Bunker C, no. 6 fuel oil)*

a. slightly volatile
b. very little product loss by evaporation
c. very viscous to semisolid; may become less viscous when warmed
d. specific gravity of 0.95-1.00; API gravity of 10-17.5
e. low acute toxicity relative to other oil types
f. can form stable emulsions
g. little substrate penetration; can be highly adhesive
h. **higher molecular weight and fewer number of straight-chained hydrocarbons make bioremediation more difficult, however OSE II, can remediate Group IV as well as the entire hydrocarbon structures and has proven this in numerous clean ups. EPA RRT VII has proven this for OSE II by performing 2 different tests in triplicate with OSE II on heavy waste oil showing an average of 73% reduction in 28 days, far exceeding any other methods ability to address this type of oil** see link http://www.osei.us/pdf%20files/RRT%20plus%20testing.pdf also see Appendix C

Group V: Very Heavy Residual Products

a. Very similar to all properties of Group IV oils, except that the specific gravity of the oil is greater than 1.0 (API gravity less than 10). Thus, the oil has greater potential to sink when spilled. **OSE II can remediate Group V as well as the entire hydrocarbon structures and has proven this in numerous clean ups. EPA RRT VII has proven this for OSE II by performing 2 different tests in triplicate with OSE II on heavy waste oil showing an average of 73% reduction in 28 days, far exceeding any other methods ability to address this type of oil see link** http://www.osei.us/pdf%20files/RRT%20plus%20testing.pdf **OSE II** Category EA also changes the density of the oil preventing it from sinking as quickly as the heavy oil would otherwise. Also see appendix C

C. Characteristics of Affected Habitats

The understanding that OSE II's use transcends all areas of impact, and is imperative that its application proceed as soon as possible, since once applied the oils density lessens, its adhesion properties diminish protecting shorelines, plants and wildlife from being coated with oil, preventing oil from sinking into the water column or seabed and immediately reducing the spills toxicity (the reason you clean up spills) reducing the time the spill is in a particular area/habitat is the desired response. See university test on OSE II rapidly reducing toxicity and being able to restore the Benthic layer see link https://www.osei.us/wp-content/uploads/Republic-of-Korea-Shoreline-Clean-with-recommendations-from-ITOPF-for-shoreline-clean-ups-2022.pdf and see appendix C

The oil spill has created the harm, how fast can its effects be diminished to save and protect as many natural resources is the goal, therefore time to apply OSE II with it overwhelming benefits should be as soon as possible. OSE II has proven its first response bioremediation mode of action can handle all the areas/habitats noted in this plan. The harmful effects of the oil must be mitigated and removed from the environment as soon as possible with a non-toxic effective means of OSE II, it fits the need. The listed habitats are appropriate for marine, estuarine and riverine settings. See appendix C, for OSE II being used in all areas.

See Table below

Open Water OSE II has successful experience in	*Off-shore Waters, OSE II has experience in*
Tidal Inlets OSE II has experience in	*Water Intakes OSE II is used in waste treatment plants so if the water will go through treatment it would be acceptable, however since OSE II causes oil to float, by booming off the intake area OSE II will prevent the oil/hydrocarbons from sinking to the level of the intake, therefore protecting the intake*
Small Lakes/Ponds OSE II has experience in	*Small Rivers/Streams OSE II has experience in*
Exposed Man-made Structures OSE II has experience in	*Sheltered Man-made Structures OSE II has experience in*
Exposed Scarps in Clay OSE II has experience in	*Wave-cut Clay Platforms OSE II has experience in*
Fine-grained Sand Beaches OSE II has experience in	*Sandy Banks OSE II has experience in*
Mixed Sand and Shell Beaches OSE II has experience in	*Shell Beaches or Banks OSE II has experience in*
Exposed Rip-rap (O) OSE II has experience in	*Sheltered Rip-rap (O) OSE II has experience in*
Exposed Tidal Flats OSE II has experience in	*Sheltered Tidal Flats (OSE II has experience in*
Salt to Brackish-water Marshes OSE II has experience in	*Freshwater Marshes OSE II has experience in*
Freshwater Swamps OSE II has experience in	*Mangroves OSE II has experience in*

Open Water, Off-shore, Tidal Inlets and Water Intakes

OSE II First Response Bioremediation is effective for the timeframes of concern, relative to the potential of transport of the oil to areas where it could affect more sensitive resources. Thus, OSE II first response bioremediation treatment is advisable for these habitats or areas and has been used in them.

First Response bioremediation OSE II is preferable for use especially in and around water intakes, due to the fact OSE II causes oil to float. This would allow booming operations to prevent oil from getting near to the intake and keep the oil on the surface out of the direct suction area of the intake. OSE II when applied to oil on the open water, offshore, tidal flats, breaks down the oils structure, reducing the oils toxicity, adhesion properties, causing the oil to float so other areas of the water column and seabed are protected, and if the oil got to the shoreline the oil would not adhere to the shoreline, marshes, sandy beach etc. For tidal flats the oil would be lifted off the flat and remediated on the surface of the water away from the shoreline once the tide goes out. OSE II has constituents that cause these matrices of the product to adhere to hydrocarbon-based material so that no matter where a spilled hydrocarbon-based material migrates it will float and remediate to CO2 and water. See US EPA requested dispersant test on OSE II, where OSE II showed zero effectiveness as a dispersant pages 126-128
https://www.osei.us/Tech%20Manual/OSEII_Beneficial_env_effects_use_and_app_tests.pdf
See link Dubai https://www.youtube.com/watch?v=dCGa5B3GR-4
and even more sensitive areas https://www.osei.us/wp-content/uploads/Missouri-Walnut-Grove-pipeline-break-ground-water-clean-up.pdf
and https://www.osei.us/wp-content/uploads/OSLO-NORWAY-VOLVO-TRUCK-CENTER-CLEAN-UP-WITH-OSE-II-10-26-2021.pdf

Small Ponds, Lakes, Rivers and Streams

This is applicable for gasoline and light oils due to their rapid evaporation. There is information on impacts and effectiveness for other oil types, however there are no special concerns about nutrient overloading in small, restricted water bodies with OSEII.

OSE II has been used on a spill if significance (over 5,000 gallons) on fresh water where the oil was lifted off the shoreline grass and sandy areas, as well as living and dead marsh grass, the oil was held on the surface, where the enhanced indigenous bacteria spread out on the oils surface, and converted the oil to CO2 and water leaving a protected water column, and the ponds floor was never impacted by the oil. See link https://www.osei.us/wp-content/uploads/Texaco-Crude-oil-Clean-up-with-captions.pdf
and https://www.osei.us/pdf%20files/RRT%20plus%20testing.pdf and see Appendix C

Solid Man-Made Structures: Exposed and Sheltered

Oiling of exposed sea walls usually occurs as a band at the high-tide line. This type of oiling is amenable to OSE II category EA first response bioremediation, Category EA/OSE II has the ability to lift the oil off of man-made vertical or horizontal structures, due to its ability to break down the molecular structure of the oil and lift the hydrocarbons out of the pours of the concrete, stone, rock, or lift the oil off of wooden structures.
BP Macondo spill Pass Christian Harbor area https://www.osei.us/photoalbums/harbor-clean-up and https://www.osei.us/wp-content/uploads/Ports-and-Harbors-Emergency-Response-Oil-Spill-Clean-Up-With-OSE-II-From-A-Burning-Vessel-4-1-2024.pdf and see appendix C

Exposed Scarps in Clay and Wave-Cut Clay Platforms

Because of their erosional nature, removal of lightly oiled sediments may not be recommended on these habitats. OSE II Category EA first Response Bioremediation means whereby the oil could be addressed in place, while producing no harm.

First Response OSE II can lift the hydrocarbon-based material from the sediment, thus preventing the blanketing off the area with oil choking any living organisms in these areas, and the reduction of the adhesion properties would prevent re-oiling.
See multiple University study where OSE II actually restored the benthic layer, see link https://www.osei.us/wp-content/uploads/Republic-of-Korea-Shoreline-Clean-with-recommendations-from-ITOPF-for-shoreline-clean-ups-2022.pdf and see how OSE II lifts oil out of soil https://www.youtube.com/watch?v=XhZzArBTVZU and see 18 kilometers of soil some clay and some sand cleaned-up with OSE II, where 97.9% the oil was removed from the shoreline see video and report with test links video https://www.osei.us/archives/1519 and report https://www.osei.us/wp-content/uploads/OSEI-NIgeria-AGIP-Brass-Terminal-Clean-up-complete-data-set-4-14-14-.pdf See appendix C

Fine-grained Sand Beaches or Sandy Banks

On outer beaches with low recreational use, OSE II first response bioremediation is the option, particularly for light oiling.

OSE II, whether the beach is recreational or not, should be utilized since the oils molecular structure is rapidly broken down and the adhesion properties reduced, therefore the oil is lifted off the sandy beach or shoreline, removing the oil, and the remediation to CO2 and water will follow with a clean protected shoreline. The adhesion properties are reduced and re-oiling is prevented.

Fine-grained sand beaches also occur along bay margins and dredge spoil banks. Sandy banks occur along rivers. These habitats typically occur in more sheltered areas, where natural removal of residual oil by wave or current action will be slower than along exposed beaches. They are often not amenable to mechanical removal; thus, OSE II First Response bioremediation is the preferred method to remove the oil, since OSE II eliminates adhesion properties and causes hydrocarbons to lift and separate from the sand from the environment.

First Response Bioremediation OSE II would preclude the manual removal of oil since mechanical manual removal disrupts the intertidal zone environment, and human removal would needlessly expose responders to toxic oil, and its gasses. Whether the beach is recreational or not, it should be utilized since the oils molecular structure is rapidly broken down and the adhesion properties reduced, therefore the oil is lifted off the sandy beach on shoreline, removing the oil, and the remediation to CO2 and water will follow with a clean protected shoreline, since the adhesion properties are reduced and re-oiling is prevented. see 18 kilometers of soil some clay and some sand cleaned-up with OSE II, where 97.9% the oil was removed from the shoreline see video and report with test links video https://www.osei.us/archives/1519 and report https://www.osei.us/wp-content/uploads/OSEI-NIgeria-AGIP-Brass-Terminal-Clean-up-complete-data-set-4-14-14-.pdf and https://www.youtube.com/watch?v=q1F0NPpN24k and 4 million liter spill in Mexico OSE II removed the crude oil on the water to non-detect, and 96.26% of the oil from the shoreline in 2 weeks see link https://spaces.hightail.com/receive/eZYxb7GQuF

Mixed Sand and Shell Beaches and Shell Beaches or Banks

For lightly or moderately oiled beaches and banks, particularly where mechanical cleanup may result in removal of large amounts of sediment or be logistically difficult, OSE II first response bioremediation is the preferred method to return the area to pre spill conditions as quickly as possible - in a safe manner.

Whether the beach is recreational or not, OSE II should be utilized since the oils molecular structure is rapidly broken down and the adhesion properties reduced, therefore the oils lifted off the sandy beach or shoreline, removing the oil, and the remediation to CO2 and water will follow with a clean protected shoreline, since the adhesion properties are reduced and re-oiling is prevented. There is no reason to use a no action decision since this will allow toxic hydrocarbons toxicity to impact the mixed sand, shell beach or banks and linger for a protracted period of time, when category EA can lift the oil off the beach and limit the time the toxic hydrocarbons linger on the beach. **These beaches in Mo Hang Port South Korea where the Hebie Spirit oil tanked hit a barge and Kuwait crude oil spilled over many kilometers of shoreline, had a combination of small rocks, shells, and sand. OSE II was used on the shoreline as well as in an**

isolated demonstration on Bunker C oil, OSE II removed 98% of the oil see link https://www.osei.us/wp-content/uploads/South-Korea-Hebie-Spirit-Clean-complete-pictures-and-captions-XX.pdf

Riprap: Exposed and Sheltered

Oil on riprap can occur as a coating on the boulders or as persistent accumulations of oil in the void spaces between the boulders. OSE II has removed the oil and remediated it permanently, removing oil from the manmade structures and the environment. This type of oil is amenable to effective removal by OSE II bioremediation techniques under most conditions.

Therefore, OSE II first response bioremediation application would be the best option.

First Response OSE II should be utilized since the oils molecular structure is rapidly broken down and the adhesion properties reduced, therefore the oil is lifted off the riprap and from the crevices, removing the oil, and the remediation to CO2 and water will follow with a clean protected area, since the adhesion properties are reduced and re-oiling is prevented. If the tide cannot carry the oil out of crevices and protected areas, the oil will merely remediate to CO2 and water in place and becomes permanently removed from the area. **OSE II being applied to Riprap on a shoreline where the Philippine Coast Guard carried out over sight, while a TV reporter showed the clean-up with OSE II on TV, see link https://www.youtube.com/watch?v=1bh5MgdV09U a second riprap shoreline clean-up in the Philippines see link https://www.youtube.com/watch?v=A44-_ONgEJE&t=102s and riprap clean up in Dubai https://www.youtube.com/watch?v=dCGa5B3GR-4 Test by Exxon on oiled rocks from the Exxon Valdez spill in cold temperatures see link https://www.osei.us/wp-content/uploads/Exxon-Personnel.pdf and the Homer volunteer group clean-up on AK rocky beaches with Exxon Valdez oil and verified by Alex Viteri of ADEC see link https://www.osei.us/wp-content/uploads/Homer-and-ChatGPT.pdf**

Exposed Tidal Flats and Sheltered Tidal Flats

Both of these habitats are inundated daily by high tides which would allow the oil to be lifted and partitioned from the shoreline when the tide comes in. First Response OSE II bioremediation is the preferred method under these conditions. There are no significant toxicity concerns for use of OSE II bioremediation agent in shallow, poorly flushed areas, such as sheltered tidal flats, or sub-tidal habitats where there are concentrations of sensitive life stages of fish and shellfish, such as sea grass beds and oyster reefs.

First Response OSE II is acceptable for high tides and flushing, since the product is molecularly attached to the broken-down molecular hydrocarbon structure that is detoxified, and caused to lift and float, so that wherever the detoxified oil may migrate it will still remediate to CO2 and water, dilution is not a factor. OSE II's ability to detoxify the

oil reduce its adhesion properties and cause it to float, in poorly flushed area still allows for separation from life stages of fish, shellfish, and sea grass beds, and allows the oil to be flushed out of the area with any minimal tidal movement, protecting the living organisms in these areas not initially effected by the initial invasion of the oil to the area. Any oil trapped where OSE II has been applied will float and remediate to CO2 and water, which prevents the lingering toxic effects of the oil to the benthic area, in the swamp or low-level water area, for an extended period. **Once OSE II is applied to oil on tidal flats it will lift up and wash out with the tide, since the oils adhesion properties will be broken down, partition from the tidal flats soil see link** https://www.youtube.com/watch?v=XhZzArBTVZU

Salt to Brackish-water Marshes, Freshwater Marshes, Freshwater Swamps and Mangroves

OSE II First response cleanup does not cause significant impacts to these sensitive habitats over and above what the oil has already produced. OSE II's ability to detoxify the oil rapidly, reduce the adhesion properties, and cause the oil to float is the only way to protect natural resources and return the spill to pre spill conditions. OSE II bioremediation is the preferred method. In wetlands with shallow, poorly mixed water bodies, the potential increase in eutrophication and ammonia caused by aggressive bioremediation needs to be considered however with OSE II these issues are alleviated by causes the oils density to lessen and the oil to float.

First Response bioremediation OSE II when compared to past methods, and understandings, does not cause significant impacts to these areas, since the application is by spray apparatus. Once the area has been invaded by oil, the toxicity of the oil will be present; therefore, the adverse impact is already present. The timely reduction in toxicity and removal of the oil is needed. OSE II's ability to breakdown the molecular structure by reducing the oil into small particles limiting the toxicity, preventing the choking of the organisms by allowing the blanketing of the oil, reducing the adhesion properties, lifting the oil to the water's surface, allowing separation from vegetation or natural landscapes lessons the time the toxic oil can effect these areas, therefore it is preferable to utilize OSE II. OSE II by causing any molecular weight oil to breakdown and lift, even in poorly mixed areas, prevents eutrophication over other response, and doing nothing.

Doing nothing allows for eutrophication to occur for an extended time, category OSE II limits this time and the impact of the oil to the surrounding area. OSE II will not exacerbate the development of ammonia over doing nothing at all. OSE II is mixed with the water from the nearby area so whether the area has fresh, salt, or brackish water the natural bacteria are enhanced and is already acclimated to the effected environment. OSE II limits the time and amount of toxicity of the oil and allows for the oil to be separated from the flora and fauna of the area.

See Nigeria 550,000 liter clean up where there are swamps, mangroves and shoreline with clay and sand video https://www.osei.us/archives/1519 and report https://www.osei.us/wp-content/uploads/OSEI-NIgeria-AGIP-Brass-Terminal-Clean-up-complete-data-set-4-14-14-.pdf

And see in Panama Crude oil seepage onto a lake in a swamp area from a leaking storage tank https://www.youtube.com/watch?v=Leg7bz51udk&t=26s

Characteristics of a spill incident, including characteristics of affected habitats and spilled hydrocarbon-based pollutant, for OSE II first Response bioremediation. The affected habitat, or type of hydrocarbon-based pollutant does not preclude the use of OSE II, it transcends almost all scenarios and will remediate almost all types of hydrocarbon-based pollutants! Because OSE II a first response bioremediation product can be used, then the logistical feasibility of implementing an appropriate OSE II bioremediation action plan can be activated. Implementation is easily performed utilizing current dispersant spray apparatuses, and labor that is already pre staged for spills. Most vessels contain firefighting induction systems so almost any vessel can be used to apply OSE II with minimal training. the scale of the spill is not a problem, since there are pre plans in place to apply large amounts of dispersants and it is an easy change over to apply OSE II, the OSEI Corporation maintains a stock of OSE II to clean up 1,000,000 gallons of oil and can out produce what can be applied daily in a matter of days. The resources necessary to conduct the application as stated previously are already pre staged and in place due to plans for dispersant applications, it is an easy change over, the craft are merely loaded with OSE II, and the dials slightly changed. The monitoring is easily handled since it is possible to visually observe the effects of the application of OSE II in all habitats. OSE II application availability, and monitoring are already in place and easily carried out.

VIII. LOGISTICAL CONCERNS

NOTE: OSEI Corporation's product OSE II has performed the greatest oil spill clean-up in the world, where in Nigeria a 550,000 liter or 150,000-gallon crude oil spill from the AGIP terminal in Bayless State. A large portion of the oil covered 18 kilometers of shoreline which consisted of sensitive mangroves for approximately 8 kilometers, 4 kilometers of clay shoreline, and 4 kilometers of sandy beach, and where approximately 250,000 liters of oil remained on the open Atlantic Ocean. The shorelines were addressed with OSE II, you can see in the video, they black clay shoreline was sprayed with OSE II as well as the sandy beaches, and the open ocean was addressed simultaneously as well. The oil on the shoreline was remediated/removed at a 97.9% rate and the open water oil was removed by 99.9% in 3.5 weeks, with no natura resource damages, and no human health was compromised, and there was no tainted or marine species killed, since once OSE II is applied, oil is caused to float until it is converted to CO2 and water, protecting the water column and the seabed. This is the best oil spill clean-up in the world except for oil spills where OSE II has been utilized, nothing has come close to OSE II's removal rate, and safety. See links above.

Scale of Bioremediation Response

The first step in assessing the logistical feasibility, is to understand the logistical feasibility is easily accomplished with pre-approval and pre-staging of OSE II, and if not pre staged OSE II can be delivered quickly by air. The scale does not preclude the use of OSE II first response bioremediation; with OSE II even for spills as large as the BP Macondo spill, a plan was quickly developed to meet the requirement of addressing 4,000,000 gallons a day release as well as several hundred thousand gallons already on the seabed was presented to BP. OSE II can handle any spill more effectively than any other means available. The scale of OSE II bioremediation response refers to the extent to which OSE II will be involved in the cleanup, particularly in terms of the size of the area, OSE II is a first and only response needed for spills and has performed these types clean up singularly, and in conjunction with booming operations. OSE II precludes the needs for any other response and can be used synergistically with mechanical clean up if needed. The scale of the OSE II response effort will determine the amount of OSE II that will be utilized, the number of personnel, and the equipment resources necessary to complete the application technique and monitoring of the OSE II bioremediation response effort. OSE II is prepared to initially respond to spills up to one million gallons of oil and by the time this quantity is applied, a follow up batch of more OSE II can be readied for deployment. OSE II is preferable than dispersants since it meets the letter of the Clean Water Act by removing oil from the environment and does not have a limited window of opportunity for application. The Nigeria spill cited above shows even large-scale spills are easily handled by OSE II.

Agent Availability

Once the scale of the spill has been determined then the Global authorities' or in the US the OSC/RRT would notify the manufacture of OSE II which in turn would allow the manufacture of OSE II to determine the amount of OSE II that needs to be utilized. This is easily determined by dividing the total spill volume by 50, if it is an ongoing spill then the daily requirement would be determined. The availability of OSE II for use at the spill location should be assessed, however OSE II can be quickly shipped to any area in the US, however if the Authorities'/RRT or a responsible party desires OSE II staged at particular location/s, then it will be incumbent on them to preauthorize the use of OSE II to meet any of their particular site or staging requirements. OSE II can be almost anywhere in the US in a matter of hours, so availability is not a problem.

OSE II contains a stockpile to initially address approximately 1 million gallons of oil and can provide more, faster than it can be deployed. Pre-approval and staging OSE II would eliminate the availability concern, which is the means to how dispersants have enough on hand for spills.

Application and Monitoring Resources

OSE II First Response is easily applied by any spray device and due to the fact dispersants spray devices are already in place it is an easy change over to OSE II and even utilizing vessels that are not typically established for spill clean-up, that do however have firefighting induction systems can be readily utilized as well. Implementation is quite easily handled due to the pre planning and staging of current dispersant application equipment. Several application methods are generally available for OSE II and each method may have unique resource requirements for its implementation. The habitat(s) where OSE II bioremediation is being considered for clean-up will determine what type of application equipment should be required. OSE II can be deployed by any spray apparatus as well as from induction systems and can be deployed in the same manner by aerial spray with a slight adjustment in the premixing in the craft with water. Most Contractors that can be deployed for dispersant application with a minor adjustment can apply OSE II. Vessels of opportunity can be outfitted easily to apply OSE II, and most commercial vessels in ports contain some type of induction firefighting systems that can be utilized for OSE II application.

Next, the types and supply of available equipment and personnel adequate to implement and monitor the OSE II response effort, as well as access to laboratory facilities for sample analyses, is easily handled by utilizing the same equipment, personnel and facilities establish for dispersants. (Refer to the OSE II Biomonitoring Plan section for recommended monitoring activities and monitoring resource requirements.) OSE II can be utilized more simply than current dispersant responses since there is not the concern of compromising responder's health, and the same visual monitoring for dispersants can be utilized for OSE II, since there is a visual effect to the oil when OSE II is applied. Additional requested testing the same laboratories and personnel can carry these out for OSE II that is carried out for dispersants.

Monitoring with OSE II can be visually observed to easily discern the oil reactions to the application of OSE II, which will also show if an area has been successfully cleaned up with OSE II. Once the report comes back stating if an area is clean or not a determination can be made if there is a need to go back to a specific set of coordinates and apply OSE II.

IX. IMPLEMENTATION

When initiating OSE II first response bioremediation application, several steps shall be completed. First, the OSC shall notify RRT 4/ or the oversight RRT, if an international spill the required Global authority for the area of spill where OSE II will be used by transmitting the pre-established OSE II First Response Bioremediation Use Authorization Form with the spill particulars added. Second, the OSE II pre-established Bioremediation Work Plan and Bioremediation Monitoring Plan shall be adjusted to a spills particular type and scale to address issues necessary to ensure an efficient and effective OSE II bioremediation spill response. These plans are being pre-developed before a spill emergency with OSE II, so there is no guess work when a spill occurs and in fact the pre plans for implementation and monitoring is attached. This document covers most of the spill scenarios, and the work plan that is contained with this document is filled out so you are now pre readied to respond to the spill's scenarios noted in this document with OSE II.

A. US FOSC/RRT or Global Notification

After adjusting the spill plan and monitoring plan for a particular spill with OSE II and the appropriate application choice has been determined for each affected habitat to receive OSE II, the completed OSE II Bioremediation spill response Use Authorization Form shall be transmitted to the affected areas Authorities, EPA and the pertinent RRT, the appropriate USCG District and the Federal Trustees so all are informed. If applicable, the appropriate Federal Land Manager (e.g., DOI) should also be notified. OSE II's ability to transcend all scenarios and types of oil allow OSE II as first response or any time frame response product/process, with no limited window of opportunity, places it in a unique situation for all responses.

If use of OSE II bioremediation in the spill area has been pre-approved or pre-authorized or staged by the pertinent RRT or responsible party, then concurrence may not be necessary. However, the OSC or Global authority, must still notify the pertinent RRT and or personnel of the decisions regarding the use of OSE II. In the event the pertinent RRT or Global Authority pre-authorizes an area for the use of OSE II, such areas will be included in the plan by addendum. Pre-approval and or Preplanning is a requirement for contractors to have OSE II staged and readied, or planned for quick delivery and should be carried out immediately.

B. OSE II First Response BIOREMEDIATION WORK PLAN

Work plans are important to ensure the safe, coordinated, and well documented implementation of OSE II bioremediation. Work plans are comprised of systematic procedures and guidelines that clarify and resolve issues such as worker and public safety, documentation requirements, response personnel roles and responsibilities, treatment technique agent application protocols, and application control and oversight considerations. Complete Work plans must include spill and site-specific considerations.

It is essential in a response that every incident or event be managed according to a plan and OSE II bioremediation.
The Work plan shall provide:

- A clear statement of objectives and actions.
- A basis for-measuring work effectiveness and cost effectiveness.
- A basis for measuring work progress and for providing accountability.

Plans should be prepared for specific time periods or operational periods. These periods can be of various segments of time. A decision on the length of the operational periods or time segments may be affected by the length of time available/needed to achieve objectives, the availability of resources, environmental considerations, and safety considerations. Essential parts of any Work plan are:

1. **Statement of objectives -** Statement of what is expected to be achieved. Objectives must be measurable.

2. **Organization -** Describes what organization will be in place. This will describe in detail the specific roles and responsibilities of the participants in a bioremediation treatment technique. This will also describe the interaction of one entity to another.

3. **Tactics and assignments -** Describe tactics and control operations and what resources will be assigned. If the application is a large one, resource assignments may be done by groups.

4. **Supporting material -** Examples include a map or sketch of the area(s) to be treated, communications, traffic plan, weather data, special precautions, and safety information.

All supervisory personnel must be familiar with the plan and any changes which develop throughout the life of the project. This can be accomplished through briefings and by distributing copies of the written plan.

The Work plan must include an avenue to provide for ongoing evaluation of the plan's effectiveness. Supervisors should regularly assess work progress against control operations called for in the plan. If deficiencies are found, improved direction or additional staffing may be required, tactical operations may need to be modified, and/or changes may need to be reflected in planning for the next segment of time.
Demobilization activities, although often overlooked, are an integral part of the Work plan. As the project begins to wind down, everyone will be anxious to leave the scene and return home. Demobilization planning helps to assure a controlled, safe, efficient, and cost-effective demobilization process.

The response structure or organizational framework identifies the participants in a response, their general areas of responsibility, and the lines of authority among them. A chart illustrating the participants in a bioremediation response activity in region 4 and their inter-relationships would be very helpful in summarizing this information. In developing this section, the following questions should be addressed:

- Who will manage the overall bioremediation activity?
- Who will be the likely participants (e.g. federal and state agencies) in the activity for the Region? What are the general roles?
- Who will be the likely participants, if any, from outside the Region? What are the general roles?
- Who will manage the monitoring portions of the activity?
- Who will develop an appropriate Work plan for the bioremediation activity?
- Who will perform specific treatment method or agent(s) application(s)?
- Who will perform monitoring?
- Who will perform public outreach?

Describe in detail the specific roles and responsibilities of the likely participants (RRT, federal and state agencies, international governments/agencies, non-governmental organizations, responsible parties, etc.) in an OSE II first response bioremediation activity in an RRT Region. The information in this section should coincide with the information presented above on the regional response structure.

Tactics and assignments

Tactical direction includes determining the tactics and operations necessary for the selected strategy and determining and assigning the appropriate resources.

Resource assignments should be made for each specific work task. Such assignments should consist of the kind, types and numbers of resources available and needed to achieve the desired outcomes.

Personnel and logistical support factors must be considered in determining tactical operations. Lack of logistical support can mean the difference between success and failure in achieving objectives.

Supporting Material

Public Safety/Information - Public safety is paramount in any OSE II bioremediation project. The following are some suggested actions which should be taken during a spill response to ensure public awareness and protection:

Provide news releases and updates to newspapers, radio, television stations, and neighboring areas that could potentially be impacted by bioremediation activities. Be prepared to discuss details regarding the chosen treatment technique in simple lay terms so the affected public will understand exactly what to expect and what the expected benefits are.

Site/Worker Safety - Worker health and safety is always the foremost concern during any spill response action. Since all oil spill response actions require a health and safety plan and the bioremediation application is merely a facet of the total spill response effort, the existing health and safety plan should be used for the OSE II bioremediation application and augmented with the specific safety hazards associated with the OSE II treatment method or agent application. A section referred to as biological hazards should be included in all health and safety plans associated with oil spill responses where biological agents are used as a response tool. This section should discuss the specific health and safety concerns associated with possible exposure to biological agents and include material safety data sheets (MSDS) for all agents being used. At a minimum, the health and safety plan should address the following aspects of the OSE II treatment method/monitoring program:

1. minimum health and safety concerns,
2. potential hazards during application and monitoring,
3. evaluations of those identified hazards,
4. actions described to minimize the potential hazards, and
5. response(s) needed if hazard does effect worker(s).

The following documents contain guidance on the preparation of health and safety plans:

1. OSHA 1910.120 and EPA 40 CFR 311,
2. USEPA, OERR ERT Standard Operating Procedures,
3. NIOSH/OSHA/USCG/EPA Occupational Health and Safety Guidelines,
4. ACGIH Threshold Limit Values, and
5. Existing local and area contingency plans.

To avoid disturbances to the treated area after treatment, all treated and control sites should be secured by the best achievable means. To avoid possible injury, post warning signs or secure the treated area to differentiate the site from surrounding localities.

C. BIOMONITORING PLAN/Testing

OSE II first Response Category EA, has proven to enhance the biodegradation of oil or hazardous substances without increasing adverse impacts to human or ecological health. The EPA, EPA RRT VII, and DOI have all proven through testing and actual field use OSE II enhances the bioremediation of weathered crude oil, heavy in emulsion oil, as well as refined dielectric oil therefore there is no need for a research and development program during an emergency event for this proven safe effective product.

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Biomonitoring for First Response OSE II Bioremediation is easily carried out, since visual observations can determine the response effect. If there is a need to monitor efficacy, then an extraction plan based on GPS coordinates, and the number of dates the extractions will take place can be determined and can be established quickly and deployed. GPS coordinates will be used to perform extractions of soil or water or both, and noted on the labels, where samples are put on ice, laboratory chain of custody documents filled out, and lab tests performed. Once three different dates of extractions

Therefore, an associated biomonitoring program shall be conducted when OSE II bioremediation treatment used as a response tool. The plan outlining the biomonitoring program will be referred to as the biomonitoring plan.

Biomonitoring for First Response OSE II Bioremediation is easily carried out since visual observations can determine the response effect. If there is a need to monitor efficacy, then an extraction plan based on GPS coordinates, and the number of dates the extractions will take place can be determined and can be established quickly and deployed. GPS coordinates will be used to perform extractions of soil or water or both, and noted on the labels, where samples are put on ice, laboratory chain of custody documents filled out, and lab tests performed. Once three different dates of extractions are carried out, degradation curves can be established and even the end points can be extrapolated.

Objectives.

The principal objectives of the monitoring program and the elements of each objective are listed below.

1. Determine the efficacy of OSE II treatment method as it relates to the degradation of the spilled material. This is easily carried out where grab sampling below is noted and instructions how to carry the sampling process.
To continue to use OSE II biological degradation, the response community has compile data, which shows that the use of OSE II bioremediation accelerates the breakdown of oil in the environment at a faster rate than if the oil was left to breakdown and degrade alone. OSE II's mode of action shows why OSE II accelerates bioremediation process see emulating mother nature link https://www.osei.us/tech-library-pdfs/2011/4-OSEI%20Manual_EmulatingNature.pdf which has been proven over 95,000 times since 1989.
2. Measure the environmental impact, if any, resulting from the OSE II biotreatment of an area, throughout the response activity to ensure against the harmful effects from the response. Especially, monitor any increases in eutrophication or ammonia caused by bioremediation (OSE II after 95,000 spills has not caused any of these, due to the OSEI Corporation careful engineering that is used with OSE II). OSE II has already proven to be virtually non-toxic and the reduce toxicity by the EPA and 11 other countries, therefore the outcome from the utilization of OSE II is already known and it is positive for the restoration of the environment from an oil spill. See Appendix C

The monitoring of water quality parameters throughout the application of OSE II is essential due to the potential for algae blooms, dissolved oxygen depletions, elevated available toxins in the water column, all of which may result in a critical impact to aquatic and vegetative life. OSE II does not create any O2 depletion over and above what the oil itself creates through its carbon loading of any ecology, OSE II causes oil/hydrocarbon-based material to float and allows the oil to flush even in slow flushing areas, since the oils adhesion properties are diminished so the oil cannot remain adhered to vegetation and this prevents the oil from lingering in any are and helps alleviate 02 depletion. The OSEI Corporation has a backup of adding O2 to any shallow wetland or body of water that in the most remote of cases happens, where drones drop perforated plastic tubing where O2 is released into the potential problem area, and then it is solved. The drones will collect the plastic tubing or tubes once the area is free of hydrocarbons.

3. Determine if the bioremediation end points have been reached.

With the use of OSE II as a response tool, it is important to determine at what point it has achieved its objective. Thus, biomonitoring end points must be developed prior to the initiation of the application, keeping in mind that these end points may need to be modified as the program progresses. The end points with OSE II have been fully substantiated by the EPA, RRT VII, DOI and use by the EPA and other countries where OSE II has been utilized on previous spills see appendix C below, and through real world clean-ups where even on 550,000-liter spill in. Nigeria OSE II removed over 97% of the oil on the 18-kilometer contaminated shoreline and 99% on the Open Atlantic Ocean, in December 2025 OSE II reduced or removed the crude oil to a level of non-detect for the open water and permanently removed 96% of the oil on the shoreline in 2 weeks.

4.Ensure the comparability of data collected from all OSE II bioremediation response efforts conducted within region 4 through compliance with USEPA Region IV's or Global Authority requirements for Sampling Standard Operating Procedures.
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This is done in order that the data may be used to enhance the already large catalogue of spill response with OSE II, to gain more understanding of OSE II first response bioremediation as an oil spill response tool. Properly collected, validated and interpreted data will provide critical information to assess the efficacy and environmental impact of OSE II bioremediation treatment and related response activities. Such documentation is needed to identify and correct problems in the biological treatment process, to verify OSE II bioremediation endpoints have been reached, to ensure that OSE II biotreatment is less environmentally harmful than the spilled pollutant and to support cost recovery and other legal actions. OSE II has been documented to reduce clean-up costs 50 to 80% compared to the old skimmer, and dispersant responses.

Secondarily, the data can be used for developing regional and national data bases, interfacing with natural resource trustees, preparing interim and final reports, and revising this OSE II biomonitoring plan.

Quality Assurance

The quality of environmental data used to support International Authorities/ US OSC decision-making is critical to a spill response that utilizes OSE II. The primary goal of the quality assurance (QA) program is to ensure the accuracy of the environmental data considered by the International Authorities/US OSC and RRT 4. It is the QA policy of RRT 4, and Global Authorities, that all activities associated with data collection and derivation are to be documented thoroughly. A monitoring program manager should be selected to specify procedures for ensuring the quality of data generated through the monitoring program and for providing sufficient resources for QA of collected data.

OSE II Biomonitoring Plan Design

Each OSE II biomonitoring program, in large part, will be event/site specific; however, pre-event planning and standardization of collection/analysis methods is encouraged. The design of the OSE II biomonitoring program is two-fold: (1) to document any impact to water quality which might result from the treatment or application of OSE II, and (2) to provide for the evaluation of the effectiveness of the OSE II treatment method.

Conducting OSE II biomonitoring does not preclude the OSC/RP or Global Authorities from conducting any other required monitoring associated with the spill event.

Project planning and site reconnaissance are essential activities conducted prior to the design of the OSE II biomonitoring plan. The OSC/RP/Global Authorities may wish to refer to the area contingency plan (ACP) for existing shoreline or site assessment procedures

developed by the area committees. The purpose of site reconnaissance activities is to gather information sufficient to:

- Determine that the objectives of the OSE II biomonitoring plan are consistent with the features of the site selected for application;
- Identify the type and quantity of existing historical water quality data for the area selected for the application, such as nutrient loading trends and physical water parameters;
- Define the geographic area of the spill targeted for application, for physical and chemical characteristics important to the design and execution of the OSE II biomonitoring plan;
- Determine the distribution, abundance, and seasonality of habitats, in the area to be considered for application;
- Project weather forecasts, meteorological and hydrogeological trends in the potential application area, for the proposed OSE II application time; period.
- Determine equipment needs based on operational logistics; and
- Develop procedures designed to document sample collection methods and procedures.

The extent of the OSE II biomonitoring program should be directly proportional to the complexity and sensitivity of the area(s) chosen for OSE II biological degradation. The more diverse and sensitive the effected environment, the more complex and extensive the OSE II biomonitoring program should be. The volume of material spilled is not the driving factor in determining the extensiveness of the OSE II biomonitoring program; however, the larger the spill, in general, the more area affected and the greater the potential for affecting sensitive ecosystems. Thus, large spills generally will require a more extensive biomonitoring program. The OSC/RP/Global Authority should refer to the ACP or their own programs, and incorporate all required monitoring as directed by the ACP or their site plans.

Because one spill event may affect several different morphological environments or habitats, OSE II bioremediation treatment techniques may be applied in several different habitats. The supporting OSE II biomonitoring program must be designed to accommodate inherent differences which are present in each habitat. Thus, each discrete habitat, within an application area, may require its own monitoring program.

Monitoring Activities

Biomonitoring plans should ensure that observations and samples be collected and analyzed from the following areas - within each discrete habitat(s):

Untreated areas

1.uncontaminated, untreated source areas (this will serve as background information and may not require the same intensity of sampling as the other areas),
2.contaminated, untreated source areas, and

Treated area

3.contaminated, treated areas

In order to evaluate the effectiveness of the OSE II bioremediation treatment technique the OSE II biomonitoring plan should provide for the comparison of replicate data from treated and untreated areas for the duration of a project.

Within each discrete habitat which is a part of the OSE II bio application project, treated and untreated sites that exhibit similar chemical and physical characteristics should be chosen. Their similarity will support the comparability of the data generated. During their selection the following criteria should be considered, (1) environmental parameters, (2) physical habitat and geomorphology, and (3) oil loading and the probability of further oiling. Site variability should be limited as much as possible in order to generate data which is comparable.

Other physical variances which may affect the integrity of the data collected are wave action, tidal flushing, currents, boat traffic, and exposure to wind or other external forces.

Because efficacy analyses focus on evaluating relative changes in the concentration of the constituents of oil between treated and untreated sites, it is important to ensure that uncontaminated source areas remain uncontaminated for the duration of the monitoring program and contaminated areas are not re-oiled for the duration of the monitoring program.

Monitoring should take in place in two forms:

1. Qualitative - serves as real time feedback for response decision and is usually in the form of visual observations, supported by photo documentation.

2. Quantitative - serves as the basis for longer term analysis of the success of the project and is in the form of sample collection and analysis.

Although visual observation is considered subjective, there is no substitute for this type of "real time" or fast feedback. Observers must be assigned to the project and trained to monitor morphological changes which may occur to the oil as it breaks down and any changes in organism behavior, such as the occurrence of algae blooms and fish kills. OSE II's initial actions are easily observed, and even the slightest problems with fish or algae will be handled quickly to prevent any are from becoming anoxic

All sample collection and analysis begins with a sampling plan. The sampling plans should include, at a minimum, the following:

Implementation schedule (monitoring should be expected to take place over 3-4 months or until end points are reached which with OSE II is generally 30 days or less.)

- List of objectives There is one with OSE II, to permanently remove as much oil from the environment as possible, which is generally over 90% in the field.
- Tasks to be conducted Staging, application of OSE II, monitoring, sampling to verify permanent removal of oil from land and water shutdown
- Description of project management Determining of the spill is one time event or continuing, applying to the front edge of the spill where it has migrated, and work back to the source, which helps with a shutdown, if continuing spill, also apply OSE II at the source to prevent further spreading of untreated oil.
- Identification of sensitive areas included in/adjacent to the sample location areas sensitive areas will be addressed with some engineering if required as well.
- Identification of sample locations, frequency, and collection methods an overview of the spill area will be set, and sampling will be set based on area to cover and the required number of samples per area.
- Description of sample chain of custody procedures and QA/QC procedures, normal laboratory chain of custody requirements will be carried out and all samples will be placed in ice chest with ice placed in the ice chest at least 1 hour prior to collecting samples.

Description of water quality history (if available) of the affected area or procedure for determining background values for the affected area if historical data does not exist
The environmental characteristics and measurements that should be assessed and the samples that should be taken as part of the OSE II biomonitoring are presented in Table 2, along with a schedule for performing these activities. Sampling at each site, water depth (as appropriate), and time, should be performed in *duplicate for 10% of the samples collected*. Although the mix of samples collected should be based on the requirements of the analytical methods, minimum sample sizes are recommended as 1 liter for water samples and 4 - 16 oz. for sediment or shoreline materials. All samples should be placed in pre-cleaned jars or bottles with Teflon lined caps, as appropriate.

The monitoring parameters should involve a tiered approach which utilizes relatively inexpensive techniques such as total petroleum hydrocarbons (TPH) for screening and more sophisticated methods that target individual petroleum constituents to confirm OSE II biodegradation efficacy in *at least 25% of the sample*s *analyzed*. The latter would include GC/MS analysis of target aliphatic and aromatic hydrocarbons which have been identified as marker compounds for tracking oil degradation and weathering, such as the normal alkanes, the isoprenoids, pristane and phytane, and the conservative biomarker hopane. Water quality measurements should include nutrients, dissolved oxygen, biological oxygen demand (BOD), TOC and COD. Refer to Appendix E for methodologies and recommended procedures.
All data is subject to review by the OSC or a delegate or Global Authority and will be made available upon request. This data will support further response decisions and to provide the response community with a better understanding about the use of OSE II bioremediation as an oil spill response tool. The OSEI Corporation can perform this before any spill due to the vast number of oil spill clean-ups already performed Globally.

DOCUMENTATION AND REPORTING

During the course of a OSE II bioremediation activity and accompanying monitoring effort, the following reports shall be prepared and submitted to the OSC/Global Authority:

Activity reports -- provide descriptions of the OSE II bioremediation activity area, weather, unique observations, and activities undertaken, as well as the names and affiliations of persons on site. Activity reports should be prepared whenever activities on a site are undertaken.

Analytical reports -- provide laboratory analysis results of environmental and control samples. Lab results should be analyzed, interpreted and a brief summary report prepared within a reasonable time agreed to by all parties.

After action report -- provide a description of the overall OSE II bioremediation activity and accompanying monitoring effort, including results of both field and laboratory activities. A draft should be submitted within 30 days after the end of the monitoring effort. A final report, (incorporating comments from those the draft was submitted to, as well as photos) should be submitted within 60 days after submission of the draft.
In addition, at the time the final after action report is submitted, all field notes, including those of contractors, should be submitted to the OSC/Global Authority.

To facilitate information transfer and the development of a data base on OSE II bioremediation use, the OSE II Bioremediation Use Follow-Up Form in Appendix F should be completed at the end of the OSE II bioremediation activity.

PLAN REVISION

The monitoring plan and suggested procedures outlined in this section should be implemented and modified, as necessary, based on the cumulative experience and knowledge gained from conducting OSE II bioremediation field activities and associated laboratory activities. Recommendations for revisions should be submitted to the Region 4 RRT/RRT or Global Authority for approval.

See Table Below

TABLE 1
FIELD-MONITORING PARAMETERS

Parameter	Sample Size[1]	Assessment/ Collection Location	Assessment/Collection Frequency[2]
Visual observations (mortality, behavioral effects, appearance changes, oil distribution)	N/A	All test sites	Daily to the extent possible; at least each day that water, sediment, and/or shoreline material sampling is performed
Temperature (air, water)	N/A	All test sites	Days 0, 1, 7, 14 and every week thereafter
Salinity	N/A	All test sites	Days 0, 1, 7, 14 and every week thereafter
Dissolved oxygen	N/A	All test sites	Days 0, 1, 7, 14 and every week thereafter
Sea state	N/A	Activity area	Days 0, 1, 7, 14 and every week thereafter
Current	N/A	Activity area	Days 0, 1, 7, 10 and 20
Wind velocity	N/A	Activity area	Days 0, 1, 7, 14 and every week thereafter
Efficacy (water, sediment, and/or shoreline material)	1 liter water; 20 grams sediment or shoreline material	All test sites and, as appropriate, all water depths	Days 0, 1, 7, 14 and every week thereafter
Toxicity[3] (water, sediment, and/or shoreline material)	8 liters water; 20 grams sediment or shoreline material	All test sites and, as appropriate, all water depths	Days 0, 1, 7 for Microtox and at same intervals for every reapplication of agent, for long term amphipod days, 0, 1, 7, 14 and every week thereafter

[1]N/A means "Not Applicable".
[2]Frequency is relative to the time of agent application.
[3]Sample size, location and frequency for toxicity testing are recommendations. Actual parameters shall be determined based upon conditions of the spill event.

APPENDIX A

APPLICABLE FEDERAL AND STATE REGULATIONS

Legislation at both the federal and state level may affect decisions to use OSE II bioremediation. Existing regulations and policies that govern the use of OSE II bioremediation treatment techniques and agents in responses to spills in Region 4/RRT/ or Global Authority are summarized below.

Federal and Global Regulations

International Maritime Organizations (IMO), signed global treaty by all the Countries of the world, states IMO protocols ban chemicals that sink oil into toxic subsurface plumes.

At the Federal level, Subpart J of the NCP governs the use of chemical and biological agents which include bioremediation agents -- in responding to oil spills. Specifically, the Subpart: J.

Global and US Federal regulations Restricts the use of chemical and biological agents that may affect US waters to those listed on the NCP Product Schedule; or approved for an emergency use.

Specifies technical product information that must be submitted to EPA for an agent to be added to the Schedule; and establishes conditions for obtaining authorization to use chemical or OSE II biological agents in a response action, which with OSE II, is virtually any scenario, or any type of oil, in almost all weather types OSE II has been used, see Clean-ups at this link for 105 case studies https://www.osei.us/clean-ups . And see appendix C in this document

If EPA determines that the required data were submitted, EPA will add the agent to the Schedule. Note, however, that listing of an agent on the NCP Product Schedule does constitute approval of that agent for use or confirmation of any claims regarding the agent's safety or effectiveness.

Data on agents listed on the NCP Product Schedule are available through EPA's Emergency Response Division in Washington, DC or globally for various regions, information for an area or international country or area, can be provided by the OSEI Corporation, of the governing bodies actions with OSE II.

The OSC, with concurrence of RRT 4, including the RRT or the Global Authority or representative from the State or Global Authority with jurisdiction over the waters threatened by the spill, may authorize the use of OSE II listed on the Product

Schedule/OSE II. In addition, when practicable, the OSC should consult with the Department of Commerce (DOC) and Department of Interior (DOI) representatives to the RRT, or the Global Authority, before planning to use OSE II first response bioremediate desired on a spill. If the use of OSE II under certain specified circumstances is approved in advance by the State, DOC, or Global Authority and DOI representatives to the RRT, **and** such preapproval is specified in the Regional Contingency Plan, the OSC may authorize OSE II bioremediation without consulting the RRT or OSE II may be used in particular areas where already approved by a country/International body.

OSE II First Response Bioremediation Category EA meets and exceeds all federal and State and local requirements. OSE II Category EA will allow the EPA/Coast Guard and RRT to meet the federal requirements by pre-authorizing and utilizing a response OSE II category EA that removes the oil from the environment, per the Clean Water act and OPAH 90, without applying a pollutant to a pollutant. The IMO/MARPOL has signed a global treaty where a responsible party cannot apply anything to hydrocarbons that cause them to sink, which OSE II meets as well. Where OSE II does not sink oil and is a clear alternative to sinking oil.

APPENDIX B
OSE II USE AUTHORIZATION FORM.

THIS IS A SAMPLE OSE II BIOREMEDIATION USE AUTHORIZATION FORM if required WHICH HAS BEEN FILLED OUT AS IT WOULD and SHOULD BE ON A PRE SPILL BASIS AS MUCH AS POSSIBLE FOR OSE II First Response BIOREMEDIATION SUB-CATEGORY EA TYPE – OSE II
BIOREMEDIATION USE AUTHORIZATION FORM

_____

The following questions should be answered, if known, and presented to the OSC/ Global Authority who will review them and present them to the RRT or representative or governing body internationally. EVERY effort should be made to present accurate and timely information. The RRT/Global Authority will use the information provided below to assist in making sure the implementation of OSE II a first response bioremediation, category EA starts as soon as possible.

The form consists of two parts, incident characteristics and feasibility assessment criteria for OSE II the feasibility has been determined on a pre spill basis as OSE II is applicable for all scenarios and all the types of oil in this plan. Additionally, a OSE II Bioremediation Work plan and OSE II Biomonitoring Plan have been pre prepared and submitted and will be submitted to OSC/RRT/Global Authority if required and should be forward to all OSC/Global Authorities for the Coast Guard and EPA on a pre-spill basis so the Global Authority or OSC's or his designee for review. (Note: Many of the items requested in the feasibility assessment criteria section can and should be included in the OSE II bioremediation Work plan.) The is no need for feasibility assessment for an already proven experienced product in OSE II, since OSE II is feasible for all areas, and has been used in all areas in this plan. The Nigeria clean-up shows the OSEI Corporation has experience in permanently removing more oil than the average spill in the US.

Incident Characteristics

Time and date of release: (TO BE FILLED IN WITH SPECIFICS OF INCIDENT)
Product spilled: (this is not a determining factor regarding the use of OSE II since sub-category EA/ OSE II handles all hydrocarbon-based materials. However, the product spilled should be noted.

Quantity spilled: (TO BE FILLED IN WITH SPECIFICS OF INCIDENT)
Status of spill: whether the oil is fresh or fully weathered, or is a continuing leak, or one that has been contained, sub-category EA/ OSE II can be applied effectively at any point, there is no limiting window of opportunity for implementation and application.
Location of incident: (TO BE FILLED IN WITH SPECIFICS OF INCIDENT – SUB-CATEGORY EA/OSEII CAN BE USED IN ANY LOCATION)

Description of incident: (TO BE FILLED IN WITH SPECIFICS OF INCIDENT)
Properties of spilled product: ( )THIS TYPE OF OIL SPILL DOES NOT IMPACT THE EFFECTIVENESS OF OSE II – OSE II WORKS ON ANY TYPE OF HYDROCARBON-BASED SPILLED PRODUCT

specific or API gravity
viscosity, cp
pour point, at temp, F
sulfur content, %w

Responsible party information: (to be filled in with specifics of incident)
company
address
telephone
contact person
telephone

Feasibility Assessment Criteria

Specific location proposed for treatment: OSE II SUB-CATEGORY EA CAN BE USED IN ALL OF THE CATEGORIES LISTED BELOW

*** What are the characteristics of the spill environment?**
* type of environment, habitat
* marine, brackish, freshwater
* past spill history

Amount of weathering spilled product has undergone: THIS IS NOT RELEVANT WITH OSE II – OSE II CAN BE UTILIZED ON FRESH, LIGHT, HEAVY OIL, AND WEATHERED OIL/ HYDROCARBON-BASED MATERIAL EQUALLY EFFECTIVELY

Description of impact(s):
* Has ownership of land been determined: (TO BE FILLED IN)
* Has written permission from landowner been obtained: (TO BE FILLED IN)
* OSE II Bioremediation agent proposed for use: OSE II
* Name of product. OSE II
* Type of agent (OSE II) ENZYME ADDITIVE
* Is agent listed on NCP or Internationally approved? YES. It is B-53 ON THE NCP LIST PRODUCT SCHEDULE UNDER CATEGORY BIOREMEDIATION, SUB-CATEGORY ENZYME ADDITIVE TYPE (EA) or approved in the country of the spill
* Has EPA data been reviewed by the SSC or Global Authority? YES
* To what tier has the agent been formally evaluated? TIER III and now the equivalent of TIER IV numerous real worlds uses.
spills, where some have been depicted in Appendix C in the reference section below

*** Does the agent or responsible party have any previous first-hand experience** with the use of OSE II bioremediation agent, or have any corroborated (laboratory or field) data indicating it enhances biodegradation and is not toxic to affected spill environment? **YES – EPA HAS SUFFICIENTLY TESTED OSE II FOR TOXICITY AND PROVEN IT TO BE COMPLETELY NON-TOXIC. THE EPA HAS SUFFICIENTLY TESTED IT FOR EFFICACY AND PROVEN IT WORKS ON WEATHERED OIL AS WELL AS HEAVY AND EMULSION OIL.** THE DOI HAS SUFFICIENTLY TESTED IT FOR EFFICACY AND PROVEN IT IS MORE EFFECTIVE THAN DISPERSANTS AND MECHANICAL. DOE HAS USED IT TO CLEAN UP SPILLS EFFECTIVELY. **DOC/NOAA HAS WITNESSED A SUCCESSFUL Clean-up on the Hebie Spirit spill in South Korea DEMONSTRATION OF OSE II REMEDIATING BUNKER C OIL IN SOUTH KOREA.** IN EACH CASE ABOVE THEY OSE II was TESTED OR USED ON FRESH/MEDIUM/HEAVY/WEATHERED TYPES OF OIL. **See Appendix C below**

*** Has this agent been used on previous oil spills**? AS OF September 5, 2026, IT HAS BEEN USED TO EFFECTIVELY CLEAN UP over 95,000 OIL SPILLS ON FRESH/MEDIUM/HEAVY/WEATHERED TYPES OF OIL to date.

*** What were the characteristics of the oil and the spill environment in each case**? FRESH/MEDIUM/HEAVY/WEATHERED TYPES OF OIL ON ROCKY SHORELINE, SANDY BEACH, MARSH, ESTUARINE, RIVERINE, WETLANDS, FRESH AND SALT WATER, OPEN OCEAN, and brackish water.

*** Are degradation results (based on oil chemistry and microbial tests) available for review?** YES, THEY ARE ALL AVAILABLE – A NUMBER OF KEY TESTS ARE CITED IN THE ATTACHED COMPILATION OF DOCUMENTATION OF TEST AND USE RESULTS OF OSE II WITH THE RRT. See efficacy test some by the US EPA at this link https://www.osei.us/efficacy-testing and https://www.osei.us/cold-temperature-testing-clean-ups and https://www.osei.us/extreme-heating-testing-clean-ups and https://www.osei.us/heavy-in-emulsion-oil-efficacy-tests-clean-ups and. https://www.osei.us/halogenated-hydrocarbon-testing-and-clean-ups and. https://www.osei.us/pesticide-testing-and-clean-ups and https://www.osei.us/toxicity-tests and. https://www.osei.us/peer-review-of-tests Also see Appendix C below

*** Is a reference available?** SEE DOI TEST CITED IN Appendix CCOMPILATION OF DOCUMENTATION OF TEST AND USE RESULTS OF OSE II WITH THE RRTs and Global responses See Appendix C below

Supply:
* Source of supply OSEI CORPORATION Direct, or if a Global spill, our distributor will have OSE II as well, OSE II has distributors in approximately87 countries.

* Amount available – Enough to clean up a million gallons initially, with constant resupply every 5 days.

* ETA to site – (estimated 2-8 hours depending on location of site in Alaska)
Application: or two days Globally by air.

* Estimated number of agent(s) needed (one gallon of OSE II for every 50 gallons of oil or hydrocarbon-based material)

* Who will apply the agent (vendor personnel, response contractor personnel, or other contractor) vendor personnel or any response contractor capable of applying dispersants, or entity with a commercial vessel with firefighting equipment/induction system.

* Method to be used in applying agent any type of spray apparatus can be used, including aerial.

* impacts of proposed application method – 1) Oil seems to break down in much thinner consistency or disappears before your eyes, 2) immediate reduction of the toxicity to the environment; 3) causes oil to float protecting the water column and seabed; 4) within 30 minutes, reduces adhesion properties so if oil reaches manmade structures or intertidal zone, or birds and other marine life or wildlife, it will not adhere; 5) diminishes fire hazard in a matter of minutes; 6) permanent removal of the oil/hydrocarbon-based material within a matter of a few days to a few weeks.

* Time to prepare agent for application – ready to apply on delivery, with firefighting induction systems, or can be poured into a container with water from 2 gallon/8 liter sprayers to pressure washers, water trucks/tanks/vessel tanks with discharge hose and nozzle or any spray apparatus.

* Has application equipment been calibrated for this application yes, with most induction systems. However, if it needs to be changed it is simply a matter of changing the spray dial from 2% to 3 % or 4%.

* Planned rate of application – enough to address 500 thousand to a million gallons of oil per day.

* How long will application take – (this depends on the amount of oil spilled. For example, if it is 10,000 gallons, it's less than 30 minutes – if it is a million gallons, it would take several hours

* Will product have to be reapplied – NO not generally

*How frequently (not applicable)

OSE II Bioremediation Work plan

* Has a OSE II bioremediation Work plan been prepared? YES – SEE ATTACHED

* Has the plan been reviewed? (IT CAN BE REVIEWED QUICKLY)
OSE II Biomonitoring Plan

* Has a biomonitoring plan been prepared? YES

* Has it been reviewed? ABSOLUTELY – IT WAS WRITTEN BY THE EPA.
Project Management

Bioremediation application project manager: (TO BE FILLED IN PER INCIDENT)
contact number:
address:

This OSE II bioremediation application has been approved:

__ _____
Federal On-Scene State On-Scene Environmental Protection
Coordinator Agency

_____
Department of Department of
Commerce Interior

This document fills in the wide information gap (incomplete and misguidance) that exists for oil spill response in the United States of America. This response plan shows there is a safe for responders; nontoxic means to permanently remove oil/hydrocarbon based spilled material from the environment, fulfilling the US Clean Water Act, and OPAH 90. The Coast Guard, EPA, NOAA and the NRT/RRT is fully aware and has absolute documentation that meets and or exceeds all federal, state and local requirements.

This response plan will now allow the EPA to meet its charter, as well as allow the President of the United States to meet his oath of office, and fulfill the requirements of the RRT, and its members. This response plan is the commonsense approach the public demands and expects its elected officials, and the personnel working for the various US Federal departments to carry out. First and most important The permanent removal of the oil/fuel/hydrocarbons, or hydrocarbon-based material, which OSE II has performed over 95000 times to date.

APPENDIX C

References For USE WITH US RRT's Testing of OSE II and Real World Clean Ups Globally In Various Temperatures, on various types of Oil Fuels, and Hazardous Materials As well as Efficacy Tests, and Toxicity tests

COMPILATION OF DOCUMENTATION AND USE OF OSE II WITH EPA/RRT'S

US Federal Government, and RRT groups that have associated with the OSEI Corporations product Oil Spill Eater II Since 1989

2010, EPA RRT IV officials witnessed the successful Clean-up/demonstration of OSE II on marsh grass and sandy beach at Waveland Mississippi during the BP Deep Horizon Spill. Link http://osei.us/archives/819 Pictures were sent to the EPA several months after the demonstration, showing the area where OSE II was applied on the sand and marsh grass, and it was still clean and the marsh grass was thriving. The marsh grass adjacent to the marsh grass where OSE II was applied was brown and dying from Corexit. OSE II was also used to perform Clean-up for the Pass Christian Harbor in Mississippi where allot of oil had oiled the port see link https://www.osei.us/photoalbums/harbor-clean-up

EPA contractor utilizing OSE II on US navigable waters, on the Osage Indian Reservation in Oklahoma see link https://www.osei.us/wp-content/uploads/Oklahoma-Osage-Indian-Reservation-Clean-up-for-US-EPA-RRT-VI-1-XXXXZZ.pdf Where the US EPA Region VI approved OSE II for use on US Navigable waters.





1992, the US EPA also spent millions testing OSE II through NETAC for bioremediation protocol development of which the OSEI Corporation CEO set in on the meetings in Pittsburgh discussing and tweaking the laboratory as well as the test protocol. OSE II's successful efficacy tests on Tier II which was peer-reviewed by 31 scientists, that established the fact that OSE II should be tested in Tier II open water mesocosm tests. OSE II proved successful at remediating the heavy Alaska North Slope oil and was approved to have Tier III testing carried out on OSE II.

The initial Tier III efficacy tests showed OSE II working well once again, Tier III also included toxicity testing on two separate marine species, which showed OSE II was far less toxic than the EPA standard stating a product is virtually non-toxic if it show > 100 mg/l on a LD 50 of LC 50 toxicity test, OSE II average toxicity test is 1900 to 10,000, see link https://www.osei.us/wp-content/uploads/US-EPA-required-tests-1.pdf and the second set of Toxicity tests see link https://www.osei.us/wp-content/uploads/US-EPA-Netac-Tests-1.pdf
and two sets of efficacy tests see link for first set of efficacy tests https://www.osei.us/wp-content/uploads/government-test-1.pdf and the second set of efficacy tests https://www.osei.us/wp-content/uploads/government-test-2.pdf and Tier III tests, and now OSE II has had 51 toxicity tests see from 11 different country governments at this link https://www.osei.us/toxicity-tests

The US EPA had full knowledge of the great Efficacy and toxicity tests on OSE II after this testing was completed in 1992, since it was their contract.

The information above for the EPA/NETAC testing was used by EPA, David Lopez along with the Tx A&M study using a similar EPA/NETAC efficacy test see link https://www.osei.us/wp-content/uploads/TAMU-SaltWaterEfficacyTest.pdf **which was deemed acceptable and used to place OSE II onto the original EPA NCP Listing list in 1996.**

2011, the department of Interior performed a test comparing OSE II to dispersants (Corexit 9527A and 9500A), and mechanical clean-up in cold water climate. OSE II cleaned up, 67% of the heavy Dielectric oil, while the dispersants were not successful at being effective (sinking oil into the water column) and the mechanical clean-up was able to clean up its normal 2 to 8%. OSE II was proven by DOI to be the superior clean-up method. See test

summary at link https://www.osei.us/pdf%20files/OSEI-Summary-of-Department-of-Interior.pdf
2008, NOAA officials visited a demonstration of OSE II, in Mo Hang Port South Korea, where the gentleman in the yellow jacket the head of the South Korean Coast Guard explained the great successful testing of OSE II, and the application of OSE II on the shoreline with South Korean Coast Guard, government officials and OSE II was added to the approval list for oil spill clean-up products in South Korea as well. These are pictures of NOAA official wearing NOAA caps at the successful demonstration.





The conclusion of the successful test showed OSE II remediating the Bunker C oil to CO 2 and water, and showed there were small crabs that were living in the water for the duration of the test unharmed. The RRT IV bioremediation response plan has stated bioremediation (microbes and nutrients) is not effective for heavy oils, this is true for category MC and NA, however this demonstration shows it is not true for OSE II, since OSE II bioremediated 98% the Bunker C oil to CO2 and water while protecting the small crabs living on the bottom of the test container. See link https://www.osei.us/wp-content/uploads/South-Korea-Hebie-Spirit-Clean-complete-pictures-and-captions-XX.pdf

2012, on March 8th, RRT VII concluded an extensive test with OSE II on heavy in emulsion waste oil with water from Spring Lake and water from the Missouri river. The test conclusively showed that OSE II increased bacterial numbers, and bioremediated the heavy in emulsion oil fractions, where OSE II reduced the DRO (lighter ends of the oil) on average 72.5% and the ORO (heavier ends of the oil) by 73.5% on average. to CO2 and water for the duration of the test time, just a short time more and the DRO and ORO would have been 100%. See this link https://www.osei.us/pdf%20files/RRT%20plus%20testing.pdf You can also see the heavy in emulsion oil being caused to float from the OSE II application for the duration of the test as well, proving again OSE II does not sink oil into the water column.

2013, the CEO of the OSEI Corporation (Steven Pedigo) has also set on the science and technology sub-committee for RRT VI developing information, in regards to Oil Spill Eater II (OSE II) including the fact heavy in emulsion oil is easily remediated with OSE II as well as hydrocarbons from C1 to C50 as well as halogenated hydrocarbons and pesticides. See link https://spaces.hightail.com/receive/I070WdjpdX
1992, OSE II has been used on US Military bases domestically as well as globally, since 1990. See link to DOD Cage Code and NSN numbers https://www.osei.us/department-of-defense

OSE II is procured directly by bases, through the rules of Sole Source as well, shipping directly to bases, and to Stacey Depot and Norfolk as well depending on what part of the world the military is shipping the drums. The rules of sole source document is on page 6 of this link https://www.osei.us/wp-content/uploads/OSE-II-used-on-over-200-350-spills-by-The-US-NAVY-Point-Loma-Fuel-Farm-San-diego-Bay-California-.pdf and this one from Navy base Norfolk, where a phase three environmental Health review was performed showing military personnel would not be required to wear PPE suites with OSE II, just goggles and gloves, numerous tests were performed with OSE II and Norfolk navy base used OSE II on spills see link https://www.osei.us/wp-content/uploads/OSE-II-tested-and-utilized-by-the-Navy-In-Norfolk-Virginia.pdf

Approximately 1995, The Navy in Key West Florida tested OSE II as a deck cleaner successfully, and where the Navy also used OSE II on ocean clean-ups where there are corral reefs, continually as well see link https://www.osei.us/wp-content/uploads/OSE-II-tested-and-used-by-the-Navy-in-Key-West-Florida.pdf

1992 OSE II is also approved for NATO Globally as well see link https://www.osei.us/wp-content/uploads/AeroBaseGroup_18x54.pdf and approved as a sole source for commanders through Navy Denix as well see link https://www.osei.us/wp-content/uploads/osei_navy_denix.pdf

2002 OSE II had cleaned up over 200 spill in the San Diego Bay Port where the Navy had accomplished this in 3.5 years, and where, the US EPA Washington DC, Debra Dietrich, Nich Nichol's, and RRT 9 members regional EPA Bill Roberson, Coast Guard and Yvonne Adasis of California Fish and Wildlife, Admiral Lively and Steven Pedigo of the OSEI Corporation all met with Steve Fry who manages the Navy Fuel farm at Point Loma for the Navy. Steve Fry relayed the information they have cleaned up over 200 spills in a 3.5-year period, with Whales and Dolphins around, with no adverse effects, and the Navy performed more complete clean ups then had been carried out previous to utilizing OSE II. This means OSE II has a great proven track record in US Navigable waters with NO natural resource destruction and no harm to anyone while permanently removing the spilled fuel/oils from the environment. The US Military use OSE II to this day. See link https://www.osei.us/wp-content/uploads/OSE-II-used-on-over-200-350-spills-by-The-US-NAVY-Point-Loma-Fuel-Farm-San-diego-Bay-California-.pdf

2016 the NRT, as well as RRT 9 have been presented the OSE II clean-up of 150,000 gallon or 550,000-liter crude oil spill in Bayless State Nigeria. The 150,000 gallons spilled was in the open ocean, covered 18 kilometers of shoreline, where a large section of shoreline was covered in Mangroves, that were covered in oil as well. Fishing was shut down for 3 weeks.

OSE II application started within 24 hours of the spill release, while a container of OSE II was air-shipped from Dallas Texas. OSE II was applied to oil on the shoreline and Mangroves as well as to oil in the Atlantic Ocean. Workers took off boots where OSE II had been applied to the shoreline, and NO worker became sick from exposure to OSE II.

In three and a half weeks, tests showed that 99.9% of the oil had been removed from the ocean water, and 97.9 % of the oil had been removed from the shoreline and Mangroves

with no natural resource damages. Fishing was re-opened and not one fish or bivalve was found to have any oil in them or coating them, since OSE II causes oil to float, and prevents hydrocarbons from sinking into the water column. The success rate for this volume of released oil has never been accomplished in the US or anywhere in the world, as of 8/6/2026. See link to 554-page document with testing https://www.osei.us/wp-content/uploads/OSEI-NIgeria-AGIP-Brass-Terminal-Clean-up-complete-data-set-4-14-14-.pdf and the video at this link https://www.osei.us/archives/1519

Also, see link to the RRT 9 presentation, poor audio quality due to a Coast recording mal function https://www.youtube.com/embed/piG1RAiLJ04

2010, British Petroleum (BP) requested the use of OSE II, to use and test for navigable waters BP Deep Horizon spill, world's largest spill. https://www.osei.us/wp-content/uploads/BP-request-OSE-II-demonstration-for-Gulf-spill-1.pdf

2010 OSE II used to clean-up BP Macondo oil, pouring into Pass Christian Harbor in Mississippi, with the Harbor Master overseeing the clean-up, see link https://www.osei.us/photoalbums/harbor-clean-up

2010, the US EPA, US Coast Guard, NOAA, OSPRY, LSU and others, all participated in the testing of OSE II by BP during the Macondo spill where great results were produced! This is the first chance OSE II had at being tested by the responsible party of a major oil spill during the spill, in fact the largest spill in US history. See link https://www.osei.us/pdf%20files/osei_sum.pdf

2010 Requests by state senators for the use of OSE II during the BP spill, which were all were sent to Unified Command/ Coast Guard and EPA.

1) A letter from the Office of A.G. Crowe requesting the use of OSE II See link https://www.osei.us/agcrowe.pdf

2) A letter from Senator Gollot of Mississippi requesting the use of OSE II to unified command of the BP spill. See link https://www.osei.us/request%20rrt.pdf

3) A request for the use of OSE II to unified command of the BP spill through a letter from Senator Hank Erwin to RRT4 Alabama State Senator support for OSE II See link https://www.osei.us/pdf%20files/rrt4.pdf

4) **2010 City of Destin requested the use of OSE II to Unified command of the BP spill. Destin City Council Minutes 07-27-2010 demonstration of OSE II Special (Council member Dentin moved that the City sends a letter to the Unified Command, or appropriate authority,** seeking permission to use the Oil Spill Eater (OSE)II product, that was demonstrated to the Dentin City Council on July27th, on the beaches within the corporate limits of the City of Dentin; If and when it becomes necessary. Motion was seconded by Council member Weidenhamer. Motion passes 6-0 (Council members

Trammell, Weidenhamer, Dentin, Bagby, Wood and Hines voted "yes" Council member Williges was absent). 8. Councilmember Bagby 9. Council member, Wood https://www.osei.us/wp-content/uploads/CityCouncilMinutes08-02-20101.pdf

2002, the US department of Energy has successfully utilized OSE II at their Sunnoco terminal as well for a valve leak on a storage tank, see link https://www.osei.us/wp-content/uploads/Department_of_Energy_OSEII.pdf
The two Co-chairs of the RRT system (US EPA and US Coast Guard), as well as the next two most important groups in the RRT system NOAA and DOI, NOAA see Hebie Spirt oil spill South Korea above, and Department of Interior see DOI test of OSE II comparing to two Corexit dispersants above as well, these Co-Chairs of the RRT's and these second two US agencies have extensive knowledge, testing, use, and witnessing of OSE II in use and being tested.

The US EPA RRT VI stated they cannot find a reason not to use OSE II and the fact that OSE II meets and exceeds the Clean water act by actually permanently removing oil/hydrocarbon based spills from the environment, by converting it to CO2 and water, while being non-toxic to responders, and protecting marine species, from the toxicity of the oil, adding no toxicity from the use of OSE II, protecting the environment, and limiting the impact of the spill to its original area of contamination, limiting and preventing natural resource damages in line with the US EPA's mission and Delegated charge from the President of the United States, to protect the natural resources of the United States of America, and the Health, Safety, and Welfare of the citizens of the US, where OSE II has no ill-fated **tradeoffs.**

Numerous other members of the RRT have extensive experience as well with OSE II, on water spills as well as soil spills, these can be viewed in our technical library, video section and photo section, and on our Clean Ups section on the OSEI Corporation web site at www.osei.us RRT VI, RRT VII and RRT VIX.

The NRT, RRT's have full knowledge of the enormous experience of OSE II's successful clean-ups in the US and Globally, as well as all the technical information in regards to OSE II, since packets of information has been sent to each member of the 12 RRT's in the past, which is how the US has arrived at handling oil spills today, where OSE II, the proven safe, efficacious product is setting ready to be utilized at a moment's notice, in the US and Globally, while also reducing clean-up costs by 77% on average.

OSE II emulates Mother-Nature's own process, we just found a means to speed it up! OSE II the safe for humans, non-toxic to marine species, product that permanently removes hydrocarbons or hydrocarbon-based contaminants from the environment, on over 95,000 spills since 1989. See link https://www.osei.us/tech-library-pdfs/2011/4-OSEI%20Manual_EmulatingNature.pdf

Some Of The OSE II Major Oil Spill Clean Ups

I. Nigeria Bayless State
One of the Worlds greatest spill response based on amount of oil removed from the 18 kilometers of shoreline contamination oil removal, and the amount of oil removed from the open water, safe for humans, non toxic to marine species, no natural resources destroyed, most economical, response.

I. **2016 the NRT, as well as RRT 9** have been presented the OSE II clean-up of 150,000 gallon or 550,000-liter crude oil spill in Bayless State Nigeria. The 150,000 gallons spilled was in the open ocean, covered 18 kilometers of shoreline, where a large section of shoreline was covered in Mangroves, that were covered in oil as well. Fishing was shut down for 3 weeks. OSE II application started within 24 hours of the spill release, while a container of OSE II was air-shipped from Dallas Texas. OSE II was applied to oil on the shoreline and Mangroves as well as to oil in the Atlantic Ocean. Workers took off boots where OSE II had been applied to the shoreline, and NO worker became sick from exposure to OSE II. In three and a half weeks, tests showed that 99.9% of the oil had been removed from the ocean water, and 97.9 % of the oil had been removed from the shoreline and Mangroves **with no natural resource damages**. Fishing was re-opened and not one fish or bivalve was found to have any oil in them or coating them, since OSE II causes oil to float, and prevents hydrocarbons from sinking into the water column. The success rate for this volume of released oil has never been accomplished in the US or anywhere in the world, as of 8/6/2026. See link to 554-page document with testing https://www.osei.us/wp-content/uploads/OSEI-NIgeria-AGIP-Brass-Terminal-Clean-up-complete-data-set-4-14-14-.pdf and the video at this link https://www.osei.us/archives/1519

II. BP MACONDO SPILL WORLDS LARGEST OIL SPILL Where OSE II Tested BY BP, Requested to the Coast Guard, And Was Used In Several Areas To Clean-Up BP Macondo Released Oil

The extensive test BP carried out with OSE II, showed how well OSE II remediated the Macondo oil but the Corexit dispersant that had been applied to the oil as well. See link https://www.osei.us/pdf%20files/osei_sum.pdf

BP Macondo Spill oil with Corexit attached at Waveland Beach Mississippi OSE II Clean-Up With OSE II

Senator Gollot wanted to see OSE II clean-up a large area of sandy beach, and marsh grass. EPA RRT IV personnel viewed the clean-up, and parts of the clean-up was shown on TV see link https://www.youtube.com/watch?v=q1F0NPpN24k
A second video at Waveland beach having discussions with contractors see link https://www.youtube.com/watch?v=HUfvqdp2zzw

The second area of the BP Macondo spill Clean-up, the Port of Pass Christian Harbor Mississippi that had been contaminated with BP Macondo oil.
The Harbor master Willie Davis requested the OSEI Corporation to perform a second clean-up in Mississippi on a larger area. The OSEI Corporation was requested to apply OSE II to pass Christian Harbor, when the Harbor Master Willie Davis discovered BP Macondo oil coming in through booms in the harbor. On August 10, 2010, Steven Pedigo along with Kevin Barbier, and David Fakouri OSEI Corporation associates went to Pass Christian Harbor to initiate a demonstration, which we had been asked if the demonstration goes well, would we be able to perform a clean-up, which we agreed to. The Pass Christian harbor had oil covering approximately 30% to 40% of the waters, surface. See link

A third area of the BP Macondo spill had OSE II used to clean up oil coated shoreline with oil that had toxic dispersant attached to it as well. See link
https://www.youtube.com/watch?v=qJ2ieqsxg6Q

III. Mexico Pentaxa River 4000000 Liter Crude Oil Release From A Pipeline, Clean-Up With OSE II

OSE II was used a major crude oil spill in Mexico when a 100-year flood caused a pipeline to break and release over 4 million liters of oil, cover at least 20 kilometers of river shoreline that eventually flows into the Gulf of Mexico/America. OSE II was applied to open water, shorelines, trees and vegetation. You can the dramatic differences in. the before and after video. Samples were taken on open water and on the shorelines. The Open water TPG levels were reduced to Non-Detect and the shoreline samples showed a 96% reduction or removal of the crude oil in two weeks. OSE II's ability to safely permanently remove oil from environments is un-matched. See link https://www.osei.us/archives/3136

IV. Over 200 to 350 spill clean ups in San Diego Bay Navy Point Loma Fuel Farm

2002 OSE II had cleaned up over 200 spill in the San Diego Bay Port where the Navy had accomplished this in 3.5 years, and where, the US EPA Washington DC, Debra Dietrich, Nich Nichol's, and RRT 9 members regional EPA Bill Roberson, Coast Guard and Yvonne Adasis of California Fish and Wildlife, Admiral Lively and Steven Pedigo of the OSEI Corporation all met with Steve Fry who manages the Navy Fuel farm at Point Loma for the Navy. Steve Fry relayed the information they have cleaned up over 200 spills in a 3.5-year period, with Whales and Dolphins around, with no adverse effects, and the Navy performed more complete clean ups then had been carried out before utilizing OSE II. This means OSE II has

a great proven track record in US Navigable waters with NO natural resource destruction and no harm to anyone while permanently removing the spilled fuel/oils from the environment, while reducing clean-up cost 87%. The US Military use OSE II to this day. See link https://www.osei.us/wp-content/uploads/OSE-II-used-on-over-200-350-spills-by-The-US-NAVY-Point-Loma-Fuel-Farm-San-diego-Bay-California-.pdf

V. Navy Air Station Key West Florida Years of Repeated Oil Spill Clean-Ups

OSE II was tested as a deck cleaner for naval vessels and has been used for years as an ocean oil spill clean-up product. Key West is surrounded by some of the most sensitive coral reefs and marine habitats in North America. The Navy's testing confirmed that OSE II could be used on surface water spills in close proximity to native marine mammals—such as whales and dolphins—without inflicting any adverse toxic effects. It stripped the natural stickiness of the oil upon contact, preventing the petroleum from latching onto local shorelines, docks, or seafloor habitats. See link https://www.osei.us/wp-content/uploads/OSE-II-tested-and-used-by-the-Navy-in-Key-West-Florida.pdf

VI. Norfolk Virgina Navy Base Navy Environmental Health Center Ongoing Spills

Oil Spill Eater II (OSE II) possesses a deeply documented operational history, particularly concerning its evaluation by the **Navy Environmental Health Center (NEHC) in Norfolk, Virginia**, its specialized military case studies, and unique structural properties. [1] Below is an extensive technical analysis compiled from official data logs, testing validations, and military defense framework entries. OSE II proved to be safe for military personnel where PPE suites are not required. OSE II does not have any hazardous substances, and does not have any mutagenic or genotoxic components. OSE II was tested on application to hot engines or and does not thermally breakdown and emit dangerous gases. OSE II has also been used on ongoing spills at the Norfolk Navy Base. See link https://www.osei.us/wp-content/uploads/OSE-II-tested-and-utilized-by-the-Navy-In-Norfolk-Virginia.pdf

VII. South Korea Hebei Spirit

The Hebei Spirit (often misspelled “Hebie Spirit”) oil spill was South Korea’s worst oil spill. On December 7, 2007, the Hong Kong-registered VLCC Hebei Spirit (laden with ~209,000 tonnes of Middle Eastern crude oils) was struck while at anchor off Taean by a crane barge that broke free from its tow in poor weather. Three tanks were punctured, releasing approximately 10,800–10,900 tonnes of Iranian Heavy, Upper Zakum, and Kuwait Export crude.
The oil polluted roughly 70–370 km of coastline (depending on the metric used), heavily impacting beaches, rocky shores, aquaculture, and fisheries. OSEI conducted (and extensively documented) a shoreline clean-up and then a test with OSE II was performed on Buncker C oil in a yellow container in connection with the Hebei Spirit spill in early 2008 at Mo Hang Harbor (near the affected area), in cooperation with the Korean Institute of Construction Anticorrosive Technology, local officials, and the South Korean Coast Guard. Key points from OSEI’s photo album and description: Mr. Pedigo of the OSEI Corporation

went to Mo Hang Port South Korea, where a review of the spill was carried out, which led to the decision where to apply OSE II in order to see how effective OSE II is at cleaning - up oil spills on shorelines visually, and would be easier to collect samples as well. It was decided the best place to start was a sandy, small pebble mixture beach where there were several kilometers of oil to clean-up. You can see the OSEI CEO overseeing the application on a long stretch of shoreline. The Coast Guard carried out inspections of the cleaned-up shoreline, where the sandy beach material was picked by hand and squeezed to see if any visual hydrocarbons released, no hydrocarbons were detected. Samples were extracted to verify the Clean-Up met SK standards. Sandy beach shorelines become free of oil after OSE II is applied in a short time. See link below.

An additional demonstration of OSE II on Bunker C oil was requested by the SK Coast Guard, it was carried out in. a yellow container, where OSE II removed 96% of the oil as well. See link for the Clean up on the shoreline and the Bunker C oil test as well. https://www.osei.us/wp-content/uploads/South-Korea-Hebie-Spirit-Clean-complete-pictures-and-captions-XX.pdf

VIII. Philippines Power Company 50,000 liter Oil Spill

Philippines Coast Guard oversight and Philippine TV, shoreline clean up for a crude oil spill with OSE II.
https://www.youtube.com/watch?v=1bh5MgdV09U

IX. Norway, Oslo, Under Ground, Ground Water, And River Clean-Up With OSE II

The Oslo Norway Volvo Service Center Under Ground Storage release of Waste Oil contaminated Soil and Ground Water, As Was the river where the hydrocarbons flowed down Was Remediated With OSE II. Waste oil from a Volvo service center released for several years, until the waste oil was detected on a river approximately 3 feet lower than the Volvo center and approximately 100 meters from the center as well. The river was boomed off in a couple of areas, a suction system was put in trying to draw the oil out of the ground, and after a couple of years of operation, reclaiming very small amounts of oil, it was decided to inject OSE II into the area underground where the waste oil had migrated from the Volvo center to the river. OSE II was applied onto the river where the oil was removed, then the oil was injected to try to break down the oils adhesion properties so it would not stick to the soil and at the same time to lift the oil to the surface of the water and the ground. This was a great success as very little oil was seen migrating to the river, and any oil that was seen was address with OSE II application, this was a difficult clean-up was still successful as well. See link https://www.osei.us/wp-content/uploads/OSLO-NORWAY-VOLVO-TRUCK-CENTER-CLEAN-UP-WITH-OSE-II-10-26-2021.pdf

X. Hudson River New York

AECOM a prominent US Company was tasked with placing piers in the Hudson River to build a structure, where there had been multiple spills for years from various manufacturing plants in the past. When the river sediments become disturbed there is a hydrocarbon sheen that develops and large amounts of oil, fuel, and potentially PCB's would rise to the surface of the water developing a large sheen. OSE II was used applied repeatedly over a two-year period. The estimated spill amount is approximately 10,000 gallons, and OSE II's quick application by spray made it easy to address 100% of the repeated spills, breaking down the hydrocarbon's toxicity in seconds, causing the oil to remain floating, where the adhesion properties were reduced in minutes, the smell was quickly eliminated, and any flammability was eliminated in 5 minutes or less, while the spills were digested by indigenous bacteria to CO2 and water. See link https://www.osei.us/wp-content/uploads/New-York-Hudson-River-OSE-II-Clean-Up.pdf

XI. Persian Arabian Gulf Continuous Clean-Ups From Offshore Platforms

Offshore oil rigs stage OSE II on their platforms, and when there is a spill they immediately apply OSE II, so the spill is detoxified and broken down, which eliminates natural resource damages, and as the spill is caused to float there is never any harm to marine species in the water column, and since OSE II eliminates the adhesion properties in minutes, any birds that may come in contact with the broken down oil, the oil will not adhere to their feathers. The broken down floating oil is then digested to CO2 and water, addressing approximately 100% of the spill and removing it from the environment. https://www.youtube.com/watch?v=CdrY6f3ZzF0

XII. Columbia Arauca, Pipeline Rupture Released Over 40,000 Liters of Crude Oil onto A Stream, And Wetland Area,

OSE II was mixed and applied to the shoreline and open water converting the crude oil to CO2 and water, protecting natural resources, where none were destroyed, and the 4 to 5 kilometer spill area was returned to pre-spill conditions in less than 30 days. See link https://www.youtube.com/watch?v=T4tk8W0UqpQ

XIII. Osage Indian Reservation Spill Where EPA RRT VI requested OSE II to Help with The Clean-Up

The US EPA had tried for an extended time to clean-up a pipeline break release onto a creek, and shoreline on over 94.7 m3 of soil and approximately 1000 meters of water and shoreline. The temperatures at night were below 32F, so this was a cold-water clean-up, where OSE II was applied, and a short time later samples were taken where

OSE II was concerting large percentages of the crude oil to CO2 and water , test reports are included. https://www.osei.us/wp-content/uploads/Oklahoma-Osage-Indian-Reservation-Clean-up-for-US-EPA-RRT-VI-1-XXXXZZ-1.pdf

XIV. BP well blow out in Trinidad and Tobago

The British Petroleum company had a well blow out in Trinidad and Tobago,, with the Interchem company addressing the spill for BP by applying 2 drums of OSE II mixing 55 gallons per drum X 2 equaling 110 gallons of OSE II and mixing the 110 gallons of OSE II with 50 gallons of water per gallon of OSE II producing 5,500 gallons of OSE II and water mixture, then applying 1 gallon of OSE II and water mixture to each of the spilled gallons of crude oil spilled cleaning up 5500 gallons of crude oil in approximately 2 to 3 weeks. See link https://www.osei.us/wp-content/uploads/BP-British-Petroleum-In-Trinidad-and-Tobago-well-blow-out-pictures-with-captions-and-emails-7-14-2004.pdf

XV. Mexico Port of Pichilingue Waste Oil Spill At Sea

Accidental hydrocarbon spill from the shrimp fishing vessel named "200 Millas II," with registration number 0304417235, occurred at approximately 09:15 on July 4,2021, in which approximately 20 liters of burnt oil were spilled into the sea. At 08:10 on July 5, 2021,
Lieutenant Nav. SMAM. L. Ocean. Bruno Mateo Sanchez, aboard the maritime vessel with registration number Marina-20206 of the Second Naval Zone, we set course for the fishing dock at the Port of Pichilingue to verify the facts and possible impact of the hydrocarbon spill in Mexican maritime zones. See link https://www.osei.us/wp-content/uploads/Mexico-oil-Spill-caso-derrame-200-millas-english-signed-off-by-the-Secretary-of-marine-for-Mexico-8-2023-1-1.pdf

XVI. Exxon Valdez Spill OSE II Tested and Used On Homer Alaska Beaches

University of Alaska, Dr, Brown tested OSE II in late 1989 to early 1990 performing 72 test tube tests where OSE II was extremely successful at remediating hydrocarbons in cold temperature, see link https://www.osei.us/wp-content/uploads/dr-brown-and-grok.pdf

Dr. Brown went to work for Exxon and where Dr. Brown and Dr. Steve Hinton were tasked with testing OSE II and the top 20 products in the world on the Exxon Valdez oil, and oiled rocks, where Dr. Brown and Dr. Hinton both reported OSE II was 95% more effective than any other product at remediating the Valdez oil. AI helped the OSEI Corporation retrieve actual test protocols and results from the Exxon Florham Park laboratory see results at this link https://www.osei.us/wp-content/uploads/Exxon-Personnel.pdf
The Homer Alaska's volunteer group performed a bucket test with OSE II cleaning rocks

and pine needles, where after this successful demonstration the Homer group mixed 2 gallons of OSE II with 100 gallons of Alaska ocean water, where this OSE II and water mixture accidently cleaned up and removed 200 gallons of Exxon Valdez crude oil from their beaches permanently, where ADEC personnel Alex Viteri acknowledged this informally for the state of Alaska, see link https://www.osei.us/wp-content/uploads/Homer-and-ChatGPT.pdf

XVI. The Texaco Oil Company Pipeline Rupture filled a small lake in Electra Texas with 5000 Gallons of Crude Oil, And Cleaned It Up With OSE II

The Texaco spill in the small lake was a spill of significance in that it was over 5000 gallons of crude oil. The pictures in the link below show you the step-by-step process OSE II carried out in approximately 20 days, where 100% of the oil was remediated/removed from the lake, with no natural resource damages and no marine species death, nor any adversity to migratory flying species. These pictures show how the oil is caused to lift from marsh grass, and sandy beaches, and float until enhance ed micro-organisms converted 100% of the crude oil to CO2 and water. See link https://www.osei.us/photoalbums/crude-oil-spill-cleanup

XVII. Mexico Port of Lapaz Oil Spill Clean-Up with OSE II After A Vessel Fire Was Extinguished

OSE II used to clean up the port of Lapaz Mexico after a fire was put out but left oil covering most of the ports water's surface. See link https://www.osei.us/wp-content/uploads/Ports-and-Harbors-Emergency-Response-Oil-Spill-Clean-Up-With-OSE-II-From-A-Burning-Vessel-4-1-2024.pdf

Quick Demonstrations on light end, medium and Heavy end oils below

XVIII.

This demonstration of OSE II on a sheen produced from a crude oil leak from Clifton Bay in the Bahamas. The head of Environment was a witness to the demonstration, you can see once OSE II makes contact with the sheen the molecular structure of **the** hydrocarbons they break down and disappear before your eyes. See link https://www.youtube.com/watch?v=G-7ehqGiLDA

XIX. This is a demonstration is in Saudia Arabia near Al Kabar on medium weight crude oil on open water, and sandy shoreline. Skip to 4:53 to the application of OSE II on open water skipping the measuring and mixing of OSE II where you see once the application of the mixed OSE II and water meets the one-to-one application rate the oil is completely broken down detoxified, caused to float, adhesion properties broken down, smell eliminated and flammability is eliminated as well. The floating broken down oil transports to the sandy shoreline and will not adhere to the sand. Once the open water application is finished around 6:45 then skip to 8:43 to see a small fish swim under where the oil has been broken down, and you will see no adverse effects to the fish, keep watching to see the Arabian crude poured onto the sand and OSE II's application, where the oil lifts immediately leaving a clean intertidal zone, where the oil cannot re-adhere to the shoreline. The oil keeps breaking down and completely disappears and floats until completely converted to CO2 and water, no natural resource damages. **https://www.youtube.com/watch?v=_u9alKeWwvI**

XX. UAE Shoreline Demonstration Of OSE II Removing Waste Oil From RIPRAP. The oil is poured onto the ocean water next to rocks, then migrates to the rocks and adheres to the rocks. The pump connected to the water truck where OSE II has been poured into, the initial water that emits from the nozzle is only water and has no effect on the oil. Once the mixed OSE II and water make it to the nozzle you see immediate breakdown of the oil on contact. A hand pump is also used to show how easy OSE II is to apply from different spray sources. See link https://www.youtube.com/watch?v=dCGa5B3GR-4

XXI. Dallas Texas OSE II Being Applied To Waste Oil On A Fresh-Water Creek. The Oil Breaks Down on contact, and will not adhere to the shoreline, will not harm any natural resources, since it is detoxified on contact, 30 second video. See link https://www.youtube.com/watch?v=7UdhBKUCkhE

Test References Efficacy: The tests shown are third party testing.

University Efficacy Testing of OSE II

1. ITOPF requested that OSE-II be tested. University of Seoul, University of Saskatchewan, and Baylor then ran an intertidal gravel-shore mesocosm (tide simulation, 12 faculty departments) using shoreline methods from the ITOPF 2011 manual.

Physical options were hand wipe, flush, and hot-water/high-pressure; biological options were oleophilic fertilizer S200, Tween 80, a microbe mix, and multi-enzyme Oil Spill Eater II, including the combined FMeM treatment (fertilizer + OSE-II + microbes). On the SQT/MAUT scorecard, FMeM (OSE-II) was the best biological treatment: 62% toxicity drop, 346% benthic-invertebrate recovery at day 60 versus 267% and 220% for the next biological mixes, 47% total recovery efficiency at 90 days (highest among biologicals), and the top environmental-performance MAUT score (0.45) because oil came off fast. Untreated controls and Tween 80 / S200 / fertilizer alone lagged; physical removal hit bacteria harder. OSE-II was the best product in that demonstration. The universities also tested and verified OSE II detoxifies oil and even more incredibly **OSE II proved to restore the Benthic layer as well**, great accomplishments. See link https://www.osei.us/wp-content/uploads/Republic-of-Korea-Shoreline-Clean-with-recommendations-from-ITOPF-for-shoreline-clean-ups-2022.pdf

2. University of Alaska Fairbanks, tested OSE II for the Valdez Oil Spill, and in the tests,

on standard laboratory tests, these researchers showed that the marine formulation of OIL SPILL EATER II diluted into artificial seawater containing a consortium of micro-organisms and hydrocarbons from Prince William Sound, Alaska will degrade Hexadecane—300% faster than the same consortium amended with mineral nutrients and hydrocarbons without OIL SPILL EATER II. See Link https://www.osei.us/wp-content/uploads/University-of-Alaska-Salt-Water-Efficacy-Test.pdf **Note** you will see Dr. Browns name associated with Exxon's testing of OSE II at their Florham Park New Jersey lab, where Dr. Brown was hired by Exxon from University of AK Fairbanks.

3. Birla Institute of Technology, Ranchi (BIT Ranchi) is a private technical institute (deemed university) situated at Ranchi, Jharkhand, India: Bioremediation of oily sludge: A case base analysis to sustainable supply chain: Bhaskar Sinha a, Supriyo

Roy b, Kaushik Kumar. OSE II showed great success at remediating oil sludge. https://www.osei.us/wp-content/uploads/1-s2.0-S2666916120300086-main.pdf

4. University of Chile, In a 2015 field trial on Andean and Orinoquía soils spiked with more than 4% crude, University of Viña del Mar researchers found that Oil Spill Eater II (OSE-II) drove petrogenic hydrocarbons down to near-zero levels within about two weeks and produced a general decline in total petroleum hydrocarbons, oils, and greases, while pH moved back toward neutrality after a brief acidification from bacterial activity. They concluded that OSE-II biodegrades spilled oil in place under open-air conditions, cuts cleanup cost versus excavation and shortens response time enough that they recommended it for Coltanques S.A.S. contingency plans. See link https://www.osei.us/wp-content/uploads/Chile-University-testing-and-review-of-OSE-II-1-2016-Informe-Final-2-1.pdf

5. University of Japan, University of Yamanashi testing of **OSE-II** as a bio-stimulant showed benzene in contaminated soil falling from 1.2 ppm before treatment to 0.024 ppm after one week, 0.003 ppm after two weeks, and below 0.001 ppm after three weeks, with TPH also declining over a multi-week course as native microbes multiplied around the oil. The same product was later used in Japan from 2004 to 2013 to treat oil, oil film, odor, and benzene in soil and groundwater at 123 former petrol stations, 20 factory sites, and 8 urban-development sites. https://www.osei.us/wp-content/uploads/University-of-Japan-Bio-Stimulation-by-OSEII-in-JAPAN-K.KACHICo.Ltd-3.pdf

6. Title: **The Effects of Oil Spill Eater II on Oil Degradation, Authors:** Mahdieh Yaghoubi, Ali Haghmoradkhani, Mohammad Rafiee, and Mahsa Jahangiri RadIt appeared as a brief report in the *Journal of Health Reports and Technology*, Volume 7, Issue 1 (January 2021). Researchers mixed seawater with crude oils from several regions, treated the mix with Oil Spill Eater II per the manufacturer's instructions, and measured total petroleum hydrocarbons by GC-MS before and after 7–15 days of aeration. OSE-II removed 59–75.5% of TPH and sharply reduced the initial hydrocarbon peaks, leading the authors to conclude it has high potential for degrading petroleum hydrocarbons in contaminated seawater. See Link https://www.osei.us/wp-content/uploads/magiran-article.pdf

7. At the University of Port Harcourt, researchers mixed 20 kg of Shell crude-impacted soil from K-Dere, Rivers State, with 7 kg of agricultural soil in 14 reactor vessels and compared untreated controls with

treatments that included an enzyme additive identified as OSE-II, SDS surfactant, uric acid, or those three combined, over a 63-day (nine-week) pilot. Treated soils cut total petroleum hydrocarbons by 4–45% after five weeks and 11–64% after nine weeks (best in the OSE-II), while the untreated control showed 0% TPH reduction. See Link https://www.osei.us/wp-content/uploads/University-of-Port-Harcort-Nigeria-study-with-EA-type-OSE-II.pdf

8. The University of Mexico tested OSE-II (sold locally as Bioderra) in agitated freshwater flasks containing 10 ml of either light Olmec or heavy Maya crude, measuring total hydrocarbons by ASTM 5520 at days 0, 7, 15, and 30 against an untreated Maya control. After 30 days OSE-II cut Olmec hydrocarbons by 84.78% and Maya by 54.46%, while the control showed virtually no reduction. See link https://www.osei.us/wp-content/uploads/Mexico-University-of-Mexico-Testing-of-OSE-II.pdf.pdf

9. The Federal University of Rio de Janeiro, Peixoto, Vermelho, and Rosado noted that the U.S. EPA NCP list then included only one pure enzyme additive—Petroleum Spill Eater II, i.e., OSE-II—and summarized the listed performance data for that product. Those figures were a 36.9% drop in alkanes and 33.6% drop in aromatics after 7 days, rising to 89.8% and 89.6% reductions, respectively, 28 days after application. See Link https://www.osei.us/wp-content/uploads/University-of-Rio-De-Janeiro-study-on-Enzyme-and-lists-OSE-II-5-2011-475193-XXXX.pdf

10. Texas A&M, working for the Texas General Land Office, ran EPA/NETAC-protocol saltwater tests on 13 NCP-listed bioremediation products and coded OSE-II as Product 10, tracking oil and grease, aliphatic and aromatic fractions, and hydrocarbon-degrader counts over about 28 days. After a short lag, OSE-II posted the steepest oil-removal rate of the set (ln-concentration slope –0.0186 versus –0.0056 for nutrient-only and –0.0013 for the untreated control), cut the aliphatic fraction from 100% to 46% (about a 54% loss versus a 34% average), and led the field on polar-aromatic/PAH decline. It also grew the largest degrader population, about 10^7.5 versus roughly 10^5 for a product considered merely acceptable. OSE II remediated the highest level of hydrocarbons of the 13 bioremediation products tested. See Link https://www.osei.us/wp-content/uploads/TAMU-SaltWaterEfficacyTest.pdf

11. **Antarctica, University of Buenos Aires researchers working with the Argentine Antarctic Institute applied OSE-II on hydrocarbon-contaminated soil at Jubany Station** during the 2006–07 austral summer, comparing it with inorganic salts, fish meal plus a Brij surfactant, and an untreated control.

Laboratory TPH samples were lost when the icebreaker Almirante Irízar burned, but field counts showed OSE-II raised total aerobic bacteria and hydrocarbon-degrading bacteria by about one order of magnitude over the control—matching or beating the other nutrient treatments—while observers noted a change in fuel composition and rapid loss of fuel odor in the cold. See link https://www.osei.us/wp-content/uploads/Antarctica-OSE-II-use-and-testing-1.pdf

12. **The Iran Transformer Research Institute** with Besco present (the minutes call the approach biological destruction of Askarel/PCB and later OSE II "adding enzyme"). Trial 1 (25 Ordibehesht 1389 / 15 May 2010) used 300 ml of oil at 436 ppm PCB, 25 °C, 300 ml of water-diluted microbes in a 1 L flask, magnetic mixing for about a week, then weekly/monthly Dexill 2000 (method 1262 oil) checks that showed a gradual drop. Trial 2 (4 Mordad 1389 / 26 July 2010) used much dirtier oil (2,962 ppm PCB) at 33 °C, 150 ml city water plus ~100 ml ethyl lactate, a 2–3-minute mix, then OSE II enzyme added; again, the minutes state PCB decreased by the end of the run. See link Farsee https://www.osei.us/wp-content/uploads/Iran-PCB-transformer-company-test.pdf and English see link https://www.osei.us/wp-content/uploads/Iran-Transformer-Research-Institute-translated-English.pdf

Government Efficacy Testing Including US EPA

1. OSE-II was run in the U.S. EPA/NETAC protocol developed to evaluate products for the NCP list; Steven Pedigo of OSEI sat in the Pittsburgh Hilton working sessions that produced that protocol, and the first two tests came out of that joint work. In the 21-day Tier II shaker-flask efficacy test on Alaskan crude, OSE-II showed a 98% reduction in total aromatics versus the control, with large cuts in the listed aliphatic markers as well (including 77% for total n-paraffins on the Lab A table). The oil-and-seawater control showed essentially no TPH change over the same period. This means the US EPA knew by the end of 1992 OSE II was an effective means to permanently remove oil from the environment at a high rate. See link

2. The Second Set Of EPA/NETAC run was a tighter closed shaker-flask comparison of total aromatics at days 0, 7, and 28 among a no-nutrient control, Venosa's nutrient control, and OSE-II, with ANOVA used to test whether the product beat both controls. Starting near 8,000 ppm, OSE-II averaged about 6,530 ppm at day 7 and 3,658 ppm at day 28, while the untreated control stayed near the start and the nutrient control showed only a small drop—so OSE-II removed more oil in seven days than the nutrient control did in twenty-eight. See link https://www.osei.us/wp-content/uploads/government-test-2.pdf

3. When US EPA required products to retest for the NCP schedule and raised the remediation percent removal from 5% to 85% for Alkanes a massive jump, Bio-Aquatic Testing administered the protocol and LSU ran the GC/MS on EPA-supplied oil. That listing package is the one posted with OSE-II's technical data: 89.8% alkane reduction, 89.6% aromatic reduction, and 85.4% gravimetric oil removal (inside the ±5% variance band). The lab report confirms statistically significant Day-28 cuts in both alkane and aromatic fractions versus the controls, matching those published NCP figures. This means the EPA knew there was a product that could permanently remove massive amounts of oil, much greater than mechanical skimmers, and dispersants in 2009 OSE II. See link https://www.osei.us/wp-content/uploads/government-test-4.pdf

4. BP's Bio Chem Strike Team, led by Dr. Tsao after Deepwater Horizon, ran this NCP-style closed lab test at LSU on Bay Jimmy Louisiana sweet crude that still carried Corexit 9500 from the field

response; the team included BP, LSU, LDEQ, the U.S. Coast Guard, California OSPR, SCAT, and spill consultants, with EPA and NOAA advising. OSE-II was applied at OSEI's normal mix rate and cut alkanes about 80% and PAHs about 79–80% by the end of the run, even after extra PAHs appeared in the week-two vials. Tsao noted the oil was Corexit-contaminated; the test is the fifth of the EPA/NCP-protocol series cited above. Another great test with OSE II. See link https://www.osei.us/wp-content/uploads/government-test-5.pdf

5. EPA's respirometry protocol—written by Dr. Al Venosa, who also supplied the test oil—measures alkane and aromatic loss together with oxygen uptake, CO2 production, and microbial activity so percent reduction can be checked against actual respiration. A third-party litigation laboratory (Chemical Analysis, Irving, Texas) ran that method on OSE-II: oil fell 870 ppm in 30 days, versus 157–158 ppm for the two NETAC products used as the comparison, and EPA later recorded OSE-II as the highest 21-day oxygen uptake among the nine products in the agency respirometry set. See link https://www.osei.us/wp-content/uploads/government-test-6.pdf

6. The EPA regional response team (RRT) tested OSEII in eight aquariums where the US EPA RRT VII tested Oil Spill Eater II (OSE II) on a very heavy in emulsion, viscous waste oil utilizing freshwater from two different sources: the Missouri River and the Bue Springs Lake. Heavy oil such as this generally forms a heavy emulsion and is difficult to break down based on its normal properties. The OSE II aquariums showed a large reduction of the waste oil – 72.5% reduction on average in the Diesel Range Organics (DRO) and the Oil Range Organics (ORO) showed an average reduction of 73.5%. One aquarium showed a reduction just over 60%; however, there was a large spike for the last samples. Usually anomalies such as this are not considered. This was a great test where the EPA themselves proved OSE II remediates Heavy In Emulsion OIL. See link https://www.osei.us/pdf%20files/RRT%20plus%20testing.pdf

7. In the Interior/BOEMRE dielectric-oil demonstration (LSU plus Ohmsett), OSE-II was the response tool that worked. It biodegraded more than 67% of the insulating oil in 28 days, while Corexit 9500 and 9527A weakened as temperature dropped and only scattered oil into the water, and mechanical skimming recovered only a small fraction of the spill (about 2–8% in the OSEI summary of the same study). On that three-way comparison—disperse, skim, or remediate—OSE-II was the best performer because it was the one that reduced the oil. The DOI and the US EPA knew of this comparison test the DOI had carried out in 2011 and knew there was a better response to oil spills than Corexit Dispersants and skimmers. See link https://www.osei.us/wp-content/uploads/OSEI-SUmmary-of-Dept-of-Interior.pdf

8. Zhu, Venosa, and Suidan's 2004 EPA literature review (EPA/600/R-04/075) lists OSE-II on the NCP schedule as a nutrient/enzyme additive and is the peer-reviewed government survey of commercial bioremediation agents for oiled estuaries. It reports the Marine Corps California vadose-zone work: after OSE-II was injected, in-situ O2/CO2 showed a sharp rise in respiration—especially at 30 ft—above the uncontaminated product-control, consistent with faster microbial activity on fuel hydrocarbons. On the U.S. government efficacy tests that sit with that review on OSEI's government-tests page, OSE-II is the product that posted the strongest performance. See link https://www.osei.us/pdf%20files/EPA%20peer%20review%20of%20OSE%20II.pdf

9. EPA RRT VI and its contractor met OSEI at the Osage reservation near Bartlesville after a pipeline broke over a waterway and oiled about 94.7 m³ of shoreline plus pockets of water. OSE-II was mixed 50:1 with fresh water and sprayed at medium pressure on rock, soil, marsh grass, and water; even in the cold it stripped adhesion so oil ran off the rocks and floated instead of sinking. OSEI pulled chain-of-custody samples on four dates, EPA RRT VI took the last round, the site received a closure letter, and Region VI approved OSE-II for that navigable-water cleanup. See link https://www.osei.us/wp-content/uploads/Oklahoma-Osage-Indian-Reservation-Clean-up-for-US-EPA-RRT-VI-1-XXXXZZ-1.pdf

10. At Point Loma, Steve Fry of the Navy Fuel Farm used OSE-II for about 3½ years on 200–350 fuel and oil spills in San Diego Bay (about 100 in year one). He said the OSE II product treated **the whole spill**, not the leftover fraction mechanical methods leave, and cut cleanup cost **more than 87%**, with sheen gone after application and no reported harm to bay wildlife. Safety rested on NEHC's review and EPA/NETAC LC50s of **>2,000–6,500 ppm** (virtually non-toxic is **>100 ppm**). This is a huge amount of continuous operational use of OSE II for years, and the US EPA, NOAA and the Coast Guard obviously knew about this remarkable use, and safety OSE II produced!

Witnesses to that use and to Fry's statements were:

- **Steve Fry** — Navy Point Loma Fuel Farm
- **Elaine Davies** — EPA Headquarters (Washington, D.C.)
- **Jim Makris** — EPA CEPPO / NRT

- **William “Nick” Nichols** — EPA Oil Program
-
- **EPA Region IX** staff
- **NOAA**
- **Yvonne Adasi-California Department of Fish and Game / OSPR**
- **U.S. Coast Guard**, Marine Safety Office San Diego

See Link https://www.osei.us/wp-content/uploads/OSE-II-used-on-over-200-350-spills-by-The-US-NAVY-Point-Loma-Fuel-Farm-San-diego-Bay-California-.pdf

MILITARY Efficacy TESTS of OSE II

1. It is very difficult to get reports or tests from the military cleanups that have been carried out with OSE-II; the OSEI Corporation has still managed to obtain some. OSE-II has been used by all five U.S. service branches since 1989 and has been listed by Defense Logistics since 1992 under CAGE 0T391, with NSN 6850-01-367-8457 for the 55-gallon drum and NSN 6850-01-399-1384 for the case of two 2½-gallon containers. Navy/Defense listings

(Norfolk NEHC review, Denix Book 18 / Abstract 14, and the AeroBase Marines–Navy–Army entry) record that procurement as sole source because of OSE-II's specifications. OSEI sells from time to time to 195 of 202 bases worldwide; the reports it has secured include Point Loma, Key West, Norfolk, 29 Palms, NAS Dallas, Scott AFB, the Fort Worth joint-reserve PCB cleanup, the Coast Guard Macondo review, and others. See link https://www.osei.us/department-of-defense

2. The Navy Point Loma Fuel Farm Clean-ups was a military action verified by the EPA, NOAA State of California, Coast Guard ect. At Point Loma, Steve Fry of the Navy Fuel Farm used OSE-II for about 3½ years **on 200–350 fuel and oil spills in San Diego Bay (about 100 in year one).** He said the OSE II product treated **the whole spill**, not the leftover fraction mechanical methods leave, and cut cleanup cost **more than 87%**, with sheen gone after application and no reported harm to bay wildlife. Safety rested on NEHC's review and EPA/NETAC LC50s of **>2,000–6,500 ppm** (virtually non-toxic is **>100 ppm**). This is a huge amount of continuous operational use of OSE II for years, and the US EPA, NOAA and the Coast Guard obviously knew about this remarkable use, and safety OSE II produced!
Witnesses to that use and to Fry's statements were:

- **Steve Fry** — Navy Point Loma Fuel Farm
- **Debra Dietrich** — EPA Headquarters (Washington, D.C.)
- **William "Nick" Nichols** — EPA Oil Program
- **EPA Region IX** Bill Roberson
- **NOAA** Ms. Heather Parker Hall (NOAA-RRT)
- **Yvonne Adasi-California Department of Fish and Game / OSPRU.S. Coast Guard**, Marine Safety Office San Diego LTJG Cris Leee (MSO-SD) ENS Adam Birst (MSO-SD)

See Link https://www.osei.us/wp-content/uploads/OSE-II-used-on-over-200-350-spills-by-The-US-NAVY-Point-Loma-Fuel-Farm-San-diego-Bay-California-.pdf

3. The Navy tested and used OSE-II at NRL Key West as a deck and dock cleaner and as an in-place treatment for fuel, lubricant, and bilge films so the wash did not have to be shipped off as hazardous waste. NRL reported the product converted those hydrocarbons to CO_2 and water and stripped oil's stickiness so it would not grab docks, shoreline, or seafloor. Key West sits on some of the most sensitive coral reefs in North America; the Navy applied OSE-II to surface-water spills on the ocean side of the base, in seawater next to that reef tract and near marine mammals, without the toxic effects associated with solvent cleaners. That Key West work fed the Navy DENIX listing later used at Point Loma and Norfolk. See Link https://www.osei.us/wp-content/uploads/OSE-II-tested-and-used-by-the-Navy-in-Key-West-Florida.pdf

4. The Navy Environmental Health Center in Norfolk, with Jerry Drewer on the review, ran a Level III Health-Hazard Assessment on OSE-II: full 100% formula with CAS numbers, no carcinogens or mutagens, no acute inhalation, skin-burn, or permanent-eye hazard under OSHA HazCom. NEHC cleared it for enclosed shipboard spaces and open docks in ordinary work clothing—no multi-layer hazmat suits or supplied-air respirators—and found it thermally stable to 128°F, so it does not break down or off-gas on hot engine decks, steaming bilge, or tropical tarmac. Physical and operating attributes in that package: viscosity 1.30 cps at 72°F (eductors, spray nozzles, fire-hose induction), aqueous and non-flammable (flash/pour point N/A), peak activity at pH 7.0 and 72°F, working range pH 3.5–8.0 (up to 11.7 in industrial wash) and 28–128°F, and salinity from drinking water to full seawater limited only by whether native bacteria can live there. OSE II used in the Norfolk surrounding sea water spills. The same Norfolk file cites the EPA 28-day GC-MS figures of 89.8% alkanes and 89.6% aromatics and ties the product to the 1992 Defense Logistics sole-source listing (CAGE 0T391, NSN 6850-01-367-8457 55-gallon drum and 6850-01-399-1384 two 2½-gallon containers) used through DENIX. See link https://www.osei.us/wp-content/uploads/OSE-II-tested-and-utilized-by-the-Navy-In-Norfolk-Virginia.pdf

5. The U.S. Coast Guard Research and Development Center reviewed OSEI's White Paper on OSE-II for the BP Deepwater Horizon spill under BAA HSCG32-10-R-R00019 (tracking #2003954) and, on 10 July 2010, wrote that the submission had potential benefit to the response. The Center forwarded that package to the BP Deepwater Horizon FOSC for

action, which put OSE-II in front of BP as the responsible party—a Coast Guard screening of OSE-II's test information for the Macondo spill suggesting OSE II's use. See link https://www.osei.us/wp-content/uploads/CoastGuard_BP_Macondo_Spill.pdf

6. Marines at MCAGCC Twentynine Palms, California, ran OSE-II on aged petroleum soil from oil/water separators and tank wash outs—

OSEI's summary is 89 cubic yards of diesel-contaminated soil (the IR memo says about 69 yd^3 on the lined pad)—using 40 gallons of OSE-II in 2,000 gallons of pond water. Composite TPH started at 3,986 ppm (EPA 8015 modified) and after four weeks, with no discing and no extra water in desert heat, fell to 600 ppm, under the 1,000 ppm acceptance level. OSE II even remediated the tetra ethyl lead. The Installation Restoration memo of 15 October 1993 records that demonstration and plans further piles on OWS, JP-5, and diesel/tank-wash soils; the cleanup is the one OSEI cites as winning the Marines a Department of Defense Environmental award, with California's standard met on that TPH drop. See link https://www.osei.us/wp-content/uploads/29-Palms.pdf

7. Air Force Base Conversion Agency at Fort Worth (joint reserve / Navy transfer of the PCB storage building) had a 4 ft × 6 ft hydrocarbon stain under a transformer.

TNRCC required swipe testing; after a denatured-alcohol attempt, PCBs were 120 µg/ft^2—almost three times higher than the first swipe and above 40 CFR Part 761.125 and TNRCC Chapter 335.551. Local firms bid $5,000 and up. A Navy contact supplied a half gallon of OSE-II; the base mixed it with one gallon of water, applied that mix to the concrete, and kept the treated stain moist for two weeks. The third swipe was 8.2 µg/ft^2, under both federal and Texas limits, the building could transfer, and Engineering Technician Elliot Smith's 11 September 1996 letter documented the drop, the $5,000-plus savings, attached lab reports, and his recommendation of OSE-II. See link https://www.osei.us/wp-content/uploads/Department-of-Air-Force-Power-Plant-Clean-Up.pdf

8. On 18 January 1995 heavy rain overflowed 2,000 gallons of JP-4, JP-8, and motor oil behind Building #193 at Dallas Naval Air Station;

the oil left the oil/water separator area through a drain and onto the adjacent private golf course. NAS (Naval Air Station) started OSE-II on 19 January at 50:1 with handheld sprayers and, over the following weeks, applied 40 gallons of concentrate and 2,000 gallons of water. No baseline TPH was taken; final soils were collected 29 August 1995 at four points (S-9-1 edge of drain, top 4"; S-9-2 1–2 ft in a drainage depression; S-9-3 surface to 2 ft on the hill; S-9-4

surface to 1.5" in the wet drain) and run EPA 8020A/5030 BTEX and 418.1/3550 TPH. Reported results: BTEX <2 µg/kg on each analyte and TPH 43 ppm (S-9-1) and 96 ppm (S-9-2)—all under the Texas 100 ppm soil limit—and the treated turf came back lush green. See link https://www.osei.us/wp-content/uploads/Dallas-Naval-Air-Station.pdf

9. Scott Air Force Base was paving when the bitumen tack coat was already down across the whole pad and asphalt had been laid on about one-third of it. Rain started at 11:30 a.m., crews stopped, and the storm ran all night into a 100-year flood that lifted manhole covers and floated uncured asphalt and bitumen off the pad onto grass, pavement, and the storm system. Rather than scrape live turf or dig the ditches, the base overnighted OSE-II and started spraying as soon as the drums arrived, mixing and applying it to every redeposited smear they could reach. OSE-II broke the adhesion, so the bitumen and asphalt released from grass and ditch banks instead of staying baked into the soil; turf was left in place, and the oil was no longer coating the drainage. Follow-up sampling on those ditches came back non-detect for hydrocarbons. That flood response is the Scott AFB job OSEI files with its other military soil cleanups. See link https://www.osei.us/military-tests

10. CDR Lawrence M. Brennan, Jr., Environmental Officer at the large Reserve NAS (Dallas), wrote George Lively on 24 August 1994 that OSE-II was the product his shop used to stay in environmental compliance on the constant small JP-5, hydraulic-fluid, and lubricant spills from aircraft maintenance and housekeeping—jobs that had to be fast, cheap, and keep oil out of the drains. On ramp hydraulics, OSE-II took the oily feel off in about an hour and the wash evaporated; on a contractor diesel spill in the rain they boomed the storm outfalls, sprayed OSE-II, then padded and vacuumed, and drain TPH was only slight traces. After a fighter-jet crash dumped burning fuel into a holding pond they sprayed the tank and banks; the next day nothing visible remained, and of 19 BTEX/TPH water samples half were non-detect and the rest only negligible traces. Brennan said his staff were skeptical at the first demo, then used OSE-II as the routine response tool. See link https://www.osei.us/military-tests

MAJOR OIL COMPANY/CONTRACTOR TESTS and USE of OSE II

1. U.S. Coast Guard four-star Commandant Paul Yost ordered Exxon to test OSE-II on Valdez oil.

OSE-II was invented in summer 1989 for that spill. In September 1989 Homer volunteers used it on Valdez oil: on **10 September** Bill Day put **8 ounces** of OSE-II with **2 gallons** of seawater and **1 gallon** of tar balls and oiled sticks; by **17 September** there was no sheen. On **18–19 September** they mixed **2 gallons of OSE-II concentrate with about 100 gallons of Alaskan seawater** pending ADEC approval—that is the standard **50:1** mix, about **102 gallons** of solution, enough at **1 gallon of mix per 1 gallon of oil** to treat about **102 gallons of oil** (**200 gallons of already-mixed** OSE-II and water would treat about **200 gallons of oil**). A rock washer knocked that mix onto the intertidal beach. By **20–21 September** the treated beach was free of detectable surface and subsurface oil and sheen, with no apparent side effects. On **22 September** the group said it would ask ADEC to fund more beach work. **ADEC's Alex Viteri informally recognized that OSE-II success**—significant even though ADEC never issued formal funding.

That fall Dr. Ed Brown at UAF ran **72** saltwater tubes and saw **near-complete degradation**. Under Yost's order, Exxon tested OSE-II at Florham Park on **4–5 January 1990** (Hinton): 400 g Prudhoe crude on rocks, OSE-II at **50:1** in seawater—**100%** off the rocks in six hours, **more than 90%** toward CO_2 and water. In Exxon's winter 1990 **21-product** cold-water lab screen, **OSE-II was best, by 95%**—Brown told Pedigo it was **95% better than any other product tested**. Inipol was the named comparison (under **12%** in 28 days) and Exxon put Inipol on **one test area**, not the whole shoreline. The Valdez record for OSE-II is Homer field use (with ADEC's informal recognition), Brown's UAF tubes, and Exxon's Florham Park flask work plus the 21-product lab ranking. OSE II was successful in all the tests, and in its use cleaning up a large area of the Homer AK Beaches. See links https://www.osei.us/wp-content/uploads/Exxon-Personnel.pdf and https://www.osei.us/wp-content/uploads/dr-brown-and-grok.pdf and https://www.osei.us/wp-content/uploads/Homer-and-ChatGPT.pdf

2. Schlumberger's Denton field office (which has moved now) stored oily process water up to three months, then paid a licensed hauler to take it away. On 7 December 2016 they put just over 150 gallons of that wastewater in a small tank, applied 1.5 gallons of OSE-II mixed with 150 gallons of fresh water, and ran recirculation plus aeration.

The odor was gone in **12 hours**. Pace Analytical (TCEQ 1005) measured untreated water at **22.6 mg/L** total TPH (C6–C35). Treated water was **non-detect** on all TPH fractions. Schlumberger reported that result within **seven days**, with VOCs, PAHs, and alkanes ND.

The treated water is **reused**. Schlumberger is not making a second waste stream and not paying to haul the old one. Store-and-haul is replaced by OSE II-and-use: cheaper, no lingering tank odor, no off-site disposal of that batch. Pedigo, Spencer Smith, and Jim Lager (Pirtek) wrote it up as a tank protocol other SLB yards can copy. This use of OSE II led to SLB using OSE II in their wash bays, that flowed into was bay drains, (that always smelled before OSE II) the drains then run to 3, 20,000-gallon tanks.
OSE II is used to wash down the high-pressure trucks used for fracking, which were cleaned of crude oil, fracking chemicals, and drilling chemicals, the cleaned pressure truck effluent then flowed into the drains where OSE II also cleaned the drains and mobilized any hydrocarbons, or hydrocarbon based chemicals, that flowed to the 3, 20,000 gallon storage tanks. Where aeration and circulation were added, and OSE II was applied. The water was remediated and hydrocarbon's/hydrocarbon-based chemicals were remediated, and the water is reused.

This saved SLB allot of money on water alone, but, since the storage tanks are not drained quarterly, this means no hazardous chemical haul off, and most importantly no shut down of the field office for 3 days, which was estimated to cost approximately 200,000.00$ US, and no haul off cost of 30 to 40,000.00$ US. This created huge savings in operations cost by merely switching to OSE II, where there are now numerous companies using OSE II for this same process. See Link https://www.osei.us/wp-content/uploads/Texas-Denton-Schlumberger-12-16-16-Report-on-waste-water-clean-up-XXXX-7.pdf

3. At Schlumberger's Denton, Texas yard, Frank Hoelzeman wanted a cleanup he could defend in an internal SLB audit or a regulator visit. William Hayes and crew, with Spencer Smith of OSEI, therefore made a real spill on loose gravel/soil: about **one quart (liter) of used diesel, and motor oil**—a hard oil because of additives and Teflon. On **23 May 2018** they pulled the first sample on ice to Pace Labs in Allen under chain of custody, then sprayed **4 ounces of OSE-II** from a backpack and **32 ounces of water** from a second sprayer (normally the two are premixed). Water was kept on the plot after that.

Pace results: **791,000 ppm TPH** at the start, **7,450 ppm** on 31 May, **5,000 ppm** on 11 June, **1,740 ppm** on 28 June. That is **more than a 99% TPH cut in about 30 days**, from a starting load far above the 150,000 ppm range OSEI flagged as severe. Composite samples were taken at depth on each date. OSEI calculated the last stretch was dropping about **272 ppm per day**, so non-detect was only a few more days if they kept watering. The treated soil stayed on site; there was no haul-off of the waste oil. That is the audit file Hoelzeman asked for: used motor oil on SLB ground, third-party TPH, and a documented drop from **791,000 to 1,740 ppm**. See link https://www.osei.us/wp-content/uploads/Schlumberger-Summary-and-Test-results-from-the-application-of-OSE-II-on-heavy-motor-oil-starting-TPH-791000-ppm-plus.pdf

4. Halliburton's Baroid lab in Colombia (iFacts 2016909, 9 July 2015) tested OSE-II on Campo Guando crude in 8.4 lb/gal sodium-formate completion brine with NOBLOK 0.5% v/v and glutaraldehyde 0.5 lpb—the dirty returns from workover and well test that are usually evaporated or drowned in fresh water. Jorge Marín requested it; Yinneth Alvarado ran it; Nubia Ramirez reviewed; Miguel Gonzalez's TEM-COL-HAL-BAR-LAB team owns the method. They sprayed OSE-II on the surface of an open tank analog at 0.1 / 0.5 / 1.0 / 1.5% v/v oil using 0.8 / 1.25 / 1.4 / 1.45 ml of product; at 1% and 1.5% the heavy emulsion broke immediately, oil moved to the walls and stayed up, and extra product after saturation did nothing more. Spray beat pouring into the mix; thicker crude encapsulated cleaner. The lab wrote "dispersion," but the oil did not sink—in this report that word means molecular breakdown—and the point of the work was to reuse the expensive brine instead of treating it as waste. OSE II proved effective to be able to reuse the expensive brine. See link https://www.osei.us/wp-content/uploads/Haliburton-Colombia.pdf

5. Baker Hughes in Kuwait used two steps because they wanted the free-phase oil back as a usable resource. The **vertical cuttings dryer** only pulled that recoverable oil off the cuttings. What was left on the solids is what would otherwise go to **expensive land disposal**.

OSE-II was applied to that residual oil with water and oxygen. The demonstration chart shows that residual TPH falling from about **45,000 ppm** to below **5,000 ppm**. That is the cleanup that keeps the cuttings from being hauled off as oily waste.

Using a dryer first does not mean OSE-II could not have treated the whole stream. It means Baker Hughes chose to **separate and reuse** free oil, then used OSE-II to finish the residual so they would not pay landfill rates on the solids. On that residual job, OSE-II did the work. See link https://www.osei.us/wp-content/uploads/Baker-Hughes-Kuwait.pdf

6. Tremco Refinery in Corsicana / Waxahachie, Texas, put OSE-II on process effluent loaded with drilling and frac chemicals at 438,800 ppm TPH (C6–C35)—an extreme, highly toxic hydrocarbon load, not a light sheen. The approved tote protocol used 150 gallons of that waste in a 330-gallon tote, 3 gallons of OSE-II mixed 50:1 with 150 gallons of fresh water, and 24/7 circulation and aeration. Pace Analytical (sample in on 24 June 2022) measured 11,300 ppm after 42 days: 427,500 ppm gone, a 97.4% reduction, about 10,417 ppm per day, with a heavy bloom of native bacteria and the liquor going from black to burnt orange. A product that can take

frack-and-drill wastewater at nearly 440,000 ppm and cut it by 97.4% in six weeks, on site, without hauling the waste off, has to work at a level most cleaners never see. Tremco managers were satisfied with the results and decided to use OSE-II; they had already seen a similar cleanup on similar chemicals for Schlumberger, so they did not require any further testing—they were convinced OSE-II works and that it had worked better than anything they had ever tried. See link https://www.osei.us/wp-content/uploads/Texas-Waxahachhe-Tremco-Refinery-Clean-up-with-test-results-and-protocol-erged.pdf

7. Ingevity's Crossett, Arkansas refinery (petrochemical process water; Rebecca on spills and water, with Daryl Bladt and Everett Kelley) first used OSE-II on soil and ditches that drained toward streams, then asked for a 330-gallon tote protocol with circulation and aeration after that soil work succeeded. Pace Analytical on the process-water test measured untreated effluent at 435,000 mg/L TPH and the OSE-II-treated sample at 5,100 mg/L (a later check 5,000 mg/L)—about 98.8% reduction on an extreme load. The plant's own treatment was missing release limits; OSEI recommended 5 gallons of OSE-II per day into the tanks with air and mixing, and Ingevity reported they were adding 2 gallons twice a day and that it was working. That let them handle the waste stream on site, keep effluent from harming water off the property, and stop hauling effluent waste off—same reuse logic as Tremco and Schlumberger, on another near-440,000 ppm hydrocarbon water. See link https://www.osei.us/wp-content/uploads/Arkansas-Ingevity-Refinery-Clean-up-of-Process-Water.pdf

8. A major oil company in Australia handed its operations sludge to OSEI's distributor CMTA International, whose yard sat 500 to 700 meters across the road from the company's offices, so employees could walk over weekly and observe the aquarium demonstration. Start TPH was extreme: 360,000 and 340,000 mg/L. OSE-II was mixed 50:1 (2%) with natural water and applied 1:1 to the sludge. At 22 days TPH was 16,000 and 17,000 mg/L—about 95% off. At 55 days it was 1,400 and 1,300 mg/L—more than 99% reduction. The company decided to put OSE-II into its system and treat sludge on site instead of loading it on hazardous-waste trucks for a haul of hundreds of miles. That is a near-350,000 mg/L sludge brought under 1,500 mg/L in under two months, with the customer's own people observing it every week. See link https://www.osei.us/wp-content/uploads/Australia-Sludge-demonstration-for-a-major-oil-company-summary-lab-tests-and-protoocol.pdf

9. At Chevron's Tacoma, Washington bulk-fuel terminal, OSE-II was used on aged, oiled soil—one plot labeled 60-year oiled soil, the other 90-year oiled soil at the terminal (Sept–Nov 1990). Sound Analytical Services in Tacoma measured TPH: the 60-year soil went from 1,800 ppm to 10 ppm (99.4%), which is essentially cleaned; the 90-year terminal soil went from 9,300 ppm to 2,600 ppm (about 72%) in the same window. That in-place remediation—near-background on the 60-year dirt and a large cut on decades-old terminal oil, without hauling the soil off—is what OSE-II accomplished, and it is why Chevron chose OSE-II for the project. See link https://www.osei.us/wp-content/uploads/tacoma-clean-up-with-photos.pdf

10. OSEI ran a freshwater test on Chevron crude for a client (sample labeled Sherman, TX) at NET Gulf Coast / National Environmental Testing in Dallas, method EPA 418.1. Oil on water started at 95,200 ppm TPH on 18 January 1991; twelve days after OSE-II the treated sample was 7,720 ppm; on 12 February 1991 (24 days) it was 690 ppm—99.3% reduction. That short flask/water test was to show the client OSE-II would take their site's crude down, and it did, from nearly 100,000 ppm to under 700 ppm in 24 days on fresh water. See link https://www.osei.us/wp-content/uploads/Chevron-Crude-oil-Test-with-fresh-water.pdf

11. The numbers give Shell and regulators a clean, operator-run record that OSE-II works on Ogoniland and Shell's other area spills. Shell itself mixed and applied the product on 5 November 2012, sampled the windrow through 27 November, and sent the soils to the lab. In 21 days TPH fell 95.4% on the top of the row (to 532 mg/L, about 551 mg/L per day) and 97.55% on the bottom (to 469 mg/L, about 911 mg/L per day). PAHs—the persistent toxic fraction regulators watch—fell 99.8%, from 40 and 46.09 mg/L to 0.08 and 0.09 mg/L. Those curves point to non-detect on the next day of the same rate. That first-party Shell field demonstration, with TPH and PAH both driven down hard, shows OSE-II as an effective in-place cleanup for Ogoniland and Shell's other Nigerian area spills. See link https://www.osei.us/wp content/uploads/Nigeria_Shell_testing_OSEII_on_Ogoniland_soil_Nov5-27-2012.pdf

12. Greencor Ambiente Sustentable in Argentina (Mario Izaguirre, Juan Carlos Oller; Catriel field, UTE Petróleos Sudamericanos–Necon) tested OSE-II on heavy tank-bottom oil loaded with paraffins and asphaltenes: 95,700 ppm total TPH, of which 85,000 ppm was that heavy fraction (INGELAB / INDUSLAB). They mixed OSE-II 50:1 and applied it 1:1 with natural water in a metal tray (10 January–8 February 2013), turning and keeping moisture for 28 days. Visible change started by day 4–5; at day 28 Greencor reported 99.21% hydrocarbon removal. That tray test is what Greencor used to gain approval for OSE-II in Argentina. See link https://www.osei.us/wp-content/uploads/ArgentinaGreencorheavyoilTank-201302.pdf

13. In June 2016 a Petroperú pipeline broke at Km 213 **in the Amazon and released about** 2,000 barrels **of heavy** Pacific crude (API gravity 8). The line was fixed and the spill contained. Crews dug about **1,000 m³** of oiled soil, bagged it, and staged it.

A pit was dug and lined with plastic. The bags were opened and the soil dumped into that lined pit. Water from a source **450–600 feet** from the pit was mixed with **OSE-II** and applied to the soil. The mix was **stirred twice a week** and **aerated**. Petroperú engineer **Constantino Arcaya** and Hazsolve's **Daniel Cross** ran that work.

On **1 November 2016** six samples came out of the treated pit under chain of custody from Station 5 toward the Lima lab. At **day 30** almost no crude was left on the water and oil would not stick to boots. Soil TPH fell **97.2%** and finished **below Peru's ECA Suelos** standard (Ministry of Energy and Mines, Hydrocarbons Directorate).

Those are **great results for OSE-II**: extra-heavy API-8 crude, Amazon dirt, site water only, one month, **97.2%** TPH drop and a close under the national soil limit. For Petroperú and Peruvian regulators that file shows Amazon pipeline soil can be treated in place and meet ECA Suelos without hauling the jungle dirt out of the basin. See link https://www.osei.us/wp-content/uploads/Peru.pdf

END USER EFFICACY TESTS

1. OSE II now has a PFAS file and working on a volume job: two Australian government-media trials plus a 1991 Anchorage halogenated-soil cleanup sit behind a contract being finalized for 78,000 m³ of PFAS-contaminated soil. **The method is the same stack used on oil, PCBs, and dichlorobenzene—mix OSE II with site water, dose to the load, keep moisture and air, turn or circulate.** Key Bank, Anchorage, 1991: DCB isomers to non-detect, TPH 7,500 to 1,890 ppm in under 30 days. 2024 soil trial (Hibbs, EPA 1633): required standard met, PFOA about 74 percent down, PFBS about 80 percent, microbes still 10^7 cfu/g. 2025 water trial (Eurofins): PFOA/PFOS/PFHxS at or below 0.01 µg/L at day 7. PFAS is hard because of the C–F bond. OSE II's path is to partition the molecule, oxidize the halogen, then let indigenous bacteria finish the matrix. Those tests were the last small-scale step. At 78,000 m³ the only open question is field mixing and moisture—not whether a halogenated contaminant can come off soil. See link https://www.osei.us/wp-content/uploads/PFAS.pdf

2. GAF Industries in Savannah, Georgia had a roughly 10-year site load of Venezuelan crude, No. 6 fuel oil, and diesel used in roofing tar — about 85 percent heavy aliphatics, 6 percent aromatics, and 9 percent weathered asphaltenes. OSEI Corporation (formerly Sky Blue Chems) set a lab test to match the planned cleanup: OSE II mixed 50:1 with Savannah River water and applied 1:1; Savannah Laboratories (EPA 418.1) measured 100,000 mg/kg on 1 June 1990 and 41 mg/L by 20 July 1990, under the less-than-100 ppm NPDES target GAF needed. The company summary states all aromatics and aliphatics were gone to CO2 and water in 96 hours; the asphaltenes took most of the remaining time. That run is the record that OSE II works on light ends, heavy ends, and weathered roofing-tar crude in river water. See link https://www.osei.us/wp-content/uploads/Venezuela-Crude.pdf

3. After the Mega Borg released South African crude off Galveston—a very light crude, almost like diesel—Southwest Research Institute (Mary Riddle, Donald E. Johnson) ran OSE, then sold by Sky Blue Chems, now the OSEI Corporation, on oil the U.S. Coast Guard

supplied and Galveston seawater Sky Blue sent in. Neat crude measured 1,070,000 mg/L TRPH; after seawater dilution the mix OSE was applied to started at 100,070 ppm TPH (600 ml seawater + 6 ml oil + 6 ml product, stirred; more seawater after 90 hours). That system fell to 7,520 at 48 h, 6,910 at 72 h, 5,990 at 96 h, and 529 at 216 hours—99.5% TPH reduction and 94.7% residual-weight reduction, with about 90% of TPH gone in the first 48 hours. That Gulf file is light South African crude, USCG oil, Texas seawater, a major lab, and 100,070 ppm after dilution taken to 529 ppm in nine days. See link https://www.osei.us/wp-content/uploads/Gulf-of-America-near-Texas-Mega-Borg-Ship.pdf

4. Chemical Analysis, Inc. (Galen W. Hartman, Dallas, 1990) tested OSE II on BTEX—benzene, ethylbenzene, toluene, and xylene, the toxic heart of gasoline—at 2,000 parts water to 1 part concentrate. After 96 hours of stirring, the aromatic (BTEX) phase fell 32% by volume; turbidity in the water showed the broken components moving into the aqueous side. OSEI's correlation from that ratio is 64% at 1,000:1, 80% at 500:1, and about 98% at the normal 100:1 field strength—enough, they argued, for gasoline and diesel on soil, UST dirt, sheen, concrete, and ballast water. That file is a third-party lab showing OSE-II works on BTEX itself, not only on whole crude. https://www.osei.us/end-user-tests

5. On 6 October 2014 **lightning hit tanks at** Slauson Exploration's Dorchester, Texas **site. Two tanks burned about four hours; one exploded and landed** 200 feet **from its base. About** 310 barrels (13,002 gallons) **of oil hit the soil**. **KW Construction** (president **Keary Williams**, who had fought the fire) split the ground into an **upper (A)** and **lower (B)** section, spread and tilled the dirt thin (under 6 inches on B, under 12 inches on A), fenced livestock out, and applied **OSE-II**: one **55-gallon drum** mixed into about **2,000 gallons** of fresh water on each section, then more water to keep the soil wet so bacteria could move.
Pace Labs in Allen ran **TCEQ 1005** (C6–C35). Start: Area A **33,900 ppm**, Area B **42,100 ppm**. Samples pulled **15 October** came back A **704 ppm** and B **1,820 ppm**. The video states the **Texas Railroad Commission** figure they were working to was **5,000 mg/kg or lower**; both plots were already under that—and under Rule 91's **1% TPH (10,000 mg/kg)** close. Oil quit sticking to a hand within minutes of spray; smell dropped; after a weekend rain the low spot showed no visible oil. That is the Dorchester job: lightning, 13,000 gallons on dirt, two drums of OSE-II, Pace numbers below the RRC limit in about a week. See link https://www.youtube.com/watch?v=dJcq3ONnESM

6. Start: November 1996 composite soil in the heating-oil / kerosene zone at Highland Falls was about 35 ppm total VOCs (EPA 8021). That is the starting point—not the 88.

Treatment: Alpha Geoscience applied **OSE-II** in place to **115 cubic yards** under trailers and porches (**~19 gallons** a day on 7 and 8 November 1996, about **0.38 gal/yd³**, water, till, plastic). The soil could not be hauled without moving buildings.

Mid-check: July 1997 composite **TPH was 88 mg/kg**. That 88 is a later TPH test, not the start. **End:** November 1997 PID on two of four soils was instrument background; the other two were **3.8 ppm** and **14 ppm** above background. STARS chemistry: **no SVOCs**, and the leftover VOCs were in the **ppb** range (example: **1,3,5-trimethylbenzene at 8 ppb**).

Alpha asked NYSDEC to close Spill **95-16786**. New York wrote **Cleanup Complete. NFA**—no further action. See link https://www.osei.us/tech-library-pdfs/2011/15-OSEI%20Manual_In-SituUnderground.pdf

COLD TEMPERATURE TESTING AND USE OF OSE II

There are a few redundances in information, where a test meets two categories

1. Antarctica, University of Buenos Aires researchers working with the Argentine Antarctic Institute applied OSE-II on hydrocarbon-contaminated soil at Jubany Station during the 2006–07 austral summer, comparing it with inorganic salts, fish meal plus a Brij surfactant, and an untreated control. Laboratory TPH samples were lost when the icebreaker Almirante Irízar burned, but field counts showed OSE-II raised total aerobic bacteria and hydrocarbon-degrading bacteria by about one order of magnitude over the control—matching or beating the other nutrient treatments—while observers noted a change in fuel composition and rapid loss of fuel odor in the cold. See link https://www.osei.us/wp-content/uploads/Antarctica-OSE-II-use-and-testing-1.pdf

2. University of Alaska Fairbanks, tested OSE II for the Valdez Oil Spill, and in the tests, on standard laboratory tests, these researchers showed that the marine formulation of OIL SPILL EATER II diluted into artificial seawater containing a consortium of micro-organisms and hydrocarbons from Prince William Sound, Alaska will degrade Hexadecane—300% faster than the same consortium amended with mineral nutrients and hydrocarbons without OIL SPILL EATER II. See Link https://www.osei.us/wp-content/uploads/University-of-Alaska-Salt-Water-Efficacy-Test.pdf **Note** you will see Dr. Browns name associated with Exxon's testing of OSE II at their Florham Park New Jersey lab, where Dr. Brown was hired by Exxon from University of AK Fairbanks.

3. EXXON VALDEZ SPILL, U.S. Coast Guard four-star Commandant Paul Yost ordered Exxon to test OSE-II on Valdez oil. Dr. Stephen M. Hinton ran that work at Exxon's Florham Park, New Jersey lab on **4–5 January 1990**: 400 g of Prudhoe Bay crude on rocks, OSE-II at **50:1** in seawater (**400 ml** of mix). The oil came **100% off the rocks in 6–8 hours** and showed **greater than 90%** conversion toward CO_2 and water. Hinton's line was that OSE-II is very effective at cleaning oil off rocks and was proven by Exxon.

Dr. **Ed Brown** had already run **72** cold-saltwater tubes at the **University of Alaska Fairbanks** in fall 1989—near-complete degradation, biodegradation more than **10×** the controls, non-toxic to marine microbes and fish larvae. After Exxon hired him he worked the winter 1990 **21-product** screen with Hinton. Brown told Steven Pedigo OSE-II was the best product, **95% better than any other product tested**; Hinton independently said it was best by **over 90%**. Homer volunteers used OSE-II on Valdez oil in September 1989: **8 oz** with tar balls and oiled debris (no sheen in seven days), then **2 gallons** of concentrate mixed into seawater and applied on the intertidal beach. That treated shore cleaned in days, with no observed toxicity to marine life. **ADEC's Alex Viteri** noted that success informally. Inipol EAP 22 was the named comparison in the compilation (under **12%** bioremediation in 28 days) and was used on Exxon's test plot, not as the Homer treatment. That 2026 compilation is Hinton's flasks, Brown's tubes and 21-product rank, and the Homer field use in one Valdez file. See link https://www.osei.us/wp-content/uploads/Exxon-Dr.-Hinton-testing-of-OSE-II-Florham-Park-New-Jersey-update2026.pdf

4. A leaking underground gasoline tank at an Anchorage station had contaminated the soil. That soil was excavated, then put back in the same hole in eight two-foot lifts. After each lift, OSE-II was applied;

stakes marked how much dirt went back and where samples would come from, and moisture was checked so bacteria could move through the soil. The treated ground met Alaska's standard, and the State of Alaska issued a clean/closure letter. The station dirt stayed on site and was closed by the state instead of being hauled off as gasoline waste. See link https://www.osei.us/photoalbums/cleanup-tank-removal

5. In the Interior/BOEMRE dielectric-oil demonstration (LSU plus Ohmsett), OSE-II was the response tool that worked.

It biodegraded more than 67% of the insulating oil in 28 days, while Corexit 9500 and 9527A weakened as temperature dropped and only scattered oil into the water, and mechanical skimming recovered only a small fraction of the spill (about 2–8% in the OSEI summary of the same study). On that three-way comparison—disperse, skim, or remediate—OSE-II was the best performer because it was the one that reduced the oil. The DOI and the US EPA knew of this comparison test the DOI had carried out in 2011 and knew there was a better response to oil spills than Corexit Dispersants and skimmers. See link https://www.osei.us/wp-content/uploads/OSEI-SUmmary-of-Dept-of-Interior.pdf

6. Norway, Oslo, Under Ground, Ground Water, And River Clean-Up with OSE II

The Oslo Norway Volvo Service Center Under Ground Storage release of Waste Oil contaminated Soil and Ground Water, As Was the river where the hydrocarbons flowed down Was Remediated With OSE II. Waste oil from a Volvo service center released for several years, until the waste oil was detected on a river approximately 3 feet lower than the Volvo center and approximately 100 meters from the center as well. The river was boomed off in a couple of areas, a suction system was put in trying to draw the oil out of the ground, and after a couple of years of operation, reclaiming very small amounts of oil, it was decided to inject OSE II into the area underground where the waste oil had migrated from the Volvo center to the river. OSE II was applied onto the river where the oil was removed, then the oil was injected to try to break down the oils adhesion properties so it would not stick to the soil and at the same time to lift the oil to the surface of the water and the ground. This was a great success as very little oil was seen migrating to the river, and any oil that was seen was address with OSE II application, this was a difficult clean-up was still successful as well. See link https://www.osei.us/wp-content/uploads/OSLO-NORWAY-VOLVO-TRUCK-CENTER-CLEAN-UP-WITH-OSE-II-10-26-2021.pdf

7. OSE II was tested in Dallas on DFW International Airport de-icing (ethylene glycol) pond effluent by Dallas Laboratories for Lancer / KnightCo, with DFW's environmental vice president requiring a cold run at about 10°C / 50°F because de-icer is used in winter. EPA 8015 modified results a few months later (summary dated 8 January 2003) showed the 14,720 ppm pond falling to 10,830 / 4,680 / 1,180 / 80 ppm on days 3, 7, 10, and 21 (control still about 14,560), and the 5,450 ppm pond at 50±5°F falling to 2,680 / 860 / 160 ppm by day 10 (control 5,380). Those reductions supported an on-airport protocol: mix OSE II 50:1 with water, apply 1 gallon of mix per gallon of de-icer used, wash to dual retention ponds, then sample at 21 days until background or non-detect for sewer or Trinity River discharge. OSE II was very effective on remediating deicing agent from DFW Airport. See link https://www.osei.us/wp-content/uploads/deice_dfw.pdf

8. AT&T Alascom used OSE II in January 2000 on diesel-contaminated soil at remote switching-terminal generator sites across eight regions of Alaska, where GRO, DRO, and PAHs were above state limits and haul-off or thermal desorption would have

cost hundreds of thousands of dollars. OSE II was mixed and applied the day before a snowstorm, then sat under snow from about 24 January until early April; sampling after thaw showed non-detect on diesel- and gasoline-range contaminants. Louis Corazza wrote that they would order more OSE II in May, and follow-on orders went out 11 May, 20 June, and July 2000. See link https://www.osei.us/wp-content/uploads/ATT-Alaskom-Summary-letter-and-report-from-ATT-Alaskom-after-utilizing-OSE-II-2000.pdf

9. The Oslo Fire Department and PGT Norway used OSE II on an about 50-liter fuel spill at near-freezing temperature, premixing OSE II at 2% in water (about 1,000 liters of water after Karl Dietrichs's correction),

waiting about 20 minutes, then flushing with fire-truck water to the drain. A meter showed VOCs gone and the road no longer slippery before that flush. Dietrichs wrote that the fire department was impressed, and the same file notes local firefighters and PGTN personnel working a related gas-station overfill at Dombås. See link https://www.osei.us/wp-content/uploads/Norway-Oslo-Fire-department-and-PGT-fuel-clean-up-with-OSE-II-11-2017-XX.pdf

10. EPA RRT VI and its contractor met OSEI at the Osage reservation near Bartlesville after a pipeline broke over a waterway and oiled about 94.7 m^3 of shoreline plus pockets of water.

OSE-II was mixed 50:1 with fresh water and sprayed at medium pressure on rock, soil, marsh grass, and water; even in the cold it stripped adhesion so oil ran off the rocks and floated instead of sinking. OSEI pulled chain-of-custody samples on four dates, EPA RRT VI took the last round, the site received a closure letter, and Region VI approved OSE-II for that navigable-water cleanup. See link https://www.osei.us/wp-content/uploads/Oklahoma-Osage-Indian-Reservation-Clean-up-for-US-EPA-RRT-VI-1-XXXXZZ-1.pdf

EXTREME HEAT CONDITIONS TESTING OSE II

1. Kuwait, OSE II was tested from 23 September to 25 November 2014 on KERP / oil-lake soils left after Saddam Hussein blew up and set fire to Kuwait oil wells, in 1-cubic-meter lined boxes with Kadhema running the analysis. Three reported boxes: FPM (fine soil plus sludge from a soil-washing unit) fell from 22,300 mg/kg to 2,280 mg/kg; CSP (contaminated soil pile) from 11,900 mg/kg to 2,000 mg/kg; EPB2 (effluent-pit soil) from 7,880 mg/kg to 1,790 mg/kg. Ocean water was mixed with OSE II because Red Adair and others reversed pipelines to cool the wellheads and put out the fires, which left high salt in the desert-covered oil; that same Gulf water also replaced moisture lost to heat and wind. The soils were turned so hydrocarbons lifted off, and the finish met the standard then required for treating those salty oil-lake soils in place. See link https://www.osei.us/wp-content/uploads/Kuwait-City-OSE-II-Trials-Cleaning-up-Kuwait-Oil-Filed-4-types-of-Contamination-from-Saddam-Hussien-setting-fires-to-the-oil-fields.pdf

2. Kuwait, AECOM tested OSE II on KERP / oil-lake soil from the fires set when Saddam Hussein blew up Kuwait oil wells, after OSEI and Envirorisk presented the 2014 four-type box trials at an AMEC workshop in February 2015 and then met Carl Pettit and Mark Bamford. Pedigo, Skinner, and Brewer set the protocol; AECOM sent the samples to the lab. Average starting TPH was 36,000 mg/L, fell nearly 40 percent in 7 days (meeting the 3 percent target), and all results were below 1 percent at 21 days, after which AECOM committed to bidding and the three companies spent four days on process and pricing. See link https://www.osei.us/wp-content/uploads/Kuwait-KERP_Oil-Lakes-Test-Results-From-The-OSEI-Corporation-And-AECOM-For-Collaborative-Testing-Of-Soil-From-KERP_Oil-Lakes-Project.pdf-combined-file-with-testsXXZZ.pdf

HEAVY IN EMULSION OIL TESTING

1. The U.S. EPA RRT VII tested OSE II from 1 February to 8 March 2012 on a very heavy, viscous waste oil in eight 10-gallon aquariums, four with Missouri River water and four with Blue Springs Lake water, with and without aeration. That oil normally forms a heavy emulsion and is harder to break down than fresh crude because of additives, preservatives, and possible Teflons from refining. OSE II reduced DRO 72.5 percent on average and ORO 73.5 percent on average, grew large bacterial populations, thinned the oil layer until only remnants remained, and kept the oil floating instead of sinking it; controls stayed oily while toxicity cleared the water of microbes. The company note is that a few more days would have finished the oil, and that two control tanks' lab drops did not match the photographs. See link https://www.osei.us/pdf%20files/RRT%20plus%20testing.pdf

2. India, OSE II was demonstrated on Thane Creek on heavy furnace oil (bunker / FO): 200 ml poured on the water, spreading over about 2 square meters as a thick patch that then became a thin surface film. About 20 ml of OSE II was diluted in a sprayer and applied; within minutes the oil lost viscosity and stickiness and broke into a thin floating film, and after about 1 hour 10 minutes almost nothing remained on the surface. The applicator used leftover mix to wipe the pour container and concluded that roughly 200 ml of mixed OSE II solution was enough for that 200 ml of furnace oil. The video is the field record of that creek test. See link https://www.youtube.com/watch?v=OowmFrWRZJY

3. Dallas, Texas, OSE II was sprayed on heavy waste oil on a freshwater creek; on contact the oil broke down, stayed on the surface, and would not stick to the shoreline. The short field video shows how easy that makes the cleanup: adhesion gone, sheen thinning, and the oil remaining floatable, so it does not smear the bank. Even on heavy waste oil, OSE II turns a sticky shoreline problem into a simple surface application. See link https://www.youtube.com/watch?v=7UdhBKUCkhE

4. Halliburton's Baroid lab in Colombia (iFacts 2016909, 9 July 2015) tested OSE-II on Campo Guando crude in 8.4 lb/gal sodium-formate completion brine with NOBLOK 0.5% v/v and glutaraldehyde 0.5 lpb—the dirty returns from workover and well test that are usually evaporated or drowned in fresh water. Jorge Marín requested it; Yinneth Alvarado ran it; Nubia Ramirez reviewed; Miguel Gonzalez's TEM-COL-HAL-BAR-LAB team owns the method. They sprayed OSE-II on the surface of an open tank analog at 0.1 / 0.5 / 1.0 / 1.5% v/v oil using 0.8 / 1.25 / 1.4 / 1.45 ml of product; at 1% and 1.5% the heavy emulsion broke immediately, oil moved to the walls and stayed up, and extra product after saturation did nothing more. Spray beat pouring into the mix; thicker crude encapsulated cleaner. The lab wrote "dispersion," but the oil did not sink—in this report that word means molecular breakdown—and the point of the work was to reuse the expensive brine instead of treating it as waste. OSE II proved effective to be able to reuse the expensive brine. See link https://www.osei.us/wp-content/uploads/Haliburton-Colombia.pdf

5. GAF Industries in Savannah, Georgia had a roughly 10-year site load of Venezuelan crude, No. 6 fuel oil, and diesel used in roofing tar — about 85 percent heavy aliphatics, 6 percent aromatics, and 9 percent weathered asphaltenes. OSEI Corporation (formerly Sky Blue Chems) set a lab test to match the planned cleanup: OSE II mixed 50:1 with Savannah River water and applied 1:1; Savannah Laboratories (EPA 418.1) measured 100,000 mg/kg on 1 June 1990 and 41 mg/L by 20 July 1990, under the less-than-100 ppm NPDES target GAF needed. The company summary states all aromatics and aliphatics were gone to CO2 and water in 96 hours; the asphaltenes took most of the remaining time. That run is the record that OSE II works on light ends, heavy ends, and weathered roofing-tar crude in river water. See link https://www.osei.us/wp-content/uploads/Venezuela-Crude.pdf

HALOGENATED HYDROCARBON TESTS

1. The Iran Transformer Research Institute with Besco present (the minutes call the approach biological destruction of Askarel/PCB and later OSE II "adding enzyme"). Trial 1 (25 Ordibehesht 1389 / 15 May 2010) used 300 ml of oil at 436 ppm PCB, 25 °C, 300 ml of water-diluted microbes in a 1 L flask, magnetic mixing for about a week, then weekly/monthly Dexill 2000 (method 1262 oil) checks that showed a gradual drop. Trial 2 (4 Mordad 1389 / 26 July 2010) used much dirtier oil (2,962 ppm PCB) at 33 °C, 150 ml city water plus ~100 ml ethyl lactate, a 2–3-minute mix, then OSE II enzyme added; again, the minutes state PCB decreased by the end of the run. See link Farsee https://www.osei.us/wp-content/uploads/Iran-PCB-transformer-company-test.pdf and English see link https://www.osei.us/wp-content/uploads/Iran-Transformer-Research-Institute-translated-English.pdf

2. Air Force Base Conversion Agency at Fort Worth (joint reserve / Navy transfer of the PCB storage building) had a 4 ft × 6 ft hydrocarbon stain under a transformer. TNRCC required swipe testing; after a denatured-alcohol attempt, PCBs were 120 µg/ft²—almost three times higher than the first swipe and above 40 CFR Part 761.125 and TNRCC Chapter 335.551. Local firms bid $5,000 and up. A Navy contact supplied a half gallon of OSE-II; the base mixed it with one gallon of water, applied that mix to the concrete, and kept the treated stain moist for two weeks. The third swipe was 8.2 µg/ft², under both federal and Texas limits, the building could transfer, and Engineering Technician Elliot Smith's 11 September 1996 letter documented the drop, the $5,000-plus savings, attached lab reports, and his recommendation of OSE-II. See link https://www.osei.us/wp-content/uploads/Department-of-Air-Force-Power-Plant-Clean-Up.pdf

3. Australia, CMTA and OSEI ran a second PFAS trial on water (the first was soil) from 20–28 March 2025 for an Australian federal department, aimed at waste-treatment water: 5 liters of PFAS water in a biological tub, OSE II mixed 25:1 with natural water, 80 percent of the dose at the start with 24/7 aeration and mixing, Eurofins/NATA using EPA 1633 plus TOP and fluoride tests. PFAS is hard to break down because the carbon–fluorine bond is among the strongest in organic chemistry; OSE II's stated path is to partition the molecule and slightly oxidize the halogen so fluorine volume drops, then let indigenous bacteria digest what is left—the same halogenated approach they cite for PCBs. The 7-day Eurofins sheet showed PFOA, PFOS, and PFHxS at or below 0.01 µg/L, enHealth sum (PFHxS + PFOS + PFOA) at 0.01 µg/L, and the company states that met

Australian drinking-water and acceptance levels. Heterotrophic count 5.9×10^4 and E. coli/coliforms >24,000 MPN/100 mL were used as proof the water had been detoxified enough for single-cell life; photos show the tub going turbid from bacterial bloom, then clearing once the food was gone. See link https://www.osei.us/wp-content/uploads/PFAS-Contaminated-Water-Summary-And-Protocol-Australia-Second-PFAS-Test-Study-Demonstration-.docx-XXXX.docx-XXXXXXZ.pdf

4. OSE II now has a PFAS file and working on a volume job: two Australian government-media trials plus a 1991 Anchorage halogenated-soil cleanup sit behind a contract being finalized for 78,000 m³ of PFAS-contaminated soil. **The method is the same stack used on oil, PCBs, and dichlorobenzene—mix OSE II with site water, dose to the load, keep moisture and air, turn or circulate.** Key Bank, Anchorage, 1991: DCB isomers to non-detect, TPH 7,500 to 1,890 ppm in under 30 days. 2024 soil trial (Hibbs, EPA 1633): required standard met, PFOA about 74 percent down, PFBS about 80 percent, microbes still 10^7 cfu/g. 2025 water trial (Eurofins): PFOA/PFOS/PFHxS at or below 0.01 µg/L at day 7. PFAS is hard because of the C–F bond. OSE II's path is to partition the molecule, oxidize the halogen, then let indigenous bacteria finish the matrix. Those tests were the last small-scale step. At 78,000 m³ the only open question is field mixing and moisture—not whether a halogenated contaminant can come off soil. See link https://www.osei.us/wp-content/uploads/PFAS.pdf

5. Alaska, Key Bank in Anchorage held soil with dichlorobenzene, low BTEX, and TPH 7,500 ppm. Northern Testing Laboratories ran OSE II on that soil in January–February 1991: 100 g sample, OSE II diluted 1:100 with the site well water. The chlorinated isomers (1,2-, 1,3-, and 1,4-dichlorobenzene) fell to undetectable by about day 15–22, and TPH dropped from 7,500 to 1,890 ppm in under 30 days. That Anchorage result is the halogenated-hydrocarbon cleanup OSEI has used since as proof OSE II can take a chlorine-bearing contaminant off soil the same way it later treated PCBs and, in the Australian trials, PFAS. See link https://www.osei.us/tech-library-pdfs/2011/16-OSEI%20Manual_ChlorHydroEfficacyTest.pdf

PESTICIDES ORGANO HALOGEN HDROCARBON TESTS

1. TBK, a third-party compost firm, had Ana Lab Corp. in Kilgore, Texas (LELAP #02008) run OSE-II for 21 days (6–20 June 2017) on soil and compost loaded with diesel and the pesticides malathion, glyphosate (Roundup), picloram (Tordon), Spectracide 2,4-D, and lambda-cyhalothrin (Warrior)—halogenated and persistent crop chemicals that move into plants, groundwater, and streams. OSE-II went on with source water (bio-surfactants to detoxify the molecule, enzymes and native bacteria to finish it to CO_2 and water); diesel and Warrior were in compost, the others in soil.
Ana Lab results: diesel **25,800 → 302 ppm** (EPA 8015B mod, **~99%**); Warrior **391 → 46 ppm** (**89.9%**, EPA 8270C); malathion **278 → 0.18 ppm** (**99.9%**, EPA 8141A); 2,4-D **26.4 → <0.283 ppm** (**99.9%**, EPA 8151A); glyphosate **28.1 → 4.59 ppm** (**83.7%**, EPA 547); picloram **12.6 → 3.03 ppm** (**63.6%**, EPA 8151A). At the measured daily rates, glyphosate was on track for complete removal in **~25 days** and picloram in **~33 days**.
The conclusion is that OSE-II permanently takes these toxins out of soil and compost on a farm-relevant clock, including halogenated pesticides and diesel, without adding microbes—NCP enzyme additive OSE II, OSHA non-toxic, mix with untreated water. That is the pesticide/halogenated-hydrocarbon file: 21-day third-party numbers, four of six analytes essentially gone, the two slower ones still falling fast enough to finish in about a month. See link https://www.osei.us/wp-content/uploads/OSEI-Summary-for-Pesitcides.pdf

MARINE TOXICITY TESTS

2 Sections, Ocean Water Species and Fresh Water Species

The US EPA standard for what is virtually non-toxic is an LC50 or LD50 of 100 or greater, the average OSE II LC 50 or LD 50 is 1900 to 10,000, fare less toxic than EPA virtually non-toxic standard. The greater the number the less toxic.

OSE II has been tested by 11 different countries/governments

OCEAN WATER/SALTWATER MARINE SPECIES:

1. **US EPA required toxicity tests (2 tests)** — 96-hour exposure, mysid LC50 **>1,900 mg/L** (definitive **2,100 mg/L**). *Mysidopsis bahia* 96-hour LC50 **>1,900–2,100 mg/L**, NOEC **100 mg/L**; 7-day LC50 **2,500 mg/L**. *Artemia salina* 48-hour LC50 for OSE II **>100 mg/L**; No. 2 fuel oil alone **12.6 mg/L**; 1:10 OSE II + oil **29.4 mg/L**. Lab: EnviroSystems / Resource Analysts, Hampton, NH (1990).
https://www.osei.us/wp-content/uploads/US-EPA-required-tests-1.pdf
2. US EPA/NETAC toxicity tests (7 tests) — mysid and inland silverside LC50s in the thousands of mg/L. *Mysidopsis bahia*: 48-hour LC50 **5,661–7,927** (avg **6,698**); 96-hour LC50 **5,970** (range **3,125–6,250**); 48- and 96-hour static-renewal LC50 **>5,700**; 7-day LC50 **2,500** (**2,225–3,133**). *Menidia beryllina*: 48- and 96-hour LC50 **8,839** (range **6,250–12,500**). Packet conclusion: virtually non-toxic.

https://www.osei.us/wp-content/uploads/US-EPA-Netac-Tests-1.pdf
UK government toxicity tests (2 tests) — oil-alone vs oil + OSE II. *Crangon crangon* (brown shrimp) 96-hour sea/agitation test: oil-alone tanks **100%** mortality; OSE II treatment **0–30%**. *Patella vulgata* (limpet) rocky-shore test (6-hour exposure, 72-hour recovery): oil-alone **77–100%** mortality; OSE II **15–25%**. Cefas. Approval cited: Marine and Coastal Access Act 2009, iODA 241/2015.
https://www.osei.us/wp-content/uploads/UK-Toxicity-Tests-Summary.pdf

Australian government required toxicity tests (24 tests) — Ecotox Services Australasia (NATA 14709). Most species **EC50 / IC10 >20 mg/L** (top concentration), NOEC **20 mg/L**: mussel

larvae, copepod *Parvocalanus crassirostris*, amphipod *Melita plumulosa*, barramundi, Australian bass EC50 **>20**. Milky oyster larvae 48-hour EC50 **16.5 mg/L**, IC10 **11.0 mg/L**, NOEC **10**. Packet conclusion: met Australian requirements; approved for use. https://www.osei.us/wp-content/uploads/Australia-Toxicity-Test.pdf

Norway toxicity test (1 test) — 72-hour algae *Skeletonema pseudocostatum*. EC50 not detected up to the top dose; NOEC **≥100**, LOEC **>100** (test stopped at the upper limit). Norwegian Institute for Water Research. Required bar cited as **>10**; result **>100**. https://www.osei.us/wp-content/uploads/Norway-Toxicity-test-XXXX.pdf

Trinidad and Tobago toxicity tests (2 tests) — 96-hour acute static test on *Metamysidopsis insularis*. Reported LC50 **9.29 mg/L** (CARIRI / UWI St. Augustine). Range-finder plus five dilutions; control survival **≥90%**. Summary states the result was treated as passing their marine-use review. https://www.osei.us/wp-content/uploads/Trinidad-and-Tobago-Toxicity-Test-With-OSE-II-Summary-1.pdf

US EPA new NCP toxicity requirements (2 tests, 2026) — Eurofins / Bio-Aquatic, Carrollton, TX (report **6 July 2026**). *Americamysis bahia* 48-hour LC50 **2,726.27 ppm** (95% CI **2,452–3,031**). *Menidia beryllina* 96-hour LC50 **2,959.84 ppm** (95% CI **2,690–3,257**). Lower 95% limits are far above the **10 ppm** NCP toxicity listing threshold. https://www.osei.us/wp-content/uploads/NCP-New-Required-Toxicity-Test-Requirements-7-26-2-Toxicity-Tests-Bahia-And-Menidia-Salt-Water-Species-Summary-and-laboratory-report.pdf

Fresh water toxicity tests:

Environment Canada toxicity tests (10 tests in the packet) — rainbow trout *Oncorhynchus mykiss* 96-hour LC50 **>10,000 mg/L** (23% mortality at 10,000). *Daphnia magna* 48-hour LC50 **>10,000 mg/L**. Microtox *Photobacterium phosphoreum*: **7,952 mg/L** (~5 min), **5,209 mg/L** (15 min), **5,474 mg/L** (30 min).
https://www.osei.us/wp-content/uploads/Canada-Fresh-Water-Test.pdf

Texas storm-drain fathead minnow toxicity test (1 test) — *Pimephales promelas*, 48-hour LC50 **9,300 mg/L**. Bio-Aquatic Testing; concentrations 200–30,000 mg/L; 100% control survival. Written as a Plano storm-drain / gasoline-wash scenario: treat, then the water is not

a fish-kill dose at that LC50.
https://www.osei.us/wp-content/uploads/Texas-Plano-Fresh-water-minnow-test-with-physical-engineer.pdf

South Korea minnow toxicity test (1 test) — *Pimephales promelas*, 24-hour LC50 **5,856.34 mg/L** at 2% OSE II (Huther and Associates, Denton, TX; EPA-821-R-02-012). Seven concentrations 250–16,000 mg/L.
https://www.osei.us/wp-content/uploads/Fresh-Water-Marine-Toxicity-Test-Summary-South-Korea-Minnows.pdf

South Korea water-flea toxicity test (1 test) — *Ceriodaphnia dubia*, 24-hour LC50 **16,000 mg/L** at 2% OSE II (Huther and Associates). Four replicates, five neonates each, 250–16,000 mg/L.
https://www.osei.us/wp-content/uploads/Korea-Water-Flea-Fresh-Water-Test.pdf

Koi fish pond — live use over years — California koi pond treated with OSE-II for oil dust blown in by wind; OSEI's freshwater index describes a **~2,600-gallon** pond, monthly application, **no adverse effect** on the koi (related post: used **over two years**, fish still live and well). Field use, not an LC50 flask.
https://www.osei.us/archives/2142

APPENDIX D

LABORATORY ANALYSIS PARAMETERS5

Parameter	Sample Matrix	Methodology	Recommended Methods
Oil hydrocarbons (C17, pristane, C18, Phytane)	Water, Sediment or shoreline material	GC + GC/MS	ASTM Method D3328
NH_3	Water, Sediment or shoreline material	Spectrophotometric	EPA Method 350.1, 350.2 or 350.3
NO_3	Water, Sediment or shoreline material	Spectrophotometric	EPA Method 353.2 or 353.3
NO_2	Water, Sediment or shoreline material	Spectrophotometric	EPA Method 354.1
PO_4	Water, Sediment or shoreline material	Spectrophotometric	EPA Method 365.1, 365.2 or 365.3
Toxicity	Water, Sediment or shoreline material		

Sampling is to be conducted in accordance with an approved sampling plan and should utilize a justified random approach where the individual sites are selected based on appropriate habitat-types within treated and untreated zones. Within a site, individual sampling stations should be randomly chosen. Dependent on habitat-type, the site may be further divided such that specific zones within the site are monitored such as the upper and lower intertidal zones or stream-side and back marsh areas. Sediment grab samples may be collected using a variety of standard techniques. Core sampling is preferred for

most intertidal and sub-tidal areas since it consistently allows for a highly reproducible volume of sample to be collected. Typically the core depth should exceed the depth of contamination if applicable and the core should be sectioned by 5 cm increments.

Scoop-type grab sampling is applicable but great care is required to ensure that consistency is maintained. The sampling plan should provide exact guidance as to the width and depth of each sample.

Adjacent subsurface water samples may be collected using standard grab techniques. Caution should be exercised to prevent surface oil from contaminating the collection vessel as it is lowered to the specified sampling depth. Water grab sample will typically be collected at 1-3'depth.

Analytical methods used for OSE II bioremediation monitoring should be consistent with standard methods utilized for oil weathering and degradation studies. Analytical guidance developed by the EPA and NETAC and International standards for laboratory testing of first response bioremediation agent OSE II has been adopted for field monitoring studies for numerous spills.

Field and laboratory blanks should be specified in the monitoring plan and should represent at least 10% of the samples analyzed. To assess environmental variability, 10% of the sample stations should be sampled and analyzed in triplicate. Certified reference material is currently available for oil OSE II First response bioremediation monitoring, a reference sample of the spilled oil should be analyzed periodically to verify laboratory consistency. Quantitative values for the reference oil should not vary by more than 10% for selected analytes. Good laboratory practices should be employed that are consistent with the objectives of the OSE II biomonitoring plan.

Accurate sample identification and proper control of samples is essential. A chain of custody procedure will be established and implemented which will ensure integrity of the samples and proper handling of the samples.

APPENDIX E

OSE II Eliminates The Flammability of Hydrocarbons

OSE II eliminates the flammability of hydrocarbons fuels and solvents. OSE II performs this due to the fact the Biosurfactants enzymes and nutrients when applied to hydrocarbons immediately break down the molecular structure of hydrocarbons, the enzymes act as catalyst to speed up the breakdown of the fuels/solvents, destroying numerous properties of the fuel including the potential for the fuel/solvent to light and start a fire. Huge safety issue for Fire Fighters, Ports Harbors, terminals, and even fueling stations on land.

The application of OSE II to fuels/solvents also destroys the VOC's so that in a few minutes a confined space may be entered without worry of explosion, or vapors over taking humans. Once the flammability is destroyed, the environmental impact of the fuel is eliminated so there will be no harm to natural resources as well. This also detoxifies the fuel so it cannot harm marine species as well. See demonstration of OSE II being applied to fuel contained in a large hole in the road, where OSE II was applied with the City Manager of Plano, Texas USA, where the effluent was collected taken to Bio Aquatic labs, where they added minnows, and then performed an LC50 test: The 48-hour LC50 for *Pimephales promelas* exposed to a mixture of OSE II, gasoline, and water was 9,300 mg/L showing OSE II reduces the toxicity of fuel.

The OSEI Corporation spent a day with the Wylie Texas Fire department performing tests, on gasoline and diesel, where a certain depth of fuel was placed in a pan, OSE II mixed at a 50 to 1 mixing ratio, then for each ounce of fuel poured into the pan the same volume of OSE II and water mixture was added to the pan. A timer was set to see how long it would take for the fuel to become non-flammable. Multiple tests were carried out until the flammability point was reach at numerous depths of fuel. The final depth on the charts that were developed, to show how much OSE II was required and how much time was needed to become non flammable. See links https://www.osei.us/photoalbums/690-2 and see charts for application rates and times https://www.osei.us/wp-content/uploads/gas2014.pdf This is a second demonstration on eliminating flammability of fuel with the Plano Texas USA fire station see link https://www.osei.us/photoalbums/fire-elimination-demo

The US Military fire departments use OSE II as well, see link on Jet fuel, JP5, JP8 and other military fuels and solvents and fuel boosters like Hydrazine,

https://www.osei.us/photoalbums/jet-fuel-cleanup
One additional aspect of OSE II is if there is a hydrocarbon-based fuel that is on fire, OSE II puts it out in seconds, see this demonstration in Brazil see link https://www.youtube.com/shorts/jnUDp5hl_0A OSE II eliminating fire is a great safety attribute of OSE II

APPENDIX F
INFORMATION FEEDBACK:
OSE II BIOREMEDIATION USE FOLLOW-UP FORM

Lessons learned from a spill cleanup operation are most useful when others, particularly those not personally involved in the original cleanup operation, can benefit from them by drawing upon the original responders' experiences with OSE II. The OSEI Corporation has established an archive to transfer of information on uses of OSE II bioremediation that is intended to provide decision makers with case data upon which future decisions regarding OSE II bioremediation may be based. Particularly because response officials have very limited experience with bioremediation in uncontrolled environments, such as open water and other marine areas, this program is expected to be a valuable resource for supporting informed decisions regarding OSE II bioremediation.

The principal objective of this OSE II First Response bioremediation information feedback program in Region 4 and for Global Authorities is as follows:

To gather relevant, accurate, descriptive, and complete information from sites where OSE II bioremediation has been used for spill response; and

To provide that information via an accessible data bank/web site for future decision makers who are considering the use of OSE II bioremediation.

The OSE II Bioremediation Use Follow-Up Form on the following pages has been provided to guide information collection efforts in support the collection of OSE II. A separate form should be completed for each unique OSE II first response bioremediation activity. Because certain information may not have been anticipated when the form was developed, feel free to provide any other information deemed appropriate regarding the use of OSE II bioremediation in a particular response action.

BIOREMEDIATION USE FOLLOW-UP FORM

A. SPILL INFORMATION

1. Spill event
2. Date
3. Location (e.g., offshore, wetlands, coastal)
4. Product(s) spilled
5. Amount of spill
6. Reason(s) for using bioremediation
7. Age of oil when bioremediation agents applied

B. BIOREMEDIATION AGENT INFORMATION

1 . First Treatment or Application:
   a. Type of agent applied (e.g., OSE II, First Response enzyme bioremediation)
   b. Name of agent Oil Spill Eater II (OSE II)
   c. Agent listed on the NCP Product Schedule? Yes
   d. Vendor OSEI Corporation
   e. Vendor address and phone number P.O. box 515429 Dallas, Texas 75251, US 1(972)669-3390
   f. Rate effectiveness (compared to control site) on a scale of 1 to 10, 10 being the highest score
      Visual observation
      Oil chemistry
      Method used (e.g., GC, GC/MS, TPH)

2. Second Treatment or Application (complete if different from above):
   a. Type of agent applied (OSE II)
   b. Name of agent
   c. Agent listed on the NCP Product Schedule?
   d. Vendor
   e. Vendor address and phone number
   f. Rate effectiveness (compared to control site) on a scale of 1 to 10, 10 being the highest score
      Visual observation
      Oil chemistry
      Method used (e.g., GC, GC/MS, TPH)

3. Third Treatment or Application (complete if different from above):
   a. Type of agent applied (OSE II)
   b. Name of agent
   c. Agent listed on the NCP Product Schedule?
   d. Vendor
   e. Vendor address and phone number
   f. Rate effectiveness (compared to control site) on a scale of 1 to 10, 10 being the highest score
      Visual observation
      Oil chemistry
      Method used (e.g., GC, GC/MS, TPH)

C. <u>SITE CONTROLS</u>
   1. Size and number of test site(s)
   2. Size and number of control site(s)
   3. Site security measures taken

D. <u>TREATMENT AREA LOCATION</u>
   1 . On water (latitude and longitude)

2. Shoreline (latitude and longitude)
   Shoreline type (e.g., sand, shell, cobble)
   Shoreline zone (e.g., intertidal, surge, storm/over wash) Depth of shoreline oiling

E. APPLICATION INFORMATION
1. Microbial counts before application
2. Microbial counts after application
3. Applications performed by (names and titles)
4. Application method(s) used
5. Application date(s)
6. Application conditions (e.g., winds, waves)
7. Agent concentration and rates (e.g., gal/acre)
8. Additional information on re-applications

F. MONITORING
1. Schedule and duration (e.g., weekly for 3 months)
2. Method (e.g., foot, by air, boat)
3. Monitoring performed by (names and titles)
4. Toxicity noted

G. PROBLEMS ENCOUNTERED (e.g., weather, site security, application)

H. LESSONS LEARNED

1. CONTACTS
1. OSC (name, address, and phone)
2. SSC (name, address, and phone)
3. Form completed by (name, title, and agency)

APPENDIX G

REFERENCES

The References below were used by the US EPA, they are for very limited bioremediation such as microbes and nutrients/fertilizers. The only reference to OSE II is the US EPA/NETAC testing performed on OSE II for the US EPA NCP listing, OSE II is a first response bioremediation product, that has three phases not one like bacteria or two like nutrients, of which both product types are not made for fresh oil spills or fuels, like OSE II can handle.

OSE II First Response Bioremdiation, third party verified references are below the EPA references for this document

Anderson, J.P.E. "Principles of and Assay Systems for Biodegradation." *Biotechnology and Biodegradation,* vol. 4, Advances in Applied Biotechnology Series. Texas: The Portfolio Publishing Company, 1990, pp. 129-146.

Atlas, R.M. "Biodegradation of Hydrocarbons in the Environment," *Environmental Biotechnology.* New York: Plenum Press, 1988.

Atlas, Ronald M. "Microbial Degradation of Petroleum Hydrocarbons: an Environmental Perspective." *Microbiological Reviews.* March 1981, pp. 180-209.

Leahy, J.G. and R.R. Colwell. "Microbial Degradation of Hydrocarbons in the Environment." *Microbiological Reviews.* September 1990.

Ponier, Ralph J. "Bioremediation Using Adapted Bacterial Cultures, Topic 1: Examination of Site Data and Discussion of Microbial Physiology With Regard to Site Remediation." *Proceedings of the Hazardous Materials Control Research Institute's First National Conference on Bioremediation.* 1990, pp. 321-361.

US Environmental Protection Agency. *Guide for Preparation of Quality Assurance Project Plans for the National Estuarine Program.* EPA 556/2-88-001. Office of Marine and Estuarine Protection, Washington, DC June 1988.

ADDITIONAL SOURCES OF INFORMATION ON BIOREMEDIATION

Ahearn, D.G. "Microbial Degradation of Oil Pollutants." Workshop, Georgia State University, December 4-6, 1972. Proceedings: Louisiana State University Center for Wetland Resources, Publication LSU-SG-73-01, 1973.

Chianelli, R.R., *et al.* "Bioremediation Technology Development and Application to the Alaskan Spill." *Proceedings: 1991 Oil Spill Conference.* March 4-7, 1991, San Diego, California, pp. 549-558.

Congress of the United States. *Bioremediation for Marine O# Spills.* OTA-BP-0-70. Office of Technology Assessment, Washington, D.C. May 1991.

DeLune, R.D., R.P. Gambrell, J.H.Pardue and W.H.Patrick, Jr. "Fate of Petroleum Hydrocarbons and Toxic Organics in Louisiana Coastal Environments." *Estuaries. 13(1),* 1990, pp. 72-80.

Jordan, Randolph and James R. Payne. *Fate and Weathering of Petroleum Spills in the Marine Environment.* Michigan: Ann Arbor Science Publishers, Inc., 1980.

Lee, Richard F. "Metabolism of Petroleum Hydrocarbons in Marine Sediments." *Proceedings of a Symposium on Sources, Effects and Sinks of Hydrocarbons in the Aquatic Environment.* AIBS Publication, 1976.

Mearns, Alan J. *Observations of an Oil Spill Bioremediation Activity in Galveston Bay, Texas.* NOAA Technical Memorandum NOS OMA 57. June 1991.

Owen, D. "Bioremediation of Marine Oil Spills: Scientific and Operational Constraints," Proceedings of the Fourteenth Arctic and Marine Oil Spill Program Technical Seminar. Vancouver, British Columbia, June 12-14, 1991, pp. 119-130.

Pitter, Pavel and Jan Chudoba. *Biodegradability of Organic Substances in the Aquatic Environment.* Boca Raton, Florida: CRC Press, 1990.

Pritchard, P. Hap and Charles F. Costa. "EPA's Alaska Oil Spill Bioremediation Project." *Environmental Science & Technology.* 25 (3), 1991, pp. 372-382.

Sauer, Ted and Paul Boehm. "The Use of Defensible Analytical Chemical Measurements for Oil Spill Natural Resource Damage Assessment." *Proceedings: 1991 Oil Spill Conference.* pp. 363-369.

Venosa, A.D. and J.R. Haines. "Screening of Commercial Innocula for Efficacy in Stimulating Oil Biodegradation in a Closed Laboratory System." *Journal of Hazardous Materials.* 28: 131-144, 1991.

[1] Bioremediation [Types MC and NA] for open water spills is not considered to be appropriate or achievable because of the above two requirements. When nutrients are added to a floating slick, they immediately disperse into the water column, essentially diluting to background levels. The exception is OSE II bioremediation, NCP Listed Type EA based on extensive field use and testing on fresh and weathered hydrocarbons/oil in fresh, brackish and ocean waters OSE II is much different. OSE II recently demonstrated an 80% rate of PAH degradation on Macondo Block La. sweet crude containing Corexit per March 3 2011- BP BCST D.Tsao , LSU R..J. Portier, L. M. Basirico *Laboratory Screening of Commercial Bioremediation Agents for the Deepwater Horizon Spill Response.] OSE II successful test for the BP and the BCST link https://www.osei.us/pdf%20files/osei_sum.pdf*

[1] 2001 *Guidelines for the Bioremediation of Marine Shorelines and Freshwater Wetlands* (http://www.epa.gov/osweroe1/docs/oil/edu/bioremed.pdf)

[1] This description of the first response bioremediation product OSE II's mode of action is based on the NCP listed, military designated sole sourced product Oil Spill Eater II's field use and test documentation on fresh and weathered hydrocarbons/oil in ocean, fresh water and shoreline environments. https://www.osei.us/tech-library-pdfs/2011/4-OSEI%20Manual_EmulatingNature.pdf

[1] As per NRT Science and Technology Committee Bioremediation Fact Sheet: Microbes/bacteria products and Nutrients/fertilizers "Added bacteria seem to compete poorly with the indigenous population." … "and has not been shown to have any long-term beneficial effects in shoreline cleanup". These two types of bioremediation are completely different from OSE II, OSE II being a first response bioremediation product with over 95,000 clean-ups since 1989, with 105 case studies on the OSEI Corporations web site www.osei.us the menu on the left side of the web site, see clean-ups, click on clean-ups, and you can scroll to see the huge number of case studies in a large number of countries.

References:

EPA: *NRT SCIENCE AND TECHNOLOGY COMMITTEE Fact Sheet: Bioremediation in Oil Spill Response An information update on the use of bioremediation. May, 2000, only applies to microbes/bacteria products, and Nutrients/fertilizers, this document does not apply to OSE II EA type.due to the extreme differences in mode of action.*

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U.S. EPA (2012) NCP Product Schedule, http://www.epa.gov/oilspill http://www.epa.gov/oem/content/ncp/products/oseater.htm

BP BCST D.Tsao, LSU R.J. Portier, L. M. Basirico, March 3 2011, *Laboratory Screening of Commercial Bioremediation Agents for the Deepwater Horizon Spill Response.*

Zhu X., Venosa A.D., Suidan M.T., (2004) EPA/600/R-04/075 Literature Review on the use of Commercial Bioremediation Agents for Cleanup of Oil-Contaminated Estuarine Environments. http://www.epa.gov/oem/docs/oil/edu/litreviewbiormd.pdf

Alleman, B.C., and E.A. Foote. 1997. Evaluation of Amendments for Enhancing Microbial Activity in Soils from Site 18 at MCAGCC Twentynine Palms, California. Battelle, Columbus, OH. Performing Organization Report Number D.O. 1795. Sponsoring Agency Report Number TCN 96-026. Feb. 7, 1997.

Bonner J.S., Autenrieth R.L., *Microbial Petroleum Degradation Enhancement By Oil Spill Bioremediation Products*, (Oct 1995) Report Submitted to Texas General Land Office (Comparative analysis of 13 NCP Listed Bioremediation Products, OSE II PAH reduction efficacy exceeded MC and NA.Types) https://www.osei.us/wp-content/uploads/TAMU-SaltWaterEfficacyTest.pdf

OSE II Type References:

LSU: Characteristics, Behavior, & Response Effectiveness of Spilled Dielectric Insulating Oil in the Marine Environment, June 2011
For U.S. Department of the Interior Bureau of Ocean Energy Management, Regulation and Enforcement (BOEMRE) Herndon, VA; By Louisiana State University Department of Environmental Sciences

A.T. Merski, (1993)-NETAC *Oil Spill Response Bioremediation Agents, Evaluation Methods Validation Testing, Discussion of Results.*

R.H. Ward, SRI San Antonio Texas OSE II (1999)-EA Type does not sink oil into water column or sediments - Swirl Flask Dispersant Effectiveness Test SwRI Project Number: 08-2326-088 Workorder: 8783

Resource Analysts, Inc. Subsidiary of MILLIPORE (June 1990) References: 1) EPA SW 846, 3RD Edition Determination of no Trace Elements and Chlorinated hydrocarbons in EA Product. OSE II does not contain any trace elements.

M.en C. Gabriel Peneda Flores, Q.B.P. Norma Pescador Elizondo, (2002) Ecologia microbian Lab, University of Mexico-Instituto Politecnico Nacional, Escuela Nacional De Ciencias Biologicas – Efficacy test of EA Type on heavy (Maya Crude) and medium weight crude oil demonstrates significant reduction of PAH's (54% reduction in 30 days on the Maya crude, and medium crude reduced 80% in 30 days.) OSE II remediates heavy oils.

Environmental Protection Authority New Zealand, Hazardous Substances Division, Benjamin Sowman, (16 July 2012); SOS # 1001797; Determination of the Status of Oil Spill Eater II-Non Hazardous

[1] 2001 *Guidelines for the Bioremediation of Marine Shorelines and Freshwater Wetlands* (http://www.epa.gov/osweroe1/docs/oil/edu/bioremed.pdf)
[1] This description of OSE II mode of action is based on the NCP listed sole sourced product Oil Spill Eater II's field use and test documentation on fresh and weathered hydrocarbons/oil in ocean, fresh water and shoreline environments.

Appendix H

General Instructions for the use of OSE II, on open Oceans, Shorelines/Intertidal zones, seabed, Mangroves/Vegetation, and Birds and Wildlife

Open Water Instructions



P.O. Box 515429
Dallas, Texas 75251
Ph: (972) 669-3390
Fax: (469)241-0896
Email: oseicorp@msn.com
Web: www.osei.us

OSE II General Instructions for Open Water Oil Spill Clean-Up

I. Parameters of contaminated site: Oil release or spill.

II. Calculations: Basic Open water calculations for OSE II followed by an example

A. On a Spill:

I. To determine quantity of Oil Spill Eater II concentrate needed:

1. Use one (1) gallon of OSE II concentrate for every fifty (50) gallons of oil.
   - 1 gallon OSE II ≈ **3.785 liters OSE II**
   - 50 gallons oil ≈ 50 * 3.785 liters = **189.25 liters oil**
   - Therefore, use **3.785 liters of OSE II concentrate for every 189.25 liters of oil.** [1]

B. C. If you know how many gallons or Liters of oil:

2. Use one (1) barrel of OSE II concentrate for every 2,750 gallons of oil.
   - 1 drum OSE II (55 gallons) ≈ **208 liters OSE II**
   - 1 55 gallon drum will clean-up 2,750 gallons oil ≈ 2,750 * 208 liters of OSE II will clean-up = **10,408.75 liters oil**
   - Therefore, use **208 liters of OSE II concentrate for every 10,408.75 liters of oil.** [1]

-OR-

Multiply Gallons of oil (A) x .02 = OSE II concentrate needed

- If you know how many liters of oil:
  - Let 'L_oil' be the liters of oil.
  - Gallons of oil = L_oil / 3.785
  - (L_oil / 3.785) * 0.02 = OSE II concentrate needed (in gallons)
  - To get OSE II concentrate needed in liters: (L_oil / 3.785) * 0.02 * 3.785 = **L_oil * 0.02 = OSE II concentrate needed (in liters)** [1]

C. If you do not know how many gallons or barrels of oil:
x (.0023) = x (.12) =
Barrels of OSE II Concentrate Needed -Or- Gallons of OSE II Concentrate Needed
Multiply: A ( ) Yds x B ( ) Yds x C ( ) Inches Length of Width of Thickness of Oil Slick Oil Slick Oil

- Let A be Length in meters, B be Width in meters, C be Thickness in meters.
  - A (meters) = A (Yds) * 0.9144
  - B (meters) = B (Yds) * 0.9144
  - C (meters) = C (Inches) * 0.0254

Or
Length_____ in meters X width_____ in meters X Depth in mm or cm_____ equals_____ M3, each m3 X 1000 liters equal liters of oil released/spilled.

To determine how much oil is covering a large area. Take these measurements L X W X D, equals a certain number_____ Then visually look at the water that is not completely covered in oil and make an estimated amount of water that is covered, such as 20 percent, or 80 percent.

If you are dealing with a small sheen on the surface of a body of water, and you are using a pump-up hand sprayer, for each gallon of water the sprayer holds add three ounces of OSE II, and spray until the sheen disappears, and repeat until spill is gone.

For larger surface spills, you can use a pressure washer that has a 250- or 500-gallon tank. 500 gallons divided by 50 this equals 10 gallons of OSE II, therefore add 10

gallons of OSE II and fill the rest of the tank until you have 500 gallons of OSE II and water mixture, this will clean up 500 gallons of oil/sheen on the water. Start spraying on the outside edges, and work towards the middle until the spill has disappeared., same for shorelines as well.

This is for example purposes, you can divide a given area of water designated by GPS coordinates into segments 50m long, 100 m long, or 500 m long ect. You may divide an area into multiple plots or areas.

1. You take the calculated area, and such as 1000 X 50 X 1cm equals 500000 liters of oil.

2. 500000 liters of oil divided by 50 (mixing ratio of OSE II 50 to 1) equals 10000 liters of OSE II. Divide 10000 by 208 (208 the number of liters in a drum of OSE II) equals 48.07 or 49 drums of OSE II required for this patch of oil. This is just an example, there will be various size areas, with various amounts of oil in an actual event.

3. 10000 liters of OSE II, each liter of OSE II will be mixed with 50 liters of ocean water, since the area to be cleaned is associated with ocean water.
Application rate of OSE II and Water mixture:

4. The amount of OSE II and water mixture that can be potentially applied, will require noting the size of pump, the diameter of piping and nozzles. There will be a general per hour pump volume discharge rate. This will allow you to take the volume of liquid that can be pumped per minute or hour divided by the volume of OSE II and water that's required, this will give you how long the application of OSE II will require.

III. Materials needed:

1. 49 drums of OSE II



2. 1 or more commercial vessels with firefighting induction or educator systems that can carry 25 drums of OSE II for medium, small to medium-size spills. The more drums that can be carried the less re-supply required. For very large spills multiple vessels will be required with coordination of areas to address, and re-supply of OSE II, fuel, personnel, and sustenance supplies.





3. Each vessel will require a Captain, a spray applicator and two crewmen to manage drums and hoses.

4. 10 water sampling wide mouth jars with Teflon sealed lids, will be needed for water extractions.



5. Ice chest with ice to transport samples to the laboratory.
6. Notebook for observations.
7. Take video and pics as well, note with GPS coordinates.

IV. Procedure:
Note: GPS Coordinates of the areas where OSE II is being applied by each vessel every hour.

The induction/educator system, one hose will be placed and held in place two meters the water to extract non-polluted water below the surface of the water.

1.Stage OSE II, and commercial water vessels approximately 500 meters south of the farthest point the oil has reached. There will be a requirement of enough vessels to cover the width of the spill, as well as one vessel to provide a barrier from oil in the water to the beach, and any oil this potentially flowing to the beach will be addressed first. More than one truck may be used as well.
Note: all induction/educator systems will be set at 2% which is a 50 to mixing ratio, and then goal is to get one liter of the OSE II and water mixture applied to each liter of oil in the water.

2. The induction/educator system, one hose will be placed and held in place two meters below the surface of the ocean water to extract non polluted water, the second hose will be placed directly into a container of OSE II. When the OSE II is depleted in a container move

the hose to a new container of OSE II.
3. Apply OSE II to the oil patches until they dissolve, then move to the next patch of oil until all patches of oil have been addressed.

4. It is visually observable when there has been enough OSE II and water applied to a patch of oil, it will break up before your eyes.

NOTE: Before applying OSE II, extract a sample of oil filling a test jar with oil, and test for TPH, which will allow for a starting point of the level of the oil. You will need to verify which TPH test is acceptable for this site's country/state, before tests are conducted.

V. Test requirements:
1. 24 hours after applying OSE II and water to the oil in a given area, and making sure no new re-oiling has occurred, extract 1 or more, 100 ml/g of water from the surface of the ocean where OSE II was applied, and one extraction from 1 meter below the ocean's surface and place extractions into wide mouth jars, label the jars and make note of the extraction area GPS coordinates. Perform extractions every 50 meters from the area where OSE II was applied. Place the labeled jars into the ice chest and transport to the laboratory. Do this for each vessel

VI. Site maintenance:
1. If there are any patches of persistent oil, or re-oiling then apply additional OSE II to the patch of oil until the oils molecular structure has broken down to the point the oil becomes a cloud that disappears.

VII. Observations
1. Make sure, video and pics of setting up for the application of OSE II as well as the OSE II application of OSE II and the effect OSE II has on the oil, the condition of the water 24 hours after applying OSE II, assuming no new re-oiling has occurred.

VIII. Expected results/Conclusion
1. OSE II will break the oil down the oil making it disappear, while detoxifying the oil and causing it to float protecting marine species, the oil smell will be eliminated, and the oil will be permanently removed from the ocean by converting it to CO2 and water, returning each area of ocean to pre spill conditions.

2. Any boom used or oil that may contact vessels can be easily removed with OSE II as well.

Chace Smith

Steven Pedigo

General Instructions for the use of OSE II on Beaches

OSE II General Instructions For Oil Spills

On Beaches/Intertidal Zones

I. Parameters of contaminated site: Oil Spills on beaches or intertidal zones

II. Calculations:

I. To determine quantity of Oil Spill Eater II concentrate needed:

1. Use one (1) gallon of OSE II concentrate for every fifty (50) gallons of oil.
    - 1 gallon OSE II ≈ **3.785 liters OSE II**
    - 50 gallons oil ≈ 50 * 3.785 liters = **189.25 liters oil**
    - Therefore, use **3.785 liters of OSE II concentrate for every 189.25 liters of oil.** [1]

B. C. If you know how many gallons or Liters of oil:

2. Use one (1) barrel of OSE II concentrate for every 2,750 gallons of oil.
    - 1 drum OSE II (55 gallons) ≈ **208 liters OSE II**
    - 1 55 gallon drum will clean-up 2,750 gallons oil ≈ 2,750 * 208 liters of OSE II will clean-up = **10,408.75 liters oil**
    - Therefore, use **208 liters of OSE II concentrate for every 10,408.75 liters of oil.** [1]

-OR-
Multiply Gallons of oil (A) x .02 = OSE II concentrate needed

- If you know how many liters of oil:
    - Let 'L_oil' be the liters of oil.
    - Gallons of oil = L_oil / 3.785
    - (L_oil / 3.785) * 0.02 = OSE II concentrate needed (in gallons)
    - To get OSE II concentrate needed in liters: (L_oil / 3.785) * 0.02 * 3.785 = **L_oil * 0.02 = OSE II concentrate needed (in liters)** [1]

C. If you do not know how many gallons or barrels of oil:
x (.0023) = x (.12) =
Barrels of OSE II Concentrate Needed -Or- Gallons of OSE II Concentrate Needed
Multiply: A ( ) Yds x B ( ) Yds x C ( ) Inches Length of Width of Thickness of Oil Slick Oil Slick Oil

- Let A be Length in meters, B be Width in meters, C be Thickness in meters.
    - A (meters) = A (Yds) * 0.9144
    - B (meters) = B (Yds) * 0.9144
    - C (meters) = C (Inches) * 0.0254
    -

Or
Length_____ in meters X width_____ in meters X Depth in mm or cm_____ equals_____ M3, each m3 X 1000 liters equal liters of oil released/spilled.

To determine how much oil is covering a particular beach, you take measurements, such as we recommend taking 1000 meter long by however wide the average area of width of the oil coverage, and then with a spade dig down to see what the penetration depth of the oil descends to. Take these measurements L X W X D, equal a certain number_____ Then visually look at the beach that is not completely covered in oil and make an estimated amount of beach that is covered, such as 20 percent, or 80 percent. Oil spills are generally surface spills on the sand; it may take several days to weeks for the oil to start penetrating to deeper depths.

Example below

This is for example purpose; you can divide the beach into smaller segment 100 m long or 500 m long. You may divide a beach into multiple plots or areas.

1. You take the calculated area, and such as 1000 X 3 X 1 equals 3000 M3 X the percent of the a of the area covered 30%. 3000 X .30 equals 900m3 of pure oil X 1000 (1000 liters per M3) equals 900000 liters of oil.



2. 900000 divided by 50 equals 18000 liters of OSE II. Divide 18000 by 208 (208 the number of liters in a drum of OSE II) equals 86.5 drums of OSE II.
3. 18000 liters of OSE II, each liter of OSE II mixed with 50 liters of ocean water, since the area to be cleaned is associated with ocean water.

III. Materials needed:

1. 86 drums of OSE II



2. 1 or more 30000 liter water trucks/tanks (the size of the water truck/tank can vary depending on beach access, and distance to apply OSE II required) with suction capabilities to uptake fresh ocean water from the ocean and the capability to uptake OSE II from a 208 liter drum, with a spray applicator, with flow meter, with enough pressure to apply OSE II to the entire area of the designated plots.





3. Each water truck/tank will extract 24500 liters of fresh uncontaminated ocean water from site application area, and then 500 liters of OSE II will be added to the water truck/tank of fresh uncontaminated ocean water from site application area. Rounding up is acceptable for odd amounts of water.
4. A means to stir the OSE II and ocean water mixture
5. 10 sediment jars will be needed for soil sediment extractions.



6. Ice chest with ice to transport samples to the laboratory.

7. Notebook for observations

Note: additional OSE II, and subsequent application of OSE II will be required if additional oiling occurs, or any other chemicals come in to contact with the designated plots.
Note: you want to apply OSE II at low tide in order to get as muc h of the oil removed from the beach while the sea water is out, once the Seawater returns the oil will lift off the sand, float and remediate on the water's surface, and since the oils adhesion properties will be eliminated there will be no reoiling from the oil removed from the sand with OSE II.

IV. Procedure:
1. Stage OSE II, water tanks/trucks with pump hoses, nozzle and dial, near contaminated area for easy access. A nozzle with a gallon dial is absolutely required on the discharge hose of the water tanks/trucks so you will know how much liquid has been applied as well as all the equipment and electrical cords to run all the equipment. The extraction hose will remain in the ocean and will be held to keep from sucking up sediments, while extraction process occurs. The water truck/tank may need to be refilled several times to complete the OSE II application. More than one truck may be used as well.
Note you will extract 24,500 liters of water and add 500 liters of OSE II to the water truck/tank, and mix.

2. Apply OSE II to the oil patches until they dissolve, then move to the next patch of oil until all patches of oil have been addressed.
3. If the tide does not rise to the oil patches, you may have to go back and fill the water truck/tank with water and wash the soil to separate the oil from the beach sand.

NOTE: Before applying OSE II, extract a sample of oil filling a test jar with oil, and test for TPH, which will allow for a starting point of the level of the oil. You will need to verify which TPH test is acceptable for the country of the spill site, before tests are conducted.

V. Test requirements:
1. 4 days after applying OSE II and water to the site, and making sure no new re-oiling has occurred, extract 1, 100 ml/g of soil from the surface of the sand, and one extraction from 25 cm is extracted into wide mouth jars, label the jars and make note of the extraction area GPS coordinates every 25 meters of the beach. Place the labeled jars, into the ice chest, and transport to the laboratory.

VI. Site maintenance:

1. If there remain patches of persistent oil, or re-oiling, then apply additional OSE II to the patch of oil until the oils molecular structure has broken down to the point the oil becomes like a liquid loses its adhesion properties and lifts off the sand.

VII. Observations
1. Make sure video and pics of mixing, OSE II application of OSE II and the effect OSE II has on the oil, and the condition of the beach 4 days after applying OSE II, assuming no new re-oiling has occurred.

VIII. Expected results/Conclusion
1. OSE II will break the oil down, detoxifying the oil and separating it from the sand, eliminating the oils adhesion properties leaving a clean non oily beach, the oil smell will be eliminated, and the beaches will be returned to pre spill conditions.

Chace Smith
Steven Pedigo

OSE II General instructions for Mangroves covered in oil/hydrocarbon or hydrocarbon-based material Clean-up

I. Parameters of contaminated site: Where there is a scenario with mangroves covered in oil, fuel or hydrocarbons or hydrocarbon-based material, you would measure from the top of oiled area of the mangrove, also insuring to take into account any subsea oiling, to gain the depth of the coated mangroves, then simply measure the length and the width of the spill. This will allow the responder and or officials to determine the extent of the spill area.

This is an example: The spill being dealt with will use the same calculations, just different measurement.
The next item to discover is what type of hydrocarbons have been released or spilled. Light ends hydrocarbons (C1 to C22) will be handled with direct application of OSE II and water mixture, and wait 20 minutes and rinse with no mixed ocean water, or fresh water if in a freshwater scenario. When you move into heavy end hydrocarbon (C22 to C60), there will be light mist application of OSE II, wait 15 minutes then a full application of OSE II, wait 20 minutes then a rinse.
NOTE: This is a video link of OSE II cleaning up a 550,000-liter spill in Nigeria covering Shoreline/beaches, Mangroves, and open Atlantic ocean water.
http://www.osei.us/archives/1519

II. Calculations: To determine how much oil is covering a particular area of Mangroves, you take measurements, such as we recommend taking 50 meter long by however wide the average area of width of the oil covering Mangroves, measuring the average height the oil has risen to on the branches of the Mangroves . Take these measurements L X W X H/D, equals a certain number_____ Then visually look at the area of Mangroves plotted that is covered in oil and make an estimated amount of Mangroves that are covered, such as 20 percent, or 80 percent ect.

These instructions are for example purpose, you can divide the Mangroves into smaller segment 10 m long or 500 m long. You may divide the Mangrove areas into multiple plots or areas.

1. You take the calculated area and such as 50m X 4m X 1m equals 200 M3 X the percent of the a of the Mangroves covering the area to be addressed, actually covered 60% of the area. 200 X .60 equals 120m3 of pure oil X 1000 (1000 liters per M3) equals 120000 liters of oil.





Mangroves vary in patterns of growth sometimes in the tidal zone and sometimes off

set from the tidal zone. Basically, the calculations are depicted to give you an idea of the potential amount of oil coating mangroves, and how to calculate the potential amount of oil coating mangroves, understanding the most basic principal with OSE II, is to get a 1 to 1 application rate of OSE II mixed with natural water applied to the oil, whether it is on Mangroves, soil/beaches, or open water. 1 liter of mixed OSE II and water to 1 liter of oil.

2. 120000 divided by 50 equals 2400 liters of OSE II. 2400 divided by 208 (208 the number of liters in a drum of OSE II) equals 11.53 or 12 drums of OSE II.
3. 2400 liters of OSE II, each liter of OSE II will mixed with 50 liters of ocean water for ocean water settings, brackish water for brackish water setting or fresh water for fresh water settings.

NOTE: The goal is to get 1 gallon or 1 liter of mixed OSE II and water applied to each gallon or liter of spilled oil, fuel, hydrocarbons or hydrocarbon based material.

III. Materials needed:
1. 12 drums of OSE II



2. 1 or more commercial vessels that can be utilized in shallow water, that can contain 6 or more drums of OSE II. The commercial vessel can have a pumping system or preferably an educator or induction system, with a 50 meter hose and nozzle for application of OSE II with 1000 PSI or preferably greater







2. Each vessel that has a tank for mixing OSE II there will be 50 liters of water extracted for of fresh uncontaminated ocean water from site application area, for each liter of OSE II therefore, 1 liter of OSE II will be added to the tank for each 50 liters of fresh uncontaminated ocean water from site application area. Rounding up is acceptable for odd amounts of water. A 1000 liter tank will contain 20 liters of OSE II and 980 liters of water. If an Eductor or induction system is used, one hose will go below the surface of the area where

3. the water is not polluted, and the other hose into the OSE II container, the educator or induction system will be asset at 2% and then you spray.

4. A means to stir the OSE II and ocean water mixture in the tank

5. 10 or more sediment jars will be needed for extracting samples of oil from the mangroves.



6. Ice chest with ice to transport samples to the laboratory.

7. Notebook for observations.
Note: additional OSE II, and subsequent application of OSE II will be required if additional oiling occurs, or any other chemicals come in to contact with the designated plots.

IV. Procedure:
1.Stage OSE II, vessels with pump hoses, nozzle and dials, near contaminated area for easy access. A nozzle with a liter dial is required on the discharge hose of the water tank or educator/induction system, so you will know how much liquid has been applied as well as all the human labor. The extraction hose will remain in the ocean, and will be held to keep from sucking up sediments, while extraction process occurs. The water tank or educator/induction system may need to be refilled several times to complete the OSE II application. More than one vessel may be used as well, depending on how many are available, how many can be supplied, and the time required to apply OSE II to the entire spill.
2. Apply OSE II to the oil patches on the mangroves root system, and branches heavily, then move to the next set of Mangrove branches of oil until all the oil on the Mangroves has been addressed.
3. 20 minutes after applying the OSE II and water, the vessel needs then, to use clean non polluted ocean water to rinse the Mangroves, all the oil should be removed at this point. In some cases a second application may need to be utilized, since Mangrove application of OSE II is on vertical surfaces, the OSE II my not be able to penetrate all the oil before it starts to slide down the branches as the oils adhesion properties diminish, creating the need for a second application

NOTE: Before applying OSE II, extract a sample of oil filling a test jar with oil, and test for TPH, which will allow for a starting point of the level of the oil. You will need to verify which TPH test/s are acceptable for the country of the spill. before tests are conducted. EPA Method 8015D or EPA method 8260 may be a good start.
V. Test requirements:
1. 7 days after applying OSE II and water to the site, and making sure no new re-oiling has

occurred, Extract 1, 100 ml/g of soil from the surface of the sand, and one extraction from 25 cm is extracted into wide mouth jars, label the jars and make note of the extraction area GPS coordinates every 25 meters of the beach. Place the labeled jars into the ice chest and transport to the laboratory.

VI. Site maintenance:

1. If there is any patches of persistent oil, or re-oiling then apply additional OSE II to the patch of oil until the oils molecular structure has broken down to the point the oil becomes like a liquid.
2.

VII. Observations

1. Make sure video and pics of mixing, OSE II application of OSE II and the effect OSE II has on the oil, and the condition of the Mangroves that have been addressed with OSE II, 7 days after applying OSE II, assuming no new re-oiling has occurred.

VIII. Expected results/Conclusion

1. OSE II will break the oil down and separate it from the Mangroves leaving a clean non oiled Mangrove roots, branches and leaves, the oil smell will be eliminated, and the Mangroves will be returned to pre spill conditions.

These are pictures of Mangrove clean up in Nigeria with OSE II

Before applying OSE II





Applying OSE II to sensitive Mangroves, a protective species of Plants due to their ability to control erosion.









After Applying OSE II, the Mangroves free of oil and none of the Mangrove plants died, these natural resources were protected with OSE II.









Chace Smith
Steven Pedigo

Protocol for Brazil Major Oil Spill October 2019
Subsea Injection of OSE II

I. Parameters of contaminated site: Currently in Brazil there are 26 beaches contaminated with oil, and there is a large amount of oil in the ocean as well, and now the oil is settling on the seabed, coral and breeding grounds for bivalve marine species, who dwell on the seabed. The oil has been weathered and whipped into a consistency of Mousse.

II. Calculations: To determine how much oil is covering a large area. Take these measurements L X W X D, equal a certain number_____ Then visually look at the seabed that is not completely covered in oil and make an estimated amount of seabed that is covered, such as 20 percent, or 80 percent.

This is for example purpose; you can divide a given area of seabed designated by GPS coordinates into segments 100 m long or 500 m long. You may divide an area into multiple plots or areas.

1. You take the calculated area, and such as 100 X 50 X 1cm, equals 100000 liters of oil. Note, one can develop any size plots, the plot denoted above is for an example as to how volume of contaminant is calculated. Next visually determine how much of the subsea bed is covered in oil, 20 or 30 or 80%, for this example we will use 50% , 50% of 100000 equals 50000 liters of oil.

2. 50000 liters of oil divided by 50 (mixing ratio of OSE II 50 to 1) equals 1000 liters of OSE II required. Divide 1000 by 208 (208 the number of liters in a drum of OSE II) equals 4.8 or 5 drums of OSE II required for the patches of oil on the seabed in this example. This is just an example, there will be various size areas, with various amounts of oil.
3. 1000 liters of OSE II, each liter of OSE II mixed with 50 liters of ocean water, since the area to be cleaned is associated with ocean water.

III. Materials needed:

1. 5 drums of OSE II



2. 1 or more commercial vessels with firefighting induction or educator systems that can carry 25 drums of OSE II, with 100-meter hose and nozzle, for underwater application with 1000 psi or greater.





https://www.oceaneering.com/datasheets/SDS-Thermoplastic-Hose-Umbilical-A4.pdf



3. Each vessel will require a Captain, a spray applicator and two crewmen to mange drums and hoses, and 4 divers.

5. 10 water sampling wide mouth jars with Teflon sealed lids, will be needed for water extractions extractions.



6. Ice chest with ice to transport samples to the laboratory.
7. Notebook for observations.

IV. Procedure:

Note: GPS Coordinates of the areas where OSE II is being applied by each vessel, and each diver every hour.

The induction system, one hose will be placed and held in place two meters the water to extract non polluted water below the surface of the water to mix with OSE II, and one hose will be set in the container of OSE II.
1.Stage OSE II, and commercial water vessels approximately 500 meters south of the farthest point the oil has reached. There will be a requirement of enough vessels to cover the width of the spill, as well as one vessel to provide a barrier from oil in the water to the beach, and any oil this potentially flowing towards the vessels will be

addressed before it gets to the beaches and will be addressed first. More than one vessel with divers may be used as well.

Note: all induction/educator systems will be set at 2% which is a 50 to mixing ratio, and then goal is to get one liter of the OSE II and water mixture applied to each liter of oil on the seabed.

2. The induction/educator system, one hose will be placed and held in place two meters below the surface of the ocean water to extract non polluted water, the second hose will be placed directly into a container of OSE II. When the OSE II is depleted in a container move the hose to a new container of OSE II.

3. Apply OSE II to with a slight stream to contact the oil patches until they dissolve, then move to the next patch of oil until all patches of oil have been addressed.

4. It is visually observable when there has been enough OSE II and water applied to a patch of oil; it will break up before your eyes and start to lift off the seabed.

NOTE: Before applying OSE II, extract a sample of oil filling a test jar with oil, and test for TPH, which will allow for a starting point of the level of the oil. You will need to verify which TPH test is acceptable for the country of Brazil before tests are conducted.

V. Test requirements:

1. 24 hours after applying OSE II and water to the oil in a given area, and making sure no new re-oiling has occurred, Extract 1, 100 ml/g of water from the surface of the ocean where OSE II was applied, and one extraction from 1 meter below the oceans surface and place extractions into wide mouth jars, label the jars and make note of the extraction area GPS coordinates. Perform extractions every 50 meters from the area where OSE II was applied. Place the labeled jars into the ice chest and transport to the laboratory. Do this for each vessel

VI. Site maintenance:

1. If there is any patches of persistent oil, or re-oiling then apply additional OSE II to the patch of oil until the oils molecular structure has broken down to the point the oil becomes a cloud that lifts off the seabed and disappears.

VII. Observations

1. Make sure, video and pics of setting up for the application of OSE II, OSE II application of OSE II and the effect OSE II has on the oil, and the condition of the water 24 hours after applying OSE II, assuming no new re-oiling has occurred.

VIII. Expected results/Conclusion

1. OSE II will break the oil down the oil making it disappear and lift off the seabed, while detoxifying the oil and causing it to float protecting marine species, the oil smell will be eliminated, and the oil will be permanently removed from the ocean by converting it to CO2 and water, returning each area of ocean where OSE II has been applied, to pre spill conditions.

Chace Smith
Steven Pedigo

General instructions for oil that has deposited onto the seabed, which requires subsea suction of heavy weathered oil that needs some mechanical processing with the application of OSE II on the oil spill

General Instructions for
Of Subsea Suction/Mechanical processing with OSE II

I. Parameters of contaminated site: Beaches contaminated with oil, and there is a large amount of oil in the ocean as well, and now the oil is settling on the seabed, coral and breeding grounds for bivalve marine species, who dwell on the seabed. The oil has been weathered and whipped into a consistency of Mousse.

II. Calculations: To determine how much oil is covering a large area. Take these measurements L X W X D, equals a certain number_____ Then visually look at the seabed that is not completely covered in oil and make an estimated amount of seabed that is covered, such as 20 percent, or 80 percent.

This is for example purpose; you can divide a given area of seabed designated by GPS coordinates into segments 100 m long or 500 m long. You may divide a an area into multiple plots or areas.

1. You take the calculated area, and such as 100 X 50 X 1cm, equals 100000 liters of oil. Note, one can develop any size plots, the plot denoted above is for an example as to how volume of contaminant is calculated. Next visually determine how much of the subsea bed is covered in oil, 20 or 30 or 80%, for this example we will use 50% , 50% of 100000 equals 50000 liters of oil.

2. 50000 liters of oil divided by 50 (mixing ratio of OSE II 50 to 1) equals 1000 liters of OSE II required. Divide 1000 by 208 (208 the number of liters in a drum of OSE II) equals 4.8 or 5 drums of OSE II required for the patches of oil on the seabed in this example. This is just an example, there will be various size areas, with various amounts of oil.

3. 1000 liters of OSE II, each liter of OSE II mixed with 50 liters of ocean water, since the area to be cleaned is associated with ocean water.

4. Oil that is sucked off the seabed will be dosed with OSE II at a 2% ratio or 50 to 1 into the suction end of the suction hos

III. Materials needed:

1. 5 drums of OSE II



2. 1 or more commercial vessels with firefighting induction or educator systems and a minimum 5hp trash/sludge pump that will grind/break up semi solids and solids, and a dosing pump with a trigger to control both pumps or just the dosing pump, that can carry 25 drums of OSE II, with 100-meter hose and suction nozzle, for underwater extraction of oil patches.







3. Each vessel will require a Captain, a 5-horsepower trash/sludge pump that breaks up solids and two crewmen to manage drums and hoses, and 4 divers.

4. The suction hose will have a trigger at the suction end of the hose that controls the main pump and the dosing pump so that when the diver is not sucking up oil, the trigger will be rereleased and both pumps will stop pumping, and when the trigger is activated the two pumps will turn on, and suction and dosing will start. It is possible the trigger may only be required for the dosing pump, and the main pump continuously sucks water.

5. 10 water sampling wide mouth jars with Teflon sealed lids, will be needed for water extractions.



6. Ice chest with ice to transport samples to the laboratory.

7. Notebook for observations.

IV. Procedure:
Note: GPS Coordinates of the areas where the oil is being sucked off the seabed, and OSE II is being applied by each vessel, and each diver every hour

The minimum 5 hp trash/sludge pump that breaks up solids, will have a 100 foot suction hose with a tube from a dosing pump that can be set to inject OSE II at a 2% ratio attached to the end of the 100 foot hose, where the end of the dosing pump discharge hose will end next to the suction end of the main pumps hose of the trash/sludge pump. The dosing pump will have its suction hose set in a container of OSE II, which will supply the discharge hose with OSE II to the main suction pump. The diver will find patches of oil and place the suction hose over the patch drawing it into the suction hose, while simultaneously dosing the oil with OSE II. The suction end of the hose will need a trigger to start the pump, to suck up the oil, and when the diver is not sucking up the oil, the trigger will be released stopping the dosing pump and the main pump. It is possible to have a trigger to just start and stop the dosing pump and leave the suction pump, sucking just water when it is not extracting oil.

1.Stage OSE II, and commercial water vessels approximately 500 meters south of the farthest point the oil has reached. There will be a requirement of enough vessels to cover the width of the spill, as well as one vessel to provide a barrier from oil in the water to the beach, and any oil this potentially flowing towards the vessels will be addressed before it gets to the beaches and will be addressed first. More than one vessel with divers may be used as well.
Note: The dosing systems will be set at 2% which is a 50 to 1 mixing ratio, and then goal is to get one liter of the OSE II and water mixture applied to each liter of oil on that is extracted from the seabed, where the discharge will be a broken down physically and molecularly oil that is no longer impacting the environment.

2. The end of the suction hose with the end of the dosing pump will be brought close to a patch of oil, the trigger will be pulled and the dosing pump will start dosing, or both pumps will be started, at which point the hose is brought close enough to the oil to extract it from the seabed, extracted as litter seabed/sediment as possible. As the OSE II is depleted the suction end of the dosing hose will need to be transferred to a new container of OSE II.

3. The extracted oil will be dosed with OSE II and broken down molecularly, while the extracted material will then pull through the trash/sludge pump the will break down any solid or semi solid material further mechanically discharging the detoxified broken-down oil, where it will then be converted to CO2 and water, permanently removing the oil from the environment.

4. It is visually observable to see the patches of oil removed from the seabed and the discharged detoxified oil molecularly broken down to fine particles that will no longer adversely impact the seabed.

NOTE: Before extracting the oil from the seabed, extract a sample of oil filling a test jar with oil, and test for TPH, which will allow for a starting point of the level of the oil. You will need to verify, which TPH test is acceptable for the country of Brazil before tests are conducted.

V. Test requirements:

1. 24 hours after applying OSE II and water to the oil in a given area, and making sure no new re-oiling has occurred, Extract 1, 100 ml/g of water from the surface of the ocean where OSE II was applied, and one extraction from 1 meter below the ocean's surface and place extractions into wide mouth jars, label the jars and make note of the extraction area GPS coordinates. Perform extractions every 50 meters from the area where OSE II was applied. Place the labeled jars into the ice chest and transport to the laboratory. Do this for each vessel

VI. Site maintenance:

1. If there is any re-oiling then extract these areas of oil as well, apply breaking down and detoxifying the oil with OSE II until the oils molecular structure has broken down to the point the oil becomes a cloud that lifted off the seabed and disappears.

VII. Observations

1. Make sure, video and pic's of setting up for the application of OSE II, OSE II application of OSE II and the effect OSE II has on the oil, and the condition of the water 24 hours after applying OSE II, assuming no new re-oiling has occurred.

VIII. Expected results/Conclusion

1. OSE II will break the oil down the oil making it disappear as the oil is extracted from the seabed, while detoxifying the oil and causing it become very fine particles that will be caused to hydraulically lift protecting marine species, the oil smell will be eliminated, and the oil will be permanently removed from the ocean by converting it to CO2 and water, returning each area of ocean where the extracted oil dosed with OSE II has been applied, to pre spill conditions.

Chace Smith

Steven Pedigo

Appendix I

Global, US RRT IV/NRT First Response OSE II WORK PLAN UTILIZING OSE II EXAMPLE

(applicable for all RRT's) Global responses as well

Work plans are important to ensure the safe, coordinated, and well documented implementation of OSE II first response bioremediation. Work plans are comprised of systematic procedures and guidelines that clarify and resolve issues such as worker and public safety, documentation requirements, response personnel roles and responsibilities, treatment technique agent application protocols, and application control and oversight considerations. Complete Work plans must include spill and site specific considerations. It is essential in a response that every incident or event be managed according to a plan and OSE II bioremediation is no exception.

The Work plan shall provide:

- A clear statement of objectives and actions.

OIL SPILL Eater II's objective in every spill scenario is to address and remove as close to 100% of the spill as possible remediating the spilled

Hydrocarbon or hydrocarbon-based pollutant to CO2 and water, permanently removing the spill from the environment as per the Clean Water Act requirement and public expectations Globally.

- A basis for-measuring work effectiveness and cost effectiveness, which has been carried out on numerous real-world spills globally.

OSE II requires $2.00 to 8.00 of OSE II for each gallon spilled that Oil Spill Eater II is applied to as of 5/15/2020 depending on oil type, which is still more economical than any other in the world that can permanently remove oil from the environment. The work effectiveness will be readily observable, since areas where OSE II has been applied correctly, the oil will be breaking up and separating from the shoreline marsh grass, etc, or in the case of open water spills the oil droplets become so small they become difficult to visually see. An area where the oil would not be breaking up would stand out and could be easily addressed by spraying OSE II to the oil that has not been addressed.

- A basis for measuring work progress and for providing accountability.

The visual observations of the oil breaking down and lifting from shorelines or

disappearing into small droplets in the open waters could be readily viewed. If the oil is not breaking down, then redirecting crews to address these areas with OSE II is easily accomplished.

Plans should be prepared for specific time periods or operational periods.
These periods can be of various segments of time. Decisions on the length of the operational period or time segments may be affected by the length of time
available/needed to achieve objectives, the availability of resources, environmental considerations, and safety considerations.

Essential parts of any Work plan:
1. Statement of objectives - Statement of what is expected to be achieved. Objectives must be measurable.
OIL SPILL Eater II's objective in every spill scenario is to address as close to 100% of the spill as possible remediating the spilled
hydrocarbon based pollutant to CO2 and water permanently removing the spill from the environment as per the Clean Water Act, and the Global publics expectations, this can be readily viewed, or GC/MS testing can be carried out if needed as well.

2. Organization - Describes what organization will be in place. This will describe in detail the specific roles and responsibilities of the participants in OSE II application technique. This will also describe the interaction of one entity to another.
The OSEI Corporation will provide a project supervisor, and one consultant for each area polluted by a spill, areas being shoreline, open water areas, marshes, estuaries, and special areas. These OSEI Corporation personnel or consultants will oversee each section of the spill (such as the ongoing source of the well blow out for the BP Deepwater Horizon spill). There will be a consultant (deployment manager) that will also make sure, the logistics of staging and supplying application vessels water based or land based are supplied with OSE II in a timely manner. For larger spills this could require two consultants, and for larger spills over 10,000,000 gallons the number of consultants supplied by the OSEI corporation would be roughly two per 10,000,000 gallons of oil spilled.

3. Tactics and assignments - Describes tactics and control operations and what resources will be assigned. If the application is a large one, resource assignments may be done by groups.
There will be water-based vessels for open water spills as well as aerial application, for shorelines land based, and shallow watercraft with fire-fighting induction systems will be utilized, marsh and estuaries, shallow watercraft with minimal pressure spray application

will be utilized. The leading edge of a spill nearest to the shoreline will be address first since it is closest to land fall to prevent the spill from impacting the shoreline.

4. Supporting material - Examples include a map with specific GPS coordinates and based on current and wind, GPS coordinates of areas that are expected to be contaminated due to oil movement or sketch of the area(s) to be treated, communications, traffic plan, weather data, special precautions, and safety information.
Satellite mapping with average depth of oil analysis will be carried out as well to determine the amount of oil in any given hectare/acre/coordinate's areas, open water, shoreline, marshes, or tidal flats. Communications covering the most sensitive areas to be protected first from application of OSE II will be determined and where to place floating curtain booms, since the oil will be caused to float allowing booms to protect inlets, bays, ports, and harbors, as well as sensitive marshes and estuaries.
All supervisory personnel will be familiar with the plan and any changes, which develop throughout the life of the project. This can be accomplished through briefings and by distributing copies of the written plan and any updated changes', s well as through cell phone and satellite phone communications.

The Work plan must include an avenue to provide for ongoing evaluation of the plan's effectiveness.
Supervisors will regularly assess work progress against control operations called for in the plan. If deficiencies are found, improved direction or additional staffing may be required, tactical operations may need to be modified, and/or changes may need to be reflected in planning for the next segment of time. Tactical operations could change from wind or a change in current from an incoming storm, otherwise the plan will be consistent with addressing the shoreline and most sensitive areas first. Demobilization activities, although often overlooked, are an integral part of the Work plan. As the project begins to wind down, everyone will be anxious to leave the scene and return home. Demobilization planning helps to assure a controlled, safe, efficient, and cost-effective demobilization process. This is accomplished by addressing the most sensitive areas and then leading edge of the spill away from the source of possible, and working back to the source, since once you get back to the source it will be near to where vessels and crew disembark to leave permanently.

Demobilization will follow from last vessels and personnel to first vessels and personnel until the site is closed.

Organization

The response structure or organizational framework identifies the participants in a response, their general areas of responsibility, and the lines of authority among them. A chart illustrating the participants in a OSE II response activity in global areas or Region 4/US RRT's and their inter-relationships would be very helpful in summarizing this information. In developing this section, the following questions should be addressed:

* Who will manage the overall OSE II activity?
With OSE II you would need an overall response manager, and open water official, for large spills this would be by areas, and may require more than one official, shoreline, official, ports, and harbor official, marsh and or intake official, official for manmade structures, and the OSEI Corporation would present a counter personnel for the same areas.

- Who will be the likely participants international authorities (e.g. federal and state agencies) in the activity for the Region? What are the general roles?
- Who will be the likely participants, if any, from outside the Region? What are the general roles?

OSEI Corporation counterpart personnel to help direct application areas and actions in concert with international authorities, US federal, state and local officials.

* Who will manage the monitoring portions of the activity?
The official for each of the affected areas will also be able to monitor through observation the oil that has been addressed and is breaking down.

- Who will develop an appropriate Work plan for the OSE II first response bioremediation activity?
-
- The OSEI Corporation will present a plan for each area after satellite
- information has been obtained; however, since OSE II is safe and has no down sides or tradeoffs, the immediate application of 1 gallon/liter of OSE II mixed with 50 gallons/50liters of non-polluted water from near the spill source and then the 1 gallon/liter of mixed OSE II and water application to each spilled gallon/each spilled liter can start while the plan is being developed for the particular case/area. The plan will include materials needed, OSE II and water needed, the entire scope of equipment required, which is minimal and readily available, support vessels and craft, or based on availability, the areas to be addressed first to last, and the step by
-

- step process for each area, the maintenance if any needed for each area, and testing requested by officials, therefore extraction of samples and the ice chest, sampling jars, labeling, and chain of custody forms and courier for samples to be taken to a designated lab. Sample plan attached.
-
- * Who will perform specific treatment method or agent(s) application(s)?
- Certified contractors that can already apply dispersants, except shoreline, sensitive areas, and marsh application will be added at the direction of the OSEI Corporation in concert with an RRT official or designate. These vessels and personnel are already in place for dispersants and the transition to utilizing OSE II is easily carried out.
-
- * Who will perform monitoring?
- *
- The International Authorities or US federal, state, local official or designate to work with the OSEI personnel established for each area of the spill. The same officials overseeing the application of OSE II will be able to carry out a duel role, since you can easily observe the effects of applying OSE II to open water, shorelines, marshes/estuaries, and manmade structures.
-
- * Who will perform public outreach?
- The OSEI Corporation will present information every 8 hours of the response, the reactions of the oil/hazardous substance to the application of OSE II and the areas protected, and estimated time to finish addressing an area.
- Describe in detail the specific roles and responsibilities of the likely participants (RRT, federal and state agencies, and International Authorities
- governments/agencies, non-governmental organizations, responsible parties, etc.) of OSE II activity. The information in this section should coincide with the information presented above on the regional response structure in the US and the global requirements internationally.
-
- The role of the designate to work with each OSEI personnel/consultant will be to oversee the application of OSE II in each segmented spill area. If there is a specific area of concern in a given area, special attention will be given to address it, so the safest most effective outcome of removing the oil from the environment can be obtained. The designate will be able to oversee application and to revisit application areas to monitor the effectiveness of the application and the oil response to the application. If a given area or spot is not reacting accordingly then a further application will need to be performed to make sure 1 gallon/liter of the OSE II and
-

- water mixture is contacting each gallon/liter of oil spilled. OSHA has reviewed the contents of OSE II and has stated there are no concerns with exposure for humans, The US Navy has performed a review of OSE II and has shown that with OSE II there is no need for PPE suites, however gloves and goggles are needed, so responders and officials will be safe without the need for hot chemical suits and respirators. Respirators may be needed initially to protect responders from the oil itself, and the need for this precaution can be gauged by the smell of the oil. Once the smell of the oil is lessened after the application of OSE II has occurred, there is no further need for protective respirators.
-
- **Tactics and assignments**
-
- Tactical direction includes determining the tactics and operations necessary for the selected strategy and determining and assigning the appropriate resources.
- Once the spill volume is determined, and the areas it covers, as well as the direction of currents and wind, the decision to use aerial spray will be determined. The need for resupply vessels for fuel, food, water and OSE II, etc, the number of aerial spray craft, the number of vessels equipped with (firefighting induction systems) spray apparatus like dispersant spray apparatus, the number of shallow water vessels and land-based application vessels will be determined. The number of vessels will be determined to give the spill complete coverage without producing a traffic problem in a given area. A staging area for supplies and OSE II will be established. For large spills this may be numerous areas. An OSEI personnel/consultant will be assigned to each area, with an official designate to work with them for application and monitoring, and test extractions if required, and area maintenance, if needed. They will report back every 4 hours, and adjustments can be made by the OSEI Corporation personnel/consultant, with agreement from the official designate, or the request for a change in procedure can be requested to the OSEI Corporation spill overseer, and then this can be agreed upon with the official designate.
-
- Based on the type of oil, and if the spill event is singular and not ongoing, once the oil has had OSE II applied to it with a one-to-one application of OSE II and water mixture, the oil will start to break up in minutes on the water and reduce to small particles in open water becoming difficult to see. The oil with OSE II applied on the environment, where OSE II's ability is exponentially more effective than in closed laboratory tests as history has proven, should have the oil toxicity reducing quickly, and the adhesion properties eliminated in 10 to 20 minutes. This may take a bit longer if it is Bunker C or a very heavy type of oil or oil in emulsion. (In the case of

- a very heavy oil, 30 minutes after applying OSE II a second application may be needed to force the further breakdown of oil faster, if needed to protect sensitive areas). The importance of adhesion properties reduction is to prevent migratory wildlife from becoming coated in oil. The fact the oil is caused to float prevents the oil from impacting marine species in the water column, the seabed, and its sediments or flora. All during these steps the oil is being converted to CO2 and water, exactly following Mother Nature's own process - just speeding it up.
-
- The plan will be to protect the most sensitive areas, first by applying OSE II to the oil closest to the most sensitive area, along with booming and absorbent barrier strategies, to cut off oil all together from reaching certain areas; then, from an order of first to last of areas that need to be addressed and the vessels, and equipment needed to fulfill a complete removal of the oil from the environment.
-
- Resource assignments should be made for each specific work task. Such Assignments should consist of the kind, types and numbers of resources available and needed to achieve the desired outcomes. The resources for the actual application will be in the various area's response plan developed by the OSEI Corporation once the scope and type of spill have been determined.
-
- Personnel and logistical support factors must be considered in determining tactical operations. Lack of logistical support can mean the difference between success and failure in achieving objectives. There will need to be staging areas for supply, and the personnel to handle the transfer of supply, as well as vessels and their intended use and area. The development of this part of the plan will be derived from the scope and type of oil spilled. The plan can be developed very quickly by the OSEI Corporation based on the facts surrounding the specific spill and will include required materials and equipment.
-
- Supporting Material
-
- Public Safety/Information - Public safety is paramount in any OSE II clean-up project. The following are some suggested actions that should be taken during a spill response to ensure public awareness and protection:
-
- Provide news releases and updates to newspapers, radio, television stations, and neighboring areas that could potentially be impacted by OSE II activities. Be prepared to discuss details regarding the chosen treatment technique in simple lay
-

- terms so the affected public will understand exactly what to expect and what the expected benefits are.
-
- Oil Spill eater II does not contain any hazardous chemicals as per the country of New Zealand's review, and the US Navy's Phase three review, and per the SDS sheet. This means OSE II itself is not a concern; however, direct contact and inhalation of the oil is of concern, and the nonresponders should be asked to keep a safe distance from spill areas, or at least warned of the potential, inhalation and exposure risk with oil spills. Once the application of OSE II is complete in any given area at temperatures above 40°F the oil should be remediated to CO2 and water within 7 to 30 days. At that point the waters would be safe once again for recreational purposes and there would be no residual oil on the sediment to come ashore later, since the oil has been permanently removed. The fish and seabed species would all be safe to harvest, since the oil would have never encroached on their living areas (water column), and or they would have been able to escape the oil's toxicity, since it would be held on the surface and prevented from entering the water column or seabed.
-
- Site/Worker Safety - Worker health and safety is always the foremost concern during any spill response action. Since all oil spill response actions require a health and safety plan and the OSE II bioremediation application is merely a facet of the total spill response effort, the existing health and safety plan should be used for the OSE II application and augmented with the specific safety hazards associated with the OSE II treatment method or application. A section referred to as biological hazards should be included in all health and safety plans associated with oil spill responses where OSE II used as a response tool. This section should discuss the specific health and safety concerns associated with possible exposure to OSE II and include material safety data sheets (SDS) for OSE II that's being used.
-
- At a minimum, the health and safety plan should address the following aspects of
- the OSE II treatment method/monitoring program:
-
- 1. Minimum health and safety concerns:
- Any concerns regarding health and safety would be because of the oil, not OSE II. OSE II is completely non-toxic - you can wash your hands with it and handle OSE II with no harmful life effects.

- 2. Potential hazards during application and monitoring: There are no potential hazards from OSE II itself. There are, however, from the oil, and direct contact, and inhalation with the oil should be avoided. It is recommended that the personnel handling OSE II and applying OSE II should wear goggles and gloves.
-
- 3. Evaluations of those identified hazards:

  Any hazards related to oil spill cleanup with OSE II are solely from the oil itself and not OSE II. Direct contact with the oil should be avoided.

- 4. Actions described to minimize the potential hazards:
- Goggles to avoid gaseous oil vapors should be worn to avoid irritation of the eyes.
-
- A mask should be worn to prevent inhalation of oil vapors. Gloves should be worn to avoid any direct contact with oil.
- For those responders only dealing with the supply line of OSE II to the site, etc., no Haz Mat equipment of any kind is required because OSE II is totally non-toxic and safe for responders just the use of goggles and gloves are warranted.
-
- 5. Response(s) needed if hazard does affect worker(s).
- OSE II, in and of itself, is not a hazardous material and it does not contain any hazardous chemicals. After reviewing OSE II's matrices, OSHA has and the US Navy stated that OSE II does not pose any potential harm to humans. See SDS link https://www.osei.us/wp-content/uploads/OSEI-US-MSDS-updated-10-14-2025.pdf See link to OSHA letter https://www.osei.us/tech-library-pdfs/2011/9-OSEI%20Manual_OSHA.pdf and the US Navy Phase 3 review of OSE II for personnel health and other tests https://www.osei.us/wp-content/uploads/OSE-II-tested-and-utilized-by-the-Navy-In-Norfolk-Virginia.pdf
-
- However, when around an oil spill, we suggest gloves in case of contact with the oil, goggles to protect from oil/gas vapors, and a mask to protect from oil vapors. Neither Chemical respirators nor chemical suits are required. Normal hygienic practices should be carried out. Any gloves or clothing, shoes or boots that come into contact with the oil can be safely cleaned off with OSE II. The oil is the hazard of concern, not OSE II.
-
- The following documents contain guidance on the preparation of health
- and safety plans:
- 1. OSHA 1910.120 and EPA 40 CFR 311,

- 2. USEPA, OERR ERT Standard Operating Procedures,
- 3. NIOSH/OSHA/USCG/EPA Occupational Health and Safety Guidelines,
- 4. ACGIH Threshold Limit Values, and this would be needed for the oil not OSE II.
- 5. Existing local and area contingency plans.

To avoid disturbances to the treated area after treatment, all treated and control sites should be secured by the best achievable means. To avoid possible injury, post warning signs or secure the treated area to differentiate the site from surrounding localities.

Appendix J

Biomonitoring Plan Example

To develop a complete biomonitoring plan we need a spill site and its parameters to be able to address all aspects of a plan. This plan has OSE II incorporated into the plan, as much as possible without a site to work from.

OSE II · CATEGORY EA ENZYME ADDITIVE

Biomonitoring Plan

Ocean Spills — Open Water and Shoreline Habitats

DOCUMENT TYPE	BASIS	REVISION
Field biomonitoring plan	RRT IV model, adapted for OSE II	September 2026 · Ocean module

This plan extracts and organizes the biomonitoring requirements from OSEI Corporation's OSE II First Response Bioremediation Response Plan (RRT IV model, September 2026) for ocean spills. It covers open water, offshore, tidal inlets, and marine shorelines. Freshwater, soil-only, and inland protocols are outside this module except where they inform marine sampling practice.

1. Purpose and Scope

The purpose of this biomonitoring plan is to document the efficacy of OSE II (NCP Product Schedule Category EA, Oil Spill Eater II) on marine oil and to confirm that treatment does not increase adverse impacts to human or ecological health. Monitoring is a required companion to application, not a research-and-development program during an emergency. The source plan states that EPA, EPA RRT VII, and DOI testing and field use have already established that OSE II enhances biodegradation of weathered crude, heavy-in-emulsion oil, and refined dielectric oil.

Scope of this module:

- Open water and offshore slicks, including tidal inlets and approaches to water intakes.
- Marine shorelines: sand and mixed sand-shell beaches, riprap, exposed and sheltered

- tidal flats, scarps and clay platforms, and salt-to-brackish marshes, mangroves, and wetland edges that receive marine oil.
- Treated versus untreated comparison sites within each discrete habitat.
- Qualitative (visual / photographic) and quantitative (chemistry, water quality, optional toxicity) tracks.

Conducting this program does not replace any other monitoring required by the Area Contingency Plan, the FOSC, NOAA SSC, or the natural-resource trustees.

2. Product Context Relevant to Monitoring

OSE II is described in the parent plan as a liquid enzyme-additive concentrate manufactured by fermentation and mixed with biosurfactants, enzymes, and nutrients. When applied, the parent plan states that converters and biosurfactants emulsify and solubilize hydrocarbon structure, reduce adhesion and acute toxicity, and cause treated oil to remain at or return to the surface. Enzymes then create protein-binding sites that catalyze use of the detoxified emulsion by indigenous bacteria, with conversion toward CO2 and water.

Monitoring implications of that mode of action:

- Visual change is expected within minutes to hours (loss of sheen continuity, loss of stickiness, floating micro-droplets). Visual observation is therefore a valid real-time control tool.
- Oil is expected to remain at the surface rather than form a subsurface plume. Water-column sampling is used to confirm that expectation, not to track a designed dispersion cloud.
- Adhesion loss on shoreline means oil may lift and move with the next tide. Shoreline stations must record tide stage and whether oil left the intertidal or remediated in place.
- Because the product is intended to attach to hydrocarbon, dilution in moving water is not treated as a loss of treatment; stations follow the treated slick and the original oiled footprint.

3. Objectives

The parent RRT IV–based plan sets four principal objectives. They are restated here for ocean use.

1. **Efficacy.** Determine whether OSE II accelerates breakdown of the spilled oil relative to untreated oiled controls. Compile chemistry that shows faster loss of target hydrocarbons than natural weathering alone.

2. **Environmental impact.** Measure water-quality and biological indicators throughout treatment. Watch for algae blooms, dissolved-oxygen depletion, ammonia or nutrient spikes, and fish kills. The parent plan states OSE II has not produced eutrophication or ammonia problems across its cited spill history because treated oil is held at the surface and adhesion is reduced so oil does not linger on vegetation.
3. **Endpoints.** Decide when treatment is no longer effective or has met its objective. Endpoints may be refined as the incident proceeds. The parent plan cites typical field removal above 90 percent and timelines of days to a few weeks once oil is contacted, with monitoring generally 30 days or until endpoints, extendable to 3–4 months if residual oil remains.
4. **Comparability.** Collect data under EPA Region 4 (or the governing authority's) sampling SOPs so results can support cost recovery, trustee consultation, and the OSE II use-follow-up archive.

4. Roles and Responsibilities

The FOSC or designated Global Authority owns the monitoring program and may assign a monitoring program manager. Typical assignments for an ocean incident:

Role	Monitoring duties
FOSC / Global Authority	Approves this plan as adjusted to the incident; receives activity and analytical reports; decides reapplication or shutdown.
Monitoring program manager	Specifies QA procedures, sample design, lab contracts, and data review. Ensures resources for QA.
NOAA SSC / scientific support	Advises on habitat selection, sensitive resources, hydrodynamics, and interpretation of chemistry versus weathering.
EPA / laboratory support	May run or oversee bioremediation-related analyses. Confirms methods against NETAC / EPA oil-degradation guidance.
USCG / strike teams	Platforms, documentation, cost tracking. Visual overflight consistent with SMART-style observation where useful.
Trustees (DOI and others)	Identify trust resources and any additional sampling they require. Review data that affect NRDA.
Responsible Party	Funds and staffs sampling under OSC direction; provides spilled-oil reference sample; cooperates on access and chain of custody.
OSEI Corporation / OSRO	Provides application records (mix ratio, gallons, GPS of spray lines, time, sea state). May support extraction logistics. Does not own data interpretation.
State / local agencies	Local water-quality history, closures, and public information. May collect split samples.

5. Plan Design

5.1 Site reconnaissance before sampling design

Before stations are locked, the monitoring manager gathers enough information to confirm that objectives match the site:

- Geographic extent of oiling and of proposed OSE II application, with GPS.
- Habitat map: open water, inlet, sand beach, mixed sand-shell, riprap, tidal flat, marsh or mangrove edge.
- Oil type and group (I–V), weathered versus fresh, and whether emulsion is present.
- Historical water-quality data (nutrients, DO, temperature, salinity) if available; otherwise a background procedure.
- Distribution and seasonality of sensitive habitats (seagrass, oyster reef, bird colonies, intakes).
- Forecast wind, tide, current, and wave climate for the proposed application window.
- Access: vessel, aircraft, and foot; equipment needed for cores versus water grabs.

The extent of the program scales with habitat complexity and sensitivity, not solely with spill volume. Large spills usually need more stations because more habitats are oiled.

5.2 Three comparison populations

Within each discrete habitat, observations and samples are collected from:

- **Uncontaminated, untreated source areas.** Background. Lower sampling intensity is acceptable if the area stays clean.
- **Contaminated, untreated source areas.** Oiled controls. Must not be re-oiled and must not receive OSE II for the life of the comparison.
- **Contaminated, treated areas.** OSE II application footprint.

Treated and untreated oiled sites should be as similar as possible in energy, geomorphology, oil loading, and probability of further oiling. Limit site variability. Record wave action, tidal flushing, currents, boat traffic, and wind exposure because they affect data integrity.

5.3 Habitat-specific notes for ocean incidents

Open water, offshore, tidal inlets, intakes. Treatment is intended to keep oil floating so booming can protect intakes and so the water column and seabed are not the primary receptor. Monitor surface morphology and near-surface water (typically 1–3 ft). Add a mid-depth or near-bottom grab only if there is reason to suspect sinking or a plume. Do not use a SMART dispersant plume protocol as the primary efficacy design; the parent plan cites EPA swirl-flask results showing OSE II is not an effective dispersant and produces hydraulic lift.

Sand, mixed sand-shell, and shell beaches. Monitor surface oiling band, wrack, and subsurface penetration. Prefer cores sectioned in 5 cm increments to a depth that exceeds visible oiling. Record whether treated oil lifts and leaves with the tide or remains as a thin non-adhesive film.

Riprap and man-made structures. Oil may coat faces or sit in voids. Photograph the same marked boulders or panels. Sample interstitial water or scrape only if the OSC requires chemistry; otherwise visual plus photo quadrats are the primary shoreline metric on armor.

Tidal flats. Daily inundation can carry treated, non-adhesive oil off the flat. Sample sediment at low tide and adjacent water on the flood. Flag stations so they can be reoccupied after the tide.

Salt and brackish marsh, mangrove edges. Spray application is the expected method. Do not trample plots. Use boardwalks or work from shallow draft. Watch vegetation coating, sheen in tidal creeks, and DO in poorly flushed basins. The parent plan states OSE II is mixed with local water so indigenous bacteria remain acclimated to ambient salinity.

6. Open-Water Protocol

Use this sequence when OSE II is applied to a marine slick.

1. Pre-application baseline. Photograph the slick from a consistent altitude and heading. Log sea state, wind, current, oil appearance code, and estimated thickness. Collect surface and 1–3 ft water at planned treated and control boxes. Obtain a reference sample of the spilled oil.
2. Application record. Mix ratio in the parent plan is 1 part OSE II concentrate to 50 parts uncontaminated local water, then approximately 1 gallon of mixed solution per gallon of oil contacted. Log start/stop times, spray line GPS, dosage, platform, and weather.
3. Immediate visual watch (0–2 hours). Record breakup of continuous slick, loss of stickiness if oil contacts gear, persistence of floating droplets, and any unexpected subsurface cloud. Photograph on the same heading as baseline.
4. Near-field chemistry. Resample treated and control boxes at 6–24 hours, then on the schedule in Section 8. Screen with TPH; confirm a subset by GC/MS (n-alkanes, pristane, phytane, hopane, target PAHs).
5. Water quality. Temperature, salinity, pH, dissolved oxygen, and Secchi or turbidity at each chemistry station. Nutrients (NH3, NO3, NO2, PO4), BOD, TOC, and COD on the laboratory tier.
6. Wildlife and water-column biota. Log birds, mammals, and fish in the watch area. Note algae blooms or kills. These are decision triggers, not optional remarks.

7. Reapplication decision. If a patch shows no morphological change after a documented contact dose, the OSC may authorize a second pass. Heavy residual and bunker-range oils may need a second application about 30 minutes after the first per the parent work plan.

7. Shoreline Protocol

Use this sequence when OSE II is applied to oiled marine shoreline.

1. SCAT-aligned layout. Divide the segment into treated and untreated plots of similar oiling category and substrate. Mark corners with GPS and durable stakes above expected wash. Photograph each plot from a fixed photo-point.
2. Baseline oiling. Record surface percent cover, thickness, character (fresh, mousse, tar, stain), and subsurface depth. Collect sediment or shoreline material (4–16 oz) and adjacent water (1 L) before spray.
3. Application. Spray to contact residual oil. Log mix, volume, pressure (medium pressure on rock and sand; low pressure on marsh), and tide stage. Keep treated and control plots secured.
4. Short-interval watch. At 15–30 minutes and again on the next low tide, record loss of adhesion, lift of oil off sand, grass, or riprap, sheen leaving the plot, and any pooling in wrack or voids.
5. Cores. Preferred in intertidal and subtidal sediment. Core deeper than contamination and section by 5 cm. Scoop grabs are acceptable only with written width and depth rules in the sampling plan.
6. Marsh and mangrove care. Limit foot traffic. Watch for vegetation recovery and for oil that has lifted into the creek rather than remaining on stems. Poorly flushed basins get extra DO and ammonia checks.

8. Monitoring Activities and Schedule

8.1 Qualitative monitoring

Qualitative monitoring is real-time feedback for operational decisions. It is visual observation supported by photo and video documentation. Observers are assigned and briefed to watch:

- Morphological change in the oil (continuous slick to droplets; loss of tar stickiness; thinning of emulsion).
- Whether treated oil stays at the surface.
- Organism behavior, algae blooms, and fish or invertebrate kills.
- Re-oiling of control plots or contamination of background plots.
-

The parent plan states that OSE II's initial actions are readily observed and that the same visual approach used for dispersant observation can be used, without the worker-exposure concerns associated with chemical dispersants.

8.2 Quantitative monitoring

Quantitative monitoring supports longer-term evaluation. It requires a written sampling plan that includes at least:

- Implementation schedule.
- Objectives and tasks (staging, application, monitoring, sampling, shutdown).
- Project management, including whether the release is one-time or continuing.
- Sensitive areas in or adjacent to sample locations.
- Station IDs, GPS, frequency, and collection methods.
- Chain of custody and QA/QC.
- Water-quality history or the procedure used to set background.

Recommended minimum sample sizes: 1 liter for water; 4 to 16 ounces for sediment or shoreline material. Containers are pre-cleaned jars or bottles with Teflon-lined caps. Place ice in the chest at least one hour before collection. Water grabs are typically collected at 1–3 ft; prevent surface oil from contaminating the bottle as it is lowered.

8.3 Recommended schedule

Adjust intervals to tide, weather, and laboratory turnaround. Do not skip T0 or the first 24-hour visual set.

Time	Open water	Shoreline	Purpose
T0 (pre-spray)	Photo, oil code, water chemistry, WQ	Photo-points, oiling, sediment + water	Baseline
0–2 hours	Visual / photo watch	Adhesion and lift check	Confirm contact and mode of action
6–24 hours	Repeat water chemistry on subset	Next low-tide photo and notes	Early efficacy / unexpected plume
Day 3–4	TPH + WQ; GC/MS on 25% subset	Repeat cores or grabs at same stations	First quantitative comparison
Day 7	Full station set	Full station set	Trend
Day 14	Full station set	Full station set	Mid-point; reapplication review
Day 21–30	Full station set + endpoint review	Full station set + endpoint review	Typical OSE II field window
Monthly to 3–4 mo.	Only if residual oil remains	Only if residual oil remains	Closeout or extended residual

Sampling at each site, depth, and time is performed in duplicate for 10 percent of samples. Ten percent of stations are sampled and analyzed in triplicate to assess environmental variability.

Field and laboratory blanks are at least 10 percent of samples analyzed.

9. Field Monitoring Parameters: Table 1 compiles the field measurements called for in the parent plan for ocean incidents.

Parameter	Matrix	Method / tool	Notes
Oil appearance / cover	Surface, shoreline	Visual code + photo-points	Same heading and tide stage
GPS and time	All stations	Chartplotter / handheld	Reoccupy ±3 m if possible
Weather and sea state	Incident	On-scene log	Wind, waves, current, tide
Temperature	Water	Calibrated probe	Every chemistry station
Salinity / conductivity	Water	Probe	Open water and tidal creeks
pH	Water	Probe	Working range cited for OSE II is 3.5–8.0
Dissolved oxygen	Water	Probe, mid-water and bottom in basins	Trigger if unexplained drop
Turbidity / Secchi	Water	Meter or disk	Open water and inlets
Biological observations	All habitats	Trained observer log	Blooms, kills, oiled wildlife
Microbial counts (optional)	Water / sediment	Heterotroph and hydrocarbon degraders	Follow-up form item; not required at every station

10. Laboratory Analysis Parameters

Use a tiered laboratory approach: inexpensive TPH screening first, then more specific methods on at least 25 percent of samples analyzed to confirm biodegradation rather than physical loss alone. Target marker compounds for oil degradation and weathering include n-alkanes, the isoprenoids pristane and phytane, and the conservative biomarker hopane. Methods should follow EPA / NETAC oil-degradation guidance and the governing authority's SOPs.

Parameter	Matrix	Approach	Recommended methods
TPH / TRPH (screen)	Water, sediment, shoreline	Screen	EPA 418.1 or TCEQ 1005 / EPA 8015 modified as specified by the lab
C17, pristane, C18, phytane; hopane	Water, sediment, shoreline	Confirm	GC and GC/MS; ASTM D3328
Target PAHs / aromatics	Water, sediment, shoreline	Confirm	GC/MS; EPA 8270 or equivalent
NH3	Water, sediment, shoreline	WQ	EPA 350.1, 350.2, or 350.3
NO3	Water, sediment, shoreline	WQ	EPA 353.2 or 353.3
NO2	Water, sediment, shoreline	WQ	EPA 354.1
PO4	Water, sediment, shoreline	WQ	EPA 365.1, 365.2, or 365.3
BOD, TOC, COD	Water	WQ	Standard Methods / EPA equivalents
Toxicity (if required by OSC)	Water, sediment elutriate	Effects	Species and protocol directed by SSC; marine package typically includes mysid and inland silverside or local equivalents

A reference sample of the spilled oil is analyzed periodically to verify laboratory consistency. Quantitative values for the reference oil should not vary by more than 10 percent for selected analytes. Certified reference material is used when available.

11. Quality Assurance

The quality of environmental data used by the OSC is critical. Policy from the parent plan: all activities associated with data collection and derivation are documented thoroughly. The monitoring program manager specifies procedures and provides resources for QA.

- Written sampling plan before the first post-application sample.
- Unique station IDs, GPS, date/time, collectors, tide, and weather on every sheet.
- Chain of custody from bottle to laboratory.
- Pre-cleaned Teflon-lined containers; iced samples; ice loaded at least one hour before collection.
- Field and laboratory blanks ≥ 10 percent of samples analyzed.
- Duplicates on 10 percent of samples; triplicate stations on 10 percent of stations.
- GC/MS confirmation on at least 25 percent of samples analyzed.
- Reference-oil check; selected analytes within 10 percent.
- Protect background plots from oiling and control plots from treatment and re-oiling.
- All data available to the OSC or delegate on request.
- 12. Endpoints and Decision Rules Endpoints are set before application and may be modified as the program proceeds. Recommended ocean decision rules:
- **Operational visual endpoint.** Treated water no longer shows a recoverable slick or adhesive shoreline oil in the application box, and untreated controls still show oiling consistent with natural weathering.
- **Chemical endpoint.** Sustained reduction of TPH and of target alkanes/PAHs in treated stations relative to paired untreated stations, with hopane-normalized ratios used to separate biodegradation from physical removal where the SSC requests it.
- **Water-quality endpoint.** No treatment-attributed DO collapse, ammonia spike, or bloom beyond what the oil alone would produce. Unexplained WQ change triggers pause and SSC review.
- **Wildlife trigger.** Fish kill, unusual bird or mammal distress in the treated box, or trustee concern stops further application in that box until the OSC decides.
- **Closeout.** OSC declares the tool no longer needed when endpoints are met or when additional application will not change the residual. Demobilize sampling after the closeout round plus any trustee split samples.
-

The parent plan's stated field expectation is generally more than 90 percent hydrocarbon removal where oil has been contacted, often within about 30 days, with longer times in cold water or on heavy residual. Those figures are planning assumptions, not a substitute for incident-specific chemistry.

13. Documentation and Reporting

13.1 Activity reports

Prepare an activity report whenever work is done on a site. Include description of the area, weather, unique observations, activities, and names and affiliations of persons on site. Application logs (mix, volume, GPS lines, platforms) attach to the same day's report.

13.2 Analytical reports

Laboratory packages are interpreted in a short summary for the OSC: methods, deviations, treated-versus-control comparison, and whether endpoints are approaching. Raw data remain available.

13.3 Use follow-up form

Complete one OSE II Bioremediation Use Follow-Up Form per unique activity and file it with the OSC and the OSEI information archive so later decision makers have case data. Minimum fields:

Block	Content
A. Spill information	Event, date, location (offshore / coastal / wetland edge), product, amount, reason for bioremediation, age of oil at application.
B. Agent information	OSE II, Category EA, NCP listed, vendor OSEI Corporation, P.O. Box 515429, Dallas, TX 75075, (972) 669-3390. Effectiveness 1–10 versus control for visual and for chemistry; method (GC, GC/MS, TPH). Repeat for each application.
C. Site controls	Size and number of test and control sites; security measures.
D. Treatment location	On-water lat/long; shoreline lat/long, type, zone, depth of oiling.
E. Application	Optional microbial counts before/after; who applied; method; dates; wind and waves; concentration and rates; reapplication notes.
F. Monitoring	Schedule and duration; method (foot, boat, air); who monitored; toxicity noted.
G–I. Closeout	Problems, lessons learned, OSC and SSC contacts, form author.

14. Health, Safety, and Public Information

Worker health and safety for monitoring follows the incident HASP. The parent plan states that OSE II itself is handled as a non-hazardous aqueous concentrate (Navy NEHC Level III

review; OSHA correspondence; SDS) and that chemical splash suits and supplied-air respirators are not required for the product. Oil remains the primary hazard. Minimum practice for sampling crews:

- Gloves and eye protection when working near oil or spray.
- Respiratory protection as the HASP requires for oil vapors until odor and vapor risk drop.
- Do not enter treated plots in a way that disturbs stations; post signs or otherwise secure treated and control sites.
- Public messaging: keep bystanders away from fresh oil; explain in plain language that monitoring is comparing treated and untreated oil, not testing an unknown chemical on the public.

SDS and supporting letters cited in the parent plan:

- SDS — https://www.osei.us/wp-content/uploads/OSEI-US-MSDS-updated-10-14-2025.pdf
- OSHA letter — https://www.osei.us/tech-library-pdfs/2011/9-OSEI%20Manual_OSHA.pdf
- Navy Norfolk review — https://www.osei.us/wp-content/uploads/OSE-II-tested-and-utilized-by-the-Navy-In-Norfolk-Virginia.pdf

15. Activation Contacts

If this module is pulled into an incident before a full work plan exists, the parent plan directs the RP or authority to contact OSEI, relay incident characteristics, and obtain a use-authorization package. Monitoring design can start as soon as habitats and oil group are known.

Office	Contact
OSEI Corporation	P.O. Box 515429, Dallas, Texas 75075
Main telephone	(972) 669-3390 · 24/7 as listed in the parent plan
Griffin Pedigo	(214) 563-4129
Robert Pedigo	(469) 223-7452
Email / web	oseicorp@msn.com · www.osei.us

16. Plan Revision

Revise this module when the parent OSE II response plan is revised, when the OSC or RRT issues incident-specific monitoring directions, or when follow-up forms show that a field method is not producing comparable data. Revisions are issued as a dated addendum and circulated with the work plan.

17. Field Quick Card

Print this page for the sampling vessel or shoreline team. It does not replace the written sampling plan.

BEFORE SPRAY (T0)	APPLICATION LOG
Photo-points and oil appearance code	Mix 1:50 with clean local water
Mark treated, control, and background GPS	Target ~1 gal mix per gal oil contacted
Collect spilled-oil reference sample	GPS spray lines, start/stop, platform
Water 1 L + sediment 4–16 oz as designed	Sea state, wind, tide stage
WQ: temp, salinity, pH, DO, turbidity	Keep control plots untreated and un-re-oiled
Ice chest loaded ≥ 1 hour before bottles	Heavy oil: OSC may authorize second pass ~30 min

Watch 0–2 h / next tide	Chemistry tier	Stop / call OSC
Slick breakup; floating droplets	TPH screen all chemistry stations	Fish kill or unusual wildlife distress
Loss of stickiness on gear or sand	GC/MS on ≥ 25% of samples	Unexplained DO drop or bloom
No unexpected subsurface cloud	Markers: alkanes, pristane, phytane, hopane, PAHs	Control plot treated or re-oiled
Repeat photos on same heading	Nutrients + BOD/TOC/COD as scheduled	No visual change after documented dose

Source note

Compiled from OSE II's Comprehensive Oil/Fuel, Hydrocarbon-Based Material Response Plan — OSE II First Response Bioremediation Type Enzyme Additive (September 2026), particularly the Biomonitoring Plan, Field Monitoring Parameters, Laboratory Analysis Parameters (Appendix D/E in that document), Documentation and Reporting, and Bioremediation Use Follow-Up Form. Ocean habitat notes are taken from the Characteristics of Affected Habitats and Implementation sections of the same plan. This module does not replace FOSC, RRT, or trustee direction.

NOTES: