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BIOLOGICAL ENVIRONMENTAL SOLUTIONS

Technical data and instruction regarding Biological spill oil clean up and soil pollution

There are actually 2 ways to solve the shoreline problem.

- 1) First of all while ships, and vessels damp the oil you could be sitting there in a small vessel with drums of OIL SPILL EATER II product (herein after OSE) and if oil escapes you can immediately apply OSE II to the oil with an educator spray system. Most barges, vessels, and fire departments have educator systems.

This is where one line goes into a drum of OSE , and a second suction line goes into the water far enough below the surface to prevent any contaminant getting into the educator. You set the educator at 2% and apply 1 liter of OSE to each liter that has escaped. In a short time, 30 minutes or less in your area, the oil will start to break into small droplets, then the oil water interface will increase. At this time the fire hazard has diminished, the oil will no longer sink, the oil is detoxified to the point it will not kill living organisms so the environment is protected, and ALSO the adhesion properties of the oil will be broken down to the point the oil will not stick to anything especially beaches with sand, rock, gravel, will not stick to vegetation, wooden or metal docks, basically the oil will not stick to anything including birds and marine life.

- 2) The second way to solve the problem is once the oil has come ashore generally in high tide, you allow the tide to go out, then mix OSE in tanks with pumping spray apparatus, or you can use on land educator systems with lines that are long enough to go out into the water, and you apply OSE to all the coated shoreline.

In a short time some of the oil will start to run off, but OSE will molecularly adhere to the oil and cause oil to float up out of the sand, which is OSE causing the oil to float, and this occurs just after OSE breaks down the molecular structure of the hydrocarbon partitioning it into small drops, and then once again the oil water interface will increase or the oil will be solubalized at this point,; which means the oil will be caused to have hydraulic lift, the oil will be detoxified, the fire hazard will be diminished, the oil will be detoxified, which



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means the oil will no longer kill single celled living organisms (which is protecting the environment, which is the main reason you clean up spills) or marine creatures, and most importantly for your case the oils adhesion properties will be diminished which means the oil can run off the sand by applying water after about 30 to 45 minutes or you can let the tide come in and the broken down oil will go out to sea, and become food for the food chain since it will be digested by enhanced single celled bacteria.

OSE also while breaking down oil and hazardous contaminants will rapidly enhance indigenous bacteria to grow rapidly so once the oil breaks down the new bacteria will digest the oil to CO₂ and water. Which means on the beach there will be nothing to pick and haul off the problem will be solved in place. Or we like to point out when someone uses OSE there is no secondary clean up required, its is one application and DONE.

OSE will as I pointed out above break down the molecular structure of hydrocarbons and hydrocarbon based chemicals. The first thing that happens is the oil emulsifies, and then solubalizes, while this is occurring there are over 156 types of enzymes developing thousands of digestive binding sites, and affecting the hydrocarbons structure. While this is occurring OSE has ingredients that rapidly colonize or (grow) indigenous bacteria to large numbers. Once the bacteria run out of the readily accessible OSE nutrients they convert over to the only food source left the broken down hydrocarbons, at which point they attach to the enzymatic binding sites and digest the oil to CO₂ and water.

The hydrocarbons break down is within 30 to 45 minutes unless the temperature goes below 40 F, and this is what you are looking for so the beaches become clean. The converting to CO₂ and water takes longer but is really does not matter once you cannot see the oil any longer.



Storage tank, or **Cargo hull** the process is different.

You need retention time to complete the conversion to CO₂ and water, and with most crude oils it is approximately 21 to 30 days. Because the oil is trapped in a tank there is no where for it to go like in the ocean. Once the process is complete in a storage tank or Cargo hull the effluent can be pumped out on soil, or grass it becomes a good fertilizer at that point, or you can pour it into the ocean it is a good food source for the food chain as well.

In a storage tank you would of course get out everything that you can and there is usually a thick sludge left. there are two ways to clean this up.

1. First you can determine the amount of sludge in cubic meters which will allow us to determine how much OSE to apply with water. You would also need to add additional water depending on the size of the storage container, and the type of contaminant (even type of crude oil) that needs to be cleaned up. You would need to set up an aeration pump to pump air into the liquid for the duration of the clean up of the tank. In approximately 21 to 30 days after applying OSE you can dump the water, it will not hurt or contaminate anything.
2. The second way to clean a cargo hull or storage tank in situations where you do not have the retention time to allow OSE to do its work; you can take diesel or kerosene to cut the sludge pump it out in a storage tank that can be moved to another location and then follow the above instruction off site or in another location with this smaller tank. Once you have pumped out the storage tank especially if they need to do any welding or repairs apply OSE to the entire tanks surface area to lift the oil out of the services, and of the tank and the pours of the metal, and then pump it into the mobile tank with all the sludge. This way there will be no fire hazard since all the oil is gone and any that could not be removed has had its fire hazard diminished.

We have done this type of work for the Chinese petroleum company, and we have done it one time for Petronas.