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Inland Oil Spill Simulation: Shoreline Cleaner Study using CytoSol, a Biosolvent Derived from Vegetable Oil

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A mesocosm simulation of an inland oil spill cleanup was recently performed at the Shoreline Environmental Research Facility (SERF) operated in Corpus Christi by Texas A&M University for the Texas General Land Office. The study was conducted in wave tanks (33 m x 3 m) to simulate mild wave action in rivers, lakes, shipping channels, and harbors prone to oil spills. The purpose of the study was to evaluate and measure the fate of weathered fuel oil after treatment with two shoreline cleaners now licensed in California: the CytoSol Biosolvent, a formulation based on vegetable oil methyl esters, or Corexit, a petroleum-based cleaner made from refined kerosene and surfactants. Gas chromatography was used to quantify the oil remaining on the beach after treatment with the respective cleaners, as well as oil recovered by skimming and oil partitioned into the water column at various distances away from the wave line in each tank. Results have been very encouraging for the use of shoreline cleaners.

The CytoSol shoreline cleaning process was developed and tested in California to aid in the recovery of petroleum from oiled shorelines in ecologically sensitive marine and aquatic habitats like marshes and deltas. The process uses a "Biosolvent" formulated with methyl esters of soybean and other vegetable oils. The methyl esters have a strong solvent activity capable of dissolving weathered crude oil and fuel oil from various shoreline habitats including marshes, tide pools, and marine sediments. In practice, the CytoSol is applied directly to oiled shorelines, vegetation, or structures, and then the dissolved oil/CytoSol mixture was rinsed off with a low-pressure water spray. Extraction efficiencies in the laboratory ranged from approximately 50% to over 90% for the removal of freshly spilled Alaska crude oil from different shoreline substrates. Since the CytoSol has a relatively low specific gravity (0.87), mixtures of the dissolved oil and product float to the water surface for easier recovery with conventional skimmer and boom technologies. Recovered oil/CytoSol mixtures can be recycled as burner fuel for oil fired ships and power plants. The presentation will include marine and aquatic toxicity studies and field trials involving the cleaning of crude oil from oiled mussel beds, oiled marsh plants, an oiled creek bed, and an oiled shoreline along the San Francisco Bay. The CytoSol is licensed by the State of California as a shoreline cleaner for oil spills.