



LAND RESEARCH PROGRAM

DEVELOPING INNOVATIVE SOLUTIONS FOR OIL SPILL CLEANUP

Issue:

The United States produces, distributes, and consumes large quantities of oil every year to fuel our factories, power plants, and homes and provide transportation. From the production, storage, transport, and use of oil, an estimated 18,000–24,000 oil spills are reported, and 10–25 million gallons of oil are spilled annually. These oil releases threaten public health and safety by contaminating drinking water, causing fire and explosion hazards, diminishing air and water quality, compromising agriculture, destroying recreational areas, and wasting nonrenewable resources. Oil spills also have a severe environmental impact on ecosystems by harming or killing wildlife and plants, and destroying habitats and food.

Scientific Objective:

The U.S. Environmental Protection Agency’s (EPA) Land

Research Program in the Office of Research and Development (ORD) is committed to providing environmental managers with the tools, models, and methods they need to better understand the fate and effects of oil spills on ecosystems and to effectively clean them up.

The Land Research Program (LRP) conducts research on:

- Bioremediation
- Mitigation: chemical and biological countermeasures for oil spill cleanup
- Fate and effects of non-petroleum and biodiesel oils in saltwater and freshwater systems
- Flow characteristics of oil spills

Application and Impact:

The research program has improved the ability of environmental managers to predict, evaluate, and respond to

oil spills. Research contributions include the following:

New Dispersant Protocol

Scientists developed a new Baffled Flask Test (BFT) for testing dispersant effectiveness and representing more accurately the over-and-under mixing energy of breaking waves at sea. More information can be found at:

www.epa.gov/nrmrl/lrpcd/rr/projects/56303.htm.

Bioremediation Guidelines

Scientists developed guidelines for the bioremediation of marine shorelines, freshwater wetlands, and salt marshes for use by spill responders. Guidance documents can be found at:

www.epa.gov/oilspill/science.htm

New Treatment Approach

Researchers are developing a new approach to treat vegetable oil spills in freshwater environments.

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science in ACTION

BUILDING A SCIENTIFIC FOUNDATION FOR SOUND ENVIRONMENTAL DECISIONS

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Oil Spill Simulation Model

Scientists developed the EPA Research Object-Oriented Oil Spill (ERO3S) model for use by on-scene coordinators and oil spill response planners. The objective of this model is to develop a multicomponent mass balance-based model for simulating transport of spilled oils with and without dispersant treatments. More information can be found at:

www.epa.gov/athens/research/projects/eros/index.html.

Wave Tank Research

A wave tank at the Bedford Institute of Oceanography in Dartmouth, Nova Scotia, has been used to improve international scientific understanding and responses to oil spills at sea. ORD scientists are involved in this international effort with Fisheries and Oceans Canada. Research has led to improved scientific understanding of the factors affecting dispersant products used to mitigate the effects of oil spills on open waters. More information can be found at: www.epa.gov/oilspill/wavetank.htm.

Tidal Marsh Research

Lock Lake in East Patchogue, New York, is a tidal marsh where EPA scientists study the waterway's natural processes, such as water flow. The research is being applied to understand the impacts of oil spills on tidal marshes. Research at the lake has improved understanding of the characteristics of flow to a marsh, provided data to evaluate subsurface and surface water interactions, determined transport characteristics of spilled and dispersed oil, and led to the development of simulation models to reproduce and predict transport of oil spills. More information can be found at: www.epa.gov/athens/research/field/locklake/index.html.

NCP Product Schedule Support

Research was key to the development of a list of chemicals and other products for use in oil spill cleanup. The list, developed under Subpart J (40 CFR Part 300.910) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), includes current dispersants, surface washing agents, bioremediation agents, and

miscellaneous oil spill control agents. More information is available at:

www.epa.gov/oilspill/ncp.

REFERENCES:

EPA's Oil Program Science and Research Web site: www.epa.gov/oilspill/science.htm.

Haines, J.R., et al. Protocol for Laboratory Testing Of Crude-Oil Bioremediation Products. *Journal of Industrial Microbiology & Biotechnology*, 2003, 30, pp. 107-113.

Haines, J.R., et al. Laboratory Evaluation of Oil Spill Bioremediation Products in Salt and Freshwater Systems. *Journal of Industrial Microbiology & Biotechnology*, 2005, 32, pp. 171-185.

CONTACT:

Albert D. Venosa, Ph.D., EPA's Office of Research and Development, U.S. Environmental Protection Agency, 513-569-7668, venosa.albert@epa.gov

Jim Weaver, Ph.D., EPA's Office of Research and Development, U.S. Environmental Protection Agency, 706-355-8329, weaver.jim@epa.gov

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