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NEW OIL CLEAN-UP TECHNIQUE TESTED

ENVIRONMENT: Novel use of dispersants could mitigate damage from BP spill in the Gulf of Mexico

TO HELP CLEAN UP the growing oil spill in the Gulf of Mexico, BP engineers have begun evaluating a new chemical technique to stop the leaking oil from continuing to reach the ocean surface. They have been testing remotely operated underwater vehicles to inject dispersants directly into the plume of oil jetting out from broken wellhead pipes.

Dispersants are a mixture of solvents, surfactants, and other compounds. They break up the oil into smaller particles that then scatter into the water, where microbes can degrade the oil or ocean currents can carry it away from shore. Planes spray the dispersants onto the ocean surface to break up oil slicks.

"They are trying every tool in the toolbox," says Edward B. Overton, a geochemist at Louisiana State University, of BP's underwater dispersant test. Preventing the landfall of oil is a major goal in any oil-spill response, he says, but is critical in this case because of the crude oil's chemical makeup, which might render it more difficult to clean up.

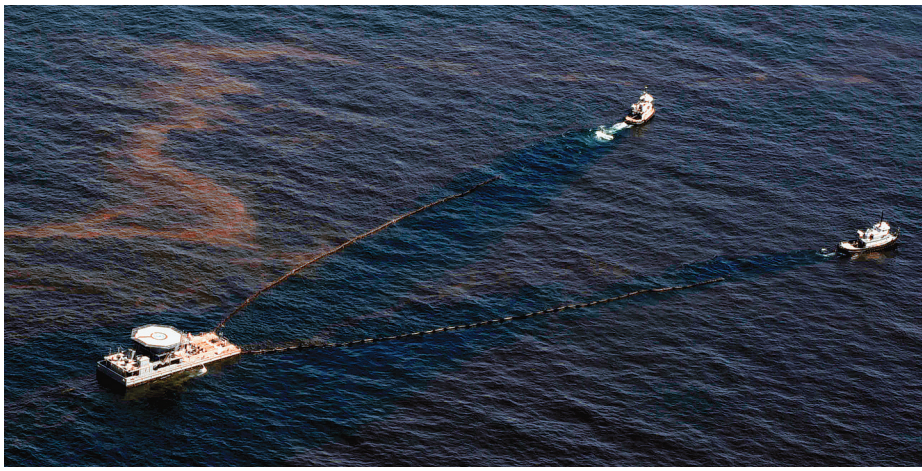
The spill, which has been leaking 5,000 barrels of oil per day from several broken pipes 5,000 feet below the surface, began when the Deepwater Horizon oil exploration platform sank after an April 20 explosion on the rig. Clean-up crews in the Gulf of Mexico have already used more than 190,000 gal of the dispersants, known as Corexit 9500 and Corexit EC9527A, which are produced by Naperville, Ill.-based Nalco.

The firm says it has already provided its full inventory to the clean-up effort and is now working with its raw material suppliers to ramp up production of the two dispersants. Although demand for Nalco's dispersants is a boon for the company, the sales are not likely to add significantly to its overall earnings, according to Laurence Alexander, chemical analyst at Jefferies & Co., a securities and investment banking firm. In a note to investors, he estimated that demand from the clean-up project would add less than 5 cents to the expected earnings per share of $1.36 for the year.

A company spokesman says Nalco hopes to work with BP to inject dispersants at the site of the underground leaks. Federal agencies are evaluating potential environmental hazards of underwater use of dispersants before giving the green light to proceed further.

As for the oil, Overton and coworkers have tested samples for the National Oceanic & Atmospheric Administration. They determined that it contains surprisingly high levels of asphaltenes, oil's high-molecular-weight compounds (C&EN, Sept. 21, 2009, page 12). Asphaltenes promote emulsification, or mixing of oil and water. In a tanker spill, emulsification would happen gradually, as the oil weathers on the ocean surface. But oil from this underwater leak could emulsify as it travels the 5,000 feet to the surface.

AP



The slick near a skimming system appears orange where crude oil mixes with water.

Emulsified oils, or "mousses," float just below the ocean's surface, "like a hot dog floating in water with a little bit of it sticking out and most of it below the water," Overton says. "That's going to slow down evaporation." Less evaporation means that more volatile aromatic compounds—the most toxic chemicals in oil—might remain when the oil hits shore. Emulsified oil also hampers clean-up efforts at the surface because dispersants don't break it up as effectively as they do unmixed oil.

"When you look at photographs of the spill, you see a lot of orange oil out there, and that's emulsified oil," says geochemist Jacqueline Michel, president of Research Planning, in Columbia, S.C., a NOAA contractor for scientific assessment during oil spills. The emulsified oil further complicates the cleanup, she adds, because oil mixed with water nearly doubles in volume.—MICHAEL TORRICE AND MELODY VOITH

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