

Researcher to determine why oil still remains from Exxon Valdez

March 19 2007

Some 18 years after the Exxon Valdez ran aground and spilled nearly 11 million gallons of crude oil into Alaska's Prince William Sound, the oil continues to cause environmental problems along some of Alaska's shoreline. To help determine why the oil continues to linger long after experts predicted it would disappear, Temple University has been awarded a three-year, \$1.2 million grant by the Exxon Valdez Oil Spill Trustee Council.

"Every indication tells us that the oil should have biodegraded," says Michel Boufadel, chair of Civil and Environmental Engineering in Temple's College of Engineering and the principal investigator for the grant. "But what we've seen is there are still plenty of places where the oil still exists."

According to a recent study published in the journal *Environmental Science and Technology*, scientists from the National Oceanic and Atmospheric Administration (NOAA), the U.S. Geological Survey and Alaskan agencies found that oil levels in the sands around the sound are much the same as they were when tests were done five years ago. The study says oil has seeped down 4 to 10 inches.

During the next two summers, Boufadel and graduate students will travel to Prince William Sound for 20 days and 50 days, respectively, to conduct field studies, take samples and try to get an understanding of the motion of the water and effects of the waves along the beaches.

"Our goal is to understand what is happening at the oil-water interface, since that is where the biodegradation of oil typically occurs," said Boufadel, an expert in oil spill remediation. "We will be examining the biodegradation from both sides of that interface — from inside and outside the oil patches." Boufadel said the researchers currently believe that micro-organisms, which would typically consume the oil, may play a key role in the oil's lack of biodegradation along the beaches.

"You would expect that over 17 to 18 years, the micro-organisms that live in water along the beach would eat the oil; that they would consume it completely," Boufadel said. "That did happen at many locations, but at these particular locations that we will be examining, there have been some limitations on that occurring."

Boufadel hypothesizes that the micro-organisms, which live in the water and need other nutrients to be able to consume the oil, may not be getting enough nitrogen, phosphorus or oxygen in order to do that. Or, he adds, a layer or sort of "skin" may have developed around the oil patches, making them impenetrable by the micro-organisms.

Boufadel also believes that environmental factors such as temperature could be inhibiting the micro-organisms. "There may be enough nutrients, but the temperature may be so low that these micro-organisms cannot grow fast enough to consume the oil that lingers on these particular beaches," he said.

As part of the Prince William Sound study, the research team will be using a numerical model developed by Boufadel to account simultaneously for all the factors causing the lack of biodegradation.

Source: Temple University

Citation: Researcher to determine why oil still remains from Exxon Valdez (2007, March 19)
retrieved 23 April 2024 from <https://phys.org/news/2007-03-oil-exxon-valdez.html>

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