

Testimony of David C. Smith, PhD  
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Before the  
Committee on Environment and Public Works  
United States Senate  
Washington, D. C.

“Oversight Hearing on the Use of Oil Dispersants in the  
Deepwater Horizon Oil Spill”  
August 4, 2010

Good morning, I am David Smith, Professor and Associate Dean at the Graduate School of Oceanography, University of Rhode Island. I appreciate the opportunity to testify on this important subject.

The environmental trade offs associated with the use of dispersants in response to oil spills are difficult to assess and therefore their use remains controversial. Dispersants reduce the chances oil will wash ashore and damage coastal habitats by moving the oil from the surface into the interior of the ocean. Dispersants do not remove oil from the ocean and therefore it is important that we not adopt an “out of sight, out of mind” attitude. Moving oil below the sea surface presents significant challenges to the organisms residing in this habitat. Impacts will be less noticeable, but could be as devastating as oil washing ashore.

Ultimately, microorganisms degrade most of the oil spilled into the ocean. Dispersants are presumed to speed up this process by making the oil more accessible. The rate of degradation is a function of many factors including temperature, nutrient concentrations, and the abundance of microorganisms capable of consuming oil. Our entire knowledge on the effects of oil dispersants is from their application at the sea surface. The Deepwater Horizon spill presents a much different scenario where the dispersants were introduced at the wellhead ~1,500 m below the surface. As we continue to extract oil from the deep ocean, it is reasonable to assume that we will face similar scenarios in the future. Therefore, there is an urgent need to understand the ultimate fate of oil dispersed at depth before we continue to apply dispersants in this manner. While we have some understanding of how microorganisms respond to dispersants at the surface, we know nothing of how they do so in the deep-sea. There are far fewer microorganisms in the deep-sea compared to the surface. This, combined with lower water temperatures, will result in a slower rate of degradation, leading to a much more persistent plume of oil in the subsurface. In addition, by keeping the oil away from the surface, the evaporation of the volatile fraction of the oil is eliminated and the probability of entraining oil into the sediments is increased. If

the oil is concentrated into sediments, a lack of oxygen will dramatically decrease the degradation rate leading to long-term contamination of the seafloor.

It will be difficult to assess the changes that will occur as a result of the oil and dispersants on the deep-sea community given our limited knowledge of the pre-spill community structure, particularly with regards to microorganisms. Working in the deep-sea presents many challenges but it is essential to address these if we are to understand the impact of the large-scale experiment that has just been conducted in the Gulf of Mexico and we need to do so quickly.

In light of our lack of knowledge of the environmental effects of dispersants in the ocean, the initiation of a National Research Plan for Oil Spill Response is warranted. This research plan should call for and support, peer-reviewed research in all environmental aspects of oil spill response including the dispersal of oil in the deep-sea. It is critical that the initiative address the following issues:

- The development of a set of best practices for experiments addressing the impact of oil and dispersants in the ocean. This will allow for direct comparisons between types of dispersants, oils and habitats as well as between laboratories conducting the research.
- The establishment of baseline datasets on environmental conditions in the water column and seafloor of oil producing areas of the ocean, including biodiversity, biological production, water current profiles, and sediment characterization.
- The development of long-term ecosystem-level studies of the environmental effects of the use of dispersants including field, mesocosm and laboratory-scale studies.
- The engagement of the nation's academic and government research infrastructure to assist in this endeavor including:
  - Research vessels
  - Undersea robotics
  - Moored instruments
  - Vessels of opportunity
  - Experimental mesocosm facilities
  - Computer modeling facilities
- The development of an online, open-access database to serve as a repository for the scientific community.
- The establishment of a significant outreach effort to disseminate the results of this research to stakeholders outside the scientific community

These efforts should result in the ability to better predict the environmental consequences of dispersants under different scenarios for use in formulating specific emergency response plans.