WRITTEN STATEMENT OF
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HEARING ON
OIL SPILL RESEARCH AND DEVELOPMENT

Before the

THE COMMITTEE ON SCIENCE AND TECHNOLOGY
SUBCOMMITTEE ON ENERGY AND THE ENVIRONMENT
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Good afternoon. I am Dr. Albert D. Venosa, Director of ORD's Land Remediation and Pollution Control Division in EPA's National Risk Management Research Laboratory, Cincinnati, Ohio. It is a pleasure to be here today to discuss EPA's oil spill research program, its past accomplishments, and future research plans.

For the past 20 years, I have led EPA's oil spill research and development program to conduct basic and applied research in both the laboratory and the field in the area of spill response technology development. I was an EPA team leader in the Exxon Valdez bioremediation project in 1989 and 1990. I also conceived and led an important controlled oil spill project on the shoreline of Delaware Bay in 1994[1], which demonstrated statistically that bioremediation with simple inorganic nutrients enhances the biodegradation rate of crude oil on a marine shoreline compared to natural attenuation without amendments. I repeated a similar experiment in 1999[2] on a Quebec freshwater wetland and again in 2001[3] on a Nova Scotia salt marsh in collaboration with our Canadian government partners. In addition to those field studies, I led a research team in developing laboratory protocols to test the effectiveness of commercial bioremediation agents and chemical dispersant products for use in treating oil spills[4-6]. I have conceived and led numerous other studies to understand how best to respond to and mitigate oil spills on land.

The Environmental Threat of Oil Spills

Why does oil spill research need to be continued? From 1980 to 2003, one study[7] (http://www.epa.gov/OEM/docs/oil/fss/fss06/etkin_2.pdf) reported more than 280 million gallons of oil (about 12 million gallons/year) were discharged to the inland waters of the U.S. or its adjoining shorelines in about 52,000 spill incidents. Even though larger oil spills from ocean-going tanker accidents have been on the decline over the last several decades, I believe the number of inland spills will likely increase due to greater emphasis on domestic oil production and higher volume production of alternative fuels such as biofuels, as our nation continues to address its independent energy security needs. Waterborne transportation of oil in the U.S. continues to increase, and the volume of oil spilled from tank barges has remained constant at approximately 200,000 gallons spilled each

year. EPA is also concerned about spills from pipelines and above ground storage tanks that could contaminate surface and/or ground waters. These are the major source of inland oil spills nationwide[7]. So, the spill threat continues even without consideration of domestic alternative fuel development. An oil discharge to the waters of the U.S. can affect drinking water supplies; sicken and/or kill fish, animals, and birds; foul beaches and recreational areas; and persist in the environment, harming sensitive ecosystems. Little is known about the effect of spills of biodiesel, emerging biofuels, or by-products from their manufacture on watersheds. Consequently, research is critically essential not only to continue to find effective ways to mitigate and respond to petroleum spills but also to understand the potential adverse human and environmental consequences of alternative fuels and non-petroleum oils and to develop effective clean-up tools to mitigate any adverse consequences. Recent research on vegetable oils and biodiesel blends suggests that the biodegradability and environmental persistence of these oils is very complex[8]. Developing an understanding of the potential environmental impacts associated with spills of these oils requires fundamental research. Without this understanding, the potential is significant for greater environmental harm if the wrong steps are taken to respond to and mitigate these spills.

EPA's Role in Spill Response

The National Oil and Hazardous Substance Pollution Contingency Plan (NCP) has established a successful oil spill response framework defining the roles of federal agencies, and this has been in effect for 41 years. In addition to EPA's normal role in spill response and planning, the NCP serves as the basis for actions taken in support of the National Response Framework, when Emergency Support Function (ESF) #10 is activated. The National Response Framework is a guide that details how the nation conducts all-hazards response, from the smallest incident to the largest catastrophe. The Framework identifies the key response principles and the roles and structures that organize national response. ESF #10 provides for a coordinated federal response to actual or potential oil and hazardous materials incidents. EPA or DHS/USCG serves as the primary agency for ESF #10 actions, depending upon whether the incident affects the inland or coastal zone, respectively. For incidents affecting both, EPA is the primary agency and DHS/USCG serves as the deputy. In addition, EPA serves as the ESF #10 Coordinator.

EPA also plays a key role on the U.S. National Response Team (NRT), which is chaired by EPA and vice-chaired by the U.S. Coast Guard. The NRT is an organization of 16 federal departments and agencies responsible for coordinating emergency preparedness and response activities for oil and hazardous substance pollution incidents and provides federal resources, technical assistance, and policy guidance as defined in the NCP. The Science and Technology Committee, which is the NRT's science arm and of which I am a participating member, provides a forum for the NRT to fulfill its delegated responsibilities in research and development. Users of and sometimes collaborators in our research include multi-agency regional response teams, EPA's environmental response team, EPA and Coast Guard federal on-scene coordinators (FOSCs) responsible for oil spill response, and other government agencies such as NOAA, Minerals Management Service (MMS), Fish and Wildlife Service, and states. Not only do these U.S. organizations rely significantly on EPA research results, the international community does as well.

Past and Current Research

The specific objective of EPA's oil spill research program is to provide environmental managers with the tools, models, and methods needed to mitigate the effects of oil spills on ecosystems. The

research includes development of practical solutions to mitigate spill impacts on freshwater and marine environments; development of remedial guidelines that address the environment, type of oil (petroleum and non-petroleum oils), and agents for remediation; and modeling fate and effects in the environment. Spill mitigation research includes bioremediation, chemical and physical countermeasures, and ecotoxicity effects. Fate and effects research focuses on modeling the transport of oil in a variety of settings with application to field situations.

The work described above has resulted in new protocols for testing the effectiveness of commercial oil spill treating agents, guidance documents for implementing bioremediation in different environments, a clearer understanding of the impact and persistence of non-petroleum oil spills in the environment, and development of potentially new treatment approaches. Important on-going research is helping to understand oil persistence long after the initial spill incident, such as the Exxon Valdez oil that still lingers in certain areas of Prince William Sound, Alaska. This research has conclusively shown that the lingering oil is still quite biodegradable despite persisting for over 20 years in the subsurface. Why is this important? Because, if oil that has been treated after a spill lingers long after the cleanup, then we need to understand if the lingering oil still poses an environmental threat to the habitat and the resources at risk. If it does, we must learn why it still lingers and develop means to remove this lingering oil to safeguard the ecosystem.

Ten years ago, we began conducting research on non-petroleum oil such as vegetable oils and animal fats. This anticipatory research investment will be invaluable as the national emphasis on biofuels development gains traction because vegetable oils and animal fats are the primary feedstocks for biodiesel production. Contrary to some claims, we have found that edible oils are not as "biodegradable as sugar" in the environment because of the complexity of chemical interactions among saturated and unsaturated fatty acids.

Future Research

Biodiesel will play a crucial role in our nation's domestic fuel source development. Future research will include multiple fuel types and blends that result from passage of the Energy Independence and Security Act of 2007 (EISA), including changes in fuels as a result of the Renewable Fuel Standard (RFS) Program. We initiated an important project in 2008 to study the comparative biodegradability of soybean oil-based biodiesel blends ranging from B0 (pure petrodiesel) to B100 (pure biodiesel). We are initiating testing of other types of biodiesels consistent with anticipated alternative fuel feedstock usage in the U.S. An important by-product in the production of biodiesel is glycerin, and we need to understand how to deal with spills of glycerin in flowing streams (spills have already caused large fish kills). Ethanol/gasoline blends, their fate and transport in freshwater bodies, and our need to understand the spill impacts of these blended fuels are another high priority research area as greater quantities of blended fuels and potentially greater ethanol percentages are handled. EPA is the only federal agency actively engaged in researching this particular topic. Second generation biofuels will be studied in the near future, such as biobutanol, whose properties are more similar to gasoline than alcohol.

The behavior of other oil types, including synthetic oils and lubricants, has not been characterized scientifically. An important topic not previously addressed in our research program is a mixed spill incident (e.g., a biofuel and an organic chemical). We need a better understanding of the consequences of such scenarios to help FOSCs from both the EPA and the Coast Guard respond appropriately.

As for spills that occur near or in Arctic regions, EPA plans to pursue partnering with the Canadian government to conduct pilot-scale dispersant research in icy waters at a jointly owned wave tank facility in Nova Scotia and field research on dispersant effectiveness and use in Arctic waters. Protection of this environment will become more critical as global climate change affects the integrity of the glacial ice fields in the Arctic.

Finally, EPA's Environmental Response Team (ERT) plays a key role in testing and validating monitoring equipment in collaboration with the MMS at the Oil and Hazardous Materials Simulated Environmental Test Tank (OHMSETT) Facility in New Jersey to understand oil monitoring systems under the Special Monitoring and Response Technologies (SMART) protocol. This interaction allows ERT and the Coast Guard to be trained on oil spill monitoring equipment for detecting oil in the water column. This understanding is important in light of the Coast Guard's Response Capabilities rule coming out soon dealing with dispersant usage.

Summary and Conclusions

In conclusion, I want to emphasize that EPA's oil spill research program is an applied, practical program that seeks to provide answers to real and important emergency spill response and environmental protection challenges based on high quality, sound science. Our research informs EPA's regulatory decision-making and policy development for oil spill prevention, preparedness, and response programs and the National Response Team. EPA's oil spill research work is vitally important to the protection of the environment from the harm associated with oil spills. So, it is vital that EPA's R&D program continue to provide its knowledge and expertise in spill response and prevention. In the 20 years that I have led this program, we have published over 85 peer-reviewed journal articles, 3 guidance documents, and 79 conference proceedings papers. Thus, the research program has been highly productive and successful both nationally and internationally.

Thank you for the opportunity to address the Committee. I am happy to answer your questions.

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