WRITTEN TESTIMONY OF
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OVERSIGHT HEARING ON

"Ocean Science and Data Limits in a Time of Crisis: Do NOAA and the Fish and Wildlife Service (FWS) have the Resources to Respond?"

SUBCOMMITTEE ON INSULAR AFFAIRS, OCEANS, AND WILDLIFE
COMMITTEE ON NATURAL RESOURCES

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Salutation

Good morning Chairwoman Bordallo, Ranking Member Brown, and members of the Subcommittee. Thank you for the opportunity to speak today about the Deepwater Horizon Oil Spill. My name is Christopher Reddy, and I am a marine chemist at the Woods Hole Oceanographic Institution in Woods Hole, MA, principally investigating marine pollution. I have published >85 peer-reviewed scientific journal articles and several book chapters on the chemistry of oil and how it interacts with the natural environment and related subjects. I have studied or am currently studying the aftermaths of oil spills that occurred in 1969, 1974, 1996, 2003, and two in 2007 as well as natural oil seeps off the coast of Santa Barbara, CA, and more recently the Deepwater Horizon oil spill. I am leaving in a few hours to participate in a National Science Foundation (NSF)-funded 12-day research cruise to quantify and characterize oil in the water column below the sea surface in the Gulf of Mexico.

Introduction

Last year on the 20th anniversary of the *Exxon Valdez* accident, I wrote an editorial in the *Boston Globe* about how this country has successfully avoided and managed oil spills since that iconic spill. I argued then, and continue to believe, that this country is one of the most experienced and effective in responding to spills. Responders have worked on countless spills that have not made CNN, participated in drills, attended workshops, and published peer-reviewed manuscripts on oil spills.

Several weeks after the Deepwater Horizon spill, as the situation was appearing dire, I wrote another editorial in the *Boston Globe*:

> *....as military planners know well, learning lessons from past wars doesn't necessarily help you fight a different kind of enemy. Numerous factors, some unpredictable such as weather and some never encountered before, will come into play. And as this spill keeps on going, success in combating it may require unprecedented stamina on the part of both personnel and equipment.*

* The views expressed here are my own.

I concluded that if the *Exxon Valdez* were Pearl Harbor, a wake-up call for modern day oil spills and how to respond to them, then the Deepwater Horizon oil spill could be more like the Siege of Stalingrad. The latter has occurred.

We are in for a long, exhausting, demanding process of observation, clean-up, and assessment, and we need to bring to bear all the resources we can. Unfortunately, one of our best resources—academic science—has had a diminishing role in oil spill research in the past two decades. I would like to give you a little history of how that happened and what it means in terms of limiting our response to this spill, and suggest ways to get the academic science community more involved.

Impacts of Oil Pollution Act of 1990 on academic science

Following the *Exxon Valdez* spill and other spills, the Oil Pollution Act of 1990 (OPA 90) was passed. This legislation provides a wide framework for diminishing the chances of spills, and how to assess damages and restore the environment after a spill. The devastating impacts of the *Exxon Valdez* spill and lessons learned from it, along with the provisions of OPA90, have led to significantly decreased numbers of spills. For example, prior to the Deep Horizon spill, the annual number of oil spills greater than 5,000 gallons documented by the Coast Guard between 1991 to 2004 decreased from 55 to 14, with none over 1 million gallons.

In addition, there has been a growing trend that the spillers are freighters, such as the *Cosco Busan,* which struck the San Francisco – Oakland Bay Bridge in 2007, and not high-volume tankers like the *Exxon Valdez*. The responses to these relatively smaller spills by Coast Guard, NOAA, other government agencies, and representatives from the responsible parties have been swift and organized. But the overall role of academia in these spills has been significantly reduced in the last twenty years.

With the passage of OPA 90, the approach to damage assessment and restoration has become a well-defined process with legal and economic consequences, and Federal scientists, consultants, and contractors now doing most of this work.

Independent scientists from academia – who have the capacity to pursue the outstanding unanswered questions about oil and its interactions with the environment -- are less often participants in spill science. I have called this the "industrialization of oil spill science."

The limited number of spills and the protocols necessary to follow OPA90 have diminished academia's role in oil spill science. This has reduced the entry of young scientists into oil spill science and has suspended progress on the science used after most spills. The introduction of newer and advanced techniques, developed in other fields of science that may be applied to oil spills, has been sluggish. Financial support for the study of oil spills has dwindled. The Coastal Response Research Center (CRRC) at the University of New Hampshire has done admirable work in distributing sparse existing funds, yet no new funds were distributed in 2010.

Oil spill science has taken a back seat to other priorities such as homeland security and climate change science. It also has been a slow victim of its own success: why continue funding research when the number of spills was declining? It isn't until a whole new problem, of unprecedented scale, hits the headlines that we see that we have only a small Phillips screwdriver, when we need a high-power toolkit.

To underscore the dearth of academics in oil spill science, consider the following recommendation from the National Research Council's *Oil in the Sea III,* which summarized our knowledge of oil's inputs and fates as well as effects on the ocean (2003):

> *Federal agencies, especially NOAA, MMS, the U.S. Coast Guard, and the USGS should work with industry to develop and support a systematic and sustained research effort to further basic science understanding of the processes that govern the fate and transport of petroleum hydrocarbons released into the marine environment from a variety of sources (not just spills).*

Of course, it would be expected that the effort to "further basic science understanding" would involve academia but it is not explicitly stated. It is the research efforts of independent scientists that can help advance oil spill science where students, time, lab space, and equipment are available.

Comments on NOAA

In the past two months, NOAA and many other Federal agencies have faced enormous challenges responding to this disaster. They have performed admirably with the resources available to them.

I also commend the efforts of the CRRC in organizing a two-day meeting at Louisiana State University on May 26 and 27, 2010 that involved more than 50 experts from academia, the Federal government, Environment Canada, industry, and non-governmental organizations and resulted in "**Deepwater Horizon Dispersant Use Meeting Report**." This report recommended that dispersant usage was worthwhile. I agree with the finding on using dispersants in the surface ocean and reserve my views on injecting dispersants near the wellhead until more data become available.

Research on oil in the surface water and pre-assessment studies began quickly after the spill. Efforts to study deepwater plumes were delayed because of limited amounts of assets in the theater, but now have become a major objective. And for the first time that I know of, NOAA has been transparent about available data and their activities during the response phase of a spill. For example during the planning of my upcoming cruise, I have relied heavily on data posted on NOAA websites.

Last year, I participated in a workshop hosted by the CRRC at the University of New Hampshire (UNH) titled, **"Research & Development Priorities: Oil Spill Workshop." (**The CRRC was established as a partnership between NOAA, through the Office of Response and Restoration (OR&R), and the UNH). At that time, CRRC was co-directed by Professor Nancy Kinner (UNH)

and Dr. Lisa Mertens (NOAA). This meeting was a productive three-day effort addressing eight broad ranging topics. The attendees were leaders in oil spill science from state agencies, including the Louisiana Oil Spill Coordinator, consulting groups, NOAA, Coast Guard, Environmental Protection Agency (EPA), international scientists, non-profits, and academia. Many of these participants are now playing key roles in the Gulf of Mexico. The final report is available on the Internet.

Several points with respect to this meeting and its final report: (i) NOAA was actively preparing for future oil spills and working with a broad spectrum of stakeholders, (ii) I do not recall any discussions on deepwater spills, even though the workshop was forward thinking with respect to spills in the Arctic and those from biofuels, and (iii) Of the 50 attending the meeting, nine were from academia with four from the University of New Hampshire. Hence, only five participants, or 10% of the participants, were from US academia outside of UNH. (There were seven international attendees).

How to move forward immediately and in the future

NOAA and other agencies should receive continued support to monitor and observe the Gulf of Mexico following the Deepwater Horizon disaster. Time is invaluable. Every day the oil content and composition are changing and moving in the surface and subsurface, and eventually once the leak is stopped, the oil will diffuse and weather to levels where it can no longer be accurately measured. Knowledge about where the oil is and how it changed is key to understanding processes acting on the oil and also estimating damages to wildlife exposed to oil. It is paramount that a massive, organized, and sustained effort be directed at researching areas impacted in the Gulf of Mexico.

It would be unfortunate if, in the next several years when scientists begin to develop a comprehensive view of the spill, they lament the absence of key data that could have been obtained but was not because of lack of funds, lack of access, or lack of political will.

Academia is equipped to conduct some of this key science but needs direction. I have received countless phone calls and emails from colleagues asking how they can contribute, but often I do not have answers. The National Science Foundation has commendably provided support via its RAPID proposal system to some scientists, and these funds have already contributed significantly to understanding this spill. Nevertheless, I believe there could be better coordination between what the academic research community is doing and all that needs to be done.

To enhance coordination, I recommend the following actions be taken immediately:

1. Allow NOAA and other key agencies to triage research, moving to the top of the list that which is most pressing and communicate it broadly, clearly, and effectively to the academic community. It is NOAA *and other federal agencies* that are best suited to provide such guidance. They have the experience and they are most aware of what is needed.

2. Appoint a panel of academic science advisors, via the CRRC, to liaise directly with key Federal stakeholders to fund research. They should use the NSF RAPID style proposal system,

which reduces the paperwork and can be approved in days. Overall, means to provide clear pathways for submission and feedbacks must be aggressively sought.

3. Encourage traditional studies but also push towards more advanced techniques. For example, analytical techniques used to analyze oil have not changed much in nearly decades despite new methods available that are used in petroleum geochemistry.

4. Assure academics that their contributions are their own and can be published by them. (The lack of publication, especially to untenured scientists, can be a major roadblock for engaging them.)

5. Academia needs information or instruction about OPA90 and damage assessments. Academic scientists must recognize those strict protocols for custody of samples and the robustness of their techniques. What would be otherwise fine for a peer-reviewed manuscript may not pass the requirements of legal proceedings.

6. I recognize that the EPA and likely NOAA will set up scientific advisory boards regarding this spill. They are certainly necessary but the time needed to vet nominees and arrange these boards is too long. So, what I propose would be in addition to these long-term advisory boards.

Academia wants to contribute and has tremendous knowledge that needs to be directed toward the most pressing issues. NOAA and other Federal experts should have a process in place for providing the leadership to academia on how to proceed during this national disaster. As an academic, I may not appreciate the nuances for such a quick and directed effort, but we must move fast.

In summary, NOAA and other responders have been handed an enormous challenge and need all available support. Time is precious. Academia, which has played a minor role in responding to oil spills over the past several decades, should be re-engaged with direction from Federal experts who are most knowledgeable about the most pressing problems.

Thank you for your time today.